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MANAGEMENT OF CARGO TRANSPORT AT AIRPORTS

Transport management is an important logistics activity. The choice of transport branches ultimately boils down to two important elements such as costs and quality of services. The features and elements related to reliability, speed, the ability to control and carriage monitoring are also taken into account. Despite high costs, air transport is part of the global value chain that enables parts to be delivered to factories located in different parts of the world in a short time. Air transport creates 3.6% of the global value of GDP. The main advantage of this branch of transport is the short delivery time and high level of security of goods, including those sensitive to shocks. On the basis of statistical data, the tendency of increasing cargo transport in 2012-2017 can be seen. The paper presents the specification of cargoes transported by air, applicable documentation, a waybill and cargo units, and types of goods security.

Keywords: cargo transport, waybill, cargo units, air freight.

1. INTRODUCTION

Air transport is an important element of the economic infrastructure as it contributes to the dynamic development of cities and regions. The pace of development of air transport has the significant impact on the development of the global economy. It enables the free movement of people, goods and capital between cities. Air transport is the only one with a strong time and space advantage, which is one of the greatest achievements of today's civilization. High reliability, a wide range of transport, security of delivery and continuous monitoring of the flow of goods are factors encouraging the choice of this mode of transport.

Over the last decade, the demand for air freight has increased significantly. This was also reflected in an increase in the number of air cargoes, the addition of cargo terminals and the number of new cargo routes (Thelle, Sonne, 2018). According to Boeing's World Air Cargo Forecasting Report (WACF), global cargo volumes are expected to increase by an average of 4.2% per year over the next 20 years (Boeing, 2018). A large number of shipments is transported in cargo holds of passenger aircraft with unused space. The reason is the low supply of loads. The main problem lies with the market. In relation to the rela-

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tively high value of goods, comparing to the weight and volume, the volume of exports and imports in Poland is still insignificant. According to the research carried out in 2005, by Dr. J. Kasard and D. Sullivan, it was shown that the amount of cargo transport was correlated with the value of the country's GDP and foreign investments (Kasard, Sullivan, 2006).

Air transport in the world of trade in goods in terms of the mass of transported cargo has a small share. It is 1% taking into account transport performance, while taking into account the value of transported cargo in the world, this share is at the level of 35%. By air, 76.200 tons are transported annually in Poland, or approximately 1% of all air transport in Europe. The largest share (70%) in transporting goods by air is occupied by Belgium, France, the Netherlands, Germany and the United Kingdom. This proves that cargo transport is closely correlated with the economic development of a given country (Stajniak, Konecka, 2017). The most advantageous use of air transport is long-distance transport both in continental and intercontinental relations (Neider, 2015).

An important problem in the field of freight transport is the characteristics of the cargo market, its size and requirements for the carriage of cargo by air. Presentation of the set requirements may be helpful when choosing this type of transport.

The characteristics of the cargo market, its size and requirements for the carriage of cargo by air is an important problem in the field of freight transport A presentation of the requirements may be helpful when choosing this type of transport. This article is an attempt to present the specifications of cargo transported by air, necessary documents from the forwarding party and legal regulations. The development of cargo transport in 2012-2017 in Poland was also presented. The subject of the research is an analysis of the literature on the subject, statistical data of the Central Statistical Office and the Civil Aviation Office. The research methods include a method of analysis and criticism of the subject.

2. SPECIFICATION OF LOADS TRANSPORTED IN AIR TRANSPORT

According to data from the Central Statistical Office, in Poland over the years 2012-2017 there was an upward trend in the transport of cargo by air. Against the background of other modes of transport, a small number of loads are carried by air (2017 – only 0.003% of all transported loads). Table 1 presents the numerical data of the transported goods from 2012 to 2017.

Table 1. Cargo transportation in Poland, by type of transport (in thous. of tons)

Year	Rail transport	Car transport	Pipeline transport	Sea transport	Inland water transport	Air transport	Total cargo transport
2012	230878	1493386	52985	7476	4579	41	1789345
2013	232596	1553050	50656	6965	5044	37	1848348
2014	227820	1547883	49810	6781	7629	38	1839961
2015	224320	1505719	54850	6963	11928	38	1803818
2016	222523	1546572	54058	7248	6210	41	1836652
2017	239501	1747266	52393	8254	5777	53	2053244

Author's own research based on the data from the CSO http://stat.gov.pl/obszary-tematyczne/transport-i-lacznosc/transport/przewozy-ladunkow-i-pasazerow-w-2017-roku,11,6.html (Access on: 20 Januar 2019).

