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# Development and potentials of sports-recreational aviation and avio tourism in Croatia

## Abstract

The development of aviation in Croatia began more than a century ago with the development of the adequate infrastructure, mostly hangars for building of aircraft and their servicing. In that long-lasting development of the Croatian aviation, the focus has been on the military and especially civil aviation already by the beginning of World War I, in Austrian - Hungarian Monarchy. This paper will describe the development of civil aviation but not the commercial public traffic than the sports-recreational aviation. Special care is dedicated to avio tourism, i.e. tourism that appears due to the activities connected with ultralight flying and air sports. Avio tourism and its development contribute to the total number of visits and the tourist's consumption at tourist destinations which develop that kind of tourism. The paper concludes with some proposals for the development of the overall sports and recreational aviation and avio tourism.

**Key words:** recreational and sports aviation; ultralight aviation; airports; avio tourism; Croatia

## Introduction

Over a century has passed since the first flights by aircraft were carried out in Croatia. The first enthusiasts, self-builders and self-taught aviators, gave rise to a fleet of aircraft that took off from grassy take-off sites, but also from sea surface even before the World War I, in the Austrian-Hungarian Monarchy. Exactly at that time, commercial civil aviation for transport of passengers and cargo started.

At the same time, the sports and recreational aviation was developing too, however, in a disorganized way, due to various limitations, particularly the financial and regulative ones. The sports and recreational aviation may comprise small airplanes and ultralight aircraft, as well as many other forms of sport, such as paragliding, hang gliding, parachuting and similar sports.

The today's umbrella organization for aviation is Croatian Civil Aviation Agency (CCAA). The Agency started the operational work in 2009. The activity of the Agency comprises the tasks connected with the air traffic safety, and, in particular, with certification, supervision and inspection for the purpose of ensuring continuous compliance with the requirements for performing air transport and other activities in air traffic, keeping of the prescribed registers and records, and performing of other tasks determined by the Air Traffic Act. Among other activities, the Agency has public authority over the licences and examinations for pilots of aircraft (airplanes, helicopters, gliders, balloons, hang gliders, paragliders and sports- recreational aircraft) and parachutes in accordance with the national regulations, and for the aircraft maintenance personnel.

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Of course, the basis of the sports and recreational aviation are the aeronautical infrastructure and the means of transport. Therefore, this paper reviewed the existing and planned aeronautical infrastructure, i.e. made the list of the existing aeronautical infrastructure that refers to international airports and public traffic landing grounds, military airports and aerodromes, airfields, helidromes, water aerodromes and the planned new aeronautical infrastructure<sup>1</sup>. In that segment, the existing supply in the field of avio tourism and the potentials for the development of that form of tourism were examined.

In the "Strategy for the Development of Tourism in the Republic of Croatia by 2020", it is stated that, by entering the European Union, Croatia is facing new challenges, but also new opportunities in tourism (Strategy for the Development of Tourism in the Republic of Croatia, 2013.).

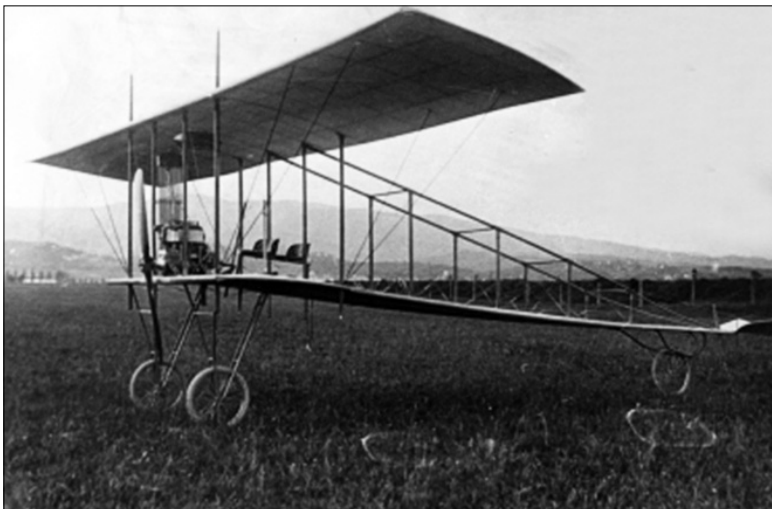
Avio tourism is one of the segments of tourism for which action plans for the development and investment in the infrastructure should be made.

