MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages 5673-5676

ELSEVIER

An Econometric Analysis of Airport Performance: Modelling the Determinants of Flight Cancellations in the United Kingdom

EDY ARIYANTO[1], ALEXANDER STEAD[2], NAHRY[3], GARI MAURAMDHA[4]

[1] Institute for Transport Studies, University of Leeds, Leeds, United Kingdom.
[2] Institute for Transport Studies, University of Leeds, Leeds, United Kingdom.
[3]Department of Civil and Environmental Engineering, Faculty of Engineering, University of Indonesia, Depok, Indonesia.
[4]Department of Civil and Environmental Engineering, Faculty of Engineering, University of Indonesia, Depok, Indonesia.

Email: [1]ediarie@gmail.com, [2]a.d.stead@leeds.ac.uk, [3]nahry@eng.ui.ac.id, [4] g.mauramdha@ui.ac.id
Orchid Id number: [1]First Author id, [2]0000-0002-7836-3827, [3]0000-0002-3904-8991, [4]0009-0001-5171-9053
Corresponding Author*: Nahry.

ABSTRACT:

This thesis provides an economic understanding of the principal reasons for cancellations of flights across all airports in the UK, for the period of 2020-2024, using unbalanced panel data. Operating within a contemporary aviation context characterised by under-capacity, cancellations have become a case study for operational wellness and system resilience. While most studies have focused on the analysis of causal factors in isolation, this study employs an all-encompassing Input-Output framework to understand the complicated interactions among an airport's resources, i.e, inputs, the workload or outputs, and uncontrollable external factors such as weather. This study adopts a multi-step approach. It begins with an exploratory Pooled OLS model and ends with an integrated Fixed Effect (FE) Panel regression model to ascertain the appropriateness and robustness of the outcomes. It was established that the principal reasons for cancellations of flights relate to aggregate production pressure and certain weather conditions with regard to visibility. In the final comprehensive model, the results indicate that aircraft movements and cargo volume, among others, are heavily utilized and, hence, greater government intervention is required in addressing primary operational constraints on the airside and as opposed to apron and landside infrastructure available to the passengers.

Moreover, the research shows a substantial nonmonotonic (inverted U) relationship between cloud cover (as a proxy for visibility) and cancellations. In contrast, the analysis was unable to find any statistically significant evidence that any marginal operational input on an annual basis was associated with a reduction in cancellations over the course of a year, such as an increase in personnel or physical capacity. These conclusions have strong bearing, implying that policies intended to enhance operational resilience should not be limited to the expansion of static infrastructure. The advanced ATFM, dynamic eficiency in terminal operations and targeted technologies designed to mitigate the impacts of low visibility should be the cornerstones of the area of operations identified.

KEYWORDS: Airport Performance, Flight Cancellations, Econometric Analysis, Panel Data, Operational Resilience, United Kingdom, Air Traffic Flow Management.

1) INTRODUCTION

The phenomenon of flight cancellations presents a significant paradox within the global aviation industry. Concurrently, cancellations function as systemic disruptions, precipitating extensive economic consequences that reverberate throughout the wider economy. The financial repercussions are substantial; industry analyses consistently report multi-billion-dollar annual losses attributable to such disruptions [4, 10, 34, 41, 42]. To contextualise this impact, a singular operational incident at a major UK hub, such as the 2024 Heathrow fire, was estimated to cost the national economy upwards of £1.5 billion [39], while even brief closures incur multi-million-pound losses [40]. This research is contextualised within the mature and complex airport systems of Great Britain, which frequently operate near their structural capacity limits [11, 30, 33]. Although a substantial body of literature addresses the direct antecedent causes of cancellations, conventional analyses often examine these determinants—such as adverse weather [36] or specific operational decisions [27, 31]—in isolation. Consequently, a critical research gap persists concerning the 'operational imbalance': the dynamic relationship between an airport's available resources (inputs) and the workload it must process (outputs) [6, 8]. This paper, therefore, seeks to elucidate the dynamics of system performance as influenced by this input-output disequilibrium alongside external meteorological factors. Theoretically, the study is anchored in Organizational Complexity Theory (OCT) [1], which posits that large-scale entities, such as major airports, function not as linear machines but as complex adaptive systems [3, 9, 20]. OCT suggests that as a system's scale and intricacy escalate, the attendant rise in operational complexity yields a non-linear degradation in performance, thereby diminishing overall system resilience.

