SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2025
ORGANIZATION AND MANAGEMENT SERIES NO. 227

MECHANISMS SUPPORTING HUB FUNCTIONS IN AIRPORT CHARGES SYSTEMS OF EUROPEAN AIRPORTS

Michał WICHROWSKI[1*], Paweł ZAGRAJEK[2]

[1] Estonian Aviation Academy, Tartu; michal.wichrowski@eava.ee, ORCID: 0000-0003-1346-4472
[2] Szkoła Główna Handlowa, Warszawa; pzagra1@sgh.waw.pl, ORCID: 0000-0002-8257-4491
* Correspondence author

Purpose: The paper investigates whether the structure of airport charges and incentive schemes at European hub airports supports the development of hub operations. The motivation arises from post-pandemic challenges, increased competition from non-European hubs, and the need to understand if pricing strategies align with hub-specific traffic profiles.
Design/methodology/approach: The study employs a mixed-methods approach combining cost simulation modelling and qualitative document analysis. It examines passenger charges and landing fees across 15 major European hub airports. Quantitative modelling involved calculating passenger costs and per-ton MTOW costs for three aircraft types (regional, narrow-body, wide-body), while qualitative analysis identified the types and purposes of discounts applied. Airports were selected using purposive sampling based on their hub status.
Findings: All analysed airports offer reduced charges or discounts for transfer passengers, and most provide lower unit costs for wide-body aircraft. However, there is no uniform strategy supporting hub development. Price differentiation by route length or aircraft type is inconsistent. Discount schemes vary widely in scope and focus.
Research limitations/implications: The study is limited to a single date (January 2025) and to officially published tariffs, which may not reflect all commercial arrangements. It focuses solely on European hub airports and does not incorporate airline perspectives. Future research should include dynamics of pricing strategies, non-European hubs, and interviews with stakeholders.
Practical implications: The results can inform airport managers seeking to enhance hub competitiveness through targeted pricing mechanisms. Regulators may use the findings to refine policy on airport charges and better align economic incentives with strategic goals.
Originality/value: This paper fills a research gap by evaluating the pricing structures of European hub airports in the post-pandemic context. It offers valuable insights for airport operators, regulators, and transport policymakers.
Keywords: airport charges, hub airports, mechanisms supporting network development.
Category of the paper: research paper.

1. Introduction

The COVID-19 pandemic has had a drastic impact on the global and European aviation market. Passenger traffic in the European Union declined by 73%, 64% and 21% from 2019 to 2020-2022, respectively (Statistica, 2024) [accessed 13.12.202]. Currently, European traffic is in a recovery phase, no less unevenly between airports. Point-to-point traffic, with a tourist profile and visiting friends and relatives, is rebuilding stronger (ACI, 2024, p. 1). This means slower traffic recovery of network carriers, which are the main operators of European hub airports. Additionally, hubs in Europe face very strong competition, both from their continental counterparts and non-European airports (OAG, 2023, p. 1). In view of the above, the question arises as to how much, in the post-pandemic era, European hubs are trying to maintain the profile of a connecting airport, and how much they are changing their business models toward operating direct flights.

One of the tools for supporting a certain type of traffic profile is the appropriate design of airport tariffs, which are one of the primary sources of airport revenue. They are charged to air carriers for the use of airport infrastructure. In practice, airlines include the cost of fees in the price of an airline ticket. Although ACI (2021, p. 2) shows that airport fees account for only 5.1% of the price of an airline ticket, taking into account the price elasticity of air carriers' customer demand, it should be borne in mind that both the amount and structure of airport fees affect the profitability of airline connections, and thus stimulate certain traffic profiles at the airport.

The purpose of the article is to investigate whether the structure of airport charges and incentive schemes at European hub airports supports the development of hub operations.

2. Airport charges

As mentioned earlier, one of the basic elements of airport revenues is airport fees. According to the definition proposed by the ICAO Council (2012), these are measures aimed at recovering the costs of providing infrastructure and services for civil aviation.

The setting, consultation, approval and implementation of airport charges are regulated by both international and domestic law[i]

At a general level, we can distinguish the following basic airport fees:

- Aircraft takeoff and landing charge.
- Noise fee or gas emission charge.
- Parking charge.
- Passenger charge.