## Overview of history of civil aviation in Croatia

The first flight in the air in Croatia was the balloon flight which was operated by Karlo Mazarović. The flight took place above Zagreb in 1789. After over a century, engineer Eduard Slavoljub Penkala constructed the first Croatian aircraft in a hangar in Zagreb. The first flight with it was made by his mechanic Dragutin Karlo Novak at Zagreb military training ground Kajzerica (according to the Croatian Encyclopaedia), in 1910, seven years after the flight of the Wright brothers from USA). A year earlier Penkala started the construction of an aerodrome, so that the first aerodrome in Zagreb, with the grassy runway, was made in 1910. After 1924, the aerodrome was abandoned because it could not be expanded to accept bigger aircraft and a new one was made, with the 750 m long runway, on a lawn in the area of Borongaj, Zagreb.

The aerodrome at Borongaj area was operating from 1926 to 1962. The first regular civil line was established in 1928 between Zagreb and Belgrade, and the lines to Vienna, Budapest, Prague, Milan, Graz, Ljubljana, Sarajevo, Split, Trieste, Dubrovnik and Klagenfurt were established soon. The aerodrome was used for military purposes as well, i.e. as the home guard airport.

Figure 1  
The first version of the aircraft of the constructor Eduard Slavoljub Penkala



Source: Aeroklub Zagreb.

Photographed at the military training grounds Črnomerec, the first Croatian aerodrome, in 1910. The earth embankment built along Selska street is seen in the back.

Figure 2

**A photo of the Zagreb airport at Borongaj, by mid 1930s**

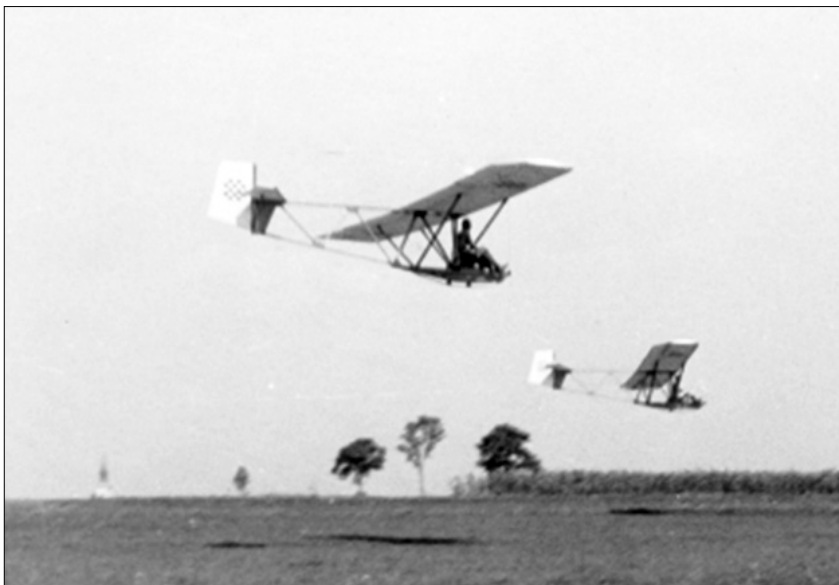


Source: Aeroklub Zagreb.

All the structures seen at the photo (to the left is the administrative building of the civil aeronautical landing ground, and the western and northern hangars) have been preserved and are protected cultural monuments of the Republic of Croatia today.

