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ECONOMIC AND FINANCIAL JUSTIFICATION FOR CHOOSING A LOGISTICS PROVIDER FOR ORGANIZING TRANSPORTATION IN UKRAINE

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ABSTRACT

The purpose of the study is to provide an economic and financial justification for the selection of the optimal logistics provider for agro-industrial enterprises of Ukraine in the period after the start of the full-scale armed invasion. The article presents the results of analytical economic and financial modelling of the selection of a logistics provider for agro-industrial enterprises of Ukraine engaged in foreign economic activity in the direction of the Republic of Poland. Based on interviews with the management of enterprises and an analysis of real economic and financial indicators for 2022–2024, the weighted sum of points (WSM) method was applied to rank three logistics providers. An economic and financial justification of the selection and the evaluation criteria themselves was carried out, in particular: asset profitability, liquidity, volume of freight transport, net margin, financing autonomy, and revenue. Based on the results of the model analysis, a reasonable distribution of providers was carried out according to the needs of three agricultural enterprises. The proposed methodology allows for formalizing the decision-making procedure in the field of logistics outsourcing, reducing risks and increasing the efficiency of logistics policy in the agricultural sector of Ukraine. A promising and at the same time expedient direction of further research is the application of fuzzy logic or multi-criteria analysis (MCDA) methods to take into account the subjective assessments of managers and logistics risks in martial law.

Keywords: logistics provider, agro-industrial enterprise, transportation, economic efficiency, WSM method, martial law, foreign economic activity, customs clearance, risk management, partner selection, trade, economy

JEL Classification: L92, Q17, F14

INTRODUCTION

European integration of Ukraine provides more opportunities for enterprises to enter international markets and find sales markets for their products, which increases competition among enterprises and requires a faster response to changes. In these conditions, namely to increase economic efficiency, there is a need for more advanced use of the principles of logistics. Orientation to the international market of enterprises and organizations of Ukraine has become an integral part of their logistics strategy. Countries involved in world trade are characterized by an increase in the volume of logistics services, as evidenced by the World Bank report. The domestic market of transport and logistics activities is a little-studied industry, which makes the study of the dynamics of foreign trade relevant and timely. However, everything has changed radically as a result of the full-scale invasion. Thus, after the start of the full-scale armed invasion of the Russian Federation into Ukraine on February 24, 2022, the agricultural sector remained one of the few stable sources of foreign exchange revenue to the state budget. Despite the destruction of infrastructure, mining of fields, and crop losses, Ukrainian farmers continue to ensure the food security of the domestic population and actively export agricultural products abroad. In these conditions, logistics becomes of key importance - both a channel for the physical provision of the life cycle of an export product and a tool for the economic survival of agro-industrial enterprises. It is logistics that accounts for the largest share of risks in wartime: stoppage of supplies, lack of routes, lack of transport, increased insurance costs, and customs complications. The transport industry

is a component of the development of the national economy of every country in the world and integration into the market of international transport goods flows.

Transport, which determines GDP growth, has been recognized as one of the drivers of growth of the Ukrainian economy in 2024. The destruction of transport infrastructure, the loss of supply chains, the mass outflow of personnel, and the "migration" of specialized enterprises across the regions of Ukraine - all these are new challenges that Ukraine has faced since the beginning of the full-scale invasion of the russian federation.

At the same time, the issue of effective organization of deliveries for the countries of the European Union, and in particular Poland, which has been a key trading partner of Ukraine in the field of agro-food for many years, has become especially relevant. Moreover, it should be noted that even in 2022-2024, Poland remained a key market for Ukrainian plant products, in particular, grain, berries, seeds, and finished products with a limited shelf life. According to the most current data from the Ministry of Agrarian Policy of Ukraine, more than 40% of exports of goods to the EU countries were transported exclusively through the Polish border. At the same time, the predominance of the volume of such exports can cause a significant logistical burden and, as a consequence, a negative prospect of limiting the transportation of resources. Given this, a large number of enterprises are forced to search for new logistical solutions and agents with appropriate transport support, experience in legal support, and valid permits for cross-border transportation.

Today, the Ukrainian market has a number of powerful logistics providers capable of providing a full range of transport and forwarding services - transportation, warehousing, customs clearance, cross-docking, GPS monitoring, and insurance. However, for agricultural enterprises, it is important not only the availability of services, but also their compliance with financial capabilities and expectations in terms of volume, quality, and frequency of deliveries. That is why there is a growing need for an analytical tool that will allow, not intuitively, but mathematically substantiate the choice of the best logistics partner in accordance with economic and financial criteria adapted to the real conditions of agricultural export under martial law.

