LOGISTICS AND INTERNATIONAL MARKETING AS FACTORS IN OPTIMIZING THE MARKETING POLICY OF DISTRIBUTION

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Abstract. The article examines the interdependence of logistics and international marketing as key factors in optimizing the marketing policy of enterprise distribution. It is shown that in the context of globalization and digital transformation, it is the integration of logistics processes and international marketing strategies that determines the efficiency of the movement of goods or services. The authors propose economic and mathematical models that allow quantifying the efficiency of distribution, taking into account costs, delivery speed, customs barriers, and demand elasticity. The authors' contribution is the testing of the developed models on the example of enterprises' activities, which allows to assess the costs of logistics and the results of marketing policy. The findings show the existence of a synergistic relationship between effective management, logistics marketing and costs. The results obtained will be useful for domestic business entities that conduct international activities and implement the latest tools in marketing policy.
Keywords: logistics; international marketing; marketing policy of distribution; optimization; globalization; digital transformation; competitiveness.

Introduction

The modern globalized economy operates in the format of high interdependence of almost all markets, when the efficiency of business activity depends not only on internal resources, but also on the ability to integrate into global value chains or internal state wealth. In such

conditions, logistics ceases to be an exclusively operational function of transportation, movement or warehousing, turning into a strategic mechanism for the most effective optimization of distribution processes. New strategic guidelines for international marketing are emerging, which should take into account the need to adapt goods and services to market requirements at an extremely fast pace. Traditional existing distribution tools are focused on minimizing costs, but do not take into account the variability or dynamism of the international marketing environment. It should be borne in mind that the international marketing environment is influenced by currency fluctuations, customs barriers, and asymmetries in institutional marketing support, which is different in each country. This creates new challenges for logistics, which can only be solved by using the latest tools that can anticipate these challenges and help marketers make the right management decision. That is why the combination of international marketing, logistics and effective management capable of solving all the difficult issues of modern marketing is an urgent need.

Literature review. In the modern scientific world, there are many scientific works devoted to the problems of logistics, international marketing, etc. As an example, Chen & Wang (2010) emphasize the critical success factors for the entry of information services into international markets. This is important for our article, as it confirms the link between information technology and international marketing and distribution efficiency. Chofreh et al. (2025) analyze strategies for integrating sustainable development into the logistics of the oil and gas industry, which is in line with our work, where distribution optimization is also considered through the prism of multifactoriality, in particular environmental and resource aspects. Grishchenko et al. (2016) propose tools for organizing and planning marketing logistics. Our article expands on this issue by forming the authors' own mathematical indices for assessing the efficiency of the distribution system.

Lee & Lam (2012) investigate reverse logistics as a mechanism for increasing sustainability in marketing systems. Their approach deepens the argumentation of our scientific work on the integration of logistics and marketing as a systemic process. Onstein et al. (2019) review the factors that determine the structure of distribution in logistics, which provides a theoretical basis for our focus on structural models of international distribution. Soysal et al. (2014) model food logistics networks with emissions in mind, which confirms the importance of including environmental parameters in distribution systems, which correlates with our formulas for integrated efficiency.

Sun et al. (2024) investigate the impact of digitalization on the sustainability of global supply chains, which directly resonates with our digital efficiency models and confirms their relevance. Szymczyk & Kadłubek (2019) study the marketing of logistics distribution in the European Community. Their results are in line with our conclusion about the importance of adaptive indices for different levels of logistics systems. Vidal & Goetschalckx (1997) provide an overview of global production-distribution

models, which is a classic foundation for modern research. Our article continues this tradition by proposing our own models for optimization evaluation. Ziari & Taleizadeh (2025) demonstrate the use of digital twins and artificial intelligence in distribution systems, which is very closely related to our approach to integrating digital technologies into optimization models.

The analysis of the reviewed sources showed that the scientific community is actively researching the issues of integration of logistics and marketing, sustainable development, digitalization, and modeling of distribution systems. However, there is a lack of scientific works that would offer comprehensive quantitative indices that can simultaneously assess the effectiveness of logistics and marketing parameters.

Research methodology. We propose to create author's formulas that allow to quantify the effectiveness of the marketing policy of distribution, taking into account logistics parameters and the international marketing environment.