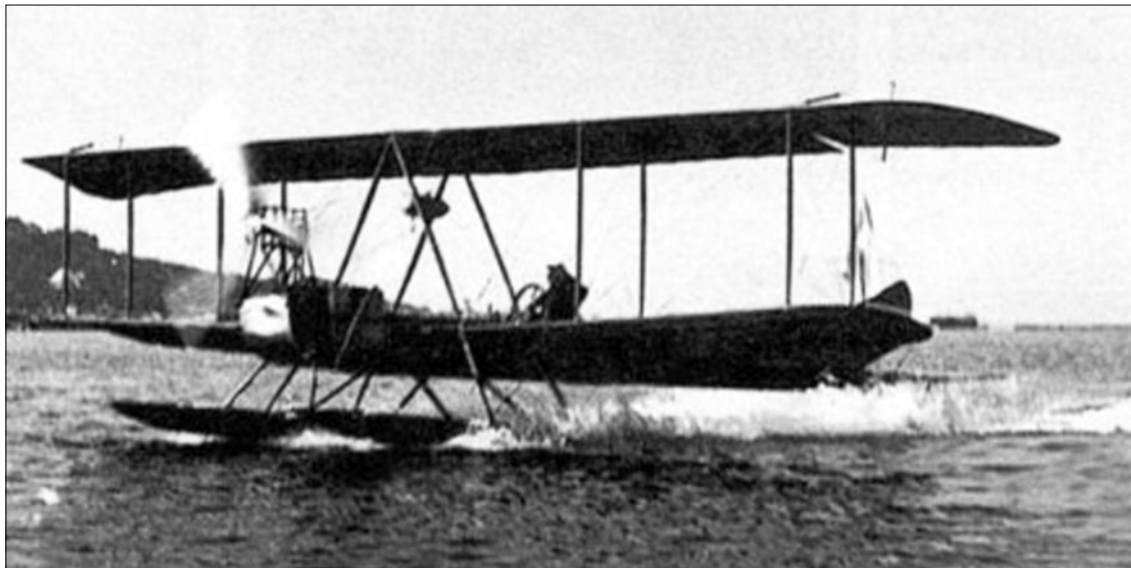
Figure 3

**Two gliders of the "Vrabac" ("Sparrow") type in flight at the Brezje location in 1942**



Source: Aeroklub Zagreb.

Figure 4  
Hydroplane of Viktor Klobučar



Source: Aerosvijet.

Edvard Rusjan, the first Slovenian aviator, together with his brother Josip, started the promotion tour around the Balkan countries in 1911, and he landed in Zagreb. Shortly after that, Edvard was killed in Belgrade near Kalemegdan and thus became the first victim of aviation accidents. Josip continued building aircraft with Dragutin Novak. They built five aircraft, and Dragutin Novak was the winner at the Second Aviation Competition in Budapest in 1912.

In 1911, Guido Prodam from Rijeka flew from Rijeka to Lovran. By that, he became the first pilot in the Austrian-Hungarian Monarchy that flew above the sea for 60 m. He constructed his aircraft Prodam I, II and III. In the latter, he was hit in 1918, in an air battle against four RAF's aircraft, after which he survived, but became disabled.

Viktor Klobučar, an Austrian-Hungarian naval officer, was a flyer of the Austrian-Hungarian ballooning. As an airplane pilot, he participated in the Grand Race around Great Britain, he was a pilot of flying boats and a gliding champion, as well as the first commander of the Austrian-Hungarian naval aviation. During the time of his commanding, a network of hydro-bases and take-off sites was established in Istria, in Štinjan, Valtura and Poreč, and all over the Adriatic, all the way to Kotor and Kumbor in Boka. There was also a naval pilot school established on the small island of Kozada in the Fažana Bay. Klobučar participated in the first group flight over the Adriatic, in the section Pula – Trieste – Pula.

Ignacije Bulimbašić was an acrobatic pilot. He completed the pilot school in Paris under Louis Blériot (French engineer and flyer, known by flying over the La Manche Channel). He was the first to have made a looping in our parts. He organized air shows in several Croatian cities in 1914. After the Lindbergh's flight across the Atlantic in 1927, he tried to collect the money to purchase an airplane for a Novi Sad – New York flight, but he failed in that.

Katarina Matanović-Kulenović is the first Croatian aviatrix and woman parachute. She was a member of the Zagreb aero club since 1935, and, already in 1936, she got the sports pilot licence. In 1938, at the airfield in Zemun, she became the first woman in Eastern Europe that jumped with a parachute.

Rudolf Fizir, is the most favourable and most efficient Croatian aircraft constructor. He constructed his first aircraft already as a student in 1913, but the construction of that sports biplane remained in drawings. World War I began soon, and, as a talented graduate student, Fizir worked in the Fokker Schwerin aircraft factory in September of 1914. He later became known by successful constructions of 18 aircrafts, hydroplanes and amphibians, among which the first biplane aircraft in 1925.

Before World War II, there were five grassy aerodromes in Croatia: in Zagreb (at Borongaj), Rijeka (at Sušak), Split (at Sinj), Vukovar (at Borovo) and in Dubrovnik.

In 1947, Zagreb was included in the international airline traffic. Later, some other airports were included too, primarily in the domestic traffic (Dubrovnik, Split, Sušak). With the introduction of newer, bigger and heavier aircraft in traffic by the end of the 50s and the beginning of the 60s, the grass covered airports of the time were not satisfactory, before all, by their carrying capacity.

In the beginning of the 60s, the former state Yugoslavia opened its borders for tourism. Inadequate road, as well as railway infrastructure did not meet the increased traffic demand, so that airports started to be built, or the military aerodromes were opened for civil traffic: Dubrovnik - 1962, Split - 1965, Pula - 1967, Zadar - 1969, Rijeka/Krk - 1970, Osijek/Klisa - 1980 and Lošinj - 1985. The period from 1991-1996 was marked by the occupation and war destructions of airports and aerodromes in Croatia.