LITERATURE REVIEW

Logistics in the agro-industrial sector

As Shylts et al. (2021) and Kuznyetsova et al. (2019) rightly note, the functioning and development of enterprises in modern market conditions is impossible without building an effective logistics system. The main goal of implementing logistics at various management levels is to minimize transaction costs that arise at the stages of supply, production, and sales of products. Agrologistics has a number of features, which are associated with the specifics of agro-industrial production. In addition, in the context of the branches of the agro-industrial complex, the mechanisms for building logistics systems differ significantly.

Enterprises operating in the agricultural sector on a permanent basis face a number of challenges associated with significant logistical problems, complicated deliveries, and cultural characteristics that should be taken into account in order to maintain competitiveness in international markets. At the same time, the role of logistics and its efficiency can hardly be overestimated in the agro-industrial sector. In this context, Topolšek et al. (2018) carried out a detailed review of the most relevant scientific sources and practical recommendations for defining transport logistics as an integrated system. The authors emphasize that effective logistics directly depends on the rational integration of all components of supply chains. We believe that the authors' findings are relevant to the reality of Ukraine, for which agro-export is a key element of economic stability. Here, it is also appropriate to recall the theses of Solarte-Montufar et al. (2021), who in their study emphasize the critical role of effective cooperation with logistics partners in the case of small and medium-sized enterprises. These findings are consistent with our research, which also focuses on this level of entrepreneurial activity.

In examining the challenges of modern logistics in a dynamic and unstable environment, it is appropriate to examine the work of Barysienė et al. (2015). The latter examined in detail various risks caused by changes in the regulatory, environmental, and economic contexts. Therefore, the study focuses on the adaptation of logistics structures to a dynamic environment through the implementation of innovative transport and supply chain management practices. A similar issue, which also concerns the application of innovative approaches to modelling logistics systems, is considered in the work of Li, Liu, and Li (2019). Thus, the authors formed a network model of logistics through the multi-objective optimization method based on the ant algorithm. It is this approach that demonstrates the possibility of using complex algorithms in the process of forming sustainable logistics systems. In turn, Chymosh (2020) analyzed the key trends in logistics development in the agricultural sector. The author emphasized the need to integrate digital technologies and flexible transportation models in the context of constant market change.

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Summing up the literature review, we also highlight the work of Aguezzoul (2014). Thus, the scientist generalizes international criteria for choosing logistics providers into blocks of costs, service quality, time and reliability, flexibility, financial stability, information technology, environmental friendliness, and risk, showing a shift in attention from purely economic to sustainability and technological feasibility. The work lists the most frequently used multi-criteria methods (analytic hierarchy process, network analysis method, weighted sum method, method of proximity to an ideal solution, fuzzy and hybrid modifications), which confirms the fact of the expediency of using modern mathematical methods for evaluation.

Challenges of wartime and international trade

The war in Ukraine, which affected almost all areas of economic activity, caused significant obstacles to the development of foreign trade, which caused changes in the commodity and geographical structure of foreign trade and forced the search for ways to solve logistical problems, as well as to strengthen cooperation with individual trading partners, primarily with the European Union. Thus, we have the fact that the full-scale invasion of 2022 radically changed logistics processes in Ukraine, which is reflected in the literature. Alkema et al. (2024) analyze the resilience and strategic management of Ukrainian enterprises in wartime, emphasizing the need to adapt to the destruction of infrastructure and increasing logistics costs. Their study confirms the relevance of our analysis of the financial stability of providers, which minimizes the risks of supply disruptions. Pavlova et al. (2022) examine logistics at the level of international economic relations, noting that exports to the EU, in particular through Poland, require reliable providers with experience in customs clearance.

AIMS AND OBJECTIVES

The purpose of the study is to select the optimal logistics provider for agro-industrial enterprises of Ukraine based on a comprehensive analysis of economic and financial criteria in the period after the start of the full-scale armed invasion. The task is to formalize the evaluation criteria, apply an economic and mathematical model to real statistical data, interpret the results, and justify the feasibility of choosing each provider for a specific customer.

