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Evaluation of Aircraft Procurement Criteria in Commercial Aviation: A MCDM Approach

Mert Akınet
University of Turkish Aeronautical Association
Yaşar KÖSE
ykose@thk.edu.tr

University of Turkish Aeronautical Association

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EVALUATION OF AIRCRAFT PROCUREMENT CRITERIA IN COMMERCIAL AVIATION: A MCDM APPROACH

Asist. Prof.Dr. Mert Akınet, University of Turkish Aeronautical Association, makinet@thk.edu.tr,
ORCID: 0000-0002-0805-9731

Prof. Dr. Yaşar KÖSE, ykose@thk.edu.tr, University of Turkish Aeronautical Association
ORCID: 0000-0003-0073-2095

ABSTRACT

This study examines the aircraft procurement process, a significant strategic investment decision requiring high capital for modern commercial airlines, from a multidimensional perspective. It analyzes decision-making criteria using a quantitative approach within a holistic framework. The research begins by systematically detailing the ten-step procurement process, from fleet planning to commissioning. Following this, six key decision criteria such as purchase cost, fuel efficiency, technical capacity, and fleet compatibility are identified through a literature review. The methodological framework of the study is based on data collected from a group of seven experts such as experienced pilots, finance specialists, and academics in the civil aviation sector and analyzed using the Best-Worst Method (BWM) of Multi-Criteria Decision Making (MCDM).

The analysis results reveal that initial investment costs (CAPEX) and financing conditions are more dominant determinants than operational savings (OPEX) in airline management. The findings indicate that modern aircraft selection decisions are not solely based on superior technical performance, but rather on a strategic balance that prioritizes liquidity management, financial sustainability, and operational integration.

Keywords

Commercial Aircraft Procurement, Fleet Planning, Strategic Investment Management, Multi-Criteria Decision Making, Best-Worst Method.

1. INTRODUCTION

For commercial airlines, aircraft represent not only their most critical assets but also the foundation of their overall business operations (Doganis, 2019). Securing ownership or long-term access to these assets constitutes one of the most vital strategic endeavors for any carrier, as the fleet directly determines capacity, network reach, and competitive positioning (Wensveen, 2020). The aircraft fleet is a key determinant of an airline's cost structure, service quality, and market image, influencing every aspect of operations—from route economics and crew utilization to maintenance efficiency and brand identity (Belobaba et al., 2020).

In the contemporary aviation industry, Boeing and Airbus dominate as the principal manufacturers of commercial aircraft, together accounting for more than 95% of global large jet deliveries (Boeing, 2023; Airbus, 2023). Airlines typically approach these manufacturers, either directly or through authorized leasing intermediaries, when seeking to acquire new aircraft (IATA, 2022). The duopolistic nature of the market amplifies the complexity of procurement decisions, as carriers, must navigate not only technical and financial considerations but also long-term manufacturer relationships, production slot availability, and after-sales service agreements.

However, the acquisition of aircraft from such major manufacturers is far from a straightforward transaction. It is, rather, a highly strategic, capital-intensive, and multidimensional process, requiring meticulous coordination across multiple departments like technical, financial, legal, and operational (Belobaba et al., 2020). Each aircraft order often represents an investment worth billions of dollars, with implications that can shape the airline's cost competitiveness and operational flexibility for decades (Morrell, 2019; Köse, 2021). The complexity is further heightened by evolving regulatory frameworks, including environmental compliance under ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) program and regional emission standards (ICAO, 2024).

Another critical dimension is the financial structuring of procurement, as airlines must decide between direct purchasing, operating leasing, or finance leasing arrangements. These decisions are shaped by macroeconomic conditions, interest rate fluctuations, and access to export credit agency (ECA) financing. According to IATA (2023), more than 50% of the world's airline fleets are currently leased, reflecting a structural shift toward asset-light balance sheets and flexible capacity management strategies. Leasing allows airlines to respond dynamically to unclear situations and market fluctuations, while ownership enhances long-term asset control and residual value retention.

