Journal of Air Transport Studies

In association with

ATRS
Air Transport Research Society

Volume 13 - No 1
Winter 2022

Hellenic Aviation Society

The *Journal of Air Transport Studies* (JATS – ISSN:1791-6771) is a peer reviewed journal aiming at publishing high quality research related to air transport. JATS is interested in publishing papers primarily focusing on economics, geography, policymaking, management, marketing, operations, technology, logistics/supply chain management and modelling.

The Journal is published electronically twice a year, i.e. in January and July by the Hellenic Aviation Society (www.aviationsociety.gr). The Winter issue usually contains papers (subject to changes) originally presented at the Air Transport Research Society (www.atrsworld.org) Conference of the previous year(s) whereas the Summer issue may be occasionally dedicated to a special theme. The Journal is accessible online free-of-charge.

Journal of Air Transport Studies (JATS)

15, Mesogeion Avenue, Athens 115 26, Greece.
Telephone: +30 210 64 24 401
Facsimile: +30 210 64 24 401
Website: http://www.aviationsociety.gr

Volume 13, Number 1, Winter 2022, ISSN:1791-6771.
DOI: https://doi.org/10.38008/jats.v12i2

Notes for Contributors

JATS publishes the following categories of papers written in scholarly English: a) Full Research Papers, b) Conference Reports, c) Book Reviews, d) Industry Perspectives. Papers should be submitted electronically via journal's website https://jats.aviationsociety.gr in MS-Word format ONLY using British spelling, single-column, 1.5 line spacing, Tahoma letters, font size 11. Section headings (and sub-headings) should be numbered and written in capital letters. Upon acceptance of a paper and before its publication, the corresponding author will be asked to sign the *Transfer of Copyright* form on behalf of all identified authors.

Full Research Papers should contain original research not previously published elsewhere. They should normally be between 4,000 and 7,000 words although shorter or lengthier articles could be considered for publication if they are of merit. The first page of the papers should contain the title and the authors' affiliations, contact details and brief vitae (of about 50 words). Regarding the following pages, papers should generally have the following structure: a) title, abstract (of about 150 words) and six keywords, b) introduction, c) literature review, d) theoretical and/or empirical contribution, e) summary and conclusions, f) acknowledgements, g) references and h) appendices. Tables, figures and illustrations should be included within the text (not at the end), bear a title and be numbered consecutively. Regarding the referencing style, standard academic format should be consistently followed. Examples are given below:

- Airbus (2003), *Global Market Forecasts 2003-2022*, Toulouse: Airbus.
- Fragoudaki, A., Keramianakis, M. and Jancovich, S. (2005) The Greek PSO Experience. *4th International Forum on Air Transport in Remoter Regions*. Stockholm, May 24-26.
- Forsyth P. (2002a), 'Privatization and Regulation of Australian and New Zealand Airports', *Journal of Air Transport Management*, 8, 19-28.
- Papatheodorou, A. (2008) The Impact of Civil Aviation Regimes on Leisure Market. In Graham, A., Papatheodorou, A. and Forsyth, P. (ed) *Aviation and Tourism: Implications for Leisure Travel*, Aldershot: Ashgate, 49-57.
- Skycontrol (2007) *easyJet welcomes European Commission's decision to limit PSO abuse in Italy*. 23rd April. Available from: http://www.skycontrol.net/airlines/easyjet-welcomes-european-commissions-decision-to-limit-pso-abuse-in-italy/ (accessed on 22/08/2008).

Industry Perspectives are usually shorter than full research papers and should provide a practitioner's point of view on contemporary developments in the air transport industry. Contributors should explicitly specify whether their views are espoused by their organization or not.

Conference Reports should be between 1,000 and 1,500 words. They should provide factual information (e.g. conference venue, details of the conference organizers), present the various programme sessions and summarize the key research findings.

Book Reviews should be between 1,000 and 1,500 words. They should provide factual information (e.g. book publisher, number of pages and ISBN, price on the publisher's website) and critically discuss the contents of a book mainly in terms of its strengths and weaknesses.

TABLE OF CONTENTS

out in the entire Scopus database, without the above criteria. The keywords used are inflight magazines, in-flight magazines, destination brand, destination branding, destination image, destination identity, however the search resulted in a very small number of articles (27) of which only four (4) were considered as relevant to the subject under consideration. Thus, any criteria that could be used for the review process were re-examined and the search was conducted on a less 'rigorous' basis, Google Scholar, in order to enrich the data and generate a comprehensive discussion of the research question. Finally, only nine (9) articles were collected for analysis (content and textual), while the findings further highlight the research gap that exists in the literature and the need for further research.

Konstantinos Chrysafis, Georgia Papadopoulou

The global airline industry has faced a considerable downturn, because of the recent COVID-19 pandemic crisis. Numerous measures had to be taken from governments and the airline industry itself in order to survive the pandemic crisis. The Greek airline industry is the main case of this study. The main goal of this study is to prioritize the appropriateness of crisis management approaches in the domestic airline market. To achieve that, Fuzzy MCDM (Multi-Criteria Decision Making) is employed (consequently a set of criteria and their weighting). The criteria are extracted using the thematic analysis and synthesis method gathering data from the international literature and news. The MCDM analysis is implemented in a fuzzy setting due to the inherent uncertainty in the airline market. The results of this study demonstrate that the actions better characterizing the crisis operations of the domestic airline companies fall under the knowledge-based management approach.

EDITORIAL

This issue collects four papers focusing on a variety of topics related with the contemporary air transport environment.

In the first paper, **Yingigba Chioma Akinyemi** examines the determinants of international air passenger travel demand in Nigeria using the autoregressive distributed lag approach and the Granger causality test. In detail, the author examined the effect of total real trade, economic growth, real exchange rate and foreign direct investment inflows on the demand for international air passenger travel in Nigeria using annual data from 1982 to 2019. The research findings revealed that total real trade and economic growth positively affect short-term and long-term demand for air travel. Concerning direct investment, it seems to have a negative effect on air travel in the long-run but a positive effect in the short-run. Lastly, a bidirectional Granger causality was detected between air travel and total real trade, and between air travel and economic growth. Thus, the author suggests that an increase in international passenger air travel will lead to growth in trade and in turn stimulate the economy. Consequently, the author suggests that infrastructure is needed to support the increased demand for international airline passengers.

Hamad Al Thani, in the second paper, conducted a literature review on the development of the aviation industry in Middle East. The author notes that existing research primarily focuses on government subsidies and investments in foreign airlines, with particular attention paid to the three Middle Eastern "super connectors" of Emirates, Qatar, and Etihad Airways. The author draws attention to the limited published literature on the Middle East aviation sector.

The gap in the literature regarding destination branding through in-flight magazines is discussed, in the third paper, which has been written by **Ioulia Poulaki** and **Eirini Vlassi**. The authors argue that although the role of in-flight magazines in tourism destination identity formation is crucial, it has not been extensively examined in the literature. Given that, when using quality criteria, the literature search resulted in 27 papers for the period 2008-2023 and only four (4) were assessed as relevant to the topic, the authors highlight the need for further research in the field.

As the measures taken by governments and airlines during the Covid-19 pandemic revealed the need for crisis management, in the fourth and final paper **Konstantinos Chrysafis** and **Georgia Papadopoulou** used Fuzzy MCDM (Multiple Criteria Decision Making) to prioritize on the suitability of crisis management approaches in the domestic aviation market. The research uses the Greek airline industry as a case study. The literature review revealed a set of criteria and helped the authors apply appropriate weightings. The study's findings showed that the knowledge-based approach to management best describes the tactics that domestic airline firms take during a crisis.

To all the authors and reviewers who contributed to this issue of Journal of Air Transport Studies, we would like to express our gratitude for your efforts. We feel that these publications make a meaningful contribution to aviation practitioners and academia while also promoting further research in relevant subject areas.

Dr. Eirini Vlassi
JATS Executive Editorial Team
Department of Business and Economics
Neapolis University
Pafos, Cyprus

DETERMINANTS OF INTERNATIONAL AIR PASSENGER TRAVEL DEMAND IN NIGERIA: COINTEGRATION AND CAUSALITY ANALYSIS

Yingigba Chioma Akinyemi (Ph.D)

Department of Geography, University of Ibadan, Ibadan, Nigeria

ABSTRACT

This paper examines the determinants of international air passenger travel demand in Nigeria using annual data from 1982 to 2019. Autoregressive distributed lag approach was employed to analyse short- and long-run relationships between the variables while Granger causality test was conducted to determine the direction of causality. Total real trade and economic growth are major factors positively influencing air travel demand in the short- and long-run. Contrary to findings in the literature, foreign direct investment impact air travel negatively in the long-run but has a positive effect in the short-run with 1-3year lag. Real exchange rate is found to reduce air travel demand in the short-run. The results indicate a bidirectional Granger causality between air travel and total real trade, and between air travel and economic growth. Infrastructure that will support increase in demand for international air passenger travel due to economic growth are required.