METHODS

3.1. Justification for the choice of the WSM method

To fully implement the set goals, the Weighted Sum Model (WSM) method was used in the study. This method belongs to a complex group of multi-criteria methods for evaluating alternatives (Windarto, 2017; Handoko, 2018). The latter makes it possible to conduct a comprehensive ranking of structural elements (in our case, logistics providers), based on a set of quantitative indicators, each of which has a certain weight of significance for decision-making. The choice of the WSM method was due to the simplicity of its implementation, transparency of calculations, and the possibility of adaptation to the practical aspects of logistics choice. The basic research tools are based on established approaches of multi-criteria assessment and analysis of real economic and financial indicators of logistics providers, as well as on interviewing management to form a system of criteria. The novelty lies in the modification of the weighted sum of points method to the wartime conditions of the agricultural sector of Ukraine, the combination of normalization, integral index, and matrix of compliance with the needs of each enterprise. It should be noted that in most cases, the weighted sum method is compensatory in nature. Therefore, it may be the case that low (weak) values for certain criteria can be fully or partially "overlaid" by high values for other criteria due to the summation with weights.

Accordingly, the first step of this methodology is to define and justify the main criteria for assessing logistics providers, reflecting their level of financial stability, range of operational capabilities, and ability to effectively implement foreign economic logistics tasks. In this context, we selected six main criteria: return on assets, absolute liquidity ratio, number of freight vehicles, revenue volume, net margin, and autonomy ratio. The choice of these criteria is justified by their combined ability to comprehensively characterize the potential of providers to ensure full-fledged logistics support.

Then, the next step was to compare the initial data of logistics providers obtained from open financial reports and statistical sources for the period 2022–2024. For convenience and the same scale of comparison, a normalization procedure was applied for each indicator, which involves converting real values into a dimensionless form according to formula (1):

$$Nor_{ij} = X_{ij}/\max(X_i) \quad (1)$$

where Xij — the value of criterion j for provider i.

Thus, this avoids distortion of the results due to differences in units of measurement or ranges of values.

In addition, within the framework of this article, the weight coefficients for each criterion were also determined. The weights were established based on an analysis of the logistical needs of each of the three agro-industrial enterprises (customers), as well as interviews with their managers.

3.2. Justification of the calculation of the integral efficiency index of a logistics provider

At the next stage, the mechanism for calculating the integral efficiency index of the logistics provider was applied, which is based on the weighting of normalized values for all criteria. The calculation was carried out according to formula (2):

$$S_i = \sum w_j * Nor_{ij} \quad (2)$$

where wj is the weight of criterion j, and Si is the integral score for provider i.

It should also be noted that, in addition to mathematical modelling, the methodology included a structural analysis of the providers' compliance with the logistics needs of enterprises, which made it possible to determine the feasibility of cooperation with each specific logistics partner. For this purpose, a compliance matrix was constructed.

Remote semi-structured interviews were conducted with the managers of five selected enterprises in several rounds using the Delphi method, which allowed for the gradual convergence of expert assessments. The clarification about the multi-round coordination of judgments explains the transparency of the formation of weights at the intersection of managers' priorities and the authors' practical experience, which have already been mentioned as a source for establishing weighting factors.

RESULTS

4.1. Analysis of agricultural export activities to EU countries

When examining the logistics sector of Ukraine, it can be determined that the latter has undergone significant changes since 2022 due to large-scale destruction of infrastructure, increased fuel costs, and the need to adapt outdated and irrelevant export routes. According to the latest data from the State Statistics Service of Ukraine, agricultural exports to the EU increased by 15% in 2023 compared to 2021, which only confirms the importance of efficient logistics. At the same time, the financial indicators of logistics companies, such as profitability, liquidity, and autonomy, have become key indicators of their functional ability to provide their services without interruption, even in the context of domestic and foreign policy instability. Conducting a comprehensive assessment of economic and financial indicators enables enterprises to minimize risks in the short and long term that may be associated with supply disruptions or financial difficulties of partners. To sum up, the increase in export volumes in 2024 indicates a high level of adaptation of the Ukrainian agricultural sector to martial law conditions, which is manifested in the formation of qualitatively new logistics chains, in particular through seaports and safe land checkpoints.

Year 2024 is characterized by stable work due to the work of the Ukrainian Sea Corridor, which provides an opportunity to increase the volume of rail transportation of Ukrainian goods to foreign markets through the ports of Odesa. However, not only this transport, but everything is transported today. In 2022, Poland became a critically important channel for exports due to the blockade of ports, but this led to market oversaturation and protests, which forced Poland to introduce a ban in 2023. The opening of the Black Sea Corridor in 2023 reduced dependence on land routes, which contributed to a partial restoration of exports in 2024. However, EU quotas and protests by Polish farmers continue to limit the potential. But despite everything, the main task for Ukraine still remains precisely the restoration and development of the Eurasian intermodal connection and ensuring maximum efficiency of freight transport in full at the Polish-Ukrainian border crossings. Strengthening the logistics partnership will help develop transit corridors that are promising for the restoration of the transit potential of the state. Ukraine and Poland are key countries on this route. Both countries are interested in the development of intermodal logistics between Ukraine and the EU countries, the creation of container terminals, and the launch of new routes and services (Figure 1).