- Security screening charge.
- Additional and other charges (e.g., commodity fee), etc.

However, it is difficult to clearly determine, the share of the individual fees indicated above in the overall airport revenue. Based on ICAO's analysis (2014, p. 7), it can be deduced that as much as at least 80% of airport fee revenue is accounted for by take-off and landing charge, passenger charge and security control charge. With this in mind, further analysis will be conducted based on takeoff and landing fees, passenger fee and security screening fee.

3. Hub airport

Chakuu, Kozlowski, Misery (2012, p. 84) distinguish between two approaches to airport types - the market approach and the technical approach. According to the market approach, airports are divided into two types - hub airports and regional airports. One of the main factors differentiating the market approach is the predominant type of traffic handled at the airport and, consequently, the predominant type of air carriers performing flight operations at the airport.

A hub port is characterized by complex airport infrastructure and a networked type of *hub-and-spoke* passenger traffic (Ministry of Transport, Construction and Maritime Affairs, 2020) [Accessed: 18.11.2024]. A network carrier's route network consists of feeder routes (generally short- and medium-haul routes) that feed passenger flows to long-haul routes (Pels, 2021, p. 2). From the passenger's perspective, this makes it possible to reach a destination, even in the absence of direct connections from the port from which the journey begins or when a connecting offer is more competitive in terms of, for example, days of operation or price.

One of the basic elements that define a hub, therefore, is the design of the route network, enabling passenger transfers at the airport. What also distinguishes a hub from other airports is a significant share of long-haul connections, fed by a network of short-haul connections, and consequently a higher share of connections operated by regional and wide-body aircraft than at other airports. An airport manager who wants to support the development of hub functions should therefore seek solutions that will reduce the costs of operating a hub/network carrier. The airport manager, due to the basic principle of non-discrimination between carriers, cannot directly address solutions that will support a specific carrier. However, it can apply tools within airport charges that will support carriers with a specific business profile. In the case of hub carriers, these are primarily the handling of transfer traffic, operations with a diversified fleet, including regional aircraft and wide-body aircraft, significant traffic volumes, a large number of aircraft based at the hub airport, a high frequency of flights or an offer of special-profile routes.

4. Literature review

Over the years, a number of scientific papers have been published analyzing airport tariffs at airports. The analyses have dealt with general patterns, similarities and differences, or types of discounts or incentives to stimulate air traffic at airports. All of the available studies were done at least a few years ago, and especially before the Covid-19 pandemic, which affected aviation in an unprecedented way.

Analyzing the available literature on the structure and amount of airport charges and their impact on traffic profiles at a given airport, one should first point to the publication by Malina, Albers, Krola (2011), who analyzed 200 of Europe's largest ports in terms of commercial policies, focusing on the analysis of airport fee tariffs at hub and regional airports. At the ports studied, the authors identified many forms of discounts and incentives in a general way (e.g., volume discount), however they did not isolate discounts that directly stimulate hub airport traffic. In a similar way, a study was conducted by Cai, Jones, Budd and Pitfield (2013). For their analysis, they selected 46 European airports of different types and scales of passenger traffic. Some of the analyzed ports included hubs (Amsterdam, Brussels, Frankfurt, Munich), however, in this case, too, the authors focused on the general pattern of discounts granted to carriers, and therefore did not directly study the stimulation and development of hub functions.

Markiewicz (2019), on the other hand, analyzed the legislative environment of the European Union and its impact on airport fees and more broadly on the financial health of airports themselves. The paper, like the previous one, did not analyze the tools that support the hub function.

The work of other researchers focused on other regions of the world, mainly Asia, e.g. (Lin, Zhang, 2017) and was conducted before the Covid-19 pandemic, or their conclusions were general and did not focus on the role of airport fees in hub development and transfer traffic. On this basis, a research gap has been identified in terms of the tools used by airports in Europe to stimulate the development of air hub functions in the post-pandemic period as part of the airport fee tariffs offered.

