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Selecting the Best-Performing Low-Cost Carrier (LCC) Airlines Using Analytical Hierarchy Process (AHP) and *Elimination et Choix Traduisant la Realite* (ELECTRE)

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Abstract

Background: Low-cost carrier (LCC) is a popular air transportation service as it offers affordable fares. Many airlines have adopted the LCC system because they need to adapt to the changes in the airline industry. The competition is tight. Despite the low cost, consumers demand quality services. Therefore, LCC airlines need to find their competitive edge.
Objective: This study aims to determine the best-performing LCC airlines, the criteria, and the sub-criteria to improve the performance.
Methods: This study uses two methods from multi-criteria decision-making (MCDM), namely the analytical hierarchy process (AHP) and *elimination et choix traduisant la realite* (ELECTRE) II. The MCDM is selected for this study because there are four criteria and 21 sub-criteria to evaluate airline performance. The AHP method selects subcriteria that affect airline customer satisfaction. It solves complex problems by establishing a hierarchy. After being assessed by relevant parties, weights or priorities are developed. The results are used to determine the best-performing airline. Meanwhile, the ELECTRE II method ranks the airline's alternatives. This method is straightforward and widely used in the MCDM.
Results: The results indicate that four criteria and 18 sub-criteria affect the performance of LCC airlines in Indonesia. The LCC airline with the best performance is AirAsia, followed by Citilink, Wings Air, and Lion Air.
Conclusion: This research integrates the AHP and ELECTRE II methods in evaluating the performance of LCC airlines. This research also provides information about the criteria and sub-criteria to improve airline performance, hence, the customer experience.

Keywords: AHP, ELECTRE II, Low-Cost Carrier, MCDM, Performance Evaluation

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I. INTRODUCTION

Air transportation is considered practical, especially for long-distance travel. With the increasing popularity, the number of passengers increases every year. In Indonesia, commercial air transportation is grouped into three types: 1) maximum standards with complete services, 2) medium standards with sufficient services, and 3) minimum standards with no-frills services. Most people choose airlines with minimum standards because of the low prices [1] [2]. This results in airlines competing in the low-cost carrier (LCC) segment. LCC provides scheduled commercial flight services at the lowest cost, making aircraft transportation accessible to everyone. LCC concerns with the number of passengers to cut costs. This means passengers are not provided with extra facilities, such as food, spacious seating, and others [3].

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Although people prefer LCC, they tend to rate the airlines poorly. This means the need to improve and develop performance to increase consumer satisfaction. Good performance will maintain passengers' comfort and satisfaction with the services even though they are at the minimum standard [3] [4].

Quality service depends on the human, the process, and the system. Prevalent problems complained about by LCC passengers include delays, poor seat quality, and baggage issues. Research is needed to investigate passenger satisfaction so that complaints can be reduced. The Department of Transportation's report in 2017 states that airlines' punctuality (on-time performance or OTP) was 71.32% for Lion Air, 76.70% for AirAsia, and 88.33% for Citilink. Meanwhile, in 2018, airlines' OTP was 85.7% for Batik Air, 71.7% for Lion Air, 70.6% for Garuda Indonesia, 67.4% for Indonesia Air Asia, and 67.5% for Sriwijaya Air. Complaints from passengers can reflect service quality. If passengers feel happy, they will give the airline a good rating, and vice versa. This image can impact sales [5].

However, evaluating airline performance is complex because many criteria and sub-criteria must be reviewed, such as tangible aspects, staff, empathy, and brand image. Each of these criteria has a complex assessment indicator. Therefore, measuring airline performance requires a decision-making method with many criteria (MCDM). The approach emulates how the human brain works in decision-making when there are many criteria and alternatives. People evaluate various aspects to choose the best alternative. The analytic hierarchy process (AHP) can mimic how humans think in decision-making [6] [7].