Cargo transportation by air in 2017 amounted to 52.7 thousand tons, thus increased by 27.2% compared to 2016. At airports, 10.9% more cargo was reloaded in 2017 compared to the previous year. The registry of the Civil Aviation Office also noted an increase in the use of the number of aircrafts in civil aviation by 24 airplanes compared to the state recorded a year earlier. In total, in 2017, the number of aircrafts amounted to 1276 units. Comparing 2017 and 2016, airport traffic was higher by 7.4% and the number of commercial aviation takeoffs and landings increased by 8.6% (GUS, 2018). Figure 1 presents the data from the Civil Aviation Office regarding cargo handled by individual airports in Poland in 2017.

The International Air Transport Association provides data on air transport. In Europe, the total value of GDP supported by aviation in 2017 amounted to USD 823 billion. The annual air freight amounted to 10.1 million tons. 3.6% of global GDP is supported by aviation (IATA, 2017).

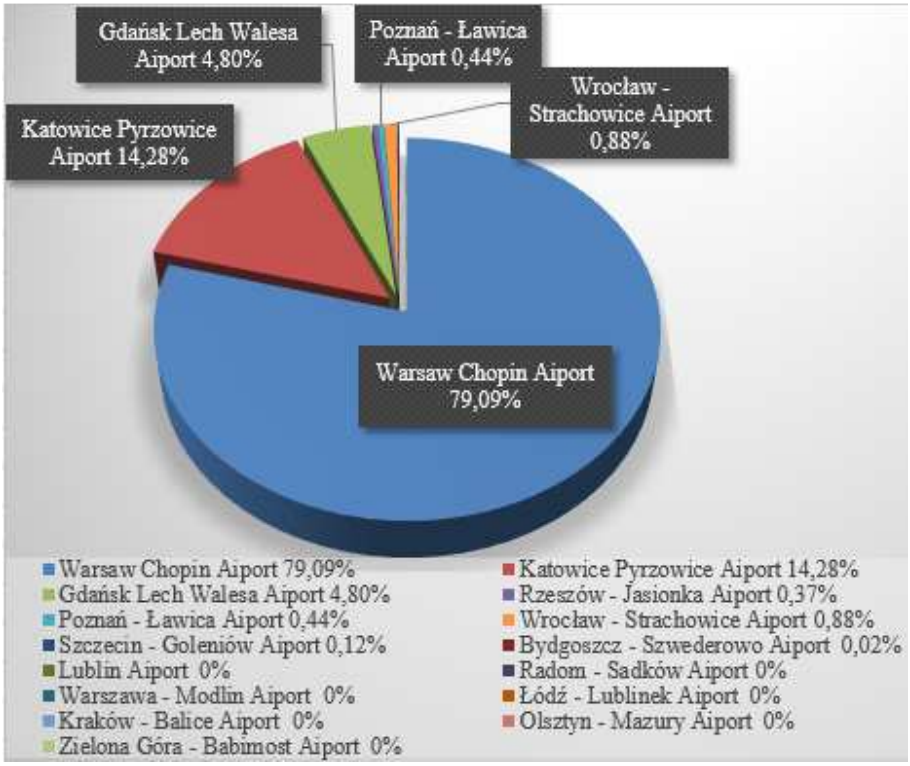

Fig.1. Percentage share of the cargo on-board served in 2017 divided into airports in Poland

Author's own research based on: http://www.ulc.gov.pl/pl/regulacja-rynku/statystyki-i analizy-rynku-transportu-lotniczego/3730-statystyki-przewoz-cargo (20.01.2019).

The main advantage in the transport of cargo by air is the short delivery time. The advantages of this type of transport include: the greatest possible range, high security of goods, including those sensitive to shocks, transport speed, which is a special advantage in the case of perishable products or postal items. In spite of strengths, the role of air transport in freight

transport is often treated marginally. The reasons result from the high costs of organizing the entire logistics process as well as the weight limit and the size of the goods transported (Liberadzki, Mindur, 2007).

Currently, the most commonly transported goods by air are perishable, high-value products, rapidly depreciating, sensitive to transport. These are express parcels, spare parts, production accessories, electronics, pharmaceuticals, plants (especially flowers), groceries (citrus) and animals Transport by air ensure an ability to control the temperature, maintain a stable environment that is suited to the transported cargo. The global value chains are also an opportunity for air transport, transporting subassemblies from suppliers to factories around the world. The automotive industry is a good example where the carriage of car parts is on the agenda (Walków, 2019).

