

## INNOVATIONS FOR SATISFIED PASSENGERS AT RIGA INTERNATIONAL AIRPORT

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**Abstract.** None of international airports were prepared for the impact of COVID-19 global pandemic. Fortunately, international airports, also Riga International Airport (hereinafter – RIX), were not caught entirely unprepared for the crisis. Aviation industry has been deeply invested in contactless technology for years. Innovation has been a pillar of strength and growth of aviation industry over the past years. The research problem lies in decreased passenger demand of RIX services due to COVID-19. It strengthens a necessity to establishment of innovative solutions and development of touchless airport which might increase passenger satisfaction and renew airport services. Technology, coupled with heightened focus on automation defines passenger experience at RIX airport. Safety and security of passengers and staff are top priorities for RIX airport. Innovations not only enhance operational efficiency and security, but they also make the airport experience quicker and comfortable for passengers. Although digitalization, automation and touchless airport solutions are shaping the future of RIX airport, human recourses still have a crucial role, particularly in terms of providing friendly service and ensuring passengers enjoying the experience. Methodologically, this study interprets results from a survey, expert interviews, knowledge transfer to empirically measure passenger satisfaction with statistical and observational data. In order to observe local and international airport expert opinions, semi-structured interviews are conducted and analysed with the qualitative data processing method NVivo 12.

**Keywords:** innovative solutions, airport services, passenger satisfaction.

### Introduction

COVID-19 global pandemic has devastating effects on aviation industry, including airports. Before global pandemic COVID-19, RIX handled 525 thousand passengers in January 2020 (7.8 million passengers in 2019). Passenger number decreased in February to 489 thousand, in March to 235 thousand. 3060 repatriation and special flights passengers were handled via RIX in April 2020. During May, when airBaltic resumed operations, 10 thousand passengers went to and from RIX. In May 2020, number of passengers declined to 98% comparing to May 2019. There was a slight passenger growth to 55 thousand in June 2020, which reached 92% of decline comparing to June 2019. The number of passengers at the airport has decreased sharply due to the additional measures introduced because of the COVID-19 pandemic [1]. Due to decline in passenger numbers, bankruptcy of airlines and number of reduced flights, airports all over the world were forced to close their runways to provide more free space for aircraft parking, decrease a number of staff and implement changes in passenger processing [2]. Despite challenges, COVID-19 pandemic has accelerated the development of innovative solutions for business development in multiple industries, including aviation. Previous analyses show pandemic inspiring international airports not only to focus on epidemiological measures such as social distancing, but to implement touchless technologies and biometrics in check-in and other processes [3]. These innovations could help increase passenger satisfaction by offering qualitative service, which is critical determinant of airport business performance [4]. Given the fact that satisfied passengers are more likely to return and can help attract even more travellers – airport provided experience should be considered as a competitive advantage [5].

Based on Antwi et al. findings airport self-service technologies can also have a positive effect on passenger satisfaction and their further intention to recommend airports to others [6]. However, there are multiple factors impacting satisfaction or dissatisfaction among passengers using technological solutions [7]. For instance, passengers below 21 years of age are more likely to use self-service check-in kiosks [8]. At the same time, airport service is closely connected to performance of their staff. According to other research, airport staff are the most influential predictor of passenger satisfaction, what cannot be said about airport shopping facilities or Wi-Fi connectivity [9].

RIX is not an exception – being the largest airport in the Baltic states, it has felt the pinch from COVID-19 global pandemic. This research aims to reveal – how successfully RIX has adapted to COVID-19 outbreak; how satisfied are passengers with their experience at RIX airport; and how digital and touchless solutions can benefit to passengers' perception of services provided.

Novelty of the study lies in a new phenomenon – touchless airport for passenger encouragement [10]. Airport digitalization is needed for quick and effective passenger services development to encourage travellers. Lessons learned during COVID-19 should be strengthened and the concept of a contactless airport should be developed. One of the key reasons why airports take efforts on digital transformation is a survival issue. Along with COVID-19, airports critically need to adapt quickly to external environmental pressures and changing customer demands and expectations. The results obtained from literature review [10] show trends of previous years research on airports around the world using digital technologies to please passengers and to guarantee a coherent, smooth, and paper-free passenger journey. Not only the number of passengers is constantly growing, so do their expectations for the entire experience. Passenger demand for efficiency, safety, health, and comfort remain strong.