Past studies on the quality of airline services used different criteria. Aydin and Yildirim [8] used five criteria (tangibility, reliability, responsiveness, assurance, empathy) and 22 sub-criteria to assess the service quality of Turkey airlines (Turkish Airlines). Min [9] used 18 sub-criteria to evaluate the quality of flight services: 1) air safety system, 2) baggage handling, 3) ticket prices, 4) timeliness of arrival and departure, 5) alternative flight arrangements for flight cancellations, 6) smooth transit flight system, 7) speed of action if there is a service error, 8) flight cleanliness, 9) previous service, 10) flight schedule volume, 11) employee behaviour, 12) comfort, 13) flight schedule, 14) ticketing speed, 15) availability free food and drinks, 16) free pillows or blankets, 17) flight frequency programs, and 18) code sharing.

Farooq et al. [10] assessed the quality of services of Malaysia Airlines and its impact on customer satisfaction. They used convenience sampling to collect data from 460 respondents in a self-administered questionnaire. The design covers the five dimensions of the AIRQUAL scale. The proposed model was tested using a variance-based structural equation model (PLS-SEM). The findings reveal that all five dimensions of the AIRQUAL scale are: 1) airlines, 2) terminal tangible goods, 3) personnel services, 4) empathy, and 5) image. They have a positive relationship and a significant effect on Malaysia Airlines' customer satisfaction. Akmal and Firman [11] used AIRQUAL and CZIPA (competitive zone of tolerance-based importance-performance analysis) to identify the priority criteria for improving flight service performance in Indonesia. The result is a recommendation for service improvement: toilet cleanliness, hospitality, airline officials' tidiness, and value for money.

Lupo [12] used the fuzzy ServPerf method, combined with ELECTRE III, to estimate service quality and compare it with alternative service quality ratings. The results showed that the key indicators are: 1) processing time (immigration process, inspection, and retrieval of luggage), 2) convenience (in-flight service), 3) and comfort (aircraft cleanliness, lighting, and passenger level). Meanwhile, Zulaichach [13] used ANOVA to determine the effect of airport facilities on airline punctuality pre-flight and post-flight. The results concluded that departure facilities have a significant influence on airline punctuality. It indicates that airport performance and facilities can minimize flight delays.

Mardlijah [14] used fuzzy data envelopment analysis to show a link between the efficiency of international flight routes at PT. Garuda Indonesia Tbk and the costs and services. Meanwhile, Percin [15] used a combination of fuzzy decision-making to evaluate the quality of Turkish airline services. Fuzzy Dematel handled the interactions between evaluation criteria, and fuzzy ANP calculated each criterion's dependency and importance. Using VIKOR methods to evaluate and perform airline service quality, the results show the rankings from the most important criteria for assessing the quality of airline services: 1) employee reliability, 2) management system, 3) service quality, 4) customer complaint handling system, 5) employees' professional appearance, 6) safety and security, and 7) check-in service efficiency.

This study proposes integrating two methods from MCDM: AHP and ELECTRE II, to determine the best performance of LCC airlines. Both methods can be used separately to conduct performance evaluations. Previous studies have compared both methods for performance measurements and performance. In this study, the two methods were integrated to complement. The AHP method measures the weight of each criterion and sub-criterion, known as the priority weight. Then the ELECTRE II method ranks the airline's alternatives.

II. METHODS

A. Analytical Hierarchy Process (AHP)

AHP is an MCDM developed in the 1970s by Thomas Lorie Saaty as an algorithm for decision-making for multi-criteria problems. The criteria are attributes called MADM. Meanwhile, AHP was synthesized to evaluate qualitative and quantitative criteria to determine the relative weight on a scale of 1-9. This approach breaks down a complicated system into a hierarchical framework of options, criteria, and sub-criteria. In AHP, a criterion is compared to other criteria as pairs. The aim is to find the order of priority or weights for various alternatives to solve a problem [14] [15].

The stages in the calculation of AHP are as follows. First, problems and goals are identified, and solutions are devised. Second, the solutions are organised into a hierarchy to facilitate decision-making, with a hierarchical structure consisting of goals, criteria, sub-criteria, and alternative problem-solving [16] [17]. Third, pairwise comparison from each criterion and sub-criterion determines the priority weight, i.e., eigenvector on a scale of 1-9 following Saaty [18]. Table 1 describes the pairwise comparison scale.

