Abstract – The aim of the paper is to determine complex factors influencing passengers’ satisfaction at RIGA International Airport (Latvia). Theoretical evidence was examined and factor analysis was carried out to identify the main groups of factors affecting passengers’ satisfaction at the Airport. The findings of the study show that the most important five factors affecting it are: (1) availability of telecommunications, (2) effective way finding signs, (3) cleanliness of restrooms, (4) courtesy of staff and (5) availability of staff. The results based on this study will help airport managers in the Baltic Sea region to better serve their passengers through introduction of modern technologies and improved attitudes.

Keywords – Airport development, customer satisfaction, factor analysis, RIGA International Airport, the Baltic Sea region.

I. INTRODUCTION

Nowadays, global aviation industry is gaining more and more weight, what in turn significantly adds to national economies. It plays an important role in moving individuals and products locally or internationally. Plus, a new trend in shifting from stately to privately owned airports makes ground open for major transformation of the establishments. As a result, numerous innovations along with more consumer friendly approach lead passengers to higher rate the services they have experience with.

Contemporary economics encourages mobility of people, what in turn creates a certain ground for progress in national economies. In these terms, positive development of Latvian aviation industry is expected to make a strong impact on the economy as a whole. In 2012, aviation industry of the Republic of Latvia accounted for 365.8 million EUR, 2% of GDP (gross domestic product), 19 thousand work places, as well as 25.3 million EUR in taxes. Airports are enterprises the industry spins around in any country.

The government of Latvia realizes the importance of the development of both the aviation industry as a whole as well as RIGA International Airport in particular. The Ministry of Transport of the Republic takes noticeable effort to bring this strategically important for the country business onto a global market. It is possible to reach this only by clearly stating the vision and goals to reach. The existing Plan of RIGA International Airport Development Until 2036 was elaborated by Infra Projekti Limited (Latvia) last year. The enterprise coordinated mutual efforts of numerous stately and privately owned organizations. The resulting document provides a clear road map to follow in an attempt to make the airfield more and more competitive advantage of the airfield. Consequently, the retained and newly gained passenger traffic may attract new airlines, investment and greater share in European aviation market. Thus the aim of the study is to determine complex factors influencing passenger satisfaction at RIGA International Airport.

II. PASSENGERS’ SATISFACTION AS AN ADVANTAGE FOR THE DEVELOPMENT OF AN AIRPORT

Consumer satisfaction with service quality is a significant aspect that the airport’s management must consider to generate competitiveness, increased income and sustainable growth. In current competitive environment, the high quality service and resulting increased consumer satisfaction create an important advantage of increased loyalty and positive word of mouth. It is generally believed that higher satisfaction with services can significantly boost customer loyalty and lead to repeated purchases (Dolnicar, Grabler, Grün, & Kulnig, 2011). Thus customer satisfaction does have a positive outcome on company’s profitability.

To reach the goal, airport managements need to recognize passenger expectations for services provided (Gilbert & Wong, 2003). Service quality can be defined as a passenger overall impression of the efficiency of the company and its services (Johnston, 1995). Thus the understanding of what passengers expect is the most vital step in delivering and defining the high-quality service. Service quality evaluation by customers is one of the best approaches to determine their perception and expectations (Adikariwattage, De Barros, Wirasinghe, & Ruwanpura, 2012). Fulfilled or even surpassed expectations of passengers lead to their satisfaction with

Factor Analysis of Passengers’ Satisfaction at “RIGA International Airport”

Sergejs Paramonovs¹, Ksenija Ijevleva¹, ¹ University of Latvia
airport’s provided services. Passenger satisfaction can be defined as a judgment made on the basis of a specific service encounter (Archana & Subha, 2012).

Passenger satisfaction with services arises when an organization can provide its customers with benefits that exceed their original expectations, and this is perceived as value-added. Airport terminal experience is something special for passengers, as they have a variety of choices to select from – for example, duty free or regular shopping, prayer rooms, numerous eateries, museums, club-rooms, information and transfer desks, smoking areas, security, airline offices, support for passengers with disabilities, restrooms, walkways, gates, all types of transportation and parking areas. The services may meet the needs of the passengers partly, completely or exceeding. Therefore, it is expected that the passenger administrations are continuously seeking for new services, developments and innovations to differentiate themselves from the competing airports. There is a variety of options to expand services, and doing that better serve existing, but attract more passengers. Airports services, like conference facilities, spa centres, sleep-boxes, exhibitions or even casinos can be presently found in variety of its areas. Present-day business traveller with the need to organize a corporate meeting may prefer to choose an airport offering a comprehensive package of a conference business centre, hotel rooms and eateries. Having exceptional experience could even make the passenger to pick a particular airport among the rest for the leisure purposes or even as a preferred point for a transfer in future. On contrary, in case the passenger is not satisfied with the time spent at a particular airport, let us say due to lack of choice or quality of services, the passenger may possibly reconsider his decision to arrive there in favour of another airport with better suitable profile. Plus, “an intention to return to the same airport” and “readiness to recommend it to others” positively affect airport’s development (Fernandes & Pacheco, 2002). Thus, the excellent passenger satisfaction is one of the best assets for airport business in competitive environment.