In 1996, there were nine airports open for international traffic in Croatia. The coverage of Croatia with airports is very good, particularly in the coastal part.

Sports-recreational aviation and avio tourism, which relates to sports aviation, is not at the level that would be desirable in comparison with such forms of sport and tourism in the surrounding countries. The infrastructure of the sports aviation and other sports connected with aerosport (gliding, parachuting, hang gliding, paragliding, gyrocopters, etc.) is relatively well developed, but new investments in modernization of the existing infrastructure and development of the new one are necessary.

## Aeronautical infrastructure

The aeronautical infrastructure in the Republic of Croatia is diverse and numerous. There are seven international airports (Zagreb, Osijek, Pula, Rijeka, Zadar, Split, Dubrovnik) in Croatia, while Mali Lošinj and Brač are public traffic landing grounds. For other air traffic, there are 23 aerodromes, and there are also three military airports in operation (Table 1).

Other air traffic infrastructure are airfields for aircraft, paragliders and hang gliders, and helidromes. There are four arranged airfields for aircraft and about thirty airfields for paragliders and hang gliders. There are also 29 helidromes arranged, four of which are within clinical hospital centres. Also, there is a strategy for building of new helidromes on Croatian islands, so that construction of about twenty new structures for receiving of helicopters (The role of private runways and smaller aerodromes as air landing grounds for the development of tourism and territories (2013) is planned. Table 2 shows the list of planned aerodromes, airfields and helidromes.

Table 1  
Air traffic infrastructure  
in Croatia

INTERNATIONAL AIRPORTS
1 Airport Zagreb
2 Airport Osijek
3 Airport Pula
4 Airport Rijeka
5 Airport Zadar
6 Airport Split
7 Airport Dubrovnik
AIR PUBLIC TRAFFIC LANDING GROUNDS
1 Air landing ground Mali Lošinj
2 Air landing ground Brač
MILITARY AIRPORTS
1 Aerodrome Pleso
2 Aerodrome Udbina
3 Aerodrome Zemunik
AERODROMES
1 Borovo
2 Vinkovci
3 Čepin
4 Slavonski Brod
5 Daruvar
6 Sisak
7 Velika Gorica
8 Ivanić Grad
9 Zvekovac
10 Brezovica
11 Koprivnica
12 Čakovec
13 Varaždin
14 Zabok
15 Lučko
16 Vrsar
17 Medulin
18 Grobnik
19 Unije
20 Otočac
21 Sinj
22 Hvar
23 Konavle

Source: Croatian Civil Aviation Agency  
and data processing by authors.

Table 2  
Existing and planned airfields for aircraft, paragliders, hang gliders  
and helidromes in Croatia

AIRFIELDS FOR AIRCRAFT	HELIDROMES
1 Blagorodovac	1 Clinical Hospital Centre Dubrava
2 Grabovnica	2 General Hospital Varaždin
3 Buševac	3 Mali Lošinj
4 Plisko polje	4 Rab
AIRFIELDS FOR PARAGLIDERS AND HANG GLIDERS	5 Drvenik Mali
1 Mirkovac	6 Drvenik Veli
2 Bilice	7 KBC Firule
3 Požega	8 Slatine
4 Kalnik	9 Zvezdano Selo
5 Cvetlin	10 Grohote
6 Ivanščica	11 Milna
7 Strahinjčica	12 Nerezišća
8 Japetić	13 Pražnice
9 Kaštelir	14 Selca
10 Motovun	15 Vinjani Gornji
11 Buzet	16 Sveti Ilija
12 Raspadalica	17 Island of Šćedrovo
13 Žbevnica	18 Hvar
14 Brgud	19 Sućuraj
15 Učka	20 Pakleni otoci
16 Pečnik	21 Vis (2)
17 Fužine	22 Vrgorac
18 Lubenice	23 Blato
19 Rab	24 Korčula
20 Odanova kosa	25 Ubli
21 Obljaj	26 KBC Dubrovnik
PLANNED AERODROMES	PLANNED HELIDROMES
1 Aerodrome Rab	1 Osijek
2 Aerodrome Stankovci	2 Čepin
PLANNED AIRFIELDS	3 Pleso
1 Stupčanica	4 Westgate
	5 Rujevica
	6 Krk
	7 Molat
	8 Gaženica
	9 Dugi Otok
	10 Otok Vrgada
	11 Šibenik
	12 Zlarin
	13 Žirje
	14 Dugopolje
	15 Osejava
	16 Trpanj
	17 Pelješac
	18 Orebić
	19 Mljet
	20 Šipan

Source: Data processing by authors.