TABLE 1
PAIRWISE COMPARISON SCALE

Level of Importance	Meaning	Description
1	Both criteria are equally important.	Both criteria have the same importance.
3	Criterion one is slightly more important than the other.	Criterion one is slightly more influential than the other.
5	Criterion one is more important than another.	Criterion one affects more than the other.
7	Criterion one is more important than the other.	Criterion one is more influential than the other.
9	Criterion one is more important than the other.	Criterion one is absolutely influential compared to the other.
2, 4, 6, 8	The average or middle value between the two criteria	Given if there is any doubt between the two criteria
Opposite	If criterion X has been given the above value at the time of the comparison, then criterion Y is given the opposite value of criterion X	

The next stage is priority synthesis, i.e., calculating priority weights in (1) from normalizing the comparison matrix in pairs [19].

$$Weight(a, b) = \frac{The\ value\ of\ the\ comparison\ of\ criteria\ a\ against\ b}{Number\ of\ criteria\ comparison\ values\ b} \quad (1)$$

Priority weights based on matrix normalization are needed to check the consistency ratio (CR), which is calculated using the eigenvalue method in (2) [20].

$$M.W = \lambda_{maks}.W \quad (2)$$

where M is the matrix comparison of pairs; W is the matrix priority weights; λ_{maks} is the maximum eigenvalue.

After the maximum eigenvalue is obtained, the consistency index (CI) is calculated using (3).

$$CI = \frac{\lambda_{maks} - n}{n - 1} \quad (3)$$

where CI is consistency index; λ_{maks} is maximum eigenvalue; n is matrix size.

The next step is calculating the ratio's consistency value using (4).

$$CR = \frac{CI}{RI} \quad (4)$$

where CR is a consistency ratio; RI is a random index. The priority weight matrix will be consistent if CR $\leq$ 10% or 0.1. If it is inconsistent, the paired comparison must be rechecked until the value is obtained CR $\leq$ 0,1 [21].

B. Elimination et Choix Traduisant la Realite (ELECTRE) II

The ELECTRE originated in Europe around 1960 and is an MCDM method that uses criteria as attributes (MADM). It was first introduced by Bernard Roy, Benayoun, and Sussman in 1968 and used to determine the best from several alternatives [22]. Among the MADM methods, ELECTRE is widely used in research. The first version of the ELECTRE method was ELECTRE I.

Since the release of the version, the ELECTRE has been developed into four versions: the ELECTRE II, III, IV, IS, and TRI. The ELECTRE I and IS are used to find the best selection; the ELECTRE TRI is used for assignment problems or sorting issues; the ELECTRE II, III, and IV are used for ranking problems. It should be noted that the ELECTRE II method's calculation is more straightforward than the ELECTRE III and IV. Therefore, ELECTRE II is more widely used in rank problems [23] [24].

ELECTRE II ranks problems based on the value of a high, medium, and low discordance [23]. The calculation starts with the normalization of the decision matrix. Each alternative attribute or criterion is converted into a comparable value using the formula in (5).

$$r_{kj} = \frac{x_{kj}}{\sqrt{\sum_{i=1}^{m} x_{kj}^2}} \tag{5}$$

where r_{kj} is normalized decision matrix; x_{kj} is a decision matrix.

The normalized matrix is then weighted by multiplication in (6).

$$V = R.W \tag{6}$$

where V is the weighted normalized matrix; R is the normalized matrix, and W is the priority weight matrix.

After that, the concordance and discordance matrix sets were determined by comparing each criterion's normalized matrix weight with other alternatives. A criterion in an alternative includes a concordance set by using (7).

$$C_{kl} = j, v_{kj} \geq v_{lj}, \qquad for\ j = 1,2,3, \dots, n \tag{7}$$

where C_{kl} is a member of the concordance matrix that sets alternative k to alternative l, and v_{kj} is normalized matrix' weight alternative k to alternative j. A criterion in an alternative includes a discordance (as opposed to concordance) set by using (8).

$$D_{kl} = j, v_{kj} < v_{lj}, \qquad for\ j = 1,2,3, \dots, n \tag{8}$$

where D_{kl} are members of the discordance matrix that set alternative k to alternative l, and v_{lj} is normalized matrix' weight alternative l to alternative j. The values of the concordance matrix element are obtained by summing up all the weights in the concordance set as seen in (9).

$$C(k,l) = \sum_{j \in C_{kl}} w_j \tag{9}$$

where $C(k,l)$ is concordance matrix and w_j is the weight in the concordance set. The discordance matrix element is obtained by dividing the maximum criteria difference by the maximum entire criteria's difference.

$$D(k,l) = \frac{\max\{|v_{kj} - v_{lj}|\}_{j \in D_{kl}}}{\max\{|v_{kj} - v_{lj}|\}_{\forall j}} \tag{10}$$

where $D(k,l)$ is a discordance matrix as in (10).