Logistics efficiency index in marketing distribution (1):

$$LMEI = \frac{\sum_{i=1}^{n}(Q_i * V_i)}{\sum_{i=1}^{n} C_i} \quad (1)$$

Our proposed formula (1) allows us to assess the relationship between the value of distributed products and logistics costs. The numerator reflects the total value created $(Q_i * V_i)$, where (Q_i) is the number of products sold and (V_i) is their market price. The denominator is the total logistics costs C_i , including transportation, warehousing, and customs costs. The higher the index, the more efficiently the company implements its distribution marketing policy.

The practical significance of the index is that it allows to determine the "profitability threshold" of logistics in international marketing. For example, if the value of products sold significantly exceeds costs, the company can afford to diversify sales channels, increase advertising budgets, or speed up delivery. Instead, a low index signals the need to optimize transportation routes, use digital logistics platforms, or negotiate lower customs tariffs.

Integral index of marketing and logistics adaptability (2):

$$IMLA = \sum_{j=1}^{m}\left(X_j^{wj}\right), \sum_{j=1}^{m} wj = 1 \quad (2)$$

$IMLA$ measures the level of integration of logistics and marketing in the distribution process. Indicators Xj may include delivery time, customer satisfaction, speed of customs procedures, safety factor during transportation, etc. The wj weights determine the relative importance of each parameter in the overall system. If the $IMLA$ value increases over three

years, this indicates a successful integration of marketing strategies and logistics innovations.

ROI of international marketing taking into account logistics (3):

$$ROIint = \frac{NP + \Delta ExpRev - LC}{TI + MC} \quad (3)$$

Our proposed formula (3) modifies the classic indicator ROI , taking into account the peculiarities of international marketing and logistics. The numerator represents the net profit NP , additional income from exports $\Delta ExpRev$ and logistics costs LC , which must be subtracted. The denominator is the total investment TI and marketing costs MC .Thus, the $ROIint$ indicator allows to assess the real return on marketing and logistics solutions in international business. It integrates financial and operational aspects, because profits in global trade often depend not so much on the base price of a product as on the ability to ensure fast delivery and regulatory compliance.

For example, if $ROIint$ is below 0.3, it means that logistics costs "eat up" a significant portion of revenues and that optimization of transportation routes or a change in the composition of partners is required. If the indicator exceeds 0.5, it indicates the effectiveness of marketing strategies combined with logistics solutions.

Cost minimization function in the international distribution system (4):

$$minZ = \sum_{i=1}^{n} \sum_{j=1}^{m} (Cij \cdot Xij) \quad (4)$$

Model (4) is based on the classical transportation problem, but is interpreted in the context of international marketing. The variable Xij represents the volume of goods delivered from point i (producer, warehouse, hub) to point i (foreign market or distribution center).Cij is the logistics cost of transporting a unit of product along this route.

The practical meaning is that the company must find a distribution of flows that ensures minimal international transportation costs, which is critical for Ukrainian companies entering the EU or Middle East markets, as the choice of route can reduce overall costs by 10-20%.

The formula allows you to model various scenarios: for example, what benefits can be gained by transferring some cargo from road to sea transport, or how changes in customs tariffs in a particular country will affect the cost of delivery. This way, the company can create optimal strategies for its distribution marketing policy.

Logistic demand function of the international market (5):

$$D(p) = \frac{1}{1 + e - \alpha(p - p0)} \quad (5)$$

Function (5) describes how demand changes depending on the price of a product on the international market. The parameter $p0$ defines the "threshold price" at which demand is 50% of the maximum possible level. The parameter α defines the sensitivity of the market to price changes. Thus, the formula allows combining logistics and international marketing: when optimizing distribution, a company can take into account not only the cost of transportation, but also how the final price of the goods will affect demand in different countries, which creates the basis for making decisions on supply diversification and market segmentation.

Integral delivery speed index (6):

$$ISD = \frac{\overset{n}{k} = 1 \overset{dk}{tk}}{n} \quad (6)$$

Formula (6) takes into account the relationship between the delivery distance dk and the delivery time tk . The higher the value of the index ISD , the more efficient the company's logistics system is on an international scale. The index is important in situations where delivery speed determines the company's competitiveness. For example, in the market of perishable goods (dairy products, organic products), even a few days of delay can make the sale economically unprofitable. The index allows us to quantify such risks and choose the best routes.

