**Systemy Logistyczne Wojsk**
Zeszyt 63(2025)
ISSN 1508-5430, s. 127-150
DOI: 10.37055/slw/218684

Instytut Logistyki
Wydział Bezpieczeństwa, Logistyki i Zarządzania
Wojskowa Akademia Techniczna
w Warszawie

**Military Logistics Systems**
Volume 63(2025)
ISSN 1508-5430, pp. 127-150
DOI: 10.37055/slw/218684

Institute of Logistics
Faculty of Security, Logistics and Management
Military University of Technology
in Warsaw

# Economic security of logistics enterprises in the face of global turbulence

**Tomasz Smal**
tomasz.smal@wroclaw.merito.pl; ORCID: 0000-0002-3237-5494
Finance and Management, University WSB Merito in Wrocław, Poland

**Maria José Ayala Marín**
mjayala@ucam.edu; ORCID: 0009-0007-1242-3069
Economics and Business, Universidad Católica San Antonio de Murcia, Spain

**Joanna Myślińska - Wieprow**
joanna.myslinska-wieprow@wroclaw.merito.pl; ORCID: 0000-0002-0286-8140
Financial and Management, University WSB Merito, Poland

**Abstract.** In order to correctly assess the economic security of an enterprise, it is necessary to evaluate its financial situation. This is particularly relevant during external turbulence (e.g. the COVID19 pandemic, economic crises and armed conflicts) that affects global logistics operations. The research problem addressed in this article is how such turbulence influences the economic security of transport, shipping and logistics (TSL) enterprises and which financial assessment tools can provide reliable earlywarning signals. The research niche of this article is the adaptation of enterprise financial security assessment methods to the specific conditions of the transport, shipping, and logistics (TSL) industry. The purpose of the article is to adapt an established methodology for evaluating the financial condition and economic security of enterprises to the context of logistics companies, and to identify the impact of global turbulence on supply chain resilience. The study used financial ratio discriminant analysis and a case study approach to evaluate selected logistics enterprises operating in international markets. The hypothesis assumed that global disturbances negatively affect the financial performance of TSL enterprises, but that appropriate assessment tools and strategies can strengthen their financial resilience. The results confirmed partial deterioration in liquidity and profitability indicators during crises, alongside the increasing adaptability of enterprises using proactive risk management approaches. The conclusions emphasize the necessity of continuous financial monitoring and implementation of early-warning systems to enhance economic security in the TSL sector.
**Keywords:** economic security, TSL, financial analysis, operating risk, economic crisis

## Introduction

The proper functioning of logistics enterprises is a vital element not only of our economy, but also of our security. Their functioning is directly related to the survival of our society, which results directly from the dependence of most people on goods from global supply chains. This became clear during the COVID-19 pandemic, which disrupted flows in said supply chains; the violent reaction of governments and media to the threat resulted in equally violent and sometimes chaotic consumer behaviour (Bø, 2023).

Although global supply chains have not yet returned to their normal flows, another crisis occurred in Eastern Europe, which deepened the turbulence even further. As a result of the war in Ukraine, fuel prices increased significantly, which had a direct impact on transport costs, and some traditional transport channels to the east were blocked or significantly hindered. In this situation, logistics companies faced further challenges of how to ensure liquidity and an acceptable price for deliveries. As a result, companies increasingly began to replace the "just in time" logistics strategy with the "just in case" approach (Smal, Śliwczyński, 2022).

We understand the concept of security in the general sense as freedom from unacceptable risk (Bris, Soares, 2009). An interesting and comprehensive approach was presented in a monograph by Nowakowski (2011), who emphasised that the functioning of logistics supply chains should be oriented towards the satisfaction of the final recipient of goods. On this basis, one can be tempted to formulate a definition of the security of logistics enterprises as the certainty that the goods will reach the final customer, ensuring his full satisfaction.

Analysing contemporary definitions of security in the context of the logistics supply chain, it can be concluded that security encompasses the fulfilment of fundamental needs such as survival, integrity, identity, independence, peace, possession and a high probability of development. It is a subjective concept that applies to individuals, social groups and economic systems, including production and transport service enterprises, and constitutes a basic prerequisite for the functioning of economic and international structures. Protective actions are undertaken both internally and externally to prevent or mitigate unfavourable situations and to reduce fear, anxiety and uncertainty. Various aspects of security, including economic dimensions, are addressed by specialized institutions as well as scientific and research centres (Żywiołek et al., 2025).

The existing material's analysis reveals a close relationship between security in various contexts and economic processes, including the supply chain. Undoubtedly, the recent global situation has shown how important it is to build secure and resilient supply chains (Wiedmer et al., 2023).

Therefore, another important indicator regarding the functioning of logistics supply chains in times of turbulence is their resilience. Supply chain resilience can

be defined as a chain's readiness for unexpected events (Hohenstein et al., 2015), which includes its ability to respond and quickly recover from potential disruptions and return to normal or improved functioning.

A key aspect of responding to any disruptions is the selection of a strategy for building the security and resilience of logistics enterprises, which has become a significant challenge in recent years (Scala, Lindsay 2021). These strategies are intended to help managers with the proper management of enterprises by planning activities at the operational and strategic level. There are three dimensions of a resilience strategy (Rahman et al., 2022), and one of the areas that is considered when building such a strategy is ensuring the economic security of the enterprise.

The aim of the article is to adapt selected methods for assessing an enterprise's economic security to the specificity of the TSL industry and to develop an assessment approach for logistics enterprises. In this context, economic security should be understood as the continuation of the operation of the enterprise, in conditions of high risk resulting from the variability of external factors.

The research problem is formulated as follows: How can the economic security of TSL enterprises be assessed under conditions of global turbulence, and which financial ratios and discriminant models provide the most informative earlywarning signals? For the formulated in this way purpose of the article, the following hypothesis was adopted: adequately selected tools and methodology for assessing the financial condition of an enterprise, can assist logistics companies to build crisis resilience and reduce operational risks. To assess the economic security of enterprises, financial and discriminant analysis tools were used, including an assessment of the asset financing structure and the use of financial performance, liquidity, and debt indicators. A case study of a company operating in the transport and logistics market was also conducted, focusing on financial and structural data and assessing customer relationships in the context of global turbulence. The study was holistic in nature, taking into account both individual entities and entire supply chains.

## The state of the TSL industry

The functioning of the logistics industry is currently influenced by the international economic and political situation. The COVID-19 pandemic has entered its next phase, and global logistics chains are still being impacted by its effects. Moreover, the operation of logistics chains is strongly influenced by current armed conflicts and the effects of these turbulences, i.e. the economic crisis and the resulting high inflation.

