American University Kyiv

A Capstone Project

OBJECT-ORIENTED LOGISTICS MANAGEMENT IN THE ACTIVITIES OF LOGISTICS COMPANIES IN THE UKRAINIAN AGRICULTURAL SECTOR IN AN UNSTABLE ENVIRONMENT

ОБ'ЄКТНО-ОРІЄНТОВАНЕ УПРАВЛІННЯ ЛОГІСТИКОЮ У ДІЯЛЬНОСТІ ЛОГІСТИЧНИХ КОМПАНІЙ АГРАРНОГО СЕКТОРУ УКРАЇНИ В УМОВАХ НЕСТАБІЛЬНОСТІ

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ABSTRACT

This study examines the adoption of object-oriented logistic management (OOLM) within Ukraine's agricultural sector and provides actionable managerial guidance for organizing logistics management in supply chains of enterprises.

The study explores the present situation of logistics relationships between agricultural businesses and logistics providers in Ukraine, pinpointing significant issues concerning integration, coordination, and adaptability amid wartime and economic uncertainty. Special focus is placed on the function of object-oriented logistics management in improving supply chain agility, clarity, and responsiveness.

This research aims to evaluate the application of object-oriented logistics management (OOLM) within Ukraine's logistics and agriculture sector and to formulate actionable recommendations for enhancing the organization and effectiveness of logistics management in supply chains of enterprises. The research seeks to assess the impact of the object-oriented approach on supply chain integration, delivery performance, and operational flexibility during times of economic instability and to suggest a structured framework for enhancing logistics processes in agricultural firms.

This framework method allows for the recognition of inefficiencies and chances to enhance collaboration among supply chain members. Furthermore, the study suggests a model for creating a cohesive logistics strategy that connects production, distribution, financial, and innovation efforts, guaranteeing synergistic outcomes throughout business operations.

The research broadens organizational, economic, and informational aspects of logistics management by incorporating object-oriented principles in supply chain governance. The study emphasizes the significance of digitalization and institutional backing in enabling coordinated decision-making and enhancing overall supply chain efficiency.

Ultimately, the study shows that adopting an object-oriented logistics management strategy speeds up delivery times during economic instability, enhances operational efficiency and customer relations, and boosts the economic resilience of agricultural businesses. The suggested recommendations offer actionable insights for Ukrainian logistics and agricultural firms aiming to improve supply chain efficiency amid unstable economic risks.

Keywords**:** *logistics management, object-oriented approach, business object, logistics strategy, delivery time, customer relations.*

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CHAPTER 1. INTRODUCTION

The modern business landscape features heightened volatility in operational conditions, notable variations in market dynamics, ongoing growth in consumer demands, and a faster rate of innovation cycles. These patterns are especially noticeable in Ukraine's logistics and agricultural industries, where businesses functioning in conditions of economic instability, disrupted supply chains, and increased uncertainty. Consequently, improving the flexibility and effectiveness of supply chain management systems has become essential.

The increasing intricacy of market changes requires the refinement of the organization and operation of economic connections that determine the position of businesses within broader supply chains. In this regard, logistics management is essential for the efficient coordination of production, transportation, and distribution activities focused on generating added value. The adoption of object-oriented logistics management (OOLM) provides a viable method for organizing these interactions by depicting supply chains as systems of linked business objects that change their states over time.

In such situations, the creation of sophisticated logistics systems can not only preserve the stability of resource movement but also greatly improve the resilience and competitiveness of agricultural businesses. Moreover, the significance of logistics strategies is anticipated to grow in the long run, especially regarding Ukraine’s economic revival and its enhanced integration into worldwide supply networks. This process entails a core reorganization of production and economic connections, in which innovative and flexible logistics management systems, like OOLM, play an essential role in sustainable development.

In 2021, Ukraine's logistics remained quite stable despite the global disruptions caused by COVID-19, characterized by operational supply chains and reliable transport routes. In 2022, Russia's full-scale invasion resulted in significantinstability: seaports were obstructed, infrastructure was compromised, and there were shortages of transportation, fuel, and staff, leading to a marked rise in delivery times and expenses. Consequently, logistics systems transitioned from operations centered on efficiency to those emphasizing survival and resilience, leading to a much more volatile and unpredictable environment than in 2021.

CHAPTER 2. LITERATURE REVIEW

2.1 Evolution of Logistics Management and Supply Chain Concepts

The idea of logistics management has transformed considerably from a limited operational role centered on transport and storage to a strategic element of overall business management. The formalization of logistics as a separate industry occurred in the mid-20th century, which included transportation, warehousing, inventory management and order fulfillment. The concepts of logistics and supply chain management evolved in accordance with the development of economic systems and under the influence of technological innovations, globalization, acceleration of information, financial, transport flows and changing market needs.

The concept of supply chain management (SCM) appeared, which includes the integrated management of flows of goods, information and finances. The development of digital services and e-commerce contributed to the development of "last mile" delivery and greater customer orientation of logistics services. The development of RFID (Radio Frequency Identification) technologies, the Internet of Things, blockchain, artificial intelligence increased the transparency and traceability of supply chains (Voloshchuk et al., 2026; Keshavarz-Ghorbani & Pasandideh, 2021; Reznik et al., 2021; Suhasini et al., 2026; Nagy-Bota & Moldovan, 2022; Akbarov, 2025; Verwijmeren, 2004).

Initial research highlighted the significance of logistics as a system that unifies material, information, and financial movements in supply chains. For example, Kolodizieva (2015), Dzhur (2021) emphasize that successful supply chain coordination is crucial for enhancing organizational efficiency and gaining a competitive edge. In the same vein. Velychko (2015) contends that logistics must be regarded as a fundamental component of managing agricultural enterprises, impacting production, distribution, and market outcomes.

With the acceleration of globalization, supply chains grew increasingly intricate and interrelated. Bestuzheva and Ohiienko (2023) show that contemporary logistics systems need organized classification frameworks because of the growing scale and connectivity of global supply chains. This change signifies a movement from linear supply chains to multi-layered systems that include various participants, such as suppliers, manufacturers, logistics companies, and clients.

Simultaneously, the rise of ecosystem-oriented business models broadened the conceptual frameworks of logistics management. Ziouvelou and McGroarty (2021) present the concept of ecosystem-focused value generation, in which businesses function within

cooperative networks instead of separate supply chains. This viewpoint is especially important for grasping contemporary agricultural logistics, where collaboration among various participants is crucial for effectiveness and sustainability.

2.2 Object-Oriented Logistics Management Concept

The growing intricacy of supply chains has prompted researchers to investigate innovative methods for modeling and overseeing logistics systems. One method involves applying object-oriented principles, initially created in computer science, to logistics and supply chain management.

Object-oriented methodologies view systems as groups of interacting objects, each possessing specific attributes, states, and behaviors. This model enables a more adaptable and modular approach to system design than conventional process-focused models. Khabbazi et al. (2013) were some of the initial contributors to this area, suggesting an object-oriented framework for inventory logistics systems. Their study shows how logistics operations – including receipt, storage, and retrieval – can be structured with object-oriented frameworks, enhancing data uniformity and system cohesion.

In a similar manner, Zeng et al. (2018) utilize object-oriented analysis and design (OOA/D) in construction logistics planning, combining it with digital resources like Building Information Modeling (BIM). Their research emphasizes how object-oriented models can depict material flows throughout various lifecycle phases, tackling discrepancies in conventional logistics planning systems.

Lammers (2022) additionally develops this method by utilizing object-oriented programming for multi-objective optimization in supply chain logistics. The research indicates that object-oriented architectures facilitate the incorporation of data processing, optimization algorithms, and enterprise systems, leading to logistics solutions that are more scalable and adaptive. These studies together create the theoretical groundwork for object-oriented logistics management (OOLM), highlighting modularity, adaptability, and integration as significant benefits compared to conventional methods.

Object-oriented logistics management (OOLM) signifies a conceptual transition from overseeing flows to handling business objects throughout supply chains. Within this framework, logistics systems are considered as collections of linked objects – like products, orders, transport units, and elements of infrastructure – whose conditions change over time.

Trebuna et al. (2024) offer an extensive examination of object-oriented logistics information systems, illustrating how this method enhances the efficiency and adaptability of

logistics operations. The authors contend that conventional structured approaches struggle to adjust to changing environments, whereas object-oriented systems better reflect actual business processes by integrating data and functions within reusable objects.

A significant aspect of OOLM is its capacity to combine different information technologies, such as ERP, MES, and advanced planning systems, into a cohesive structure. This integration improves visibility, collaboration, and decision-making within supply chain processes. Abramovych and Volovyk (2020) stress the significance of modeling logistics business processes within agriculture, underlining how digital tools contribute to optimizing resource flows and minimizing uncertainty.

A key element of OOLM is its connection to systems theory. By viewing supply chains as dynamic systems of interacting elements, OOLM enhances the understanding of logistics processes and their interconnections. This method fosters the creation of flexible and robust supply chain frameworks, especially in unstable conditions.

The practical use of object-oriented methods in logistics has been examined in several contexts, such as production systems, construction, and optimizing supply chains. These research findings offer important understanding of the practical applications of OOLM in everyday situations. Trebuna et al. (2024) show the application of object-oriented logistics systems via case studies that include electronic Kanban and real-time location tracking systems (RTLS). Their results indicate that object-oriented systems boost production scheduling, increase transparency, and facilitate better decision-making.

In inventory management, Khabbazi et al. (2013) demonstrate that object-oriented models facilitate real-time monitoring of inventory conditions and enhance coordination among various enterprise subsystems. This ability is especially vital in agricultural supply chains, where the prompt transport of perishable items is essential.