2) METHODOLOGY

Ensuring the validity and reliability of the results was paramount. Thus, this research began its analytical sequence by establishing a baseline Pooled OLS model. Outcomes of diagnostic tests, however, showed this model to underestimate the statistics, overlooking time-variant, airport heterogeneities, such as managerial location and structural geographies. These methodological weaknesses compromise the validity of the estimates, which necessitates the adoption of sophisticated panel data models, which brings forth the concept of sophisticated panel data models. The formal specification test using the Hausman Test validated FE as the most consistent and statistically appropriate estimator for the created datasets. Therefore construct, the citation of findings in this paper are exclusively from the FE specification the model which 'controls for' attributes of the airport to the level of weath FMC, forward flow and bypass. The sets of equations are used to construct the answers to the sastsifed questions by the research in this paper by quantitative methods utilizing the longitudinal panel data design. The design, which embeds both cross sectional scope with time series across fifty airports spanning from 2020 to 2024, is critical for building frameworks to test hypothesis, establishing regression lines to data sets, and demonstrating statistical correlation.

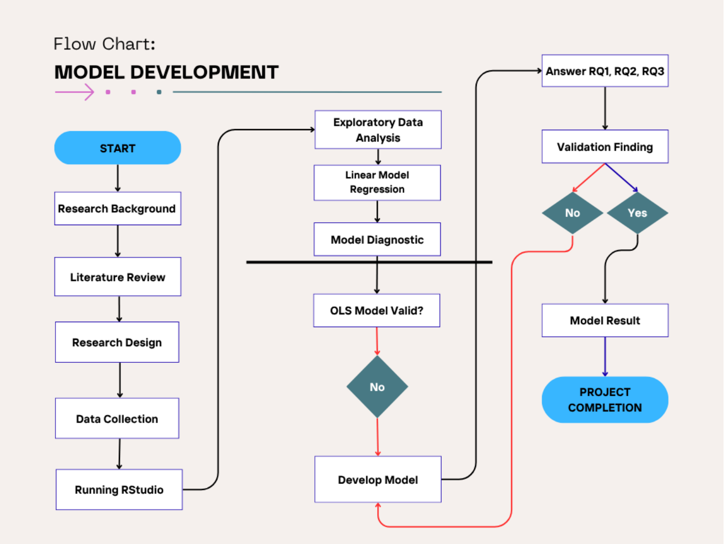
The main benefit is the control for unique unobserved and time-invariant heterogeneity for each airport such as management and geography, thus yielding more precise and less biased estimates. The data came from three main sources: the UK CAA for operational data, airport annual reports for capacity data, and Weatherspark.com for historical weather data. Variables were operationalized and categorized based on the conceptual framework:

- Dependent Variable: FLIGHT_CANCELLATION, measuring the count of flight cancellations.
- Operational Inputs: Variables representing physical and human resources, such as AIRPORT_SIZE_PAXCAPACITY, STAFF, RUNWAY_COUNT, and PARKING_STAND.
- Operational Outputs: Variables measuring the actual workload, including TRAFFIC_MOVEMENTS_INT, TRAFFIC_MOVEMENTS_DOM, PAX_INTERNATIONAL, PAX_DOMESTIC, and cargo volumes.
- External Factors: Meteorological variables such as RAINFALL_DAYS, CLOUD, and WIND.

This research uses a log-log model specification as the theory anchoring the operations tied to an airport transfer set as multiplication and not addition. Each coefficient in this situation can be interpreted as an elasticity due to a possible transformation. Estimation was done through a purposeful three stage plan where in the first stage a thorough Pooled OLS model was set as a benchmark, in the second stage the model was transformed to a panel data model in order to address the OLS limitations, and finally in the third stage the model underwent a full structure selection where the Hausman test was extensively applied and repeatedly preferred the Fixed Effects (FE) model as the most appropriate model for the given analysis. The extensive computation required to estimate the overall model was done on the last comprehensive FE model which has the following structure:

$$\log(\mathbf{CANCELLATIONS}_{it}) = \beta_0 + \beta_1(\log(\mathbf{INPUTS}_{it})) + \beta_2(\log(\mathbf{OUTPUTS}_{it})) + \beta_3(\log(\mathbf{WEATHER}_{it})) + \varepsilon_{it}$$

Where α_i is the crucial unobserved time-invariant individual effect for each airport i, which captures all unique, constant characteristics and is mathematically controlled for in the estimation.