KEYWORDS

international air passenger traffic; demand; cointegration analysis; causality analysis; macroeconomic factors; Nigeria

1. INTRODUCTION

International air travel demand in Nigeria has witnessed significant growth in recent years. According to the annual reports of Federal Airport Authority of Nigeria-FAAN (FAAN 2019), enplaned international air passengers to and from Nigeria increased by 286% from 1.1 million in 1982 to 4.6 million in 2019 (figure 1). This growth has been attributed to the liberalization of the air transport market (Oluwakoya 2011). With the adoption of deregulation, privatization and liberalization policies, Nigeria signed open skies agreement with the United States, Bilateral Air Service Agreement (BASA) with several countries and implemented the Yamoussoukro Declaration with the aim of increasing international air traffic to and from Nigeria. In addition, the aviation agencies have made huge investments on infrastructures in the airports. In spite of these efforts, the volume of international air traffic in Nigeria is low compared to other countries in Africa such as Ethiopia, Kenya, Egypt, South Africa, and Morocco ((ICAO 2018). It is important to determine other factors influencing international air passenger traffic besides air service agreements so as to implement policies that will increase demand and enhance economic growth in the future.

Several studies in the literature have examined the factors influencing demand for international air travel (Abed, Ba-Fail, Jasimuddin 2001; Kulendran and Wilson 2000; Chi 2020; Chang 2012: Pacheco and Fernandes, 2017; Zhang 2015; Chi, 2014; Seetaram, 2012; Zhang, Qu, Tavitiyaman 2009; Pham, Nghiem, Dwyer 2017; Eita, Jordaan and Jordaan 2011; Naude and Saayman, 2005; Deese, 2013). Most of these studies focused on the US, countries in the Asia-Pacific region including Australia, Thailand, South Korea with very few on African countries particularly Nigeria. These countries have high traffic and matured aviation markets. Furthermore, while the long-run effects of determinants of international air travel demand have been examined in previous studies (Webber, 2001; Kulendra and Wilson, 2000), analysis of the simultaneous effects of the short- and long-run dynamics of these factors have attracted little attention (Chi, 2014). Since the long-run adjustment of air travel demand to macroeconomic factors could be different from its short-run effect, estimating the short- and long-run dynamics in a single model is essential (Chi, 2014).

The objective of this paper is to examine the impact of total real trade-sum of real export and real import, real gross domestic product (constant 2015 US$), real effective exchange rate index (2010=100), and net inflows foreign direct investment on international air passenger travel demand in Nigeria. Bounds testing approach to cointegration within an autoregressive distributed lag (ARDL) framework proposed by

Pesaran, Shin and Smith (2001) was applied. In addition, Granger causality test was employed to examine the causal relationship between the macroeconomic factors and demand for international air travel. Annual data over the period 1982-2019 was used for the analysis. This study is important because understanding the causal relationships will guide economic decisions made by airlines, airports, policymakers, government agencies and other stakeholders. Analysis of the short and long-run impacts of factors influencing international air passenger traffic could influence decisions on airplane design, production planning, airspace and infrastructure planning, planning of airline's route choice, pricing and revenue management, forecasting and supply chain management, reduce risk on investments, improve efficiency of the aviation industry, and design of appropriate policies and regulations by the government (Fernandes and Pacheco 2010; Hakim and Merkert 2019).Furthermore, the determinants of international air travel demand could be different in a low income country with low demand for air travel compared with countries with high income.

2. LITERATURE REVIEW

Several studies in the literature have used various economic, locational, structural, service-related measures and public policy indicators to investigate the determinants of international air passenger travel demand. Using system generalized method of moments approach, Zhang (2015) found that aviation policy, gross domestic product (GDP), bilateral merchandise trade, distance, common language and immigration are determinants of international arrivals to Australia. Vijver, Derudder, Witlox (2014) applied heterogeneous time series cross section Granger causality analysis to investigate the linkages between trade and air passenger traffic among different country pairs in Asia-Pacific region. Findings revealed significant causality running from air passenger to trade between more developed and less developed countries and causality running from trade to air passenger for countries with liberalized air transport policies. Results of regression analysis of determinants of international air travel demand in Saudi Arabia by Abed, Ba-Fail, Jasimuddin (2001) indicate that population size, and total expenditure are significant factors influencing air travel demand. Kulendran and Wilson (2000) employed cointegration and Granger causality approaches to investigate the relationship between international trade and travel flows between Australia and USA, the UK, New Zealand and Japan. The authors concluded that there is causal relationship between travel and total real trade (sum of real export and import).

The determinants of bilateral air passenger flows between pairs of ASEAN countries was examined by Chang (2012). Data on population, GDP, annual import/export, national income per capita, unemployment rate, consumer price index, distance and language for each country for 2006 and 2007 was analysed using linear regression and non-parametric regression tree methods. All the explanatory variables except population significantly influenced passenger flows. The relationship between air traffic volume and 35 macroeconomic indicators in Taiwan was analysed by Chen et al. (2020) using K-means clustering and decision tree classification. The major determinant of air traffic are industrial production index, national income per capita, employed population and Japanese stock average.

Zhang, Qu, Tavitiyaman (2009) used annual times series data to investigate determinants of international tourist arrivals to Thailand. Results of multiple regression analysis showed that exchange rate, promotion budget, Asia financial crisis and SARS were significantly associated with international air travel demand. Deese (2013) found that income, relative prices, cultural factors (being from an English-speaking or a bordering country) and policy are major determinants of inbound travel to the US. Pham, Nghiem, Dwyer (2017) examined determinants of inbound travel from China to Australia using a dynamic time series estimator. Findings showed that gross domestic product (GDP) per capita and weighted price are significant factors influencing travel demand.

Lee (2012) examined the long-run and Granger causal relationship between foreign exchange rates and inbound and outbound travel demand in South Korea. Increase in exchange rate reduces outbound travel demand from Korea but does not change inbound travel demand from other countries. Naude and Saayman (2005) used panel data for the period 1996 to 2000 to identify the determinants of inbound travel to 43 African countries. The paper concluded that political stability, tourism infrastructure, marketing, information and level of development are the determinants of travel to Africa. In South Africa, income, exchange rate and infrastructural development have significant impact on inbound travel (Eita, Jordaan and Jordaan 2011). Long-run demand for international travel from Australia during the period 1983 to 1997 was examined by Webber 2001 using Granger causality approach. Results showed that changes in exchange rate influence destination choice and national income is the most important determinant of travel. Jena and Dash (2020) employed quintile regression to investigate the impact of GDP per capita, nominal Indian Rupee US Dollar exchange rate and exchange rate volatility on inbound travel into India. It was found that per capita income and exchange rate volatility have strong impact on international arrivals. Similar findings

were reported by Agiomirgianakis, Serenis, Tsounis, (2014) in Turkey. While GDP per capita has a positive effect on international arrivals into Turkey, exchange rate volatility exerts a negative influence on travel.

Although determinants of international air travel have been examined extensively, analysis of the short and long-run impact of macroeconomic factors on travel have attracted little attention. Pacheco and Fernandes (2017) applied Granger causality framework to investigate the determinants of international air passenger traffic in Brazil. Results showed that international trade openness and US$ purchasing power have significant short- and long-run effects on international air travel demand. Chi (2014) examined the short- and long-run impact of GDP, exchange rate and 9/11 terrorist attack on demand for international air travel to and from the USA using ARDL approach. Findings revealed that GDP has a strong effect on demand for inbound and outbound travel from the US while real bilateral exchange rate has mixed effects. Also, a unidirectional Granger causality running from GDP and exchange rate to bilateral air flows was reported. In another study, Chi (2020) revealed that real income has a significant effect on outbound travel demand from South Korea to all the selected countries both in the short- and long-run.

A cursory look at the studies reviewed indicate that determinants of international air travel demand is not conclusive because different determinants, analytical techniques, and types of travellers are used to examine international travel demand in countries with different degree of market maturity. Hence, the results are different (Valdes, 2015). However, the literature is in agreement that macroeconomic factors influence international air travel demand. Our paper aims to examine the short- and long-run effects of macroeconomic factors on international air travel demand in a developing country (Nigeria) using ARDL cointegration and Granger causality approaches.

