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Revolutionizing Cargo Transport: The Impact of Innovative Technologies

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Abstract

For many years, cargo traffic was marred by inefficiency, slow work systems, extensive paperwork and inaccuracies in the supply chain and transportation to the final destination. Processes within the chain itself entailed slow work, which resulted in large deviations in terms of transport and delivery time to the end user. To overcome these shortcomings and improve cargo traffic, the focus of the work will be on the application of innovative technologies in cargo traffic, the analysis of the application and the advantages it provides. A special aspect of the work is the analysis of cargo traffic in Bosnia and Herzegovina and the application of innovative technologies in its area.

Keywords: innovative technologies, cargo, logistics, air traffic.

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Introduction

Information technologies undoubtedly represent one of today's key resources. We live in a world where technological progress leads to an information leap, which has all the characteristics of the modern industrial revolution. Jobs that were performed a few years ago with slowed-down intensity today with the application of new work methods have been simplified thanks to technology (Mičić, 2018).

At the very core of the strategy of technological growth and development, there is complex information and communication technology.

Every definition of logistics generally leads to one conclusion, which is that the management approach and control of the physical flow is one of the key steps in cargo traffic itself (Shi et al., 2011).

The subject of research in this paper is, on the one hand, the advantages of innovative technologies in logistics and shipping compared to the current way of doing business and, on the other hand, the limited resources available to the company. The purpose is to point out the increasing impact that digitization has on the transport business itself and the importance of applying technological possibilities, tools, software, and digital business as important factors in achieving a competitive advantage and market position.

Within those above, there are technical deficiencies, as well as deficiencies of sufficiently qualified staff that could improve the transport process itself. One of the business challenges for airlines that deal with cargo transportation is the management function, i.e., human resource management.

After the introductory part, the second thematic unit explains the concept of air cargo, how it has developed over time, and its main advantages, it also describes the analysis and assessment of the level of development of the transport system in Bosnia and Herzegovina.

In the third thematic unit, through the description of cargo traffic in Bosnia and Herzegovina, the cargo service sector is described by J.P. "SARAJEVO" International Airport as the main centre of cargo traffic in Bosnia and Herzegovina. Also, in this thematic unit, a graphic presentation of the dynamics of demand for cargo traffic in the world is given in comparison with the cargo transported in Bosnia and Herzegovina.

The fourth thematic unit describes individually innovative technologies within cargo transport, their importance and application.

In the fifth chapter, i.e., the conclusion, a review was made of everything stated in the paper, and the most important conclusions established by this paper were mentioned.

Term and Significance of Cargo Traffic

Air transport is one of the safest and most developed forms of transport. In this traffic, airports represent the starting and ending point of every transport and thus represent hubs that cover and connect distant spaces, people and cultures, open new entrances to individual cities and countries and create first impressions about them. On the other hand, airports are no longer exclusively transport infrastructure but are places where numerous users find their business or private interests because not only passengers and their personal belongings are transported, but also cargo. This is the cargo that we want to transport in the shortest possible period, and this is where air transport is the most important form of transport (Mičić, 2018).

Airport operators are looking for solutions that will increase their overall efficiency while still being quick and flexible to implement (Air Cargo News, 2020).

However, we cannot transport goods to warehouses, shops or kiosks by plane alone; other forms of transport are also needed, so all of them together form a logistically very complex transport network throughout the world, which we call transport systems. Cargo terminals play a key role in air cargo transportation (Milenković et al., 2020). Air cargo is any property that is or will be transported on an aircraft. Air cargo includes cargo, air express and air mail (Allaz, 2004). Cargo traffic developed with the development of the Internet, which, on the one hand, led to the facilitation of airline operations and increased reliability in the processes of preparation, transport and receipt of goods. On the other hand, the Internet still increases the need to use air transport for goods precisely thanks to the increase in the popularity of buying goods via the Internet. In addition to the Internet, the advancement of technology in the form of electronics leads to the facilitation of business in almost all sectors, and the same is visible in air transport, where the use of electronic documentation facilitates and speeds up the process by reducing paper documentation (Rakuša, 2017).