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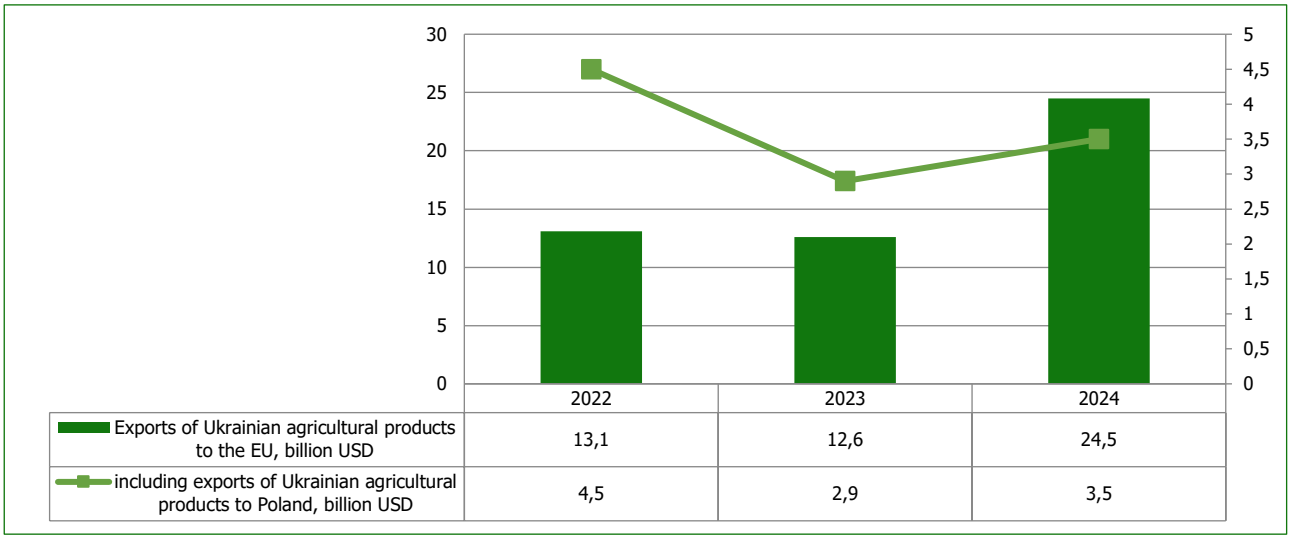

Figure 1. Exports of Ukrainian agricultural products to the EU, USD billion (2022-2024).

But, despite everything, Ukrainian agricultural enterprises continue to import their products across the border with the Republic of Poland. These data emphasize the need to choose logistics providers that can effectively adapt to changing conditions, providing transportation and customs clearance. However, the direct choice of a logistics provider is complicated by the diversity of needs of agricultural enterprises. To this end, we selected existing enterprises in Ukraine that provide transportation, logistics, and customs clearance services and conducted interviews with the management of agricultural enterprises in order to identify their key needs when choosing the optimal logistics provider for organizing transportation and shipments.

4.2. Analysis of economic and financial indicators of providers and the needs of agricultural enterprises

We selected three enterprises that constantly need logistics, transportation, and customs clearance services to practically demonstrate the methodological approach:

1. Farm "Victoria's Sense". A farm specializing in the cultivation and export of berries and fruits has a constant need for refrigerated transportation and customs support of products to EU countries.
2. Farm "Sad Polissya". Focused on intensive gardening, exporting apples and pears to Poland, and requiring regular logistical support with minimal storage costs.
3. Farm "Zerno Lan". A grain farm with high supply volumes that requires large-scale transportation without warehouse pauses (Table 1).

Table 1. Systemic needs of agro-industrial enterprises in logistics services.

Enterprise	Transportation volume, tons/year	Frequency of shipments, times/month	Customs clearance	Warehousing requirement	Priority of selection criteria
Farm "Victoria's Sense"	2 400	8	Yes	Yes	Reliability, cost, liquidity
Farm "Sad Polissya"	3 000	12	Yes	No	Revenue, profitability, liquidity
Farm "Zerno Lan"	6 000	20	No	Yes	Transport, margin, autonomy

For their needs, we have selected three of the most leading logistics and transport companies in Ukraine:

1. LLC "FM Logistic Dnipro." The undisputed leader in all key indicators. In 2024, the company has the largest fleet (248 trucks, up from 220 in 2022) and the highest revenue. We can speak of an extremely high level of financial stability and the ability to handle large and specialized orders, for example, refrigerated transportation.
2. LLC "UVK Ukraine." The fleet has decreased from 92 to 84 trucks, and revenue has fallen sharply. Liquidity (0.04) and autonomy (0.28) remain low, which limits its ability to handle significant volumes or complex orders.

