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AIRLINE SERVICE QUALITY EVALUATION FOR INDONESIAN LOW-COST CARRIERS BASED ON EXTENICS INNOVATION THEORY

Ronald SUKWADI[1], Angela SUSANTO[2], Yun-Chia LIANG[3]

[1, 2] *Department of Industrial Engineering, Atma Jaya Catholic University of Indonesia, Indonesia*

[3] *Department of Industrial Engineering and Management, Yuan Ze University, Taiwan*

Abstract:

Nowadays, the market is getting competitive in all aspects of the survival of the company. Companies, especially in the service industry, realize that in order to win the market, they need to explore new ways of delighting customers. The airline industry has played a vital role in Indonesia's modern development and competitiveness. Fierce competition and shrinking profits have impelled the airlines to stress upon improving the quality of the services being provided to the passengers. Passengers have become very specific about their service needs and often tend to shift to others that provide better services. Service quality has emerged as a critical consideration for airlines in the competitive global market, coinciding with Low-Cost Carriers' rapid proliferation (LCCs), bringing a paradigm shift in airline business strategy. Twenty-five service quality attributes identified through extensive literature review and results obtained through five modified AIRQUAL dimensions are fruitful for airline managers to address service quality issues. This paper aims to evaluate LCCs' service quality in Indonesia using the Extenics innovation theory. The Extenics innovation theory is a kind of method with the combination of formalization, quantification, and logicalization. It is effectively applied to put forward creative ideas of new services of airlines. The concepts and principles of service attributes classification based on Extenics are also discussed. To consider interdependence and to calculate the relative importance of each criterion, the AHP method is applied. The study demonstrates and signifies that the Extenics theory and AHP method are promising and pragmatic evaluation model for customer-oriented airline strategic planning. This study has a number of practical implications for LCC airlines, its policy makers and managers. Findings of this study suggest that LCC airlines should focus on appropriate strategies for improving their customers' satisfaction. Airlines should concern on service failures such as delays by providing extra customer care to supplement required material compensation and provide valuable objective feedback and information. A theoretical implication of this study is that Extenics innovation theory can classify and prioritize the service attributes of airlines. Further, the scope of future research works has been discussed at the end to conclude the paper.

Keywords: *Service quality, LCC, modified AIRQUAL, AHP, Extenics theory*

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Contact:
1) ronald.sukwadi@atmajaya.ac.id [https://orcid.org/0000-0001-6639-2041] - corresponding author, 2) aangelasusanto@gmail.com [https://orcid.org/0000-0002-6241-743X], 3) ycliang@saturn.yzu.edu.tw [https://orcid.org/0000-0002-0375-0830]

1. Introduction

Commercial air travel has experienced exponential growth in recent decades, and airlines play a crucial role in the global economy, directly contributing the growth in related industries such as hospitality, retail and transportation (Ganiyu, 2017; Tahanisaz & Shokuhyar, 2020; Shah et al., 2020). This growth in commercial aviation has been accompanied by increased competition, with airline seeking to establish competitive advantage based on service offering and pricing (Park et al., 2020). To successfully navigate this highly competitive environment, domestic airlines, in particular, must focus on understanding and prioritizing passenger service expectations, raising the need to effectively allocate resources to services which have the greatest impact on customer satisfaction (Tahanisaz & Shokuhyar, 2020).

Service quality is an essential concept for firms to establish and maintain market competitiveness (Ghorabaee et al., 2017; Gupta, 2018; Shah et al., 2020), and several studies (Alotaibi, 2015, Jeeradist et al., 2016; Farooq et al., 2018; Sukwadi et al., 2018; Park et al., 2019; Park et al., 2020; Tahanisaz & Shokuhyar, 2020) have demonstrated that service quality is a critical driver of airline choice among travelers. Consistently high-quality service not only helps firms attract new customers but also generates loyalty among existing customers. Thus, airline managers need to understand the concept of quality in airline service experiences.

IATA figures indicate that Asia presents the largest growth region for air transport, with over 1 million passenger flights in 2019, up 1.60% on the previous year (IATA, 2020). The US Federal Aviation Administration (FAA) also predicts Asia will be the fastest-growing region for commercial air transport over the next two decades. Within Southeast Asia, Indonesia is the fourth most-connected country after Singapore, Malaysia, and Thailand, with air connectivity increasing by 20% over the last five years (World Bank, 2019). Indonesia is forecast to be a standout performer-climbing from the world's 10th largest aviation market in 2017 to the 4th largest by 2030 (IATA, 2018). Indonesia's geographical location gives it the potential to serve as an important regional air transport hub. In addition, Indonesia is an archipelago of more than 17,000 islands, served by nearly 700 airports, making air transport a critical component of domestic transport within the country. Indonesia is one of five aviation fastest-growing markets in the world, anticipating passenger-trips to nearly double to 242 million by 2030, reflecting the increasing importance of developing countries in driving passenger growth, with the developing world's share of total passenger traffic rising from 24% to nearly 40% (IATA, 2020).

The airline industry in Indonesia nowadays has many opportunities, partly due to the increasing demand for aviation services. The total number of passengers from January to December 2019 has increased by 16.97% compared to the same period in the previous year for a domestic flight, in contrast to an increase of 8.16% for international flights.

The 1971 launch of Southwest Airlines began a broad trend towards first low-cost carriers (LCCs), and such carriers today accounted for 30% of the worldwide market in 2019. Compared to full-service carriers (FSCs), which aim to provide premium airline services, an LCC is defined as "an airline that differentiates itself in the market through reduced ticket prices and limited services" (Buaphiban and Truong, 2017; Park et al., 2019). Currently, the biggest LCCs operating in Southeast Asia are Malaysia's AirAsia and Indonesia's Lion Air. In Indonesia, LCCs face some challenges, particularly the popular impression that equates LCCs with low service quality, which is then reflected in low customer satisfaction.

Low-Cost Carriers (LCCs) have achieved tremendous success worldwide and have emerged as an essential driver to the growth of the aviation industry and national economies (Choo and Oum, 2013). The LLC concept has a particular attraction in Southeast Asia, which contains many islands that increasingly rely on air transport links to the outside world (Hanaoka et al., 2014). Passengers in this region are price sensitive and prefer the simple, low-fare service offerings provided by LCCs (Bowen, 2016). Finally, LLCs are favored by regional aviation policies, especially the creation of the ASEAN Single Aviation Market (ASAM) (Wang et al., 2017). Currently, LCCs account for nearly half of the region's commercial aviation market (Bowen, 2016), a significantly higher market share than in the U.S. or Europe, the two major LCC markets (Klophaus et al., 2012; Kwoka et al., 2016). The growing number of LCCs in Southeast Asia has driven increased competition among airlines, which raises the question:

How do passengers in this region choose an LCC instead of a full-service airline (FSA) for travel? The characteristics and attitudes of passengers in this region differ from those in Western countries, leading to different purchasing behaviors. Understanding their buying attitudes and behaviors is a crucial success factor for airlines in this growing region.