Lammers (2022) emphasizes the importance of object-oriented architectures in merging optimization models with corporate data systems. Utilizing modular components, these systems can adjust to evolving operational conditions and facilitate multi-objective decision-making. Moreover, Vasylchenko et al. (2018) highlight the significance of logistics control systems in handling uncertainty. Although not explicitly object-oriented, their efforts correspond with OOLM principles by emphasizing the monitoring and regulation of system states using performance indicators.

In general, these studies show that adopting object-oriented methods improves the flexibility, scalability, and efficiency of logistics systems, making them more appropriate for dynamic and unpredictable environments.

2.3 Relevance to the Agricultural Sector of Ukraine

The formation of agri-food market logistics in Ukraine has been influenced by various factors, including the country's agricultural potential, economic reforms, infrastructure development, and integration into global markets (Navolokina, A.S. 2020; Reznik et al., 2021).

The implementation of object-oriented logistics management is especially pertinent for Ukraine's agricultural sector, particularly in the last years of instability. This time was marked by considerable disturbances caused by economic challenges and widespread military conflict, impacting supply chains, transportation systems, and market accessibility.

Ukrainian agricultural businesses function within intricate supply chain networks that include various participants such as farmers, logistics companies, processors, and exporters. Thus, the necessity for efficient coordination and flexibility is essential. Abramovych and Volovyk (2020) and emphasize the significance of modeling agricultural logistics processes to enhance efficiency and minimize uncertainty. Koryt’ko (2026) determined that modeling of the logistics system with IDEF0 allows to structure material, information and financial flows, specify key functions, inputs and outputs, as well as management mechanisms for process optimization. Voloshchuk et al. (2026) analyzed logistics component of comprehensive performance of agricultural enterprises and underlined the significance of structural balance of transport channels.

OOLM presents a hopeful solution for tackling these issues by offering an organized system for handling logistics exchanges. OOLM allows for improved tracking, coordination, and optimization of logistics processes by depicting supply chains as systems of interlinked objects. Furthermore, incorporating digital technologies into object-oriented systems facilitates real-time decision-making and improves supply chain visibility. This is especially crucial in the Ukrainian context, where swift adjustment to evolving circumstances is vital for ensuring operational continuity.

2.4 Research Gap and Contribution

Although interest in object-oriented methods for logistics is increasing, there is a deficiency of empirical research analyzing their application within the agricultural sector, especially in Ukraine. The majority of current studies emphasize theoretical models or their use in industrial and construction environments.

This capstone research tackles this gap by examining the application of object-oriented logistics management in agricultural supply chains in Ukraine in times of instability. The

research seeks to offer actionable suggestions for enhancing supply chain management by merging theoretical understanding with qualitative data gathered from interviews with logistics managers.

The study adds to the current body of work by:

– broadening the use of OOLM in the agriculture industry,

– offering practical proof from an actual situation,

– formulating actionable suggestions for logistics management in uncertain conditions.

Conclusion of Literature Review:

1) The literature shows that object-oriented methods signify a notable progress in logistics management theory and practice. By focusing on business objects instead of processes, OOLM offers a more adaptable, integrated, and flexible framework for managing supply chains.

2) The examined research emphasizes the ability of OOLM to enhance effectiveness, clarity, and robustness in logistics systems. Nonetheless, additional studies are required to investigate its real-world application in particular industries and situations.

3) This capstone enhances these theoretical bases and tackles current research gaps by exploring the use of OOLM in Ukraine's agricultural field, offering significant insights for academia and practical applications.

CHAPTER 3. RESEARCH FRAMEWORK AND METHODOLOGY

3.1 Research Problem and Objectives

Prior to 24 February 2022, Ukrainian agrilogistics functioned as one of the most globally interconnected export systems in the Black Sea area. Farm produce represented USD 27.8 billion of Ukraine's exports in 2021, making up 41 percent of overall exports, based on USDA Foreign Agricultural Service data. The mechanism depended on volume, harbor capacity, and consistency: grains, oilseeds, sunflower oil, and meal flowed through a meticulously organized network that connected farms, storage facilities, rail, road transport, waterways, merchants, and ocean ports.

The invasion transformed that system into a wartime logistics area characterized by route fragmentation. Ports were shutdown, and grain storage along with transport facilities were harmed, and the managerial focus transitioned from optimizing efficiency to managing continuity. This report examines that transition through the particular perspective of object-oriented management of logistics. In this analysis, OOLM refers to arranging operations as interoperable entities with defined states, properties, and interaction guidelines.

In practical agrilogistics, the elements consist of routes, deliveries, transport vehicles, railcars, storage facilities, silos, agreements, clientele, grievances, and backup plans. That perspective is important because wartime logistics penalizes systems centered on a single prevailing route. An exceptionally streamlined yet singular network can be effective in standard circumstances and delicate in disrupted situations. A more modular network might not provide the quickest path, but it can handle disruptions and replace hallways, and separate breakdowns. The report thus poses a specific operational inquiry:

- **Does OOLM enhance the functionality of Ukrainian agrilogistics amid instability?**
- **And if that is the case, where are the improvements most apparent?**

The response derived from the evidence is nuanced yet compelling. OOLM does not bring back the world as it was before the war. Rather, it transforms the business from a fixed logistics coordinator into a flexible management system. This is why the report considers reliability, reducing delays, resolving complaints, and fostering customer trust as key factors.

This research intends to analyze the effects of applying object-oriented logistics management (OOLM) in Ukraine's agricultural sector in times of instability and to create actionable suggestions for enhancing logistics management organization in enterprise supply chains. In order to reach this goal, the subsequent objectives are established:

– to examine the existing logistics relationships between agricultural and logistics

companies in Ukraine and to pinpoint the distinctive characteristics of their roles in integrated supply chains and production collaboration networks amid economic volatility;

– to support a methodological framework for formulating a cohesive logistics strategy for enterprise supply chain management founded on object-oriented concepts;

– to pinpoint the essential characteristics of applying security-focused management in the creation of logistics interactions within supply chain ecosystems, emphasizing resilience and risk management.

Object of the Research. The focus of the study is the operations of agricultural businesses involved in logistical interactions within the supply chain ecosystem.

Subject of the Research. The research topic encompasses theoretical principles, methodological strategies, and actionable guidance for object-oriented logistics management within enterprise supply chains.

3.2 Research Assumptions and Design

Research question: How object-oriented logistic management impacts on activity of Ukrainian agrilogistic company in times of instability?

We assumed that the implementation of OOLM has a positive impact on the activities of Ukrainian agrilogistics companies in times of instability and analyze next questions:

1) Is it likely that instability for Ukrainian agrilogistics companies significantly increased in 2022 with spreading of military conflict, which negatively influenced on cargo transportation turnover;

2) Is it likely that the implementation of OOLM in the activities of logistics companies in conditions of instability leads to a reduction in the time of cargo delivery;

3) Is it likely that the implementation of OOLM in the activities of logistics companies in conditions of instability leads to an improvement in customer relations.

Research design. The research employs a mixed-methods approach, combining both qualitative and quantitative methods to correspond the research objectives and research questions comprehensively.

Quantitative analysis of statistical data on freight turnover for 2019-2025 allows to identify periods in which significant changes were observed, which means a significant increase in instability. To identify such periods, we use the Mann-Whitney U-test. Qualitative analysis is conducted using a semi-structured interview method and allows for an in-depth study of the experience of using OOLM in the activities of agro-logistics companies in conditions of instability.

3.3 Research Methodology

3.3.1 Methodology for Quantitative Research

Comparative analysis is used to identify trends in statistical data over the period 2019–2025. The results are visualized using a scatter plot. Changes in statistical data values by year are visually assessed, identifying fluctuations and trends. The Mann-Whitney U-test is used to confirm the statistically meaningful differences identified.

The Mann-Whitney U-test is non-parametric and does not require testing on normal distribution. After summing the ranks for each group, the Mann-Whitney U-test statistic is selected as the smallest of the two following calculated U values.

The null hypothesis (H0) assumes that there are no statistically meaningful differences between two samples. The alternative hypothesis (H1) assumes that statistically meaningful differences between two samples (Technology Networks Informatics, 2025). Key assumptions of this method are given in Table 3.1.

Table 3.1 Mann-Whitney U-test Key Assumptions

Criteria	Requirement	Design choice
Independent Groups	The test compares two independent samples (e.g., cargo transportation turnover)	2 independent samples: 2021 and 2022 data by months. Freight transport figures for 2021 do not depend on the figures for 2022, since these are different points in time.
Dependent Variable Type	Data should be continuous or ordinal (ranked)	Data ranked
Independence of Observations	While it does not require normal distribution, the distributions of the two groups should have a similar shape to compare medians	Statistic data on freight turnover for 2021 and 2022 are independent
Sample Size	For valid results, it is generally recommended to have at least 5 observations in each group	2021 and 2022 data, 12 months each

Source: developed by author, based on (Creswell, 2009; Technology Networks Informatics, 2025).

3.3.2 Methodology for Qualitative Research

This research utilizes a qualitative research design, which is especially appropriate for examining the application of object-oriented logistics management (OOLM) in Ukraine's agricultural sector from 2021 to 2022. The qualitative method allows for a thorough examination of intricate, context-sensitive logistics processes, managerial choices, and supply chain relationships that cannot be entirely represented by quantitative measures. Considering the economic instability and disruptions experienced by Ukrainian businesses during this time, qualitative methods allow for a deeper insight into actual operational difficulties, adaptive strategies, and the practical implementation of logistics management techniques.