3. LLC "Zammler Ukraine." Demonstrates significant growth in revenue and fleet, which makes the company suitable for large volumes. There are potential challenges with short-term liabilities (Table 2).

Table 2. Economic and financial indicators of the selected providers.

Indicators	2022	2023	2024
LLC "Zammler Ukraine"			
Number of personnel, units	203	381	459
Number of passenger vehicles, units	102	115	121
Number of trucks	158	163	170
Revenue (UAH million)	195.1	331.4	489.8
Current liabilities	169.7	117.4	179.3
Autonomy ratio	0.16	0.23	0.21
Net margin	0.01	0.01	0.05
Return on assets	0.01	0.02	0.09
Absolute liquidity ratio	0.17	0.22	0.03
LLC "UVK Ukraine"			
Number of personnel, units	136	111	103
Number of passenger vehicles, units	85	76	65
Number of trucks	92	88	84
Revenue (UAH million)	90.6	40.5	32.3
Current liabilities	16.6	16.8	17.1
Autonomy ratio	0.29	0.26	0.28
Net margin	0.03	0.01	0.02
Return on assets	0.01	0.01	0.03
Absolute liquidity ratio	0.22	0.22	0.04
LLC "FM Logistic Dnipro"			
Number of personnel, units	761	652	641
Number of passenger vehicles, units	202	235	243
Number of trucks	220	235	248
Revenue (UAH million)	1090.3	1367.7	1557.1
Current liabilities	150.8	178.5	160.9
Autonomy ratio	0.72	0.73	0.77
Net margin	0.07	0.07	0.05
Return on assets	0.15	0.15	0.11
Absolute liquidity ratio	0.87	0.97	1.29

From all the economic and financial indicators, we will select only the 6 most significant in the context of our study and designate them as K1-K6, respectively. Thus, the general distribution of weights was: return on assets – 20%, liquidity – 15%, the number of freight transport – 20%, revenue – 15%, net margin – 15%, and autonomy – 15%. This approach ensures the adaptability of the model to the real context of a logistics order. It should be noted that the weight of each was determined not only on the basis of their own experience but also taking into account the specifics of the work of agro-industrial enterprises that participated in the study. In particular, in the process of forming a system of criteria and their weight, a series of interviews was conducted with managers of agricultural enterprises that regularly use logistics services. Their answers allowed us to identify key priorities when choosing a logistics provider - from transport potential to indicators of financial reliability (Figure 2).

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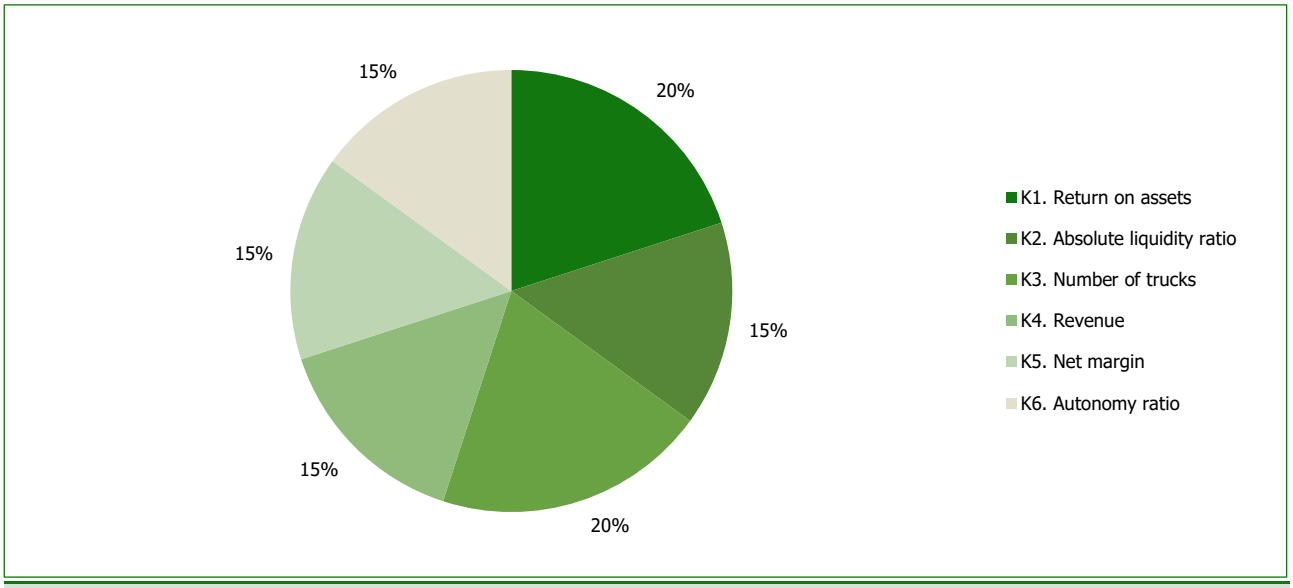

