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## DEMAND OF CITIZENS OF SLOVAK REPUBLIC FOR AIRPORT 4.0 APPLICATIONS

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### ABSTRACT

The aim of airlines and airports is to develop a transformation program that will be closely linked to operations. One of the new concepts that can revolutionize air traffic is the Internet of Things. Devices based on Internet of Things technology will become the standard for increasing customer satisfaction. The object of the research is the concept of digital transformation of the airport, called Airport 4.0, and the demand for its implementation at the Slovak airports Bratislava and Košice. The main goal is to define the basic concepts with the issues addressed and the implementation of primary research focused on the level of demand for the implementation of applications of the Airport 4.0 concept at Bratislava and Košice airports and its subsequent evaluation.

**Key words:** Digital Transformation, Smart Airport, Airport 4.0, Smart Check-in, Self-boarding, Indoor Navigation, Biometric Services, RFID Baggage Tags, Self-baggage Tagging, Kiosk for Lost Baggage, Airport Application for Mobile Devices

### INTRODUCTION

The digital transformation is increasingly entering the subconscious of human society. It affects not only the everyday life of people, but also businesses and all processes related to their operation. Thanks to digitalization, the company is able to reduce management costs, increase the efficiency of all processes and become more competitive. However, the digital transformation is far from at its peak, which is why companies are forced to constantly innovate and adapt to current trends. Transport is an important area for the implementation of digital technologies.

Due to global globalization, air transport in particular is gaining more and more prominence and the number of passengers carried is increasing day by day. However, the capacity of airports is limited and therefore airports strive to make their operations as efficient as possible in order to be able to carry as many passengers as possible in the shortest possible time, with a view to maintaining maximum security. The integration of digital technologies in the airport environment can significantly help in this.

### CHARACTERISTICS

The airport industry has begun the process of digitalization based on the impulse of airlines. Digital transformation is the integration of digital technology

into all areas of business, which fundamentally changes the way we work and brings value to customers. It is also a cultural change that requires organizations to constantly question the current situation and experiment. Digital Transformation is the profound transformation of business and organizational activities, processes, competencies and models to take full advantage of the changes and opportunities of digital technologies and their accelerating impact on society in a strategic and priority way with regard to current and future changes. [1] [2] [3] [4]

The definition of Smart Airport is related to the definition of Smart city. Smart cities use technology for urban life to create a more comfortable and sustainable environment. Smart Airport is a subsystem of a specific smart city. The system combines city life and aircraft movements. Information is seamlessly exchanged between urban traffic management, suburban traffic management and air traffic management. This connection is intended to achieve the optimization of individual processes and airport operations, as well as customer satisfaction. [5] [6] [7]

Airport management is the most important and critical task in operating airports with limited resources, negotiating with internal and external agencies, ensuring the provision of services on time, maintaining

the safety of passengers and visitors, operating the airport safely and ensuring compliance. The operation of airport terminals is divided into passenger services, baggage handling and customs controls. The impact of intelligent technologies provides various solutions to overcome problems at airports due to the increased flow of passengers during rush hours and increased passenger satisfaction. The following indents list intelligent aerodrome applications suitable for implementation in aerodromes: [5]

- Smart check-in
- Self-boarding
- Internal navigation
- Biometric services
- RFID luggage tags
- Autonomous baggage marking
- Kiosk for lost luggage
- Airport applications for mobile devices

Digital transformation in the environment of air traffic can be converted into a concept Airport 4.0, which is considered the highest level of digitalization of the airport. Airport 4.0 consists of eight applications, including: smart check-in, self-boarding, internal navigation, biometric services, RFID baggage tags, autonomous baggage tagging, lost baggage kiosks and airport applications for mobile devices.

#### METHODOLOGY

The source of information were secondary sources, which come from book publications and in particular from professional articles published on the Internet, related to the topic of digital transformation of the airport, and primary sources, which were obtained by primary research through electronic inquiries of respondents.

The sample size was calculated on the basis of the formula, which is given in the following table together with the substituted values.