From a managerial perspective, ISD can be used to monitor the efficiency of logistics partners: if a particular carrier demonstrates a significantly lower score than the average, the company should review the terms of cooperation or change its logistics strategy. Thus, the formula is a tool for monitoring and strategic management of distribution speed.

Adapted Harrington's function for integral assessment of distribution quality (7):

$$H = exp - e^{s(y - y0)} \quad (7)$$

The adapted Harrington's formula is used for an integrated assessment of the quality of the distribution system, adapted to international marketing. The variable y represents the actual value of the indicator (e.g., delivery time or service level), and $y0$ represents the target value. The parameter s determines the sensitivity of the function to deviations from the target level.

In a practical sense, the value of H from 0 to 1 reflects the level of satisfaction with the distribution system: the closer the indicator is to 1, the more efficient the logistics and marketing policy is. For example, if the average delivery time to international markets is 7 days instead of the targeted 5, the Harrington function will show a significant decrease in the integral score.

This allows managers to make decisions on priority investments: in speeding up customs procedures, improving warehousing, or hiring faster carriers. Thus, the function makes it possible to formalize the subjective perception of quality by customers into a clear quantitative assessment.

Elasticity of demand with respect to delivery time (8):

$$Et = \frac{\Delta Q/Q}{\Delta t/t} \quad (8)$$

The elasticity of demand with respect to delivery time shows how much the sales volume of Q changes when the average delivery time of t changes. If $Et > 1$, the demand is highly sensitive, and even a slight delay causes a significant decrease in sales. If $Et < 1$, the market is relatively insensitive to time. This indicator is of particular importance for international marketing. In highly competitive segments (e.g., electronics), even a delay of a few days can lead to the loss of customers to competitors. While in the markets of specialized equipment or unique goods, delivery time plays a lesser role, and the company can afford more flexible routes.

Thus, by calculating the elasticity of demand with respect to delivery time, the company receives a tool for prioritizing logistics decisions: where to invest in speeding up delivery, and where it is enough to ensure stability and reliability.

Model of the total cost of international logistics (9):

$$TLC = TC + IC + CC \quad (9)$$

The model decomposes the total cost of international logistics TLC into three key components: transportation costs TC , inventory costs IC and customs and credit costs CC . This approach takes into account both the direct costs of moving goods and the hidden costs associated with storage, customs delays, and inventory financing.

The practical value of the model lies in the ability to plan budgets for international operations more accurately. For example, a company may have relatively low transportation costs but high inventory costs due to delays in customs procedures. In this case, optimization should not be about changing the route, but about negotiating with customs brokers or digitalizing the document flow.

Thus, the TLC formula helps businesses see the full picture of logistics costs and avoid mistakes when optimization focuses only on transportation and other cost items are overlooked.

Optimization function of the international marketing and logistics mix (10):

$$maxU = f(P, D, C, T) \quad (10)$$

In this model, the utility function U of an enterprise depends on four key parameters: price P , delivery D , communications$C$, and technology T . This approach integrates the classic marketing mix (4P) with the logistics dimension.

Formula (10) allows to determine the optimal combination of these parameters to maximize the effectiveness of the distribution policy, which is important in conditions when the company's resources are limited and it is necessary to find a balance between marketing costs and logistics costs.

Model of integrated reliability of international supplies (11):

$$IR = \frac{i = 1(1 - Fi) \cdot Wi}{\sum_{i=1}^{n} Wi} \quad (11)$$

In this model, Fi denotes the frequency of failures or delays in deliveries in the direction of$i$ and Wi denotes the weight of this direction in the total volume of operations. The lower the level of disruptions, the higher the integral reliability index IR.

In the long run, the IR model allows for the construction of ratings of logistics partners and the formation of a motivation system: reliable carriers receive larger orders, while less efficient ones lose their share of cooperation.

The formula for digital efficiency of logistics and marketing integration (12):

$$DE = \frac{AI + BD + DC}{LC + HC} \quad (12)$$

Digital efficiency (12) takes into account the impact of digital tools on the integration of logistics and marketing. In the numerator: the use of artificial intelligence AI for demand forecasting, BD for analyzing customer behavior, andDC for managing real-time communications. In the denominator: logistics costs LC and human capital costs HC.