Semi-structured interviews are chosen as the main method for data collection. This method integrates a fixed list of questions with the ability to investigate new subjects and seek clarifications from participants. This approach guarantees consistency between interviews while enabling a more profound comprehension of how logistics managers view and apply object-oriented principles in supply chain management. It also allows for the recognition of actionable insights concerning coordination, integration, delivery times, and customer relations in agricultural logistics.

This approach is especially pertinent in examining logistics management, where numerous choices are made dynamically and are not consistently formally recorded. Interviews with managers of Ukrainian logistics and agricultural firms enable the researcher to gather factual data and understand the reasoning behind decision-making processes, including how companies modify logistics operations amid uncertainty.

Ultimately, the selected methodological approach guarantees a thorough comprehension of the practical use of object-oriented logistics management and facilitates the formulation of well-founded, actionable suggestions for enhancing supply chain management in agricultural businesses.

The empirical foundation consists of a qualitative interview framework involving eight specialists in the Ukrainian agrilogistics sector. The spreadsheet documents coded answers to 18 semi-structured inquiries. The majority of questions are categorical, while a few are multi-select. The coding operates on two levels. Initially, each question is summarized descriptively by means of frequencies. Next, the frequencies are organized into more complex themes related to stability, disruption, management response, delivery performance, and customer relationships. Qualitative research framework is given in Table 3.2.

Table 3.2 Qualitative Research Framework

Element	Design choice	The matter for analysis
Sample	8 market experts	Compact yet information-dense sample ideal for crisis analysis and mechanism exploration
Time focus	2021 baseline versus 2022 shock, extended to 2025 market evolution	Enables a before-and-after framework while avoiding the illusion that post-war normalization is real
Evidence type	Coded interview responses	Facilitates pattern identification but does not e nable statistical generalization.
Coding strategy	Question-level descriptive coding plus thematic aggregation	Ensures the report is clear: readers can follow the conclusions back to the matrix.
Comparative logic	OOLM adopters versus non-adopters	Offers a structured approach to evaluate feasib ility without exaggerating causal relationships.

Source: developed by author, based on (Creswell, 2009).

The report employs a combined deductive-inductive coding framework. The questionnaire inherently distinguishes between delivery speed, KPIs, customer relations, and OOLM characteristics. Inductively, the analysis categorizes them into a more limited set of themes: pre-war stability, 2022 disruption, OOLM as a response to resilience, reliability versus speed, effects on customer trust, and feasibility during market restructuring.

There are three key methodological limitations to consider. Initially, the sample size is insufficient for making statistical assertions. Secondly, the matrix reflects expert insights instead of verified operational records. Third, the inquiry regarding delivery time is semantically distinct from the inquiry about delay frequency; this distinction is analytically beneficial but also necessitates careful interpretation. Consequently, the report refrains from making simplistic assertions that OOLM accelerated delivery in a definitive manner.

3.4 Data Collection

3.4.1 Statistic data description

Study Period. The data covers 7 years, starting in January 2019 and ending in December 2025. This allows for the study of both short-term and long-term trends in freight transportation.

Observation Frequency. The data are presented as monthly indicators, allowing for a detailed analysis of changes in freight transportation over the specified period.

Freight Volume. Freight turnover is measured in arbitrary units (tonnes-km), allowing for quantitative analysis and comparisons across different time periods.

Data Sources. Data are collected from (Ukrstat, 2025) – government statistical agency and (Skilky-Skilky Info, 2023) industry reports , which gives it reliability and validity.

Statistic data are given in *Appendix A*.

3.4.2 Sample for interview description

The research utilizes purposive sampling and features four participants holding senior management roles in Ukrainian logistics firms. The chosen participants are essential decision-makers — like directors, operations managers, and supply chain managers — who have direct accountability for coordinating and overseeing logistics operations and supply chain communications within their organizations.

Every respondent represents logistics firms that were actively functioning during 2021–2022, a time marked by considerable upheaval caused by economic instability and the extensive war in Ukraine. These firms persisted in their logistical operations amid uncertainty, infrastructure limitations, and evolving supply chain setups, rendering them especially pertinent for examining the real-world application of object-oriented logistics management (OOLM). The chosen firms engage in logistics services that support the agricultural industry, encompassing transportation, storage, and management of supply chain activities. Despite the small sample size, it offers significant insights into actual managerial practices, decision-making processes, and the difficulties of incorporating logistics activities into intricate supply chain ecosystems.

The organizations vary in scale and operational reach, permitting a comparison of logistics management methods across diverse business environments. All participants asked for confidentiality, which has been completely honored in the research.

In general, the sample shows diversity in operational settings and logistics roles while consistently emphasizing supply chain management within the agricultural industry. A central common element among respondents is their direct engagement in overseeing logistics operations and modifying supply chains in the face of disruptions, which allows the research to gather practical insights on the execution and efficacy of OOLM. In summary, the selected methodological approach guarantees a thorough comprehension of the practical implementation of object-oriented logistics management and aids in formulating well-founded, practical suggestions for enhancing supply chain management in agricultural businesses.

3.4.3 Interview procedure

Every interview took place online using videoconferencing tools like Zoom and Microsoft Teams. Before each interview, participants gave verbal consent for their involvement, audio recording, and the academic utilization of the information. The interviews ranged from 20 to 30 minutes, based on the level of discussion.

The interview guide comprised a systematic collection of questions centered on critical elements of logistics management and the application of object-oriented logistics management, encompassing supply chain collaboration, decision-making, integration, and flexibility amid uncertainty. Although the main questions remained uniform for all participants, further probing questions were posed when needed to delve deeper into particular managerial experiences. All interviews were recorded using **Turboscribe.ai**, maintaining the complete conversation between the interviewer and the participant. Ethical standards were upheld during the study, ensuring voluntary participation, anonymity of respondents, and the utilization of gathered data solely for academic purposes. List of interview questions is given in *Appendix C.*

3.4.4 Respond coding and anonymization

To ensure the confidentiality of data, each respondent is assigned a unique identifier (R1, R2, R3, etc.), preserving anonymity (Table 3.3).

Table 3.3 Respondent coding scheme

Respondent Code	Company	Position
R1	Anvit	CEO
R2	Syaivo	CEO
R3	Panko	CEO
R4	Lyubimovka	CEO
R5	Fortune	CEO
R6	VPK-Agro	CEO
R7	K+S	CEO
R8	Biofert	CEO

Source: developed by author

All references to personal information (first names, last names, job titles, and places of work) are removed or replaced with generic terms. Contextual anonymization was also performed: specific details that could identify the respondent are also generalized or changed. Recordings and transcripts are stored in a secure location. Table, summarizing the respondents answers, is given in *Appendix D.*

CHAPTER 4. DATA DESCRIPTION AND ANALYSIS

4.1 Quantitative analysis of statistic data

Cargo turnover dynamics from 2019 to 2025 show significant changes due to large-scale military operations. The period up to 2022 is characterized by growth and stability, while in 2022 a sharp decline is observed.

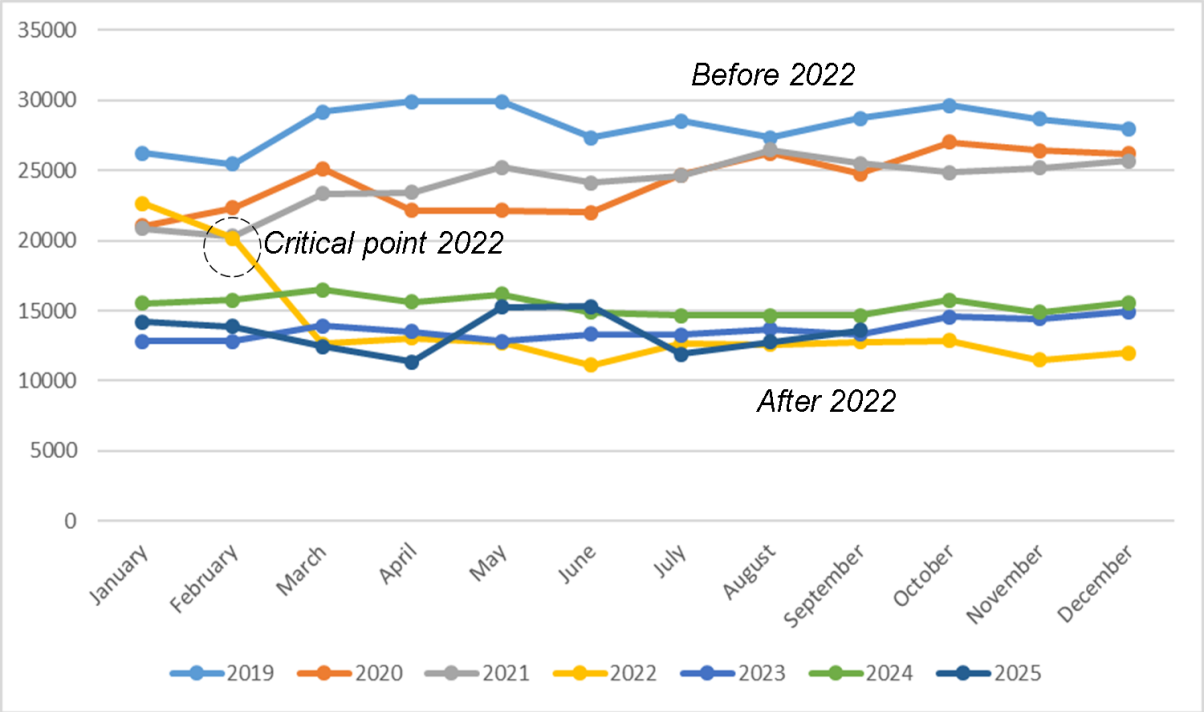

Figure 4.1 Cargo turnover dynamics (in tonnes-km)

Source: developed by author, based on (Ukrstat, 2025).