5. Description of the research method and indication of the research objectives

The research method used combines elements of quantitative analysis (modeling of costs based on algorithms included in airport tariffs) and qualitative analysis (in-depth analysis of the tariff strategy and discount system used by airports).

The selection of cases was purposeful and based on the criterion of "hubness", i.e. a significant share of transfer traffic. The study looked at 15 European airports[ii] that the authors identified as hubs. The authors deliberately excluded Heathrow Airport from the study because of the significantly above-average cost of airport fees offered by the airport's management.

The first two parts of the study were quantitative in nature. First, the authors realized an analysis of the mechanisms used by airports in relation to passenger fees. They analyzed the existence and, if any, the number of differences in charges between short-haul and long-haul flights, as well as the application of different fees for a direct flight passenger and a transfer passenger. The two analyzed pricing strategies of the ports were identified as the most effective in supporting the development of hub functions within the framework of passenger fees. The purpose of this section was to determine the pricing strategies applied to passengers traveling on long-haul flights and to identify the application and analyze the size of discounts, if any, for transfer passengers.

The second part of the study was based on simulation modeling of operating costs, based on current airport tariffs. The modeling included three representative aircraft types - regional (E190), narrow-body (A321) and wide-body (B773) - with fees for takeoff, landing, emissions and noise. The analysis allowed an analysis of the unit cost of operations in relation to take-off weight (MTOW). The purpose of this section was to determine to what extent the fare algorithms preimmunize the fleet typical of hub carriers, i.e. regional and wide-body aircraft.

Finally, a qualitative content analysis of fee schedules and regulations and supporting documents was applied. Using thematic categorization, typologies of discounts and concessions that can support hub functions were identified - including discounts for transfer traffic, high frequency, aircraft basing or opening strategic routes. Based on the identified typology, an analysis of the discounts and concessions used by airports was conducted. The goal of this section was to identify additional mechanisms to support hub functions.

The authors formulated the following research objectives:

1. Whether the passenger charge structure at hub airports supports operations with a diversified fleet serving routes of different lengths, and whether it supports transfer traffic.
2. Whether the charges structure for take-offs and landings supports diversified fleet operations.
3. Does the discount system support operations with a diverse fleet, transfer traffic, traffic volume, based aircraft, high frequency of traffic or opening of routes with a specific profile.

6. Research results

In pursuing the research objectives outlined above, it is first necessary to look at passenger fees. Due to the fact that the security screening fee is also charged to the passenger, and in value can match or even exceed the passenger fee, the sum of both fees was used in further analysis.

As a first step, it can be assumed that one potential way to support hub operations is to differentiate fees according to the length of the route, with the assumption that the fee is higher on long-haul flights. Such a solution makes it possible to link charges to revenue per passenger, which is also higher on long-haul flights. It is worth bearing in mind, however, that without additional mechanisms to reduce rates in other areas, such a solution may increase the average rate of fees that a hub airline incurs.

An analysis of airport charges schedules showed that some of the analyzed airports differentiate passenger fees depending on the length of the flight. Such solutions are used by FRA, MUC, CDG, MAD, LIS and FCO airports. VIE airport does not differentiate basic fees depending on the distance, while such a difference exists for transfer passenger fees. Among the airports analyzed, however, five[iii] do not differentiate fees for security screening. LIS, on the other hand, charges higher fees for passengers on long-haul flights.

It should be noted that the airports in the studied range approach the differentiation of flight length in different ways. As a common denominator for comparing rate differentiation, one can assume a division into short- and long-haul routes. In the case of short-haul routes, it can be assumed that they are defined by the Schengen zone, the EEA or the EU area, depending on the airport. The results of the analysis are illustrated in the figure below, which shows the difference between the rate per passenger on short-haul and long-haul flights.