The energy crisis and high commodity prices caused by the war in Ukraine were the main driving forces behind high fuel prices last year. The average price of diesel fuel (after the deduction of duties and taxes) turned out to be 69.3% higher in 2022

than the average price in 2021. Carriers were also affected by a drastic increase in the price of the AdBlue catalytic additive, which, together with oil prices, almost immediately resulted in freight price increases. All this was also compounded by high demand for energy resources even before the outbreak of the war, caused by the reconstruction of economies after the pandemic. Contrary to the concerns of the transport and logistics market, from mid-2022 the price of diesel began to fall, which was immediately reflected in lower freight prices. At the end of June, the average diesel price reached a maximum annual value of €1,302.98/1000 l, but then the situation on global stock exchanges began to settle down. As a result, in the last quarter of last year, prices systematically dropped (albeit a temporary disruption of the downward trend was the earlier increases in August and early September). The highest diesel prices were recorded in Germany. Additionally, considering the fact that German carriers also use LNG – and were subject to gigantic price increases – German transport found itself in a difficult situation in 2022. Fuel costs have made German carriers less competitive in Europe. The record price of fuel in Europe (€1,472.46 /1000 l) was set in mid-March last year in Germany. The Dutch economy also struggled with high fuel prices for almost the entirety of 2022 (Report Market Insights, 2023).

The onset of the energy crisis caused by Russian aggression almost simultaneously resulted in an increase in freight rates. The upward trend in freight prices ceased at the end of July 2022 in response to the start of the decline in diesel prices approximately two weeks earlier. Experts associate lower fuel prices with the first stronger symptoms of economic recession in Europe, especially in Germany, which is plagued by increasingly high inflation and the effects of the energy crisis. If the situation on the energy raw materials market stabilises – and carriers are not affected by sudden price changes – the relationship between freight prices and diesel costs will no longer be as significant. However, much depends on the consequences of the law introduced in February this year imposing an EU embargo on imports of energy raw materials from Russia (Report Market Insights, 2023).

The year 2024 is perceived by the TSL industry as being particularly uncertain. High inflation and uncertain demand are a concern, and the industry still faces a profound energy and digital transformation. Another growing structural challenge is the growing lack of drivers, the deepening crisis on the Polish-Ukrainian border related to the transfer of Ukrainian grain and other products through Poland, as well as another increase in road tolls in Germany. These aspects will worsen the already difficult situation in the Polish TSL sector. Large companies will cope with these difficulties by passing on increased costs to contractors and reducing their transport potential, but many smaller companies will be forced to close their operations (Ołdak, 2023).

The TSL industry must increase supply chain flexibility and resilience, with managers diversifying suppliers and using modern technologies for real-time

logistics management to prevent disruptions. Rising operating costs drive efforts to optimise expenses through fuel management, GPS monitoring of carriers, and savings in areas such as warehouse rental, lighting, and heating. Long-term pricing policies are difficult to plan, forcing budget adjustments for 2024. Reduced consumption lowers demand for goods and logistics services, while increased costs pass to customers, prompting further savings. The sector is evolving towards automation and ecological solutions, which may help overcome the crisis but require investment that can be limited by declining volume and revenues. Staff shortages further intensify challenges (TRANS.EU, 2023).

## Economic and financial analysis of logistics companies – the theoretical approach

Recognising the existing financial condition of a company requires calculating the appropriate economic relations and determining the causes of the changes therein. These reasons are the basis for correct conclusions and decisions regarding future periods. Knowledge of economic relations may be useful both for business management purposes and for business entities constituting the environment. An entity's financial data are used by capital donors, contractors, investors, government institutions, owners, and employees.

Economic analysis encompasses the material and financial aspects of an enterprise's operations and includes technical and economic analysis, which evaluates the results achieved through the use of production factors, as well as financial analysis. The latter examines the company's assets, capital structure, financial results, and overall financial condition. Financial analysis serves as the key tool for assessing enterprise performance, covering the evaluation of financing sources, solvency and liquidity, and the effectiveness of operations (Nowak, 2008).

When assessing the economic and financial situation of an enterprise, its specificity and the industry in which it operates should be taken into account. On the one hand, entities can be grouped in order to develop theoretical models. On the other hand, each individual is different. Taking this into account, it is worth considering whether logistics companies can be assessed using traditional financial measures or whether it is necessary to develop an individual methodology for their economic and financial situation (Franc-Dąbrowska, 2014).

An analysis of the literature shows that authors have focused on a number of problems of entities participating in supply chains in order to indicate the sources of improvement of the economic and financial situation of both a single enterprise and the entire group of cooperating units. This draws attention to the need to focus on the customer's needs while meeting the needs of all entities participating in the processes taking place in supply chains, taking into account modern information

and communication technologies. A lack of process coordination between individual members of the supply chain leads to inefficiencies, which may result in, among other things, excessive inventories, or e.g. extended order fulfilment cycles, unnecessary transport and storage (Bednarz, 2014).

As Cywka (2006) notes, important areas of supply chain functioning are savings logistics, efficiency logistics, and the optimisation of inventory levels. They refer to the basic areas of assessing the economic and financial situation of entities: costs and revenues (and their effects in the form of savings), efficiency, and inventory management. Undoubtedly, this cannot be done without access to reliable information, the acquisition and subsequent processing of which may be expensive, especially when using advanced IT tools (Cywka, 2006).

Moreover, other authors point out, among other things, measures used in the economic and financial calculations of logistics companies such as transport costs, the value of one's own means of transport, depreciation costs per means of transport, and productivity indicators. Dziaduch and Konkol's own research shows that the most important factors in the efficiency calculation – in the opinion of respondents – were the punctuality of deliveries, the avoidance of damage to the cargo during transport, and the completeness of deliveries (Dziaduch, Konkol, 2009).

In turn, some authors emphasis, that individual companies have a smaller impact on the final market success, and the competitive position of the entire supply chain in which a given company is a participant is decisive. Additionally, effective logistics takes into account the efficient organisation of product deliveries, with the lowest costs and an appropriate level of customer service. This opinion should be considered questionable in the sense that the failure of one link in the supply chain may, through a domino effect, adversely affect the financial efficiency of all its participants. Therefore, in overall terms, each of its participants is important to the economic and financial success or failure of the supply chain (Franc-Dąbrowska, 2014).

Anam draws attention to the benefits of responsible supply chain management in the form of cost optimisation resulting from the level of resource consumption and, therefore, savings generated in this area. The author also points to other benefits that result in positive economic and financial effects, including risk reduction (legal and organisational), image improvement, and new products and services (Anam, 2012).

