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Characteristics and the Overview of Air Traffic in the Republic of Croatia

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ABSTRACT

As one of the largest and most important industries in the world, the air industry's impact on economic development, living standard and productivity in the Republic of Croatia has been significant. Air transport is of high significance for the economic development of the Republic of Croatia because its tremendous importance in the development of one of the most important economic branches in Croatia – tourism. Due to the liberalization of the air transportation market in the European Union the growth of low-cost carriers has been noteworthy. The aforementioned liberalization has had a significant impact on the Croatian air transportation market, especially on the presence of low-cost carriers in the coastal Croatian airports. Based on the secondary data analysis, the purpose of this paper is to underline the characteristics of the Croatian air transportation market, and as well to analyse the importance and the role of low-cost carriers in the traffic of all Croatian airports. Due to this development, a significant increase has been noted in the passenger air traffic and as well in the number of low-cost carriers that are offering their services on the Croatian market.

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1 Introduction

Air industry is one of the largest and most significant world industries whose development and achievement largely influence the progress of the modern society (Air Transport Action Group, 2011: 4). Development of air transport activities has globally increased the demand for airport services, along with the need for the establishment of a more efficient process of providing airline, passenger and cargo services (Budiarto *et al.*, 2018). Air traffic, as all other traffic branches, generates advantages for an economy, but it also carries certain disadvantages. In relation to other traffic branches, modern air traffic definitely stands out with its speed and significantly higher safety of the goods (manipulative losses and thefts are considerably lower) if the goods of higher value are transported. Hernandez (21 July 2018) lists the advantages of air traffic: speed and safety during the travel, selection of different destinations for holiday, fast delivery of medical aid, contribution to the progress of the modern society, influence on the growth of productivity of the entire economy and facilitation of the world trade. Air Transport Action

Group (2011: 3) states that most important benefits are: improvement of the living standard and alleviating poverty, transport to distant areas and contribution to the development of tourism and trade. On the other hand, the main disadvantage of air traffic is its negative impact on the environment: noise, gas emissions, water and ground pollution, harming the flora and fauna around the airport.

The paper is divided into five chapters. After the introduction, in the second chapter the air traffic in the Republic of Croatia is analysed. The analysis of traffic on the Croatian air traffic market will be presented in the third chapter, while strategy for further air transport development in the Republic of Croatia will be addressed in the fourth chapter. Conclusions are presented in the fifth chapter.

2 Air Traffic in the Republic of Croatia

2.1 Historical development of Air Traffic

Croatia has a long and rich history concerning air traffic. Faust Vrančić, born in Šibenik, also known as the Croatian Leonardo Da Vinci, drew and designed the par-

achute in the 17th century. Although it was Da Vinci who first drew the parachute, it was Vrančić who first published the design, built it and even tested it and jumped off the cliffs and church towers (The European Library, n/a). Zagreb airport celebrated its 50th birthday in 2016, and the location it was first built was Črnomerec, more accurately, the area between Selska road and the stream Črnomerec. It was built only 6 years after the first historic flight of the Wright brothers (Putoholičari, 6 December). The airport, i.e. airfield, was opened by Slavoljub Penkala, an inventor of Slovakian descent who lived and died in Zagreb. In 1910, he finished his airplane, the first Croatian airplane ever. Unfortunately, his flight was not successful, it flew at only about ten meters off the ground and the plane crashed during its first flight. After that, Penkala gave up aviation, but he definitely put a stamp on the beginning of Croatian air transport with his first airplane, with opening the first airfield, and with being the educator and the instructor of Croatia's first pilot – Dragutin Novak (Aeroklub Zagreb, 2018). The airfield was soon after Penkala's unsuccessful flight sold to the businessman Merčep who, together with the Rusjan brothers from Gorica, worked on the airplane construction. Very soon, they "set the unofficial world record when their 7 meter long monoplane took off with barely 28 meters of the run" (Barić, 2017). Before the World War I, airfields were grassland, and airplanes were mainly used for military purposes. Then, there were 5 grassland airfields in Croatia: Zagreb, Split (Sinj), Dubrovnik, Rijeka (Sušak) and Vukovar (Oborovo) (Pavlin *et al.*, 2006).

After the World War I, new airport started to be built in Zagreb, the first airport in every sense of the word. The construction started in 1923, and was finished in 1926. The airport was built in the eastern part of the city and named Borongaj. It was used for military and civil purposes and had a runway 750 meters long. The airport was bombed several times at the end of the World War II. After the War, Borongaj Airport stopped to be used for civil purposes and a military workshop was set up there. In 1961, the military workshop was relocated to Velika Gorica and Borongaj Airport was closed completely. Airport Lučko was chosen as the replacement for Borongaj. It had a grassland 1.500-meter-long runway, but Lučko Airport could not follow the development of aviation, so civil traffic lasted only till 1959 (Vrančić and Nadilo, 2006). After that moment, Lučko served only for sport aviation (Nadilo and Vrančić, 2015).

In 1959, air traffic moved to Pleso which was up until then only used by the military. "The runway was 2.500 meters long and the platform could receive five smaller airplanes" (Pavlin *et al.*, 2006). In 1962, a company for airport services was founded, called "Zrakoplovna luka Zagreb" (*eng. Zagreb Airport*). At that point, "Zagreb Airport" had a concrete 2.500-meter-long runway, a parallel taxi runway, a passenger building of 1.000 m², an apron for five smaller airplanes and a few smaller facilities, mostly prefabricated huts (Zračna luka Zagreb, n/a). Those moments marked the beginning of the first international airport in

Croatia and the beginning of mass transportation. Sudden development of tourism on international and domestic lines was becoming more and more significant in the development of air traffic, so from 1963, 131.380 passengers and 813 tons of cargo were transported, and 5.620 take-offs recorded. In 1966, the runway was expanded to 2.864 meters and a new management building with the control tower was built (Pavlin *et al.*, 2006).

The period from 1966 to 1975 was characterized by a surge in air transport, i.e. in the use of Croatian airports, which was also the highest increase in history. The growth culminated in 1969, when the number rose to 58% (the increase of passengers in relation to the year before) (Pavlin, 2000). At the end of the 1980s, Croatia recorded stagnation in air traffic. Because of the Independence War, the airports were occupied, and the equipment and the airplanes were damaged (Pavlin, 2003). Air traffic began to move again in 1992, and Croatia became a full member of the ICAO (International Civil Aviation Organization) in April of the same year (Croatia Air traffic Control, n/a). Today, the Republic of Croatia has 7 airports (Zagreb, Split, Dubrovnik, Osijek, Rijeka, Pula and Zadar), Brač aerodrome and two airfields (Vrsar and Lošinj), which means that the share in the total international air traffic is 1 % (Pavlin, 2003).

2.2 Croatian airports

Zagreb, Split and Dubrovnik are primary Croatian airports, while Osijek, Rijeka, Pula and Zadar can be characterized as secondary airports. In other European countries airports are divided into primary and secondary. Primary airports are characterized with the fact that they do not receive low-cost carriers – LCCs. Low-cost carriers land in secondary airports and they are characterized with the traffic of fewer than 4 million passengers. Although the above-mentioned characteristics imply that airports in Croatia could be divided into primary and secondary, this kind of division does not exist in Croatia, which is supported by the fact that Germanwings, the first low-cost carrier present on Croatian market, connected Zagreb and Bonn in 2004. Low-cost carriers have influenced the change in the behaviour of the users throughout Europe, and they have made certain destinations more available to everyone (Naletina *et al.*, 2018). *Figure 1* shows airports and airfields in the Republic of Croatia.