Air transport, as well as its part related to cargo transport, has two main advantages:

1. Speed that cannot be achieved by any other means of transport and
2. Ease of use (Jagodić, 2017).

Aeroplanes today enable transportation from one end of the world to another in a time duration often shorter than a day. In the busy world we live in, where time is extremely important, if not the most important resource, the very feature of aeroplanes that enable the transport of both people and goods in a very short period makes them an important form of transport whose development still needs to be worked on (Allaz, 2004).

The analysis and assessment of the level of development of the transport system in Bosnia and Herzegovina showed that the transport system is still not sufficiently developed and competitive in relation to the transport systems of developed European countries. However, it has certain advantages that put it in a slightly better position compared to neighbouring European countries and some other European countries. Research has shown that Asdibi Bosnia and Herzegovina's transport system could significantly contribute to the development of the general and broader economy and be of importance for the entire European and world economic system (Jagodić, 2013).

In the following chapter, cargo traffic in Bosnia and Herzegovina is described in more detail.

Cargo Traffic In Bosnia And Herzegovina

Cargo traffic in Bosnia and Herzegovina mostly takes place from the largest and busiest airport in Bosnia and Herzegovina, which is J.P. International Airport "SARAJEVO" d.o.o., which is confirmed by statistical data of the Agency for Statistics of Bosnia and Herzegovina. The cargo services sector within J.P. International Airport "SARAJEVO" includes the following types:

- Acceptance and dispatch of goods and mail
- Acceptance and dispatch of special shipments (DG, VAL, and PER)
- Documentary handling
- Sale of bills of lading
- Storage of imported goods (all types of consignments except animals (AVI), mortal remains (HUM), radioactive material (RRY, RRW), value-money consignments (VAL) and veterinary medicines. Consignments containing

ammunition are stored only with the approval of the JGP and Sarajevo Airport Customs offices.

- Delivery of goods with own vehicles. (CARGO, n.d.).

The customs warehouse of the Airport Cargo Center covers an area of over 800 m², including the import and export part. The space is equipped with a CCTV system for monitoring and control.

Data on cargo and mail refer to international air traffic because there is no domestic air traffic in Bosnia and Herzegovina (BHDCA, 2015b).

In the continuation of the work, we provide an analysis regarding the dynamics of demand for cargo traffic in the world until 2022, as well as for transported Cargo in Bosnia and Herzegovina until 2021.

Figure 1

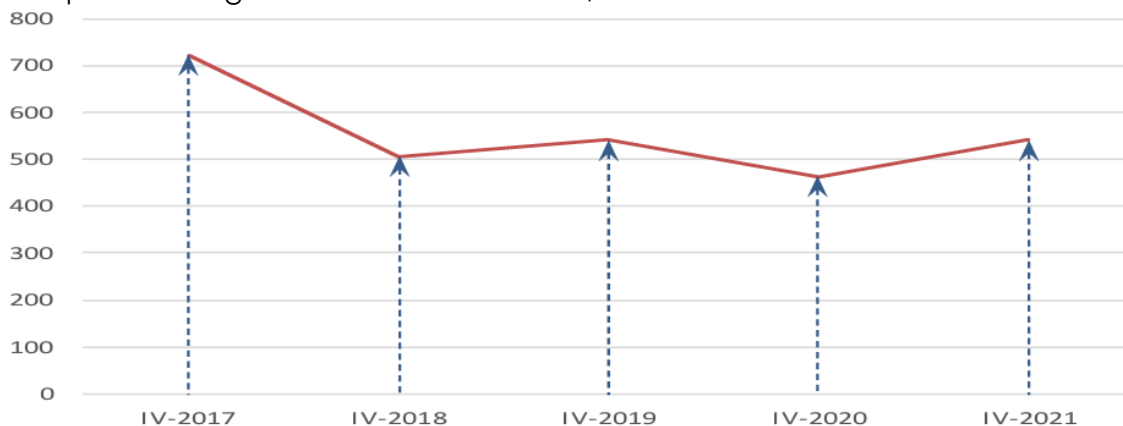
Dynamics Of Demand For Cargo Traffic In The World



Source: (IATA, 2019)

In December 2021, there was a moderate easing of the disruptions that affected air cargo during part of the year and caused growth to slow in November. Coupled with strong demand, that helped industry-wide freight tonne kilometres (CTK) increase 8.9% above 2019 levels in December. This is up from 3.9% in November and the best performance since April 2021 (11.4%). Compared to 2020, growth was roughly similar in December (8.4%) and November (9.0%).