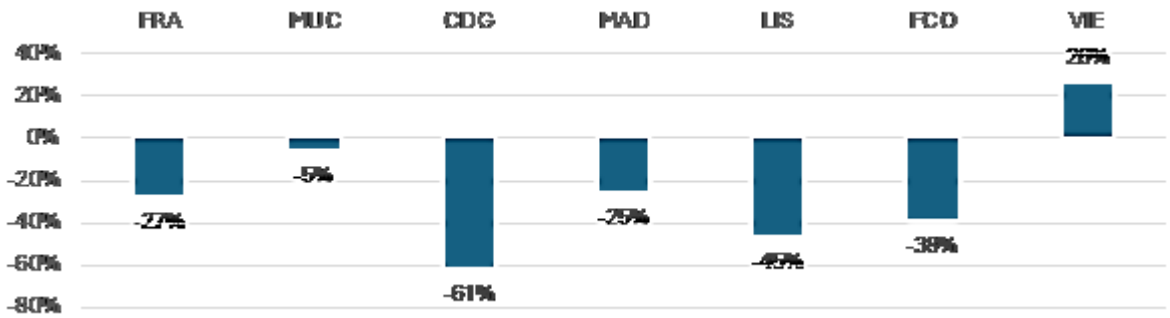

Figure 1. Ratio of short-haul passenger fare to long-haul passenger fare.

Source: own compilation based on airport tariffs.

The analysis showed that the biggest difference between fees for long-haul flights and short-haul flights is at Paris, where the passenger fee for short-haul flights is more than 60% lower than for long-haul passengers. The smallest difference is at Munich, at just 5%. In the case of Vienna, there is an inverse relationship and the charge for a passenger on a short-haul flight is 26% higher than for a passenger on a long-haul flight. Thus, the analysis showed

that a relatively low percentage of the analyzed ports apply a mechanism for differentiating prices according to the distance of travel.

Another element requiring analysis is the potential differentiation of rates for transfer and point-to-point passengers. Such a mechanism potentially reduces the costs of operating a hub carrier, while correlating with lower revenue yields from transfer passengers compared to point-to-point passengers.

An analysis of price lists showed that all analyzed airports apply lower charges or discounts for transfer passengers. In contrast, the airports use a different strategy regarding screening fees. Four[iv] apply a lower rate, five[v] do not vary it, three[vi] do not charge it at all, and two[vii] do not separate it out. As the figure below shows, the largest difference between the rates, by 83%, is at the Warsaw. The smallest difference is offered in Lisbon[viii].

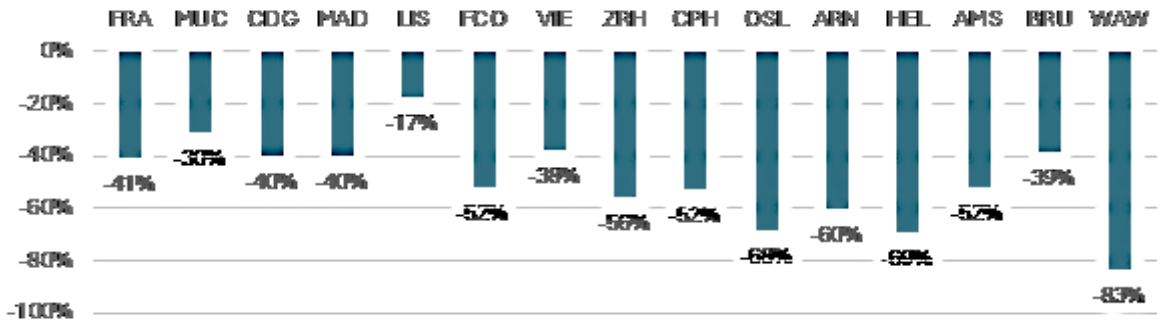

Figure 2. Difference in transfer passenger fee vs. passenger charge on a direct flight.

Source: own compilation based on airport tariffs.

A separate analysis was devoted to the question of whether airports differentiate transfer passenger discounts by travel distance. For four of the analyzed airports differentiating fees by travel distance, the difference in the transfer passenger fee was virtually the same depending on travel distance. In Rome, the difference between the per-passenger fee on short-haul flights and long-haul routes was greater in favor of shorter connections. In Vienna and Frankfurt, the relationship is reversed. In conclusion, no conclusion can be drawn that airports follow a consistent practice in this area.