In ELECTRE II, there are three levels of the concordance threshold: the high (p^*), medium (p^0), and low (p^-). For threshold discordance, there are two levels: high (q^*) and medium (q^0). The concordance threshold value is obtained from the average discordance value, added 0.1 at each level increase. The value of the concordance threshold must qualify for (11).

$$0 < p^- < p^0 < p^* < 1 \tag{11}$$

As for the threshold, the discordance value must qualify for (12).

$$0 < q^0 < q^* < 1 \tag{12}$$

The matrix of outranking relationships is determined based on the concordance and discordance threshold values. There are two types of outranking relationships: strong and weak outranking. Strong outranking qualifies for (13) and (14) [25].

$$C(k,l) \geq p^* \qquad D(k,l) \geq q^*\ and\ W^+ \geq W^- \tag{13}$$

$$C(k,l) \geq p^0 \qquad D(k,l) \geq q^0 \; and \; W^+ \geq W^- \quad (14)$$

and weak outranking qualifies for (15).

$$C(k,l) \geq p^- \qquad D(k,l) \geq q^0 \; and \; W^+ \geq W^- \quad (15)$$

The outranking matrix is given the number 2 if it qualifies as strong outranking and the number 1 if it qualifies as weak outranking. Once the matrix of outranking relationships is obtained, the graphs for strong and weak outranking relationships are used. The relationship between strong and weak outranking receives advanced and retreating rankings based on the graph.

The concordance and discordance values are obtained based on the concordance matrix and discordance results. Concordance values are calculated with (16) and discordance with (17).

$$T_k = \sum_{l=1}^{n} C(k,l) - \sum_{k=1}^{n} C(k,l) \quad (l \neq k) \qquad (16)$$

where T_k is the concordance value on alternative k

$$U_k = \sum_{l=1}^{n} D(k,l) - \sum_{k=1}^{n} D(k,l) \quad (l \neq k) \qquad (17)$$

where U_k is the discordance value on alternative k

The concordance values are sorted from the most significant value. Then based on the discordance value, the alternative with the smallest value is placed on the first rank, and so on. The rank based on concordance and discordance is determined based on the averages [26], [27]. From the description above, the stages of completing the research using AHP and ELECTRE II are shown in Fig. 1.

