

Modern Technologies in Increase the Flow of Tourists and the Profitability of the Airline on the Example of Montenegro Airlines

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Abstract—In the modern world airlines have to face number of challenges. They have to suit fast changing economy and fast developing technologies. Nowadays one of the most extensive trends is implementation of virtual and augmented reality technologies into the different areas. Therefore authors in this paper consider how this technology could be applied in the context of working practice of the airlines based on the example of Montenegro Airlines.

Keywords-airlines; income; virtual reality; augmented reality; Montenegro Airlines

I. INTRODUCTION

The development of modern society and a large number of tourism products in different price categories encourage companies related to the tourism industry to break the prevailing stereotype of providing services to the consumer. In other words, with the development of the media and with the access to the Internet that has become unlimited in many countries, a potential tourist already has many offers, he compares prices and he always looks for the “most interesting”, some kind of service that would attract him. And in an environment of fierce competition is the entire tourism industry, including the airlines.

Many aspects of human life are connected with digital technologies and in the near future this connection will become closer. In no time, such an aspect of the digital world as an augmented, virtual and mixed reality will enter everyday life. The future will be characterized by intelligent devices and innovative technologies supplying digital services into all areas of activity.

Many research and analytical companies make forecasts regarding the development of technologies and digital technologies in particular. As an example we decided to consider reports of Gartner research company, which makes a report on the hype cycle every year [1]. Technology analysis in the forecast period reflects the attitude of consumers towards innovative technologies and developments. It is illustrated in Figure 1:

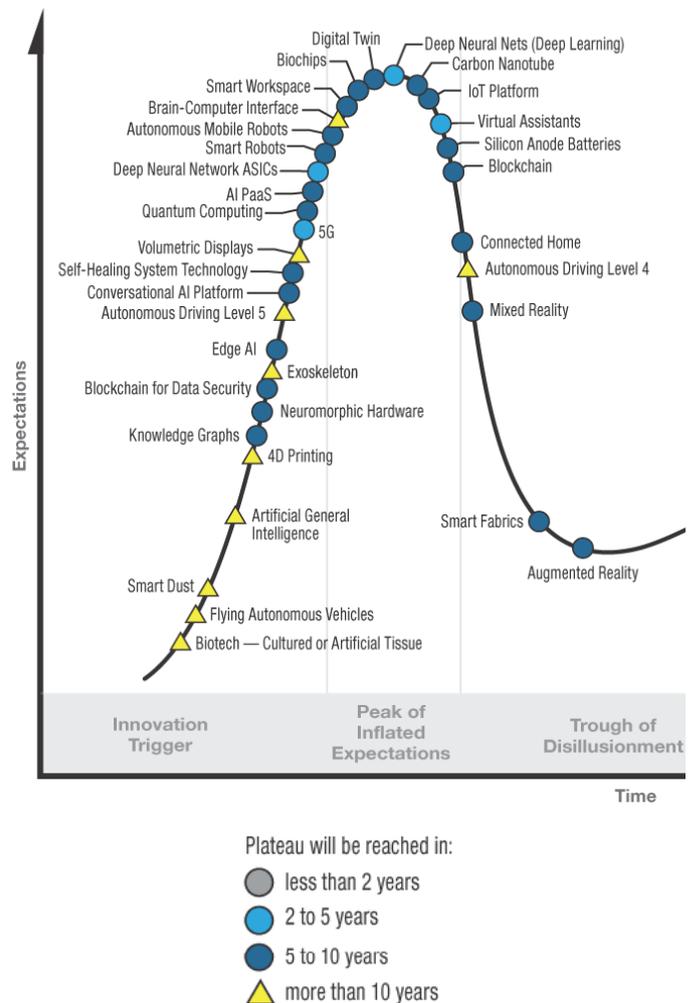


Figure 1. Hype cycle for emerging technologies 2018, Gartner [1].

This diagram shows innovative technologies and helps to assess the relative risk and timing of the appearance of new technologies, as well as evaluates the trade-offs between risk and innovation. As we can see, augmented and mixed reality has been presented on the market for a long time and, according to Gartner forecasts, it will need more than 5 years for the market in this area to become mature enough.

The Gartner forecast notes that augmented reality will have a greater impact on the consumer than the virtual one, because it is richer, it allows you to improve the experience of real life and has great potential for real changes in the world [2].

The trend includes both augmented and mixed reality, that are blurring the boundaries between the real and virtual world.

These technologies will become available and will continue to be implemented in various fields of activity, including the tourism industry. Augmented, virtual and mixed reality will have a huge impact on consumers, because they allow to improve the experience of real life. It is worth to say that these technologies have great potential for forthcoming changes in the future.