Figure 5

International airports and public traffic landing grounds, military airports and aerodromes, airfields, helidromes, water aerodromes and planned new aeronautical infrastructure in the Republic of Croatia in 2019



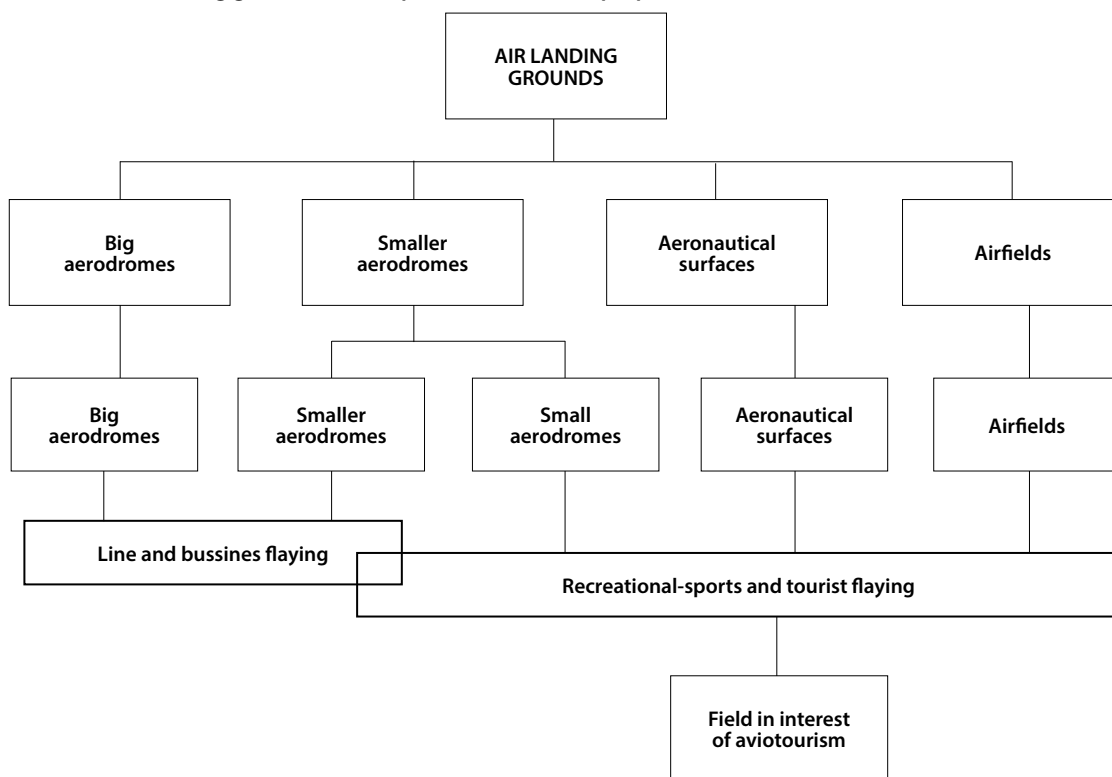
## Avio tourism

The main infrastructure for the development of avio tourism are aerodromes, i.e. aeronautical surfaces and they are part of the air landing grounds. Figure 4 presents the division of air landing grounds. In order to better understand that classification, the basic division was made, specifically to aerodromes (big and smaller) and aeronautical surfaces and airfields.

As aerodromes are understood big international airports (for international and national traffic) with asphalt runways and all the other necessary infrastructure, as well as the aerodromes for local traffic. At such aerodromes, commercial public transport of passengers and cargo is carried out, and the private aviation traffic consisting of smaller tourist aircraft and aircraft for business and other purposes. Such an aerodrome infrastructure is mostly situated on the state-owned land and, since they are in public use, they are subject to control by the Croatian Civil Aviation Agency.

Aeronautical surfaces refer to the privately-owned runways on which landing and taking-off can be carried out only with the approval by the runway owner or concessionaire. The term aeronautical surfaces were introduced in Europe in 1968 to liberalize the use of own runways of small tourist aircraft owners, i.e. so as not to force them to use aerodromes. Such aeronautical surfaces are mostly grassy, besides having the enough length, and there is usually a hangar for aircrafts next to them.

Figure 6  
Division of air landing grounds with respect to the size and purpose



Source: New approach to sports and recreational aviation in Croatia (2013).