Airport in Zagreb, named "Franjo Tuđman Airport" (the name has been in use since 2016) is the largest airport in the Republic of Croatia and it is also the key airport for travelling inside and outside the country, crucial for tourism and for business. Consequently, it is extremely important for economic development of the country. Currently, Zagreb is directly connected with 39 destinations, and 24 airline companies operate there regularly. For a long time, the capacity of the airport was 5 million passengers annually and it could not follow the growing demands of the market. For that reason, Croatian government decided to

build a new terminal, 2.5 km away from the old terminal, under government and private ownership, 65.600 m² in size (World Bank Group, 2017). Those 65.000 m² comprise of four levels, 30 check-in counters, 9 lanes for security check-ups, 8 airplane bridges and three aprons for smaller airplanes, a baggage handling system, over 1000 parking spaces, stores and hospitality facilities.

It is important to point out that the build of the new terminal brings “new passenger flows: road access for the passengers to the new passenger terminal goes over the eastern Gorica bypass connecting via modern roads Kosnica junction of the A3 highway (Bregana – Zagreb – Slavonski Brod), the eastern gate to Zagreb over the Domovinski bridge, and A11 highway (Zagreb – Sisak), i.e. new Velika Gorica bypasses.” ZET (Zagreb Public Transport Company) has introduced an additional bus line (Zagreb: Kvaternikov trg – Zračna luka Zagreb) going directly to the airport, and along the bus that rides directly from the main bus terminal, organized by the airport, that additional route was enabled, at a somewhat more affordable price (Turistička zajednica Velika Gorica, n/a). The new terminal implies the increase of the capacity to 5 million passengers, with the possibility of increasing the number to 8 million. It is important to note that this build has enabled a direct entering from the building into the plane. The new terminal started operating on 28 March 2017 and on that day, all the traffic was transferred from the old terminal to the new one (Pavlič, 2017). The increase was justifiable, since the number of the passengers has been growing year by year, with slight decrease in 2009 and 2013, while in 2017 it exceeded the number of 3 million, as visible in *table 1*.

Table 1 The number of the passengers in Franjo Tuđman (Zagreb) Airport from 2007 to 2017

Year	Passengers	Trend (%)
2007	1.992.455	0.00
2008	2.192.453	10.04
2009	2.062.242	- 5.94
2010	2.071.561	0.45
2011	2.319.098	11.95
2012	2.342.309	1.00
2013	2.300.231	- 1.80
2014	2.430.971	5.68
2015	2.587.798	6.45
2016	2.766.087	6.89
2017	3.092.047	11.78

Source: Zračna luka Zagreb: Statistika; <http://zlj-zagreb-airport.hr/hr/statistika> (15 October 2018).

The growth trend continues in 2018 as well, which can be seen from the data shown in *table 2*, where data until September 2018 are available. It can be seen that the number of the passengers increased every month.

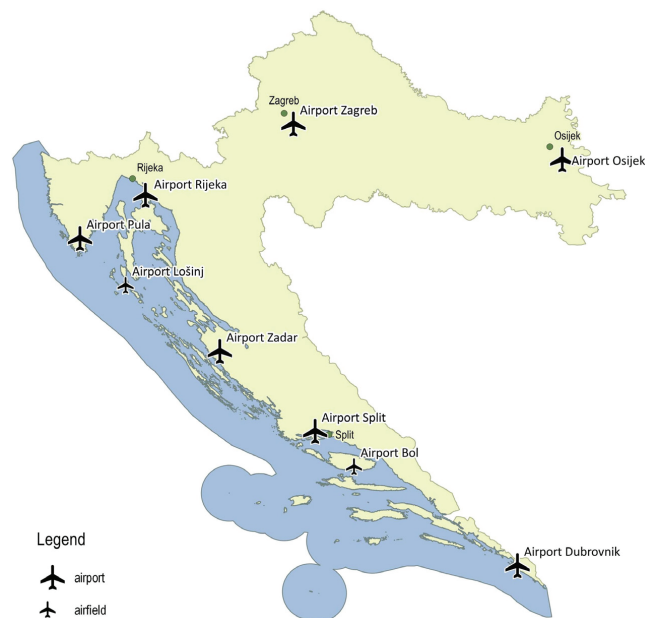


Figure 1 Airports and Airfields in the Republic of Croatia
Source: authors

Table 2 The number of the passengers per months for the years 2017 and 2018

MONTH	2017	2018
January	168.788	191.276
February	154.679	170.658
March	192.533	223.642
April	240.168	253.843
May	268.847	300.676
June	310.921	331.533
July	351.532	379.308
August	347.663	372.590
September	330.855	345.770
October	297.682	
November	222.697	
December	205.682	
Total	3.092.047	2.469.296

Source: Zračna luka Zagreb: Statistika; <http://zlj-zagreb-airport.hr/hr/statistika> (15 October 2018).

Figure 2 shows the comparison of 2017 and 2018 and the percentages for every month. The highest percentage, i.e. the biggest increase in the number of the passengers was in March, 16 %, or 31.109 passengers. It can be concluded that there was increase in the months outside the summer season as well, so the average increase for the first half is 10 %. Therefore, it is concluded that the increase can be expected in the summer season as well. The growth in the summer should be supported by the increase in the capacities of the existing partners, like the Spanish Iberia, that has announced more flights for Madrid (SEEBiz, 27 March 2018).

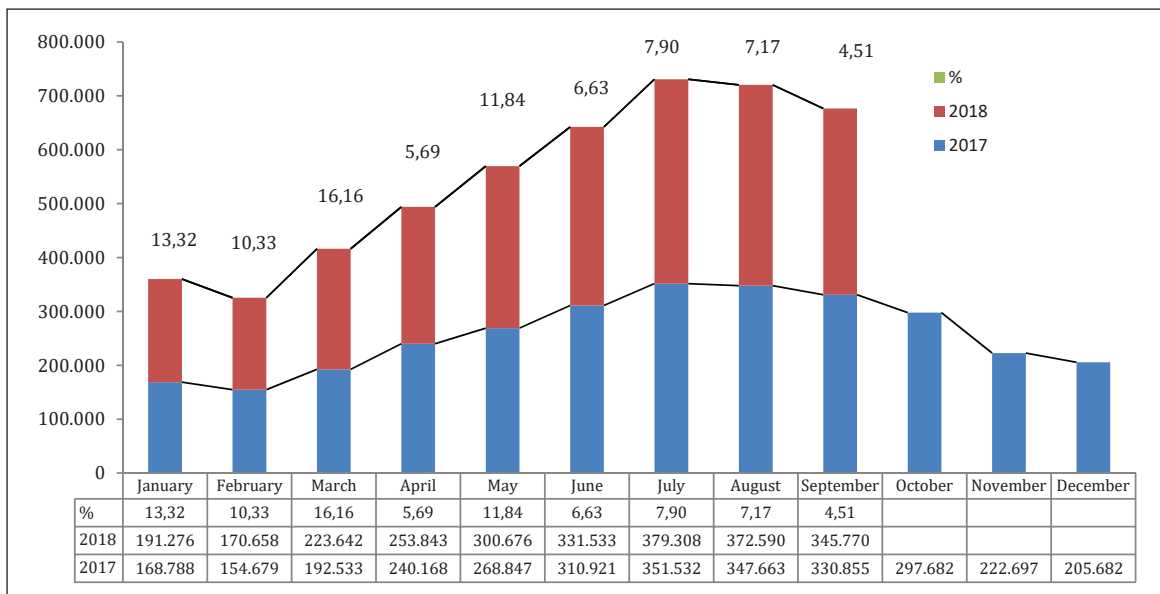


Figure 2 Comparison of the number of the passengers for the first 6 months (2017 and 2018) and the change in percentage
 Source: authors according to Zračna luka Zagreb: <http://zljz-zagreb-airport.hr/hr/statistika>. (15 October 2018).