Figure 2. Weighing criteria (according to customer needs).

So, the output further allows us to proceed to the direct calculation of the indicator and determination of optimal providers.

4.3. Selection of optimal providers for selected agricultural enterprises

Normalization of indicators was a necessary procedure in the study in order to ensure a correct comparison of logistics providers according to different criteria, which have different natures, units of measurement, and scales of values. In order for all criteria to have the same weight in mathematical calculations within the framework of the weighted sum of scores (WSM) method, the mini-maxi normalization method was applied, which involves dividing the value of each indicator by its maximum value within the considered set. This allowed transforming all values into the range [0;1], where 1 corresponds to the best value among all providers according to a certain criterion, and other values , according to their relative distance from the maximum (Table 3).

Table 3. Normalization of indicators K1-K6.

Provider	K1	K2	K3	K4	K5	K6
LLC "Zammler Ukraine"	0.82	0.02	0.69	0.31	0.97	0.27
LLC "UVK Ukraine"	0.27	0.03	0.34	0.02	0.01	0.36
LLC "FM Logistic Dnipro"	0.95	0.96	0.97	0.93	0.92	0.91

Next, we will calculate the WSM indicator directly for each logistics provider for organizing transportation and shipments, separately:

1. LLC "Zammler Ukraine": S=0,20×0,82+0,15×0,02+0,20×0,69+0,15×0,31+0,15×0,97+0,15×0,27=0,54;
2. LLC "UVK Ukraine": S= 0,20×0,27+0,15×0,03+0,20×0,34+0,15×0,02+0,15×0,01+0,15×0,36=0,19;
3. LLC "FM Logistic Dnipro": S= 0,20×0,95+0,15×0,96+0,20×0,97+0,15×0,93+0,15×0,92+0,15×0,91=0,94.

It is important not to simply choose the best provider based on the overall rating, but to correlate it with those enterprises that have the corresponding needs, scale of operations, and priorities (Table 4).

Table 4. Matrix of correspondence of logistics providers to agricultural enterprises.

Enterprise	Key Requirements	Recommended Provider	Integral Indicator (WSM)	Justification of Choice
Farm "Victoria's Sense"	Reliability, liquidity, cost	LLC "FM Logistic Dnipro"	0.94	It has the highest liquidity (0.96), profit margin (0.92), and return on assets (0.93), which is critically important for the rapid transportation of fruit and vegetable products with a short sales period.
Farm "Sad Polissya"	Revenue, profitability, liquidity			The provider demonstrates absolute dominance in all key economic criteria, which guarantees the stability and profitability of logistics cooperation.
Farm "Zerno Lan"	Number of trucks, autonomy, margin	LLC "Zammler Ukraine"	0.54	Despite the lower overall index, this provider provides the best values of the key criteria: number of cars (0.97), autonomy (0.91), and profit margin (0.92). Transport capacity is critically important for the enterprise, and not only financial efficiency.

Therefore, based on the analysis conducted, we have the opportunity to determine the optimal logistics provider for organizing transportation for each of the enterprises (Figure 3).