3) RESULT

The evaluation began with descriptive statistics which indicated there was variability and heterogeneity between the airports in the sample and hence supported the need for a Fixed Effects model. The first exploratory analysis based on a Pooled OLS model had some operationally unreasonable outcomes, including the instance of RUNWAY_COUNT, which had a large positive coefficient and is a classic case of omitted variable bias, where the runway count acts as a proxy for operational complexity which is not measurable. Such oddities prepared the ground for formulating a more nuanced methodology.

Table 1.Summary of Findings and Managerial Implications

Key Research Question	**Principal Findings (Non-Technical)**	**Managerial Implications (The "So What?" Factor)**
Does augmenting staff levels or expanding terminal infrastructure mitigate cancellations? (RQ1)	No. The analysis yields no statistically significant evidence to support this hypothesis. Conversely, greater capacity demonstrates a positive correlation with increased cancellation rates, a phenomenon potentially attributable to operational 'complexity'.	The root cause is not terminal-centric. Consequently, investment directed solely towards staff augmentation or infrastructure expansion will be insufficient to resolve the core cancellation problem.
What are the primary operational drivers of cancellations? (RQ2)	Airside activities. Aircraft movements and cargo volume emerge as the most significant predictive factors. Conversely, passenger volume is not statistically significant.	Focus on Airside & Apron Operations. The critical bottlenecks are located on the runway and apron areas, not in passenger queues. Investment must be prioritized accordingly.
What is the impact of weather? (RQ3)	Visibility is the critical factor. An 'Inverted U-Curve' relationship is observed between cloud cover (a proxy for visibility) and cancellation incidents.	Invest in Low Visibility Technology. The most detrimental impact occurs during the transition from 'clear' to 'marginal' (foggy) conditions. Technologies supporting Low Visibility Procedures (LVP), such as enhanced ILS, are paramount.

Table 2. Estimation Results of the Comprehensive Final Model

Variable	**Coefficient Estimation**	**Std. Error**	**p-value**	**Significant**
Input (Capacity)				
log_AIRPORT_SIZE_PAXCAPACITY	0.3723	0.1128	0.0021	**
log_STAFF	0.1844	0.2067	0.378	
Output (Aggregate Utilization)				
log_TOTAL_PAX	0.0873	0.1072	0.4209	
log_TOTAL_CARGO	0.1557	0.0257	< 0.001	***
log_TOTAL_MOVEMENTS	0.2144	0.0795	0.0104	*
Weather (Linear, Mean-Centered)				
log_WIND_mc	173.8132	101.8209	0.0962	.
log_CLOUD_mc	331.3578	160.5035	0.046	*
log_RAINFALL_DAYS_mc	-71.4626	78.4115	0.368	
Weather (Kuadratik, Mean-Centered)				
log_WIND_mc_SQ	-89.9905	51.1325	0.0867	.
log_CLOUD_mc_SQ	-172.7628	81.7926	0.0415	*
log_RAINFALL_DAYS_mc_SQ	41.8526	39.7256	0.2989	

Signif. codes: 0 ‘’ 0.001 ‘’ 0.01 ‘’ 0.05 ‘.’ 0.1

Note: Input variables that remain constant over time (e.g., RUNWAY_COUNT) are automatically excluded by the Fixed Effects estimator.