### Materials and methods

RIX passengers were asked to participate in a survey. The survey was conducted by the research centre *SKDS* via the Internet (WAPI) in August 2021, with 1315 respondents. The sample design was established directly proportional to the entire population of Latvia in the target group in terms of age, sex, nationality, and place of residence.

Almost half of respondents were women (51.7%), with the rest (48.3%) being men. Most of the respondents were aged between 45-54 (21.7%), 55-63 (20.3%), 35-44 (20.1%). 59.0% were Latvians; 27.7% – Russians; 2.5% Ukrainians; other participants represented other nationalities. With regard to level of education, most respondents have completed higher education (62.4%), 23.2% – secondary vocational education and 11.9% – secondary education. Most respondents (52%) used RIX services at least once during last three years until global pandemic COVID-19 began, however, from March 2020 till August 2021 the majority did not use RIX services at all (90%).

To determine statistically significant differences ( $p < 10\%$ ) in people's survey responses (service expectations, actual experience, etc.) between various groups (based on demographic information, airport use, etc.) the following procedure was carried out:

1. Reading of survey data in RStudio environment
2. Selection of variables by which respondents were to be grouped (e.g., age group, frequency of travel).
3. Selection of variables of interest (e.g., expectations of baggage transfer).

Since the survey data is ordinal, standard one-way ANOVA and t-tests cannot be used. Hence, Kruskal-Wallis H test and Wilcoxon signed-rank tests were used to determine whether significant differences within the groups are present.

4. Kruskal-Wallis H test is applied for all combinations of groups and variables of interest.
5. Combinations of p value  $< 10\%$  are selected.
6. Wilcoxon signed-rank test is applied to all pair combinations of the selection to determine which groups differ significantly, since Kruskal-Wallis H test cannot determine which exact groups differ significantly.

When looking for significant correlations in data, Spearman's Rank Order Correlation was used, as the survey data is ordinal.

Spearman correlation coefficient  $r$  between two variables is calculated as follows:

$$r = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y}, \quad (1)$$

where  $X = R(x)$ ,  $Y = R(y)$  – ranked variables  $x$  and  $y$ ;  
 $\text{cov}(X, Y)$  – covariance between variables  $X$  and  $Y$ ;  
 $\sigma_X, \sigma_Y$  – standard deviations of ranked variables  $x$  and  $y$ .

These calculations were automated as they were carried out in RStudio environment.

To obtain insights and future implications on the airport development, the author has conducted 7 interviews with airport experts in Europe. After the first interview answers were obtained, it was clear that airport experts around Europe agree on the necessity to develop touchless airports (contactless passenger processing), based on IATA (International Air Transport Association) suggestions. It was no

need to make a larger group of interviewees. Interview qualitative analysis was performed using NVivo 12 software. Interviews were imported into NVivo 12. The most important themes and subthemes were identified by using auto coding functionality. This method eliminates human bias in the coding process and provides an objective overview of the most frequently mentioned themes. Furthermore, using NVivo 12 software also allows to identify links between themes, subthemes, and their reference documents, in this case interviews with airport experts. As a result, this method allows tracking a link between a theme and a region or a specific enterprise which is often mentioned during the interview. The results of NVivo 12 analysis were used to validate the findings from statistical regressions.

In order to measure service quality (both provided by employees and technologies), it is common to use scales like SERVQUAL. As explained by Parasuraman, there are five quality gaps – difference between consumer expectations and perceptions, which are the main causes of dissatisfaction with the perceived service [11]. SERVQUAL method is used to measure the quality of airport services, too [12].

