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### **Forward-looking applications of lightweight aircraft in tourism development**

*This abstract examines key issues concerning forward-looking applications of light aircraft in tourism development*

The development of international tourism is rapidly accelerating with each year. The UN WTO (United Nations World Tourism Organization) experts predict that by 2030, the number of international tourist visits will reach 1 800 000 000.

Lightweight aircraft have been used in human history since the very birth of aviation technology: they have been employed for rescue operations in emergency situations and during natural disasters. As air taxis, they are used in many countries in America, Europe, and Asia. Moreover, in a number of countries they are used for air tours over sightseeing sites that are popular with tourists.

The German Union of Alpinists (DAV), one of the largest public organizations in the world, uses light aircraft, above all helicopters, in order to secure shelters in the mountains, as well as for rescuing hikers in the mountains [3].

Cutting-edge technologies are being used more and more widely in our daily life. In recent years, leading aviation companies in many countries have proposed, in addition to lightweight aircraft, designs of personal air vehicles in order to meet the demand for air travel.

Personal air vehicles began to appear just a few years ago, primarily as prototypes. Most publications on the subject of personal air vehicles belong to their designers, bloggers and magazines specializing in technological innovations. Articles on this topic have been published in such magazines as “Time” and “Novate,” in the popular TV show “Discover Science,” as well as on Wikipedia. Numerous internet posts, including you tube videos, have lately appeared as well.

Personal air vehicles have great potential for use in tourism industry in the near future. An application of innovative technologies is particularly important, as it enables one to develop tourism in new directions. No less significant is the potential of using personal air vehicles as means of transportation to a destination or as a transfer from a transportation hub to one’s lodging.

One of the first automobile/airplane hybrids that was able to lift off successfully is called “Terrafugia Transition.” Its first flight took place on March 20th, 2009. Its manufacturing company claims that the vehicle can fly around 724 kilometers without an additional fueling stop, and it requires regular gasoline for both flying and riding. Therefore, when the fuel is out, the auto-plane can be filled up at a regular gas station.

This model with folded wings, the first in the world of its kind, has successfully passed its flying tests. According to the company’s official spokesmen, this new technology is certified for use on commonly used motorways, and it can take off from any runway. In order to fly Terrafugia Transition, pilots are required to receive a special license. The company claims that the license can be received after

completing a training course and accumulating approximately 20 hours of flying. On the land, Terrafugia Transition is a front-wheel-drive car with a regular gas engine. Its maximum speed is 185 kilometers per hour. On the land, Terrafugia Transition with a full gas tank can only cover 105 kilometers. This hybrid costs \$194,000, and it is already possible to reserve one with a deposit of \$10, 000 [4].

Another interesting air vehicle is Aero Mobil 3.0, presented by company “Aero Mobil” (Slovakia). It was first introduced at the Pioneers Festival in Austria where this “auto-plane” completed its first ride and flight.

The automobile utilizes the principle of carbon-coated wings — this is how the plane turns into a car. The prototype is designed only for two people. Aero Mobil 3.0’s maximum speed on a highway is 160 kilometers per hour. When flying, the vehicle can reach 200 km/h, and the maximum flight distance it can cover is 700 km. Its take-off speed has to be at least 130 km/h. In order to take off, the auto-plane requires 250 meters of a straight runway, and for landing, it needs 50 m. As for the price, it will exceed somewhat the cost of standard supercars but will be cheaper than a small plane. This model is the first serial design in Europe of this kind. [5].

The recent report that the European aerospace giant Airbus unveiled its newest project of a flying automobile “Vahana” has become a media sensation. It is an autonomous vehicle capable not only of vertical take-off but also of vertical landing.

Vahana by Airbus is an electric-powered vertical take-off and landing 8-propflying prototype financed by Airbus SV. Vahana project started in 2016 as one of the first projects at A<sup>3</sup> (pronounced “A-cubed”), the advanced projects and partnerships outpost of Airbus Group in Silicon Valley. Airbus announce that they "envision Vahana being used by everyday commuters as a cost-comparable replacement for short-range urban transportation like cars or trains". Airbus targets 2020 for a production-ready version of the aircraft. In 2017 small-scale models were flown to test out the Vahana concept in Santa Clara, California, USA. The full-scale aircraft made its maiden flight self-piloted on January 31, 2018 in Pendleton, reaching 5 meters (16 feet) over 53 seconds The aircraft has been designed as a "low-cost, single-passenger, electric VTOL aircraft that could provide utility to a large number of people». The two most compelling configurations are electric helicopter and eight fan tilt-wing. The estimated electricity cost is \$0.12 per kW-hr. For both configurations, the hover performance estimates were base on blade element momentum theory. For now the electric helicopter configuration is shown to be more compelling at low ranges, while the tilt-wing configuration is more compelling at longer ranges. The designer has not finalized the Vahana project and hope that "the electric tilt-wing configuration provides a DOC advantage and many other advantages such as reduced noise and enhanced safety for urban mobility" [6,7].

The plane is proposed to be used as a taxi. The internet magazine “CNN Money” reports that this will be the aerial version of “Über.” The launching fits demonstration model can become a sightseeing tourist attraction costing thousands of US dollars.

Another unique aircraft is being designed by the Martin Aircraft Company of New Zealand. The Martin Jetpack is a single-person aircraft under development after 30 years of work. Despite its name, it does not use a jet pack as such, but ducted for lift. Martin Aircraft Company of New Zealand (not related to Glenn L. Martin Company, the US company also known as Martin Aircraft) developed it, and

they unveiled it on 29 July 2008, at the Experimental Aircraft Association's 2008 AirVenture in Oshkosh, Wisconsin, US. The US Federal Aviation Administration classified it as an experimental light airplane. New Zealand aviation regulatory authorities approved the Martin Jetpack for a limited set of manned flight tests in 2013. As of 2016 the price of the commercial production units is expected to be US \$250,000] and sell in the US for US \$250,000-350,000 subject to local tax and customization requirements [8,9].

Thus, Martin Jetpack is a radically new and unusual development that can be offered to tourists. In the foreseeable future it will become possible to offer exclusive aerial tours over interesting architectural monuments, mountain peaks, surfaces of lakes and seas in order to observe objects inaccessible by land. However, current versions of Martin Jetpack are still far from perfect and are limited in terms of flight duration which does not exceed 30 to 40 minutes at best. Another issue is guaranteeing the flights' safety. Another, no less pressing problem is the cost of such technology which can exceed US \$ 100,000 per unit. Therefore at this point only VIP tourists can afford to use this air vehicle.

### Conclusions

With the development of science and technology, the number of international tourist visits grows as well. Leading tour operators seek new technologies and exclusive tours that can attract tourists. One such technology is flights on special air vehicles which can be used as a tourist attraction, becoming one of the innovative approaches to the development of new types and forms of tourism.

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