Previous studies on LLC operations in Southeast Asia have focused mainly on the impact of ticket prices, safety, airline image, in-flight services, booking convenience, and scheduling (Buaphiban and Truong, 2017). While ticket price is consistently the most dominant impact factor, studies have found inconsistent results for the relative impact of service quality, safety, and airline image (Chang and Hung, 2013; Davison and Ryley, 2010). Additionally, these studies mainly examined the direct impacts of these external factors on LCC selection but overlooked differences in passenger attitudes toward LCCs in this region. The lack of focus on attitude and behavioral factors is the major gap in the LCC literature significant, and carriers require improved further understanding of passenger purchase behavior (Buaphiban and Truong, 2017).

Airline service quality affects the company's goodwill and consumer satisfaction and is a critical factor in determining operating costs and profitability (Wang et al., 2011). As such, airlines seek to understand, maintain, and maximize service quality (Punel et al., 2019). Previous studies have used the AIRQUAL model to measure airline service quality and its effect on customer satisfaction and loyalty (Alotaibi, 2015). This research uses a modified AIRQUAL model to focus on airline services provided by it's the airline carrier and exclude non-carrier services such as those provided by airports or terminals (e.g., cleanliness of airport toilets, number of shops in the airport, etc.). Dimensions related to airline services have also been added, such as availability (e.g., passenger information, online ticket sales, etc.).

The Extenics method is adopted because it allows us to calculate the degree of correlation to reflect passenger assessment of airline service quality. Extenics is already widely used in several areas such as transportation, logistics, management, etc. (Fu et al., 2017). It allows us to analyse different classes of passengers based on their characteristics by comparing the degree of correlation. The method is chosen because of its simplicity and intuitiveness, making it potentially more useful for airline management seeking a concise and easily usable measure of service quality.

Extenics provides a way to complete the problem discovery process, establish models, analyze problems, and generate strategies for solving problems with formalized models. However, the method can only classify the service attributes, but the priority level of each attribute is unclear and not accurate. Therefore, developing an integrated method that can and classify and prioritize the attributes of airline services is meaningful for the decision-makers to make valid decisions.

In this study, Extenics is integrated with MCDM to calculate the weights of the evaluation criteria. Extenics will be combined with an MCDM method called the Analytic Hierarchy Process (AHP) to calculate the respective weights of the evaluation criteria (Ren et al., 2013). AHP is applied to confirm weightings and to calculate the weights of the evaluation criteria. The integration of these methods will strengthen the validity and accuracy of the results.

2. Literature review

2.1. Airline service quality

The five original service quality dimensions proposed by Parasuraman et al. (1988) have been widely criticized due to a lack of consistency across industries. Thus, many researchers have sought to both add and delete dimensions in the original service quality scale (SERVQUAL), with names based on their specific industries. For example, the service quality scale for the airline industry is called AIRQUAL (Bari et al., 2001; Farooq et al., 2018). The scale developed and proposed by Bari et al. (2001) based on the Cypriot market lacked validity, as it did not follow all the required steps necessary for instrument validation. Thus, the AIRQUAL scale cannot be applied in other countries. This study uses the same AIRQUAL scale and follows all steps proposed by Parasuraman et al. (1988) to confirm and validate the instrument.

Ekiz et al. (2006) presented a comprehensive AIRQUAL model for assessing airline service quality. Their AIRQUAL model comprises five dimensions, i.e., airline tangibles, terminal tangibles, personnel services, empathy, and image. A later study by Nadiri et al. (2008) also validated the AIRQUAL scale by using it to assess the impact of airline service quality on customer loyalty for North Cyprus

Airlines, and Ali et al. (2015) used this scale to assess service quality for Pakistan International Airlines (PIA). Farooq et al. (2018) adapted the AIRQUAL scale to analyze service quality for Malaysia Airlines.

Ekiz et al (2006) expanded on Bari et al. (2001), to create a 44-items instrument to measure perceived service quality and customer satisfaction levels for the national airline for Northern Cyprus. The service quality dimensions proposed by Bari et al. (2001) are as follows: airline tangibles (ATANG); terminal tangibles (TTANG); personnel (PER); empathy (EMP); and image (IMG) are used as independent variables where perceived service quality (PSQ); and customer satisfaction (CSAT) is used as the dependent variable.

Of the 44 items, 36 measured perceived service quality (adopted from Bari et al., 2001) with 6 items for airline tangibles (ATANG), 12 items for terminal tangibles (TTANG), 8 items for personnel (PER), 7 items for empathy (EMP), and 3 items for image (IMG), with another three items each for perceived service quality (PSQ) and customer satisfaction (CSAT) (Ekiz et al., 2006).

Focus groups produced new information that led to a revision of the existing AIRQUAL scale. As a result, the terminal tangible (TTANG) label with its items was removed because insight from an exploratory study about this dimension shows that airlines have no control over the terminal service quality. Previous research using the AIRQUAL scale measured airline service quality and its effect on customer satisfaction and loyalty (Alotaibi, 2015). Another study combined service quality and AIRQUAL to measure airline service quality to evaluate airline service performance because AIRQUAL does not measure certain aspects of airline service quality (Ali et al., 2015; Farooq et al., 2018; Shah et al., 2020).

2.2. Extenics theory

The concept of extension was developed by Chinese Mathematician Wen Cai to solve contradictions and incompatibility problems in 1983. Extenics theory describes matter as consisting of three elements: matter, character, and corresponding character value. The matter element denotes the logic cell of Extenics theory. It is assumed that the three elements together can provide qualitative and quantitative solutions to contradictory and incompatibility problems. The matter is symbolized as N, the character c, and a character value v. Therefore, the matter element is defined as R = [N, c, v]. The essential roadmap for the application of Extenics is as follows: grading the evaluation target according to a data value, constructing an Extenics model, setting the evaluation index for each rank set in turn for multiple index evaluation, and rating based on comparative correlation degree of evaluation results and each class set (Qian, 2016).