## Results and discussion

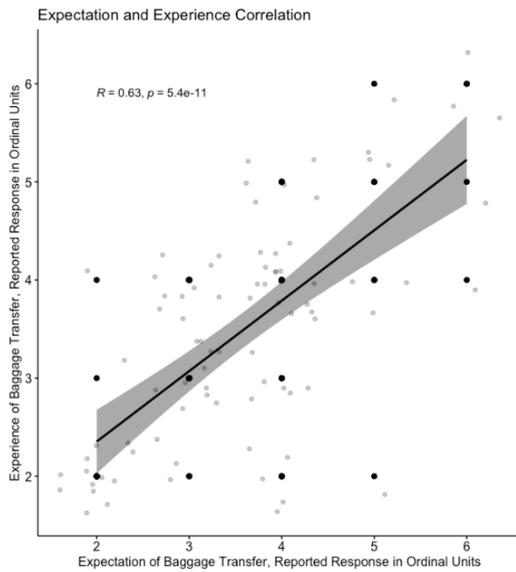
Current research data reveal that during COVID-19 global pandemic, passengers feel safe by travelling via RIX airport, thereby affirming the necessity to keep hygiene measures after the pandemic is over. Even though during COVID-19 RIX significantly improved processes in airport and passenger numbers are growing, overall passenger numbers remain low. The idea to implement touchless airport is still topical. Although RIX airport continuously develops their operational processes and successfully adapts to COVID-19 outbreak in both passenger service and digitalization, there are divergent causes. Changes in RIX are mainly driven by two important factors – to comply with general EU regulations and the results of COVID-19 global pandemic passenger decrease.

People with higher education have significantly higher expectations than those with a professional high school diploma ( $p = 0.93\%$ ). No proof of other groups significantly differing. High/mid-level managers, laborers or housewives had lesser expectations than specialists and government officials at significance levels of 0.06%, 7.39% and 1.47% respectively. People who have children below 18 expect worse attitude from security personnel at a significance level of 2.5%. Ethnic Russians report worse experience regarding security personnel attitude than ethnic Latvians at a confidence level of 1.58%. There is weak evidence that ethnic Ukrainians also have had worse experience than ethnic Latvians at a confidence level of 6.4%. Similar trend arises when comparing experience between respondents who use Latvian at home and those who use Russian at home. Russian speaking respondents report worse experience with security personnel, at a high statistical significance level of 0.44%.

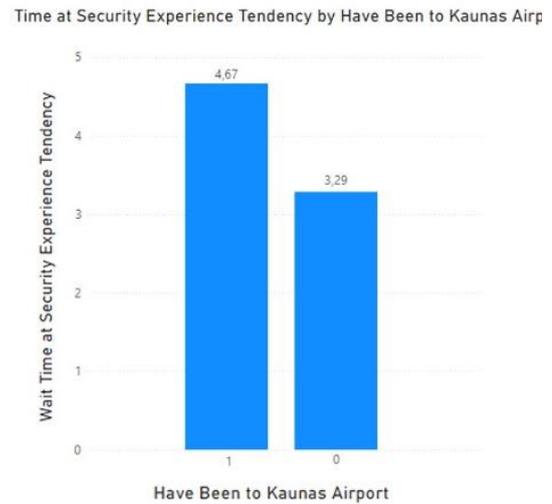
At the same time, there is weak evidence that baggage transfer expectations are lower for people with children below 18 ( $p = 9.53\%$ ). There is significant evidence ( $p = 2.46\%$ ) that clients who have used RIX services once during COVID-19 were more satisfied with baggage transfer than those who have used it 3-5 times. Overall, Fig. 1 illustrates the correlation between expectation of baggage transfer and real experience of baggage transfer which is moderate positive ( $r = 0.63$ ).

Passengers who have used neither Vilnius, Kaunas nor Tallinn airports report worse experience in RIX than those who have used one of these airports during COVID-19 ( $p = 6.14\%$ ). At the same time, comparing satisfaction with security experience between passengers who have used Kaunas airport during COVID-19 and those who have not, there is evidence that a second group reported better experience at a significance level of 5.55% (see Fig. 2). This strengthens the understanding of RIX performing better than its competitors in other Baltic states, but it is recommended to analyse separate processes and improve them accordingly.