The analysed literature also draws attention to a very important area of the financial effects of an enterprise's operation – financial liquidity. In an effective customer service (ECR) strategy, responsibility for inventory management is taken over by suppliers, which enables the reduction of the risk associated with their maintenance. This, in turn, has a positive impact on financial liquidity. Further, referring to supply management in the supply chain, was emphasises that in managing the flow of goods and the related flow of information and financial resources, it is important to adapt them as best as possible to the needs of the consumer, and at the same time increase the efficiency of both these flows and reduce the operating costs of the

entire supply chain. The ability to settle liabilities on time is crucial for the entity's survival on the market and undoubtedly limits its development possibilities in the event of liquidity problems (Wyrębek, 2013).

Based on research results, logistics companies require a holistic assessment approach encompassing individual supply chain participants and entire supply chains. While logistics companies share characteristics with other enterprises, they possess distinct features requiring specialized evaluation methods. A comprehensive assessment must combine multiple approaches examining individual entities, inter--participant relationships, and external dependencies affecting entire chains. Given these complexities, the economic and financial evaluation of logistics enterprises should follow a three-stage process: assessment of individual enterprise conditions, evaluation of contractor cooperation impact on financial performance, and assessment of total supply chain effectiveness including synergy effects. Traditional financial assessment methods can be applied, but specific attention must focus on delivery service levels and associated costs as core logistics activities. Since working capital management significantly determines cost levels, it serves as a fundamental measure of logistics companies' economic condition. Additionally, cost analysis by type becomes crucial. Therefore, while conventional financial evaluation measures apply to logistics companies, certain operational areas require more rigorous assessment due to the sector's distinctive characteristics, particularly inventory management and financing methods (Franc-Dąbrowska, 2014).

Logistics companies must monitor their financial performance to ensure they are able to survive emerging crises. The generated financial result is one of the most important indicators of the company's financial condition. This financial assessment could be used to study a company before any collaboration or partnership takes place. Financial institutions and investors may also use the financial assessment for credit analysis. Financial analysis could also serve as a guide for a company in terms of strategy formulation to leverage business potentials and mitigate risks (Hofmann, Lampe, 2013). Financial analysis can be based on a logistics company's annual report, including the profit and loss statement and balance sheet, which are historical in nature. They can include analysis on the liquidity, solvency and profitability ratios to measure the ability of a company to satisfy short term and long-term obligations and for profit generation. Nevertheless, profitability is the main concern of a logistics company, to create value, hire employees, enhance research and development, and for the sustainability and expansion of the company (Anthony et al., 2019).

Logistics companies could measure and perform achievement evaluations based on financial analysis such as profitability ratios, debt ratios, and the current ratio. The analysis of all these financial ratios could provide an insight for logistics companies for decision making in their investments for annual strategic planning, especially in their plans for the procurement, insurance, and maintenance of transport units (Vochozka et al., 2016). In the analysis of the efficiency of logistics companies, the

profitability ratios ROE and ROA, as well as the debt-to-asset ratio and debt-to--equity ratio, are also used.

## Research methods

The economic and financial condition of a logistics company can be evaluated using traditional financial analysis tools focused on cost control, asset efficiency, working capital management, and liquidity. The process includes analysing the balance sheet, profit and loss account, operational efficiency, profitability, and debt. Preliminary analysis examines relationships between financial statement items through horizontal analysis, which tracks changes over time, and vertical analysis, which studies structural proportions. Using long-term data enables identifying trends in assets, liabilities, and overall financial stability. The asset structure shows capital utilization, while the liability structure reveals funding sources (Sierpińska, Jachna, 2017).

In the case study presented in the article, dynamics indicators are calculated as a percentage ratio of the volume from a given year to the volume from the previous year (chain method).

Vertical–horizontal analysis involves checking whether the company's asset financing methods ensure its safety in terms of long-term financial liquidity. It is assumed that a company applying a conservative, safe financial policy should use the so-called the golden balance sheet rule. The golden rule is that all fixed assets owned by the company are financed with equity. According to this principle, fixed assets should be financed with equity capital, because this part of the assets is related to the enterprise in the long term. As such, it is characterised by a low rate of conversion to cash, and therefore it should be financed with more stable capital, made available to the enterprise for a long period. A possible, less restrictive silver balance sheet rule assumes that all fixed assets held by the company should be financed with fixed capital (equity + long-term liabilities, i.e. capital that finances assets over a period longer than 12 months) (Kołosowska et al., 2018).

Preliminary analysis of the profit and loss account examines the dynamics and structure of revenues, costs, and financial results, as well as relationships between result categories. Changes in net profit stem from shifts in these components, evaluated through revenue and cost dynamics and their structural composition (Sierpińska, Jachna, 2004).

The next stage, after the preliminary analysis of the balance sheet and profit and loss account, is a ratio analysis, including the examination of operational efficiency, financial liquidity, profitability, and debt.

Operational efficiency indicators (Table 1) are used to assess the effectiveness of the use of assets at the company's disposal. The analysis of operational efficiency

is closely related to the analysis of financial liquidity because it explains how efficiently the company manages receivables, inventories, and short-term liabilities (Pomykalska, Pomykalski, 2007).

Table 1. Activity (turnover) ratios

| Financial ratio | Calculation formula |
|---|---|
| Inventory turnover ratio (in days) | $\frac{average\,inventory}{cost\,of\,\,producing\,sold\,\,products}$ |
| Receivables turnover ratio (in days) | $\frac{average\,balance\,of\,\,short-term\,receivables}{sales\,revenues}$ |
| Liabilities turnover ratio (in days) | $\frac{average\,balance\,of\,\,short-term\,liabilities}{sales\,revenues}$ |

Source: Own study based on Kołosowska et al., (2018); Zaleska (2012)

Liquidity in terms of assets is characterised by the ease of transforming the assets owned by the company into cash in the shortest possible time and with insignificant or no loss of value. Liquidity in terms of assets and capital expresses the company's ability to settle short-term liabilities. The third type of liquidity (Table 2) means, that financial liquidity is maintained if expenses resulting from current short-term liabilities and necessary future expenses are covered by current cash inflows (Wędzki, 2002).

Table 2. Financial liquidity ratios

| Financial Ratio | Calculation formula |
|---|---|
| Current ratio | $\frac{current\,assets}{current\,liabilities}$ |
| Quick ratio | $\frac{current\,assets-inventories-short-term\,prepayments}{current\,liabilities}$ |
| Cash ratio | $\frac{short-term\,investments}{current\,liabilities}$ |

Source: Own study based on Pomykalska, Pomykalski (2007)

Profitability reflects the financial efficiency of a business. Profitability ratios are also called profitability ratios or rates of return. They measure economy expressed as the ratio of effects to expenditure (Table 3).