- Answering RQ1 (The Impact of Operational Inputs): The model found no statistical evidence that marginal increases in inputs like STAFF directly reduce flight cancellations. More strikingly, AIRPORT_SIZE_PAXCAPACITY was found to have a positive and statistically significant relationship with cancellations. This counterintuitive result is interpreted as evidence of endogeneity, where the variable acts as a proxy for unobserved operational complexity inherent in larger, more intricate airport systems.
- Answering RQ2 (The Impact of Operational Outputs) It has been established by the model that an increase in operational outputs positively and significantly drives cancellation. More remarkably, the study found that aircraft movements (TOTALMOVEMENTS) and cargo volume (TOTALCARGO) were the main contributors, while total passenger volume (TOTAL_PAX) was insignificant. This tells us an operational fact: the fiercest bottlenecks are on the airside and apron, not in the landside passenger terminal.
- Responding to RQ3 (Impact of Weather Factors): The impact of weather was deemed non-linear and foremost associated with cloud cover as a proxy for visibility. The analysis revealed a statistically significant inverted U-shaped relationship. Operationally, this captures the essence of Low Visibility Procedures (LVP), where a metamorphosis from clear to foggy conditions leads to a drastic increase in cancellations as runway capacity is abruptly diminished and remains operationally viable. The effect then flattens at very poor visibility, where mass cancellations are pre-emptively assumed deemed a cancelable visibility threshold. The large, positive linear coefficient for logCLOUDmc ($\beta = +331.36$, $p < 0.05$) together with the significant negative quadratic coefficient for logCLOUDmc_SQ ($\beta = -172.76$, $p < 0.05$) settles the issue of an inverted U-curve as shown in Figure 2.

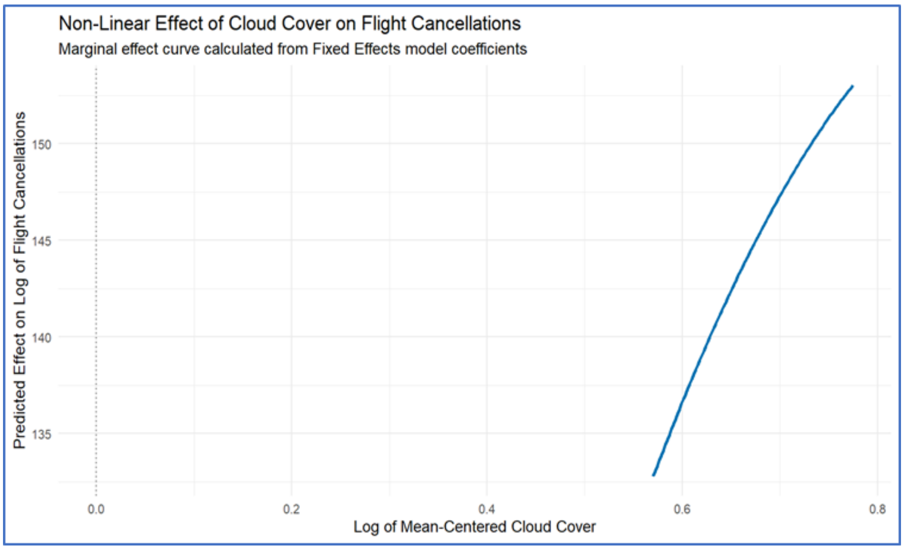


Figure 2. Non-Linear Effect of Cloud Cover on Flight Cancellations

4) DISCUSSION

By integrating airport operational performance with cancellation rates, one learns that airport cancellation rates are predominantly influenced by dynamic operational pressures and specific visibility-related weather events, rather than the static scale of infrastructure. To reinforce the practical contributions of the research, this econometric analysis translates directly into decision support tools for airport managers and policymakers.

- First, the finding that bottlenecks are critical and situated airside—driven by log_TOTAL_MOVEMENTS and log_TOTAL_CARGO while log_TOTAL_PAX is insignificant—provides quantitative justification for budget prioritization. An operations manager may utilize these elasticity coefficients, such as the value of +0.2144 for aircraft movements, to construct a business case. Instead of arguing for expensive passenger terminal expansion, which the model clarifies has no significant influence on cancellations, managers can justify investments that directly improve airside operational effectiveness, such as A-CDM systems.
- Second, the evaluation of non-linear weather effects acts as an implicit cost-benefit analysis (CBA) tool. The pronounced inverted U-shaped relationship between cloud cover and cancellations quantitatively captures the operational 'costs' of performing Low Visibility Procedures (LVPs). Terminal managers can estimate the financial impacts of low-visibility disruptions using the logCLOUDmc and logCLOUDmc_SQ coefficients. This model can then be used to estimate the ROI of operationally focused technology investments, such as Instrument Landing Systems (ILS) CAT II/III, that are intended to 'flatten' these disruption curves and improve operational resiliency.
- Third, the scale elasticities findings, such as the aggregate utility elasticity of +0.3492 and the positive coefficient on passenger capacity, are important for policymakers. The aggregate elasticity can serve as a benchmark for resilience for the entire UK airport network, allowing regulators to perform 'stress tests' on national slot allocation policies. At the same time, the positive coefficient on logAIRPORTSIZE_PAXCAPACITY provides a theoretical counter to 'grow-for-growth-sake' policies. It demonstrates that expenditures on physical assets need to be balanced with expenditures on the management of the increasing complexity associated with the scale of operations, as articulated in Organizational Complexity Theory.