The statistical data visualization (Figure 4.1) shows a critical point in February 2022, when cargo traffic fell almost in half following the onset of full-scale military operations. A recovery was observed thereafter, but the figures for 2020-2021 have yet to return. In turn, the 2020-2021 figures are lower than those for 2019, due to the COVID-19 pandemic.

Thus, the statistical data defines the 2021-2022 period as a boundary between conditional stability and instability for logistics companies. To confirm this visual observation with quantitative methods, we use the Mann-Whitney U-test.

The Mann-Whitney U-test is used to test a hypothesis about the differences between two independent samples. The full calculation of the U-criterion is given in the *Appendix B*.

$U_{emp} = 2$

Ucr	
p≤0.01	p≤0.05
31	**42**

The empirical U value (Uemp = 2) is significantly smaller than the critical U values (Ucr = 31 and Ucr = 42) for both significance levels ($p \leq 0.01$ and $p \leq 0.05$). This indicates a statistically significant difference between the two groups being compared. The results obtained demonstrate the presence of significant differences between the two data sets (2021 and 2022 cargo transportation), confirming research hypothesis H1, that instability for Ukrainian agrilogistics companies significantly increased in 2022 with spreading of military conflict, which negatively influenced on cargo transportation turnover.

4.2. Qualitative analysis of the interviews

This part offers a qualitative examination of interviews held with eight pivotal managers from Ukrainian firms involved in logistics and agricultural supply chains. The analysis aims to uncover trends, difficulties, threats, and management responsibilities associated with logistics management in companies and the application of object-oriented logistics management (OOLM) amidst war, economic uncertainty, and supply chain interruptions in 2022.

The study is grounded in thematic coding of feedback across essential dimensions: external obstacles, evolution of logistics systems, effects on delivery performance, enhancements in operations, management of customer relationships, and function of OOLM.

4.2.1 Development of the codebook

The codebook (Table 4.1) provides a structured framework for analyzing the qualitative data collected during interviews. Each theme is associated with specific analytical codes that reflect the nuances of responses regarding various aspects of logistics management. Using the codebook during analysis allows for the generalization and systematization of interview results, the identification of patterns, and the elicitation of valuable insights across various aspects of the data.

Table 4.1 Codebook for qualitative analysis

Core Dimensions	Analytical Codes	Operational Definition
Theme 1: Universal Stability in 2021 and Universal Instability in 2022	Stability Levels	Refers to the perceived stability or instability of the logistics system in 2021 versus 2022 based on interview responses. Categories include: Stable in 2021, Stable in 2022; Stable in 2021, Unstable in 2022; Unstable in 2021, Unstable in 2022; Unstable in 2021, Stable in 2022.
Theme 2: OOLM as the Main Managerial Response	OOLM Implementation	Describes the implementation of Object-Oriented Logistics Management (OOLM) as a key response to challenges faced during disruptions. Categories include: management Initiative (key initiatives taken by the company to adapt to disruptions); technical innovation (innovations introduced to improve logistics processes); OOLM (specific reference to the adoption of Object-Oriented Logistics Management principles).
Theme 3: Speed Deteriorated, but Delay Discipline Improved	Delivery Time Changes	Captures responses regarding changes in delay frequency and average delivery time after OOLM implementation, including categories like significantly decreased, moderately decreased, and no significant change.
Theme 4: Routing as the Operational Lever that Mattered Most	Routing Improvements	Focuses on which logistics processes improved delivery speed the most, emphasizing the importance of routing compared to other processes like scheduling, coordination, and planning.
Theme 5: Customer Relations are Where OOLM Looks Strongest	Customer Relations Changes	Analyzes how customer relations management has changed post-OOLM implementation, with categories ranging from significantly degraded to significantly improved.
Theme 6: What OOLM Seems to Improve in Practice	Delivery Performance Metrics	Examines specific improvements attributed to OOLM, including delivery performance, influence on delivery time, enhancement of logistics operations, and reduction of complaints.

Source: developed by author

4.2.2 Thematic analysis

Theme 1: Universal stability in 2021 and universal instability in 2022

The initial discovery is the most pristine in the whole dataset. All eight experts chose the response pattern indicating that 2021 was stable and 2022 was unstable. This collective shift is analytically significant as it eliminates uncertainty regarding whether the performance change in the sector can be linked to individual company problems. In this case, the baseline remained steady; the turmoil originated from the war setting.

Table 4.2. Disruption code (Question 3)

Description	Experts selecting the code	Share of sample
Supply-chain interruptions	8	100%
Destruction of logistics infrastructure	7	87.5%
War as direct operating shock	6	75%

Source: developed by author

The mechanisms for crisis management are also very centralized. All eight experts (100%) identified supply-chain interruptions; seven experts (87.5%) pointed to destruction of logistics infrastructure; and six experts (75%) recognized war itself as the overarching source of disruption. This coding pattern indicates that businesses were not merely encountering slower logistics. They were functioning within a flawed logistics framework.

Theme 2: OOLM as the main managerial response

Regarding the inquiry into essential initiatives launched in 2022, five experts (62.5%) chose OOLM, two (25%) selected technical innovation, and a wider management option was also noted.

Effort by a single individual (12.5%). Thus, the sample does not suggest that companies arrived at a unified response. It suggests that OOLM was the most prevalent.
response and, as demonstrated later, the one linked to the optimal balance of operational and customer-oriented results.

The coding also indicates that OOLM was not viewed as a limited IT instrument. The survey considers it a management strategy, and the performance indicators in subsequent queries reinforce that understanding. The reasoning is structural: OOLM seems to assist businesses in breaking down logistics into controllable segments that can be redirected, reassessed, and conveyed without redesigning the whole system each time a disruption happens.

Theme 3: Speed deteriorated, but delay discipline improved

The delivery-performance section is the report's key analytical pivot. At first glance, it may appear contradictory, but it becomes clearer when velocity is divided into unrefined duration and dependability. Question 5 inquired about the variation in average delivery time following the implementation of OOLM. All five correct responses originated from OOLM

users, and all of them indicated a reduction in delivery time. Two indicated a moderate reduction and three a substantial reduction.

Question 8, however, inquired about the frequency of delays following implementation. Here the image becomes also optimistic. Four participants indicated a notable reduction in delays, one a moderate reduction, two a minor reduction, and one no substantial change. Since not all of these respondents had adopted OOLM, the clear understanding of the situation is next: wartime routes persisted for a longer duration, yet improved management minimized the occurrence of unexpected service disruptions. In other terms, the firms improved their performance in adverse conditions rather than eliminating those conditions.

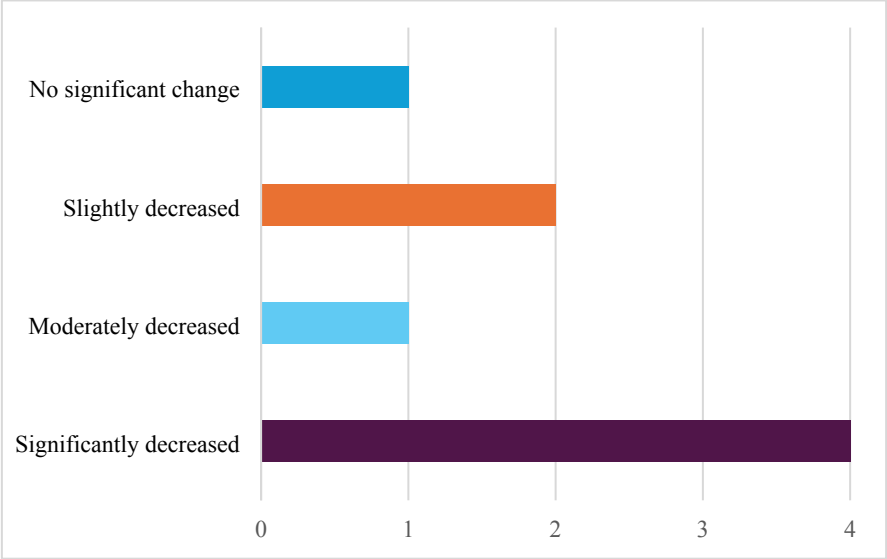

Figure 4.2. Post-implementation change in delivery delays (Question 8)

Source: developed by author

This differentiation is not just a matter of semantics. During wartime agrilogistics, clients may accept a lengthier route if the company offers a reliable guarantee, transparency, prompt modifications, and swift responsive measures. They are unable to endure frequent unexpected breakdowns. That is exactly why minimizing delays is economically beneficial.

Significant even if the typical path requires more time than it did prior to the conflict.

Interview data confirms the research assumption 2: Implementation of OOLM in the activities of logistics companies in conditions of instability leads to a reduction in the time of cargo delivery;

Theme 4: Routing was the operational lever that mattered most

When questioned about which processes enhanced delivery speed the most, experts assigned the top score to routing. Out of eight respondents, five chose routing, four opted for scheduling, four preferred planning, and three picked coordination. The structure is becoming clear. In wartime logistics, selecting corridors becomes a primary management decision. A system unable to swiftly substitute one route object for another will experience both service disruption and managerial burden.