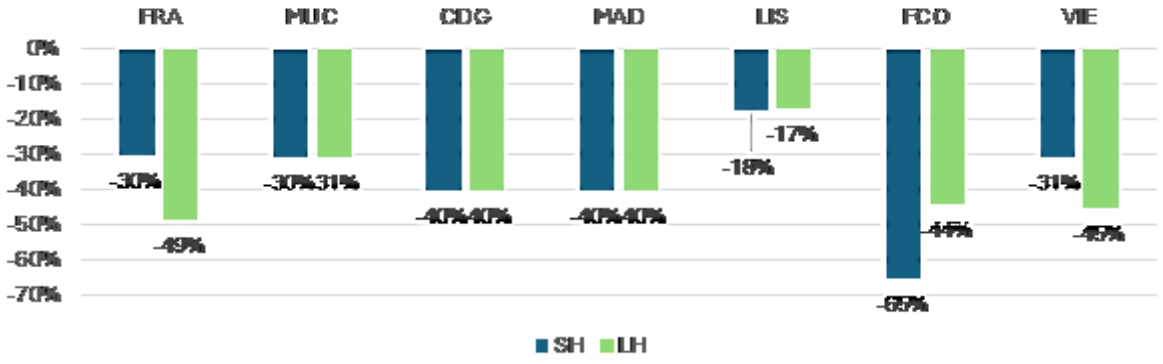

Figure 3. Difference in transfer passenger fare vs. on a direct flight depending on the length of the travel distance.

Source: own compilation based on airport tariffs.

The second part of the analysis focused on algorithms for calculating landing charges. Based on the price lists[ix] of airport fees provided by airport managers, the value of fees charged for operations (for landing, noise and emissions) was calculated for three types of aircraft: E190, A321 and B773. The first type represents a group of regional aircraft. The second of large, narrow-body aircraft, used by low-cost carriers[x] . The third type of aircraft belongs to wide-body aircraft. This selection of aircraft was intended to analyze the cost of operations of aircraft used by hub carriers. Given that the hub's business model involves the use of regional and wide-body aircraft, the purpose of the analysis was to examine to what extent airports use algorithms that result in lower calculated costs per ton MTOW[xi] for these types than for narrow-body aircraft.

Analysis of the per-ton MTOW for regional aircraft did not provide a clear picture regarding the strategies used by airports. For five airports, the price per ton MTOW for regional aircraft is higher than for narrow-body aircraft. In contrast, 6 airports show a noticeably lower price, which may indicate a practice of supporting network carriers. The remaining airports basically do not differentiate prices.

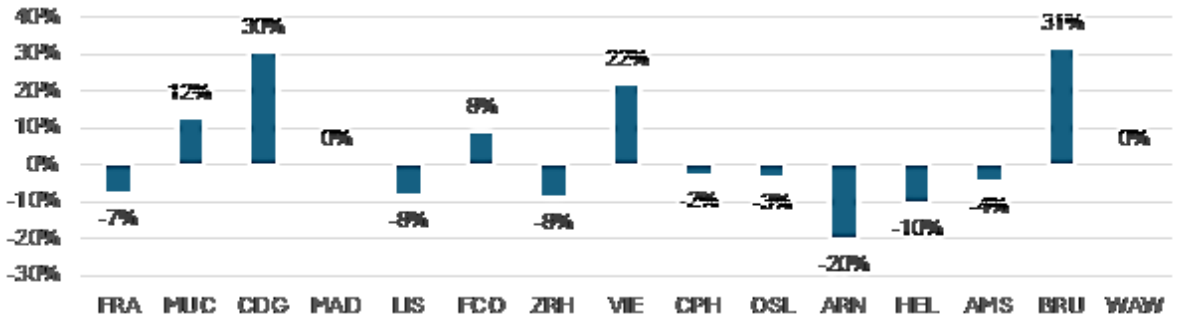

Figure 4. Difference in fee per ton MTOW for a regional aircraft compared to a large narrow-body aircraft.

Source: own compilation based on airport tariffs.

The picture is different for the difference per 1 ton MTOW for wide-body aircraft. As many as 9 airports show significantly lower rates for this type of aircraft compared to narrow body aircraft.