Table 1.  
Sample size

<b>Formula</b>	$n \geq t_{1-\frac{\alpha}{2}}^2 \cdot \frac{\sigma^2}{\Delta^2}$
<b>Size of the basic file for primary research as of 1.3.2020.</b>	4,432,419 and represents all citizens of the Slovak Republic over 18 years of age.
<b>Reliability estimation</b>	95%
<b>Maximum allowable margin of error</b>	$\pm 5\%$ .
<b>Basic file variability</b>	0,5
<b>Critical value determined from tables</b>	1,96
<b>Substituted values into the formula</b>	$n \geq 1,96^2 \cdot \frac{0,5^2}{0,05^2} \geq 384,16$
<b>Results = Sample size</b>	$n \geq 384,16$ $\Rightarrow 385$ respondents (after rounding)

The minimum number of respondents with the required 95% reliability of the estimate and 5% admissibility of the margin of error is 385 respondents.

#### RESULTS

Respondents were divided into three groups, the first group consisted of respondents who for the last five years have used at least once Bratislava Airport, the second group consisted of respondents who for the last five years have used at least once Kosice airport and the third group consisted of respondents who for the last five years did not use neither airport.

However, the last group was not the subject of further research, as they do not have an up-to-date overview of the services provided at the airports addressed.

The first research goal was focused on determining the level of demand for applications of the Airport 4.0 concept at Bratislava Airport. The research prerequisite for the given research goal was "More than half of the respondents would welcome the application of the Airport 4.0 concept at Bratislava Airport."

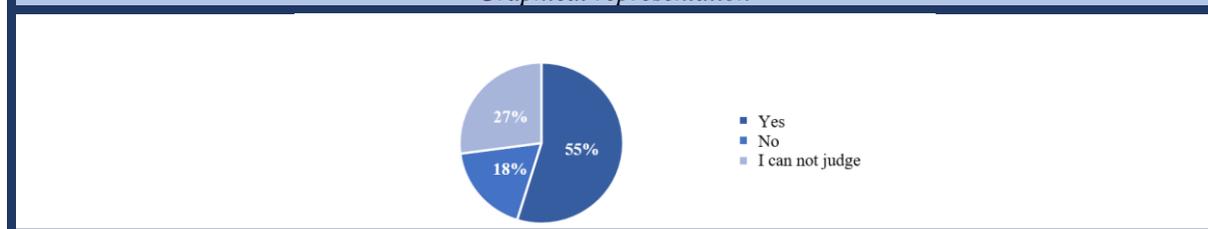
Responses were obtained from respondents who used Bratislava Airport at least once in the last 5 years, which represents a total of 165 respondents. Subsequently, the answers "yes" were calculated for all applications, analogously also for the answers "no" and "I can not judge". The numbers of individual responses for specific applications, their percentage and also the total sum are given in Table 2. Table 2 also contains a graphical representation of the structure of the total number of responses.

Table 2.

**Demand for applications of the Airport 4.0 concept at Bratislava Airport**

Question	Answer						Total	
	Yes		No		I can not judge			
<i>Would you like the introduction of the following at the airport in Bratislava:</i>	Amount	%	Amount	%	Amount	%	Amount	%
<i>Self-boarding</i>	100	61	21	13	44	27	165	100
<i>Indoor navigation</i>	52	32	67	41	46	28	165	100
<i>Biometrical services</i>	71	43	16	10	78	47	165	100
<i>RFID luggage tags</i>	97	59	34	21	34	21	165	100
<i>Autonomous baggage marking</i>	134	81	14	9	17	10	165	100
<i>Kiosk for lost luggage</i>	70	42	34	21	61	37	165	100
<i>Airport application for mobile devices</i>	109	66	23	14	33	20	165	100
<i>Total</i>	633	55	209	18	313	27	1155	100

*Graphical representation*



The assumption was confirmed, because of all the answers of the respondents to the questions concerning the welcome of applications of the Airport 4.0 concept at Bratislava Airport, up to 55% of the answers were those where the respondents would welcome specific applications of the Airport 4.0 concept at Bratislava Airport. The answer "no" was chosen in 18% of cases and in the remaining 27% of respondents the answer "I can not judge".

The second research goal was focused on determining the level of demand for applications of the Airport 4.0 concept at the airport in Košice. The research prerequisite for the given research goal was

"More than half of the respondents would welcome the application of the Airport 4.0 concept at the airport in Košice."