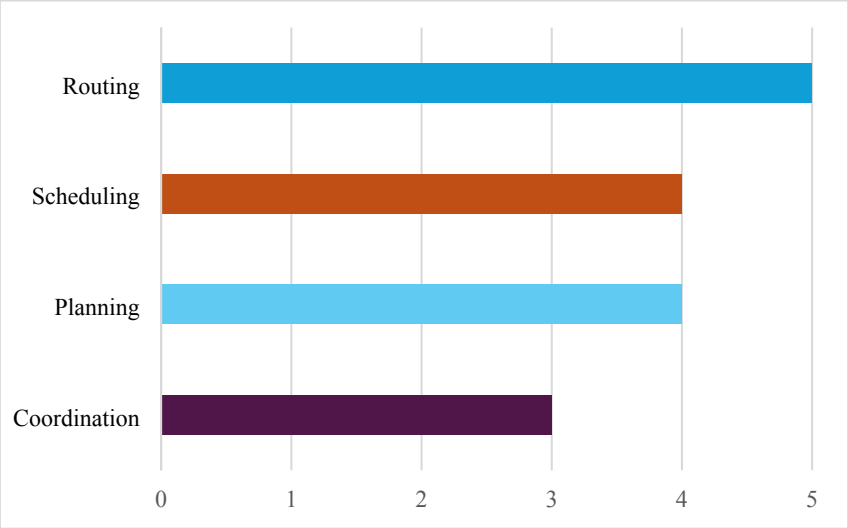

Figure 4.3. Processes viewed as most influential for delivery performance (Question 6)

Source: developed by author

The KPI structure emphasizes the same idea. All eight respondents identified delivery quality as a delivery-efficiency KPI, whereas on-time delivery, successful delivery, and cost were each chosen by six respondents. Only three respondents chose the average delivery time. This represents one of the most compelling pieces of evidence in the entire study: the industry has reshaped performance metrics to focus on reliability and integrity, rather than the time-based standard passed down from 2021.

Theme 5: Customer relations are where OOLM looks strongest

The customer-relations segment is the most robust pro-OOLM indicator in the sample. Regarding how customer relations management evolved post-implementation with the new approach, five respondents indicated considerable improvement, one noted minor improvement, and two experienced no noteworthy change.

The five OOLM adopters are the ones who indicated notable improvement. The trend intensifies in the subsequent inquiries. All eight specialists noted variations in the volume of complaints or claims. Regarding the speed of processing complaints, seven respondents gave valid responses: two noted a substantial increase, three a moderate increase, one a minor increase, and one no notable change. On customer assessment of delivery reliability and communication showed that all five valid responses indicated substantial enhancement, and once more, these five are linked to the OOLM users.

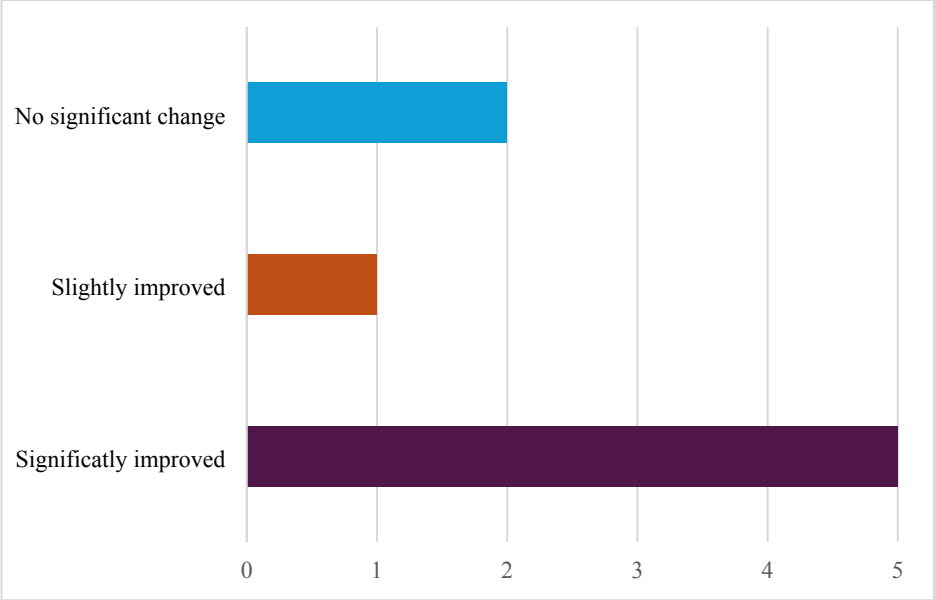

Figure 4.4. Change in customer relations management after the new approach (Question 12)

Source: developed by author

The selected KPIs for customer satisfaction convey a similar narrative. Seven respondents chose repeat orders, while the complaint rate, service rating, and customer

Each review was chosen by five participants. The strategic implication suggests that agrilogistics firms during war are providing not only tonnage transport but also assurance in controlled unpredictability.

Interview results confirm the research assumption 3: Implementation of OOLM in the activities of logistics companies in conditions of instability leads to an improvement in customer relations.

Theme 6: what OOLM seems to improve in practice

Question 18 holds particular importance as it inquires about the elements of OOLM that most significantly enhanced client satisfaction and customer relationships. Dependability

was chosen by all five relevant participants. Four individuals chose adaptability, flexibility, speed of delivery, and safety. One was chosen for planning. The ranking provides a straightforward understanding: OOLM is appreciated less as an abstract design ideology and more as a pragmatic approach to rendering service commitments credible during precarious circumstances.

The primary position of reliability is analytically crucial as it connects the operational and customer components. Reliability is practically evident through reduced delays and commercially apparent as heightened trust in communication. In this dataset, this is the primary way OOLM seems to function.

External Challenges and Disruption of Supply Chains

All participants uniformly highlighted that the large-scale invasion introduced new difficulties for company management. The frequently encountered challenges consist of: port and border blockades, damage or inaccessibility of logistics infrastructure, instability in transport routes, limited transport capacity, and unreliability of logistics partners.

For instance, one participant mentioned that ports, railroads, and logistics hubs either ceased operations or were impacted, while road transport faced challenges due to the closed borders with the European Union. Another participant pointed out the scarcity of transport options and the inconsistency of carriers, which greatly impacted delivery scheduling. Moreover, firms that formerly depended on a small group of logistics partners and suppliers faced significant risks, as interruptions in a single channel resulted in total collapses of supply chains across the entire sector.

Essential observation: In 2022, the Ukrainian logistics framework transitioned from a comparatively stable and predictable operation to a significantly unstable and scattered situation, necessitating an urgent overhaul of management strategies.

Transition from Traditional to Object-Oriented Logistics Management.

Prior to the war, every company depended on conventional linear logistics models, defined by: consistent routes, a small number of partners, centralized planning, and minimal adaptability. Nonetheless, these systems were found to be ineffective during crisis situations. Participants indicated that planning systems turned unreliable, supply chain interruptions were not managed effectively, and response times were inadequate. Customers voiced their frustration because orders were not delivered on schedule.

Consequently, all eight firms adopted object-oriented logistics management (OOLM) as an innovative strategy. Implementation of OOLM comprised: reorganizing logistics

processes into adaptable units, establishing risk management systems, creating alternative scenarios, digitalizing logistics operations, employee training, and organizational adjustment.

For example, a certain organization implemented scenario-driven planning and risk assessment systems, greatly enhancing flexibility. Another highlighted the significance of swiftly changing logistics partners and routes. Core understanding: OOLM arose not from theory, but as a crucial need for survival, allowing businesses to handle logistics as an evolving system rather than a static procedure.

Delivery performance and influence on delivery time.

All participants indicated that the average delivery time rose following the onset of the war, and in many instances, the increase was considerable. Elements contributing to this: extended routes, border hold-ups, infrastructure limitations. With the implementation of OOLM, companies began to enhance their delivery performance and reduce delivery time. One company, for instance, noted a slight reduction in delivery time alongside enhanced responsiveness. Others noted a notable decline, indicating structural modifications in its logistics pathways. Consequently, every company noted a considerable decrease in delays following the OOLM implementation.

Examples:

– delays reduced by a factor of 5 in one organization;

– delays decreased by 3–4 times in another;

– in certain situations, delays were nearly eradicated.

Key insight: OOLM shortens delivery time during crises and greatly enhances predictability and reliability, which is essential for supply chain effectiveness.

Enhancement of Logistics Operations. Participants recognized three fundamental processes that enhanced following the adoption of OOLM:

Routing: dynamic selection of routes, capability to swiftly redirect shipments, and evasion of high-risk or obstructed zones.

Planning: scenario-driven planning, enhanced predictions in uncertain conditions, optimized resource coordination.

Coordination: enhanced communication with collaborators, quicker decision-making, improved synchronization among supply chain participants.

A respondent mentioned that enhancements started with routing and coordination, then progressed to planning improvements.

Key insight: OOLM enhances logistics performance by utilizing adaptive coordination instead of optimizing a predetermined process.

Customer Relationships Management. A significant takeaway from all interviews is the beneficial effect of OOLM on client relationships:

Reduction of Complaints. Every company noted a notable decrease in complaints, with some instances of complaints being entirely eradicated.

Customer Satisfaction. Customers viewed companies as more dependable, adaptable, and able to perform under any circumstances. For instance, businesses indicated a rise in repeat purchases, enhanced service scores, and greater trust from customers.

Responsiveness. Businesses became swifter in addressing complaints, more proactive in resolving problems, and more responsive to customer demands. Essential understanding: OOLM enhances customer satisfaction by boosting reliability and flexibility, even if delivery times rise.

KPI Evolution. Participants noted that KPI systems transitioned from basic metrics to more extensive frameworks. Conventional KPIs include delivery duration and timely delivery percentage. Enhanced KPIs within OOLM: velocity, dependability, cost-effectiveness, service excellence. Moreover, KPIs associated with customers gained significance: order frequency, complaint levels, customer contentment. Essential understanding: OOLM needs a multi-faceted KPI framework that captures the intricacies of supply chain efficiency.

Cross-Case Examination and Significant Trends.