It should be noted that for domestic companies seeking to integrate with the global market, the digital efficiency of logistics and marketing

integration is particularly important. It is digital efficiency that is a condition for maintaining the competitiveness of the enterprise and its rapid integration into the international business system.

Results. Let's determine the practical feasibility of the proposed formulas in order to provide practical recommendations for enterprises that plan to adapt their distribution marketing policy in the context of international competition.

Table 1 shows the difference in the structure of logistics costs for the distribution of goods within the domestic market and in international destinations. The focus is on three key categories: transportation costs, warehousing costs, and customs costs. The domestic market is characterized by the absence of customs costs, while in international business this cost item is one of the most significant. The comparison makes it possible to determine the economic feasibility of the enterprise's entry into foreign markets and the need to optimize cost items (Table 1).

Table 1.

Logistics costs in domestic and international marketing (thousand dollars)

Indicator	Domestic market	International market
Transportation costs	120	310
Warehouse expenses	80	150
Customs expenses	-	220
General expenses	200	680

Source: authors' elaboration

According to the data presented, the total logistics costs in the domestic market amount to USD 200 thousand, while in the international market - USD 680 thousand, which is 3.4 times higher. The main reason for this is customs duties (USD 220 thousand) and significantly higher transportation costs (USD 310 thousand versus USD 120 thousand). This confirms the thesis that entering international markets without deep integration of marketing policy and logistics can lead to a decrease in profitability. It is important to note that the share of warehouse costs in the structure of international expenses is growing (USD 150 thousand versus USD 80 thousand in the domestic market), which indicates greater risks associated with the storage of goods in transit, waiting for customs clearance, and the need to have an extensive network of warehouses in different countries.

Thus, Table 1 illustrates that international logistics requires a fundamentally different approach to distribution management: optimization of transport routes, use of digital customs services, and integration of warehouses into a single network are becoming critical tasks. For Ukrainian companies, this means the need for strategic partnerships with international

logistics providers and the use of new technologies to reduce transaction costs.

Table 2 demonstrates the application of the integrated index of marketing and logistics adaptability $IMLA$ proposed in the methodology to assess the performance of five conventional companies. The index is calculated as a multiplicative model that takes into account key logistics and marketing parameters: delivery costs, transportation speed, service level, and the company's ability to adapt to international conditions.

Table 2.

Integral index of distribution marketing policy efficiency $IMLA$

Company	Logistics costs (thousand dollars)	Delivery speed (days)	Adaptability index $IMLA$
A	210	6	0.72
B	320	5	0.81
C	280	7	0.69
D	190	4	0.88
E	350	6	0.74

Source: authors' elaboration

The results show that company D has the highest adaptability index (0.88), which is due to low logistics costs ($190 thousand) and fast delivery (4 days), indicating optimal integration of logistics processes with marketing policy. Instead, Company C demonstrates the lowest score (0.69), which is the result of relatively high costs ($280 thousand) combined with slow delivery (7 days).

It is important to note that Company B, despite the highest costs ($320 thousand), has a fairly high adaptability index (0.81). This is due to the high speed of delivery (5 days), which is a key factor for international markets where customers prefer speed of service. Company E has an average performance: costs are high ($350 thousand) and delivery takes 6 days, which allowed it to achieve only an average level of adaptability (0.74).

From the analysis, we can conclude that optimizing the marketing policy of distribution is not always about reducing costs. In many cases, the balance between costs and delivery speed is more important. The multiplicative nature of the $IMLA$ index emphasizes this pattern: poor performance in one parameter can significantly reduce the final result. For Ukrainian companies, this means that they need to work comprehensively on all aspects of logistics and marketing, as local failures can offset global achievements.

Table 3 demonstrates the application of the author's formula $ROIint$ for five conventional companies. Unlike the classical ROI , this model takes into account not only net profit and investment, but also specific indicators of international business: additional income from exports $\Delta ExpRev$ and logistics costs LC . Thus, it better reflects the real conditions of companies' operation in global markets, where logistics can "eat up" a significant part of income.