Airfields are surfaces intended for taking-off and landing of ultralight aircraft, i.e. sports aircraft, and they are usually grassy terrains or agricultural lands (uncultivated - out of use). The user of an airfield has no legal obligation towards the aeronautical authorities, he does not need an approval for taking-off or landing, nor should the runway be specially equipped. Thus, it may be a strip of land on a private land, within the given urban planning requirements for that area.

For avio tourism, smaller aerodromes, aeronautical surfaces and airfields are of the greatest importance. Small aerodromes have neither the line, or commercial air traffic, but they provide big services to small aircraft for sport, entertainment and tourism, and in the activities of local air operation. Unfortunately, small aerodromes in Croatia are located often in the abandoned state, placed into a narrow territorial context, and they struggle to survive, since they are burdened by the imposed obligations of being compliant by the equipment and services, which they are obliged to provide.

On the contrary, aeronautical surfaces and airfields in Croatia have been developing with exceptional growth indexes in recent years. Unfortunately, aeronautical surfaces and airfields are also burdened by unnecessary regulations regarding the maintenance and infrastructure, which is exceptionally expensive.

Italy is among the first ones in the European Union in general and ultralight aviation, in the sense of the production, the number of registered aircraft, belonging services, small aerodromes, aeronautical surfaces and airfields. The Italian avio tourism project started in 1985. Every two years, the list of landing grounds provides new information on small aerodromes, aeronautical surfaces and airfields, collecting the data by making the list directly in the field with the sponsorship and assistance by the Ministry of Tourism and Traffic, and the Aero Club of Italy. The beginning of making the List of Landing Grounds dates way back to 1987. The airfields realized by ultralight aircraft pilots were in question, that could not take off and land anywhere but from/on aeronautical surfaces, of which there were about ten in the whole Italy at the time. From that time on, making of the list is repeated every two years and, after twenty years, the data base was created that has no parallel in Europe. In that time, the number of aeronautical surfaces increased by 1,700 percent, from which somewhat over 8 percent make small aerodromes, aeronautical surfaces make 38 percent, and airfields 53 percent.

Tourist flight routes were created, and the first European avio tourism guide was made in 2005. During those extensive activities, eight photos for each runway were archived, and forty-five thousand air photos of the terrain, landscapes, cities, monuments and other landmarks of Italy, covered with over thirty thousand kilometres of tourist flight routes. By completion of that work, an actual and perspective form of the Avio tourism Project was obtained, by which an organized system of airfields for entertainment flights and tourist flights is continued (The role of private runways and smaller aerodromes as air landing grounds for the development of tourism and territories (2013.)).

A good example of the development of avio tourism in Croatia is the example of the Vrsar Airport. That is a civil aviation airport, it is situated about two kilometres southeast of Vrsar (Istria), and it was built in 1976. It is equipped for receiving and maintenance of smaller aircraft: it has a fuel pump, hangar, servicing for aircraft, a small restaurant and a customs office. It carries out the navigation services (flight plan, meteorological situation and air traffic control) through the Pula airport. The runway is situated in the north-south direction, and it is intended for temporary air traffic, and comprises the receiving and maintenance of smaller aircraft, panoramic flights over Istria, taxi flights to domestic and foreign airports, sports flights (parachuting, training and competitions), and medical and firefighting service flights. The airport is registered for domestic and foreign air traffic. The airport is open for foreign air traffic from April to November.

The Vrsar Airport has, primarily, a sports purpose and attracts many amateur flyers, parachutes and other tourists. Until now, the Vrsar Airport has hosted one world parachuting championship, one military, two European, 17 international cups, six state championships, 20 rally competitions and several other manifestations (equipment fairs, etc.). It attracts sports persons and tourists which come by ultra-light aircraft (in the radius from 500 to 700 km) from Italy, Switzerland, Austria, Slovenia, southern Germany, Czech Republic, Slovak Republic and Hungary. The tourists of that type come with their families and friends which are very good consumers. The Vrsar Airport has limitations in receiving the aircraft and capacities for accommodation of sports persons (tourists), and its modernization and minor expansions could attract a considerably larger number of visitors and tourists that use the domestic tourist offer in a wide Istrian and Croatian area (overnight stays, food, excursions, personal consumption, etc.).

## Proposals for development of avio tourism in Croatia

The analysis of the condition of ultralight aviation in Croatia undoubtedly indicates that changes are necessary. According to the present model, as the holder of public authority, the Croatian Civil Aviation Agency takes care about the safety of the users of services in air traffic on behalf of the state, and its primary role is to ensure, through certification and supervision, that the parties that provide services meet the civil air traffic safety standards. With respect to the fact that the sports and recreational aviation is not a part of the commercial public transport, problems have arisen.