Split Airport was built in 1979 and first, it was intended to accept up to one million passengers a year (Split Airport, n/a). However, this capacity is by far not enough, since Split has been receiving over one million passengers for years. In 2006, the numbers surpassed one million, and in 2016, it was over 2 million passengers, as shown in *table 3* – the number of passengers from 2013 to 2018 (for the first 9 months of 2018). In 2017, the number almost reached three million and that year also recorded the highest increase of even 23 %.

An interesting fact is that over 90 % of the passengers that go through Split Airport come via international lines. In 2016, when the increase of the passengers was 17 %, 94.5 % of them were from international flights. There was also an increase in the flights by 9 %. The same year in July, the most passengers went through the airport, half a million

of them. This number is the highest number ever achieved till that moment in Croatian airports (Poslovni dnevnik, 13 February 2017). Already next year, Split Airport continued to file records, so in July 2017, the number of passengers was 657.056, which is the increase of 21 % in relation to July 2016 (Bogdan, 2017). Exactly for this reason, for the increase of the number of passengers, which will probably go over 3 million this year, in 2017, there began the process of reconstruction and addition of Split Airport. “With the planned reconstruction, the building will be added three floors and total of 35.000 m², due to which the terminal will be able to receive 2.500 passengers during the rush hours. The parking lot for buses and cars with the facilities of 35.500 m² should be expanded, along with the bus terminal, rent-a-car offices and the bridge for the pedestrians that will connect to the passenger terminal’. The reconstruction

Table 3 The number of passengers in Split Airport (2013-2017)

Year	2013	2014	2015	2016	2017	2018 (September)
Passengers	1.581.734	1.752.657	1.955.400	2.289.987	2.818.176	2.799.756
% change when compared with the previous year	0 %	10.8 %	10.37 %	17.11 %	23.07 %	-

Source: Split Airport: Statistics (2018); http://www.split-airport.hr/index.php?option=com_content&view=article&id=160&Itemid=115&lang=en (11 October 2018).

Table 4 Number of the passengers in Dubrovnik Airport (2013 – 09/2018)

Year	2013	2014	2015	2016	2017	2018 (September)
Passengers	1.522.629	1.584.471	1.693.934	1.993.243	2.323.065	2.245.371
% change when compared with the previous year	0 %	4.06 %	6.91 %	17.67 %	16.55 %	-

Source: Dubrovnik Airport: Statistics; <https://www.airport-dubrovnik.hr/index.php/en/about-us/statistics> (15 October 2018).

Table 5 The number of the passengers in Zadar Airport (2015 – 09/2018)

Year	2015	2016	2017	2018
Passengers	487.652	520.226	589.468	538.640
% change when compared with the previous year	0 %	6.68 %	13.31 %	-

Source: Zadar Airport, <https://www.zadar-airport.hr/statistika-prometa> (12 October 2018).

should be finished by the beginning of the summer season 2019 (Poslovni dnevnik, 13 February 2017).

Dubrovnik Airport is situated in Čilipi, built after the WW II, and its primary location was in Gruda, Konavle (Zračna luka Dubrovnik, n/a). More than 70 airline companies use Dubrovnik Airport and they fly to more than 100 different locations (national and international) (Dubrovnik Insider, 8 December 2017). “The importance of Dubrovnik Airport lies in the fact that it enables the connection between Dubrovačko-neretvanska County and the remote destinations (domestic and foreign), since the connection by the road is made difficult due to the fact that it is necessary to cross the border with Bosnia and Herzegovina twice at a very short distance. This problem will only be exacerbated when Croatia finally implements the Schengen Agreement, which will imply stricter border control. There is no railway, and the city of Dubrovnik is connected by the sea only with the adjacent islands (Šipan, Lopud, Koločep, Mljet, Korčula and Lastovo). Air traffic is the only traffic branch that enables free daily flow of people and goods without crossing the state border of the country that is not a member of the European Union” (Ministarstvo pomorstva, prometa i infrastrukture, 2017a). The capacity of the airport was, until one year ago, 1.5 million passengers, but this number was exceeded in 2013, with 1.522.629 passengers (Zračna luka Dubrovnik, n/a). The number of the passengers continued to grow, as evident in *table 4*, where the passengers for the period from 2013 to 2018 are shown.

The biggest increase was in 2016, 17 %, and 16 % in 2017, and in that same year, the number of 2 million pas-

sengers was reached. Also, the popularity of Dubrovnik has been boosted by the filming of the popular show Game of Thrones and the movie Star Wars (episode 8) than happened in 2016. The growing popularity and the increase in the number of the passengers brought overload to the airport of only 1.5 million passenger capacity, so the reconstruction was essential for further development. The project “Dubrovnik Airport Development” was launched and co-financed by the European Union via the Operational Programme Competitiveness and Cohesion 2014 – 2020 (Dubrovnik press, 31 July 2018). Exactly in 2017, when the number of 2 million passengers was reached, the new terminal was finished, and the runway is still being reconstructed during the winter months of this year because there are fewer passengers in that period (Dulist, 31 July 2018).

Zadar Airport is the only one that has not experienced the decrease of the number of the passengers due to the recession in 2009 (Gašparović, 2011), however, the real increase of the passenger traffic has been achieved only in the last few years, and the number of half a million was reached in 2016 (Zadar Airport, n/a). The cause of this growth was the arrival of the low-cost carriers. “With their model of associate marketing in cooperation with Zadar Authority and Zadar County, the Croatian Tourist Board and the local tourist boards, Zadar Airport is the pioneer in introducing low-cost carriers in air traffic of Croatia. Since then, Zadar Airport has breaking passenger traffic records year after year.” Irish Ryanair has mostly contributed to the increase of the number of the passengers. It is the largest low-cost carrier in the world, and it came

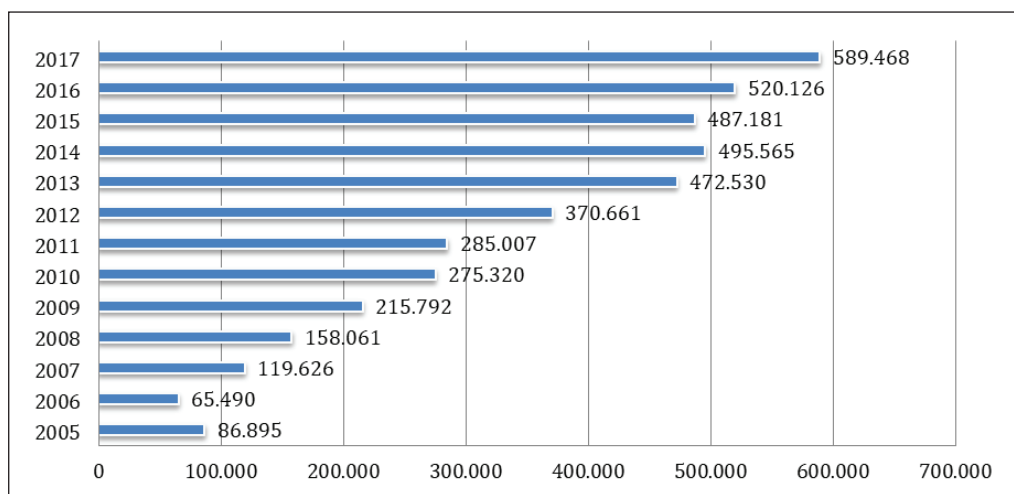
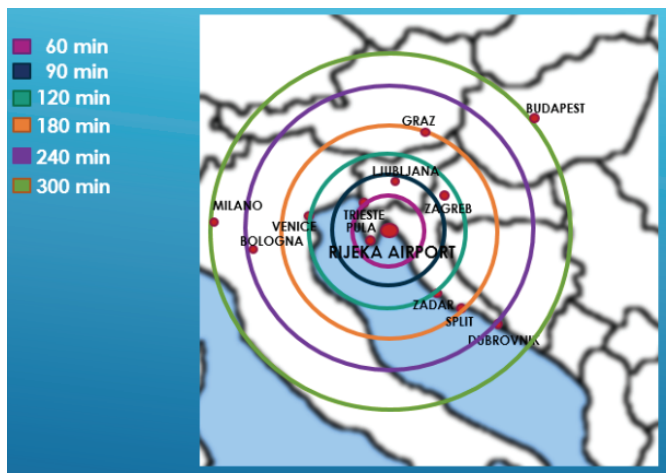


Figure 3 The total number of the passengers in Zadar Airport for the period from 2005 to 2017
 Source: Zadar Airport: Statistics: <https://www.zadar-airport.hr/en/traffic-statistics> (15 October 2018).



