

UDC 658.78:656.033.6]:664-048.34

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National University of Food Technologies***PROBLEMS OF THE TRANSPORT AND LOGISTIC NETWORK
OF FOOD ENTERPRISES****ПРОБЛЕМНІ ПИТАННЯ ТРАНСПОРТНО-ЛОГІСТИЧНОЇ МЕРЕЖІ
ХАРЧОВИХ ПІДПРИЄМСТВ****ANNOTATION**

Enterprises of food industry are usually located close to raw materials or are oriented towards consumer. Therefore, the issue of shipping costs is relevant as the products produced by food industry enterprises must be delivered to the final consumer. The article defines the essence of shipping costs, their composition, and examples of such costs. The main methods of optimizing the transport-logistic network, their advantages and disadvantages are also described. It is highlighted how the price for delivery is determined and what it depends on. Also, the primary documents that are issued to confirm the fact of the carriage of goods are observed. The concept of Incoterms, the sphere and conditions of their application are also highlighted.

Keywords: cost measure, weight concept, shipping costs, logistics network optimization, transport documents, Incoterms.

АНОТАЦІЯ

Підприємства харчової промисловості зазвичай розташовані близько з сировинними ресурсами або орієнтуються на споживача. Тому питання витрат на доставку є актуальним у зв'язку з тим, що продукцію, яку виробляють підприємства харчової промисловості потрібно доставити до кінцевого споживача. У статті визначено сутність витрат на доставку, їх склад, наведені приклади таких витрат. Також охарактеризовані основні методи оптимізації транспортно-логістичної мережі, їх переваги та недоліки. Розглянуто яким чином визначають ціну на доставку й від чого вона залежить. Також розглянуто первинні документи, які оформлюють для підтвердження факту здійснення перевезення товару. Розкрито поняття Інкотермс, сфера та умови їх застосування.

Ключові слова: вартість вимірювання, концепція ваги, транспортні витрати, оптимізація логістичної мережі, транспортні первинні документи, Інкотермс.

АННОТАЦИЯ

Предприятия пищевой промышленности обычно расположены близко с сырьевыми ресурсами или ориентируются на потребителя. Поэтому вопрос расходов на доставку актуален в связи с тем, что продукция, которую производят предприятия пищевой промышленности нужно доставить до конечного потребителя. В статье определена сущность затрат на доставку, их состав, приведены примеры таких расходов. Также охарактеризованы основные методы оптимизации транспортно-логистической сети, их преимущества и недостатки. Рассмотрено каким образом определяют цену на доставку и от чего она зависит. Также рассмотрены первичные документы, которые оформляют для подтверждения факта осуществления перевозки товара. Раскрыто понятие Инкотермс, сфера и условия их применения.

Ключевые слова: стоимость измерения, концепция веса, транспортные расходы, оптимизация логистической сети, транспортные первичные документы, Инкотермс.

Formulation of the problem. Each company aims to increase its income and reduce costs.

Expenses for the delivery of the enterprise are included in the cost of production, therefore, the less they pay, the better for both: buyers and consumers of this product. Costs of delivery consist of transport expenses and additional expenses, which are possible or impossible to foresee. Therefore, it is very important for companies to know about possible ways of saving money and about the rules to follow.

Analysis of recent research and publications. A.M. Sumets [1] substantiates the key role of transport in Ukraine and determined the structure of the implementation cost of logistic activities by means of transportation on macro level.

Authors of the monograph L. Shevtsev, I. Pyetsky [2, p. 11-12] state that the largest share of logistic vitas is the cost of managing inventories (20-40%), transport costs (15-35%) and administrative and managerial costs, which range from 9 to 15%.

Vovk V. M., Niefiodova Y. M. reviewed the mechanism of the calculation of transport costs when performing import operations under the main conditions of delivery of Incoterms [3].

Martsinkovska Oleksandra, Lehkyi Oleg describe the Incoterms 2010 and there implementation in Ukraine [4].

Setting of objectives. The analysis of the research attracted significant attention of scientists to the concept of shipping costs, disclosed international rules of transportation of products. In the article, the main attention is devoted to the methods of optimization of transport-logistic network and the methods of cost saving on delivery under the modern conditions.