Table 3. Profitability ratios

| Financial Ratio | Calculation formula |
|---|---|
| ROE (return on equity) | $\frac{net\ profit}{equity} x100\%$ |
| ROA (return on assets) | $\frac{net\ profit}{total\ assets} x100\%$ |
| ROS (return on sale) | $\frac{net\ profit}{sales\ revenue} x100\%$ |

Source: Own study based on Kotowska et al. (2018)

The indicators used to analyse a company's debt can be divided into two groups (table 4).

Table 4. Debt ratios

| **Indicator** | **Calculation formula** |
|---|---|
| Debt ratio | $\frac{total\ liabilities}{total\ assets}$ |
| Debt–equity ratio | $\frac{equity}{total\ assets}$ |

Source: Own study based on Kotowska et al. (2018)

An important stage in the analysis of financial condition is the prediction of bankruptcy, which can be made using discriminant models. Over the past decades, researchers have suggested statistical and analytical approaches to predicting bankruptcies, ranging from simple statistical prediction models (Altman, 1968; Beaver, 1966) to modern machine-learning (ML) models (Geng et al., 2015; Lee and Choi, 2013). The Altman model is one of the most popular early warning models and is still successfully used by theoreticians and practitioners in many countries. However, the literature on the subject emphasises that this is not a universal model but is rather adapted to assessing enterprises operating in different countries and, therefore, in different economic conditions.

The next modification concerned the addition of a constant of 3.25 to the Z A3 function. This model is called the EMS (Emerging Market Score) model (Altman, Hotchkiss, 2005). According to this classification, it is assumed that for an index value less than or equal to 5.25 (BB+ rating), the risk of bankruptcy is high, while for values above 5.25, the risk of bankruptcy is low (Table 5).

Table 5. The form of the Altman EM-Score model and the interpretation of the Z function

| **Model** | **Mathematical form of the model** | **Interpretation** |
|---|---|---|
| E. Altman EM-Score | $x_1 = \frac{working\ capital}{total\ assets}$<br>$x_2 = \frac{retained\ earnings}{total\ assets}$<br>$x_3 = \frac{EBIT}{total\ assets}$<br>$x_4 = \frac{equity}{total\ liabilities}$ | safe zone (SZ)<br>grey zone (GZ)<br>distress zone (DZ) |

Source: Own study based on Altman E.I., Hotchkiss E. (2005)

One of the Polish models was chosen as the second bankruptcy prediction model – the Mączyńska model, the formula of which is presented in the table below.

Table 6. The form of the Mączyńska model and the interpretation of the Z function

| Model | Mathematical form of the Model | **Interpretation of the Z Function** |
|---|---|---|
| Mączyńska model | $x_1 = \frac{gross\ profit + depreciation}{total\ liabilities}$<br>$x_2 = \frac{total\ assets}{total\ liabilities}$<br>$x_3 = \frac{gross\ profit}{total\ assets}$<br>$x_4 = \frac{gross\ profit}{revenues}$<br>$x_5 = \frac{inventories}{revenues}$<br>$x_6 = \frac{revenues}{total\ assets}$ | safe zone (SF)<br>distress zone (DZ)<br>grey zone (GZ) |

Source: Own study based on Mączyńska (1994)

A. Hołda and B. Prusak (2001) point out the limitations in the application of Altman's model resulting from several of its characteristic features. First, the conditions under which empirical data for the model were collected change over time, making the usefulness of models based on historical data limited over time. According to Grice and Ingram (2001), the predictive bankruptcy capacity decreases when it is applied to recent periods. Moreover, the use of discriminant functions should be limited to the country where the data used to develop the model were collected,

precisely due to the different environment in which economic entities operate and the specific nature of the accounting system (Fitó-Bertran et al., 2018; Hołda, 2001; Prusak, 2004). Furthermore, Platt and Platt (1991) showed that adjusting coefficients based on the particular sector under analysis leads to improved outcomes. However, traditional statistical techniques such as the Altman model can be a valuable tool for assessing the financial condition of companies.

Notwithstanding the above, one should be aware of their limitations and, when assessing companies, confirm the results obtained by means of additional analysis (Mosionek-Schweda, 2014). Amat et al. (2016) proposed an improved version of the Altman model (1986) designed to enhance its ability to identify instances of insolvency within the Spanish context. Following Fitó-Bertran et al. (2018), the predictive capacity of financial distress increases when it is adapted to the analysis environment. Hence, using Logista S.A. (Spain) as part of our data analysis, we consider the Amat Z-score model a proper indicator for our study.

Table 7. The form of the Amat model and the interpretation of the Z* function

| Model | Mathematical form of the model | Interpretation |
|---|---|---|
| Amat Z* formula | $x_1 = \frac{current\ assets}{current\ liabilities}$<br>$x_2 = \frac{net\ equity}{total\ assets}$<br>$x_3 = \frac{net\ income}{total\ assets}$<br>$x_4 = \frac{net\ income}{net\ equity}$ | low probability of good financial health<br>high probability of financial problems |

Source: Own study based on Amat et al. (2017)

Apart from the above models, the risk of bankruptcy can also be assessed using the Wilcox ratio, which defines the company's ability to repay its current debts, as well as its ability to cover potential future liabilities.

## Financial condition of companies – case studies

## ATC Cargo S.A. – financial analysis

ATC Cargo S.A. is a logistics operator offering comprehensive solutions in supply chain management tailored to the individual needs of clients. The company provides, among other things, freight forwarding services, transportation, loading, unloading, customs clearance, required inspections, assistance in obtaining the

relevant certificates, warehouse and contractual logistics services, and port handling. The company also offers services for organising maritime, air, road (including full-container transport and FTL), and railway transport, and utilises intermodal solutions. The company has been in operation since 2006.

Table 8. Analysis of the dynamics and structure of the balance sheet (in %)

| | **Dynamics 2020/2021** (+)growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease | Structure 2020 | Structure 2021 | Structure 2022 |
|---|---|---|---|---|---|
| Fixed assets | (-) 5 | (-) 5 | 25 | 15 | 14 |
| Current assets | (+) 83 | (+) 1 | 75 | 85 | 86 |
| Equity | (+) 61 | (+) 53 | 38 | 38 | 58 |
| Long-term liabilities | (+) 35 | (-) 51 | 1.3 | 1.1 | 0.8 |
| Short-term liabilities | (+) 52 | (-) 35 | 92 | 88 | 85 |
| Total liabilities | (+) 59 | (-) 33 | 62 | 62 | 42 |

Source: Own study based on ATC Cargo S.A. annual financial statements for 2021-2022

In 2021, fixed assets decreased by 5% compared to 2020. A similar situation occurred in 2022. Regarding current assets, there was an 83% increase in 2021 compared to 2020, while in 2022, current assets increased by 1%. Throughout the examined period, current assets dominated the company's overall assets, accounting for 75% in 2020, 85% in 2021, and 86% in 2022, respectively. The significant decline in fixed assets was primarily attributed to the reduction in tangible fixed assets.