Picture 1 The position of Rijeka Airport and distance to the nearest European cities

Source: Rijeka Airport (n/a), <http://rijeka-airport.hr/hr/tehnicki-podaci> (15 October 2018).

to Zadar in 2007. After Ryanair saw the tourist potential of Zadar Airport, in 2012 they opened a base in Zadar, and soon after, many other companies like Lufthansa, Eurowings, easyJet and Croatia Airlines started spreading their networks towards Zadar. Due to the fast growth facilitated with the arrival of low-cost carriers after only a few seasons, the recently reconstructed airport building had to be expanded and reconstructed again. So, in 2008, Zadar got the new terminal, i.e. the VIP terminal, first of that kind in Croatia, which attracts new guests who want to visit Croatia with their private planes (Zadar Airport,

n/a). The flow of the passengers for the period from 2015 to 2018 (first 9 months) and the changes in percentages are visible in *table 5*.

The *table 5* shows that the greatest increase happened in 2017, but for this year, the increase for the first 7 months was 10 %. If the trend continues or stays the same, Zadar Airport could reach the number of 600.000 passengers for the first time. If we are to observe the longer period (*figure 3*), one can notice that the earlier mentioned increase started in 2007, with the arrival of Ryanair, but with the reconstruction of the passenger terminal, the increase grew to even 82.66 %.

Rijeka Airport is situated on Krk Island and it was opened on 2 May 1970. It has excellent location, in the very “heart of Europe”, as evident in *picture 1*. Even 3 million people live only 120 minutes from Rijeka Airport (Aerodrom Rijeka, n/a).

Despite the excellent location, the airport did not have good results for a longer period of time, and it has started recording better results only in the last few years. The number of the passengers is around 140.000 annually, with slight changes. The only significant increase was in 2015, as shown in *figure 4*. In 2014, there was a drop of the number of the passengers, but then there was a big increase in 2015, mostly due to Croatia Airlines that in 2015 achieved the increase in its operations by 162 % (Rijeka Airport, April 2016). After that, there was no significant increase. In 2016, there was the increase of 4 %, and in 2017, there was the drop of 2.5 %.

Table 6 shows the comparison of the passenger traffic for 2017 and 2018 (first nine months) to see if an increase

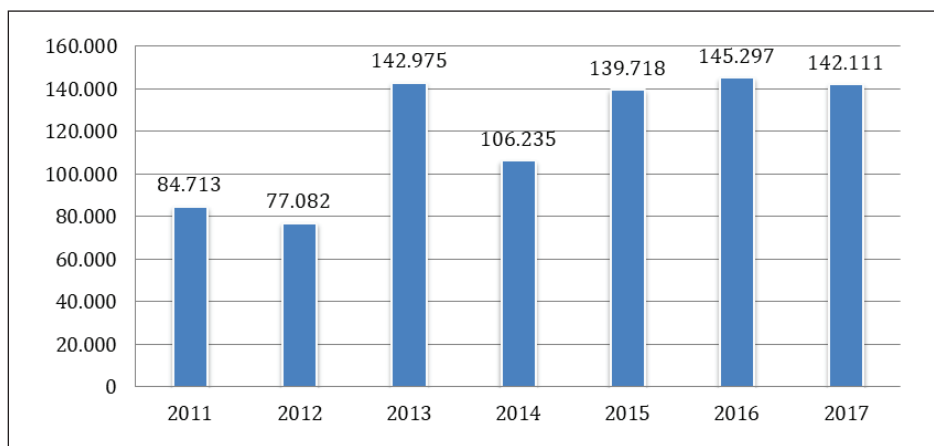


Figure 4 The total number of the passengers in Rijeka Airport for the period 2011 to 2017
Source: Rijeka Airport: Statistics; <http://rijeka-airport.hr/hr/statistika> (15 October 2018).

Table 6 The number of the passengers in Rijeka Airport from 2017 to 2018 (first nine months)

Year	January	February	March	April	May	June	July	August	September	Total
2017	128	240	754	3.996	10.401	22.411	32.271	34.860	24.312	129.373
2018	1.406	751	2.631	7.091	17.476	22.726	41.832	41.335	28.356	163.604
Trend	998.4 %	212.9 %	248.9 %	77.45 %	68.02 %	1.4 %	29.63 %	18.57 %	16.63 %	26.46 %

Source: Rijeka Airport: Statistics; <http://rijeka-airport.hr/hr/statistika> (15 October 2018). According to its CEO, predictions and plans of Rijeka Airport are half a million passengers by the year 2020 (Glavan, 28 November 2017).

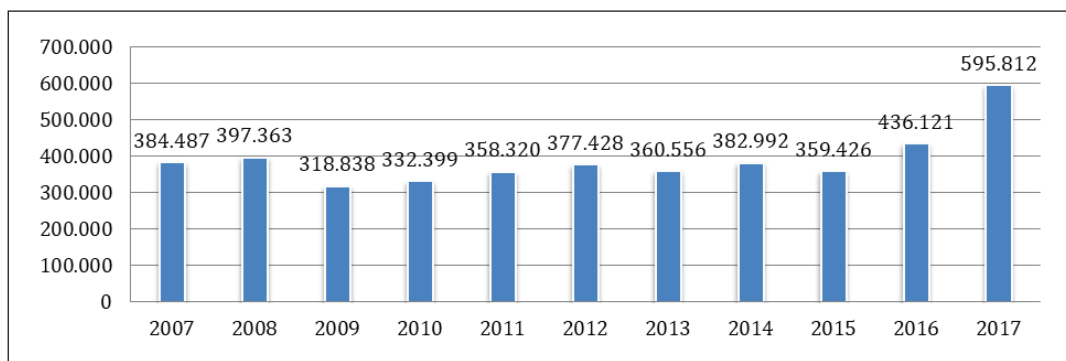


Figure 5 The number of the passengers in Pula Airport from 2007 to 2017
 Source: Pula Airport; <https://airport-pula.hr/en/business-info/about-us-2/statistics/> (15 October 2018).

after the mild drop in 2017 can be expected. In the first 5 months of 2018, there was a major increase of the passengers in relation to the same months in 2017. In the first seven months of 2018, there was the increase of 23.712 passengers, i.e. 33.78 % in relation to the first seven months of 2017.