From a strategic management perspective, the procurement process also functions as a form of strategic investment planning, linking fleet modernization goals to the airline's broader business strategy. Modern aircraft such as the Airbus A321neo and Boeing 787 offer significant improvements in fuel efficiency, range, and environmental performance, making fleet renewal essential for airlines seeking to maintain competitiveness and meet sustainability targets (Gössling & Humpe, 2020). Moreover, technological convergence in aircraft design, digital maintenance, and predictive analytics has transformed procurement into an integrated system that extends beyond mere acquisition—encompassing life-cycle cost optimization, training, and operational support.

2. PROCUREMENT PROCESS OF A COMMERCIAL AIRCRAFT

Given its strategic, operational, and financial significance, the aircraft procurement process can be systematically analyzed under multiple interrelated dimensions. These include demand forecasting, fleet planning, aircraft evaluation and selection, financial modeling, contract negotiation, production and delivery coordination, and post-delivery integration. Each dimension involves a series of complex decisions that collectively determine the long-term success of the airline's operations. Accordingly, the procurement process is examined in detail in the following.

Procurement Process of a commercial aircraft includes ten steps as shown in Figure 1.



Figure 1. Procurement Process Steps of a Commercial Aircraft

2.1. Fleet Planning and Needs Assessment

The aircraft procurement process begins with a comprehensive assessment of the airline's current and projected operational needs (Doganis, 2019). This stage involves evaluating passenger traffic forecasts, route structures, flight distances, and the average age of the existing fleet to determine both the number and types of aircraft required (Belobaba et al., 2020). Rising operational costs associated with aging aircraft, particularly those related to fuel consumption, maintenance, and reliability often necessitate fleet renewal and the acquisition of newer, more efficient models (Wensveen, 2020).

The airline must also decide whether narrow-body aircraft (e.g., Airbus A320neo, Boeing 737 MAX) or wide-body aircraft (e.g., Airbus A350, Boeing 787 Dreamliner) best fit its operational

profile, considering factors such as route range, passenger capacity, and network strategy (Airbus, 2023; Boeing, 2023). In addition, expansion plans such as launching new international routes or responding to seasonal surges in passenger demand may require an increase in total fleet capacity (IATA, 2022).

Operational and regulatory considerations play a decisive role in aircraft selection. Fuel efficiency, maintenance, repair, and overhaul (MRO) costs, and compliance with international noise and emission standards—as set by organizations such as the International Civil Aviation Organization (ICAO)—are essential determinants in modern fleet planning (ICAO, 2022). Modern, quieter, and more fuel-efficient aircraft not only ensure environmental compliance but also enhance an airline's competitive position through reduced operating costs and improved passenger perception (Belobaba et al., 2020).

Other key planning factors include range requirements (short-haul versus long-haul operations), fleet compatibility (pilot training, spare parts, and maintenance infrastructure), environmental regulations (CO_2 and NOx limits), and slot constraints at congested airports, which may favor the deployment of higher-capacity aircraft on high-demand routes (Doganis, 2019; Airbus, 2023).

2.2. Initial Contact with Manufacturers and the Negotiation Process

Airlines typically initiate parallel discussions with both Airbus and Boeing when considering new aircraft acquisitions, seeking to explore multiple models and configurations that align with their operational and financial requirements (Airbus, 2023; Boeing, 2023). At this preliminary stage, the dialogue encompasses the aircraft's technical specifications, delivery schedules, pricing structures, payment schemes, and potential purchase options (Doganis, 2019).

To formalize the process, airlines issue a Request for Proposal (RFP) to the manufacturers, which specifies intended operational routes, preferred cabin configurations, targeted delivery dates, and expectations regarding maintenance programs and after-sales support (IATA, 2022). In response, manufacturers submit comprehensive proposals that include the aircraft's list price, offered discounts, proposed delivery timeline, and maintenance agreements, often provided under Power-by-the-Hour (PBH) contracts (FlightGlobal, 2023).

The negotiation phase, which may extend over several months, involves detailed discussions concerning discount margins—typically ranging between 30% and 60% of the official list price—along with options for supplementary orders, after-sales technical assistance, training

packages, and financial arrangements, which may include credit facilities supported by export–import banks (Doganis, 2019; Belobaba et al., 2020).

2.3. Negotiation and Order Placement

Airlines typically initiate parallel discussions with both Airbus and Boeing, exploring multiple aircraft types and configurations suited to their operational requirements (Airbus, 2023; Boeing, 2023). At this preliminary stage, negotiations cover a wide spectrum of topics, including technical specifications, delivery schedules, pricing structures, payment schemes, and potential purchase options (Belobaba et al., 2020).