3. MATERIALS AND METHODS

Annual data over the 38-year period between 1982 and 2019 was used for the empirical analysis. The data is limited to 2019 since air travel was restricted in 2020 due to coronavirus pandemic which affected many countries. Data on total number of enplaned air passengers' movements (arrivals and departures) was used as an indicator of international air travel demand (PAX). Data on air passengers was obtained from annual reports of Federal Airport Authority of Nigeria (FAAN 1982-2019). The FAAN collates

data on air passenger from all the airports in the country. The explanatory variables are total real trade-sum of real export and real import (TRA), real gross domestic product (constant 2015 US$) (GDP), real effective exchange rate index (2010=100) (REX), and net inflows foreign direct investment (FDI). Total real trade is an indicator of international trade while real GDP is a proxy for economic growth. Real exchange rate is used as a proxy for cost of travel and tourism for international arrivals into Nigeria. In addition, net inflows of FDI is a proxy for international traffic drivers (Valdes 2015). The World Development Indicators was the source of data on real trade, real GDP, real effective exchange rate index and net FDI similar to Valdes (2015). All the variables were converted to natural logarithms. Table 1 shows the descriptive statistics of variables used in the analysis.

The effect of macroeconomic factors on international air passenger travel demand in Nigeria is examined using econometric approaches for testing cointegration and causality. A three-stage procedure was adopted to determine the direction of causality. First, unit root test is conducted to determine the stationarity and order of integration of the series. Second, the existence of a long-run relationship (cointegration) among the variables when international air travel demand (PAX) is the dependent variable is investigated using the ARDL approach. The ARDL cointegration approach proposed by Pesaran, Shin and Smith (2001) has some advantages compared to other cointegration techniques (Engle and Granger 1987). Compared with the Johansen technique which require the variables to be integrated of the same order I(1) or I(0), the ARDL approach can be applied irrespective of the order of integration of the variables whether I(0), I(1) or both. The ARDL approach perform better for small and finite sample size (Chi 2016). Furthermore, the optimal number of lags of each variable could be different. The long-run and short-run parameters of a model are estimated simultaneously and endogeneity problems are avoided. The result of the ARDL analysis determines the causality test that will be employed. If the series are cointegrated, vector error correction model (VECM) is estimated to determine the direction of causality in the series. However, if the series are not cointegrated, the standard Granger causality test (vector autoregression-VAR) is applied. Eviews 10 software was used to conduct the empirical analysis.

Table 1. Descriptive statistics of variables

	PAX	IMEX	GDP	REX	FDI
Mean	2153624.	9.50E+10	2.56E+11	144.2260	2.57E+09
Median	1484861.	8.59E+10	1.83E+11	100.2585	1.61E+09
Maximum	4673797.	2.03E+11	5.03E+11	536.8903	8.84E+09

Minimum	812621.0	3.43E+10	1.13E+11	49.74471	1.89E+08
Std. Dev.	1380562.	4.52E+10	1.36E+11	116.7392	2.61E+09
Skewness	0.728799	0.645513	0.663236	2.042306	1.113498
Kurtosis	1.931442	2.518499	1.879080	6.384059	2.985864
Jarque-Bera	5.171810	3.006105	4.775317	44.54853	7.852883
Probability	0.075328	0.222450	0.091845	0.000000	0.019714
Sum	81837702	3.61E+12	9.75E+12	5480.589	9.76E+10
Sum Sq. Dev.	7.05E+13	7.57E+22	6.86E+23	504237.4	2.53E+20
Observations	38	38	38	38	38

3.1 UNIT ROOT TEST

The order of integration and stationarity of the time-series data was examined to ensure that none of the variables was integrated of order two, *I*(2) and higher. If the variables are *I*(2), the F-statistics will not be valid (Ouattara, 2004). A stationary series revert to its long-run average and its statistical properties (mean, variance and co-variance) do not change overtime. Non-stationary series do not revert to its long-run average value so the statistical properties change overtime (Shrestha and Bhatta, 2018). A non-stationary series is transformed by first differencing *d* times to make it stationary, then the series is integrated of order *d*, *I*(*d*). Dickey-Fuller generalized least squares (DF-GLS) method was used to conduct the unit root test of the variables. The DF-GLS test has better performance in terms of small sample size and power when an unknown mean or trend is present (Elliot et al., 1996). Since our sample covers a period of 38years, the DF-GLS unit root test was considered appropriate. The DF-GLS unit root test takes the following form:

$$\Delta Y^{d}_{t} = \alpha Y^{d}\, t\text{-}1 + \sum_{i=1}^{k} \psi_i \Delta\, Y^{d}_{\,t\text{-}i} + u_t \qquad (1)$$

where Δ is the difference operator, t represents the period, k is the lag order and u_t is the error term. The series for the variables (Yt) is detrended to $Y^{d}t$ (the series is regressed on a constant and linear trend, and the residual series is used in a standard Dickey-Fuller regression) and $\Delta Y^{d}t$ represent the first difference of the detrended series with no intercepts or time series trend. The DF-GLS follows a D-F distribution in the constant case but the asymptotic distribution is different when constant and trend are included. The DF-GLS test the null hypothesis that each of the variables have a unit root, Yt =I(1) Ho: $\phi = 1$ against the alternative hypothesis: H_1: series is stationary, $\phi < 1$. When the probability value of the DF-GLS statistic is less than 0.05, the statistics is greater than the critical value in absolute terms and Ho is rejected. This implies that the series is stationary. The lag length was based on Schwarz Bayesian Criterion.

3.2 CONINTEGRATION

The existence of a long-run equilibrium relationship among the series was examined using ARDL approach to determine if the time series data are cointegrated. Following Chi (2014), the log-linear form of demand for international air travel is specified as:

$$\text{In } PAX_t = a_0 + a_1 \text{InTRA}_t + a_2 \text{In GDP}_t + a_3 \text{InREX}_t + a_4 \text{ InFDI}_t + \varepsilon_t \quad (2)$$

where In PAX is the log of the number of enplaned passengers (arrival and departure from Nigeria), In TRA is the log of merchandise trade, In GDP represent the log of real gross domestic product per capita (constant 2015 US$), In REX is the log of real effective exchange rate index (2010=100), InFDI is the log of net foreign direct investment and t represent time. In terms of the signs of the coefficients, it is assumed that $a_1 > 0$ since an increase in trade can lead to rise in international travel. Similarly, improvement in national income could also increase the demand for international travel for business and holiday, hence a_2 is expected to be positive. Increase in real exchange rate reduce the demand for inbound travel as the cost of international travel to Nigeria increases. On the other hand, the increase in real effective exchange rate reduce the cost of outbound travel from Nigeria and travel demand increases. Hence, it is assumed that $a_3 > 0$. Findings in the literature indicate that increase in FDI leads to increase in air travel demand. Hence, a4 is expected to be positive, i.e. $a_4 > 0$. The ARDL representation of equation (2) is as follows:

$$\Delta \text{ In } PAX_t = b_0 + \sum_{i=1}^{k} b_1 i \, \Delta \text{InPAX}_{t-i} + \sum_{i=1}^{k} b_2 i \Delta \text{InTRA}_{t-i} + \sum_{i=1}^{k} b_{3i} \Delta \text{In GDP}_{t-i} + \sum_{i=1}^{k} b_{4i} \Delta \text{In REX}_{t-i}$$

$$+ \quad b_5 \text{InFDI}_{t-i} + b_6 \text{InTRA}_{t-i} + b_7 \text{InGDP}_{t-i} + b_8 \text{InREX}_{t-I} + b_9 \text{InFDI}_{t-I} + \varepsilon_t \quad (3)$$

where Δ is the first difference operator, k is the lag order, the coefficients of the lagged level terms (b_5, b_6, b_7, b_8, b_9) indicate the long-run relationships among the variables while b_1, b_2, b_3, b_4 and b_5 represent the short-run dynamics. In the bound testing approach to cointegration, the existence of a long-run equilibrium relationship among the variables is determined using F-statistic. The F-statistic test the significance of the lagged levels of the variables. F-statistic is a joint significance test of the null hypothesis of no cointegration among the variables (H_0: $b_5 = b_6 = b_7 = b_8 = b_9 = 0$) against the alternative hypothesis (H_1: $b_5 \neq b_6 \neq b_7 \neq b_8 \neq b_9 \neq 0$). The F test has a non-standard distribution and two sets of critical values are computed (upper and lower bound critical values) for a specific significance level. The critical value provides bounds for regressors

that are purely $I(1)$ and purely $I(0)$. If the computed F-statistic is higher that the upper critical bounds, the variables are cointegrated and H_0 is rejected. If the computed F-statistic is lower than the lower bound of the critical value, the variables are not cointegrated and the null hypothesis cannot be rejected. If the estimated F-statistic falls inside the two critical bounds, then the result is inconclusive. When a long-run relationship is confirmed among the variables, the error correction model is derived from the ARDl model in equation 3 through a simple linear transformation given as:

$$\Delta InPAX_t = c_0 + \sum_{i=1}^{k} c_{1i}\Delta InPAX_{t-i} + \sum_{i=1}^{k} c_{2i}\Delta TRAt\text{-}i + \sum_{i=1}^{k} c_{3i}\Delta InGDP_{t-i} + \sum_{i=1}^{k} c_{4i}\Delta InREX + \sum_{i=1}^{k} c_{5i}\Delta InFDI +$$

$$\lambda ECT_{t-1} + \varepsilon_t \qquad (4)$$

where λ, the coefficient of the error correction term (ECT) is the speed of adjustment. The ECT in equation (4) integrates the short-run dynamics and the long-run equilibrium to avoid spurious relationship due to non-stationary time series data (Shrestha and Bhatta, 2018). The existence of a long-run equilibrium relationship among variables is confirmed if the coefficient of the error-correction term is negative, range between 0 and 1 and is statistically significant.