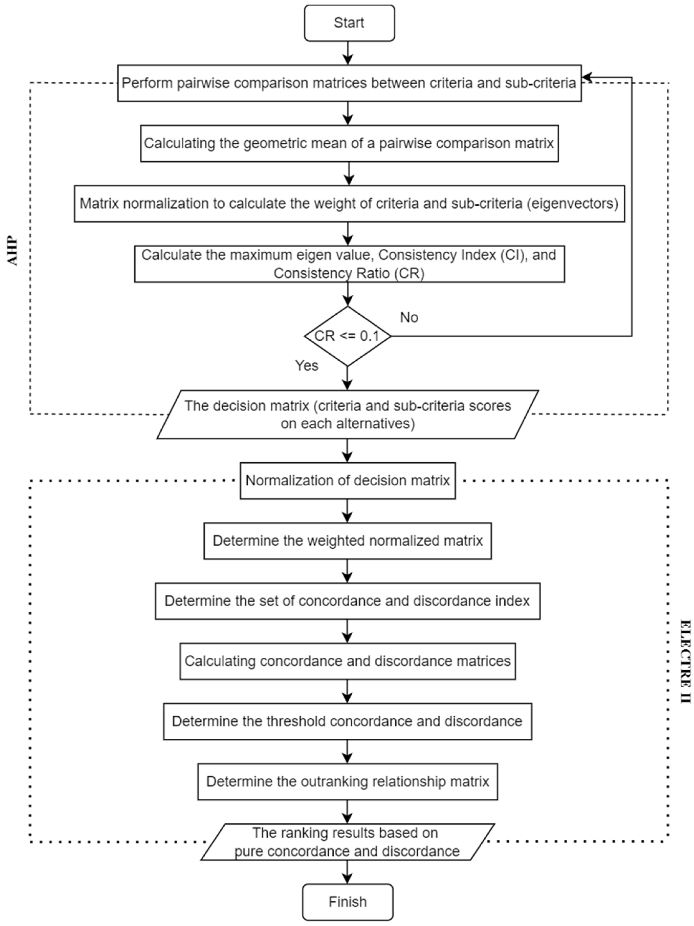

Fig. 1 Research flowchart

C. Data

This research uses primary data collected directly by researchers. Based on consultations with experts from PT. Angkasa Pura I Surabaya (Indonesia) and pas research [8], the airlines that belong to the LCC category are Citilink, Lion Air, Wings Air, and Air Asia. In AHP, the four airlines are named as alternatives. The data were collected by distributing questionnaires to respondents: experts and passengers. The former consisted of two pilots and four flight attendants, and the latter 30 users of the four LCC airlines.

The questionnaire is divided into three parts: 1) criteria, 2) sub-criteria, and 3) interest scores. Part 1 questionnaire comprises half-open questions with a Likert scale of 1-5. The level of importance is determined based on these scores. A score below 4 is not used to evaluate airline performance because it indicates that all respondents agree that the criteria are unsuitable. Only a score of 4 and above is considered acceptable. Part 2 collects the data to determine the matrix of paired comparisons. Expert respondents were involved in comparing criteria and sub-criteria. The comparative values follow Saaty, i.e., from 1 to 9. Part 3 is the data collection on the importance of each criterion and sub-criterion given by passenger respondents to all four airlines using a Likert scale of 1-5.

Four criteria used as key performance indicators (KPIs) are presented in Table 2.

TABLE 2
ALTERNATIVE, CRITERIA, AND SUB-CRITERIA

Alternative	Criteria	Subcriteria
Air Asia (A1), Citilink (A2), Lion Air (A3), Wings Air (A4)	Airline Tangible (C1)	Aircraft Physical Condition (SC1)
		Food Quality (SC2)
		Aircraft Cleanliness (SC3)
		Seating Comfort (SC4)
		Toilet Cleanliness (SC5)
		Security Equipment (SC6)
	Airline Staff (C2)	Staff Uniform Selection (SC7)
		Staff Friendliness (SC8)
		Staff Knowledge (SC9)
		Staff Care (SC10)
		Staff Behavior (SC11)
		Service Equality (SC12)
		Staff Alert (SC13)
	Empathy (C3)	Schedule Suitability (SC14)
		Quality Compensation (SC15)
		Baggage Fees (SC16)
	Airline Image (C4)	Ticket Promo Available (SC17)
		Consistency of Price with Service (SC18)

The various criteria and sub-criteria are presented in Table 2, with hierarchically in Fig. 2.