An individual variable's statistical insignificance does not detract from its importance but highlights underlying issues such as multicollinearity or the inability of the fixed-effect model to quantify the impact of time-invariant constructs (e.g., number of runways). A key insight from the analysis is the notion of aggregate elasticity. The total utilization elasticity (the sum of output elasticities) was found to be +0.3492. This value, significantly lower than one, indicates that UK airport systems exhibit increasing returns to scale concerning workload. They are not proportionately 'fragile' as they become busier, 'absorbing' a large proportion of the additional workload with high efficiency. Coupled with the positive estimate on passenger capacity, this result provides strong evidence in favour of Organizational Complexity Theory. It provides evidence that an airport is not a linear machine but a complex adaptive system exhibiting emergent properties, challenging the notion that the benefits of increased physical capacity always outweigh the adverse effects of interdependence

5) CONCLUSION

The conclusions drawn from this study indicate that the causes of flight cancellations among key airports in the UK stems more from operational dynamics as well as particular climatic phenomena than from the physical limitations of the structural framework themselves. In this case, the primary factors include the degree of airside and apron use (concurrent aircraft and cargo movements) and visibility restrictions. These conclusions lead to clear and actionable proposals regarding operational resilience, suggesting an augmented focus on dynamic rather than static operational efficiency. These proposals strongly suggest that, in terms of operational readiness, investment in Air Traffic Flow Management (ATFM), advanced ground handling systems, and Instrument Landing Systems should take priority. This dissertation goes beyond these suggestions and applies its findings by creating an innovative policy instrument: The Airport Resilience Diagnostic Framework. It utilizes model fixed efeects (α_i) as a determinant of scored operational fragility that allows us to assess the core operational fragility of an airport, after and controlling for every other modelled airport and other factors. It allows the mapping of airports onto a 2x2 matrix and assessing the systemic impact (total movements) versus the inherent operational fragility (fixed effect value) and categorizing them into the following four Strategic Quadrants: Critical Priorities (high impact, high fragility), Efficiency Traps (low impact, high fragility), System Anchors (high impact, low fragility) and Stable Performers (low impact, low fragility). This framework outlines ranges of necessary actions, i.e. for the 'Critical Priorities' Quadrant, there is urgent funding required for technological implementations, while other quadrants emphasize and widely advocate 'best practice' approaches from the System Anchors, thus are effective for contribution network resilience enhancing practical approaches to the UK national aviation network.

Table 3. Airport Resilience Diagnostic Framework

	Low Inherent Operational Fragility (Low/Negative Fixed Effect Value)	**High Inherent Operational Fragility (High/Positive Fixed Effect Value)**
High Systemic Impact (High Annual Aircraft Movements)	**Quadrant 3:** System Anchors Diagnosis: Large, resilient hubs demonstrating operational best practice. Implication: Protect efficiency via stringent slot management; disseminate best practices. Example: Manchester	**Quadrant 1:** Critical Priorities Diagnosis: Systemically important hubs exhibiting high inherent fragility. Implication: Prioritise investment in dynamic efficiency (e.g., ATFM, ILS upgrades). Example: Heathrow
Low Systemic Impact (Low Annual Aircraft Movements)	**Quadrant 4:** Stable Performers Diagnosis: Operationally efficient regional airports with low systemic impact. Implication: Low intervention priority; focus on routine performance monitoring. Example: Edinburgh	**Quadrant 2:** Efficiency Traps Diagnosis: Smaller airports with significant, underlying operational inefficiencies. Implication: Focus on internal process improvements prior to any capacity expansion. Example: Bristol

6) ACKNOWLEDGMENT

I wish to express my sincere gratitude to my supervisors, Alexander Stead and Phill Wheat, for their invaluable guidance, patience, and insightful feedback. This research would not have been possible without the generous scholarship and administrative support provided by the Indonesian Ministry of Transportation.