3.3 GRANGER CAUSALITY

The Granger causality test is used to examine causal relationship between international air passenger traffic and the macroeconomic variables. According to Granger (1988), if there is a cointegrating relationship among variables, then there is a Granger causality in at least one direction provided the variables are integrated of the order one. The lagged ECT is added to the standard Granger causality test (VAR) if the variables are cointegrated. Otherwise, the Granger causality test will be unspecified (Engle and Granger, 1987). The VECM differentiates between the long-run and short-run relationship among the variables and identify the source of causation. Through the VECM, the long-run causal relationship is determined based on the ECT. Following the work of Narayan and Smyth (2004), the Granger causality test which includes the ECT is specified in a multivariate pth order VECM as follows:

$$\begin{bmatrix} \Delta In\ PAX \\ \Delta In\ TRA \\ \Delta In\ GDP \\ \Delta In\ REX \\ \Delta In\ FDI \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \end{bmatrix} + \sum_{i=1}^{k} \begin{bmatrix} d_{11i} & d_{12i} & d_{13i} & d_{14i} & d_{15i} \\ d_{21i} & d_{22i} & d_{23i} & d_{24i} & d_{25i} \\ d_{31i} & d_{32i} & d_{33i} & d_{34i} & d_{35i} \\ d_{41i} & d_{42i} & d_{43i} & d_{44i} & d_{45i} \\ d_{51i} & d_{52i} & d_{53i} & d_{54i} & d_{55i} \end{bmatrix} \begin{bmatrix} \Delta In\ PAX_{t-i} \\ \Delta In\ TRA_{t-i} \\ \Delta In\ GDP_{t-i} \\ \Delta In\ REX_{t-i} \\ \Delta In\ FDI_{t-i} \end{bmatrix} + \begin{bmatrix} \lambda 1 \\ \lambda 2 \\ \lambda 3 \\ \lambda 4 \\ \lambda 5 \end{bmatrix} [ECT_{t-1}] + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \end{bmatrix} \qquad (5)$$

EC_{t-1} is the lagged ECT obtained from the long-run relationship but it is not included if the variables are not cointegrated, and ε_1, ε_2, ε_3, ε_4 and ε_5 are random errors. Standard Chi-square Wald test was conducted to examine the short-run Granger causality, that is, the combined significance of the coefficient of the explanatory variables. Also, to determine the direction of causality, pairwise Granger causality test based on F-statistics was implemented.

3.4 PARAMETER STABILITY

Since the parameters of a time series can vary overtime leading to model misspecification and spurious results, the stability of the parameters was tested by applying cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests which are based on the recursive regression residuals. The short-run dynamics are incorporated to the long-run coefficients in the stability test through the residuals. The results of the stability tests are presented as graphs with the 5% critical bound. If the plots of the CUSUM and CUSUMSQ are within the critical bounds of 5% significance level, the coefficients are stable. In addition, Jarque-Bera, Breusch-Godfrey Lagrange Multiplier, Breusch-Pagan-Godfrey Heteroskedasticity and Ramsey Regression Equation Specification Error (RESET) tests for normality, serial correlation, heteroskedasticity, and functional form misspecifications were conducted to assess the validity of the results.

4. EMPIRICAL RESULTS AND DISCUSSION

Trend of international air passenger traffic in Nigeria over the period 2018 – 2019 is presented in figure 1. International air passenger traffic increased from 1.196,694 in 1982 to 1,346,352. This was followed by a decline to 935,042, a steady rise to a peak of 4,673,797 in 2014 and decline to 4, 628,350 in 2019. The rise in international air passenger traffic could be due to improvement in the economy.

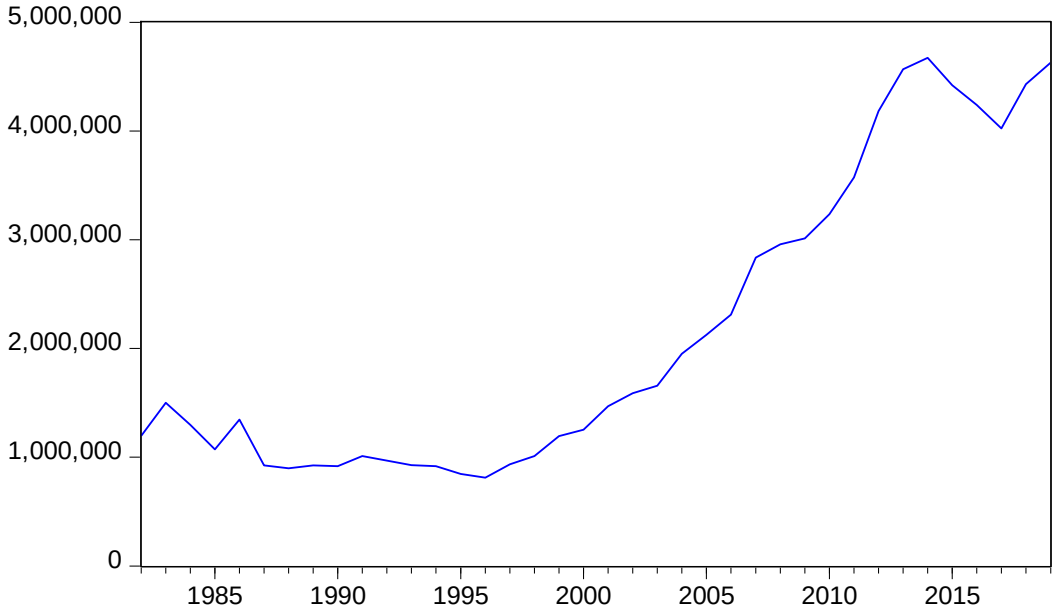


Figure 1. International air passenger traffic in Nigeria, 1982-2019
Source: Annual reports, Federal Airport Authority of Nigeria

4.1 UNIT ROOT TEST RESULT

The DF-GLS unit root test results (table 2) indicate that none of the series is integrated $I(2)$. The series are all integrated of order one, i.e., $I(1)$. The series are non-stationary in level value but are stationary when their first difference are taken. Since the series are non-stationary, the shock effect on the variables are persistent.

Table 2. Results of Dickey-Fuller GLS unit root test

Variable	Deterministic	Level	First Difference
PAX	Individual intercept	0.45	-2.62*
	Individual Intercept and trend	-1.42	-5.79***
TRA	Individual intercept	-0.79	-6.01***
	Individual Intercept and trend	-2.27*	-6.28***
GDP	Individual intercept	-0.54	-2.22*
	Individual Intercept and trend	-1.28	-3.52***
REX	Individual intercept	-2.26*	-4.47***
	Individual Intercept and trend	-2.79	-4.69***
FDI	Individual intercept	-1.12	-9.92***
	Individual Intercept and trend	-1.49	-9.36***

Note: lag length based on Schwarz Bayesian Criterion

4.2 LONG-RUN ANALYSIS RESULTS

The ARDL cointegration approach was used to estimate Eq. (3). The maximum of four lags obtained from unrestricted VAR through Akaike Information Criterion (AIC)

was imposed on the model. A total of 34 observations were included in the analysis. Narayan and Smyth (2004) argued that for small sample sizes, the critical values deviate from the critical values stated by Pesaran, Shin and Smith (2001) which is based on 1000 observations. Based on the critical values for a finite sample size of 35, the estimated F-statistic (10.04) in table 3 is higher than the lower (4.093) and higher (5.532) bound of the critical values at 1% significance level suggesting that the null hypothesis of no cointegration among the variables is rejected. Hence, a long-run relationship exist among the variables.