Throughout all eight interviews, multiple recurring themes are identified:

– Transition from Efficiency to Resilience - pre-war emphasis: cost and speed, post-war emphasis: reliability and adaptability.

– Greater Complexity in Logistics Systems: additional routes, increased partners, more decision factors.

– Significance of Adaptability: capacity to alter paths swiftly, capacity to substitute co llaborators, capacity to react to interruptions.

– Impact of Digitalization: enhanced monitoring, improved collaboration, quicker decision-making.

– OOLM as a Crucial Facilitator: enhances decentralized choices, boosts object-level management, allows for immediate adjustments.

CHAPTER 5. FINDINGS AND RECOMMENDATIONS

5.1 Key Findings

OOLM Adopters Versus Non-Adopters

The comparison must inherently be a small sample and should not be misconstrued as evidence of causation. Nonetheless, it remains analytically beneficial as the division is clear: 5 adopters compared to 3 non-acceptors. If OOLM lacked practical significance, the performance trend would be varied. Conversely, the relational and KPI results closely correlate with adoption.

The most significant difference lies within the relational domain. All OOLM users indicated considerable CRM enhancement, while none of the non-users experienced any. This is important for viability since gains in customer trust are frequently what rationalize operational investments in times of uncertainty. If the sole advantage was the refinement of internal processes, the business case would be less compelling. In this instance, the business case is linked to retained orders, reduced complaint friction, and enhanced service credibility. The operational comparison is significant as well, albeit more complex. Non-adopters did not experience significant failure after implementing their own alternative strategies; two out of the three noted a minor decrease in delays, and none indicated a decline in KPIs. This indicates that both technical innovation and overall management efforts continue to be beneficial. The benefit of OOLM is not that every other method is entirely ineffective. Its benefit is that it generates greater uniformity across a wider range of outcome categories.

Table 5.1. Indicator Comparison

Indicator	OOLM adopters (n=5)	Non-adopters (n=3)
Significant decrease in delays	4/5 (80%)	0/3 (0%)
Any decrease in delays	5/5 (100%)	2/3 (66.7%)
Delivery KPIs improved	5/5 (100%)	0/3 (0%)
Significant CRM improvement	5/5 (100%)	0/3 (0%)
Customer-satisfaction KPIs improved	5/5 (100%)	0/3 (0%)

Source: developed by author

The inquiry about delivery time deters excessive claims. The comparative data indicates a slight but strong conclusion: OOLM enhances the company's management of a disrupted system more than it reinstates the initial speed of the disrupted system.

The qualitative analysis shows that the adoption of object-oriented logistics management greatly enhanced supply chain performance in extreme situations, even with structural limitations.

Key takeaways:

• OOLM enhances flexibility and reactivity.

• delivery times might extend, but dependability significantly enhances.

• improved coordination minimizes delays and disruptions

• customer satisfaction increases because of consistency and adaptability

• logistics systems become increasingly robust and distributed

In general, OOLM demonstrated its efficacy as a management strategy for functioning in extremely volatile conditions, like those in Ukraine throughout 2022. It allows companies to transition from inflexible logistics frameworks to flexible, responsive supply chain systems, essential for maintaining operational continuity and competitive effectiveness.

5.2 Strategic Aspects of OOLM in Enterprise Supply Chains

The contemporary business landscape features heightened uncertainty in operating conditions, major shifts in market dynamics, the ongoing growth and intricacy of consumer needs, and the rapid pace of technological advancement cycles. These trends have become notably evident in Ukraine during 2021–2022, where businesses — especially in the agricultural industry — encountered significant disruptions caused by economic instability and external shocks. Consequently, enhancing the structure and operation of supply chain management systems has become essential.

The increasing unpredictability and magnitude of market changes have heightened the importance of optimizing economic connections that define the position of businesses within extensive supply networks. These supply chains signify intricate systems of production and distribution activities designed to generate new value. In these circumstances, efficient logistics management is crucial not only for maintaining the consistent flow of materials, finances, and information but also significantly contributes to improving the overall sustainability and competitiveness of businesses.

From a strategic standpoint, the enhancement of logistics management is especially crucial in light of Ukraine’s economic recovery and its integration into international supply chains. This process necessitates a structural change in production and economic connections, along with the implementation of innovative logistics methods. In this context, object-oriented logistics management (OOLM) represents a potentially effective framework, allowing

companies to represent supply chains as networks of interrelated business objects, enhancing coordination, transparency, and flexibility.

Simultaneously, numerous challenges concerning the logistical backing of sustainable supply chain operations in the agricultural industry are still inadequately examined. This is particularly significant given the intricate context in which agricultural businesses function, encompassing not just economic aspects but also political, security, social, and institutional elements. The agricultural sector holds strategic significance for Ukraine's economy, necessitating further research into effective logistics management strategies that can facilitate its integration into European and global markets.

A crucial element of this process is the coordination of logistics strategy with various operational and strategic facets of business management. This alignment guarantees that supply chains continually adjust to evolving business circumstances and improves organizations' capacity to address external obstacles. In the realm of OOLM, this entails managing the states and interactions of business objects at various tiers of the supply chain.

The success of logistics management in agricultural businesses is mainly influenced by how well they are integrated into supply chain ecosystems. These ecosystems include various stakeholders participating in the generation of agricultural value, encompassing activities like production, processing, transportation, and distribution. Due to the significant material intensity of agricultural goods, logistics choices regarding the optimization of resource movements and distribution methods become extremely crucial.

Historically, logistics management within industrial economic frameworks concentrated mainly on transportation and storage activities. Unfairly stable market scenarios, businesses focused on improving storage capacities and transportation systems to guarantee the accessibility of goods and resources. In agriculture, this method was linked to the necessity of keeping adequate stock levels to address seasonal demand variations and market shifts.

Nonetheless, the growing intricacy of consumer expectations, technological necessities, and market dynamics has resulted in a change in logistics management methods. The increasing demand for specialization, labor division, and global collaboration has led to the development of logistics management from operational tasks to strategic alignment of supply chain operations. This change involves enhancing the coordination of materials, finances, and information flow both internally within companies and externally among supply chain partners.

For agricultural businesses, these trends have been evident in two primary forms. On one side, large companies have increased their production capabilities and broadened their operations by creating logistics-related services like transportation, storage, and trading

activities. Conversely, small and medium-sized businesses, which frequently do not have the resources for extensive growth, have progressively depended on collaboration and integration within supply chain ecosystems. This has resulted in the establishment of joint logistics networks designed to enhance efficiency and competitiveness.

In this setting, object-oriented logistics management offers an organized method for handling these intricate interactions. By depicting supply chains as networks of linked entities, OOLM allows for greater accuracy in managing logistics operations, enhances collaboration among stakeholders, and facilitates responsive decision-making. This is especially crucial in settings marked by significant uncertainty, where conventional process-focused methods might fall short.

Moreover, the growing unpredictability of technological and market changes has heightened the demand for creative solutions that improve competitive edges. Logistics management is crucial in this process, allowing companies to enhance internal operations and external relations within supply chains. By utilizing OOLM principles, companies can create logistics systems that are more adaptable and resilient, able to react to shifting conditions.

In summary, logistics management has transformed from a supportive operational role into a strategic asset for maintaining business competitiveness and sustainability. The use of object-oriented methods marks a notable advancement in this progression, enabling a more thorough and flexible management of supply chains. In Ukraine's agricultural sector, adopting these approaches is especially pertinent as it can improve supply chain efficiency, aid integration into global markets, and foster long-term economic growth.

5.3 Interpretation, Feasibility, and Strategic Implications

OOLM as a resilience framework rather than a speed miracle

The evidence from the interviews and the market evidence align with one interpretation. OOLM is most effectively viewed as a resilience framework for agrilogistics within corridor fluctuations. It generates value by breaking the network into functional components that can be reassembled when disturbances happen. Such modularity diminishes managerial disorder, enhances exception management, and enables organizations to maintain service quality despite changes in geography, infrastructure, and trade regulations.

This interpretation aligns completely with the macro market history. The industry oscillated between route architectures, shifting from blockade during 2022 to 2025 conditions, BSGI conditions, Danube-laden conditions, and subsequently Odesa-corridor restoration conditions. A logistics firm that retains route information, risk traits, lead-time expectations,

documentation guidelines, and customer obligations in a reusable object framework will adjust more quickly than one that rebuilds. Choices made individually.

Feasibility assessment for Ukrainian agrilogistics companies

The evaluation of OOLM must be conducted on three dimensions: strategic, operational, and financial. Strategically, the model aligns with a market where route diversification, corridor oversight, insurance planning, and compliance adjustments have turned into standard practices instead of be ingrare. From an operational standpoint, the evidence collected during the interview suggests that modular routing, planning, and complaint management align with real company operations. From an economic standpoint, the probable advantages come from a reduction in significant delays, decreased customer attrition, quicker claims processing, and improved utilization of accessible routes instead of significant decreases in overall transit hours.

Table 5.3. Feasibility dimension

Dimension	Assessment	Reasoning
Strategic	High	The market itself became modular: ports, Danube, western rail, EU corridors, and compliance regimes all require structured route substitution.
Operational	High with phased rollout	The sample already contains five adopters, proving that implementation is workable under real wartime pressure.
Economic	Moderately high	Returns come from reliability, retained customers, and lower exception costs rather than from simple labor savings.
Technological	High where digital systems exist; moderate where they do not	Companies with transport-management or ERP layers can embed object logic faster.
Organizational	Moderate	The hardest part is often not software but aligning dispatch, commercial teams, warehouses, and customer service around common object definitions.