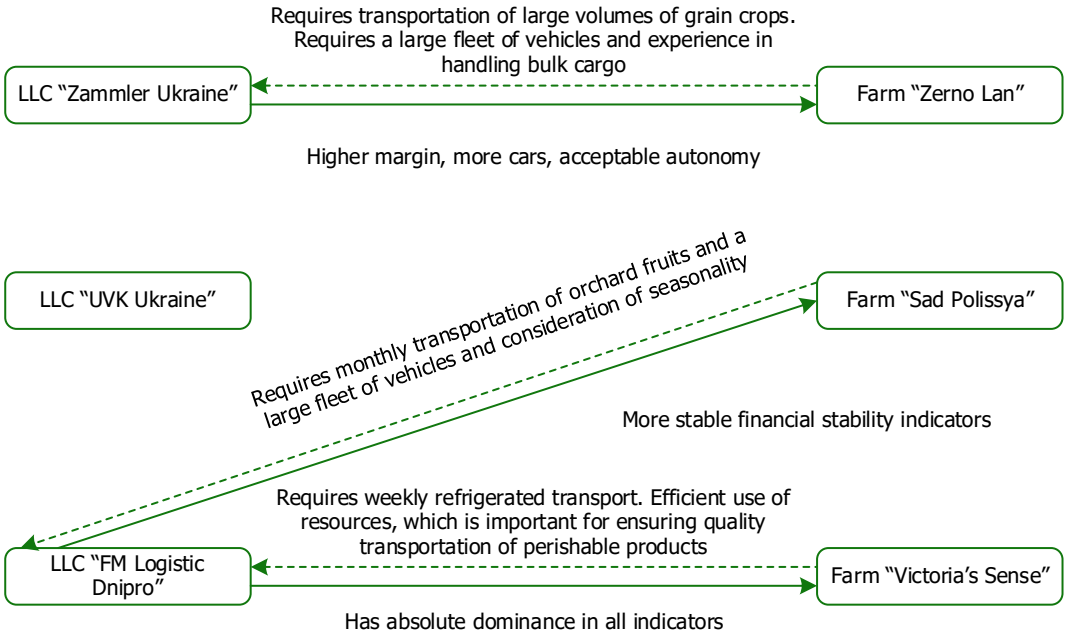

Figure 3. Choosing the optimal logistics provider to organize transportation and shipments for each enterprise.

It should be noted that the selection of providers is based on maintaining a balance between their operational capacity, financial stability indicators, and compliance with individual standards at the selected enterprise. Thus, LLC "FM Logistic Dnipro" is the leader for Farm "Victoria's Sense" and Farm "Sad Polissya", due to its high level of reliability and specialization, while LLC "Zammler Ukraine" better meets the needs and requirements of Farm "Zerno Lan" due to its flexibility and potentially lower cost. At the same time, we believe that for LLC "FM Logistic Dnipro", cooperation with Farm "Victoria's Sense" and Farm "Sad Polissya" should be different. Thus, for Farm "Sad Polissya" we recommend focusing cooperation within the framework of seasonal contracts with flexible conditions, providing for an increase in the dynamics of transportation in peak months (August-October).

We also consider it advisable to organize regular consultations with "Sad Polissya" in order to form more effective forecasts of harvest volumes. In the long term, this would make it possible to organize a more rational logistics system in advance. In the case of "Victoria's Sense" Farm, in order to optimize cooperation, we recommend forming individual contractual relations with a fixed schedule of weekly refrigerated transportation, with a special emphasis on real-time temperature monitoring.

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DISCUSSION

Compared with existing studies in the field of evaluating logistics systems in the agro-industry, the results of our work have an important difference both in methodological approach and in practical content. In particular, unlike the work of Hao et al. (2022), in which the efficiency of logistics operations in agriculture is analyzed using the Analytical Hierarchy Analysis (DEA) method and the Tobit model, our study focuses not only on measuring efficiency but also on making a managerial decision regarding the choice of a specific logistics provider. We not only state the level of efficiency, but also offer a practical mechanism for adapting the choice to the needs of a specific agricultural enterprise.

In their own study, Bensassi et al. (2015) conduct a detailed analysis of the relationship between the state of logistics infrastructure and the state of regional exports in Spain. In doing so, the authors applied integrated econometric models to assess the impact of transport infrastructure on trade flows. Although this study is of great value in terms of understanding the macroeconomic impact of logistics, it does not provide clear practical tools for selecting logistics providers at the level of an individual enterprise. In turn, our study fills this gap by proposing a specific methodology (WSM) for ranking providers based on real data for 2022-2024. In turn, the work of Alazzam et al. (2023) is based on the study of aggregated statistical dependencies. The value of their work lies in the systematic confirmation of the importance of logistics as a key determinant of trade growth. At the same time, our study offers a more comprehensive microeconomic tool that allows not only to assess the overall impact of logistics, but also to structurally assess the suitability of an individual logistics provider in the current business environment.

An equally important differentiating component inherent in our study is the consideration of the unstable environment of the post-war period, which is extremely relevant and often not reflected in other studies. For example, Castro & Jaimes (2017) focus on the impact of supply chain structures on logistics performance in the field of perishable goods. However, this study does not include current challenges and problems on a global and national scale that affect the speed and safety of logistics processes.