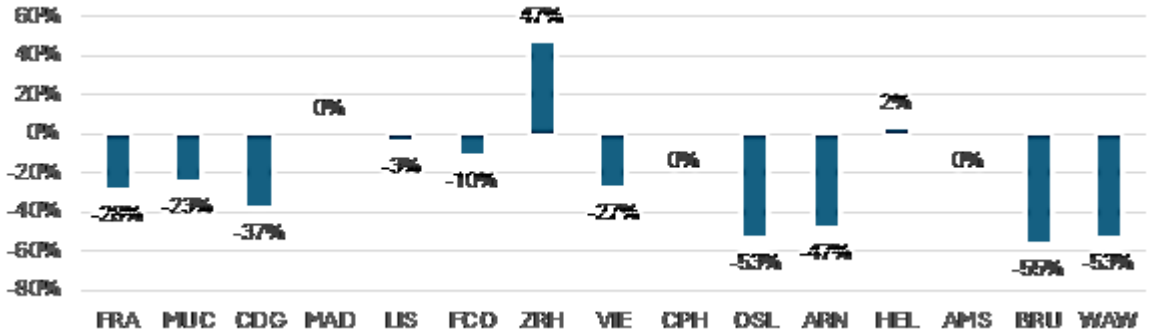

Figure 5. Difference in fee per ton MTOW for a wide-body aircraft compared to a large narrow-body aircraft.

Source: own compilation based on airport tariffs.

In conclusion, it can be noted that it is not possible to see directly the efforts of airports to reduce the unit cost of operations by regional aircraft. On the other hand, such action is already evident in the case of wide-body aircraft.

7. Analysis of the discount system

The analysis showed that hub airports take different approaches to the airport fee discount system. Some of them offer discounts directly related to stimulating transfer traffic, and some do so indirectly using a mechanism that can be applied, for example, to all passengers of a particular carrier checked in at the port, or applies to a new route that will be traveled by local and transfer passengers.

The following table is the result of researching airport fare tariffs and additional related documents. Discounts have been categorized based on destination. Such discounts were selected that are directly or indirectly related to transfer traffic, traffic volume, aircraft basing and the profile of routes served.

Table 1.
Analysis of types of discounts at transfer ports

Type of discount and its impact on transfer traffic (B - direct, P - indirect)	**FRA**	**MUC**	**CDG**	**MAD**	**ZRH**	**VIE**	**CPH**	**OSL**	**ARN**	**HEL**	**AMS**	**BRU**	**WAW**
Discount for high filling of airplane seats, (P)	X	X											
Discount for intercontinental or transfer passengers, (B)	X												
Discount on new regular route, (P)			X	X			X	X	X	X		X	X
Discount on new regular strategic route, (P)													X
Discount for passenger traffic growth, (P)									X			X	X
Discount for route served with high frequency, (P)							X						X
Volume discount, (B)					X				X				
Discount for increase in number of based aircraft, (B)												X	

Source: own compilation based on airport tariffs.

Based on the table above, it can be seen that the vast majority of hub airports apply various types of discounts, which can be directly or indirectly linked to the support of air hub functions. The most popular discount is the new route discount, which, while it can support the development of traffic in general, not necessarily only hub connections, but all new scheduled routes. The strategic route discount works in an analogous way. In terms of discounts that can be linked directly to the hub development function, the research has shown that they are applied by individual ports, and it is not possible to hypothesize on this basis that the ports apply a consistent strategy and mechanisms in this regard.

8. Summary

The study found that hub airports are diversifying their passenger and landing fee structures, as well as employing discount systems that support the operations of network carriers, and thus the development of hub functions. However, the mechanisms and tools used, as well as their scope, vary between airports. The survey results showed that all hub airports apply discounts or lower fees for transfer passengers. Most airports also support operations by wide-body aircraft, through a lower charge per ton MTOW for take-off and landing. In the case of the other tools identified, such patterns can no longer be found, and it can be concluded that in this regard, airports no longer use a consistent approach and similar mechanisms. However, the results of the study in this regard should be considered valuable, as they identify possible mechanisms used by different airports.