Results. The main component of shipping costs is transport costs. In addition, shipping costs consist of handling, fuel cost, import customs clearance, etc.

Several companies purchase products from one supplier, for example sugar. Each buyer will order a delivery of sugar, because the location of sugar factories is usually far from the city. Thus, each buyer will order at least one truck to deliver the goods to the store, supermarket, etc. In order to reduce the company shipping costs, buyers can

group their products in one container and pay only for the place that the product takes in it. In order to measure the cost of delivery, determine the chargeable weight – the greater of volumetric and actual weight. Actual weight is the weight of the goods including all packaging. Volumetric weight is calculated using a volumetric weight formula. Different courier companies use different metrics, for example to determine the volumetric weight it is necessary to divide the volume (length \times height \times width) by 5000 (EU express services) or 4000 [5]. Then, the volumetric weight is compared with the actual weight of the shipment to ascertain which is greater and the higher weight is used to calculate the shipment cost.

For example, company bought 4 packages of sugar of 50 kg each. A package dimension is 100 \times 120 \times 100 cm each. Freight rate is 5 UAH per kg.

Actual weight is $4 \times 50 = 200$ kg.

Volumetric weight is $(100 \times 120 \times 100) / 4000 = 300$ kg.

Volumetric weight $>$ Actual weight.

Therefore, freight cost is $300 \times 5 = 1500$ UAH.

In addition, one of the ways to reduce shipping costs is the logistics network optimization. From the middle of the 20th century, the method of «Milk run» [6] began to exist. The essence of the method was that every morning a milkman on a refrigerating truck filled with freshly filled bottles of milk delivered the products to the buyer, replacing the empty bottles with full ones. Now the essence of the method lies in the fact that one truck is sent to several sellers to pick up the necessary products and then delivers these products to the buyer. The advantage of Milk Run model is clear, efficient and provides reliable sales to the goods, stable route that can be controlled. However, the Milk Run model has a critical weakness: it doesn't work whenever any variability is introduced; for example, if someone requested a different delivery time or wanted to order something different.

Then, there's the Hub & Spoke model [6]. The essence of the method lies in the fact that each company can take advantage of the flexibility that comes with pushing their deliveries through a centralized hub. The advantage of Hub & Spoke model is an online ordering system to manage infinitely variable deliveries where buyers could order basic goods for almost instantaneous home delivery. The essential disadvantage of the model is that it is unstable, expensive and there isn't any remote control for placing orders and the Internet connection is limited.

There is also a Cross-docking logistic network [7]. Cross-docking solutions allow companies to expedite shipments to customers, so customers get what they want and when they want it. In simple words, the customer bought products from three factories. In order to deliver these products the client has to pay for three items. However, in

the distribution center, there is a reload of goods and one truck gets products from three of these plants at a time.

The advantages of Cross-docking are: reduction the shipping costs, reduction the time of delivering products to the consumer, reduction the need of warehouse space for the manufacturer.

The disadvantages of the model are: additional freight handling can lead to the damage of product, additional labor costs for employees who work in distribution center.

Every mode of transport has its transport document. Transport documents confirm the fact of transportation and indicate the shipping cost. For each mode of transport, there are appropriate types of transport document issued by the transport company, such as [8]:

- for the road transport mode a Road Consignment Note (CRM) is used;
- for the air – Air Waybill (AWB);
- for the sea – Bill of Lading (B/L);
- for the rail – Railway Consignment Note (CIM).

Those goods which are carried in multimodal transport units (mainly containers) the document which is called FIATA multimodal Bill of Lading (FBL) are used.

Brief description each of these documents is below:

Road Consignment Note (CRM) is an international bill of lading, which is used to validate the international carriage of goods by road. The carrier fills in the road invoice, but the supplier is obliged to provide accurate information and sign the document when the goods are taken out of its warehouse. A buyer of products signs a delivery form, as the carrier can confirm the delivery of the goods and substantiate the payment for their services.

An Air Waybill (AWB) or an air consignment note is a document issued by the international airline for documentary confirmation proof of carriage of goods. An AWB consists of 11 digit numbers. These numbers are used to make bookings, check the delivery status of consignments and track shipments. AWBs are issued in 8 sets of different colors which are the following:

- Green copy for carrier's company;
- Pink copy for Consignee's company;
- Blue copy for shipper;
- Brown copy is a proof of delivery;
- White copy is an extra copy.