Marketing theory suggests that increasing customer loyalty and its retention is a chief key to the ability of a company to generate profit (Gandomi & Zolfaghari, 2013). Recognition of the determinants affecting passenger satisfaction and a correlation between the one and loyalty are of utmost importance. There are many factors that can help an airport to form its customer base, where passengers’ satisfaction can become the determining factor in evaluation of achievements of an entire operation.

Airport passenger satisfaction has been studied by many researchers around the world for decades. Studies related to the service quality and customer satisfaction in the given field have been growing an interest for the previous ten years. A number of researchers have solely elaborated on related theories (Correia & Wirasinghe, 2007); methods (De Nicola, Gitto, & Mancuso, 2013) and models (Lubbe, Douglas, & Zambellis, 2011) related to service quality throughout the industry (Arblander, 2014). Most of previously conducted studies rely mainly on passenger satisfaction with airport services (Norazah Mohd, 2014) and conducted analyses of empirical data on the matter (Pabedinskaitė & Akstinaïtė, 2014) with an accent on the effect of quality of services on passengers consecutive behaviour (Wittman, 2014; Steven, Dong & Dresner, 2012; Park, 2007). Some researchers have assumed that the measurement of consumer satisfaction should be used in combination with the assessment of necessity level of services and its perceived value. This is due to the chance, the latter might come out to be more accurate predictor of returning intentions (loyalty) than quality and satisfaction (Park, Robertson & Wu, 2004; Chen, 2008). Hence, perceived value, service quality and general satisfaction with services, all seem to be good predictors of passengers returning intentions (Petrick & Backman, 2002). Although, the specific relationship between variables still remains unclear, the authors made an attempt to examine the factors affecting passenger satisfaction with RIGA International Airport services.

Since the authors chose this path, one of the primary steps prior to conducting the survey of passengers was to determine the most applicable factors influencing the overall perception of airport functioning by a passenger. For this reason, the authors have examined The Airports Council International questionnaire, where the matters related to the airport service evaluation process were revived (Airports Council International, 2000). This survey conveys the factors concerning both the objective and subjective criteria. And what is especially important, it was employed to evaluate the overall quality of airport operations.

It is possible to measure objective criteria, like waiting time, walking distance or punctuality, in two ways. The first step is to employ real experimental measurements of these criteria – let us say minutes or metres – gained from the monitoring systems or observation. And the second one is about the passenger perception of evaluation or weighting the criteria. For instance, the researchers would be interested in how passengers evaluate a distance between two points at the airport on a scale ranging from short to very long.

The measurement of subjective criteria, like evaluation of overall attitude of the check-in staff or airport security, cleanliness and comfort of restrooms or Wi-Fi coverage, can be evaluated in terms of the passenger perception only. The Airports Council International questionnaire contains 51 exceptionally detailed criteria for evaluation. However researchers Correia Wirasinghe and De Barros (2008) stress only seven common factors:

1) waiting time;
2) processing time;
3) walking time;
4) walking distance;
5) level changes;
6) orientation/information;
7) space availability for passengers.

The authors consider these factors being important dimensions, but insufficient to be used as variables for the evaluation of passenger satisfaction with their experience.
Another attempt to classify the factors influencing passenger satisfaction has been made by De Barros, Somasundaraswaran and Wirasinghe (2007). The researchers have created a questionnaire in order to evaluate passengers’ subjective experience. Commuters were asked to rate their experience accordingly to 22 offered factors, that were previously classified by authors into six categories:
1) transit;
2) rest rooms;
3) restaurants & bars;
4) duty free shops;
5) security;
6) other facilities.

The received sample was 1037 answer sheets from the passengers used at the moments of conducting Airport services at the RIGA International Airport. The authors divided the survey sample by age, gender, education, residency, as well as by income and status. The authors conducted the survey according to the sample method conditions for the period spanning between the beginning of February and the end of May, 2014 (see Table I).