7) REFERENCES

[1] Anderson, P. 1999. Complexity Theory and Organization Science. *Organization Science.* **10**(3), pp.216-232.

[2] Ashford, N., Coutu, P. and Beasley, J. 2013. *Airport Operations.*

[3] Axelrod, R. and Cohen, M. 2001. Harnessing Complexity: Organizational Implications of a Scientific Frontier.

[4] Ball, M., Barnhart, C., Dresner, M., Hansen, M., Neels, K., Odoni, A., Peterson, E., Sherry,

[5] L., Trani, A., Zou, B., Britto, R., Fearing, D., Swaroop, P., Uman, N., Vaze, V. and Voltes, A. 2010. *Total Delay Impact Study: A Comprehensive Assessment of the Costs and Impacts of Flight Delay in the United States.*

[6] Barnhart, C., Fearing, D., Odoni, A. and Vaze, V. 2012. Demand and capacity management in air transportation. *EURO Journal on Transportation and Logistics.* **1**(1), pp.135-155.

[7] Belobaba, P. 2009. The Global Airline Industry. pp.73-111.

[8] Brueckner, J.K. and Van Dender, K. 2008. Atomistic congestion tolls at concentrated airports? Seeking a unified view in the internalization debate. *Journal of Urban Economics.* **64**(2), pp.288-295.

[9] Burnes, B. 2005. Complexity theories and organizational change. *International Journal of Management Reviews.* **7**, pp.73-90.

[10] Cook, A.J. and Tanner, G. 2011. European airline delay cost reference values.

[11] de Neufville, R. and Odoni, A. 2013. *Airport Systems: Planning, Design, and Management.*

[12] EUROCONTROL. 2023. *European Aviation Overview.*

[13] Fu, X., Homsombat, W. and Oum, T.H. 2011. Airport–airline vertical relationships, their effects and regulatory policy implications. *Journal of Air Transport Management.* **17**(6), pp.347-353.

[14] Gebhardt, M., Spieske, A., Kopyto, M. and Birkel, H. 2022. Increasing global supply chains' resilience after the COVID-19 pandemic: Empirical results from a Delphi study. *Journal of Business Research.* **150**, pp.59-72.

[15] Hsiao, C. 2014. *Analysis of Panel Data.* 3 ed. Cambridge: Cambridge University Press.

[16] Januszewski Forbes, S. and Lederman, M. 2009. Adaptation and Vertical Integration in the Airline Industry. *American Economic Review.* **99**(5), pp.1831-1849.

[17] Wooldridge, J.M. 2010. *Econometric Analysis of Cross Section and Panel Data.* The MIT Press.

[18] Zhang, A. and Czerny, A.I. 2012. Airports and airlines economics and policy: An interpretive review of recent research. *Economics of Transportation.* **1**(1), pp.15-34.

[19] Zou, B. and Hansen, M. 2014. Flight delay impact on airfare and flight frequency: A comprehensive assessment. *Transportation Research Part E: Logistics and Transportation Review.* **69**, pp.54–74.

[20] Holland, J.H. (1995) Hidden Order: How Adaptation Builds Complexity. Reading, MA: Addison-Wesley.

[21] Grypari, I.A.F.G. (2017) Investigating the Costs and Economic Impact of Flight Delays in the U.S. Airline Industry. Unpublished MSc thesis, Purdue University.

[22] Chang, Y-C., Tzeng, G-H. and Chen, C-H. (2007) 'Operational efficiency of Asia-Pacific airports', Journal of Air Transport Management, 13, pp. 209-217.

[23] Tsai, D.C.L., Hsieh, H-I. and Yen, M-H. (2012) 'Ownership forms matter for airport efficiency: A stochastic frontier analysis of worldwide airports', Transportation Research Part A, 46, pp. 1546-1558.

[24] Niemeier, H-M. (2010) 'Privatization, corporatization, ownership forms and their effects on the performance of the world's leading airports', Journal of Air Transport Management, 16, pp. 3-13.

[25] Blundell, R. (2006) Ready for take-off? The economic effects of air transport liberalisation. CEPR Discussion Paper No. 5957. London: Centre for Economic Policy Research.

[26] Graham, A. and Iatrou, K. (2006) Managing Airport Performance. Oxford: ButterworthHeinemann.