Not only the cargo with small mass and volume is transported, but also the oversized goods. Therefore, airports that can handle large transport planes are obliged to have adequate length of runways and have an optimal access to the airport, connection of road, rail and sea infrastructure - depending on location. The availability of specialized equipment facilitating loading and unloading is an indispensable element in oversized items. Moreover, attractive rates of airport charges, good cooperation of a handling agent with an airport operator, facilitation of customs procedures in transit within the European Union, 24-hour availability encourage the selection of this branch of transport (Rześny-Cieplińska, Wach-Kloskowska, 2016).

Restrictions in oversized transport are the capacity of the aircraft's hold and its capacity, an ability to deliver large-size item from/to the sender from the airport, and an ability of the airport to accept a cargo aircraft. In order to transport more loads at one time, large load aircraft were constructed, among others (Jóźwiak, 2010). Airbus A 300 (payload: 45 tons), Boeing 767 (payload: 60 tons), Mc Donnell MD 11 (payload 80 tons), Antonov An-124 (payload 120 tons, possible), Antonov An-225 (payload capacity 250 tons).

Transport of goods by air can also apply to hazardous materials. Strict requirements must be met in line with international and national regulations in this type of transport. Nine classes of hazardous materials can be distinguished: explosive gases, flammable solids, liquids or self-igniting, in contact with water emitting flammable gas, peroxides and organic, radioactive, toxic and infectious, corrosive and other materials not mentioned in the above.

If the consent of the participating countries in the transport of a given dangerous material is obtained, the cargo is accepted for carriage by air. The transport conditions for hazardous materials are contained in the ICAO Technical Manual and IATA DGR regulations (Kwasiborska, 2011).

3. AIR FREIGHT DOCUMENTATION

Transport documents that a carrier or a forwarder needs to prepare are all contracts and forms necessary for domestic and international transport. In air transport, the basic document is Air Waybill (AWB) (Morrell,.2011). It was introduced by the Warsaw Convention and defines the relationship between an importer and an exporter. It should be noted that AWB is not a valuable document and, therefore, it cannot be negotiated or resold. An example AWB document is presented in table 2.

Table 2. Air Waybill – egxample

Shippers name and adress CABLE AND STEEL COMPANY 1234 INDUSTRIAL STREET, NEW YORK, USA PHONE : 555 55 55										**Air Waybill** It is agreed that the foods described herein are accepted in apparent good order and conditio (akcept as noted) for carriage SUBCJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL			
Consignee's name and adress CABLE BIG STORE 4321 ROGERS STREET, LONDON, ENGLAND PHONE: 555 12 34										GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY ISTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERING CARRIER'S LIMITATION OF LIABILITY. Shipper May increase such limiation of liability by de clearing a higher value for carriage and paying a supplemental charge if required.			
Issuing Carrier's Agent Name and City BOND STUFF FORWARDERS QUEEN STREET 7,LONDON, ENGLAND PHONE: 555 55 12										Accouting information NOTIFY: SOMEBODY, PH:555 55 34			
Agent's IATA Code 11-1 0000		Account No.								Reference Number		Optional Shipping Information	
Aiport of Departure (Addr, of First Carrier) and Requested Routing NEW YORK CITY										Currency USD	CHGS Code PP	X	X	Declared Value for Carriage	Declared Value for Cusoms
To LHR	By First Carrier AA	to	by	to	by					Amount of Insurance				INSURANCE – If Cartier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicato Mount to be insured in figures in box mared „Amount of Insurance".	
Aiport of Destination HEATHROW				Requested Flight/Date AA1234/12											
Handling Information													
No. Of Pices RCP	Gross Weight	kg lb	Rate Class Commodity Item No.	Chargeable Weigt	Rate / Charge					Total				Nature and Quantity of Goods (incl. Dimensions Or Volume)	
2	324	K								1234.00				SOME ITEMS	
2	324.00									1234.00					
Prepaid Weight Charge Collect					Other Charges										
1234.00															
Valuation Charge															
Tax															
Total Other Chages Due Agent					Shipper certifies taht the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is property described by name and is in proper conditio for carriage by air according to the applicable Dangerous Goods Regulations. ..... Signature of Shipper Or his Agent										
Total Other Charges Due Carrier															