Even successful companies still have to face fast-growing technological innovations, which have a profound impact on how a company copes with its workforce, customers and partners. The trends revealed by these emerging technologies should be the next most effective technologies that can destroy the business and should be actively monitored by the company's executive team.

II. SITUATION IN THE AIRLINE INDUSTRY WORLDWIDE

The International Air Transport Association (IATA) expects that in 2019 the net profit of the global aviation industry will be \$ 35.5 billion, which slightly exceeds the profit forecast for 2018 in the amount of \$ 32.3 billion.

Next year passenger traffic will grow by 6%, to 4.59 billion people, according to IATA. At the same time, total revenue will rise by 7.7% to \$ 885 billion, from passenger traffic alone - by 7.5% to \$ 606 billion. According to IATA, the number of air passengers will double by 2035 and world passenger traffic will reach 7.2 billion[3].

Low cost airlines are the most popular in Europe: they account for 32% of all passenger traffic. At the same time, the border between low-cost airlines and airlines with a traditional economic model has become blurred. At the present time, it makes sense to talk about hybrid carriers that offer a wide tariff network, including low-cost fares with a minimum baggage allowance, and the usual economy class tickets that provide free meals on board, as well as premium and business fares.

Global airlines and airports are increasing the use of digital technology both in internal control and in communicating with passengers. 6% of airlines are already testing, and 17% plan to begin testing artificial intelligence over the next five years. Among airports, the share is slightly higher: 21% of airports intend to test applications using artificial intelligence in the next five years, according to a study by the supplier of IT

solutions for aviation Société Internationale de Télécommunications Aéronautiques (SITA).

According to SITA, 55% of travelers in the world have used any self-service technology when making a flight. Interest in digital services is increasing: about 76% of passengers would like to receive notifications about the start of baggage claim on their mobile devices, almost as many (74%) would like to know about changes in flight schedules via mobile applications [4].

III. MONTENEGRO AIRLINES STATISTICS

Montenegro Airlines is the national airline of Montenegro and the second largest enterprise in the country, with a fleet of 6 aircraft and a total number of passenger seats is about 700. According to the results of statistical studies that were conducted by Montenegro Airlines, from July 1 to September 30, 2017, directly and indirectly brought Montenegrin tour industry income in the amount of about 120 million euros. The airline brings to tour industry about 170 million euros annually, despite the fact that the company's annual income is 70 million euros.

The 2018 was the most successful year in Montenegro Airline's history, passenger traffic in the first 10 months has increased by almost 13% compared to 2017 for the same period, that is more than a quarter of the total number of passengers, namely 576 thousands. Despite this, the airline faces various difficulties, such as an increase in fuel prices in 2018 by 27% and additional costs for it, a reduced amount of tourist traffic in winter, thus most of the revenue falls on 4-5 months of the summer season. It causes difficulties to conduct a company development policy, code-sharing agreements, government assistance and so on.

The authors of this article want to offer another indirect income for the airline, as well as additional advertising for Montenegro itself as a tourist destination [5, 6].

Firstly, it is the availability of Internet on board the aircraft and the provision of such a service for an additional fee.

Secondly, providing the opportunity to use 3D glasses and watch virtual tours with virtual and augmented reality. And sell a service such as games with augmented reality.

In this paper we consider the second aspect and the first one will left for the future research.

IV. REVEALING CURRENT PROBLEMS

Virtual tourism today is one of the most pressing and promising topics in the development of the tourism industry, but it is still underdeveloped at present. Virtual tourism means a set of activities of individuals and legal entities that organize or carry out virtual tours using modern computer equipment and technologies, as well as telecommunications connections to form the most realistic information about the desired tourist direction. Virtual travel technologies are based on a virtual tour, which is understood as a realistic way to display three-dimensional space. This type of travel is much more convenient, affordable and safer. A virtual tour is an activity of

an individual who due to the modern technologies and communication networks usage creates the most realistic and reliable information about the desired tourist destination [7].

Virtual tourism is developing rapidly because it has a large number of positive features for both the manufacturer of this service and the potential tourist. Virtual tour, which is an integral part of virtual tourism, has a number of positive qualities: Firstly, it is a minimization of the consumption of personal resources such as time and money for customers. And in the case of air travel, people spend this time in the sky anyway and it is likely for everyone to spend it sensibly in order to choose the places that one would like to visit for a limited time of one's rest, and this product will help one to do that.

Secondly, it is an opportunity to visit sights and regions that are not available during the normal traditional travel. For instance, on a virtual tour one could walk up Bobotov Kuk, the highest point in the Durmitor mountain range, while traveling with two children one will not be able to do that.

Thirdly, this is of course, a safety and contactless way of exploring some of the sights during virtual tour. For example, one really want to see the canyon of Nevideo, but canyoning is a dangerous and extreme kind of recreation, and during the flight you enjoy it during a virtual visit, anticipating the rest in Montenegro itself.