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>TECHNICAL INFORMATION RECEIVED FROM THE SURVEY ON PASSENGER SATISFACTION WITH PROVIDED SERVICES AT RIGA INTERNATIONAL AIRPORT, FEBRUARY–MAY 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>General population</td>
<td>Riga airport served 4 793 045 passengers in 2013</td>
</tr>
<tr>
<td>Sample planned</td>
<td>1000 respondents</td>
</tr>
<tr>
<td>Sample received</td>
<td>1037 respondents</td>
</tr>
<tr>
<td>Sample valid</td>
<td>937 respondents</td>
</tr>
<tr>
<td>Sample method</td>
<td>Stratified random sampling</td>
</tr>
<tr>
<td>Period survey conducted</td>
<td>From 1 February to 25 May 2014</td>
</tr>
</tbody>
</table>

All RIGA International Airport passengers were taken as population and the sampling frame included the passengers who used the Airport services at the moments of conducting the survey. The authors admitted that the sample was fitting the study, because it ensured the best accessibility of respondents, as well as variability of different demographic factors, like residential status, gender, age, income and education. Respondents for polling were selected using the stratified random sampling method. This method is a superior approach to the simple random sampling and ensures representativeness in frames of variables important to the study. Therefore, the minimum recommended sample size calculated for the study was 384 respondents, where population is 4 793 045, confidence level is 95% and confidence interval is 5%.

Relying on the data of passengers’ demographic profile provided by the Airport experts, the authors divided the survey sample by age, gender, education, residency, as well as by income and status. The authors conducted the survey according to the sample method conditions for the period spanning between the beginning of February and the end of May, 2014 (see Table I).
customer satisfaction were selected on the basis of the named aspects. The survey questions were built by authors in such a way, that the obtained data could be further used whilst applying the factor analysis and getting the number of complex factors as a result. The respondents were offered to evaluate each of 46 factors that influence their satisfaction with airport services. They had to apply a ten-point scale for evaluating the factors measured, where “1” meant that the factor did not affect the satisfaction level at all, but “10” that the factor extremely affected their satisfaction level. According to a number of scientific studies, the 10-point scale was widely recognized as the most suitable for researching customer satisfaction, expectations or evaluations (Coelho & Esteves, 2007; Hill, Roche, & Allen, 2007).

In order to evaluate the strength of the relationship between variables, the authors used the correlation coefficients, which additionally allowed manipulating with different data types simultaneously. Then, factor analysis was carried out by the principal component analysis but factor rotation implemented by Varimax method with Kaiser Normalization. The Kaiser–Meyer–Olkin (KMO) test was performed to confirm the sampling adequacy for the implementation of factor analysis.