2.2.1. Determining classical domains, segmented domain, and matter elements

The classical domain is the value scope of one assessment index, which includes all the possible values when considering one kind of assessment remark (Fu et al., 2017). The classical domains represent different classes or grades, and each classical domain could be determined by determining the corresponding values of the characteristics. R_k^d denotes the classical domain matter element of the d kind of assessment indices considering the k assessment grade.

$$R_k^d = \left(N_k, c_i^d, v_{ik}^d\right) = \begin{bmatrix} N_k & c_1^d & v_{1k}^d \\ & c_2^d & v_{2k}^d \\ & \vdots & \vdots \\ & c_{n_d}^d & v_{n_dk}^d \end{bmatrix} = \\ = \begin{bmatrix} N_k & c_1^d & < a_{1k}^d, b_{1k}^d > \\ & c_2^d & < a_{2k}^d, b_{2k}^d > \\ & \vdots & \vdots \\ & c_{n_d}^d & < a_{n_dk}^d, b_{n_dk}^d > \end{bmatrix} \quad (1)$$

$$(k = 1,2,\dots,l, d = 0,1,2,\dots 5 \quad i = 1,2,\dots,n_d)$$

where d denotes the classification of the assessment indices, c_i^d is the i assessment index which belongs to the d kind of assessment index, v_{ik}^d is the classical domain of c_i^d considering the k assessment grade, a_{ik}^d and b_{ik}^d are the boundary data of v_{ik}^d, and n_d is the quantities of the d kind of assessment indices.

The joint domain, also called the segmented domain, is the value scope of one assessment index which includes all the possible values.

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$$R_q^d = \left(N_q, c_i^d, v_{iq}^d\right) = \begin{bmatrix} N_k & c_1^d & v_{1q}^d \\ & c_2^d & v_{2q}^d \\ & \vdots & \vdots \\ & c_{n_q}^d & v_{n_d q}^d \end{bmatrix} = \\ = \begin{bmatrix} N_q & c_1^d & < a_{1q}^d, b_{1q}^d > \\ & c_2^d & < a_{2q}^d, b_{2q}^d > \\ & \vdots & \vdots \\ & c_{n_d}^d & < a_{n_d q}^d, b_{n_d q}^d > \end{bmatrix} \quad (2)$$
$(d = 0,1,2,\ldots 5 \quad i = 1,2,\ldots,n_d)$

where v_{iq}^d is the joint domain of the c_i^d index, a_{iq}^d and b_{iq}^d are boundary data of v_{iq}^d, and N_q denotes the set of all assessment remarks.
Matter element refers to the object to be assessed. R^d denotes the matter element of the *d* kind of indices:

$$R^d = \left(P^d, c_i^d, x_i^d\right) = \begin{bmatrix} P^d & c_1^d & x_1^d \\ & c_2^d & x_2^d \\ & \vdots & \vdots \\ & c_{n_d}^d & x_{n_d}^d \end{bmatrix} \quad (3)$$
$(d = 0,1,2,\ldots 5 \quad i = 1,2,\ldots,n_d)$

where P^d denotes the overall assessment index, namely, the airport service quality, and x_i^d is the data of c_i^d. Means of the passengers' score on those assessment indices are taken as x_i^d.

$$x_i^d = \frac{\sum_{j=1}^{N_u} x_{ji}^d}{N_u} \quad (4)$$
$(d = 0,1,2,\ldots 5 \quad i = 1,2,\ldots,n_d)$

where x_{ji}^d denotes the score in the *j* (j = 1,2, …, N_u) useful questionnaires for the evaluation degree of the c_i^d index (Yang, et al., 2012).

2.2.2. Determining characteristic weights

The Analytic Hierarchy Process (AHP) is generally used to confirm weightings, but this method results in an over-dependence on subjective expert input (Perçin, 2018). AHP is a widely used multi-criteria decision-making method used to determine the weights of criteria and priorities of alternatives in a structured manner based on a pairwise comparison (Liu et al., 2020). Data in this research is inputted through a matrix with geometric mean data (Li et al., 2017). This research uses the geometric mean method (GMM) because the number of components is more than one. The average ratio of each pairwise comparison category is represented by GMM (Abu et al., 2016), which is calculated by:

$$GMM = \left(\prod_{k=1}^{n} a_{ij}^k\right)^{\frac{1}{n}} \quad (5)$$

where *n* is the number of members and a_{ij} is the preference of a member for element '*i*' over '*j*'.

2.2.3. Calculating the extension correlation degree for each factor

The correlation degree can reflect the membership of one index with one assessment grade. The correlation degrees of variables should be calculated first. Let e_{ik}^d denote the correlation degree of the c_i^d assessment index with the k assessment grade..

$$e_{ik}^d = \begin{cases} -\frac{\rho^d\left(x_i^d, v_{ik}^d\right)}{|v_{ik}|}, & \left(x_i^d \in v_{ik}^d\right) \\ \frac{\rho^d(x_i^d, v_{ik}^d)}{\rho^d\left(x_i^d, v_{iq}^d\right) - \rho^d(x_i^d, v_{ik}^d)}, & \left(x_i^d \notin v_{ik}^d\right) \end{cases} \quad (6)$$
$(d = 1,2,\ldots,6, \;\; i = 1,2,\ldots.n_d, \;\; k = 1,2,\ldots l)$

where $\rho^d\left(x_i^d, v_{ik}^d\right)$ is the distance between x_i^d and v_{ik}^d and $\rho^d\left(x_i^d, v_{iq}^d\right)$ is the distance between x_i^d and v_{iq}^d, which can be calculated according to the following formula:

$$\rho^d\left(x_i^d, v_{ik}^d\right) = \left|x_i^d - \frac{1}{2}\left(a_{ik}^d + b_{ik}^d\right)\right| - \frac{1}{2}\left(b_{ik}^d - a_{ik}^d\right)$$
$$\rho^d\left(x_i^d, v_{iq}^d\right) = \left|x_i^d - \frac{1}{2}\left(a_{iq}^d + b_{iq}^d\right)\right| - \frac{1}{2}\left(b_{iq}^d - a_{iq}^d\right) \quad (7)$$

Then the correlation degree of the dimensions should be calculated. Let e_{ik}^0 denote the correlation degree of the c_i^0 assessment index with the k assessment grade.

$$e_{ik}^0 = \sum_{j=1}^{n_d} w_j^i \cdot e_{jk}^i \quad (8)$$

Finally, the correlation degree of the index of the modified airline service quality should be calculated. Let e_{0k}^0 denote the correlation degree of the overall assessment index with the *k* assessment grade.

$$e_{0k}^0 = \sum_{i=1}^{5} w_j^0 \cdot e_{jk}^0 \quad (9)$$

2.2.4. Calculating the synthetic assessment

Synthetic assessment is calculated to determine the adaptability degree between the assessment index and the assessment grade. The larger value of e_{ik}^d is, the nearer the passengers' evaluation degree on the assessment index is to the *k* assessment grade.

$$h_{ik}^d = \max e_{ik}^d \quad (d = 1,2,\dots,6,\ i = 1,2,\dots n_{d,}\ k = 1,2,3,4,\ m = 1,2,3,4,\ k \neq m) \quad (10)$$

$$z_{im}^d = \min e_{im}^d \quad (d = 1,2,\dots,6,\ i = 1,2,\dots n_{d,}\ k = 1,2,3,4,\ m = 1,2,3,4,\ k \neq m) \quad (11)$$

where h_{ik}^d denotes the maximum value of the correlation degree among *l* correlation degrees of assessment index c_i^d and z_{im}^d denotes the minimum value. If $h_{ik}^d > 0$, passengers' evaluation degree on the c_i^d assessment index belongs to the *k* assessment grade. Passengers' evaluation degree on the c_i^d assessment index is nearer to the *l* assessment grade than that of c_j^d if $y_{il}^d > y_{jl}^d$ (Fu et al., 2017).