To formalize these discussions, airlines issue a Request for Proposal (RFP) to the manufacturers, detailing projected route structures, preferred cabin configurations, delivery timelines, and expectations regarding maintenance and after-sales support (IATA, 2022). In response, manufacturers submit comprehensive proposals specifying the aircraft's list price, offered discounts, delivery timelines, and maintenance packages, often structured under Power-by-the-Hour (PBH) agreements (FlightGlobal, 2023).

The negotiation phase, which may last several months, involves detailed discussions regarding discount levels—commonly between 30% and 60% below the official list price—alongside terms for optional orders, training programs, technical support, and potential financing solutions, including those backed by export–import banks (Boeing, 2023).

During this process, airlines may issue a Letter of Intent (LOI) as a non-binding commitment to proceed with the order under agreed preliminary terms. The deal is finalized with the signing of a Definitive Purchase Agreement (DPA), which serves as the binding contract governing all commercial, financial, and technical aspects (Airbus, 2023). Typically, 5–10% of the total order value is paid upfront, followed by milestone-based payments, while deliveries are scheduled 2–4 years in advance depending on production capacity and backlog (Doganis, 2019).

2.4. Purchase Agreement and Contract Finalization

The Purchase Agreement specifies critical clauses, including delivery schedules, payment structures, engine selection, cabin design, and maintenance arrangements. Optional aircraft are also included under option agreements, granting airlines the right—but not the obligation—to acquire additional units within a set time limit (Belobaba et al., 2020).

2.5. Technical Customization and Configuration

Once the agreement is finalized, airlines engage in technical customization to align the aircraft with their operational and commercial strategies. This includes defining the Layout of Passenger Accommodation (LOPA), determining the number of seats in each class, and selecting the preferred engine type (e.g., CFM LEAP-1A for the Airbus A320neo or Rolls-Royce Trent XWB for the A350) (Airbus, 2023). Additional options may include Wi-Fi connectivity, in-flight entertainment (IFE), galley design, and livery customization. Manufacturers typically assign customer configuration teams to support airlines through this process, which may extend over several months (FlightGlobal, 2023).

2.6. Production and Delivery

Following configuration approval, aircraft production begins across multiple global facilities. Major components—such as wings, fuselage sections, and engines—are manufactured at different sites before being transported to the final assembly line (e.g., Toulouse or Hamburg for Airbus; Renton or Charleston for Boeing) (Airbus, 2023; Boeing, 2023). Due to high global demand, production backlogs may delay delivery by 2–5 years (IATA, 2022).

2.7. Pre-Delivery Inspections

Before official handover, each aircraft undergoes rigorous factory test flights conducted by the manufacturer. Airline representatives, typically engineers and pilots, then perform an acceptance flight to verify performance and ensure all technical specifications are met (Belobaba et al., 2020). Any discrepancies identified during these inspections are corrected prior to delivery. The airline also reviews regulatory documentation, including the Type Certificate and maintenance records, before issuing final payment (ICAO, 2022).

2.8. Delivery, Customs, and Ferry Flight

The aircraft handover occurs at the manufacturer's delivery center, where customs clearance, registration, and airworthiness certification are completed. Following acceptance, the aircraft is ferried to the airline's home base or to a third-party facility for post-delivery modifications such as branding or cabin enhancements (Airbus, 2023).

2.9. Pilot and Cabin Crew Training

After delivery, pilots undergo type-rating training specific to the aircraft model, supported by full-flight simulators provided or approved by the manufacturer. Simultaneously, cabin crew,

maintenance, and ground personnel receive technical and operational training to ensure smooth entry into service (Boeing, 2023).

2.10. Entry into Service

The aircraft officially joins the airline's operational fleet with its first scheduled commercial flight. High-profile deliveries are often publicized through media events and press releases. Following entry into service, the aircraft's performance is continuously monitored using manufacturer-supplied data analytics systems to optimize efficiency, safety, and reliability (IATA, 2022).