Pula Airport is situated in Valtursko polje, and it experienced its first take-off as early as in 1911, while the civil flights started in 1924, flying to Trieste, Opatija and Ancona. In 1967, the old military aerodrome was put to use for civil purposes, and the airport experienced great success in 1987, when it received even 701.370 passengers. In 1989, the new project for reconstruction of the airport building started, and the capacity was increased to one million passengers. After that, there was the period of the War and the stagnation of the traffic which again started to grow in 1999 with a somewhat changed passenger structure (the British were replaced by the guests from East Europe), and also with different airlines. Former charter companies were replaced with low-cost carriers and with the companies flying regular routes (Pula Airport, n/a). The flow of the passengers over the last few years can be seen in *figure 5* (total number of the passengers from 2007 to 2017). In 2009, there was

the drop of passengers, probably due to the economic crisis and recession, then there followed the growth. There were more and more passengers every year until 2013, when there was a slight drop caused by fewer guests from Russia (by even 45 %), because of the introduction of the visa requirement for Russian citizens (Zračna luka Pula, 2014). In 2015, there was also a slight drop, however, it was that year that the passengers from Great Britain returned and most British passengers landed in Pula that year. The same year started the reconstruction of the airport, and more low-cost carriers started to arrive, with the help of Istria County and Istria Tourist Board that allocated 8 million HRK (Croatian kuna) for the support of airline companies in 2015 (Glas Istre, 8 July 2015). The result was the growth in 2016, but the most significant growth happened in 2017, when the number of the passengers grew to 600.000. The prognosis of Pula Airport CEO's is that, in 2018, 700.000 passengers should land in Pula, an increase of about 15 % (Glas Istre, 19 January 2018). The current number of the passengers in 2018 (for the first seven months) is 378.870, while in the last year, the number was 311.964, which is the growth of 21.45 %. If this trend is to be continued, Pula Airport could achieve or exceed the number of 700.000.

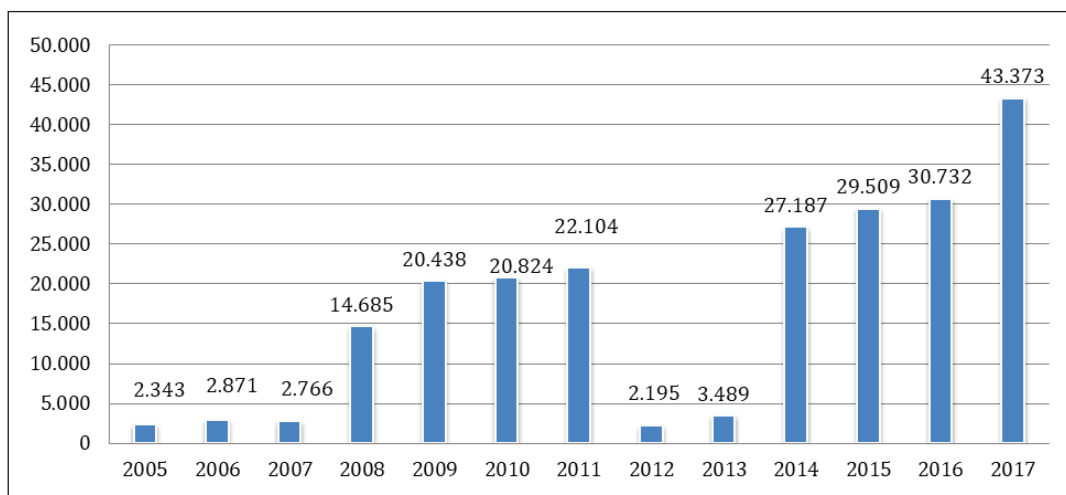


Figure 6 The total number of the passengers in Osijek Airport for the period from 2005 to 2017

Source: MMPI: Osijek Airport: Market analysis, <https://www.aik-invest.hr/wp-content/uploads/2016/12/Zracna-luka-Osijek-prosinac-2017.pdf> (15 October 2018).

Years 2017 and 2018 were very successful for this airport for two more reasons. In 2017, they received a certificate for infrastructure, so Pula Airport is the first airport in Croatia to successfully complete the process of conversion of the aerodrome certificate according to the requirements by the European Regulation from 2014. Namely, "European Commission adopted the Regulation 139/2014 on setting the requirements and administrative procedures regarding aerodromes. This Regulation defines the administrative rules for determining conditions for projecting and safe working conditions of the aerodrome that reflect the latest achievements and best practices at aerodromes, and considering applicable standards and recommended practices of the ICAO' (Hina, 18 May 2017). The year 2018, with the increase of the passengers, also brings a big project: Interpass (Intermodal Passengers Connectivity between Ports and Airports). "Intermodal connectivity of the passengers between the ports and the airports, which includes Pula Airport and Pula Port Authority", says Glas Istre (daily newspaper published in Pula). "The goal of the project is to improve intermodal connectivity between the ports and the airports in the Adriatic-Ionian region, to improve the flow of the passengers, mostly travellers from cruisers, in reaching the tourist destinations situated on the Adriatic and the Ionian coast during the main season". Likewise, the project included the acquisition of the shuttles for the passenger transport, which is currently in progress, and which will connect Pula Port and Pula Airport by road (HrTurizam.hr, 26 May 2018).

Osijek Airport was built and put in operation on 30 May 1980, however, the War came soon and left considerable consequences. It was rebuilt and again made operational in 2001. A significant increase in the traffic was seen not before 2008, which is a consequence of new airline companies entering the market. Greatest contribution has been given by low-cost carriers. In that year, the contract with Germanwings was signed and the number of the passengers grew from 2.766 to 14.685, as evident in *figure 6*.

In 2009, there was a new increase (app. 40 %), which was the result of the five-year contract with Ryanair being concluded. In 2010 and 2011 the number was moderately growing, while in 2012 there was considerable drop by even 90 % because Ryanair cancelled the contract. This happened because of the lack of subsidies. The year 2013 was similar to 2012, but with a slight increase.

In 2014, the contract with Ryanair was renewed, and the airport received the most passengers that year. The new attractive destination – London helped increase the traffic flow. The growing trend has continued till today. Although Ryanair stopped flying in 2017, this year recorded the highest number of the passengers and the number of 40.000 was reached for the first time. Instead of Ryanair, two new airlines were introduced: Eurowings and Wizz Air (Ministarstvo pomorstva, prometa i infrastrukture, 2017b). It is expected that the growth trend will continue. This year, Osijek Airport plans on doubling the number from the year 2017 (HrTurizam.hr, 26 May 2018).

3 The analysis of traffic on the Croatian air traffic market

3.1. The analysis of low-cost carriers

Low-cost carriers represent competition to commercial airline companies due to the price, which is in itself the most important factor for most users. The price structure of commercial airlines (with full service) disables efficient competition with the prices offered by low-cost carriers. They attract the users with more affordable ticket prices and in so doing, increase their market share on the air transport market. In the last years, their significance has been growing and they pressure traditional airlines to consider their business model (Vennix, 2017: 4). Standard characteristics of low-cost carriers are (Vidović, 2010):

1. Distribution (reservations over the phone or online);
2. On-flight services (no class differentiation, no food and beverage service);
3. Frequent flights and one airplane type (a few flighty per plane daily);
4. Minimal delays;
5. Low prices and simple operations without associating with other operators;
6. High utilization;
7. Direct, shorter lines;
8. Secondary, low-frequented airports;
9. Growth goals (10 % annually);
10. Employees (share in the profit, high productivity, competitive salaries);
11. Hiring highly-trained and qualified flying and cabin crew.

Table 7 The structure of the departing passengers according to the airlines for Split Airport (2014 and 2015)

Carrier	2015	Structure	2014	Structure	Index
Croatia Airlines	215.211	22.1	214.470	24.6	100
Other domestic carriers	1.143	0.1	896	0.1	128
Foreign carriers	301.426	31.0	289.503	33.2	104
Low-cost carriers	455.177	46.8	366.877	42.1	124
Total	972.957	100.00	871.746	100.0	112

Source: Zračna luka Split, March 2016; http://www.splitairport.hr/images/Revizorsko_Godisnje_izvjesce_2015.pdf (15 October 2018).

Low-cost carriers emerged in Croatia in 2004. Till then, common understanding was that they attract poor passengers, when now; it is clear that these passengers simply possess better ICT knowledge, searching for cheaper and unplanned travels. “The first low cost carrier in regular transport in Croatia was Germanwings that established a year-around line between Cologne (Bonn) and Zagreb and a season line between Cologne (Bonn) and Split, and very soon after, they introduced the lines from Berlin, Stuttgart, Hamburg and Bonn to Croatia” (Vidović, 2010).