3. Research methods

3.1. Research design

A quantitative approach is applied with descriptive analysis to describe respondents' characteristics and their profiles (Creswell, 2014). Survey research provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying that population sample. A questionnaire was designed to collect data from respondents who have used LCC airlines for domestic travel within Indonesia at least once in 2019.

The demographic section of the questionnaire contains statements that relate to respondents' identities using closed-answer questions except for name/initial. This demographic information is then used to categorize respondents by age, gender, occupation, monthly expenditures, the purpose of travel, and travel frequency in 2019. Respondents were then given a series of statements and asked to respond to each by saying whether they: 1 = strongly disagree with the statement (SD), 2 = disagree with the statement (D), 3 = agree with the statement (A), or 4 = strongly agree with the statement (SA). The rating scale's width tends to vary from 4 to 11 points (Vogt & Johnson, 2011). The 4-points option is used to avoid a neutral answer. Statements are shown in Table 1.

Table 1. Statements in the questionnaire

3.2. Extenics

Extenics method contains four steps (Fig. 1):

- Determine classical domains, segmented domains, and matter elements. In this step, different grades/classes will be determined, and the evaluation criteria (characteristics) and their corresponding grade intervals will be defined.
- Classical domain finds the means from the data range of passengers' scores for airline service quality, from strongly disagree with score value range = 1-1.75 to strongly agree with score value = 3.25-4. Segment domain is all possible values of scores. Matter element is assessed by counting the means of the passengers' scores for those assessment indices.
- Determine the weight of the characteristics. This step determines the weight of the evaluation criteria using the AHP method by collecting the weight of each characteristic from questionnaires distributed to decision-makers experienced in airline service quality.
- Calculate the extension correlation degree for each factor. Correlation degree reflects the membership of one index with one assessment grade, calculated for each indicator, each dimension, and overall correlation degree of assessment.
- Calculate the synthetic assessment. The synthesis correlation degree is calculated by taking the correlation degree of the overall assessment. The respondents' perception of service attributes can be obtained in this step.

Indicator	Statements in Bahasa Indonesia	Statements in English
AT1	Pesawat memiliki penampilan bersih dan modern	Aircraft has clean and modern look
AT2	Katering yang disajikan memiliki kualitas yang baik	Food and beverages have good quality
AT3	Pesawat memiliki toilet yang bersih	Aircraft has clean toilet
AT4	Kursi yang ada di dalam pesawat bersih	Chairs inside the aircrafts are clean
AT5	Kursi yang ada di dalam pesawat nyaman	Chairs inside the aircrafts are comfortable
AT6	Pendingin ruangan memberikan udara yang sejuk	Air conditioners are working and cool
PER1	Personel maskapai bersikap sopan dan ramah	Airline crews are polite and respectful to passengers
PER2	Personel maskapai memberikan jawaban yang tepat	Airline crews provide accurate answers to passengers
PER3	Personel maskapai memiliki keterampilan dan pengalaman yang memadai	Airline crews has adequate skills and experiences to serve passengers
PER4	Personel maskapai memberikan perhatian yang sama terhadap setiap penumpang	Airline crews gives equal attention to passengers
PER5	Personel maskapai memiliki pengetahuan yang memadai untuk menjawab pertanyaan Anda	Airline crews has adequate knowledge to answer passengers' questions
PER6	Personel maskapai memiliki empati terhadap penumpang, dan senantiasa membantu penumpang	Airline crews are empathetic towards passengers and are continuously helping passengers
PER7	Personel maskapai memiliki kesadaran terhadap kewajibannya (menjalankan tugas dengan baik)	Airline crews are doing their tasks well
PER8	Transaksi pemesanan dan pembelian tiket bebas dari kesalahan (error-free)	Transactions for ticket bookings and purchases are error free
EMP1	Keberangkatan dan kedatangan tepat waktu	Flight departures and arrivals are on time
EMP2	Adanya skema kompensasi yang jelas pada kasus kehilangan atau kerusakan barang bawaan	There is a clear compensation scheme/rules regarding baggage loss or damage
EMP3	Adanya perlakuan yang baik terhadap barang bawaan penumpang	Airline pays good attention to passengers' baggage (carry on/checked in)
EMP4	Lokasi kantor maskapai mudah dijangkau	Locations of airline offices are easy to reach
EMP5	Jumlah penerbangan yang diberikan oleh maskapai penerbangan telah sesuai dengan kebutuhan Anda	Airline offers enough flight schedules for passengers to comfortably choose
IMG1	Maskapai menawarkan harga tiket yang murah dengan berbagai promosi	Airline offers affordable tickets through promotions
IMG2	Maskapai memberikan harga tiket yang sesuai dengan pelayanan yang diberikan oleh maskapai	Airline ticket prices are worth the service that airline gives
IMG3	Maskapai penerbangan memiliki citra yang baik	Airline has good reputation
PSQ1	Kualitas layanan yang diberikan oleh maskapai penerbangan sudah baik	Service quality given by airline is good
PSQ2	Kualitas layanan yang diberikan oleh maskapai lebih baik dibandingkan maskapai lainnya	Service quality given by airline is better than other budget airlines
PSQ3	Kualitas layanan yang Anda harapkan telah terpenuhi oleh maskapai penerbangan	Airline fulfills the expected service quality that passenger expected

4. Results and discussion

4.1. Profile of respondents

Data on the airline service quality are collected through a questionnaire distributed to passengers who flew at least once in 2019 with LCC airlines on a domestic route in Indonesia. A total of 304 respondents responded, including 254 online respondents and 50 offline respondents. Table 2 summarizes the demographic data of the 304 respondents.

Passenger age varies from under 18 years old to over 45, with the majority of respondents aged 18-25 (72.70%), and 57.57% of respondents were female. The majority of respondents listed “student” as their occupation (63.82%), in line with the age distribution, whereas only 23% of the general population of Jakarta’s are students. In terms of monthly expenditures, 33.35% of the sample spent between US$ 71 and US$ 142, while 67.76% were below US$ 213.