### Table II

**Complex Factors Affecting Passengers’ Satisfaction with Airport Services**

<table>
<thead>
<tr>
<th>Primary Factors</th>
<th>Number of Complex Factors and its Correlation Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Quality of public announcements</td>
<td>0.753</td>
</tr>
<tr>
<td>Information for passenger monitoring</td>
<td>0.721</td>
</tr>
<tr>
<td>Accessibility and user-friendliness of terminal way finding signs for pedestrians</td>
<td>0.885</td>
</tr>
<tr>
<td>Availability of assistance for disabled</td>
<td>0.814</td>
</tr>
<tr>
<td>Competence/responsiveness of staff</td>
<td>0.892</td>
</tr>
<tr>
<td>Security/airport safety</td>
<td>0.832</td>
</tr>
<tr>
<td>Airport location</td>
<td>0.401</td>
</tr>
<tr>
<td>Terminal atmosphere/comfort</td>
<td>0.219</td>
</tr>
<tr>
<td>Terminal temperature/air conditioning</td>
<td>0.342</td>
</tr>
<tr>
<td>Seat congestion in terminal</td>
<td>0.014</td>
</tr>
<tr>
<td>Availability of play areas for children</td>
<td>0.196</td>
</tr>
<tr>
<td>Availability of telecommunications (including Wi-Fi Internet)</td>
<td>0.247</td>
</tr>
<tr>
<td>Availability of lifts/escalators/moving walkways/conveyors/stairs</td>
<td>−0.110</td>
</tr>
<tr>
<td>Availability of trolleys</td>
<td>0.077</td>
</tr>
<tr>
<td>Availability/number of rest rooms</td>
<td>0.360</td>
</tr>
<tr>
<td>Ease of finding rest rooms</td>
<td>0.060</td>
</tr>
<tr>
<td>Availability of seats in transfer area</td>
<td>0.230</td>
</tr>
<tr>
<td>Terminal cleanliness</td>
<td>0.115</td>
</tr>
<tr>
<td>Cleanliness of restrooms</td>
<td>0.201</td>
</tr>
<tr>
<td>Staff appearance</td>
<td>0.241</td>
</tr>
<tr>
<td>Courtesy and friendliness/empathy of staff</td>
<td>0.357</td>
</tr>
<tr>
<td>Availability/reliability of staff</td>
<td>0.381</td>
</tr>
<tr>
<td>Availability of airport security staff</td>
<td>0.273</td>
</tr>
<tr>
<td>Politeness of security zone officers</td>
<td>0.102</td>
</tr>
<tr>
<td>Efficiency of staff</td>
<td>0.188</td>
</tr>
<tr>
<td>Security check waiting time</td>
<td>0.163</td>
</tr>
<tr>
<td>Check-in waiting time</td>
<td>0.078</td>
</tr>
<tr>
<td>Terminal decor/aesthetics/style</td>
<td>0.013</td>
</tr>
<tr>
<td>Availability of drinking water</td>
<td>0.058</td>
</tr>
</tbody>
</table>
Convenience of parking & 0.109 & 0.173 & 0.192 & 0.732 & 0.021 & 0.068 \\
Convenience of baggage handling services & 0.001 & 0.080 & $-$0.032 & 0.541 & 0.133 & 0.073 \\
Modernity of rest room facilities & 0.065 & 0.126 & 0.014 & 0.794 & 0.207 & 0.102 \\
Variety of public transportation & 0.241 & 0.173 & $-$0.088 & 0.527 & 0.002 & $-$0.064 \\
Convenience of walking to/from an airplane & 0.352 & 0.282 & 0.237 & 0.751 & 0.255 & 0.111 \\
Art and exhibitions in terminal & 0.107 & 0.081 & 0.051 & 0.264 & 0.803 & 0.203 \\
Availability of entertainment in terminals & 0.258 & 0.016 & 0.042 & 0.187 & 0.726 & 0.155 \\
Variety of eateries & 0.061 & 0.053 & 0.164 & 0.165 & 0.818 & $-$0.117 \\
Prices in eateries & 0.117 & 0.004 & 0.155 & 0.264 & 0.857 & 0.012 \\
Quality in eateries & 0.183 & 0.101 & 0.246 & 0.067 & 0.806 & 0.084 \\
Price in duty free shops compared to other countries & 0.342 & 0.116 & 0.187 & 0.351 & 0.604 & 0.174 \\
Availability of goods/variety in duty free shops & 0.291 & 0.103 & 0.248 & 0.253 & 0.615 & 0.177 \\
Convenience of prayer rooms & 0.113 & 0.126 & 0.067 & 0.264 & 0.104 & 0.734 \\
Convenience of medical aid/pharmacy & 0.217 & 0.181 & 0.163 & 0.192 & 0.177 & 0.518 \\
Availability and convenience of smoking lounge/areas & 0.211 & 0.163 & 0.142 & 0.214 & 0.315 & 0.626 \\
Availability of automated services & 0.153 & 0.002 & 0.278 & 0.103 & 0.283 & 0.525 \\
Walking distance from terminal to gates & 0.301 & 0.255 & 0.234 & 0.078 & 0.260 & 0.867 \\

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

The number of columns is the number of independent uncorrelated and meaningful patterns of the studied subject. Thus columns define the complex factors.

The factor loadings performed in Table II are the correlations between the variables and factors. The practical meaning of a complex factor can be produced by combining those variables that have relatively high factor loadings after implementing the principal component factor analysis by Varimax rotation. The mentioned variables are loaded maximally to only one complex factor and minimally to the rest of complex factors. Definitely, the produced six complex factors are the key dimensions of all 46 factors (see Table II).

The results provide a clear picture of what complex factors represent. The five most significant passenger satisfaction factors produced by factor analysis were identified as follows:

- **Complex factor directly related to flight implementation.**

This complex factor includes six factors (variables): quality of public announcements, information for passenger monitoring, accessibility and user-friendliness of way finding signs, availability of assistance for the disabled, competence and responsiveness of staff, security and airport safety. The first complex factor is the prospective on flight services.

- **Complex factor related to passenger comfort.**

The second complex factor is comfort-related and it combines airport location, terminal atmosphere, temperature and air conditioning, seating area congestion, availability of playing areas for children, telecommunications (including Wi-Fi Internet), as well as availability of lifts, escalators, moving walkways, conveyors, stairs, trolleys, restrooms and ease of finding those. The authors conclude that an airport should be comfort-oriented to provide a good atmosphere.