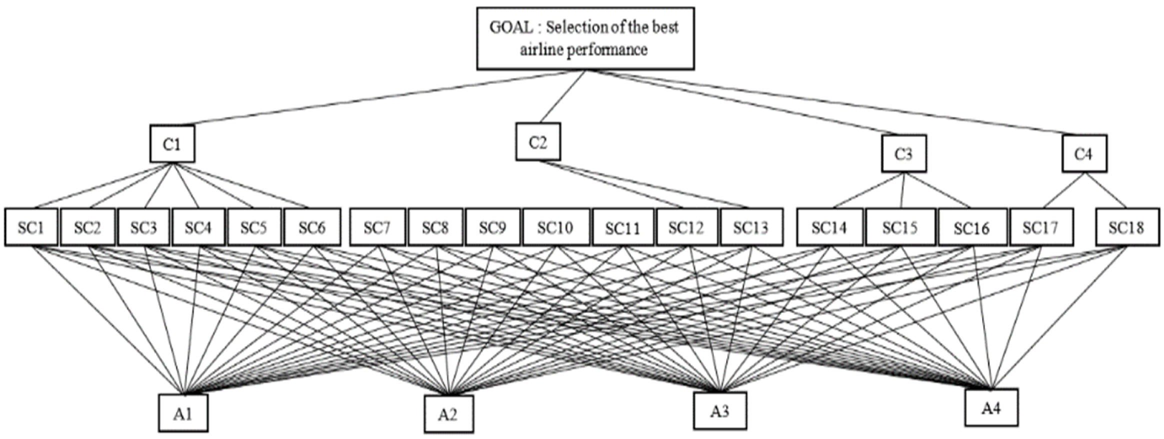

Fig. 2 Hierarchical structure of the selection of best airline performance

III. RESULTS

A. Calculation of Priority Weights with the AHP Method

The AHP method begins by determining the matrix of paired comparisons. Next, the weight of criteria, priority weights or eigenvectors is determined. The matrix values derive from the paired comparisons by respondents. The matrix of paired comparisons is then calculated by the AHP method to produce a priority weight or eigenvector. The priority weight shows the criteria with the highest influence on the performance of LCC airlines in Indonesia. The first step is to normalize the comparison matrix in pairs with the formula in (2). The results are presented in Table 3.

TABLE 3
PRIORITY WEIGHT CRITERIA

Criteria	Priority Weight
C1	0.4287
C2	0.2722
C3	0.2075
C4	0.0917

Table 3 indicates that the airline'sphysical form (C1) has the highest priority or importance for evaluating LCC airline performance in Indonesia. The priority weight of its sub-criteria is presented in Table 4. Meanwhile, the priority weight of airline staff (C2) is presented in Table 5, empathy (C3) in Table 6, and airline image (C4) in Table 7.

TABLE 4
PRIORITY WEIGHT OF AIRLINE TANGIBLE'S SUBCRITERIA

Subcriteria	Priority Weight
SC1	0.242
SC2	0.1084
SC3	0.1587
SC4	0.124
SC5	0.1124
SC6	0.2545

TABLE 5
PRIORITY WEIGHT OF AIRLINE STAFF'S SUBCRITERIA

Subcriteria	Priority Weight
SC7	0.1042
SC8	0.1628
SC9	0.1376
SC10	0.1595
SC11	0.1402
SC12	0.1329

TABLE 6
PRIORITY WEIGHT OF AIRLINE EMPATHY'S SUBCRITERIA

Subcriteria	Priority Weight
SC14	0.5431
SC15	0.2247
SC16	0.2322

TABLE 7
PRIORITY WEIGHT OF AIRLINE IMAGE'S SUBCRITERIA

Subcriteria	Priority Weight
SC17	0.3465
SC18	0.6535

After obtaining priority weights on each criterion and sub-criterion, the consistency of each comparison matrix in pairs is checked by looking for maximum eigenvalue values (λ_{maks}), consistency index (CI), and consistency ratio (CR). λ_{maks} was calculated by the formula (3). In the paired comparison matrix between criteria, λ_{maks} of 4.1015 is obtained. The obtained CI value was calculated by (4), resulting in 0.0338. The CR value is calculated by (5), resulting in0.0376. Because the CR value has met the tolerance limit of < 1, the comparison matrix between the criteria is considered consistent. The priority weight is used in the next calculation step using ELECTRE II.

TABLE 8
FINAL PRIORITY WEIGHT OF SUBCRITERIA

Subcriteria	SC1	SC2	SC3	SC4	SC5	SC6
Final Weight	0.1038	0.0465	0.068	0.0531	0.0482	0.1091
Subcriteria	**SC7**	**SC8**	**SC9**	**SC10**	**SC11**	**SC12**
Final Weight	0.0284	0.0443	0.0374	0.0434	0.0382	0.0362
Subcriteria	**SC13**	**SC14**	**SC15**	**SC16**	**SC17**	**SC18**
Final Weight	0.0362	0.1127	0.0466	0.0482	0.0318	0.0599

In the ELECTRE II calculations, the final priority weight of each sub-criteria is required. The absolute priority weight of each sub-criterion is obtained from each sub-criterion multiplied by the appropriate priority weight. The final value of the sub-criteria priority weight is obtained as follows:

TABLE 9
DECISION MATRIX

Alternative	SC1	SC2	SC3	SC4	SC5	SC6
A1	**4.2667**	3.3667	4	3.7667	3.7667	4.0333
A2	4.1333	3.3667	3.9333	3.7	3.8	4.0333
A3	3.5667	3.2667	3.3667	3.2667	3.6333	4
A4	3.7667	3.2667	3.7667	3.4	3.6667	4
Alternative	SC7	SC8	SC9	SC10	SC11	SC12
A1	4.1	4.0333	3.9	4.0333	4	4
A2	3.9	4	3.9333	3.9	4.0333	4
A3	3.7333	3.8667	3.8333	3.7667	4	3.9333
A4	3.7	3.8333	3.8333	3.9333	4	3.9667
Alternative	SC13	SC14	SC15	SC16	SC17	SC18
A1	4.0667	4.1333	3.8667	3.9333	**4.2333**	3.9333
A2	4.0333	4.1	3.7333	4	3.9	4.0333
A3	3.9333	**2.7**	3.3667	3.1333	3.3	3.6
A4	4.0667	3.4667	3.7667	3.3	3.1667	3.7333

B. *Alternative Ranking using the ELECTRE II Method*

All alternatives need a decision matrix for ranking. It contains the values of each alternative (airline) to the entire sub-criteria. The decision matrix containing is presented in Table 9. The decision matrix in Table 9 is normalized by (6). Then the normalized matrix is weighted by multiplying it by the priority weight of each sub-criteria in Table 8 (7). After obtaining the weighted normalized matrix, the concordance and discordance set matrix is calculated using (8) and (9). The following is an example of the calculation of the determination of the concordance matrix set.

$$C_{kl} = v_{kj} \geq v_{lj}$$

$$C_{12} = v_{1j} \geq v_{2j}$$

$$C_{12} = 1,2,3,4,6,7,8,10,12,13,14,15,17$$

The concordance set is determined by comparing the values between alternatives (airlines) on all sub-criteria obtained from the results of the weighted normalized matrix. If the sub-criteria value on alternative or airline A is compared with the value of alternative sub-criteria, airline B meets the requirements of the concordance set in (8). The sub-criteria is included in the concordance set from alternative A to B. A value on the airline is included in the discordance set if it meets the requirements mentioned in (9).

$$C_{kl} = v_{kj} < v_{lj}$$

$$C_{12} = v_{1j} < v_{2j}$$

$$C_{12} = 5,9,11,16,18$$

The discordance matrix is the opposite of the concordance matrix. The concordance matrix is defined by (10), where all the weights of the concordance matrix set are summed, so the sub-criteria in Table 10 are obtained.

TABLE 10
CONCORDANCE MATRIX

Alternative	A1	A2	A3	A4
A1	0	0.76	0.9918	0.9918
A2	0.4236	0	0.9918	0.8656
A3	0.0382	0	0	0.3356
A4	0.0743	0.1262	0.8874	0

Next, the difference between each airline value line is calculated to obtain the value of each element of the discordance matrix. After obtaining the difference matrix, the discordance matrix is determined based on the set and formula in (11).

TABLE 11
DISCORDANCE MATRIX

Alternative	A1	A2	A3	A4
A1	0	0.4444	0	0
A2	1	0	0.3472	0.0204
A3	1	0	0	0.3051
A4	1	1	0.0508	0

Next, the threshold concordance is determined by taking the average value of the concordance in Table 10, the value obtained is added by 0.1 in a row. The concordance threshold value of each level is p^{-} = 0,5405, p^{0} = 0,6405, and p^{*} = 0,7405. As for the threshold, the discordance value is determined by taking the average discordance value in Table 11. The value obtained is added by 0.1. The threshold discordance values are q^{0} = 0,4307 and q^{*} = 0,5307.

Threshold concordance and discordance values obtained in the previous step are used to form an outranking relationship matrix: strong outranking and weak outranking. A relationship requirement is said to be a strong outranking using (12) and (13). The outranking relationship matrix is shown in Table 12.