Low-cost carriers that land in Croatian airports are: Ryanair, Germanwings (Eurowings), Norwegian, Air Berlin, Wizz Air, Volotea, Vueling, Thomson Airways, InterSky, TUIfly, Eurolot, Monarch Airlines, Jet2com, easyJet, Flybe, Jetairfly, Aer Lingus, DanubeWings, Sky Europe, Flyglobespan, Clickair, On Air and Sterling.

Although Zagreb Airport was the first to receive a low-cost carrier (Germanwings), now, it has the smallest share of low-cost carriers’ traffic in all Croatia. In 2017, only four low-cost carriers used Zagreb Airport: Eurowings, Vueling, Norwegian and Monarch (Vidović, 2010). The situation with Split Airport is quite the opposite, and most passengers travel with low-cost carriers, as evident in *table 7*. LCCs realize almost half the traffic of (departing) passengers, so in 2014, the number was 42.1 % and in 2015, it grew to 46.8 %.

The most prominent operator is Croatia Airlines, while easyJet has recorded the highest rise in traffic and is right behind Croatia Airlines. They are followed by Germanwings, SAS and Norwegian, and Vueling, Lufthansa and Wizzair have also had a considerable growth (Zračna luka Split, n/a).

Low-cost carriers play a significant role in the operations of Dubrovnik Airport, where on the list of 31 first airlines, 11 of them are LCCs (Putovnica.net, n/a). *Table 8* shows the first 11 airlines of Dubrovnik Airport. Here, Croatia Airlines also holds the leading position with the share of 18.44 %, which is a drop in relation to 2016, when the share was 19.81 %. Then there follow the low-cost easyJet which occupies the second place, same as in 2016,

Table 8 Top 13 airlines in Dubrovnik Airport for the year 2017

Airline	Number of passengers	Percentage/Share
Croatia Airlines	428.489	18.44
easyJet	306.791	13.21
Jet2Com	142.782	6.15
Vueling Airlines	115.317	4.96
Thomson Airways	99.449	4.28
Austrian Airlines	88.678	3.82
Lufthansa	87.921	3.78
Norwegian Air Shuttle	87.278	3.76
Norwegian Air International	84.543	3.64
Monarch Airlines	84.024	3.62
Eurowings	81.931	3.53
British Airways	81.915	3.53
Turkish Airlines	55.340	2.38

Source: Dubrovnik Airport: Statistics; <http://www.airport-dubrovnik.hr/images/stories/stat/Top13Avioprijevoznika.pdf> (15 October 2018).

but the share has grown from 10.89 % to 13.21 %, and Jet2Com that grew from 4.6 % to 6.15 %.

In Zadar Airport, there currently operate 12 airlines, four of them being low-cost carriers: Ryanair, Eurowings, Vueling and easyJet. LCCs represent great significance for this airport, since they have brought many passengers. *Figure 7* shows the total number of the passengers for top three airlines. Ryanair is the most significant. Over the 10 seasons (2007 – 2016), it carried almost 2 million passengers, while Croatia Airlines is in the second place, and it carried 547.086 passengers in the same period, which is almost four times less than the first, Ryanair. Then, there is Eurowings (until 2016 it operated under the name Germanwings) which carried 387.905 passengers in the mentioned seasons. These facts are presented in *figure 7*.

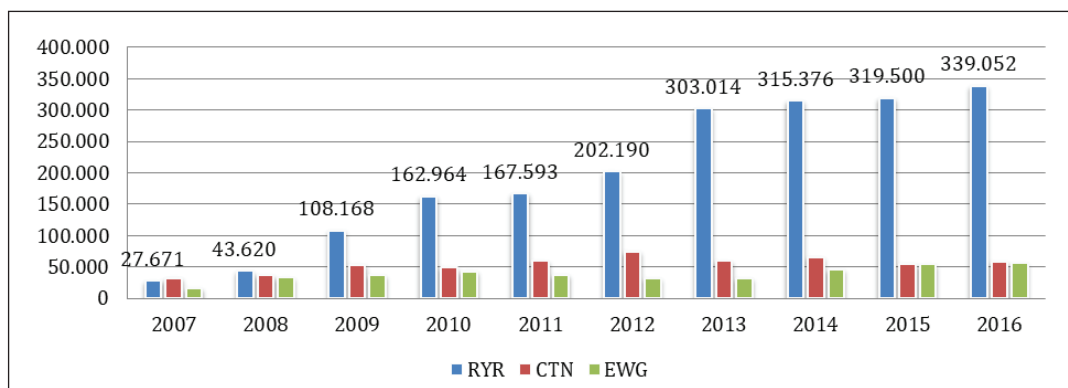


Figure 7 The total number of the passengers for Zadar Airport for top 3 airlines (2007 – 2016)
Source: Zadar Airport: Statistics; <https://www.zadar-airport.hr/en/traffic-statistics> (15 October 2018).

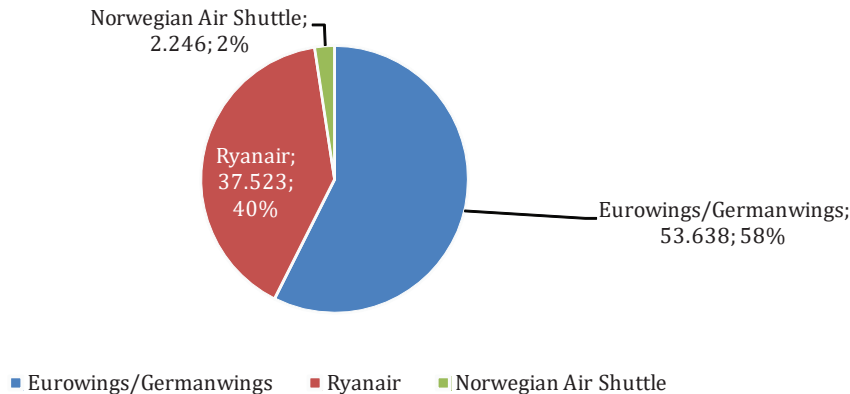


Figure 8 The number of the passengers on low cost carriers in Rijeka Airport in 2017

Source: Zračna luka Rijeka: Godišnje izvješće za godinu završenu 31. prosinca 2017., May 2018.;

http://rijeka-airport.hr/pages/sub/26/doc_hr/godisnje-izvjesce-o-stanju-i-poslovanju-drustva-za-2017.pdf (15 October 2018).

Rijeka Airport is also dominated by the low-cost carriers. The share of the passengers according to the type of transport in 2017. It is evident that low-cost carriers occupy over 60 % of the total traffic, more precisely 67 %. The highest share of the passengers belongs to Eurowings/Germanwings (58 %), and then Ryanair with 40 %. Norwegian Air Shuttle has only 2 %. These facts can be seen in *figure 8*.

In the top six airlines of Pula Airport for 2016, even four of them are low-cost carriers, as evident in *figure 9*.

The first is Ryanair with 17.5 %, then Thomson Airways and Croatia Airlines, and after them, three low-cost carriers: Norwegian with 7.6 %, easyJet with 7.3 % and Eurowings with 5.5 %.

Low-cost carriers have been present in Osijek Airport since 2008, with two years of interruption (2012 and 2013), and in those two years there was a significant drop, i.e. there were fewer passengers than in other years. This is evident in *figure 10* that shows the total number of the passengers and the share of low-cost

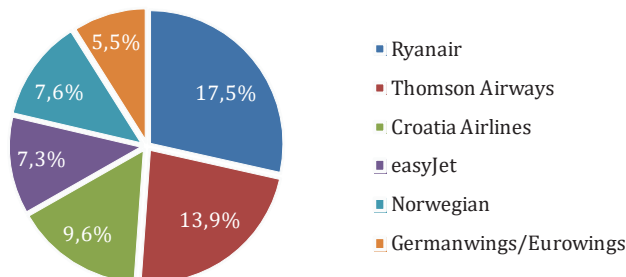


Figure 9 Traffic structure according to the most represented airlines in Pula Airport for the year 2016

Source: Zračna luka Pula: Godišnje izvješće uprave o stanju društva „Zračna luka Pula“ u 2016. godini, January 2018.;

<https://airport-pula.hr/poslovno/o-zracnoj-luci/poslovna-financijska-izvjesca/> (15 October 2018).