[27] Hall, M.J.B. (2012) 'Modelling airline flight cancellation decisions', Journal of Air Transport Management, 20, pp. 41-43.

[28] Rey, S.J., de Rus Mendoza, M.A. and de Rus, G. (2008) 'Scale and (quasi) scope economies in airport technology. An application to the Spanish case', Journal of Air Transport Management, 14, pp. 3-10.

[29] Brennan, M.P. (2011) Short Term National Airspace System Delay Prediction. Unpublished MSc thesis, Georgia Institute of Technology.

[30] Civil Aviation Authority (2013) Regional airports: A data and connectivity analysis. London: Civil Aviation Authority.

[31] Zhang, Y., Li, L., Wang, S., Chen, X. and Zhang, M. (2021) 'Review of Optimization Problems, Models, and Methods for Airline Operations Recovery', Advances in Operations Research, 2021, pp. 1-17.44

[32] Seman-Varner, R., Mandic, A. and Dal-by, P. (2016) 'The impact of the economic crisis on air transport and tourism in Central and Eastern Europe', Journal of Transport Geography, 51, pp. 246-262.

[33] Civil Aviation Authority (2018) The role of London airports in providing connectivity for the UK. London: Civil Aviation Authority.

[34] National Center of Excellence for Aviation Operations Research (2010) Total Delay Impact Study: A comprehensive assessment of the costs and impacts of flight delay in the United States. Berkeley, CA: NEXTOR.

[35] Prado-Roman, C., Villalba-Sanchez, F.J. and F-Revuelta, P. (2019) 'Transportation quality, customer satisfaction and behavioral intentions in the airline industry', Journal of Retailing and Consumer Services, 46, pp. 133-140.

[36] Zhang, Y., et al. (2011) 'Weather Impact on Airport Performance'. Paper presented at the Ninth USA/Europe Air Traffic Management Research and Development Seminar (ATM2011), Berlin, Germany, June.

[37] Chuan, Y-C., F, C-M. and L, K-L. (2010) 'The commercial performance of global airports', Journal of Air Transport Management, 16(4), pp. 165-172.
Proussaloglou, K. (2014) The impact of flight delays on passenger demand and societal welfare. Unpublished PhD thesis, Imperial College London.

[38] Li, K., T, P.L. and L, C.Y. (2019) 'The impact of national macro-environment exogenous variables on the efficiency of international airports', Technological and Economic Development of Economy, 25(5), pp. 868-890.

[39] Limb, L. (2024) Heathrow Airport fire could cost UK economy £1.5bn, expert claims. The Independent [online]. 20 Agustus. Available from: https://www.independent.co.uk/news/business/heathrow-airport-fire-cost-uk economyb2719521.html [Accessed 21 August 2025].

[40] Cooney, S. (2025) Heathrow shutdown: Cost of airport closure 'could be worth millions'. Sky News [online]. 12 Maret. Available from: https://news.sky.com/story/heathrowshutdown-cost-of-airport-closure-could-be-worth millions-13333089 [Accessed 21 August 2025].

[41] Gledhill, S. (2024) Flight disruption's impact on economy and environment. International Travel & Health Insurance Journal [online]. 17 Juni. Available from: https://www.itij.com/latest/news/flight-disruption-impact-economy-and-environment [Accessed 21 August 2025].

[42] Air Navigation Service Performance Review Body. (2023) Cancellation Cost. [online] ANS Performance. Available from:https://ansperformance.eu/economics/cba/standardinputs/latest/chapters/cancellation_cost.html [Accessed 21 August 2025].

[43] Civil Aviation Authority. (2025) UK airport data 2024. [online] Civil Aviation Authority.Available from: https://www.caa.co.uk/data-and-analysis/uk-aviationmarket/airports/ukairport-data/uk-airport-data-2024/ [Accessed 21 August 2025].

[45] WeatherSpark. (2025) Average Weather at Wick Airport, United Kingdom, Year Round.[online] WeatherSpark. Available from: https://weatherspark.com/y/147765/AverageWeather-at-Wick-Airport-United-Kingdom Year-Round [Accessed 21 August 2025].

[46] Companies House. (2025) BRISTOL AIRPORT LIMITED: Company number 02078692. [online] GOV.UK. Available from: https://find-and update.companyinformation.service.gov.uk/company/02078692 [Accessed 21 August 2025].