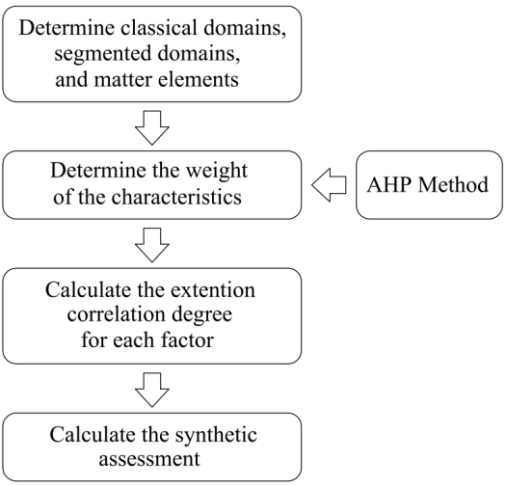

Fig. 1. Extenics innovation method

Table 2. Respondent demographic data (N=304)

Characteristics	Frequency (Percentage)
Age	
<18 years	5 (1.64%)
18-25 years	221(72.70%)
26-35 years	42 (13.82%)
36-45years	27 (8.88%)
>45 years	9 (2.96%)
Gender	
Male	129 (42.43%)
Female	175 (57.57%)
Occupation	
Entrepreneur	26 (8.55%)
Private employees	74 (24.34%)
Student	194 (63.82%)
Government employee	10 (3.29%)
Expenditure per month (US$)	
≤ 71	42 (13.82%)
71-142	102 (33.35%)
142-213	62 (20.39%)
213-284	37 (12.17%)
284-355	34 (11.18%)
>355	27 (8.88%)

4.2. Extenics method

4.2.1. Classical domain and segmented domain

Classical domain in this research is the data range of passenger scores for airline service quality by index, from strongly disagree (score = 1) to strongly agree (score = 4). There are four classical domains to describe passenger evaluations of airline service quality, denoted as:

$$\begin{aligned} v_{i1}^{d} &= < a_{i1}^{d}, b_{i1}^{d} > = <1, 1.75> \\ v_{i2}^{d} &= < a_{i2}^{d}, b_{i2}^{d} > = <1.75, 2.5> \\ v_{i3}^{d} &= < a_{i3}^{d}, b_{i3}^{d} > = <2.5, 3.25> \\ v_{i4}^{d} &= < a_{i4}^{d}, b_{i4}^{d} > = <3.25, 4> \end{aligned} \quad (12)$$

From the classical domain, a segmented domain can be determined by considering all the possible score values. A segmented domain is denoted as:

$$v_{iq}^{d} = < a_{iq}^{d}, b_{iq}^{d} > = <1, 4> \quad (13)$$

Matter element refers to the object for assessment. Means of passenger scores for the assessment indices are taken as x_i^d, calculated for AT1 as shown below for example:

$$x_{AT1}^{d} = \frac{3+3+\cdots+1+2}{304} = \frac{900}{304} = 2.9605263 \quad (14)$$

Matter element is used to calculate the extension correlation degree for each factor with values. It is shown in Table 4.

Classical domains were determined by the linguistic variable from the index of collected passenger scores for airline service quality. A linguistic variable with verbal expression as its value is used to express hard-to-define situations. Airline service quality is an example of a linguistic variable, where the possible values for this variable are: strongly disagree, disagree, agree, strongly agree. Passenger evaluation of airline service quality was indicated with the scale range of 1-4, and the personal range of the linguistic variable can be assumed for calculation (Park et al., 2020).

This research uses a unique range of airline service quality classical domains in Extenics analysis from strongly disagree with a score value range = 1-1.75 to strongly agree with a score value = 3.25-4, to describe passenger evaluations. The segment domain or joint domain is the union set of all the classical domains and the corresponding value of each characteristic is the union of all the possible values of each characteristic (Ren et al., 2013).

The passenger evaluation score means are based on passenger characteristics in the range of passenger overall assessments, and no critical differences were identified for the whole sample. Based on this result, the Extenics method was only calculated for whole samples and not based on passenger characteristics.

4.2.2. Determining characteristic weights

Characteristic weights are determined by the AHP method. The hierarchy structure of the airline service quality is provided in Fig.2. The weight of the dimensions and indicators is then obtained (Table 3), and used to calculate the Extenics method. Three decision-makers were asked to fill out questionnaires about the importance of various dimensions and indicators in determining airline service quality. Two of the respondents were frequent LCC airline passengers in Indonesia, while the third is an independent pilot who had studied airline service quality both in Indonesia and the Philippines. Airline employees, such as ground staff, stewards, etc., were not included to avoid potential bias.

The results of each decision-maker questionnaire were aggregated to obtain a pairwise comparison before determining the comparison matrices for weight calculation. The group aggregation of the individual priorities was done using the Geometric Mean Method (GMM).

4.2.3. Calculating the extension correlation degree for each factor

The extension correlation degree reflects the membership of one index with one assessment grade. Correlation degree can be calculated by considering the distance between the matter element and classical domain on a specific range and between the matter element and segmented domain. Table 4.

The extension correlation degree appraises the matter-element analysis for each indicator's airline service quality, each dimension, and overall assessment degree, as stated in Table 4. The largest correlation degree for every statement collected in value = 3 (agree), except for EMP1 (flight departures and arrivals are on time) in value = 2 (disagree). The second greatest correlation degree shows the range of passenger feelings toward airline service quality. For AT1, passenger responses are approximately "strongly agree", with a correlation degree of 0.386 (agree) > -0.218 (strongly agree) > -0.307 (disagree) > -0.538 (strongly disagree). Passengers indicated near strong agreement with most of the statements except for AT2, AT5, EMP2, EMP3, EMP4, and PSQ3 for which responses were approximate to "disagree".

The Extenics results show that EMP1 (flight departures and arrivals on time) has the lowest degree of correlation. Failed to meet passenger service quality expectations requires airlines to invest in recovering customers because lost customers typically result in a significant financial and reputational loss (Hogan et al., 2003).

Improvements to on-time flight departures and arrivals are needed to increase passenger evaluation scores for airline service quality. Based on Indonesia Ministry of Transportation regulations PM 89/2015, airline delays are classified into 6 categories where category 1 denotes a 30-60 minutes delay, up to category 6 which represents flight cancellation requiring compensation.