To ensure future development of the sports aviation, the state should be relieved of the key role in that segment. Namely, the regulations must follow the specific activities of the sports and recreational aviation and must reflect the special features of that type of aviation. The sports and recreational aviation should be treated as a separate sector with its rights and regulations, and not partial EASA (European Aircraft Safety Agency) aviation regulations. The regulations should be reduced to the minimally necessary ones, and focus should be put only on the main risks for specific activities, upgrading the regulations proportionally to the complexity, operations and risks.

Therefore, it would be necessary to carry out the modification of the Air Traffic Act, which would enable the transfer of the authority for sports and recreational flying of ultralight airplanes to the Croatian Aeronautical Federation, i.e. give the authorization of the Croatian agency for safety of civil aviation to transfer the part of the tasks of supervising the safety of sports and recreational flying to the Croatian Aeronautical Federation. Furthermore, it is necessary to make the Croatian Aeronautical Federation capable of performing the tasks of registration, certification and supervision of airfields, training and licencing of the flight and technical personnel, keeping the register of aircraft, aerodromes, authorized organizations, personnel, airworthiness of aircraft.

The Republic of Croatia should organize small aviation so that it becomes attractive to all aviation devotees in Croatia and in the surrounding countries, so that the tourist potential in small aviation could be used.

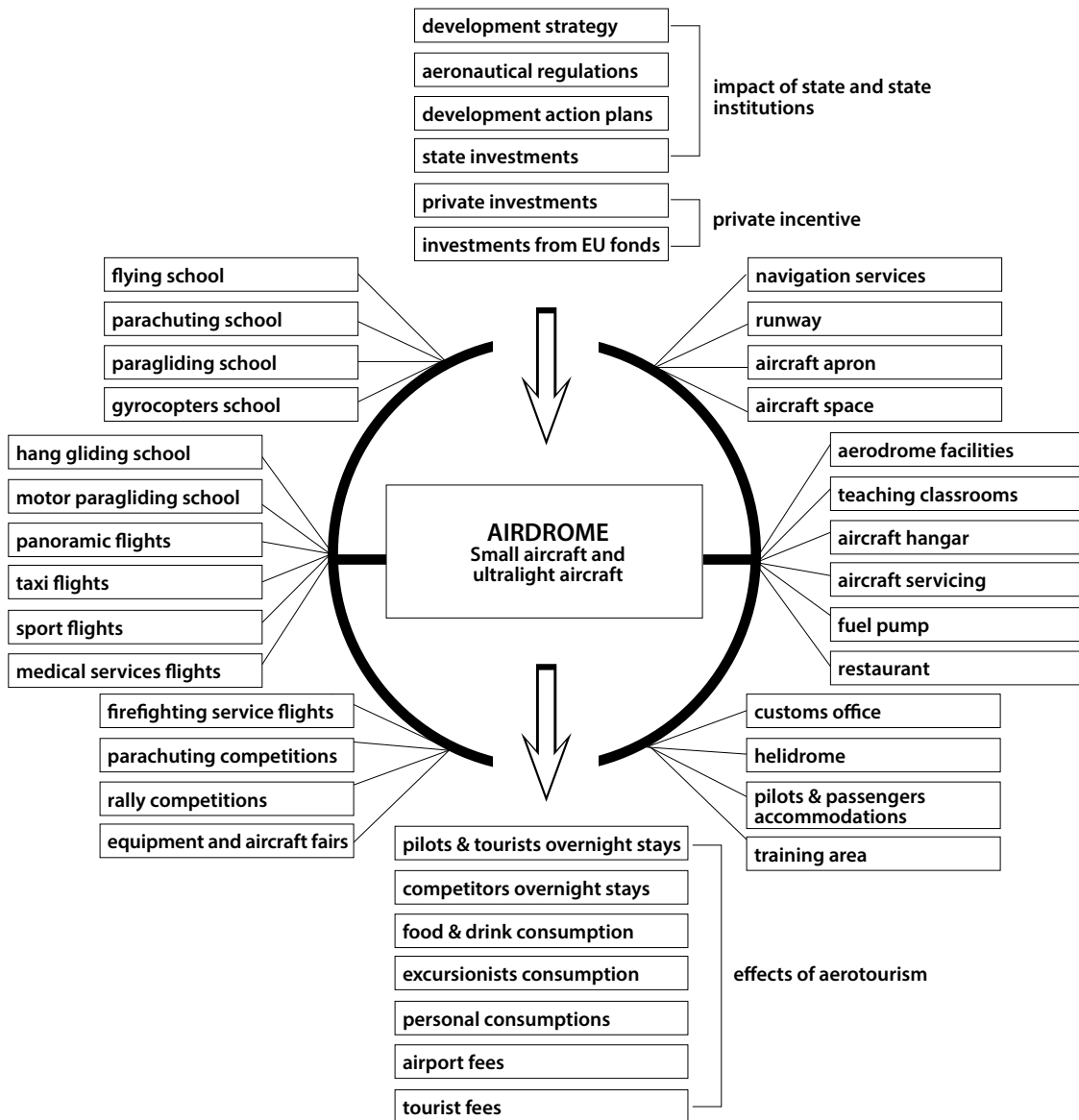
It is necessary to create the system of small airfields with an attractive tourist offer, as well as, for example, to develop a system of off-season events in tourism, organize amateur competitions, fleet flying, meetings of flyers and similar. Also, more modern regulations in small aviation should open the freedom of developing the aircraft "industry" in the future, production of aircraft in the Republic of Croatia, as well as the prerequisite of using more favourable conditions for production of aircraft.