Results of the long-run coefficients is presented in table 3. The lag order of the ARDL model is 2, 2, 1, 2 and 2. The long-run coefficients of all the macroeconomic variables are statistically significant at 5% significance level except real effective exchange rate. Hence, total real trade, GDP and net foreign direct investment have significant impact on international air passenger travel. The coefficient of total real trade is positive and significant at 5% significance level suggesting that if total real trade increase by 1%, international air passenger traffic will increase by 0.76% in the long-run. This suggest that real trade play an important role in the demand for international travel in Nigeria. This is consistent with findings of Zhang (2015) and Chang (2012) which revealed positive effects of trade on international air passenger travel between countries. Data on Nigeria's trade shows that the value of real import exceed real export as the country depend on her trading partners for various goods including industrial machinery, oil and mineral fuels, motor vehicles and electrical machinery. Real import increased from US$ 97 million in 1982 to a peak of US$163 in million 2007 before declining to US$ 48 million in 2017. On the other hand, real export increased gradually from US$13 million in 1982 to US$71 million in 2019. Growth in international trade lead to increase in international air travel demand due to need for face-to-face contact required for collaboration and monitoring of components moved along global production networks, to overcome information asymmetries and foster confidence with customers and suppliers (Vijver, Derudder, Witlox 2014).

Table 3. Results of estimated long-run coefficients of international air passenger travel

Explanatory variable	Coefficient	Std. error	t-Statistic	Probability
In TRA	0.762825	0.185938	4.102576	0.0008
In GDP	1.003833	0.146959	6.830704	0.0000
In REX	-0.052774	0.081811	-0.645068	0.5280
In FDI	-0.454711	0.113698	-3.999280	0.0010
Constant	-5.652746	4.825746	-1.171372	0.2586
F-statistic	10.04***			

Diagnostic statistics	
LM test	1.948515
Heteroskedasticity	0.423276
Normality	8.2968
Ramsey RESET	0.970218

*** denote significant at 1% significance level. The lower and upper critical bound values of the F-statistic for finite sample of n=35 at 1% significance level is 4.093 and 5.532 respectively.

Real effective exchange rate is negatively associated with international air travel demand in Nigeria but it is not statistically significant at 5% significance level. A possible explanation for the negative sign is that depreciation of the naira increases cost of travel of travelers from Nigeria to international destinations resulting in a negative impact of real effective exchange rate on demand for outbound travel. Since the economy is largely dependent on imports, depreciation of the naira increases prices of goods and disposable income decline leading to reduction in international air travel particularly for leisure and holiday.

The coefficient of GDP is positive and significantly associated with international air travel at 5% significance level indicating that GDP of Nigeria has a significant impact on international air travel demand in the long-run. An increase of 1% in GDP is associated with 1.00% growth in the number of passengers travelling into and from Nigeria by air. Similar positive long-run relationship between GDP and air travel demand was reported by Chi (2014), and Hakim and Merkert (2019). A possible explanation for the positive effect of economic growth on international air travel is that growth in GDP increases disposable income which stimulate demand for business travel, leisure (recreation and holiday), visiting friends and relatives, health and education related trips. Also, economic growth enhance demand for goods and services which stimulates production, trade and investment thereby increasing demand for air travel.

Foreign direct investment is negatively associated with number of air passengers that travel to and from Nigeria by air in the long-run and it is statistically significant at 5% significance level. This suggest that as investment made by foreign individuals and firms into business interests in Nigeria increase, demand for international air travel decrease. A 1% increase in foreign direct investment leads to 0.45% decrease in international air travel. This is contrary to findings by Gillen (2009) which revealed a positive association between foreign direct investment and international air travel. Inflows of FDI in Nigeria fluctuated between 1982 and 1998 before it started increasing gradually in 1999 until it peaked in 2011. During this period, international air traffic increased from 1.1 million in 1999 to 3.5 million in 2011. From 2012, inflows of FDI

started declining up till 2019 while the number of international air passengers continued to grow. Orji et al. (2021), attributed the decline in inflows of FDI to political instability, macroeconomic instability, high inflation, inconsistent economic policies and excessive budget deficit. The growth of international air travel demand in spite of decline in FDI inflows is possibly due to growth in trade.

The long-run coefficients of the variables indicate that the impact of economic growth on international air passenger traffic is the strongest compared to other variables, with a 1% increase in GDP resulting to 1.00% increase in international air travel demand. The magnitude of the effect of trade is also high as 1% increase in trade leads to 0.76% rise in international air travel. Hence, economic growth and total real trade are the main factors influencing international air travel in the long-run.

The diagnostic test result in table 3 shows that the goodness of fit of the model is good since all the results are not significant at 5% significance level. The null hypothesis of no non-normal errors, serial correlation, functional form misspecification, heteroskedasticity, and Ramsey RESET cannot be rejected. Hence, the model is valid and correctly specified.

4.3 SHORT-RUN ANALYSIS RESULTS

The short-run dynamics among the variables was obtained through the estimation of the ECM of Eq. (4). The short-run results in table 4 indicate that the adjusted R-square of the model is 0.85 implying that the model explains 85% of variance in data. The coefficient of international air travel demand is negative with one and two-year lag but positive with a three-year lag. This suggest that the explanatory variables will lead to growth in international air travel after a three-year lag. The coefficient of total real trade has a positive and significant short-run impact on air travel in the current year implying that increase in total real trade leads to growth in air travel in the short-run. Real effective exchange rate has a significant and negative effect on air travel demand similar to its long-run impact. The coefficient of GDP is positive but statistically insignificant at 5% significance level in the current year. With a 1year lag however, the impact of GDP on air travel is positive and statistically significant. It is important to note that the magnitude of the 1-year lag coefficient is stronger. Table 4 also indicate that although the coefficient of FDI is negative, and statistically significant in the current year, the impact of FDI on air travel demand is positive and statistically significant with 1-3 year lag. The magnitude of the coefficient with one-year lag is strongest. The result suggest that FDI will lead to increase in air travel demand in the short-run with 1-3years

lag. Furthermore, the coefficient of the lagged error correction term (ECMt-1) is negative and statistically significant at 5% significance level. The speed of adjustment, -0.57 indicate that convergence to equilibrium once the cointegrating relationship is shocked is rapid. A deviation from the long-run equilibrium due to a short-run shock in the current period will be corrected by 57% after one year. This further confirm the F-statistic result indicating existence of a long-run relationship in the model.

Table 4. Results of estimated short-run dynamics of international air passenger travel

Regressors	ARDL (2,2,1,2,2) Coefficient	Std. Error	t-Statistic	Prob.
Δ In PAX $_{t-1}$	-0.4309	0.0895	-4.8151	0.0002
Δ In PAX $_{t-2}$	-0.3300	0.0826	-3.9977	0.0010
Δ In PAX $_{t-3}$	0.1828	0.0794	2.2989	0.0353
Δ In TRA	0.1199	0.0292	4.1139	0.0008
Δ In TRA $_{t-1}$	-0.0958	0.0436	-2.1974	0.0431
Δ In REX	-0.1207	0.0261	-4.6338	0.0003
Δ In GDP	0.1757	0.2677	0.6561	0.5211
Δ In GDP $_{t-1}$	0.5482	0.2562	2.1392	0.0482
Δ In FDI	-0.0545	0.0145	-3.7516	0.0017
Δ In FDI t_{-1}	0.2293	0.0300	7.6287	0.0000
Δ In FDI $_{t-2}$	0.1685	0.0265	6.3536	0.0000
Δ In FDI $_{t-3}$	0.0823	0.0198	4.1443	0.0008
CointEq(-1)	-0.5696	0.0640	-8.8914	0.0000
R-squared	0.9062			
Adjusted R-squared	0.8526			
Sum of squared residual	0.0369			
Durbin-Watson statistic	1.7505			

4.4 GRANGER CAUSALITY RESULTS

Based on the result of the cointegration test which revealed the existence of a long-run relationship among the variables, Granger causality VECM model was used to determine if there is a long-run causal relationship among the variables. Only the PAX vector was estimated with an ECT. The Granger causality test was applied to other vectors without the ECT since a long-run relationship was not confirmed. The lag length was selected based on the criteria proposed by Hurlin (2004): Ti > 5 + 2K (Ti = time span, K = lag length). A lag length of three was selected based on AIC. The lag length is suitable since it is <1/3 of the total time period as suggested by Holtz-Eakin et al. (1988). Results of the long-run causality test in table 5 shows that the coefficient of the lagged ECT is negative and statistically significant. This confirms the result of the bounds test. In the long-run, total real trade, GDP, real exchange rate and foreign direct investment inflows Granger cause international air passenger traffic. This implies that causality runs interactively through the macroeconomic factors to international air passenger traffic.

The speed of adjustment is lower compared to the ARDL results. This implies that convergence to equilibrium due to a shock is slow.