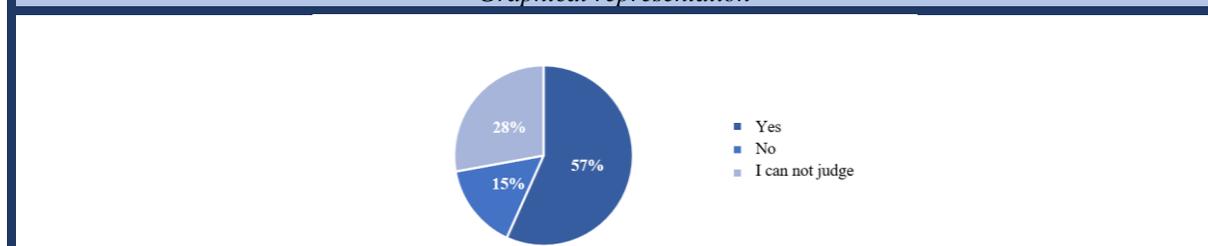
Answers were obtained from respondents who used Košice Airport at least once in the last 5 years, which represents a total of 155 respondents. As with the second research goal, the answers "yes", "no" and "I can't judge" were calculated together for all applications. Table 3 lists the numbers of each of the possible responses for all applications. Table 3 also contains a graphical representation expressing the percentage of the sum of responses.

Table 3.

**Demand for applications of the Airport 4.0 concept at Košice Airport**

Question	Answer						Total	
	Yes		No		I can not judge			
<i>Would you like the introduction of the following at the airport in Košice:</i>	Amount	%	Amount	%	Amount	%	Amount	%
<i>Self-boarding</i>	96	62	30	19	29	19	155	100
<i>Indoor navigation</i>	62	40	43	28	50	32	155	100
<i>Biometrical services</i>	88	57	23	15	44	28	155	100
<i>RFID luggage tags</i>	80	52	21	14	54	35	155	100
<i>Autonomous baggage marking</i>	105	68	17	11	33	21	155	100
<i>Kiosk for lost luggage</i>	67	43	25	16	63	41	155	100
<i>Airport application for mobile devices</i>	118	76	8	5	29	19	155	100
<i>Total</i>	616	57	167	15	302	28	1085	100

*Graphical representation*



The assumption was confirmed, as up to 57% of all respondents' answers to questions concerning the welcome of Airport 4.0 concept applications at Košice Airport were "yes". The answer "no" was given in a total of 15% of cases and 28% of the answers were attributed to the answer "I can not judge".

As part of the evaluation of research assumptions, it was found that in Bratislava the most respondents would welcome the application of autonomous baggage marking, in which respondents chose the answer "Yes" up to 134 times out of a maximum of 165. For Košice Airport, it was found that respondents would most welcome the airport application for mobile devices, where the answer was marked "Yes" a total of 118 times out of 155 possible. Both at Bratislava Airport and at Košice Airport, the application of internal navigation was the least welcome.

### CONCLUSIONS

Digital technologies have become an integral part of everyday life and have great benefits for smoother and more efficient business operations. In the field of air transport, digitalization has been implemented since the 1990s. At present, in an environment of air traffic there are used multiple systems and technology solutions that ensure the progress of the processes carried out. Primary research was conducted to determine the level of demand for the implementation of applications of the Airport 4.0 concept at Bratislava and Košice airports in the Slovak Republic. At the airport in Bratislava, respondents would most welcome autonomous baggage marking, while at the airport in Košice, they would most welcome an airport application for mobile devices. Primary research has shown that the introduction of applications of the Airport 4.0 concept would contribute to increasing the use of Bratislava and Košice airports and to improving the processes taking place in the air transport environment in Slovakia.

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## ТЕОРЕТИЧЕСКИЙ АНАЛИЗ СООТВЕТСТВИЯ ПРЕДПОЧТЕНИЙ ТУРИСТОВ И ВЫБОРА ДЕСТИНАЦИЙ

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## THEORETICAL ANALYSIS OF THE CORRESPONDENCE BETWEEN TOURIST PREFERENCES AND DESTINATION SELECTION

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### АННОТАЦИЯ

Как феномен сопоставления предпочтений туристов влияет на их выбор между двумя возможными вариантами?

В результате проведенного исследования были получены два главных вывода. Во-первых, если затраты на посещение равны – то и дестинации будут посещаться в равных долях. Во-вторых, существует