Figure 10 The total number of the passengers and the share of low-cost carrier passengers in Osijek Airport for the period from 2008 to 2016

Source: Osijek Airport: Statistics; <http://www.osijek-airport.hr/> (15 October 2018).

carriers for the period from 2008 to 2016, when the share was even 83 %, while in 2012 and 2013, when there were no low-cost carriers; Osijek Airport realized poor results, with just over 2.000, i.e. 3.000 passengers. Although Germanwings was the first that in 2008 entered this airport, the next year, its place was occupied by Ryanair that operated till 2011. After the three-year pause, in 2014, Ryanair started again to offer its services in Osijek Airport. The *figure 11* shows the growth from 2014 to 2016 that followed after Ryanair returned. Eurowings (Germanwings until 2016) returned to Osijek Airport in May 2017, together with Wizz Air, and for the first time in history, the number of 40.000 passengers was exceeded (Ministarstvo pomorstva, prometa i infrastrukture, 2017b). This supports the importance of low-cost carriers in Osijek Airport.

3.2 Analysis of air passenger and cargo transport

Since the Croatian economy has been largely influenced by the results realized in the tourist sector, it also reflects on the Croatian air transport market. Air passenger traffic in Croatia is extremely seasonal and under the influence of tourist movements. "Croatian air transport market is characterized by strong seasonality of the demand with high level of competition in the summer months. During summer season almost 100 airline companies operate on the Croatian market, more than half of the passengers are transported in the third quarter, and during the winter months their presence is minimal" (Croatia Airlines, April, 2018). Seasonality of air transport in Croatia is evident in *figure 11*, which also shows how the highest number of the passengers is realized in the third quarter.

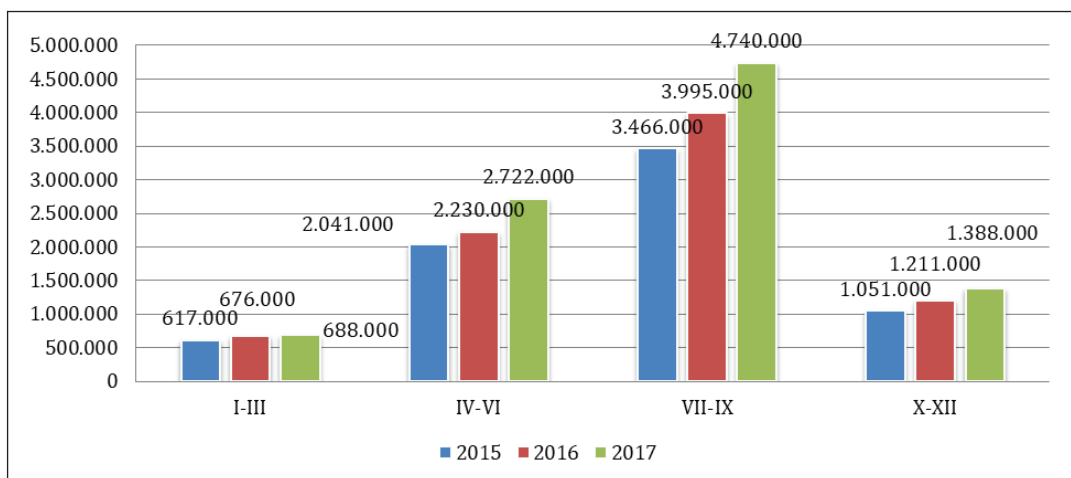


Figure 11 The total number of the passengers in air transport in the Republic of Croatia per quarters for the period from 2015 to 2017
 Source: authors, according to Državni zavod za statistiku Republike Hrvatske; <https://www.dzs.hr/app/kalendar/PubBySubject.aspx> (15 October 2018).

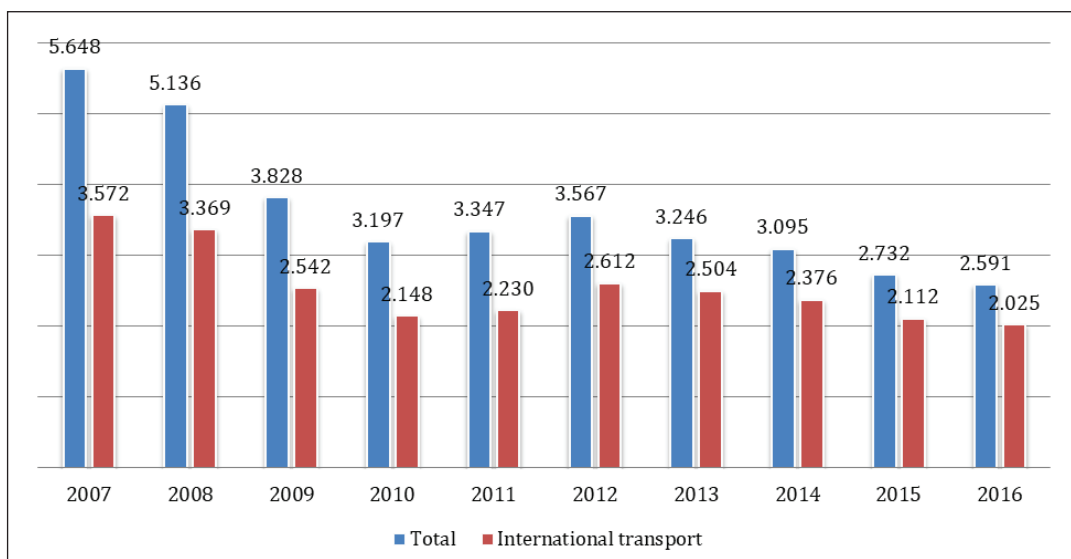


Figure 12 Transported cargo by air in the Republic of Croatia, 2007 - 2016
 Source: Državni zavod za statistiku Republike Hrvatske; Statistički ljetopis Republike Hrvatske 2017, 2017; https://www.dzs.hr/Hrv_Eng/ljetopis/2017/sljh2017.pdf (15 October 2018).

The analysis of the monthly distribution of the number of the passengers shows that air transport in the Republic of Croatia is directly connected with tourism. The demand in all Croatian airports significantly rises from May to September. This is especially true for Split and Dubrovnik, airports that record twenty times more traffic in the summer months, July and August, than in February. The number of the passengers in Zagreb, "Franjo Tuđman" Airport, is almost double in July than in February. In Rijeka and Pula, the traffic in the off-season is at the bottom limit, while in August, the number of the passengers at Rijeka Airport grows to almost 35.000 and at Pula Airport to 85.000 a month. These great seasonal discrepancies in all the airports point to the need for changing the tourist concept with the aim of prolonging the season (Ministarstvo pomorstva, prometa i infrastrukture, 2017a). The number of the passengers has been growing year after year, and the greatest growth was noted in the third quarter of 2017, when it was 18.6 % while the total growth of the passengers for 2017 was 18 %. Almost 85 % of the entire passenger traffic in airports takes place in three main airports: "Franjo Tuđman" Airport (36 %), Split Airport (25 %) and Dubrovnik Airport (24 %). If the structure of the passengers and the demand for air transport services is analysed, it can be seen that biggest generators of the traffic are foreign passengers with even 88 %, and the cause of it is the exposure to recession and economic crisis (Croatia Airlines, April 2018).