The data analysis shows that the highest $ROIint$ is that of Company B (0.46), which combines high net profit ($680 thousand) with relatively balanced logistics costs ($260 thousand). This indicates an optimal ratio between income and expenses in international business. Company C, on the contrary, demonstrates the lowest $ROIint$ (0.35), as a significant part of the profit is absorbed by high logistics costs ($300 thousand). This is an example of how even good export revenues ($270 thousand) can be offset by inefficient delivery management.

Company E receives the highest export revenue ($330 thousand), but its $ROIint$ score is lower (0.41) than that of Company B, which is explained by the fact that Company E has the highest logistics costs ($350 thousand). Thus, even export growth without logistics optimization does not guarantee increased profitability.

Table 3.

ROI International marketing with regard to logistics costs

Company	Net profitNP, thousand dollars	Export revenue$\Delta ExpRev$, thousand USD	Logistics costsLC, thousand dollars	Marketing expensesMC, thousand dollars	$ROIint$
A	520	220	180	150	0.42
B	680	310	260	200	0.46
C	450	270	300	180	0.35
D	590	240	210	170	0.44
E	720	330	350	220	0.41

Thus, $ROIint$ is a critical indicator for strategic planning of international activities. For Ukrainian companies, its use can become an indicator of readiness to enter foreign markets: if $ROIint$ is below 0.4, it means that the company should review logistics costs and introduce digital innovations (for example, customs clearance automation or demand forecasting systems). If the index exceeds 0.5, the company may consider scaling up its export operations.

Figure 1 illustrates a conceptual model of the interaction between logistics and international marketing, which is the basis of an effective distribution marketing policy. The model is centered on the integration of two flows: physical (material) and information. It is the combination of these flows that forms a new logic of distribution management, which allows to simultaneously reduce costs and increase customer value (Fig. 1).

Figure 1 shows the integration of physical flow (logistics) and information flow (international marketing), which together form the marketing policy of distribution.

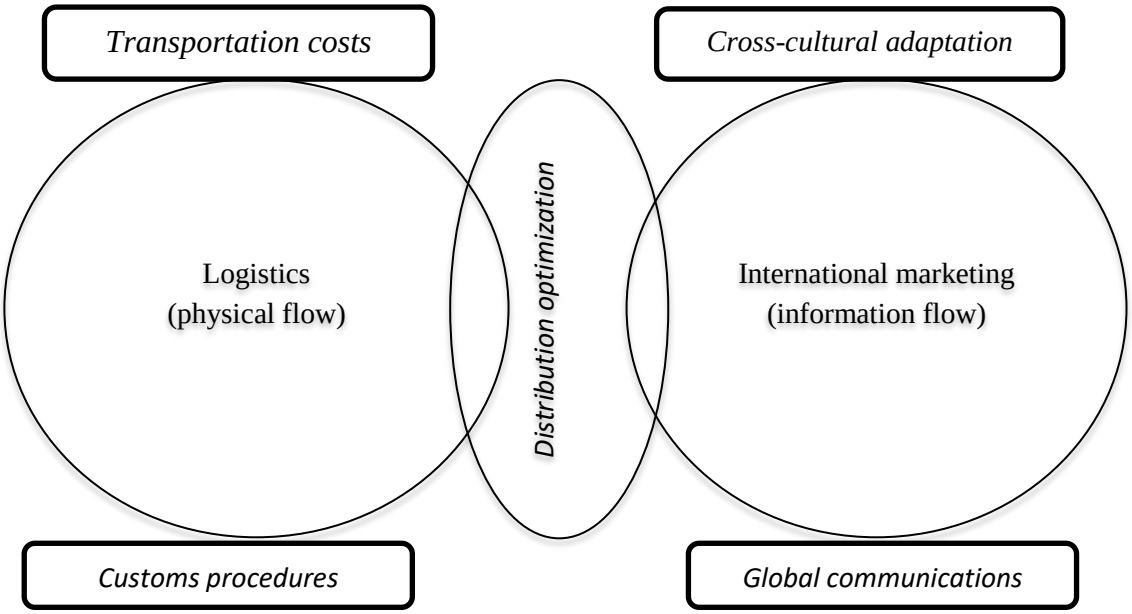

Figure 1. Model of interaction between logistics and international marketing
Source: proposed by the authors

As shown in Fig. 1, logistics is responsible for material processes: transportation of goods, storage, and processing of customs documents. At the same time, international marketing focuses on information processes and integrations in the following areas: analyzing customer needs, adapting offers to market requirements, and managing communications. For modern enterprises, such integration is especially relevant in the post-war recovery, as it allows them to quickly adapt to changes in the international business environment.