We believe that the results of our study are of extremely practical importance for both small and medium-sized agricultural enterprises, which often do not have their own available capabilities and resources for their own logistics department. Therefore, within the framework of our study, using the example of "Victoria's Sense", "Sad Polissya" and "Zerno Lan", the study demonstrates how the proposed methodological approach can be applied to select a provider that meets one or another need of an agricultural enterprise. The results of the work can be used as a guide for other agricultural enterprises that seek to optimize logistics processes in conditions of limited resources and high competition.

CONCLUSIONS

We believe that within the framework of our research, the goal was achieved. We managed to substantiate the choice of the optimal logistics provider for agro-industrial enterprises of Ukraine by means of a comprehensive analysis of economic and financial criteria in the context of today's conditions of a full-scale armed invasion. At the same time, it was thanks to the formalization of the evaluation system (six key indicators: K1-K6) and the construction of weighting coefficients based on interviews with heads of agricultural enterprises that we managed to apply the weighted sum of points (WSM) method to rank three real logistics providers. Then, as a result of econometric modelling, the integral values of the providers' efficiency were determined, and their compliance with the individual needs of each customer enterprise was verified. Thus, the expediency of choosing a specific logistics partner was substantiated, taking into account financial stability, transport potential, and logistics specialization, which may indeed allow increasing the efficiency of logistics policy in the agricultural sector of Ukraine under martial law.

Thus, the study proved the effectiveness of the weighted sum score (WSM) method for evaluating logistics providers in agricultural logistics. It was established that LLC "FM Logistic Dnipro" is the undisputed leader among the considered providers in terms of economic sustainability, transport potential, and liquidity. It was proven that different enterprises have unique requirements for logistics, which require not unified, but flexible solutions. For example, the enterprise "Zerno Lan" is more interested in transport autonomy, while "Victoria's Sense" focuses on the liquidity and reliability of the service provider. Such a differentiated approach allows you to form strategic logistics alliances, taking into account the business profile. At the same time, we note that the proposed modelling algorithm can be scaled to a wider range of agricultural producers and logistics operators, which opens up new opportunities for the implementation of digital logistics audit systems and increasing the competitiveness of Ukrainian exporters. We believe that an extremely promising and at the same time appropriate direction for further research is the application of fuzzy logic or multi-criteria analysis (MCDA) methods to take into account the subjective assessments of managers and logistical risks in martial law conditions.

In future studies, the time range of assessment should be expanded. Therefore, the current version of the study is based exclusively on statistical and financial indicators of the wartime period 2022–2024, without a full representation of the pre-war base for dynamic comparison and identification of structural shifts (for example, 2019–2021). To correctly highlight the impact of the war factor, it is advisable to add pre-war series in future studies and construct: (a) basic trends (pre-war trend) and their extrapolation as a counterfactual scenario.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ЕКОНОМІКО-ФІНАНСОВЕ ОБҐРУНТУВАННЯ ВИБОРУ ЛОГІСТИЧНОГО ПРОВАЙДЕРА ДЛЯ ОРГАНІЗАЦІЇ ПЕРЕВЕЗЕНЬ В УКРАЇНІ

Метою дослідження є економіко-фінансове обґрунтування вибору оптимального логістичного провайдера для агропромислових підприємств України після початку повномасштабного збройного вторгнення. У статті представлено результати аналітичного економіко-фінансового моделювання вибору логістичного провайдера для агропромислових підприємств України, що здійснюють зовнішньоекономічну діяльність у напрямку Республіки Польща. На основі інтерв'ю з керівництвом підприємств та аналізу реальних економіко-фінансових показників за 2022–2024 роки було застосовано метод зваженої суми балів (WSM) для ранжування трьох логістичних провайдерів. Здійснено економіко-фінансове обґрунтування вибору й самих критеріїв оцінювання, зокрема: рентабельності активів, ліквідності, кількості вантажного транспорту, чистої маржі, автономності фінансування та обсягу доходу. На основі результатів модельного аналізу здійснено обґрунтований розподіл провайдерів відповідно до потреб трьох аграрних підприємств. Запропонована методика дозволяє формалізувати процедуру ухвалення рішень у галузі логістичного аутсорсингу, знизити ризики та підвищити ефективність логістичної політики в агросекторі України. Перспективним та одночасно доцільним напрямом подальших дослідження є застосування методів нечіткої логіки або багатокритеріального аналізу (MCDA) для врахування суб'єктивних оцінок управлінців і логістичних ризиків в умовах воєнного стану.

Ключові слова: логістичний провайдер, агропромислове підприємство, перевезення, економічна ефективність, метод WSM, воєнний стан, зовнішньоекономічна діяльність, митне оформлення, управління ризиками, вибір партнера, торгівля, економіка

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