Figure 2
Transported Cargo In The Air Traffic Of BiH, Tons



Source: (BHDCA, 2015a)

The modernization of the traffic system of Bosnia and Herzegovina represents the renewal, growth and development of all its subsystems and elements, and above all, technical, technological, organizational, economic, legal, ecological, educational, informational, qualitative, and its approach to the achievements and standards of the most developed traffic systems in Europe and the world (Jagodić, 2017).

The traffic system of Bosnia and Herzegovina needs to be modernized and improved in order to become an equal partner to the traffic systems of developed countries. In an effort to be included in European and world goods and passenger flows, such a request is inevitable. Suppose you analyze the state of Bosnia and Herzegovina's traffic system, i.e., the state of certain branches of traffic. In that case, it is possible to see numerous shortcomings, which are primarily manifested in the obsolescence of infrastructure and superstructure, uneven development of traffic subsystems, and inappropriate organization of management, work and business (Jagodić, 2013).

Innovative Technologies In Cargo Transport

Among other transport systems, cargo transport has always been a special business, given that it offers the fastest delivery time over medium and long distances, especially on continents. In order to make the most of the speed factor, airline networks need to expand continuously, making the airline industry more flexible (Jeffrey, 2022).

The air cargo industry will benefit the most if large cargo carriers can be dispatched without pilots. This will help the industry to reduce fuel consumption and reduce the harmful impact on the environment by using aircraft that are lighter and more efficient (Schodl et al., 2018).

When analyzing the advantages and disadvantages of air cargo transportation, it is necessary to mention the efforts made by the professional community led by IATA in order to improve air traffic and eliminate its disadvantages. The two most important programs have been designed and accepted, namely the Quality Management System Cargo 2000 and e-freight. Cargo 2000, i.e., Cargo IQ and e-freight technology, are programs of the IATA organization within the StB (Simplifying the Business) project. Actually, it is an initiative of IATA. The initiative is global, and the following are actively involved: air carriers, workers, providers of acceptance and shipping services, and customs (Aeroclass Team, 2014).

There are two fundamental goals of this initiative: reducing business costs and improving service quality. The StB program includes the following projects:

1. Bar Coded Boarding Passes (BCBP);
2. IATA electronic business - IATA e-services;
3. Baggage Improvement Program - Baggage Improvement Program;
4. Fast Travel Program - Fast Travel Programs;
5. IATA electronic cargo business - IATA e-freight (IATA, 2019).

In the continuation of this thematic unit, innovative technologies in cargo traffic are described (Table 1).

Table 1
Innovative Technologies In Cargo Traffic: A Review

TECHNOLOGY	DESCRIPTION
3D printing and autonomous vehicles	This technology can be used to track container transport worldwide in real time, identify likely bottlenecks and collection areas, and alert workers to potential disruptions. Therefore, the potential cost savings to reduce congestion and disruption in the industry's supply chain are enormous.
Bluetooth-based smart sensor networks	Trade facilitation has evolved from electronic customs based on electronic data exchange. This has evolved into a fully integrated and unique system for connecting traders, customs, regulatory authorities and private sector participants. A unified system can improve the availability and authenticity of the information, thereby reducing fraud and speeding up and simplifying the flow of information between trade centres and administrative authorities, resulting in greater compliance and sharing of relevant data for parties involved in cross-border trade.
Real platforms with one window	It will help facilitate international trade and allow governments to give businesses the opportunity to reduce overheads and simplify international shipping while keeping borders secure and documentation up-to-date and verified. Digitization is a rule-changing opportunity for the air cargo industry, creating a new and simpler future.
E-Freight	This system has complete functionalities, from reservation, business, bill of lading, accounting, banking, cash management, and general ledger to reporting.
Molecular screening	This technology provides a unique data editing tool that reduces data entry errors.
Automation in cargo traffic	Automation in cargo transportation will be taken to new heights with autonomous vehicles, robotic systems and drones, enabling operations to achieve more every day. Productivity, precision, and quality will be improved, process waste will be removed, and speed will be increased. Autonomous material handling equipment will measure, shade, take photos of the receipt and automatically move the load to the next location. Drones will handle automated sorting and inventory management. Robotic systems will automatically collect and break loads. A cargo drone is an unmanned aerial vehicle that can transport cargo to the desired destination in an environmentally friendly way. This drone is capable of lifting