3. LITERATURE REVIEW

The process of aircraft acquisition constitutes a pivotal aspect of airline fleet management, integrating strategic foresight, operational efficiency, and financial prudence. The extant literature portrays aircraft procurement as a multidimensional and high-stakes decision-making process that directly influences an airline's long-term competitiveness, network expansion, and financial stability (Doganis, 2019; Belobaba, et al., 2020). From a strategic perspective, aircraft acquisition aligns closely with corporate objectives such as market growth, cost optimization, and service quality enhancement. Fleet planning, therefore, is not merely a logistical activity but a core strategic function that determines route profitability, scheduling flexibility, and network resilience (Doganis, 2019; Heskett et al., 2021).

Research delineates the procurement process as a structured sequence of interdependent stages, including fleet requirement analysis, manufacturer engagement, negotiation and contract finalization, technical customization, financing, and post-delivery operations such as training and maintenance (Zhang & Zhang, 2020; IATA, 2024). Airlines often maintain competitive tension between major manufacturers—principally Airbus and Boeing—to secure favorable pricing, delivery timelines, and performance guarantees (Wensveen, 2018). This dual-sourcing strategy has been shown to strengthen bargaining power while diversifying technological and operational risks across fleet types.

The literature also emphasizes the increasing complexity of the technical and financial dimensions of procurement. Modern aircraft acquisition involves intricate configuration processes to meet specific airline operational profiles, including range, capacity, fuel efficiency, and maintenance cost considerations (Graham, 2020). Financing methods have evolved beyond traditional purchasing and leasing structures toward hybrid mechanisms combining sale-and-leaseback arrangements, export credit financing, and operating leases. These models enable

airlines to manage capital expenditures and liquidity risks while maintaining fleet modernization schedules (Belobaba et al., 2020; IATA, 2024).

In addition, contemporary research draws attention to the growing emphasis on sustainability and environmental performance in aircraft selection decisions. The integration of next-generation propulsion systems, lightweight composite materials, and digitalized maintenance solutions reflects a broader industry shift toward carbon reduction and operational efficiency (Zhang & Zhang, 2020). Airlines increasingly view sustainability not only as a regulatory requirement but as a competitive differentiator that influences brand perception and investor confidence.

Finally, scholars underline the significance of long-term relationships between airlines and manufacturers. Collaborative partnerships that emphasize transparent communication, continuous technical feedback, and joint innovation efforts have been shown to mitigate production delays, improve delivery reliability, and enhance the in-service performance of aircraft fleets (Graham, 2020). While substantial research has examined the technical and economic aspects of acquisition, emerging studies highlight the need to integrate sustainability objectives, digital transformation, and financial resilience into future fleet planning frameworks. Collectively, the literature confirms that aircraft acquisition represents a strategic investment decision that not only determines operational capability but also shapes the airline's long-term positioning within the global aviation market (Belobaba et al., 2020; IATA, 2024).

Accordingly, the criteria to be used in this study and their explanations, obtained from the literature review, are expressed in the table below.

Table 1. The criteria and explanations discussed in the study

Code	Criteria	Description	Related Studies
C1	Purchase and Financing Costs	List price, payment schedule, credit/leasing options	(Bourjade et al., 2017; Guzhva et al., 2024; Boeing, 2025)
C2	Fuel Efficiency and Emissions	Fuel efficiency, carbon footprint, compliance with environmental regulations	(Brueckner, 2017; ICCT, 2017, Lee et al., 2021)
C3	Technical Capacity and Range	MTOW, range, seating capacity, cargo volume	Kiracı & Bakır, 2018; Güntut & Gökdalay, 2023)
C4	Fleet Compatibility and Flexibility	Shared cockpit/training with the existing fleet, operational flexibility	(Brüggen & Klose 2010; Merker & Hensher, 2011)

C5	Manufacturer Support and Delivery	Slot availability, after-sales support, delivery speed	(Katagiri et al., 2024; Hallensleben et al., 2025)
C6	Maintenance and Operating Costs	Spare parts, maintenance periods, direct operational costs	(Shukri et al., 2013; Zuidberg, 2014; Mofokeng et al., 2020)

In commercial aviation, the decision to acquire an aircraft, as widely emphasized in the literature, is not merely a simple aircraft selection but also involves a multidimensional strategic process that integrates financial constraints, environmental compliance obligations, operational costs, network requirements, and supply risks. In this context, the six criteria used in the study are complementary in nature and aim to make significant contributions to the creation of a decision support mechanism by integrating the criteria in the decision-making process from different perspectives.