A Bill of Lading B/L is a transport document issued by a carrier and signed by the captain of a vessel, evidencing a contract of carriage and receipt of cargo. Required requisites of the document are the date of issue, the name of shipper and the place of shipment, the lace of delivery, the description of goods, whether the freight charges are prepaid or collect and the carrier's signature.

Railway Consignment Note (CIM) is a freight document indicating that the goods have been

received for shipment by rail. The company, which is responsible for transporting the goods to the railway carrier, delivers the consignment note. It must be signed by the sender and by the carrier.

A Multimodal Bill of Lading FBL is a type of international transport documents covering two or more modes of transport. Unlike other transport documents, the FBL does not identify any type of transport as the principal, so the responsibility falls on the forwarding agent.

International Commercial Terms developed by the International Chamber of Commerce were created as an industry standard to facilitate international trade. Incoterms was first introduced in 1936 and revised to accommodate changes in global trade [9].

Today, these rules form an essential part of day-to-day international trade as well as domestic trades and they form an integral part of many sales contracts worldwide.

The core functions of Incoterms are to:

- outline the obligations of the buyer and the seller in a trade transaction;
- clarify when risk passes from seller to buyer under each of these rules;
- outline how costs are allocated between the buyer and the seller.

Incoterms are designed to regulate the following areas of trade relations:

- determine the date of delivery of goods;
- distribution between the parties to the contract of transportation costs and other costs are associated with the carriage of goods;
- settlement of conditions for the transfer of liability for risks is associated with the loss, loss or damage of goods during transportation.

There are 11 Incoterm rules in circulation currently. They are divided into two classes:

- rules for any mode of transport;
- rules for the sea and inland waterway transport.

Brief description of each type of the rule (Table 1, 2):

Table 1

Rules for any mode of transport [10]

№	Short name	Full name	Description
1	2	3	4
1.	EXW	Ex Works	The seller's only responsibility is to make the goods available at the seller's premises. The buyer bears full costs and risks of moving the goods from there to destination.
2.	FCA	Free Carrier	The seller delivers the goods to the carrier and loads the goods. From that point, the buyer bears the costs and risks of moving the goods to destination.
3.	CPT	Carriage Paid To	The seller delivers the goods to the carrier at an agreed place and that the seller must contract for and pay the costs of carriage necessary to bring the goods to the named place of destination.
4.	CIP	Carriage Insurance Paid To	The seller has the responsibility of obtaining insurance against the buyer's risk of loss or damage of goods during the carriage.
5.	DAT	Delivered at Terminal	The seller bears all risks involved in bringing the goods to and unloading them at the terminal at the place of destination.
6.	DAP	Delivered at Place	The seller bears the responsibility and risks to deliver the goods to a named place. The goods are deemed to be delivered when they are placed at the disposal of the buyer on the arriving means of transport ready for unloading at the named place of destination.
7.	DDP	Delivered Duty Paid	The seller is responsible for delivering the goods to the named place in the country of importation, including all costs and risks in bringing the goods to import destination. This includes duties, taxes and customs formalities.

Table 2

Rules for the sea and inland waterway transport [11]

№	Short name	Full name	Description
1	2	3	4
1.	FAS	Free Alongside Ship	The seller has fulfilled his obligation when goods have been placed alongside the vessel at the port of shipment. The buyer is responsible for all costs and risks of loss or damage to the goods from that moment.
2.	FOB	Free On Board	Once the goods have passed over the ship's rail at the port the buyer is responsible for all costs and risks of loss or damage to the goods from that point.
3.	CFR	Cost&Freight	The seller must pay the costs and freight required in bringing the goods to the named port of destination.
4.	CIF	Cost Insurance& Freight	The seller is required to provide insurance against the buyer's risk of loss or damage to the goods during transit.

Conclusions. According to the above-mentioned material, the importance of the cost of delivery as an integral part of most companies should be highlighted.

Logistic optimization network, Incoterms knowledge, primary documents and price formation specifics will help companies to avoid mistakes and to reduce shipping costs.

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