Summarizing the results of the study, it should be emphasized that they are of an applied nature. Based on them, airport managers can adjust the structure of airport fees to more effectively support the hub function. Regulators, on the other hand, can use the results of the study to further develop policies and regulations on airport fees and airport regulation.

The main limitations of the study stem from its scope and the nature of the source data. First, the analysis is based on officially published tariffs and documents, which do not always reflect the actual all commercial and operational conditions for operating at a given airport. Second, the study focuses on a single moment in time, January 1st 2025, which limits the ability to observe dynamic changes. Third, the selection of airports is limited to European ports considered to be hubs, which precludes comparisons with airports on other continents. In addition, the study does not analyze the effectiveness of support mechanisms in practice, but only their existence and structure. Finally, the methodology does not include the carriers' perspective, which could enrich the interpretation of the results.

The results suggest several directions for future analysis. First of all, it is recommended to evaluate the effectiveness of individual support mechanisms in the development and competitive position of hub airports. Comparative studies are also needed with airports outside of Europe, especially with rapidly growing ports in Asia and the Middle East. Longitudinal studies to capture changes in fare strategies over time are also worth considering. A further step might be to include the carriers' perspectives, their experiences regarding the effectiveness and preferences of their fare systems. An analysis of the impact of fares on decisions to open new routes would also be an interesting extension.

References

1. ACI (2021). *Modernizing Global Policy Frameworks on Airport Charges: Ensuring the Efficient Use of Infrastructure for the Benefit of the Travelling Public*.
2. ACI (2024). *Air traffic finally above pre-pandemic levels in the first half of 2024*.
3. *Airport Economics Manual* (2013). ICAO Doc 9562, ed. 3, Montreal.
4. *Amsteradm Airport, Schiphol Airport Charges and Conditions*, April 1, 2024.
5. Arrêté du 24 janvier 1956 fixant les conditions d'établissement et de perception des redevances d'atterrissage et d'usage des dispositifs d'éclairage à percevoir sur les aérodromes ouverts à la circulation aérienne publique, modifié par l'arrêté du 26 février 2009 et du 24 juin 2022.
6. Cai Jones, O., Budd, L., Pitfield, D. (2013). Aeronautical charging policy incentive schemes for airlines at European airports. *Journal of Air Transport Management*.
7. Chakuu, S., Kozlowski, P., Nędza, M. (2012). *Fundamentals of air transportation.* Academic Consortium.
8. Commission Regulation (EU) No 139/2014 of February 12, 2014 laying down requirements and administrative procedures for aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council. *Official Journal of the European Union, L 44, 2014*.
9. Convention on International Civil Aviation, signed in Chicago on December 7th 1944. Chicago Convention (Journal of Laws of 1959, No. 35, item 212, as amended), 1944.
10. Copenhagen Airport. *Charges Regulations Applying to Copenhagen Airport*. Københavns Lufthavne A/S.
11. Directive 2009/12/EC of the European Parliament and of the Council of 11 March 2009 on airport charges, OJ of the EU, OJ of the EU, C 99 of 2014.
12. European Commission. *Communication from the Commission - Guidelines on State Aid to Airports and Airlines.* OJ of the EU, C 99 of 2014.
13. European Parliamentary Research Service (EPRS), Revision of Directive 2009/12/EC on Airport Charges (2020).
14. Frankfurt Airport, Flughafenentgelte nach § 19b LuftVG - Frankfurt Airport.
15. Helsinki Airport, Finavia Oyj, Terms of Services.
16. ICAO (2014). *State of Airport Economics*.
17. ICAO Policies on Charges for Airports and Air Navigation Services (9th ed.), ICAO. Doc. 9082 (2012).
18. ICAO (2012). *ICAO's Policies on Charges for Airports and Air Navigation Services.* ICAO Doc 9082, ed. 9, Montreal.
19. Law of July 3, 2002. - Aviation Law, Dz.U. 2002, No. 130, item 1112, as amended (2002).