Fourth, it is a great opportunity to advertise not only Montenegrin sights, which will help the tourist to make plans for visiting them during the holidays, but also will help to choose the additional infrastructure of interest for a good rest. In other words, one could choose restaurants, shops, cafes, nightclubs and open discos, water park and other forms of entertainment and eating places. This is the main idea of our project.

On-board magazines are presented in the back pocket of every seat in front of the passengers in Montenegro Airlines airplanes, but magazines have high costs of printing, plus not everyone can read in Montenegrin or English, and in one magazine it's impossible to fit all possible advertising articles in all languages and sights of this beautiful country - the way out is to create a special information platform, which the authors discuss in this article.

V. CONCEPTS AND SOLUTIONS

Based on the above facts, it becomes clear that the problem is possible to become solved with implementation of an information platform that will use augmented and virtual realities.

Modern research shows that the more receptors are involved in perception, the more real the feeling of presence is created.

According to the numerous scientific results of research in cognitive psychology - about 80% of the information received about the world around us, people acquire it through visual perception. Thanks to various modern technologies, virtual reality makes it possible to fully use these 80% of the

information received by a person with the help of organs of sight, but it is worth considering the fact that people remember about 20% of what they can see, about 40% if they are not only see, but also hear, and as much as 70% in the event that they both see, and hear, and do.[8]

Based on this consideration, we obtain the following concepts:

1. Creation of an information platform like an electronic journal.
2. Creation of virtual tours of existing objects, both the cultural heritage of Montenegro, and objects of interest related to the tourism industry.
3. Creation of a virtual reality, for complete immersion and as close as possible perception of finding and interacting with the recreated environment.
4. To create a sense of presence, it is better to use VR glasses or a virtual reality helmet.
5. To transfer the material of the object, you can use existing gloves today VR.
6. To transmit sound information using a headset or a virtual reality helmet.

To fill this information platform, you must also perform some actions:

1. Collect the information about the sights of Montenegro, best of all from competent places, so that this information is reliable
2. Create 3D panoramas of natural beauty, 3D models of objects, etc.
3. Conclude contracts with representatives of restaurants, night clubs and etc., all those who has a need in advertising services on board of the aircraft and to fix the duration of the advertising campaign.
4. To translate the information not only into the Montenegrin and English but also into several most disseminated languages and languages of the countries where the airline most often flies (Russian, Italian, German, French, etc.).
5. Purchase all the special equipment for installation on board aircraft.

The use of these services should be ensured using personal devices (mobile phones, smartphones, tablets), and using rented devices provided to passengers by the airline.

VI. IMPLEMENTATION AND TECHNICAL DETAILS

To create an information platform, some research has already been conducted in the field of the tourism industry, involving experts from this field [9], in order to identify the most attractive places of both cultural heritage and natural attractions, to be the first to enter the beta version of the information platform. Also, some experiments were carried out

in the laboratory with regards to the equipment necessary for the implementation of this platform on board of the aircraft.

In previous studies, the authors of this article have already created a 3D model of one of the cultural heritage of the city of Kotor [10], which has been under the protection of UNESCO since 1979, this is the building of the Maritime Museum [11]. Therefore used the help of a qualified land-surveyor, since the building-up in Kotor is very dense and it is impossible to make a simple scan. Also, 3D panoramas of various natural sights were created, such as the entrance to the Bay of Kotor overlooking the Arza and Mamula fortresses, filming of the Niegos mausoleum on Lovchen from a bird's eye view, photos of national parks, Ostrog Monastery and Tsetinsky Monastery, and other objects deserving Attention.

The created information platform can be launched under various operating systems, such as Android, IOS, Windows, MacOS. Also important is the fact that the possibility of using virtual reality glasses is realized. Control is possible with the help of the motion controller for glasses and on the passenger's personal device if VR glasses are not used.

Modules that provide information in text form on the screen and in the radio format on the device were also developed and implemented. Information is translated into several languages.

VII. CONCLUSION

In the modern world, information technologies are used very actively in various fields of activity. The authors of this work emphasized the need to apply modern technologies for the development of the tourism potential of Montenegro, and the implementation of an information platform into the onboard customer services of Montenegro Airlines in order to attract additional income and promote Montenegro as a tourist destination.

In this paper, the authors proposed concepts that need to be implemented in order to create the possibility of obtaining a holistic perception of this project on board of the airline's

aircraft in order to maximize the attention of passengers and tourists heading for holidays in Montenegro.

Thus, the involved information technologies, as well as the technology of virtual and augmented reality in particular, that are being used in the proposed information model could help to increase the profitability of both the Montenegro Airlines and Montenegro in general as a tourist destination.

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