4. METHODOLOGY

An airline's fleet consists of the total number of aircraft of the same or several types that have been purchased and added to the fleet based on aircraft acquisition decisions made at specific times. For airlines, fleet planning involves long-term investment decisions shaped by business strategies, encompassing a series of complex decision-making processes such as what type of aircraft will be acquired, when, with what financial resources and payment plan, and which aircraft will be removed from the fleet and when. The turbulent environment within the aviation industry, future uncertainties, and numerous factors require airlines to use multi-criteria decision-making and optimization models for fleet planning. Fleet planning decisions for airlines are shaped in line with the strategic objectives of the companies.

From a strategic perspective, decision-makers use multi-criteria decision-making methods to make the most optimal decision by selecting from a set of decision criteria. In this study, the Best-Worst Method (BWM), introduced to the literature by Rezaei (2015) among multi-criteria decision-making methods, was selected and applied within the framework of criteria obtained from the literature on aircraft acquisition.

The Best-Worst Method (BWM), a contemporary approach among multi-criteria decision-making methods, is a vector-based approach introduced to multi-criteria decision-making techniques by Rezaei's 2015 study (Rezaei, 2015). The distinguishing feature of the Best-Worst Method compared to other multi-criteria decision-making methods is that, when making pairwise comparisons, it does not compare all criteria with each other like other methods but

rather compares them with other criteria based on the two criteria considered most important (best) and least important (worst). This reduces the number of comparisons required while increasing the consistency of evaluations and contributing to more reliable results.

BWM consists of an application process comprising five basic stages. The relevant stages are explained below in 8 equation order (Rezaei, 2015);

i. Determining the criteria ($C1$, $C2$,..,Cn) involved in the decision problem,

ii. Identifying the best (e.g., most desired, most important) and worst (e.g., least desired, least important) criteria,

iii. Determining preference levels between 1 and 9 for the most important criterion relative to other criteria,

$$A_B = (a_{B1}, a_{B2,} \dots a_{Bn)} \tag{1}$$

iv. Determining preference levels for other criteria relative to the least important criterion,

$$A_w = (a_{1w}, a_{2w,} \dots a_{nw)}{}^T \tag{2}$$

v. Determining optimal weights,

$$\left|\frac{w_B}{w_j} - a_{BJ}\right| \; and \; \left|\frac{w_j}{w_{\dot{w}}} - a_{jw}\right| \tag{3}$$

$$\min \xi \tag{4}$$

$$\left|\frac{w_B}{w_j} - a_{BJ}\right| \leq \xi, \forall j \tag{5}$$

$$\left|\frac{w_j}{w_{\dot{w}}} - a_{jw}\right| \leq \xi, \forall j \tag{6}$$

$$\sum_j w_j = 1 \tag{7}$$

$$w_j \geq 0, \forall j \tag{8}$$

After solving the linear programming model described above, consistency must be tested. At this stage, the consistency index value (CI) created by Rezaei (2015) and provided in Table 2 is used.

Table 2. Consistency Index Values (CIV)

a_{BW}	1	2	3	4	5	6	7	8	9
TED, max ξ	0.00	0.44	1.00	1.63	2.30	3.00	3.73	4.47	5.23

The consistency ratio (CR) is calculated as follows in 9.equation (Garg et al., 2020);

$$\text{Consistency Ratio (CR)} = \quad \xi/\text{Consistency Index Value (CIV)} \tag{9}$$

The consistency ratio takes values between zero and one, and it is known that as it approaches zero, the assessments are more consistent (Rezaei, 2015; Garg et al., 2020).

In this study, the Best-Worst Method (BWM) from Multi-Criteria Decision Making (MCDM) method was used to support the findings obtained from the literature review with numerical data and to determine the importance weights of aircraft selection criteria. The Best-Worst Method (BWM) was preferred because it requires less data input and produces more consistent results compared to other multi-criteria decision-making methods.

The data set for the research was obtained from a group of 7 experts selected by purposive sampling. To increase the validity and reliability of the study, the experts were selected from both academic and industry experienced individuals, creating a heterogeneous structure. This diversity provided a comprehensive perspective on aircraft purchase decisions from technical, financial, and strategic angles.