Table 5. Results of Granger short-run and long-run causality

Dependent Variable	Chi-square Wald test (Probability)					
	Δ InPAX $_t$	ΔInTRA $_t$	Δ InGDP $_t$	ΔInREX $_t$	ΔIn FDI $_t$	ECT $_{t-1}$ (t-statistics)
Δ In PAX $_t$	-	10.51** (0.02)	11.29*** (0.01)	2.47 (0.48)	2.97 (0.39)	-0.14** (0.04)
Δ In TRA $_t$	21.19*** (0.00)	-	9.20** (0.02)	5.25 (0.15)	0.70 (0.87)	
Δ In GDP $_t$	13.17*** (0.00)	3.59 (0.31)	-	8.62** (0.03)	1.82 (0.61)	
Δ In REX $_t$	0.38 (0.94)	0.26 (0.96)	1.92 (0.59)	-	4.19 (0.24)	
Δ In FDI $_t$	6.30 (0.09)	3.92 (0.27)	6.27 (0.09)	1.38 (0.70)	-	

Note: **p<0.05, *** P < 0.01, these represent significant p values

In the short-run, the Chi-square statistic result (table 5) suggest that there is a bidirectional Granger causality between PAX and total real trade, PAX and GDP, total real trade and GDP, as well as a unidirectional causality that runs from GDP to exchange rate at 5% significance level or better. The pairwise Granger causality results (table 6) reveal that the null hypothesis of i) PAX does not Granger cause real trade, ii) PAX does not Granger cause GDP, iii) real trade does not Granger cause PAX, iv) GDP does not Granger cause PAX, v) GDP does not Granger cause exchange rate can be rejected at 5% significance level or better.

Table 6. Summary of pairwise causality results

Direction of causality	F-statistic (Probability_
PAX→TRA	3.84 **(0.02)
TRA→PAX	7.20 ***(0.00)
GDP→PAX	6.89*** (0.00)
PAX→GDP	3.29** (0.03)
GDP→REX	3.21** (0.03)

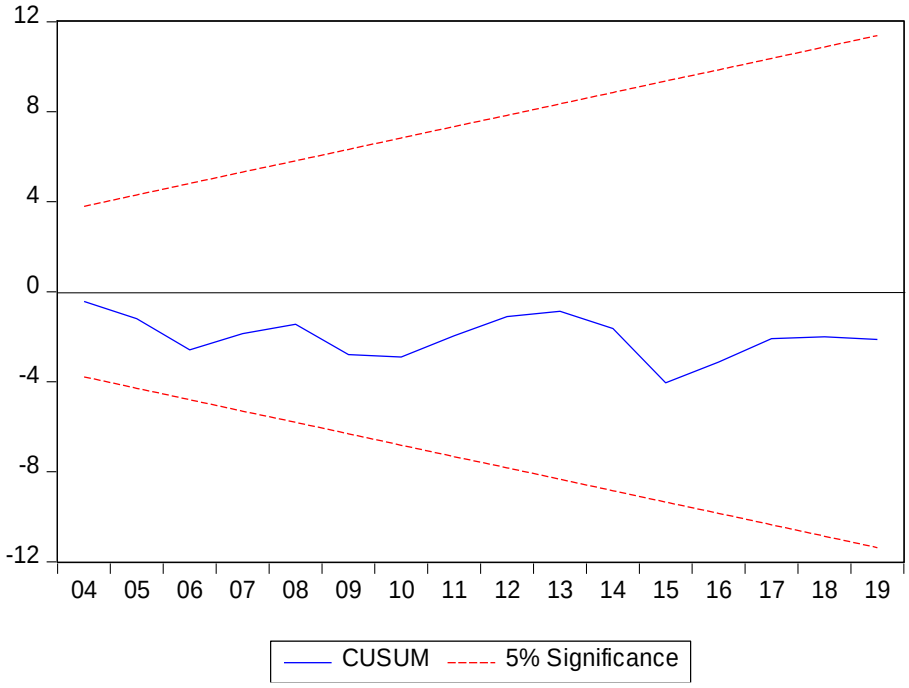
Note: **p<0.05, *** P < 0.01, these represent significant p values

4.5 PARAMETER STABILITY RESULTS

The stability of the coefficients was evaluated using the CUSUM and CUSUMSQ tests. As shown in figure 2, estimated short- and long-run coefficients are stable since the plots of the CUSUM and CUSUMSQ statistic are within the 5% significance level. Therefore,

the parameters of the ARDL model for international air passenger traffic provide sound results.

a)



b)

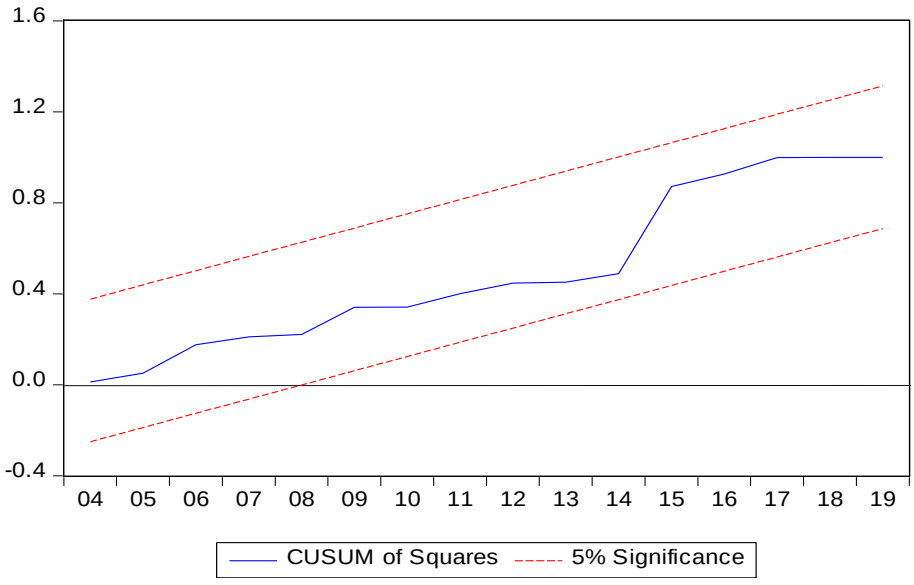


Figure 2. Plots of CUSUM and CUSUM of squares

5. SUMMARY AND CONCLUSION

This paper examined the effect of total real trade, economic growth, real exchange rate and foreign direct investment inflows on international air passenger travel demand in Nigeria using annual data from 1982 to 2019. The ARDL approach was employed to examine cointegration and analyse the short- run dynamics and long-run coefficients simultaneously. Furthermore, Granger causality test was applied to determine causal relationships between international air passenger travel and macroeconomic factors. The empirical results and policy implications are as follows: first, total real trade and GDP are the main factors contributing to the growth of international air travel in Nigeria in both the short-and long-run. With GDP projected to grow by 3.0% in 2023 and as policy measures targeting an increase in share of trade in GDP to 50% by 2023 are being implemented, international air passenger travel demand will increase. Hence, policymakers, airlines and airports need to provide facilities and infrastructure necessary to meet the possible high demand for international air travel. Second, the results highlight the importance of estimating both short–run dynamics and long-run relationships in a model. The effect of GDP and FDI on international air traffic differ in the short-and long-run. While GDP has a strong positive impact on international air travel in the long-run, its positive impact in the short-run manifests after a one-year lag. Also foreign direct investment leads to decline in air travel in the long-run but has a positive impact with 1-3year lags in the short-run. This suggests that strategies that will increase foreign investments such as improvement in trade openness, development of human capital and infrastructures should be implemented so as to increase international air travel demand. Third, our results reveal that long-run causality runs from total real trade, GDP, real exchange rate and foreign direct investment to international air passenger traffic. Since macroeconomic factors impact international air travel demand, development strategies should focus on enhancing economic growth, trade and foreign investments which will then boost international air travel demand.

Furthermore, the bidirectional causality between air passenger traffic and total real trade, air passenger travel and GDP, suggest that increase in international air passenger travel will lead to growth in trade and boost the economy. Thus, measures that will increase international passenger traffic such as reduction in cost of air services, improved safety, connectivity, infrastructures and quality of service need to be implemented by government, policymakers, airlines and airports. Finally, the empirical results provide evidence that real exchange rate is negatively associated with international air passenger traffic in the short term. This implies that monetary policies

that will reduce the depreciation of naira exchange rate and exchange rate volatility needs to be adopted so as to encourage international air travel by residents.

The limitation of this study is that we were unable to explore the effect of the macroeconomic variables on inbound and outbound international air passenger traffic separately mainly due to lack of data. Future research could explore the determinants of bilateral air passenger flows between Nigeria and its major travel partners.

REFERENCES

Abed, S. Y., Ba-Fail, A. O. and Jasimuddin, S. M. (2001), 'An econometric analysis of international air travel demand in Saudi Arabia', Journal of Air Transport Management, 7, 143–148.

Agiomirgianakis, G., Serenis, D. and Tsounis, N. (2015), 'The effects of exchange rate volatility on tourist flows: evidence from the UK and Sweden', International Journal of Tourism Politics, 6 (1), 1–16.