Airport experts' (airBaltic, Finavia, K. K. Aviation, Liepaja airport, Malta airport, Prague airport, RIX) interview analysis reveals frequent flyers and technology advanced passengers shifting towards digital solutions, as they reduce waiting times, interactions with other people, e.g., airline or airport staff. Most passengers like new technologies and are using them whenever possible, because they save a lot of time. Cost saving, improved airport operational efficiency and capacity, improved passenger experience, increased revenues are seen as main benefits of international airports investing in digital technologies.

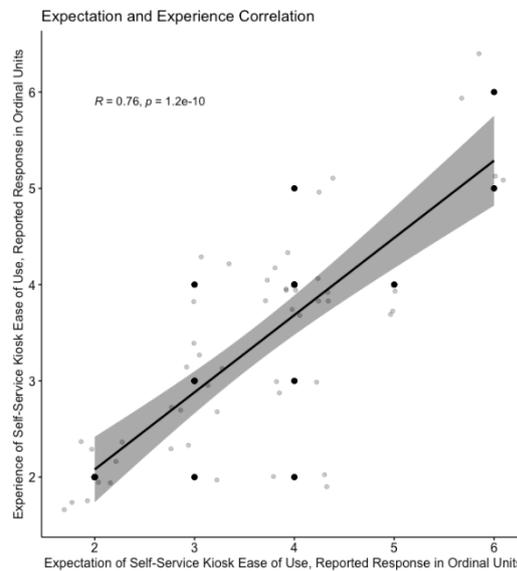


**Fig. 1. Relation between experiences and expectations with baggage transfer at RIX**



**Fig. 2. Satisfaction with security processes at RIX between passengers who have been to Kaunas airport during COVID-19 and those who have not: 1 – have not been; 2 – have been**

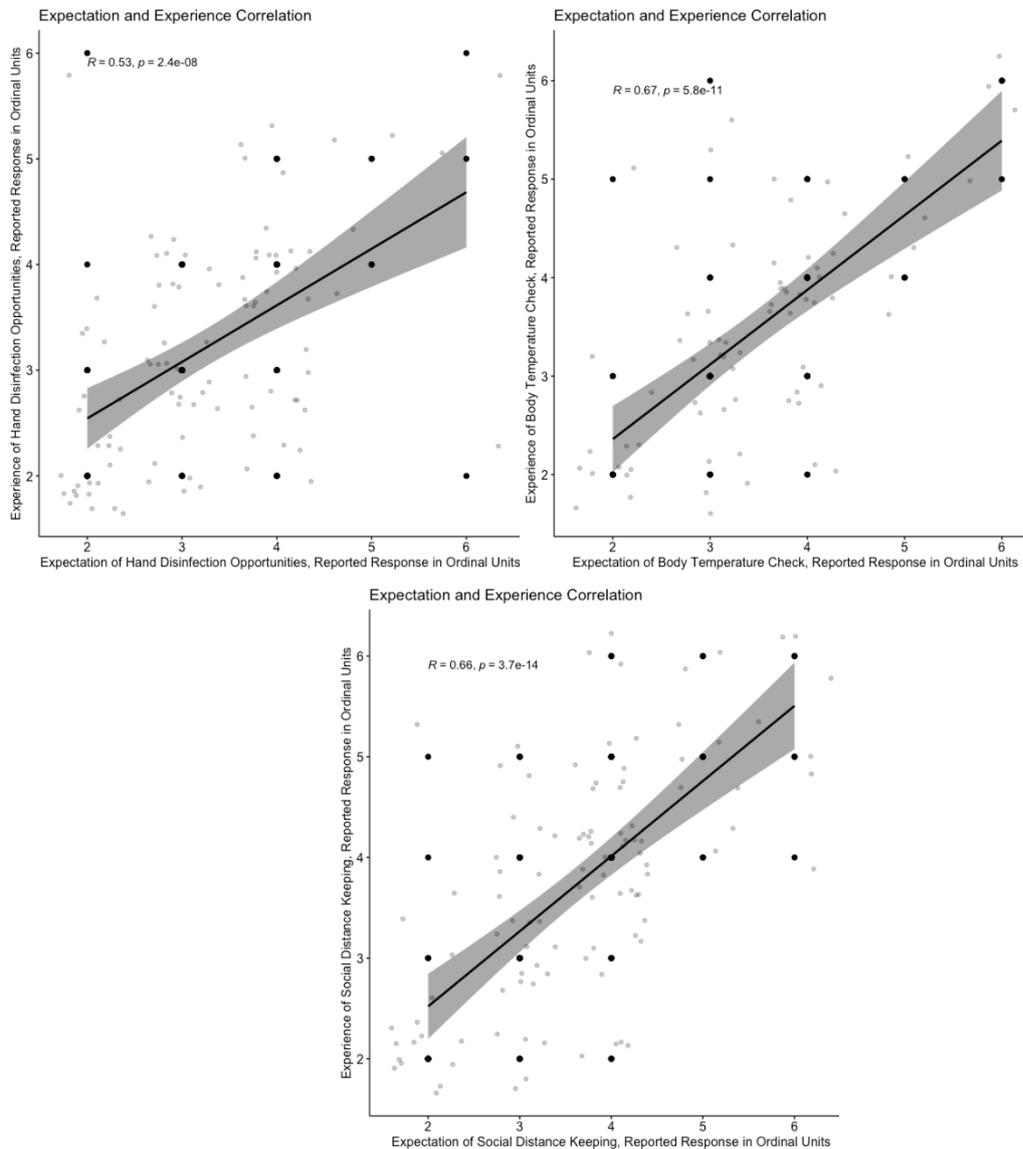
Self-check-in kiosks are one of the examples of digital solutions at airports allowing passengers to print their boarding passes without any assistance. Given the fact that with stricter safety measures in place, there are long waiting times to check-in, airports are eager to let people check-in with more automation options. A considerable number of RIX passengers rated self-service check-in kiosks as convenient in use. Moreover, as Fig. 3 shows, relationship between experience and expectation with the ease of use of self-check-in kiosks is positive and high ( $r = 0.76$ ). However, the number of those passengers for whom this option was irrelevant, is still high (54%). Considering that passengers spent more time waiting for their registration than they had expected, airport shall promote self-service kiosks.