- **Complex factor related to airport staff.**

The third complex factor refers to the airport personnel and includes terminal cleanliness, cleanliness of restrooms, staff appearance, courtesy and friendliness/empathy of staff, availability/reliability of staff, and availability of airport security staff, politeness of security zone officers, efficiency of staff, security check waiting time, and check-in waiting time. The authors conclude that the complex factor reflects not only on the personnel as such, but also on specific results of work completed by particular individuals and teams. For instance, whilst evaluating staff, it is recommended to use the functional concept of completed tasks, where any work is primarily evaluated by the extent to which a task or a project is completed, not by hours spent.

- **Complex factor related to extra services.**

The fourth complex factor covers seven initial factors, that were indicated by authors as extra services – terminal decor and aesthetics, availability of drinking water, convenience of parking, convenience of baggage handling services, modernity of rest room facilities, variety of public transportation and convenience of walking to/from an airplane. These factors are not crucial for flight implementation, but add to generally good impression of an enterprise and result in increased passenger loyalty.

- **Complex factor related to entertainment.**
The fifth complex factor also includes seven initial factors and its meaning refers to entertaining passengers: art and exhibitions in terminal, availability of entertainment in terminals, variety of eateries, prices in eateries, quality in eateries, pricing in duty free shops compared to other countries, as well as availability of goods and variety in duty free shops. Like the previous one, this complex factor also is not just about the airport operations, but more about overall attractiveness of an airport.

According to the rule “of thumb,” and as applied in statistical factor analysis, the final complex factor presented in Table II includes such variables as convenience of prayer rooms, convenience of medical aid and pharmacy, smoking lounge availability and its convenience, availability of automated services and walking distance from the terminal to the gates. These initial factors have a statistical significance, but do not have an interpretable meaning. Therefore, this complex factor is not very important.

Thus, the authors applied the factor analysis to identify the most important complex factors that could influence passenger satisfaction. The results can be used by the administration of RIGA International Airport with the purpose of increasing passenger satisfaction and loyalty, as well as avoiding negative reputation. The significance level barrier in this study followed the general level for statistical significance of 0.05, while the level of 0.01 being highly significant.

V. CONCLUSION

The authors of the paper conducted their study concentrating on the factors reflecting on passenger satisfaction at RIGA International Airport. However, it should be remembered, that further development and growth of the RIGA International Airport will depend more on transit passengers rather than on locals. This is due to a limited solvency of local consumers. Aviation services are relatively expensive in Latvia, if compared to average income of its residents. This is why the given survey targets both residents and non-residents.

The authors applied the factor analysis to obtain empirical evidence about passenger satisfaction at RIGA International Airport. The findings of the study suggest that the most important five factors affecting passenger satisfaction with RIGA International Airport are availability of telecommunications, accessibility of way finding signs, cleanliness of restrooms, courtesy of staff and availability of staff.

It is impossible to win in the global competition using just standard schemas. New breakthrough ideas and projects are to be employed. It is crucial to make RIGA International Airport a national business project, where many of Latvian residents would happily join the initiative of making it very special to stay or a transfer place for any passenger. Latvia has gained excellent experience in organizing cultural events, like Dziesmu Svētki, and this is the time to move ahead and use the experience while realizing a successful economical project.

REFERENCES


Sergejs Paramonovs graduated from the University of Latvia in 2014. He wrote his Master thesis on airport efficiency influencing factors. His knowledge and experience has extended by years of studies and applied work in the field of clinical psychology. Whilst having decided to practice psychotherapy and psychology as a hobby, he is pursuing his further academic and goals in business. Whilst working in top management positions in the USA (Chicago) and Europe (Latvia) he has proven to be an effective crisis manager and is known for introducing new effective ways of organization in management and operations.

Presently, he is developing business for SPLAT Cosmetics and is a part of a team bringing the company into the global market. His recent achievements are bringing the company into eight countries in Europe for a twelve month period and reaching a contract with one of the largest European retailers, El Corte Ingles (Spain).

E-mail: sergeypar@yahoo.com

Ksenija Ijevleva received the Dr.oec degree from the University of Latvia in 2014. She completed her master studies in management with honours (Summa Cum Laude) in 2010. During her studies she concentrated on such topics as banking and consumers’ financial literacy. She has taken part in the international project URBACT II, where she conducted research on social mood (2010 – 2012).

She worked as analyst and project manager at DNB banka for 6 years and as financial analyst at BIGBANK for 1 year. Her present scientific interest is related to analysis of consumers within universal banking area.

E-mail: kijeveleva@inbox.lv

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