Chang, L.Y. (2012), 'International air passenger flows between pairs of APEC countries: A non-parametric regression tree approach', Journal of Air Transport Management, 20, 4–6.

Chen, J.H., Wei, H.H., Chen, C.L., Wei, H.Y., Chen, Y.P. and Ye, Z. (2020), 'A practical approach to determining critical macroeconomic factors in air-traffic volume based on K-means clustering and decision-tree classification', Journal Air Transport Management, 82, 101743.

Chi, J. (2014), 'A cointegration analysis of bilateral air travel flows: The case of international travel to and from the United States', Journal of Air Transport Management, 39, 41–47.

Chi, J. (2016), 'Exchange rate and transport cost sensitivities of bilateral freight flows between the US and China', Transportation Research Part A, 89, 1–13.

Chi, J. (2020), 'The impact of third-country exchange rate risk on international air travel flows: The case of Korean outbound tourism demand', Transport Policy, 89, 66-78.

Eita, J. H., Jordaan, A. C. and Jordaan, Y. (2011), 'An Econometric Analysis of the Determinants Impacting on Businesses in the Tourism Industry', African Journal of Business Management, 5 (3), 666-675.

Elliot, G., Rothenberg T. and Stock J. (1996), 'Efficient tests for an autoregressive unit root', Econometrica, 64(4), 813–836.

Engle, R.F. and Granger, C.W.J. (1987), 'Cointegration and error correction representation: estimation and testing', Econometrica, 55, 251-276.

Federal Airport Authority of Nigeria: Annual Report 1982-2019.

Fernandes, E. and Pacheco, R.R. (2010), The causal relationship between GDP and domestic air passenger traffic in Brazil', Transportation Planning and Technology, 33 (7), 569–581.

Gillen, D. (2009), International Air Transport in the Future: Bringing citizens closer together. 18th International Transport Research Symposium, OECD/ITF, Madrid, Discussion Paper No. 2009-15.

Hakim, M. and Merkert, R. (2017), 'Econometric evidence on the determinants of air transport in South Asian countries', Transport Policy, 1–7.

Holtz-Eakin, D., Newey, W. and Rosen, H.S. (1988), 'Estimating vector autoregressions with panel data', Econometrica, 56, 1371–1395.

Hurlin, C. (2004), Testing Granger Causality in Heterogeneous Panel Data Models with Fixed Coefficients. University Paris IX, Mimeo.
ICAO (2018). Presentation of 2018 Air transport Statistics Results. Available from https://www.icao.int/annual-report-2018/Documents/Annual.Report.2018_Air%20Transport%20Statistics.pdf2 (accessed on 12/8/2022). 018 Air Transport
Jena, S.K.and Dash, A.K. (2020), 'Does Exchange Rate Volatility Affect Tourist Arrival in India: a Quantile Regression Approach', Regional and Sectoral Economic Studies, 20, 65–78.
Kulendran, N. and Wilson, K. (2000). 'Is there a relationship between international trade and international travel?', Applied Economics, 32 (8), 1001–1009.
Naude, W. A. and Saayman, A. (2005), 'Determinants of Tourist Arrivals in Africa: A Panel Data Regression Analysis', Tourism Economics, 11(3), 365-391.
Oluwakoya, A.O. (2011), 'The Impact of Deregulation and Liberalisation in Nigeria Air Transport Industry: An Overview', Journal of Air Transport Studies, 2, 1, 50-68.
Pacheco, R.R. and Fernandes, E. (2017), 'International air passenger traffic, trade openness and exchange rate in Brazil: A Granger causality test', Transport Research Part A, 101, 22–29.
Pesaran, M.H., Shin, Y. and Smith, R.J. (2001), 'Bounds testing approaches to the analysis of level relationships', Journal of Applied Econometrics, 16(3), 289-326.
Pham, T.D., Nghiem, S. and Dwyer, L. (2017), 'The determinants of Chinese visitors to Australia: A dynamic demand analysis', Tourism Management, 63, 268–276.
Ouattara, B. (2004), Foreign Aid and Fiscal Policy in Senegal. Mimeo University of Manchester, Manchester, UK.
Seetaram, N. (2012), 'Immigration and international inbound tourism: Empirical evidence from Australia', Tourism Management, 33, 1535–1543.
Shrestha, M.B. and Bhatta, G.R. (2018), 'Selecting appropriate methodological framework for time series data analysis', Journal of Finance and Data Science, 4, 71–89.
Valdes, V. (2015), 'Determinants of air travel demand in Middle Income Countries', Journal of Air Transport Management, 42, 75–84.
Van De Vijver, E., Derudder, B.and Witlox, F. (2014), 'Exploring causality in trade and air passenger travel relationships: The case of Asia-Pacific, 1980-2010', Journal of Transport Geogrphy, 34, 142–150.
Webber, A.G. (2001), 'Exchange rate volatility and cointegration in tourism demand', Journal of Travel Research, 39, 398–405.
Zhang, Y. (2015), 'International arrivals to Australia: Determinants and the role of air transport policy', Journal of Air Transport Management, 44–45, 21–24.
Zhang, Y., Qu, H. and Tavitiyaman, P. (2009), 'The determinants of the travel demand on international tourist arrivals to Thailand', Asia Pacific Journal of Tourism Research, 14, 77–92.

AUTHOR'S BIO

Dr **Yingigba Chioma Akinyemi** is a senior lecturer in the Department of Geography at the University of Ibadan, Nigeria. Her research interest includes transport safety, transport demand analysis, tourism and health geography. Email: chiomajaja@yahoo.com, Tel: +234 803 566 0485

A CENTURY OF THE GLOBAL AIRLINE INDUSTRY AND THE EMERGENCE OF THE GULF'S SUPER CONNECTORS

Hamad Al Thani
Durham University Business School, Durham University, Mill Hill Lane, Durham, DH1 3LB, UK
Emlyon Business School, Ecully cedex Lyon (Paris Campus), France

ABSTRACT

This article surveys the literature on the three Middle Eastern super connectors and provides insight into their early development and the mainstream research on them. Employing a semi-systematic methodology to survey the literature, this article compiles relevant literature into a single document and provides a comprehensive overview for practitioners and academics interested in understanding current research on the Gulf's super connectors. The findings highlight the limited literature on the early development of the Middle East's aviation industry. The fierce rivalry and fast expansion of the three super connectors have piqued the curiosity of industry professionals and academics, leading to two main streams of research: investments in foreign airlines and government subsidies. The motives and benefits of investing in foreign airlines remain debatable. Studying the role of government subsidies is sensitive and difficult to pinpoint.

KEYWORDS

Gulf carriers; Globalisation; Single sky; Super connectors; Government subsidies

1. INTRODUCTION

The airline industry is vital to contemporary civilisation because it is a key player in advancing globalisation, linking regions, fostering global commerce, promoting tourism, and aiding economic and social progress. Since the deregulation of the industry, air transportation has undergone a significant structural and institutional transformation. The development of low-cost carriers (LLC) and introduction of hub systems have resulted in an uneven geographic distribution of air passenger traffic. The Gulf super connectors (SC) have provoked a series of questions in recent years regarding their business practices and close ties with their respective governments. This study investigates the origins of the SC and examines the extant literature on their strategies, disputes, and long-term survivability.

2. METHODOLOGY

The aviation history of the Middle East can be studied from scattered publications and textbooks on oil exploration missions and early flights over the Middle East (see, for instance, Butt, 2011). However, the literature on the SC only recently became prominent in academia because of its significant role in the global aviation industry. Using a semi-systematic methodology, this study investigates and scrutinises the available literature on the SC from multiple sources, including academic journals, books, and company reports to derive and categorise the research streams and synthesise them in a single paper.

3. AVIATION IN THE MIDDLE EAST

3.1 THE GEOPOLITICS OF THE ARAB WORLD

The unique geographic positioning of the Gulf and Strait of Hormuz has attracted the interest of Western conquerors since 1507. Arab states are typically governed by historically dominant families or post-revolutionary nationalist regimes that depend on the military for survival. The Middle East has undergone massive economic change, but development has been uneven and, in some respects, distorted. A deep divide exists between the countries with primary oil production and those without. This complex combination has significantly influenced aviation history in this region, particularly after the discovery of oil. The discovery of oil in many parts of the Levant area attracted companies and investors to search for more resources (Bina, 2017). The exploration of oil fields in the Gulf, mainly by expatriates, accelerated the development of air routes and airfields (Watson, 2013). Airfields and routes such as the Sharjah-Bahrain-Dammam-Kuwait-Basra-Mosel were strategically developed to carry

expatriates and local merchants to and from the oil fields (Watson, 2013). Later, these wealthy Gulf states played a pivotal role in mapping the international aviation arena (Joshan and Maertens, 2020). The emergence of airline companies such as Emirates, Etihad, and Qatar Airways has allowed millions of people to exploit the region's unique geography and culture. The airline industry's growth in the Gulf states reflects their strong business practices and geopolitical influence (Joshan and Maertens, 2020).