The table below shows the areas of expertise and experience of the experts participating in the analysis and the criteria they selected.

Table 3. Profiles and Preferences of Experts

Code	Field of Expertise	Aviation Industry Experience	Best Criteria	Worst Criteria
E1	Captain Pilot	23 years	*Technical Capacity and Range*	*Manufacturer Support and Delivery*
E2	Fleet Planning Specialist	12 years	*Procurement and Financing*	*Maintenance and Operating Costs*
E3	Procurement Specialist	8 years	*Procurement and Financing*	*Maintenance and Operating Costs*
E4	Senior Airline Finance Specialist	14 years	*Procurement and Financing*	*Manufacturer Support and Delivery*
E5	Senior Airline Finance Specialist	10 years	*Procurement and Financing*	*Fuel Efficiency and Emissions*
E6	Aviation Management Academic	8 years	*Fleet Compatibility and Flexibility*	*Maintenance and Operating Costs*
E7	Finance Academic	15 years	*Fuel Efficiency and Emissions*	*Manufacturer Support and Delivery*

The table above shows that the priorities of operational and financial experts diverge. Financial and procurement experts (E2, E3, E4, E5) consider purchase cost to be the most important criterion, while the captain (E1) focuses on the aircraft's technical performance and the academic (E6) focuses on strategic flexibility and fleet compatibility. A noteworthy finding is that the finance expert coded as E5 selected fuel efficiency, a criterion considered important in the study, as the least important criterion. This indicates that in financial leasing processes, the impact of the initial investment cost (CAPEX) on cash flow is prioritized over the aircraft's fuel expenses.

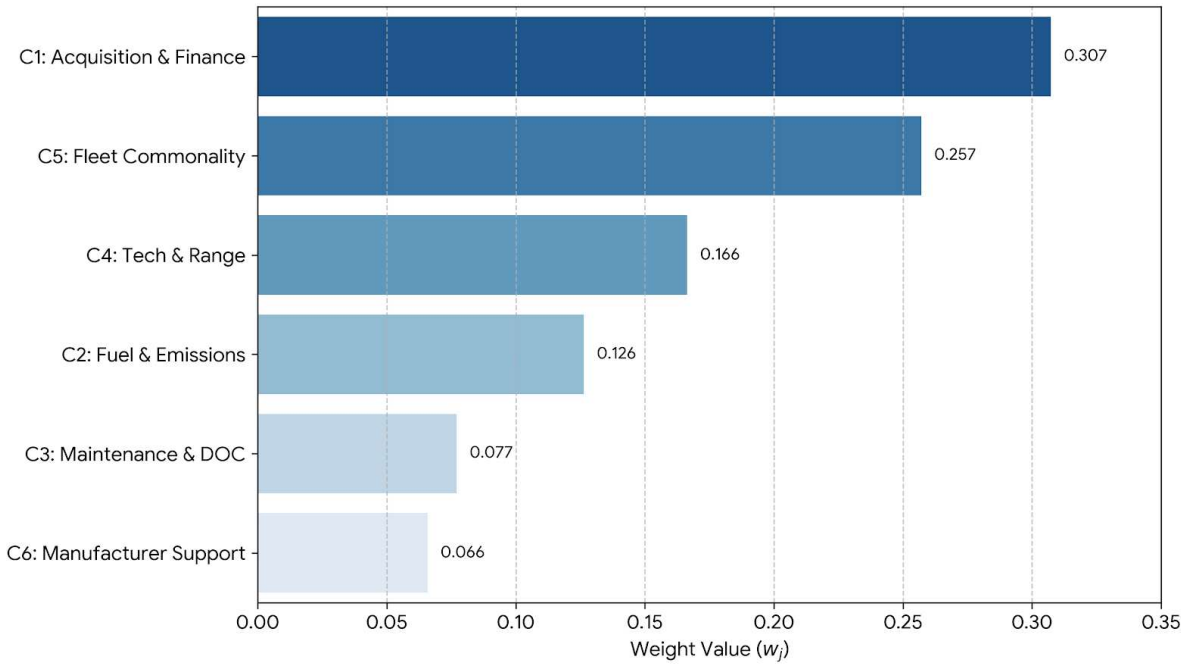
The table below shows the final weights and importance ranking of the criteria created based on the data provided by the experts participating in the study. The pairwise comparison data collected from the experts was calculated using the best-worst method linear optimization model, and evaluations were made by taking the geometric mean of the individual weights when calculating the group decision. The consistency ratio was calculated as 0.08 in the analysis, and it was concluded that the data and analyses were consistent.