Table 2 (cont.). Air Waybill – egxample

Total Prepaid 1234.00	Total Collect	
Currency Conversion Rates	CC Charges in Dest. Currency	Excuted on (date) at (Place) Signature of Issuing Carrier Or its Agent
For Carrier's Use Only at Destination	Charges at Destination	Total Collect Charges

Source: www.awbeditor.com (Access on: 25 October 2017)

The Air Waybill presented in table 1 is an evidence of the conclusion of a transport contract, the acceptance of goods in air transport. This document is standardized for each carrier. It accounts for the relationship between an importer and an exporter and determines the relationship of a sender and a recipient to the carrier. AWB is issued in English and has an individual carrier number. It is executed on three originals and a specified number of copies (Andrzejczyk, Fajfer, 2016).

Starting from the upper left corner of the document, the following fields can be distinguished: the sender below the recipient of the given cargo, carrier data, port of loading - in this case New York City, unloading port and its code (LHR – Heathrow) next to the flight number (AA1234 / 12). The longitudinal tables should show the parameters of the load, its dimensions, weight, cost, name and volume. In the upper right corner, the second table shows the terms of contract execution. At the very bottom of the consignment note the signature of the agent or the carrier and the date and place of issuing of the document should be placed.

Depending on the type of the cargo transported, transport relation, modes of transport involved, a mode of transport and a number of entities, each transport and forwarding process is diversified. In addition, to a large extent, this process depends on the scope of the transporter's or exporter's transport competence. There is no homogeneous order of performing transport and forwarding activities by entities participating in their implementation, due to the specificity of activities in the case of import and export.

In order to send a shipment, in air transport there is a specific procedure. In the export process, in the case of air freight, the procedure starts from sending the order (by the exporter) and accepting it (by the forwarder). Then the forwarder carries out the registration, assigns the order to the appropriate identification number, which appears on all documents related to the execution of the given order.

It is worth paying attention to the fact that in the first place an inquiry from the importer or exporter appears more and more often, only when the forwarding agent receives a full list of transport costs and if they are accepted, a forwarding order is given by the interested party. Upon its receipt, the forwarder analyzes the information on the document and prepares the concept of organizing the transport of a given batch of cargo.

After providing a possibility of transportation, the next action of the shipper is to prepare a shipping instruction, which must be sent to the sender of the parcel, and a copy to the ordering party. An international waybill and specimen of the freight specification should be attached to the instructions. Subsequent actions are taken by the exporter. On the basis of the forwarding instructions given by the forwarder, the goods are prepared in an appropriate

manner for dispatch. The exporter then organizes the delivery of the cargo to the designated collection point or airport.

The next step is to submit goods using the SAD form (it is used for self-declaration of goods) for customs clearance, along with the customs documents required. In the Republic of Poland, there are provisions in force, according to which declarations of goods for customs clearance may be made by entities which are participants, as exporters or importers, of commodity exchanges with foreign countries, customs agency or forwarder possessing the customs agency's authorization.

Then, the sender receives an international waybill (AWB). After sending the parcel abroad and handing over the international consignment note, the forwarder sends the exporter a transport document, which is necessary for the payment for the shipment.

The International Association of Air Carriers (IATA) launched the E-Fright platform for the better and faster service of air freight. During one year (2009-2010) its use increased 5 times. Saving costs of supply chain services through the use of the platform can reach up to 4.9 billion dollars annually. The electronic document e-AWB is one of the documents that the new platform includes. The use of the platform helps in precise tracking of the shipment, speeds up the service, reduces costs and protects the environment by eliminating the need to print documents.

In 1936 the International Chamber of Commerce developed the first version of the International Trade Rules (*Incoterms*) in Paris. These formulas are used between the parties to avoid misunderstandings when concluding transport and commercial contracts. Defining the rules was a unification of interpretation of transport and commercial contracts in order to define in a comprehensible and safe way the responsibility of each party. The last version published on 01.01.2010 was called *Incoterms 2010*.

Incoterms 2010 regulates the distribution of transport costs between a seller and a buyer and the moment of passing the risk from a seller to a buyer. In addition, it defines the division of duties, insurance and customs duties in transport. It makes it easier for the forwarder to organize properly the transport, secure any claims, determine the customs value of the goods and the clearance (Popa et. al., 2013). Incoterms 2010 contain 11 commercial formulas divided into categories: all means and modes of transport and sea and inland waterway transport. Formulas are marked with a three-letter abbreviation (first letters of names in English).