Economic and political movements have enormous influence on air freight transport. It enables efficient connection of different markets regardless of their distances, and the establishment of fast delivery chains (Kasarda and Green, 2005: 459). The inclusion of air transport in the organization of cargo transport enables cargo being shipped very quickly, but also the increase of efficiency, quality and improvement of economic relations with the foreign countries (Sokolova, Soloviova and Borets, 2018). Air cargo industry is essential for international trading flows, especially among North America, Europe and Asia (Merkert and Alexander, 2018: 32). Assuredly, the economic crisis has had the greatest influence, where the markets dependent on the industrial production have suffered the most. With the recovery form the influence of the global crisis, air cargo traffic also recovers. The overall potential of the air cargo traffic for the period from 2007 to 2010 is between 10.500 and 15.000 tons, relying mostly on Zagreb (Drljača, Pašagić-Škrinjar and Brnjac, 2012). In Croatia, the drop in air cargo traffic has been present for years, as is shown in *figure 12*. The drop has been present since 2006, and only in 2007 there was a slight increase. However, the drop was almost negligible until the economic crisis, and after it and the recession there has been a significant drop of air cargo traffic in the Republic of Croatia. If the year 2015 is compared to 2007, it can be seen that the number is cut in half. 2016 brought another drop, half the value recorded in 2008, the year prior to the crisis. With structural issues in economy, the crisis caused the drop of production investments, export, consumption, and

closing many companies, mostly those dealing with production. This had consequences on air cargo traffic as well, it being substituted with ships and trucks (Drljača, 2012). Croatian market has been recovering over the last years and it is expected that this recovery will influence the air cargo traffic as well in the upcoming years.

At the beginning of the crisis, big global shippers and logistics companies ordered their branch offices in Croatia to direct their cargo to other airports, like Graz and Vienna, which further influenced the drop of air cargo transport in Croatia. Also, there are many legislative and regulative limitations enforced by different countries that relate to air transport. Croatia had one of those limitations which referred to the lack of a complete institutionalized framework that regulates traffic of the planes that go over the permitted level of noise, for example IL76 which makes significant share in the cargo space on the global market (Drljača, Pašagić-Škrinjar and Brnjac, 2012).

4 Strategy for further air transport development

Air transport is becoming one of the most significant models of transport. Although sensitive to economic and energy crises, wars and terrorist acts, a constant growth of passenger traffic, between 5 and 7% annually, is recorded on the global level (Peović, Vince and Štimac, 2012). Air transport represents great significance for Croatia as well, especially because it is a tourist-oriented country.

With the accession of the Republic of Croatia to the European Union, and the future entering the Schengen area, certain challenges are placed before air transport and main priorities focus on the following (Ministarstvo pomorstva, prometa i infrastrukture, 2017a):

- modernization of Dubrovnik Airport because there is the need for improving the access to Dubrovnik region;
- adjustment of the relevant airports to European requirements regarding safety and management, in order to manage the demanding high seasonal traffic more efficiently and to prepare for the possible implementation of the Schengen Agreement;
- increase of sustainability of the air transport system and the airport maintenance efficiency and reduction of the influence on the environment;
- improvement of the safety standards in airports and air transport;
- improvement of the access to the airports (public transport in particular), since in Croatia there is no airport connected with a railroad or a tramway, so the passengers are transported by cars, public buses or taxis.

Since modernization of Dubrovnik Airport is the topic, it is important to note that Dubrovnik is one of the most popular destinations on the Adriatic coast. Regarding its geographic position that forms an enclave, it is necessary to preserve the existing, but also to improve traffic connections to ensure good traffic flow. "The planned

measures include the extension of the existing traffic/infrastructure capacities to maintain the existing level of quality of the service, reducing/removing traffic bottlenecks, improvement of the existing and the build of the new roads and facilities necessary for safe and easy airport operations, introducing measures for environmental protection, implementing measures for higher energy efficiency and the acquisition of the necessary equipment and machines" (Ministarstvo pomorstva, prometa i infrastrukture, 2017a). Furthermore, the plan is to develop smaller airports on big islands for better connectivity of the Croatian territory, i.e. for improving regional connectivity and to satisfy the growing tourist traffic. "The measure would contribute to consolidation of intermodal traffic system by connecting the air, road and maritime traffic". This strategy predicts the development of tertiary airports on the following islands: Hvar, Vis, Korčula, Ploče, Lisačke rudine and Lastovo (Ministarstvo pomorstva, prometa i infrastrukture, 2017a). One of the issues that arise is the accessibility to the airports and distribution of the passengers regarding the means of transport in the traffic structure to the airport and from the airport. 36 % of them travel by car, one and a half passenger per vehicle on average, 33% travel by bus, with 25 passengers on average, and 31 % of the passengers travel by taxi. The goal is that in the future, measures are undertaken to improve the passenger transport service to the airports "in the sense of increasing the flow on the roads, or in the sense of decreasing the overload of the road network by managing the demand, or introducing alternative forms of transport etc.' In Croatia there is no airport that is connected by a railway or a tramway, and the plan is to enable connectivity with these types of transport to the airports in the future. Table 9 shows the structure of the transport towards the airports in the Republic of Croatia.

Safety is among top priorities and the goal is to develop highest standards of air transportation safety on international, regional and national level to reduce threats in air transport. The aim is to reduce the number of accidents and limit negative consequences. It is important that air-

ports satisfy international safety standards. Besides safety, special attention is given to raising awareness on the user satisfaction and the importance of monitoring the quality of the service with key indicators of successfulness. The importance of presenting the results publicly, clearly and thoroughly is also highlighted, with the aim of grasping the opinions of the public and the participants in the process.

For the future of air transport in the Republic of Croatia, innovations and modernization of aviation and air fleet are also crucial. To achieve this goal, it is necessary to turn to research, development and environmental protection in cooperation with private investors and the Government of the Republic of Croatia in the sense of special funds. It is necessary to pay more attention to the application of innovations and to achieving compatibility with new technological standards (Ministarstvo pomorstva, prometa i infrastrukture, 2017a).

5 Conclusion

Air industry is one of the largest and most significant world industries whose development and achievement largely influence the progress of the modern society. The Republic of Croatia is not an exception, as the growing influence of air traffic development has been noted in the last few years. Due to the continuing interdependence and need for faster transportation arising from the ever-developing and growing globalization in the world, the share of air transportation in overall transport has been growing regardless of the nature of the travel (touristic, business or private). Croatia has been following this trend as well.

Croatian airports have during the last several years recorded a considerable increase in passenger traffic. Significant entrance of new companies, especially of low-cost carriers, has been recorded on the Croatian air traffic market. The greater presence of low-cost carriers positively affected the number of tourists in the Republic of Croatia. Based on the conducted secondary data analysis, the importance of Franjo Tuđman Airport in the overall air traffic of passengers has been confirmed. Franjo Tuđman Airport, with the completion of the new airport terminal, has made a significant step forward in positioning itself as one of the most important airports in Croatia and the region as a whole. It is crucial that in the future, the rest of the airports in the Republic of Croatia follow Franjo Tuđman's example in further increasing investments in air traffic infrastructure in order to facilitate further growth that the market demands.

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Table 9 Transport allocation to the airports according to the means of transport

Airport	Bus	Automobile	Taxi
Zagreb	33 %	36 %	31 %
Split	25 %	37 %	38 %
Dubrovnik	35 %	33 %	32 %
Osijek	-	50 %	50 %
Rijeka	33 %	32 %	35 %
Pula	28 %	40 %	32 %
Zadar	35 %	33 %	32 %

Source: Ministarstvo pomorstva, prometa i infrastrukture; <http://www.mppi.hr/UserDocsImages/MMPI%20Strategija%20prometnog%20razvoja%20RH%202017.-2030.-final.pdf#page=133&zoom=100,0,94> (15 October 2018).

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