**Fig. 3. Relation between experiences and expectations with the ease of use of self-service check-in kiosks at RIX**

Self-service check-in kiosks have proved themselves to be efficient from epidemiological point of view, eliminating contact with personnel. Experience from other countries shows that self-service check-in kiosks could be integrated with temperature screening kiosks allowing to protect health and safety of both passengers and airport employees.

RIX has also been implementing various health and safety measures to renew passenger flows. Among them – hand disinfection opportunities, body temperature check and promoting social distance. Fig. 4 reveals that passengers' expectations and experience with above mentioned measures are positively correlated. Hence, relationship for hand disinfection solutions is a little bit lower ( $r = 0.53$ ).



**Fig. 4. Relation between experiences and expectations with hand disinfection opportunities, body temperature check and social distance keeping at RIX**

Touchless solutions have proven to be an efficient way to minimise spread of viruses. It should be noted that biometrics technology also has a major role in shaping touchless travel experience. The most frequent themes in expert interviews which were identified by using NVivo 12 auto coding functionality were: passenger; solutions; airport; experience; self-service; and subthemes: innovative self-service solution; human service interaction. Interviewed experts acknowledged that technology savvy and health-conscious passengers are on the rise. As these passengers feel more re-assured if there is less human contact, airports are encouraged to facilitate the customer journey with provided more touchless solutions on demand.

This study should continue to develop policy recommendations for innovative business solutions, to help policy makers renew RIX services after COVID-19 global pandemic.

## Conclusions

1. People with children younger than 18 have significantly lower expectations about services provided at RIX than their counterparts with no children below an age of 18.
2. There is weak evidence that passengers who use Russian language at home are less satisfied than their Latvian speaking counterparts.
3. Digital solutions such as self-service check-in kiosks and more advanced can help reduce friction at certain processes keeping passengers satisfied with their travel experience.
4. With passengers shifting to digital solutions, airports should provide as seamless travel experience as possible by automating processes.
5. Digital solutions can help reduce a risk of spreading COVID-19 and will remain relevant in future.
6. Establishment of innovative solutions and development of touchless airport makes passengers more satisfied and is renewing airport services.

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