Thus, Figure 1 emphasizes that the marketing policy of distribution in the 21st century is not the result of separate actions of logisticians and marketers, but of joint work in a digital and global context.

Figure 2 shows the change in the integrated distribution optimization index over six years. The index is calculated based on the author's formulas that take into account logistics costs, delivery speed, and marketing adaptability. The purpose of this graph is to identify dynamic trends and determine whether the efficiency of the distribution system is increasing in the long term.

Figure 2 shows an increase in the integral index from 0.65 in 2019 to 0.84 in 2024, which reflects the gradual optimization of distribution processes. This growth shows that companies are gradually learning to balance costs and efficiency. However, reaching a value of 0.84 does not mean full optimization: there is still potential for improvement, in particular by automating customs procedures, using predictive analytics systems, and reducing delivery times on critical routes.

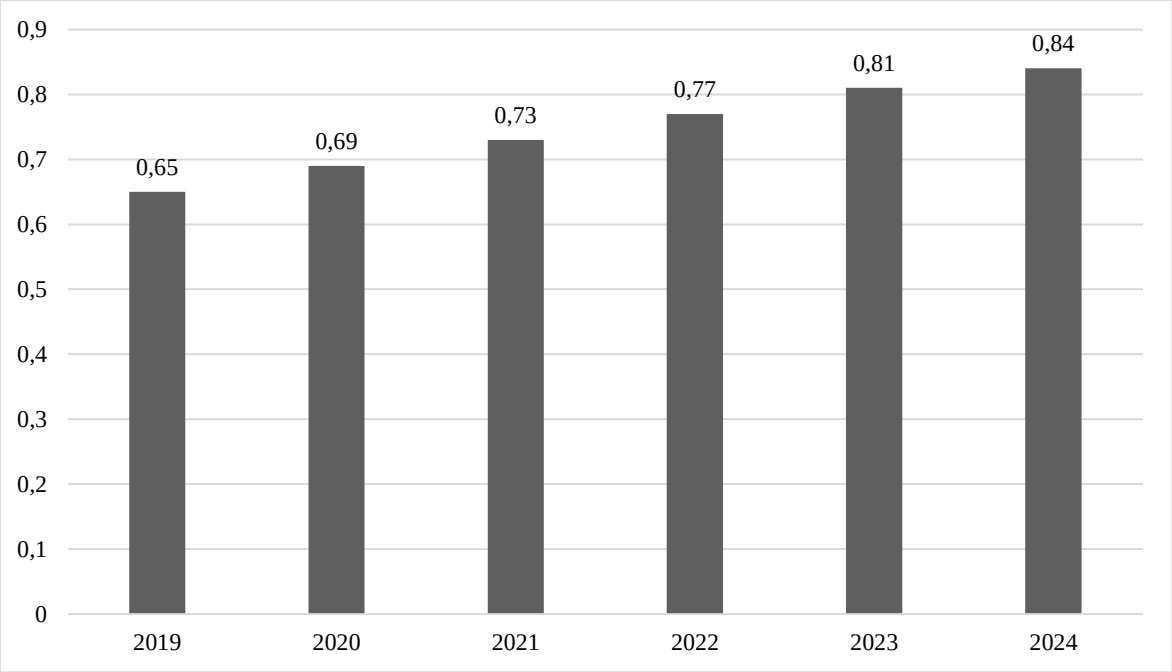

Figure 2. Dynamics of the integrated distribution optimization index (2019-2024)
Source: Authors' elaboration

Figure 3 shows the relationship between delivery time and the level of demand for products in international marketing. To build the graph, we used conditional data to illustrate typical customer behavior: as delivery time increases, the willingness to buy goods decreases. This indicator is especially important for perishable products, electronics, and highly competitive goods in global markets (Figure 3).