In the period of 2020–2021, equity represented 38% of the total capital, while in 2022, the share of these capitals increased to 58%. Liabilities in 2021 increased by 59% year-over-year, while in 2022, they decreased by 33%. This was reflected in the capital structure, as the share of liabilities in the total capital (equity + liabilities) decreased from 62% in 2021 to 42%. Throughout the research period, short-term liabilities comprised the largest share in total obligations, accounting for 92% in 2020, 88% in 2021, and 85% in 2022.

Table 9. Dynamics of EBIT and net profit (in %)

| | **Dynamics 2020/2021** (+) growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease |
|---|---|---|
| EBIT | (+) 258 | (+) 12 |
| Net profit | (+) 245 | (+) 24 |

Source: Own study based on ATC Cargo S.A. annual financial statements for 2021-2022

In the period of 2020–2022, the company achieved a net profit, which increased by 245% year-over-year in 2021 and by 24% in 2022 compared to the previous year. EBIT also experienced growth during the examined period.

Table 10. Dynamics and structure of operating revenues and costs (in %)

| | **Dynamics** (+) growth (-) decrease | **Dynamics** (+) growth (-) decrease | **Structure 2020** | **Structure 2021** | **Structure 2022** |
|---|---|---|---|---|---|
| Net revenues from sales | (+) 68 | (+) 19 | 99.6 | 99.7 | 99.5 |
| Operating expenses | (+) 62 | (+) 20 | 99.4 | 99.1 | 99.5 |
| Other operating expenses | (+) 16 | (+) 33 | 0.3 | 0.2 | 0.3 |
| Financial expenses | (+) 381 | (-) 64 | 0.1 | 0.1 | 0.2 |

Source: Own study based on ATC Cargo S.A. annual financial statements for 2021-2022

In 2021, sales revenues increased by 68% compared to 2020, and in 2022, they grew by 19%. Their share in total revenues was significant, as operational revenues accounted for over 99% of the total revenue during the examined period. The growth dynamics of operating costs were similar to those of operating revenues. Their share in total costs was over 99% in the surveyed years. Other operating costs and financial costs constituted less than 1% of the total costs.

Table 11. Analysis of operating costs (in %)

| | **Dynamics 2020/2021** (+) growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease | **Structure 2020** | **2021** | **2022** |
|---|---|---|---|---|---|
| Cost of products, goods and materials sold | (+) 66 | (+) 21 | 89.5 | 91.3 | 92.1 |
| General and administrative costs | (+) 34 | (+) 9 | 10.5 | 8.7 | 7.9 |
| Operating expenses | (+) 62 | (+) 20 | 100 | 100 | 100 |

Source: Own study based on ATC Cargo S.A. annual financial statements for 2021-2022

According to the analysis, the costs of products, goods, and materials sold constituted approximately 90% of the total operating costs in the surveyed years. The value of these costs increased by 66% in 2021 and by 21% in 2022. General administrative costs in 2021 increased by 34%, and in 2022, there was growth of 9%. Their share in the total operating costs in 2020 was 10.5%, while in the period of 2021–2022, it remained below 10%.

Table 12. The value of the company's selected financial indicators

| Year | 2020 | **2021** | **2022** |
|---|---|---|---|
| Coverage ratio I | 1.46 | 2.49 | 4.02 |
| ROE | 20.9 | 44.6 | 36.1 |
| ROA | 7.9 | 17.0 | 21.1 |
| ROS | 2.4 | 5.0 | 5.2 |
| Debt ratio | 0.62 | 0.62 | 0.42 |
| Debt–equity ratio | 1.64 | 1.61 | 0.70 |
| Current liquidity | 1.29 | 1.56 | 2.06 |
| Inventory turnover ratio (in days) | ~18 days | ~17 days | ~5 days |
| Receivables turnover ratio (in days) | ~53 days | ~50 days | ~34 days |
| Liabilities turnover ratio (in days) | ~65 days | ~58 days | ~32 days |
| Operational index | 96% | 93% | 93% |

Source: Own study based on ATC Cargo S.A. annual financial statements for 2021-2022

As indicated by the analysis of financial indicators, the company faced no issues with financial liquidity. It can be observed that liquidity increased. Debt represented 62% in 2020–2021 and was then reduced to 42%. Throughout the period of 2020–2022, the company remained profitable. Furthermore, the examined profitability ratios increased and were higher than the sector average (GPW industry: Transportation and Logistics). Inventory turnover, which was 18 days in 2020, decreased to five days. This indicates that the company is operating well.

Table 13. Altman EMScore and Mączyńska models

| | **2020** | **2021** | **2022** |
|---|---|---|---|
| Altman EMScore | 5.5847 | 7.6419 | 10.4764 |
| Mączyńska | 1.86 | 3.38 | 6.95 |

Source: Own study based on ATC Cargo S.A. annual financial reports for 2021-2022

As per the analysis of the company's bankruptcy prediction using the Altman EMScore model and the Mączyńska model, the enterprise was not under the threat of bankruptcy in the period of 2020–2022. The analysis of the company's financial data for the period under review indicates its stable condition and positive prospects. The company not only maintained financial liquidity and profitability, but also achieved significant net profit, with a significant increase in 2021 (by 245%). The increase in costs, especially operating costs (by 62% in 2021 and 20% in 2022), was effectively compensated for by the increase in sales revenue (by 68% in 2021). The company also maintained a golden balance sheet, which means that its fixed assets were covered by equity. Positively, the capital structure has improved, as evidenced by the decrease in the share of short-term liabilities in total capital from 62% to 42% in 2022. This indicates less reliance on short-term debt. All these factors suggest a low risk of company bankruptcy. The payment of dividends in 2020–2021 and the absence thereof in 2022 may suggest a change in the dividend policy, which requires further research.

To sum up, the company demonstrates a stable financial position and high profitability, despite rising costs. The positive revenue growth trend and improved capital structure further strengthen these positive prospects. However, the lack of a dividend in 2022 requires further analysis of the company's dividend policy.