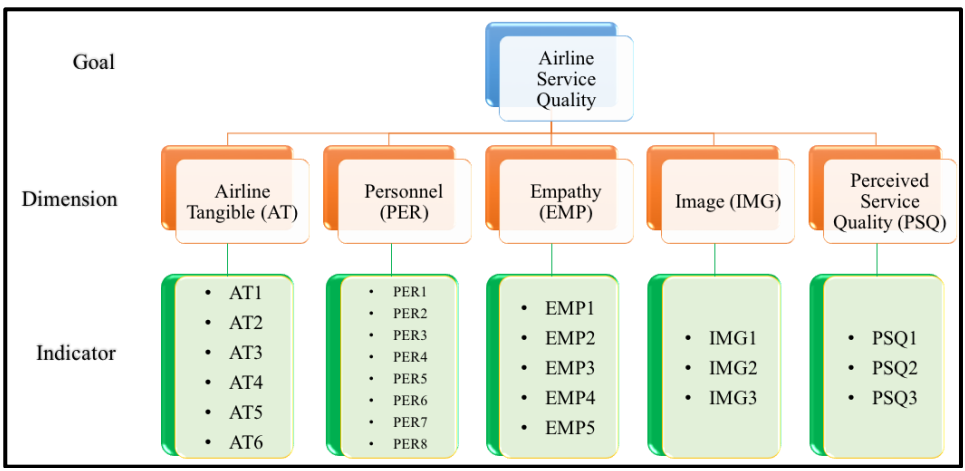

Fig. 2. The hierarchical structure of airline service quality

Table 3. AHP: Overall weights of criteria to goal

Criteria	**AT**	**PER**	**EMP**	**IMG**	**PSQ**	**Overall**
Weight	0.0838	0.06834	0.29305	0.23174	0.32307	**Weight**
AT1	0.04769					0.00399642
AT2	0.05743					0.00481263
AT3	0.19489					0.01633178
AT4	0.22074					0.01849801
AT5	0.20514					0.01719073
AT6	0.27412					0.02297126
PER1		0.03901				0.00266594
PER2		0.04191				0.00286413
PER3		0.08726				0.00596335
PER4		0.06698				0.00457741
PER5		0.14462				0.00988333
PER6		0.09697				0.00662693
PER7		0.10326				0.00705679
PER8		0.41999				0.02870212
EMP1			0.06357			0.01862919
EMP2			0.09383			0.02749688
EMP3			0.09004			0.02638622
EMP4			0.15720			0.04606746
EMP5			0.59536			0.17447025
IMG1				0.05671		0.01314198
IMG2				0.33855		0.07845558
IMG3				0.60474		0.14014245
PSQ1					0.06867	0.02218522
PSQ2					0.46765	0.15108369
PSQ3					0.46367	0.14979787

Table 4. The extension correlation degree

Primary Index						Senior Index						
Index	Weight	Correlation degree value				Index	Weight	Score	Correlation degree value			
		1	2	3	4				1	2	3	4
Airline Tangible (ATANG)	0.0838	-0.5315928	-0.2973842	0.29310399	-0.2104112	AT1	0.04769	2.961	-0.5380117	-0.3070175	0.38596491	-0.2178218
						AT2	0.05743	2.648	-0.3991228	-0.0986842	0.19736842	-0.3080808
						AT3	0.19489	3.072	-0.5877193	-0.3815789	0.23684211	-0.1607143
						AT4	0.22074	2.921	-0.5204678	-0.2807018	0.43859649	-0.2336449
						AT5	0.20514	2.734	-0.4371345	-0.1557018	0.31140351	-0.2896679
						AT6	0.27412	3.095	-0.5979532	-0.3969298	0.20614035	-0.1459627
Personnel (PER)	0.0683	-0.5649087	-0.347363	0.30527404	-0.1808434	PER1	0.03901	3.158	-0.6257310	-0.4385965	0.12280702	-0.0985915
						PER2	0.04191	3.148	-0.6213450	-0.4320175	0.13596491	-0.1068966
						PER3	0.08726	3.049	-0.5774854	-0.3662281	0.26754386	-0.1742857
						PER4	0.06698	3.039	-0.5730994	-0.3596491	0.28070175	-0.1797753
						PER5	0.14462	3.148	-0.6213450	-0.4320175	0.13596491	-0.1068966
						PER6	0.09697	3.013	-0.5614035	-0.3421053	0.31578947	-0.1935484
						PER7	0.10326	3.132	-0.6140351	-0.4210526	0.15789474	-0.1200000
						PER8	0.41999	2.918	-0.5190058	-0.2785088	0.44298246	-0.2348837
Empathy (EMP)	0.2931	-0.482841	-0.2231032	0.36996059	-0.2561764	EMP1	0.06357	2.484	-0.3308605	0.02192982	-0.0109649	-0.3406433
						EMP2	0.09383	2.533	-0.3479532	-0.0219298	0.04385965	-0.3283133
						EMP3	0.09004	2.780	-0.4576023	-0.1864035	0.37280702	-0.2782101
						EMP4	0.15720	2.855	-0.4912281	-0.2368421	0.47368421	-0.2564103
						EMP5	0.59536	2.924	-0.5219298	-0.2828947	0.43421053	-0.2323944
Image (IMG)	0.2317	-0.5180946	-0.2771419	0.44571627	-0.2354626	IMG1	0.05671	2.987	-0.5497076	-0.3245614	0.35087719	-0.2061856
						IMG2	0.33855	2.918	-0.5190058	-0.2785088	0.44298246	-0.2348837
						IMG3	0.60474	2.908	-0.5146199	-0.2719298	0.45614035	-0.2385321
Perceived Service Quality (PSQ)	0.3231	-0.4967923	-0.2451934	0.46893035	-0.2519999	PSQ1	0.06867	2.947	-0.5321637	-0.2982456	0.40350877	-0.2233010
						PSQ2	0.46765	2.882	-0.5029240	-0.2543860	0.49122807	-0.2477876
						PSQ3	0.46367	2.842	-0.4853801	-0.2280702	0.45614035	-0.2605042

Most applicable improvements can be made by implementing TRIZ principles in a service-related context. The Theory of Inventive Problem Solving (TRIZ) was designed to be used in technical areas, but it has since been applied to non-technology related sectors including service provision (Gazem & Rahman, 2014). TRIZ principle #22 discusses means of converting harm into a benefit, and airlines can do so by providing extra customer care apart from required material compensation to support passengers facing service failures such as delays. Such extra service can take the form of hotel accommodation, arranging travel alternatives, or complimentary meals (Jeeradist et al., 2016). Airline personnel need to responsively assist passengers by promptly providing personalized information.

For AT2, AT5, EMP2, EMP3, EMP4, and PSQ3, passengers respond approximately "disagree". These indicators are not critical, but they need to be taken into considerations by airlines. Some improvements can be made, especially in terms of empathy and perceived service quality dimensions. Airlines can hire mystery shoppers to provide management with objective insight into the customer experience in terms of various aspects, including cleanliness, facilities, meal options, and service quality. Furthermore, mystery shoppers can also help airlines assess staff performance, evaluate competitors, and ensure that airline staff follows proper procedures (Nasief, 2017).

After calculating the correlation degree values for the senior index (indicators), the synthetic correlation degree values for the primary index (dimension) were then calculated by adding all weights multiplied by the correlation degree value. The high correlation degree value for dimensions is 3 for all dimensions, indicating that passengers agree with all airline service quality dimensions. The rank of correlation degree for all primary indexes is agreed to strongly agree, except for empathy and perceived service quality. The correlation degree value for the overall assessment degree was then calculated, finding that passengers agree with the overall degree of assessment.