4. UNIT LOAD DEVICES AND TYPES OF SAFETY MEANS

In air transport, one can distinguish two basic types of cargo units such as air containers and pallets. A *Unit load Device* (ULD) – an air cargo unit, it can be a term for both a pallet and a container. Depending on the type of an aircraft, and a carrier, one can define the maximum gross weight. The units must be marked (Rokicki, 2016).

An air palette is a constructed aluminum plate with hooks holding the cover and safety net placed on the pallet load against moving. The air cargo containers are designed to fill the space of the hull and cargo arches as much as possible. They are made of light materials, including aluminum and plastics. The containers used in air transport must meet IATA standards. They enable not only air transport, but also a delivery of cargo to the airport via ground transport. Container types most often depend on the type of aircraft (Markusik, 2009). Designed in accordance with the IATA and ISO guidelines, the parameters are selected for the type of an aircraft.

All air cargo units, in accordance with regulations, should have ULD identification codes. The code consists of nine items. The first one consists of a letter denoting the category of an air cargo unit (Rokicki, 2016). For example, the letter "A" means a certified air container, the letter "P" – a certified flight palette, and the letter "R" – a certified thermal container. The second position of the code, also in the form of a letter, defines the basic dimensions, e.g. "A" – 224 x 318 cm, "B" – 224 x 275 cm. The third item completes the description of the unit's profile, its circumference or consistency. Another element of the ULD code is the serial number that occupies four or five positions. The last items are the airline code, e.g. "BA" – British Airways, "LH" – Deutsche Lufthansa (Sikorski, 2008).

The unique signature of the given air cargo unit can be expressed in the form "AKN 1234 KL". From the presented code, it can be read that it is an LD3 (IATA type 8) container with the number 1234, dimensions 123 x 200 x 162 cm, with a designated place for entering the forklift truck and belonging to the KLM airlines. In addition, the maximum gross weights of the container (Maximum Gross Weight - MGW) in kilograms and pounds (1 pound – 0.453 kg) as well as the current tare weight (TARE) also in two units must be given on all signatures.

When deploying air cargo, two issues are considered: the permissible surface load and the center of gravity of an aircraft. Goods placed on pallets or containers are transported on board using specialized equipment, i.e. platforms equipped with overhead cranes. Then, using the appropriate fastening belts and fasteners, the load is secured against slipping during transport. Security devices are adapted to the type of goods being transported, for example cylindrical shapes are blocked with the help of the skid.

Shock absorbers are designed to absorb kinetic energy, damping shocks and vibrations. A proper placement, protection with shock-absorbing loads and proper packaging can reduce the sensitivity of goods to the impact of mechanical energy (Kwasiborska, 2011).

The packaging of loads transported by air should be certified and marked in accordance with IATA DGR. According to *Notification to Captain* (NOTOC), the captain of an aircraft, in writing, must be informed what goods are on board, cargo compartment and route of carriage of the cargo concerned (Lasota, 2016).

5. CONCLUSIONS

Globalization facilitates an access to all products, regardless of the type and a country of origin. Developing technologies allow the purchase of any chosen product which should be transported to the buyer. There are several traditional forms of transport, but considering the delivery time, air transport is second to none. Especially, when transporting products sensitive to changes in humidity, temperature, shock, air transport is the most advantageous solution.

Transport cargo management is an important element contributing to the economic development of the region and the country. Taking into account the production zones, the supply of Just in Time production elements, air transport is an opportunity to choose a reliable means of transport, with the fastest possible transport time and an ability to control transport conditions.

With the economic development, the number of cargo transportations at airports is growing. Every year, there is a several percent increase in the use of this mode of transport. It also depends on the development of technical infrastructure. By air, there are transported

that constitute 1% of all international trade, while 35% takes into account the value of transported cargo, which means light, but valuable goods.

The basic document proving the conclusion of the contract between the importer and the export used in the air freight forwarding is *Air Way Bill.* In order to unify the interpretation of concluded transport and commercial contracts, the International Trade Rules for *Incoterms 2010* were developed. They regulate the division of transport costs, the moment of transfer of risk between a buyer and a seller, as well as insurance and customs issues. Two basic types of loading units are used for transport, such as a container and an aviation palette. They also enable a delivery of cargo to the airport. Containers are designed in accordance with the requirements of ISO and IATA standards, while the exact parameters depend on the type of an aircraft.

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