## Logista Group S.A. – financial analysis

Compañía de Distribución Integral Logista Holdings, S.A., also known as Logista Group, is a Spanish distribution company which has been operating in Europe since 1999. Its distribution portfolio includes tobacco, pharmaceutical products, e-transactions, and convenience stores, among others. Logista Group also offers transportation solutions, temperature-controlled services and industrial parcels, operating in Spain, Portugal, Holland, France and Italy. The company went public for the first time in 2014, being listed on the Spanish leading stock Index IBEX35 in 2022.

Aggregate values remained stable throughout the research period. Permanent resources account for around 10% of the company's total assets. Thereby, the company's financial structure is mostly comprised of short-term debt, accounting for almost 90% of the total in all years. Although it could pose certain solvency problems, the majority of the debt belongs to that acquired via public administration. One of the main activities of the company is the distribution of tobacco, which is subject to a high percentage of taxes. However, short-term assets account for a high percentage of the total economic structure, being a rather dynamic structure.

Table 14. Analysis of the dynamics and structure of the balance sheet (in %)

| | Dynamics 2020/2021 (+) growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease | **Structure 2020** | **Structure 2021** | **Structure 2022** |
|---|---|---|---|---|---|
| Fixed assets | (-) 6.4 | (-) 1.9 | 22.2 | 21.5 | 20.8 |
| Current assets | (-) 2.4 | (+) 2.3 | 77.8 | 78.5 | 79.2 |
| Equity | (+) 1.6 | (+) 8 | 6.6 | 6.9 | 7.4 |
| Long-term liabilities | (-) 10.6 | (-) 3.2 | 5.4 | 5 | 4.7 |
| Short-term liabilities | (-) 3.2 | (+) 1.1 | 88 | 88.1 | 87.9 |
| Total liabilities | (-) 3.7 | (+) 0.9 | 93.4 | 93.1 | 92.6 |

Source: Own study based on Annual financial statements of Logista Group S.A. for 2021-2022

Table 15. Dynamics of EBIT and net profit (in %)

| | **Dynamics 2020/2021** (+) growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease |
|---|---|---|
| EBIT | (+) 16.4 | (+) 10.9 |
| Net profit | (+) 10.5 | (+) 14.4 |

Source: Own study based on Annual financial statements of Logista Group S.A. for 2021-2022

The company demonstrated growth in both periods, evidenced by increases in both net profit and EBIT. In 2020–21, it improved its financial standing by cutting expenses by over 66% and boosting income from financial operations. Then, in 2021–22, losses from discontinued operations were reduced, leading to a more pronounced variation in net profit. These data support the findings of Atayah et al. (2022), who suggest that the logistics sector experienced increased demand during the COVID-19 period, leading to improved financial performance and, therefore, an increase in profits.

The company's income comes mainly from the distribution of tobacco and related products (96%), followed by transportation and pharmaceutical distribution. Although tobacco distribution serves as the primary revenue stream for the company, it is evident that the transportation sector is progressively assuming a substantial presence within the array of services offered. In 2022, the company acquired Speedlink Worldwide Express B.V., 24 Hours B.V., and German-Ex B.V., which specialise in express deliveries originating from or destined for Belgium and the Netherlands. in April 2022, the Group concluded an agreement to obtain 100% ownership of Carbó Collbatallé, S.L., a Spanish entity specialising in cold transport and logistics within the food sector. Furthermore, in June 2022, the Group finalised

an agreement to acquire 60% ownership of Herinvemol. S.L. (Transportes El Mosca), a Spanish enterprise specialising in the transportation and warehousing of goods, as well as frozen or refrigerated transport and high-volume transportation, primarily catering to the food industries. Additionally, the company is well-versed in both national and international maritime transport.

Table 16. Dynamics and structure of operating revenues and costs (in %)

| | **Dynamics 2020/2021** (+) growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease | **Structure 2020** | **Structure 2021** | **Structure 2022** |
|---|---|---|---|---|---|
| Net revenues from sales | (+) 2.4 | (+) 6 | 99.8 | 99.8 | 99.8 |
| Operating expenses | (+) 2.2 | (+) 5.9 | 99.95 | 99.98 | 99.98 |
| Financial expenses | (-) 65.7 | (+) 39.8 | 0.05 | 0.02 | 0.02 |

Source: Own study based on Annual financial statements of Logista Group S.A. for 2021-2022

The cost structure of the company primarily revolves around operational expenses, with financial costs remaining below 1% throughout the studied period. Operational costs, notably procurement expenditures (refer to Table 4), constitute the primary expense. Financial expenses decreased by 66% during the 2020–21 period.

Table 17. Analysis of operating costs (dynamics and structure, in %)

| | **Dynamics 2020/2021** (+) growth (-) decrease | **Dynamics 2021/2022** (+) growth (-) decrease | **Structure 2020** | **2021** | **2022** |
|---|---|---|---|---|---|
| Cost of products, goods and materials sold | (+) 2.5 | (+) 6.1 | 90.8 | 91.1 | 91.35 |
| General and administrative costs | (-) 1.2 | (+) 3.2 | 9.2 | 8.9 | 8.65 |
| Operating expenses | (+) 2.2 | (+) 5.9 | 100 | 100 | 100 |

Source: Own study based on Annual financial statements of Logista Group S.A. for 2021-2022

Following the cost analysis, the main item is the cost of goods and materials sold, which constitutes 90% of the total operational expenses, similar to ATC Cargo. The cost of goods sold progressively increased until 2022, with other administrative and management costs accounting for smaller percentages. Although, from a trend

and benchmarking view, the variations are not significant over the period studied, the trend of increasing operational costs reflects the fact that operational costs are impacted, in part, by the escalation in the prices of supplies stemming from the prevailing circumstances.

Table 18. The value of the company's selected financial indicators

| **Year** | **2020** | **2021** | **2022** |
|---|---|---|---|
| Coverage ratio I | 0.30 | 0.32 | 0.35 |
| Coverage ratio II | 0.54 | 0.55 | 0.58 |
| ROE | 30.52% | 33.20% | 35.14% |
| ROA | 2.01% | 2.30% | 2.59% |
| ROS | 1.49% | 1.61% | 1.74% |
| Debt ratio | 93.42% | 93.09% | 92.63% |
| Debt–equity ratio | 0.066 | 0.069 | 0.074 |
| Current liquidity | 0.88 | 0.89 | 0.90 |
| Quick ratio | 0.70 | 0.67 | 0.68 |
| Cash ratio | 0.02 | 0.03 | 0.03 |
| Inventory turnover ratio (in days) | ~50 days | ~52 days | ~53 days |
| Receivables turnover ratio (in days) | ~65 days | ~66 days | ~63 days |
| Liabilities turnover ratio (in days) | ~46 days | ~43 days | ~46 days |

Source: Own study based on Annual financial statements of Logista Group S.A. for 2021-2022

While the liquidity ratio exhibits relatively low values, it is crucial to consider the composition of short-term debt. Approximately 80% of the short-term debt comprises liabilities to public administration resulting from tobacco-related activities, thereby subjecting it to the settlement periods stipulated by the Spanish administration. Consequently, similar to certain sectors, a ratio below one should not necessarily be construed as being indicative of liquidity challenges. This liquidity pressure may be alleviated by the positive and ascending trends observed in financial and economic profitability during the period spanning from 2020 to 2022. However, the debt ratio indicates a significant level of asset coverage, raising concerns if the company fails to maintain its current level of overall income.