4.2.4. Calculating the synthetic assessment

Synthetic assessment is calculated to find the degree of adaptability between the assessment index and the assessment grade. The value of e_ik^d means the passengers' evaluation degree for the assessment index.

The overall correlation degrees are as follows:

$$\begin{aligned} e_{01}^{0} &= -0.5052118 \\ e_{02}^{0} &= -0.2574795 \\ e_{03}^{0} &= 0.40862911 \\ e_{04}^{0} &= -0.2410435 \end{aligned} \tag{15}$$

According to the assessment criteria, $h_{03}^{0} = 0.4086 > 0$, indicating that the passengers stated agree with airline service quality. The value of $h_{04}^{0} > h_{02}^{0} > h_{01}^{0}$, indicates a sign that passengers are near to strongly agree with airline service quality. The correlation degree between strongly agree and disagree is close, indicating that passengers near disagree with the airline service quality.

Based on the correlation degree value for dimensions or a primary index of airline service quality, all passengers strongly agree to all dimensions and tend towards "strongly agree" with the tangible, personnel, and image aspects, but tend towards "disagree" for empathy and perceived service quality.

Airlines can use Extenics to evaluate service quality by collecting data from passenger questionnaires and thus plan improvements for indicators to which passengers respond negatively. Airlines can also collect various demographic information, categorize passengers based on specific characteristics, and devise specific solutions to satisfy these various types of passengers. Finally, airlines need to conduct regular evaluations to maintain and improve service quality.

5. Conclusions

From the results of the present study, it can be concluded that:

- Dimensions and variables for the modified Airline Service Quality (AIRQUAL) for Low-Cost Carrier (LCC) airlines in Indonesia include tangible (6 indicators), personnel (8), empathy (5), image (3), and perceived service quality (3).
- Prioritized dimensions and variables of the modified AIRQUAL are determined by AHP with group aggregation using Geometrical Mean Method (GMM) with the following results: tangible (0.0838), personnel (0.06834), empathy (0.29305), image (0.23174), and perceived service quality (0.32307).

- Classification of passenger evaluation indicators is agreed or satisfied with every indicator except for EMP 1. Passengers tend to "strongly agree" for most of the statements, except AT2, AT5, EMP2, EMP3, EMP4, and PSQ3, to which they tend to "disagree."
- Passengers stated they agree with all airline service quality dimensions and strongly agree with most of the dimensions except for empathy and perceived service quality.
- The synthetic assessment of Extenics theory shows which service attributes to which passengers agree.

The following suggestions are given for future research:

- Research samples should better reflect the general air passenger population to improve accuracy, especially in terms of demographic characteristics.
- Research scope can be expanded to other regions, and specific airlines using other methods such as MUSA with the aggregation-disaggregation approach and linear programming modelling.
- The Extenics can be applied to other research areas, such as transportation, logistics, etc.

The following suggestions are provided for Indonesian LCC airline operators:

- Respond to service failures such as delays by providing extra customer care to supplement required material compensation.
- Hire mystery shoppers to provide valuable objective feedback and information.
- Use Extenics to evaluate airline service quality using passenger questionnaires for characteristic-based evaluation.

References

[1] AKAA, O., ABU, A., SPEARPOINT, M., GIOVINAZZI, S., 2016. *Decision analysis of stakeholder views in the design of steel structures in fire.* International Conference on Transdisciplinary Engineering, 523-532.

[2] ALI, F., DEY, B.L., FILIERI, R., 2015. *An assessment of service quality and resulting customer satisfaction in Pakistan International Airlines: findings from foreigners and overseas Pakistani customers.* International Journal of Quality & Reliability Management, 32, 486–502.

[3] ALOTAIBI, M.M., 2015. *Evaluation of "AIRQUAL" Scale for Measuring Airline Service Quality and its Effect on Customer Satisfaction and Loyalty.* Cranfield: Cranfield University.

[4] BADAN PUSAT STATISTIK. *Berita Resmi Statistik. Perkembangan Transportasi Nasional Desember 2016*. Jakarta, DKI Jakarta, Indonesia.

[5] BARI, S.B., 2001. *AIRQUAL: A Multiple-Item Scale for Measuring Service Quality, Customer Satisfaction, and Repurchase Intention.* School of Tourism and Hospitality Management. Gazimagusa: Eastern Mediterranean University.

[6] BUAPHIBAN, T., TRUONG, D., 2017. *Evaluation of passengers' buying behaviors toward low cost carriers in Southeast Asia*. Journal of Air Transport Management, 59, 124–133.

[7] CENTRAL INTELLIGENCE AGENCY, 2017. *The World Factbook.* Retrieved December 17, 2017, from Central Intteligence Agency: https://www.cia.gov/library/publications/the-world-factbook/geos/id.html.

[8] CRESWELL, J.W., 2014. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* California: SAGE.

[9] CVETKOSKA, V., REDZEP, N.B., 2016. *Applying the Analytic Hierarchy Process to rank city branches.* XV International Symposium Symorg (pp. 241-252). Zlatibor: Faculty of Organizational Science, University of Beigarde.

[10] DATABOKS, 2016. *20 Profesi Warga Jakarta, Apa yang Dominan?* Retrieved December 17, 2017, from Databoks (2016, September 8), Katadata: News and Research: https://databoks.katadata.co.id/datapublish/2016/09/08/26-persen-warga-jakarta-bekerja-sebagai-karyawan.

[11] EKIZ, H. E., HUSSAIN, K., BAVIK, A., 2006. *Perceptions of service quality in North Cyprus National Airline.* 18th Biennial International

Congress: New Trends in Tourism and Hospitality Management. 03-05, 778-790. Croatia: Faculty of Tourism and Hospitality Management.

[12] FAROOQ, M. S., SALAM, M., FAYOLLE, A., JAAFAR, N., AYUPP, K., 2018. *Impact of service quality on customer satisfaction in Malaysia airlines: A PLS-SEM approach.* Journal of Air Transport Management, 67, 169–180.

[13] FU, Y., EBOLI, L., MAZZULLA, G., ZHANG, Y., 2017. *Railway service quality in Northern Italy: A multilevel synthetic assessment.* Advances in Mechanical Engineering, 9, 1-12.

[14] GANIYU, R.A., 2017. *Customer satisfaction and loyalty: a study of interrelationships and effects in Nigerian domestic airline industry.* Oradea Journal of Business and Economics, 2(1), 7–20.

[15] GAZEM, N., RAHMAN, A.A., 2014. *Interpretation of TRIZ principles in a service related context.* Asian Social Science, 10(13), 108-130.

[16] GHORABAEE, M.K., AMIRI, M., ZAVADSKAS, E.K., TURSKIS, Z., ANTUCHEVICIENE, J., 2017. *A new hybrid simulation-based assignment approach for evaluating airlines with multiple service quality criteria.* Journal of Air Transport Management, 63, 45-60.