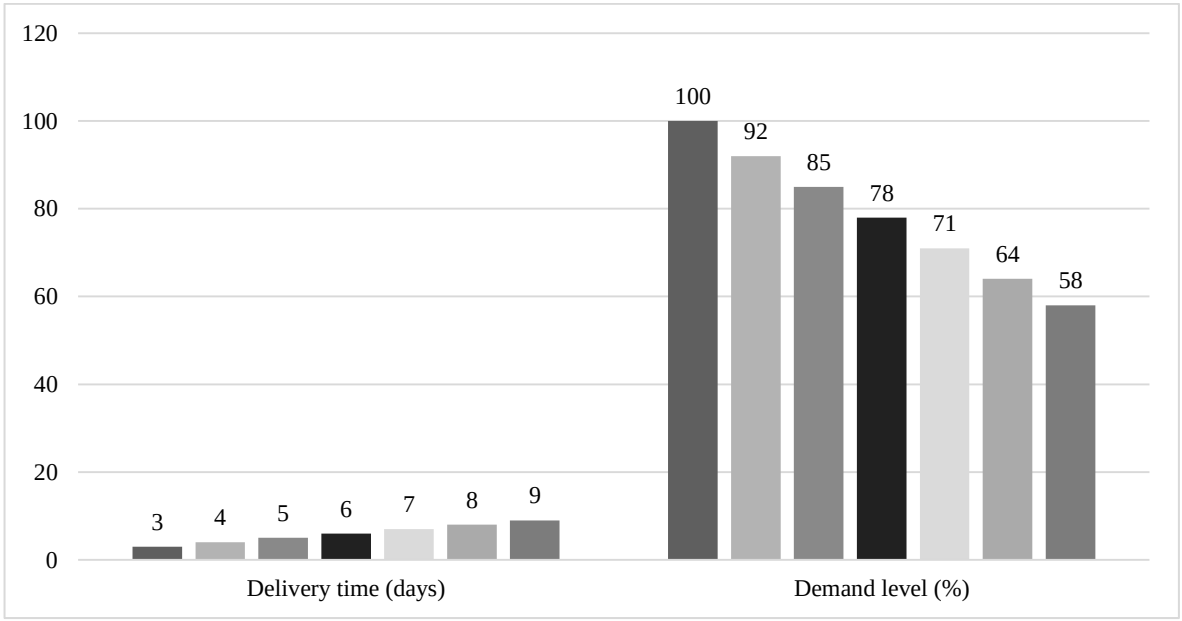

Figure 3. Elasticity of demand depending on delivery time
Source: authors' elaboration

Figure 3 shows a decrease in demand from 100% to 58% when the delivery time is extended from 3 to 9 days, which confirms the critical role of logistics speed in international marketing. The graph shows that when the delivery time increases from 3 to 9 days, demand drops from 100% to 58%, which means that the longer the period between ordering and receiving the goods, the lower their market attractiveness becomes. The high elasticity of demand to delivery time is typical for categories where speed is a critical factor: fresh produce, components for production. For durable goods, the elasticity may be lower, but it still reduces competitiveness.

From a management perspective, this analysis helps companies determine which segments are worth investing in to speed up logistics. For example, if even a one-day delay in a particular market result in a significant loss of demand, the company should prioritize route optimization and the selection of reliable carriers. This is especially true for Ukrainian exporters, as entering international markets requires not only a competitive price but also a guarantee of fast delivery.

Conclusions.

In summary, we have determined that the modern globalized economy operates in a highly interdependent market format, where the efficiency of business activity depends not only on internal resources but also on the ability to integrate into global value chains. In such conditions, logistics ceases to be an exclusively operational function of transportation and warehousing, turning into a strategic mechanism for optimizing distribution processes. This creates new challenges for logistics, which can only be solved by using the latest tools that can anticipate these challenges and help marketers make the right management decision. To this end, we propose to create author's formulas that allow to quantify the effectiveness of the marketing policy of distribution, taking into account logistics parameters and the international marketing environment. The carried-out research has confirmed that the integration of logistics and international marketing is a determining factor in optimizing the marketing policy of distribution of enterprises in the globalized business environment. The author's own economic and mathematical models made it possible to quantify the efficiency of various aspects of distribution: from the cost of logistics processes and delivery speed to the elasticity of demand and the level of digital efficiency.

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