Private runways on airfields, aeronautical surfaces and small aerodromes are, for the moment, mostly, without the accompanying offer, that would give a pilot and his passenger a possibility of refreshment,

accommodation and other services. With time, that will arise too, along with flying schools, receiving services, as well as the connecting structures and carrying out of the civil protection activities.

Thus, the categorization and the list of airfields, the liberalization of light aviation and ultralight aircraft, the development of aero-nautical companies and the belonging infrastructures are immediately necessary. Already now, at least 25 to 30 percent of airfields, aeronautical surfaces and small aerodromes have the possibilities for refreshment, nourishment and overnight stay within the distance of two kilometres from the airfield, and it is already becoming profitable and useful for the territory around an airfield to have it nearby, and to partly invest in the same too.

Figure 7  
Proposed system of avio tourism



Source: Created by authors.

## Conclusion

According to the aeronautical infrastructure for the needs of civil public passenger transport as well as the needs of the army and recreational-sports aviation that was recorded in the list, numerous aeronautical infrastructures is evident in the territory of the Republic of Croatia. What is particularly encouraging is a large number of the existing aerodromes and airfields that have a potential for the development of avio tourism.

Avio tourism was developed intensely in the neighbouring countries. In Croatia, there are perspective possibilities for development of avio tourism, however, it is impeded by various regulative measures and a shortage of state ambitions for its progress. Some of the urgent measures that could be undertaken, in a dialogue with all the interested stakeholders, is to transfer a part of the tasks of supervising the safety of sports and recreational flying to the Croatian Aeronautical Federation, and that it can carry out some other tasks connected with sports and recreational flying as well. It is also necessary to relieve aero clubs from excessive legal acts which presently regulate that type of aviation, i.e. to take over the positive experiences from the countries that developed avio tourism to a serious extent.

In the long run, it is necessary to invest in aerodromes and airfields and connect them into a common tourist product with the surrounding attractions. The basis should certainly be a national strategy for the development of the sports and recreational aviation. The goal itself is to decrease the seasonality of the tourist offer in the segment of avio tourism, which will be manifested through an increase in overnight stays of pilots, tourists, sports persons (competitors). Connected with that is the excursionist tourist consumption, along with the personal consumption, etc.

Avio tourism is a type of tourism that can fit well in the existing tourist offer, both, at the Adriatic, and on the mainland of Croatia. Exactly due to that, it is necessary to prepare (after the Strategy is adopted) detailed action plans for the development of avio tourism and include in them all stakeholders, such as local self-governments, tourist boards, associations of hoteliers, sports aero clubs, aircraft servicers, aircraft builders and others.

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### Notes

<sup>1</sup> An aerodrome is a location from which aircraft flight operations take place, regardless of whether they involve air cargo, passengers, or neither. Aerodromes include small general aviation airfields, large commercial (national and international) airports, and military airbases. An airport is an aerodrome with facilities for flights to take off and land. Airports often have facilities to store and maintain aircraft, and a control tower. An airport consists of a landing area, which comprises an aerially accessible open space including at least one operationally active surface (runway). The term airport may imply a certain stature (having satisfied certain certification criteria or regulatory requirements) that not all aerodromes may have achieved. This means that all airports are aerodromes, but not all aerodromes are airports.

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