20. Lin, M., Zhang, Y. (2017). *Hub-airport congestion pricing and capacity investment*. Transportation Research Part B: Methodological.
21. Lisbon Airport. *Lisbon Airport Charges and Conditions*.
22. Lisbon Airport. *Lisbon Airport Regulated Charges* (2025).
23. Madrid Airport. Aena SME S.A. Price Guide (2025).
24. Malina, R., Albers, S., Kroll, N. (2011). *Airport incentive programs: A European perspective, Working Paper.* Department of Business Policy and Logistics, University of Cologne.
25. Markiewicz, T. (2020). Airport charges as an instrument of competition between airports in the European Union. Legislative aspects. *Zeszyty Naukowe Akademii Sztuki Wojennej*.
26. Ministry of Transport, Construction and Maritime Economy (2013). *Glossary of Terms for the Transport Development Strategy to 2020 (with an Outlook to 2030),* 23.01.2025.
27. Munich Airport (2025). *Munich Airport Tariff Regulations*.
28. OAG (2024). https://www.oag.com/blog/europe-the-frustrations-of-a-hub-airport, 13.12.2024.
29. *Ordinance of the Minister of Infrastructure and Development of August 8, 2014 on airport fees* (2014). Journal of Laws. 2014, item 1074.
30. Oslo Airport. *Regulations Relating to Charges at Avinor AS's Airports*.
31. Paris Charles de Gaulle Airport. *Aéroports de Paris Fee Schedule for 2024*.
32. Pels, E. (2021). Optimality of the hub-spoke system: A review of the literature, and directions for future research. *Transport Policy, Vol. 104*.
33. Regulation (EC) No. 1107/2006 of the European Parliament and of the Council of July 5, 2006 concerning the rights of disabled persons and persons with reduced mobility when travelling by air. Official Journal of the European Union L 204 of 26.7.2006, 2026.
34. Rome's Fumicino Airport. *Fiumicino - Airport Fees*.
35. Stockholm Arlanda Airport. *Swedavia Airport Charges and Conditions of Services 2025*.
36. *Vienna Airport Charges Regulations 2025*.
37. Warsaw Chopin Airport. *Tariff of Airport Fees at Warsaw Chopin Airport*.
38. Zurich Airport. *Airport Charges Regulation 2025*.

Footnotes

[i] Article 15 of the Chicago Convention (OJ 1959 No. 35, 1944) refers to airport charges. In addition, in the area of airport charges, the ICAO has issued recommendations (ICAO, 2012), which form the basis for much of the world's regulation in the area of airport charges. ICAO regulations and recommendations point to a number of basic principles that should apply to the airport fee regime, in particular non-discrimination, transparency, cost dependence and an independent mechanism for economic regulation of airports in the process of setting and implementing airport fees. At the European level, the basic act regulating this area is Directive 2009/12/EC of the European Parliament and of the Council on airport charges, which applies to airports handling more than 5 million passengers a year. The directive emphasizes the basic principles and conditions for setting airport charges, which are based on ICAO recommendations. From the point of view of the amount and structure of fees, special attention should be paid to:

- the principle of non-discrimination, which, however, does not preclude differential fees,
- ability to modulate fees,
- the possibility of offering infrastructure and services that vary in quality and scope, while access to this infrastructure should be open to all users. As far as the Polish legal order is concerned, the issues of airport fees are regulated in particular by the Aviation Law, particularly Article 67 paragraphs 1-3 and Articles 75-77. However, the implementing regulations in this regard are contained in the Regulation of the Minister of Infrastructure and Development of August 8, 2014.

[ii] London Heathrow Airport and Istanbul Airport were excluded from the study, due to the fact that they are not subject to the European EU regulatory regime. This approach was intended to assess the behavior of the ports in a uniform regulatory environment.

[iii] FRA, MUC, MAD, VIE and CDG, with Paris airport not singling out this fee at all.

[iv] MAD, ZRH, CPH, AMS.

[v] FRA, MUC, LIS, VIE, BRU.

[vi] OSL, ARN and HEL.

[vii] WAW and CDG.

[viii] Among the airports differentiating fees.

[ix] For 5 ports, calculators available on airport websites were used.

[x] This aircraft is also used by network carriers.

[xi] Charges for takeoffs, landings, but also often noise and emissions, are calculated according to algorithms based on an aircraft's maximum takeoff weight (MTOW), expressed in tons.