TABLE 12
OUTRANKING RELATIONSHIP MATRIX

Alternative	A1	A2	A3	A4
A1	0	2	2	2
A2	0	0	2	2
A3	0	0	0	0
A4	0	0	2	0

The determination of airline performance based on concordance and discordance values is calculated using (17) and (18), so the ranking results are obtained in Table 13.

TABLE 13
RANKING RESULTS BASED ON PURE CONCORDANCE AND PURE DISCORDANCE

Alternative	Pure Concordance	Ranking	Pure Discordance	Ranking	Average Ranking
A1	2.2076	1	-2.5556	1	1
A2	1.3949	2	-0.0768	2	2
A3	-2.4973	4	0.9071	4	4
A4	-1.1052	3	1.7253	3	3

Based on Table 13, the airline with the first rank is AirAsia (A1), the second rank is Citilink (A2), the third rank is Wings Air (A4), and the fourth rank is Lion Air (A3).

IV. DISCUSSION

This study evaluates the performance of LCC airlines using the AHP and ELECTRE II methods. The results show that the first rank is AirAsia, the second rank is Citilink, the third rank is Wings Air, and the fourth rank is Lion Air. AirAsia received a lot of appreciation from respondents in terms of the aircraft physical condition (SC1) and ticket promo available (SC17) (as shown in Table 9). Respondents assessed that the physical aircraft of AirAsia is better than the other three airlines in this study. Besides that, AirAsia often provides promos. This result is in line with a recent study by Febrianto and Sitinjak [28], stating that one of Indonesia's most developed LCC airlines is AirAsia. It has also entered the Asia Pacific market share. The prices offered by AirAsia airlines are below all its competitors. Promos are given during the holiday season (mid-year), during Eid, or at the year's end. Some lucky first bookers may also be given free seat prices for specific flight destinations.

However, Diana and Apriadi [29] stated that AirAsia ranked first as the World's best LCC because of the service quality and customer satisfaction. AirAsia has a philosophy that a sale should not be aggressive but rather on the decision of consumers to buy a product. Market orientation is more directed toward understanding a competitor, focusing on consumers, and coordinating between functions to provide the best value. Kasdi et al. [30] stated that during the COVID-19 pandemic, airline customer satisfaction was influenced by implementing health protocols, low fares, and good service quality. AirAsia Indonesia has provided the best courtesy with the first rank with existing policies. These results agree that tangible aspects are the most crucial criterion, along with food quality (SC2) and security equipment (SC6). Berto et al. [31] stated that AirAsia has begun to be active in environmental activities with a program called Green24, focusing on climate change throughout the ASEAN region. AirAsia occupies the first position in the most significant number of passenger airlines in CSR or green financing activities.

Then Lion Air took the last position in this research because its sub-criteria on schedule suitability scored low. This result is in line with research by Payanta [32], arguing that Lion Air was once criticized for poor operational management in areas, especially regarding scheduling and safety. Lion Air has grounded 13 aircraft due to sanctions and poor on-time performance (OTP). The Ministry of Transportation noted Lion Air OTP of 66.45 percent was the worst of the six airlines in an assessment at 24 national airports. The results of this study on the schedule suitability (SC14) sub-criteria have the lowest weight, as shown in Table 9. Therefore, Lion Air ranked the last of the LCC airlines in Indonesia.

However, the criteria and sub-criteria used in performance evaluation will continue to evolve, and each researcher may use different indicators. Likewise, several sub-criteria in other studies have not been accommodated. For future research, the suggestion is to add sub-criteria for health protocols as part of the tangible criteria,. Besides that, with the demands of industry concern for the environment and sustainability, airline performance must adapt to green practices. The various characteristics of airline customer satisfaction show that something dynamic continues to develop along with social conditions in society. It makes this topic always interesting to study in the future to strengthen the company's brand.

V. CONCLUSIONS

The ranking results of the LCC airline performance with AHP and ELECTRE II distinguished AirAsia from the rest. Citilink was ranked second, followed by Wings Air and Lion Air. AirAsia occupies the first position because it has advantages regarding aircraft physical condition and ticket promo. Lion Air came last because its schedule suitability scored low. This research provides an overview of the criteria and sub-criteria to select and provides an overview of which criteria and sub-criteria must be improved.

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