Source: developed by author

The only significant warning is definitional shift. If OOLM is simplified to software terminology without related process rigor, the anticipated advantages will not actualize. The companies that seem to gain the most advantages are those that manage routes, incidents, customer commitments, and escalation paths as organized operations, entities, instead of relying on makeshift spreadsheets and phone conversations

5.4 Recommendations for Ukrainian Agrilogistics Operators

The suggestions listed below are deliberately practical. They are created for companies functioning within the context of Ukrainian wartime conditions, rather than for the perfect scenario of greenfield logistics surroundings.

- Structure route entities with characteristics for security risk, customs obligations, anticipated lead time, available capacity, and alternative options.
- Establish a corridor library featuring templates for the Black Sea, Danube, rail-to-border, and mixed intermodal options instead of depending on a single standard export route.
- Integrate customer entities within the logistics framework to ensure that service commitments, communication choices, complaint records, and contractual penalties are accessible to teams responsible for operations.
- Distinguish between the metrics for absolute lead time and schedule reliability; ensure that they do not obscure each other.
- Establish complaint management as a procedural workflow with defined trigger conditions, designated escalation owners, and specified response timelines.
- Connect digital shipment tracking with customer communication, ensuring that status changes trigger both operational updates and client-facing updates simultaneously.
- Conduct practice scenarios for corridor loss, energy failures, rail delays, port shutdowns, and customs delays to evaluate the effectiveness of object substitution rules.
- Implement OOLM initially in the corridors and customer accounts with the highest volatility, then expand as the data model and escalation guidelines demonstrate effectiveness.

5.5 Management Enhancement Recommendations

The application of object-oriented logistics management (OOLM) is especially significant during periods of economic instability, conflict, and disruptions in supply chains. Ukrainian businesses, particularly in agriculture throughout 2021-2022, encountered unmatched difficulties, such as damage to logistics infrastructure, transportation limitations, market fluctuations, and heightened operational risks. In these circumstances, conventional logistics methods that rely on steady processes and straightforward planning are inadequate.

OOLM offers a versatile and responsive framework by modeling supply chains as networks of linked business entities (e.g., shipments, inventory items, transport resources, agreements), whose conditions can be observed and controlled in real-time. The subsequent suggestions are designed to assist businesses in successfully adopting OOLM to improve resilience, adaptability, and operational continuity.

Table 5.4. Recommendations for enhancement of Supply Chains

Structural Recommendations: Reorganizing Supply Chains as Object-Based Systems

Approach	Purpose	Actions
Identification and Structuring of Business Objects	Enables precise monitoring and decision-making.	Decompose the supply chain into key business objects, such as: • raw materials and agricultural products • transportation units (trucks, rail wagons, vessels) • storage facilities (warehouses, silos) • logistics partners and service providers • orders, contracts, and financial flows
Mapping Object Interactions	Improves visibility and helps identify bottlenecks.	Define interaction of objects within the supply chain: • transfer of goods between nodes • transformation processes (processing, packaging) • synchronization with financial and information flows

Risk Management and Resilience

Approach	Purpose	Actions
Integration of Risk Attributes into Business Objects	Allows to prioritize resources and protect critical flows	Include risk-related parameters to each logistic object: • probability of delay or loss • exposure to military or infrastructure risks • criticality for production or delivery
Scenario Planning and Stress Testing	Enable simulating changes proactive decision-making using OOLM	Develop multiple logistics scenarios based on possible disruptions: • infrastructure destruction (e.g., blocked ports, damaged roads) • supply shortages • sudden demand fluctuations
Building Redundancy and Buffer Capacity	Reduces the risk of supply chain failure.	Make changes in internal logistic infrastructure: • maintain safety stock for critical inputs • diversify transport modes and logistics partners • invest in flexible storage solutions (mobile warehouses, temporary facilities)

Digitalization and Information Integration

Approach	Purpose	Actions
Implementation of Integrated Information Systems	Provide a single view of all logistics objects	Integrate in the enterprise management system: • ERP systems for resource planning • transport management systems • warehouse management systems • real-time tracking technologies
Data-Driven Decision-Making	Enhance forecasting and decision-making under uncertainty using AI-based tools.	Use analytics to: • evaluate object performance (delivery time, cost, reliability) • identify inefficiencies • optimize logistics processes

Organizational and Strategic Recommendations

Approach	Purpose	Actions

Alignment of Logistics Strategy with Enterprise Strategy	Ensure consistency and maximizes synergies across business functions	Integrate OOLM into the overall strategic framework of the enterprise, including: • production planning • marketing and sales strategies • financial and investment decisions • decisions
Development of Logistics Competencies	Skilled personnel	• train employees in object-oriented thinking and digital tools • develop cross-functional teams • encourage knowledge sharing and continuous learning
Strengthening Collaboration within Supply Chain Ecosystems	Cooperation under crisis conditions	• build long-term partnerships with logistics providers • share information with supply chain participants • develop joint risk management strategies
Practical Implementation Roadmap	Ensure effective adoption of OOLM	• Assessment phase – analyze current logistics processes and identify key business objects • Design phase – develop an object-oriented model of the supply chain • Digitalization phase – implement IT systems for tracking and managing objects • Pilot phase – test the approach in selected supply chain segments • Scaling phase – extend OOLM across the entire enterprise and partner network.

Source: developed by author

5.6 Limitations and Future Research Perspectives

When conducting empirical qualitative research using semi-structured interviews, it is important to consider the following **limitations:**

1) Limited sample size. Only 8 interviews were conducted. This may limit the generalizability of the results to a broader population of logistics companies, as the participants' opinions and experiences may not reflect the full diversity of perspectives in the industry.

2) Data subjectivity. Semi-structured interviews are dependent on the perceptions and interpretations of participants, which may lead to subjective conclusions. Participants may have their own biases or limited knowledge about the impact of object-oriented logistics management.

3) Researcher influence. The researcher may inadvertently influence participants' responses through question wording or nonverbal cues, which may bias the data.

4) Contextual dependence. Results may be context-specific (e.g., geographic region, company type), limiting their applicability to other settings.

5) Lack of quantitative data. Qualitative studies do not provide quantitative indicators, which makes it difficult to assess the extent to which object-oriented logistics management influences performance.

Prospects for further research:

1) To enhance the generalizability of the results, additional interviews could be conducted with a larger number of participants from different types of logistics companies and regions.

2) Longitudinal studies would allow us to track changes in logistics companies' performance over time, which would help better understand the dynamics of the impact of object-oriented management.

3) A comparative study between companies that employ object-oriented logistics management and those that do not could reveal clearer differences in performance.

4) Investigating the impact of other factors (e.g., technological change, market conditions) on logistics companies' performance in conjunction with object-oriented management could provide a more comprehensive understanding of the complex interrelationships.

CHAPTER 6. CONCLUSION

The application of object-oriented logistics management offers organizations a robust means of overseeing supply chains in times of economic uncertainty, conflict, and infrastructure challenges. By emphasizing the conditions and relationships of business objects, OOLM allows for increased adaptability, clarity, and reactivity.

Implementing this approach can greatly enhance the resilience of Ukrainian agricultural enterprises, minimize operational risks, and guarantee the continuity of logistics operations. The suggested management recommendations provide a viable framework for executing OOLM and adjusting supply chain management to very unpredictable and dynamic settings.

The main conclusion of the report is that object-oriented logistics management is practical, beneficial, and strategically compatible with the development of Ukrainian agrilogistics from 2021 to 2025. The invasion no only decreased through put; it changed the fundamental reasoning of the market. Corridor diversity, infrastructure unpredictability, regulatory adjustments, and customer anxiety alleviation turned commonplace. In such circumstances, a modular management framework is not merely a theoretical choice. It provides a useful functional benefit.

Simultaneously, the evidence suggests a restrained rather than an inflated assertion. OOLM did not restore average delivery time to 2021 levels in the interview sample. It effectively minimized delay frequency, enhanced delivery KPIs, sped up complaint resolution, and greatly fortified customer relationships among users. For agrilogistics companies in Ukraine, that synergy is strategically advantageous as it transforms instability from a harm to reputation into a controllable service issue. When management teams adopt OOLM with well-defined route objects, customer objects, and escalation procedures, they are probable to create a more robust export system. In an industry that is essential to Ukraine's economy and the global food supply, such resilience is not only financially sensible. It holds systemic significance.

Assumptions are confirmed by results of empirical research. OOLM has a positive impact on the activities of Ukrainian agrilogistics companies in times of instability.

Instability for Ukrainian agrilogistics companies significantly increased in 2022 with spreading of military conflict, which negatively influenced on cargo transportation turnover;

Implementation of OOLM in the activities of logistics companies in conditions of instability leads to a reduction in the time of cargo delivery;

Implementation of OOLM in the activities of logistics companies in conditions of instability leads to an improvement in customer relations.

The **scientific significance** of this capstone project lies in the empirical study of the impact of object-oriented logistics management on the performance of logistics companies in times of crisis and instability. The scientific significance of this work is confirmed by participation in the conference and the publication of these papers.

There is **practical significance** in developing recommendations for improving logistics management in Supply Chains based on an object-oriented approach. The practical significance of the study is confirmed by 2 Certificates of implementation.