Table 19. Altman EMScore model and Amat Z score model estimations

| | **2020** | **2021** | **2022** |
|---|---|---|---|
| Altman EMScore | 2.8951 | 2.9855 | 3.0808 |
| Amat Z score model | -0.7717 | -0.5949 | -0.44211 |

Source: Own study based on Annual financial statements of Logista Group S.A. for 2021-2022

According to both models, the company is situated within a distress zone, suggesting a potential risk of future bankruptcy. Nonetheless, there is an upward trend in the values, indicating a positive trajectory and the company's gradual approach towards a more stable level. This suggests a favourable outlook for its economic and financial situation. These findings corroborate the assertions of Atayah et al. (2022), who posit that the surge in demand for logistics services during the COVID-19 period contributed to improved performance.

This document conducts an analysis of the economic and financial landscape of Logista Group throughout the timeframe of 2020 to 2022, with the objective of providing a comprehensive insight into the turbulent periods experienced within the logistics sector in Spain. This period was characterised by a surge in the prices of raw materials, supplies, and other essential resources, consequently leading to an escalation in the cost of living. Nevertheless, the logistics and transportation sector has managed to leverage the prevailing economic conditions of the period. In general, Logista Group demonstrates a positive trajectory in its financial circumstances. Despite the progression being gradual, the company consistently records amplified profits annually, showcasing a growth rate ranging between 10% and 15% per year.

Aggregate values have remained stable over the years studied, with permanent resources accounting for approximately 10% of the company's total assets. The debt structure exhibits a higher reliance on short-term debt for financing its assets, covering roughly 90% of the company's assets. This is primarily attributed to current liabilities owed to public administration, such as tobacco excise tax or VAT.

The situation stemming from the COVID-19 pandemic has not negatively impacted the company, as numerous products distributed by the company were available in retail establishments that remained operational during the lockdown, thereby sustaining distribution volumes. The primary component of its revenues is the distribution of tobacco and related products (96%). According to García-Álvarez et al., (2020), the lockdown increased the consumption of these substances. Logista Group also distributes pharmaceutical products, which were essential commodities during the COVID-19 crisis. Additionally, the transportation sector persisted in its operations to address and alleviate congestion, thereby streamlining clearance processes.

Although models indicate a potential bankruptcy scenario, the upward trend in values points to recovery and improvement. The company's inclusion in the IBEX35 index confirms its strong position in the Spanish and European markets. Its stable and growing dividend policy increases investor interest, while continuous acquisitions in national and international transportation firms highlight its strategy of expansion and diversification.

## Discussion

International companies were selected for the analyses, implementing logistics processes in various geographical and cultural areas, which makes the research results universal in terms of both geography and industry. When analysing selected companies, it should be remembered that the specificity of the logistics industry is that they must carry out their activities, i.e. delivering products, despite the ongoing crisis, i.e. even in the most unfavourable situations. For this reason, companies from the TSL industry should remain highly resistant to all types of crises. In order to effectively increase the resilience of such companies and at the same time reduce the risk of bankruptcy or loss of financial liquidity, it is necessary to select a methodology for monitoring their financial situation.

Based on the research, the proposed methodology for assessing the financial security of logistics companies includes collecting financial and operational data, conducting preliminary balance sheet and profit and loss analysis, determining and interpreting key indicators, evaluating the impact of external conditions on operations, and summarizing results to identify areas for improvement and main risk factors.

In summary, the presented methodology combines both quantitative and qualitative aspects of the financial security of logistics companies, taking into account the specific nature of the TSL industry and current market conditions. In the authors' opinion, this allows for a reliable and comprehensive assessment of the company's condition, identification of threats, and effective risk management in a dynamic business environment.

In the authors' opinion, the tools for assessing financial condition presented in the article, along with discriminant models, can successfully serve this purpose. After demonstrating that discriminant models can be an effective tool for assessing the economic security of enterprises in the TSL industry, it is assumed that at the next stage of research, those that are most effective in terms of their application will be selected. This will equip managers with a set of ready-made tools for assessing and forecasting the economic security of enterprises in the TSL industry.

## Conclusions

The financial analysis of selected companies from the TSL sector shows that the global crises of recent years have had a negative impact on their financial condition, but did not threaten the continuation of their operations, as was observed in the case of other industries, e.g. hotels and catering. Despite a significant increase in costs, the analysed companies coped well in crisis situations, which were unpredictable

and global in nature and could therefore have disrupted the functioning of the entire TSL sector. During the period under review, the companies were profitable, did not have high debts and demonstrated efficient operations. The discriminant models used in the research do not indicate any risk of bankruptcy among the analysed companies. The results obtained indicate the most important aspects of the company's operation and allow for decisions related to the operations of logistics companies in conditions of various external crises to be made. The research showed that the methods used to assess companies in the TSL industry are effective tools for monitoring their economic security, and can therefore be used to build the resilience of enterprises and reduce the risk in their operation.

BIBLIOGRAPHY

[1] Amat, O., Manini, R., Renart, M. A., 2017. Credit concession through credit scoring: Analysis and application proposal. Intangible Capital, 13(1).

[2] Annual financial statements of Logista Group S.A. for 2021-2022 [online]. Available at: https://www.logista.com/en/home/investors-shareholders/economic-financial-information/financial-reports.html [Accessed: 12 November 2023].

[3] Anthony, P., Behnoee, B., Hassanpour, M., Pamucar, D., 2019. Financial performance evaluation of seven Indian chemical companies, Decision Making: Applications in Management and Engineering, 2 (2), May 2019

[4] Atayah, O. F., Dhiaf, M. M., Najaf, K., Frederico, G. F., 2022. Impact of COVID-19 on financial performance of logistics firms: evidence from G-20 countries. Journal of Global Operations and Strategic Sourcing, 15(2).

[5] ATC Cargo S.A. annual financial statements for 2021-2022 [online]. Available at: https://atc-cargo.pl/dla-inwestora [Accessed: 12 May 2024].