[17] GUPTA, H., 2018. *Evaluating service quality of airline industry using hybrid best worst method and VIKOR.* Journal of Air Transport Management, 68, 35–47.

[18] HEIMLICH, J. P., JACKSON, C., 2017. *Air Travelers in America: Survey Highlights.* Retrieved December 17, 2017, from Airlines for America: We connect the world (2017, February 28): http://airlines.org/wp-content/uploads/2017/02/Heimlich-AirTravelSurvey-FINAL-28Feb2017.pdf.

[19] INTERNATIONAL AIR TRANSPORT ASSOCIATION. (2018, October). *IATA Forecast Predicts 8.2 billion Air Travelers in 2037*. Retrieved October 20, 2020, from IATA: https://www.iata.org/en/pressroom/pr/2018-10-24-02/.

[20] INTERNATIONAL AIR TRANSPORT ASSOCIATION, 2020. *20 Year Passenger Forecast.* Retrieved October 20, 2020, from IATA: https://www.iata.org/en/publications/store/20-year-passenger-forecast/.

[21] JEERADIST, T., THAWESAENGSKULTHAI, N., SANGSUWAN, T., 2016. *Using TRIZ to enhance passengers' perceptions of an airline's image through service quality and safety.* Journal of Air Transport Management, 53, 131-139.

[22] KIERZKOWSKI, A., KISIEL.T, PAWLAK, M., 2018. *Passenger level of service estimation model for queuing systems at the airport.* Archives of Transport, 47(3), 29-38.

[23] LI, W.H., YU, S.H., PEI, H.N., ZHAO, C., TIAN, B.Z., 2017. *A hybrid approach based on fuzzy AHP and 2-tuple fuzzy linguistic method for evaluation in-flight service quality.* Journal of Air Transport Management, 60, 49-64.

[24] LIU, Y., ECKERT, C.M., EARL, C., 2020. *A review of fuzzy AHP methods for decision-making with subjective judgements.* Expert Systems with Applications, 161, 113738.

[25] MUNOZ, C., LANIADO, H., CORDOBA, J., 2020. *Airline choice model for an international round-trip flight considering outbound and return flight schedules.* Archives of Transport, 54(2), 75-93.

[26] NADIRI, H., HUSSAIN, K., EKIZ, E.H., ERDOĞAN, Ş., 2008. *An investigation on the factors influencing passengers' loyalty in the North Cyprus national airline.* TQM Journal, 20, 265–280.

[27] NASIEF, K., 2017. *Hiring Mystery Shoppers for Airlines.* Retrieved December 17, 2017, from Measure CP: https://measurecp.com/hiring-mystery-shoppers-for-airlines/.

[28] PAN, J.Y., TRUONG, D., 2018. *Passengers' intentions to use low-cost carriers: An extended theory of planned behavior model*. Journal of Air Transport Management, 69, 38–48.

[29] PARASURAMAN, A., ZEITHAML, V.A., BERRY, L.L., 1988. *SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality.* Journal of Retailing, 64(1), 12-40.

[30] PARK, E., JANG, Y., KIM, J., JEONG, N. J., BAE, K., DEL POBIL, A.P., 2019. *Determinants of customer satisfaction with airline services: An analysis of customer feedback big data.* Journal of Retailing and Consumer Services, 51, 186–190.

[31] PARK, S., LEE, J.S., NICOLAU, J.L., 2020. *Understanding the dynamics of the quality of airline service attributes: Satisfiers and dissatisfiers.* Tourism Management, 81, 104163.

[32] PERÇIN, S., 2018. *Evaluating airline service quality using combined fuzzy decision-making approach.* Journal of Air Transport Management, 68, 48-60.

[33] PODVEZKO, V., SIVILEVICIUS, H., PODVEZKO, A., 2014. *Scientific application of the AHP method in transport problems*. Archives of Transport, 29(1), 47-54.

[34] POMEROL, J.C., BARBA-ROMERO, S., 2000. *Multicriterion Decision in Management: Principles and Practice*. New York: Springer Science Business Media.

[35] PUNEL, A., AL HAJJ HASSAN, L., ERMAGUN, A., 2019. *Variations in airline passenger expectation of service quality across the globe*. Tourism Management, 75, 491- 508.

[36] QIAN, L., 2016. *Logistics service quality evaluation for e-commerce based on extenics theory.* International Journal of Simulation Systems, Science, & Technology, 17(2), 201-206.

[37] REN, J., MANZARDO, A., TONIOLO, S., SCIPIONI, A., 2013. *Sustainability of hydrogen supply chain. part ii : prioritizing and classifying the sustainability of hydrogen supply chains based on the combination of extension theory and AHP*. International Journal of Hydrogen Energy, 38, 13845-13855.

[38] SHAH, F. T., SYED, Z., IMAM, A., RAZA, A., 2020. *The impact of airline service quality on passengers' behavioral intentions using passenger satisfaction as a mediator*. Journal of Air Transport Management, 85, 101815.

[39] SPICER, R., 2018. *Driven by competition, the airline industry is taking off.* Aviationpros retrieved on July 20, 2020. https://www.aviationpros.com/airlines/artcle/12419680/driven-by-competition-the-airline-industry-is-taking-off.

[40] SUKWADI, R., 2015. *Utilizing Customer Experience Management framework to create a delightful service experience.* International Journal of Industrial Engineering and Management, 6(1), 29-42.

[41] SUKWADI, R., MUAFI, SANJAYA, H.P., 2018. *Incorporating Kansei Engineering into service quality tools to improve the Airline services.* International Journal for Quality Research, 12(2), 297-316.

[42] SUKWADI, R., YANG, C.C., 2014. *Determining service improvement priority in a zoological park.* Journal of Industrial Engineering and Management, 7(1), 1-20.

[43] SUKWADI, R., YANG, C.C., FAN, L., 2012. *Capturing customer value creation based on service experience - A case study on News Café.* Journal of the Chinese Institute of Industrial Engineers, 29(6), 383-399.

[44] TAHANISAZ, S., SHOKUHYAR, S., 2020. *Evaluation of passenger satisfaction with service quality: A consecutive method applied to the airline industry.* Journal of Air Transport Management, 83, 101764.

[45] TRUONG, D., PAN, J.Y., BUAPHIBAN, T., 2020. *Low cost carriers in Southeast Asia: How does ticket price change the way passengers make their airline selection?* Journal of Air Transport Management, 86, 101836.

[46] VOGT, W.P., JOHNSON, R.B., 2011. *Dictionary of Statistics & Methodology.* SAGE.

[47] YANG, J., GAO, H., LIU, W., 2012. *Evaluation of land grading based on extenics theory.* IEEE 2nd Int. Conference on Cloud Computing and Intelligence Systems, 1263-1266. Dalian: IEEE.