Tablo 4. Final Weights and Importance Ranking of Criteria

#	Criteria Code	Criterion Name	Weight (w_j)
1	C1	Purchase and Financing Costs	0.294
2	C2	Fuel Efficiency and Emissions	0.186
3	C3	Technical Capacity and Range	0.165
4	C4	Fleet Compatibility and Flexibility	0.158

5	C5	Manufacturer Support and Delivery	0.108
6	C6	Maintenance and Operating Costs (DOC)	0.089

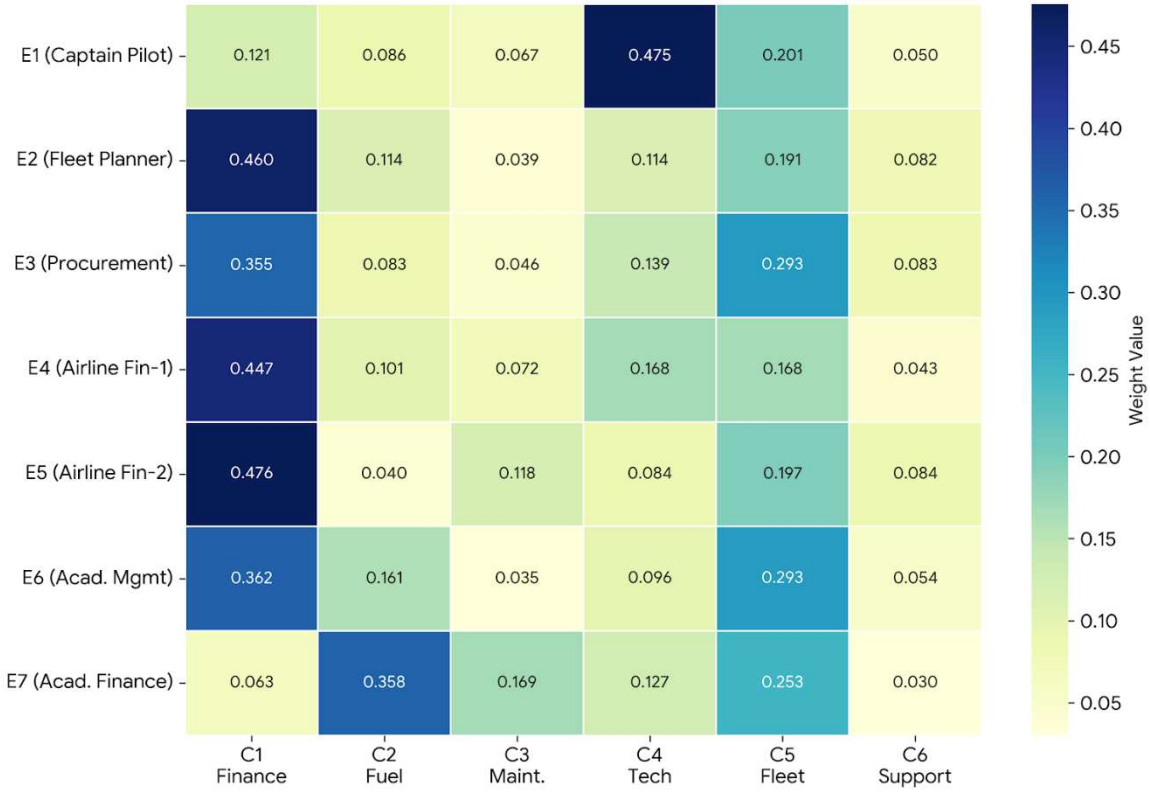
Figure 2. Final Weights and Importance Ranking of Criteria



According to the results of the analysis conducted in the study, the most important criterion was determined to be "Purchase and Financing Cost" (0.307). This criterion was followed by "Fleet Compatibility and Flexibility" (0.257), which was determined by the evaluators as the second most important criterion. "Technical Capacity and Range" (0.166) ranked third, followed closely by "Fuel Efficiency" (0.126). The criteria with the lowest importance in the study were "Maintenance Cost (DOC)" (0.077) and the "Manufacturer Support" option.