[6] Bednarz, L., 2014. Mechanizmy i sposoby koordynacji w łańcuchach dostaw, „Zarządzanie Przedsiębiorstwem, Zeszyty Naukowe", No. 41.

[7] Bø, E., Hovi, I. B., Pinchasik, D., 2023. COVID-19 Disruptions and Norwegian Food and Pharmaceutical Supply Chains: Insights into Supply Chain Risk Management, Resilience, and Reliability. Sustainable Futures 5, DOI: https://doi.org/10.1016/j.sftr.2022.100102.

[8] Bris, R.,Soares, C. G., 2009. Homogeneity and scale testing for small samples with censored and missing data. In Reliability, Risk, and Safety, Three Volume Set pp. 941-948. CRC Press.

[9] Cywka, M., 2006. Informacja a informatyka – wpływ na sprawne zarządzanie łańcuchem dostaw, Świętokrzyskie Centrum Edukacji na Odległość, Zeszyty Naukowe 2/2006.

[10] Dziaduch, I., Konkol, K. P., 2009. Wpływ przedsiębiorstw transportowo-spedycyjnych na efektywność łańcucha dostaw, LogForum, 5, I. 2(4), 2009.

[11] Fitó-Bertran, À., Plana-Erta, D., Llobet Dalmases, J., 2018. Usefulness of Z scoring models in the early detection of financial problems in bankrupt Spanish companies.

[12] Franc-Dąbrowska J., 2014. Ocena ekonomiczno-finansowa przedsiębiorstw logistycznych w kontekście łańcuchów dostaw, Logistyka 4/14.

[13] García-Álvarez, L., de la Fuente-Tomás, L., Sáiz, P. A., García-Portilla, M. P., Bobes, J., 2020. ¿ Se observarán cambios en el consumo de alcohol y tabaco durante el confinamiento por COVID-19?. adicciones, 32(2).

[14] Standardy GS1 w łańcuchu dostaw, [online] Instytut Logistyki i Magazynowania – GS1 Polska, Available at: https://gs1pl.org/app/uploads/2022/01/Standardy_GS1_w_transporcie_i_logistyce_nowe.pdf [Accessed: 15 November 2023].

[15] Hofmann, E. and Lampe K., 2013 Financial statement analysis of logistics service providers: Ways of enhancing performance, International Journal of Physical Distribution & Logistics Management, 43(4), Apr. 2013.

[16] Hohenstein, N. O., Feisel, E., Hartmann, E., Giunipero, L., 2015. Research on the phenomenon of supply chain resilience: A systematic review and paths for further investigation. International Journal of Physical Distribution and Logistics Management., 45.

[17] Kołosowska, B., Voss, G., Huterska A., 2018. Analiza finansowa w praktyce, Difin, Warszawa.

[18] Kotowska, B., Uziębło, A., Wyszkowska-Kaniewska O., 2018. Analiza finansowa w przedsiębiorstwie, CeDeWu, Warszawa.

[19] Mączyńska, E., 1994. Ocena kondycji przedsiębiorstwa (uproszczone metody). Życie Gospodarcze, 38, 44.

[20] Nowakowski, T., 2011, Niezawodność systemów logistycznych (Reliability of logistics systems), Oficyna Wydawnicza Politechniki Wrocławskiej.

[21] Ołdak, A., 2023. Od 1 grudnia duża podwyżka opłat za drogi w Niemczech. URL: [online] Available at: https://www.wnp.pl/logistyka/od-1-grudnia-duza-podwyzka-oplat-za-drogi-w-niemczech-moze-dobic-polskie-firmy,772971.html. [Accessed: 29 November 2023].

[22] Platt, H. D. Platt, M. B., 1991. A note on the use of industry-relative ratios in bankruptcy prediction. Journal of Banking & Finance, 15(6),.

[23] Pomykalska, B., Pomykalski, P., 2007. Analiza finansowa przedsiębiorstwa, PWN, Warszawa.

[24] Rahman, T., Paul, S. K., Shukla, N., Agarwal, R., Taghikhah, F., 2022. „Supply Chain Resilience Initiatives and Strategies: A Systematic Review". Computers & Industrial Engineering 170: 108317. https://doi.org/10.1016/j.cie.2022.108317

[25] Raport Market Insights, 2023. CargoOn #3, [online] Available at: https://cargoon.eu/pl/lp/mion-3/?gclid=Cj0KCQiA6fafBhC1ARIsAIJjL8nouM3yOHVYDnLQB6CZXbxLMIRknRFh3Ub88RpAF-4qF7jMwNbd3voaAvs2EALw_wcB [Accessed: 12 January 2024].

[26] Scala, B., Lindsay, C. F., „Supply Chain Resilience during Pandemic Disruption: Evidence from Healthcare". [online] Supply Chain Management: An International Journal 26, nr 6, Available at: https://www.scribd.com/document/668383636/SCM-09-2020-0434-Accepted-Version [Accessed: 6 September 2023].

[27] Sierpińska, M., Jachna, T., 2004. Ocena przedsiębiorstw według standardów światowych, PWN, Warszawa.

[28] Sierpińska, M., Jachna, T., 2017. Metody podejmowania decyzji finansowych. Analiza przykładów i przypadków, PWN, Warszawa.

[29] Smal, T., Śliwczyński, B., 2022, European Research Studies Journal, XXV, Special Issue A, 138-148, DOI: https://doi.org/10.35808/ersj/2943.

[30] TRANS.EU, 2023. Rynek transportowo-logistyczny w Europie. Podsumowanie 2023. Prognozy i trendy 2024. Raport TRANS.EDU.

[31] Vochozka, M., Rowland, Z., Vrbka, J., 2016. Financial analysis of an average transport company in the Czech Republic, Nase More International Journal of Maritime Science & Technology, 63 (6).

[32] Wędzki, D., 2002. Strategie płynności finansowej przedsiębiorstwa, Oficyna Ekonomiczna, Kraków.

[33] Wiedmer, R., Polyviou, M., Paraskevas, J. P., 2023 Does global supply chain integration payoff? The case of maritime shipping firms. First published: 08 June 2023. DOI: https://doi.org/10.1111/jbl.12350.

[34] Wyrębek, H., 2013. Strategie zarządzania łańcuchem dostaw, Military Logistics Systems, 39(2).

[35] Zaleska, M., 2012. Ocena kondycji ekonomiczno-finansowej przedsiębiorstwa przez analityka bankowego, SGH w Warszawie, Warszawa.

[36] Żywiołek, J., Szymonik, A., Smal, T., 2025. Navigating Supply Chain Turbulence Leveraging Modern Technologies for Safety, Resilience, and Risk Reduction, Routledge Taylors & Francis. DOI: https://doi.org/10.4324/9781003561736.