	approx. 2,500 kilograms in vertical takeoff and landing, flies at a cruising speed of 205 miles per hour and delivers packages not only in urban areas but also to remote rural locations within a range of 1,120 miles.
Electronic data interchange (EDI systems)	Electronic data interchange (EDI) is used for the exchange of order information between retail firms and manufacturers and invoicing procedures, enabling e-invoicing. It is also used to send electronic orders for delivery to logistics service providers and provide product information or process payment requests. For example, by using the EDI system, the supplier can automatically send a notification about the delivery of the requested goods and deliver an invoice at the same moment that the goods leave the warehouse. Likewise, the moment the company receives a new order, the EDI system automatically sends a notification to the warehouse to start preparing the delivery of the requested products. Immediately after that, the client receives a notification that his order is being processed and that the delivery process is underway, all without unnecessary paperwork and wasting time.
Robots	Robots will also eliminate dangerous human tasks, such as dealing with toxic spills and handling oversized or extremely fragile cargo. Replacing the storage shelf (i.e. buffer) function with automated lifters or automated storage and retrieval devices allows the shelves to be closer together, as well as freeing up staff time to continue with tasks still performed by humans. An added benefit is the ability to reduce the horizontal footprint with these efficiency gains. Augmented reality will reduce errors, improve turnaround time, improve user/worker satisfaction, and reduce the burden on training and ongoing competency assessment.

Source: Authors

Conclusion

The process of receiving and shipping cargo in air transport is a complex process consisting of a large number of activities that need to be coordinated in terms of time and space. Given that good coordination of all activities is important for the most efficient and smooth overall process, there is a need for the application of innovative technologies that directly affect the further development of the airport and increase the level of safety in air traffic.

In order to improve cargo traffic, it is very important to mention the efforts made by the professional community led by IATA. IATA is committed to providing enhanced value to the aviation industry, safe transportation, and a secure, profitable and sustainable cargo supply chain. It also develops global standards and tools to launch innovative solutions for simplifying business and easier, smarter and faster cargo transportation in air traffic.

By using increasingly advanced technology, cargo transport users are now able to track shipments through appropriate software, and by adopting electronic documentation (electronic waybill), they have led to a reduction in paper documentation, speeding up and simplifying the process of using air cargo transport.

One of the advantages of air transport is certainly the lower costs required for the construction of the infrastructure required for such a form of transport.

The application of innovative technologies described in the previous thematic unit will help the industry to reduce fuel consumption; less time is needed for certain activities in the process of acceptance and dispatch, which contributes to the direct economic benefit of the air carrier, reducing the harmful impact on the environment, and also increasing the level safety for aircraft, equipment, surrounding facilities and personnel. The level of safety in air traffic is reflected in the fact that most innovative technologies have appropriate systems and sensors that prevent the possibility of any dangers.

As for the traffic system of Bosnia and Herzegovina, it is necessary to modernize and improve it, given that numerous shortcomings are primarily manifested in the obsolescence of the infrastructure, as well as the uneven development of traffic subsystems. Cargo traffic of Bosnia and Herzegovina needs to be developed to other airports, in addition to J.P. International Airport "SARAJEVO", and to develop and apply innovative technologies at the European level.

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