The distribution of importance given to the criteria by participants with different areas of expertise is shown in Figure using a Heat Map.

Figure 3. Heat Map of Decision Makers



When examining the heat map, it is evident that, as expected, purchasing and finance-based experts placed greater emphasis on "cost"-focused criteria. In contrast, Captain Pilots gave the highest score to technical capacity, while academics gave the highest score to fleet compatibility. A notable finding is that maintenance costs were rated as low priority (light-colored areas) by all experts.

5. DISCUSSION AND CONCLUSION

Aircraft acquisition represents one of the most strategic and complex processes in commercial aviation, encompassing technical, financial, operational, and regulatory dimensions. In today's complex civil aviation environment, each aircraft order placed by an airline often represents an investment of billions of dollars, shaping the airline's sustainability, financial competitiveness, and operational flexibility for decades to come. In addition, from a strategic management perspective, the procurement process also functions as a form of strategic investment planning, linking fleet modernization goals to the airline's broader business strategy. The aircraft procurement process can be systematically analyzed under multiple interrelated dimensions such as fleet planning and needs assessment, negotiation and order placement, technical customization and configuration, delivery, customs, and ferry flight which are examined in detail in this study.

The Best-Worst Method (BWM) from multi-criteria decision making (MCDM) method was used to support the findings obtained from the literature review with numerical data and to determine the importance weights of aircraft selection criteria. In today's commercial aviation, as widely emphasized in literature, the decision to acquire an aircraft is not simply a matter of choosing an aircraft but also involves a multi-dimensional strategic evaluation process. In this context, the six criteria obtained from the literature and used in this study are complementary and aim to make significant contributions to the creation of a decision support mechanism by integrating these criteria into the decision-making process from different perspectives.

When the study results are analyzed, the fact that the Purchase and Financing Cost criterion ranks first with a 30% weighting can be explained by the highly capital-intensive structure of today's civil aviation sector. Although some studies in the literature emphasize fuel efficiency (Gössling & Humpe, 2020), the findings of this study show that airlines consider cash flow and initial investment cost (CAPEX) as a more important strategic objective than long-term operational savings (OPEX). The fact that airlines have defined their economic sustainability goals more clearly and their liquidity sensitivity has increased, especially in the post-COVID-19 period, also supports this finding.

Another important finding in the study is that Fleet Compatibility ranks second with 25% weight. This clearly demonstrates the importance airlines place on their Uniform Fleet or Cross Crew Qualification strategies. No matter how fuel-efficient an aircraft is, if it cannot be used by the pilots in the existing fleet or if it does not fit the spare parts inventory, the hidden costs it creates can negate supply advantages. This finding is consistent with the strategies of low-cost carriers examined in case studies in literature.

Another important finding in the study is that the Fuel Efficiency criterion, with a weighting of 12%, came out lower than expected. This can be explained by the fact that airlines operating in today's turbulent environment need to protect themselves against fluctuations in oil prices through financial strategies such as Fuel Hedging, or by their ability to pass on fuel costs to ticket prices, in order to ensure long-term economic sustainability.

In conclusion, this study demonstrates that in modern airline operations, optimal aircraft selection is based not solely on technical superiority in fuel efficiency, but on a strategic balance that prioritizes minimizing acquisition costs and ensuring operational compatibility with the existing fleet. The aim of this study is to make significant contributions by re-evaluating the aircraft acquisition processes of commercial airlines, which have made ensuring their

sustainability a strategic goal in today's highly competitive environment, from a multi-dimensional perspective, and by supporting existing aircraft acquisition studies in the literature with a quantitative approach.

CRediT authorship contribution statement: Data collection was conducted by Mert Akinet. Conceptual development and literature review were carried out by Yaşar Köse. Data analysis was performed by Mert Akinet. The introduction phase and overall proofreading was conducted by Yasar Köse. All authors contributed to drafting, revising, and approving the final manuscript.

Data Availibility Statement: Authors can provide and share data if any request.

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