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LIST OF APPENDIXES

Appendix A

Statistic data on cargo turnover (tonnes-km)

	January	***February***	***March***	***April***	***May***	***June***	***July***	***August***	***September***	***October***	***November***	***December***
2019	26257	25441,8	29164	29909	29935	27352	28516	27364	28742,4	29621,9	28688,8	27972
2020	21032	22316	25116	22143	22159	22005	24684	26221	24755,6	27024	26436,5	26186,6
2021	20880	20311,1	23331	23455	25224	24114	24622	26453	25507,5	24871,2	25194,1	25673
2022	22651	20191,6	12632	13035	12723	11118	12653	12602	12767,7	12861,7	11498,7	11999,1
2023	12813	12807,1	13925	13483	12816	13339	13273	13668	13323,5	14573,8	14431,8	14908,2
2024	15506	15773,5	16469	15597	16186	14899	14649	14656	14665,2	15773,4	14865,1	15574,7
2025	14213	13882,7	12426	11358	15267	15307	11913	12762	13582,9			

Source: Ukrstat, 2025

Appendix B

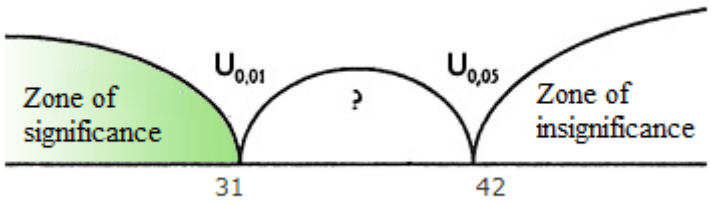
Mann-Whitney U-test calculation

№	Sample 1 (2021)	Rank 1	Sample 2 (2022)	Rank 2
1	20880.3	13	22651.1	14
2	20311.1	12	20191.6	11
3	23330.9	15	12631.5	5
4	23454.8	16	13034.5	10
5	25224.0	21	12723.1	7
6	24113.7	17	11117.7	1
7	24622.1	18	12653.0	6
8	26452.7	24	12601.6	4
9	25507.5	22	12767.7	8
10	24871.2	19	12861.7	9
11	25194.1	20	11498.7	2
12	25673.0	23	11999.1	3
Sum:		220		80

Result: U_{emp} = 2

Ucr	
p≤0.01	p≤0.05
31	**42**

Axis of importance:



Appendix C

Interview questions

Delivery Time

1. How did the average delivery time change after implementing object-oriented logistics management in your company?
2. What specific logistics processes improved delivery speed the most?
   Routing, scheduling, coordination, your answer.
3. How often did delays occur before and after implementation? Can you estimate the difference?
4. How did the system perform before the war in 2021 and during disruptions in 2022?
   War, supply chain interruptions, your answer.
5. Which KPIs do you use to measure delivery efficiency and how have they changed?
   Average delivery time, on-time delivery rate, your answer.

Client Satisfaction

1. How has your client satisfaction changed after implementing object-oriented logistics management in the company?
2. Have you observed changes in the number of complaints or claims from clients?
3. How do your clients evaluate delivery reliability and communication after implementation of the new logistics management approach?
4. Which KPIs do you use to measure client satisfaction and what trends do you see?
   Repeat orders, complaint rate, service rating, your answer.
5. What aspects of the new system contributed most to improving client satisfaction?

Appendix D

Respondents answers

№	Question	Answers	R1	R2	R3	R4	R5	R6	R7	R8
1	What challenges did your company face before and after the full-scale invasion?	Stable in 2021, stable in 2022								
		Stable in 2021, unstable in 2022	1	1	1	1	1	1	1	1
		Unstable in 2021, Unstable in 2022								
		Unstable in 2021, stable in 2022								
2	How did the system perform before the war in 2021?	Stable	1	1	1	1	1	1	1	1
		Unstable								
3	How did the system perform during disruptions in 2022?	War	1	1	1	1	1		1	
		Supply chain interruptions	1	1	1	1	1	1	1	1
		Destruction of logistics infrastructure	1		1	1	1	1	1	1
4	What key initiatives, innovations, new management approaches have you implemented in your company in 2022?	Management Initiative					1			
		Technical Innovation		1						1
		OOLM	1		1	1		1	1	
5	How did the average delivery time change after implementing object-oriented logistics management in your company?	Significantly decreased								
		Moderately decreased								
		Slightly decreased								
		No significant change								
		Slightly increased								
		Moderately increased	1			1				
		Significantly increased			1			1	1	
6	What specific logistics processes improved delivery speed the most?	Routing	1			1	1	1	1	
		Scheduling				1		1	1	1
		Coordination	1		1			1		
		Planning	1	1	1			1		
7	How often did delays occur before implementation? Can you estimate the difference?	Significantly often before	1	1	1	1	1		1	1
		Moderately often before						1		
		Not occured before								
8	How often did delays occur after implementation? Can you estimate the difference?	No significant change		1						
		Slightly decreased after					1			1
		Moderately decreased after						1		
		Significantly decreased after	1		1	1			1	
9	Which KPIs do you use to measure delivery efficiency?	Average delivery time		1				1		1
		on-time delivery rate		1	1	1	1	1	1	
		Successful delivery	1	1		1		1	1	1
		Quality of delivery	1	1	1	1	1	1	1	1
		Cost of delivery	1	1	1		1	1	1	
10	How have they changed?	KPI degraded								
		No significant change		1			1			1
		KPI improved	1		1	1		1	1	
11	What key innitiatives, innovations, new	Key innitiative					1			1

	management approaches have you implemented in your company in 2022 to ensure timely delivery of goods to customers?	Innovation		1						
		Object-oriented logistics management	1		1	1		1	1	
12	How has your customer relations management changed after implementing new approach?	Significantly degraded								
		Moderately degraded								
		Slightly degraded								
		No significant change		1						1
		Slightly improved					1			
		Moderately improved								
		Significantly improved	1		1	1		1	1	
13	Have you observed changes in the number of complaints or claims from clients?	Changes observed	1	1	1	1	1	1	1	1
		Changes not observed								
14	How has the speed of processing complaints and the speed of eliminating the causes of complaints changed?	Significantly decreased								
		Moderately decreased								
		Slightly decreased								
		No significant change								1
		Slightly increased					1			
		Moderately increased			1	1		1		
		Significantly increased	1						1	
15	How do your clients evaluate delivery reliability and communication after implementation of the new logistics management approach? Was the reletionship level degraded or improved?	Significantly degraded								
		Moderately degraded								
		Slightly degraded								
		No significant change								
		Slightly improved								
		Moderately improved								
		Significantly improved	1		1	1		1	1	
16	Which KPIs do you use to measure client satisfaction and customer relations?	Repeat orders	1	1	1	1	1	1	1	
		Complaint rate		1		1	1		1	1
		Service rating	1	1	1	1			1	
		Customer reviews	1	1	1				1	1
17	What trends do you see?	KPI degraded								
		No significant change		1			1			1
		KPI improved	1		1	1		1	1	
18	What aspects of the OOLM contributed most to improving client satisfaction and customer relations?	Adaptability	1		1			1	1	
		Flexibility	1		1			1	1	
		Reliability	1		1	1		1	1	
		Speed of delivery	1			1		1	1	
		Safeness			1	1		1	1	
		Planning							1	

Appendix E

ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ «СЯЙВО»

49000 Україна м. Дніпро

Вих. №101 від 30.04.2026р.

ДОВІДКА

У діяльності ТОВ «Сяйво» були використані методичні та практичні рекомендації Леснікова Павла Володимировича, що представлені в дипломній роботі на здобуття наукового ступеня на тему: «ОБ'ЄКТНО-ОРІЄНТОВАНЕ УПРАВЛІННЯ ЛОГІСТИКОЮ У ДІЯЛЬНОСТІ ЛОГІСТИЧНИХ КОМПАНІЙ АГРАРНОГО СЕКТОРУ УКРАЇНИ В УМОВАХ НЕСТАБІЛЬНОСТІ».

Використання пропозицій Леснікова Павла Володимировича щодо розробки логістичної стратегії, узгодженої з параметрами корпоративної стратегії, орієнтованої на забезпечення заданої конкурентної поведінки ланцюга постачань та узгодженої з іншими операційними стратегіями підприємства є доцільним та сприятиме досягненню високих економічних результатів діяльності підприємства. Значне практичне значення мають рекомендації відносно підтримки економічної безпеки та стабільності життєдіяльності ланцюга постачань, засновані на формуванні адаптивної архітектури логістичних процесів. В контексті реалізації виробленої логістичної стратегії є вельми цінними розробки щодо запровадження об`єктно-орієнтованого логістичного менеджменту нашого підприємства та забезпечення надійного функціонування учасників ланцюгів постачань.

Довідка видана без фінансових обов'язків підприємства перед автором.

ТОВ «Сяйво»

Фінансовий Директор
Токарева Л.Є.

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Вих. № 100 від 13.05.2026 р.

ДОВІДКА

У діяльності ТОВ «Любимівка» були використані методичні та практичні рекомендації Леснікова Павла Володимировича, що представлені в дипломній роботі на тему: «ОБ'ЄКТНО-ОРІЄНТОВАНЕ УПРАВЛІННЯ ЛОГІСТИКОЮ У ДІЯЛЬНОСТІ ЛОГІСТИЧНИХ КОМПАНІЙ АГРАРНОГО СЕКТОРУ УКРАЇНИ В УМОВАХ НЕСТАБІЛЬНОСТІ».

Застосування рекомендацій Леснікова Павла Володимировича щодо формування логістичної стратегії, яка відповідає параметрам корпоративної стратегії, спрямована на забезпечення конкурентоспроможності ланцюга постачань та узгоджена з іншими операційними стратегіями підприємства, є обґрунтованим і сприятиме підвищенню ефективності та економічних результатів діяльності підприємства. Важливе практичне значення мають також рекомендації щодо забезпечення економічної безпеки та стійкості функціонування ланцюга постачань, що базуються на створенні адаптивної архітектури логістичних процесів.

Довідку видано без виникнення фінансових зобов'язань підприємства перед автором.

фінансовий директор
ТОВ «Любимівка» Сергій МУДРАК