3.2 ARAB AIR CARRIERS ORGANIZATION

The initial idea of a partnership in civil aviation between the Arab nations originated with the Alexandria Protocol in 1944. The aim was to increase and combine the ties that bind all Arab countries (AACO, 2018). The 10th conference of the Commission of Communication of the Arab League, held in Tunis in May 1964, endorsed the establishment of a permanent organisation, namely the Arab Air Carriers Organization (AACO). The first conference of AACO took place in Cairo in 1965 and was attended by 14 Arab air carriers (AACO, 2018). AACO was established according to Article 2, Paragraph B of the Arab League Pact (dated 22 March, 1945), which recommends the development of infrastructure and communications, including railroads, aviation, navigation, telegraphs, and posts. Usually, this organisation's membership is not part of any national government, although it is common for Arab state governments to participate. Since its formation, the organisation has been responsible for resolving several commercial aviation issues and encouraging its member states to foster communication systems and build railroads, air/sea infrastructure, and navigational aids (Elashiq, 1987). In addition, it seeks to establish and develop practical cooperation among its members for a better air transport system. The 1974 Marrakech session marked a significant milestone for civil aviation in the Arab world with the formation of the Arab Civil Aviation Council (ACAC). There was a unanimous agreement to adopt the 'Marrakech Declaration', which seeks the liberalisation of traffic rights between the Arab states. Moreover, the objectives extended the necessity to cooperate with the International Civil Aviation Organization (ICAO) to improve the welfare of civil aviation in the region (Elashiq, 1987). The Marrakech agreement substituted for the preceding Civil Aviation Council of Arab States (CACAS) established in November 1967 (Elashiq, 1987). Subsequently, the Arab Civil Aviation Organization (ACAO) replaced CACAS in 1996. The organisation's main objectives are as follows: (1) to provide the Arab civil aviation authorities with a framework to implement a plan for civil aviation among Arab countries and improve its safety, and (2) to develop and advance Arab civil aviation to reflect the needs of the Arab nations for a more advanced and secure air transport system. To achieve this goal, Arab transport ministers gathered in Damascus, Syria, in 2004. The initial

agreement aimed to provide the region with a similar agreement as that of the EU, but failed. The institutional and legal tools that allowed the EU to achieve its objectives do not exist in the Middle East, because it does not have power over its member states (O'Connell and Williams, 2010). Furthermore, it is challenging to implement collective initiatives, as there is a significant time lapse between what the leaders of the Arab states decide and their application at the collective regional level. In addition, there is a wide gap in the economies of the individual countries, which leads to more difficulties in freeing the transport market as a whole (Tan, 2016). The whole Middle East remains severely restricted, as it is still common for airlines to be owned by governments, leading to more restraining forces. Bilateral agreements between each state govern full market access, and the national guidelines for air transportation and competition rules vary within the region. Thus, there exists a divide between the carriers in the Gulf and those in the rest of the Middle East.

3.3 BRITISH OVERSEAS AIRWAYS CORPORATION

The establishment of the British Overseas Airways Corporation (BOAC) is pivotal in the Middle East's aviation history. Formed in 1939 from the merger of British Airways and Imperial Airways, the company provided airline services to several countries worldwide (Watson, 2013). BOAC's establishment during the war presented many operational challenges. Nonetheless, the company strategised to identify safe operational routes. Furthermore, it developed key partnerships with other players in the aviation industry to drive its economic performance. The Arabian Peninsula's strategic geography was central in persuading intercontinental flights to move through the Gulf region (Kemp, 2012). Moreover, the presence of the British protectorate influenced the BOAC's decision to acquire stakes in the region's airline industry. Sharjah and Dubai became intercontinental flight hubs connecting countries in Europe and Asia. In the late 1940s, British pilot and entrepreneur Freddie Bosworth began operating an air taxi service in parts of the Middle East (Watson, 2013), primarily between the cities on the Doha-Dhahran-Bahrain route. Bosworth expanded his operations and attracted local investors to establish a new aviation company, 'Gulf Aviation', in 1951. Later, the BOAC acquired majority shares from Gulf Aviation (Pirie, 2017a), becoming a significant shareholder in the Gulf's aviation industry and thereby extending its network to cover transatlantic countries, Africa, and the Middle East. In 1973, the governments of Qatar, the United Arab Emirates (UAE), Bahrain, and Oman purchased Gulf Aviation from BOAC and named it Gulf Air (Pirie, 2017a). Each of the four countries considered the airline their national carrier. The Bahrain International Airport became the base of operations. It expanded its operations and took advantage of the market monopoly (Satia, 2014).

3.4 EMIRATES, QATAR, AND ETIHAD AIRWAYS (SUPER CONNECTORS)

The change of ownership of Gulf Aviation in 1973 marked a new era. First, the company's name changed to Gulf Air. Second, the airline operated with a quarter share from each of the four independent states of Qatar, Oman, Bahrain, and the UAE (Kemp, 2012). This transition welcomed a new wave of business opportunities. In 1990, the airline became the first to fly the Australian route (Bailey *et al.*, 2019). Furthermore, it operated direct flights to South Africa (Henderson, 2014). In subsequent years, the airline operated as the largest airline company in the Middle East. However, during the mid-1990s, the Middle East's aviation market began to evolve, and market competition intensified. Till this day, Gulf Air remained under the ownership of Bahrain and operated under stiff competition (O'Connell and Bueno, 2018). However, the rapid economic growth and infrastructure development the region has experienced since then have led to the introduction of more airlines in the region.

Emirates was the first to be established, in 1985. Since then, it has enjoyed close ties with Dubai's ruling family (Squalli, 2014). The company's early growth was aided by the expanding mass markets (Squalli, 2014) and mass movement of labour migrants. By the mid-2000s, the airline was transporting more than 3 million passengers annually. In 2018, it transported more than 58 million passengers, had a fleet size of 266 aircraft, and flew to 157 destinations worldwide (O'Connell and Bueno, 2018). Another major airline was Qatar Airways, launched in 1994 and relaunched in 1996 (Douglas, 2019). Its early growth was promoted by the country's leadership shift in 1995, whose vision was to adopt an internationalisation strategy that allowed the airline to connect Qatar to the rest of the world. Qatar Airway's global strategy has enabled it to increase its passenger numbers annually. Between 2015 and 2019, its number of passengers grew from 22 million to more than 29 million, and it served 172 destinations (Douglas, 2019). The competition increased in 2003 with the launch of Etihad Airways. Etihad's success is attributed mainly to stable financial backup. In 2008, the airline acquired 205 new aircraft valued at more than USD 20 billion (Bose, 2018). This strategy enabled Etihad Airways to compete with the world's largest airlines. Today, the three SCs carry more passengers than the majority of large-scale European airlines. They compete with and often outperform the world's greatest airlines in terms of quality and services.

4. KEY FINDINGS

4.1 BUSINESS MODEL

The three SCs operate with 40 minutes of flight time with no domestic operations, and under an identical business model of shifting crowds from the East to West, and back. They function in an environment characterised by high competition between them. In addition, with the development of more efficient and newer ultra-long-range aircraft, the airlines operating in these strategic hubs will gradually find themselves with a thinning flow of passengers. Currently, these airlines attract passengers because of their ability to maintain a highly complex hub and spoke network. Furthermore, they frequently operate flights that serve destinations that would be impossible for other airlines, as they will not have a viable load factor to be considered profitable. Through Emirates, Dubai has set the standard for how a country's vision can benefit its airline operations. Dubai's less restrictive entry requirements and more accessible business environment ensured that Emirates remained profitable. The idea of airline privatisation needs to be developed, as governments can no longer operate these airlines by themselves. Nevertheless, the danger of transferring ownership rapidly may result in complex issues related to rent, fuel, and the usage of airport slots. The current unclear operating mechanism does not provide clarity regarding the costs incurred by these airlines. The introduction of strict environmental measures can further increase operating costs and shrink airlines' profits. In addition, the COVID-19 pandemic exposed the SC's vulnerability to global events. The complete halt of air transport during the pandemic grounded airlines' entire fleets for an extended period. However, running costs were still incurred, regardless of whether the aircraft were in storage or airborne. During these challenging times, governments worldwide ensured the survivability of their airlines by injecting a massive amount of cash to keep them afloat.

4.2 SUPER CONNECTORS' INVESTMENTS ON OTHER AIRLINES

Over the years, the three SCs have expanded their network to almost every continent. They have also grown their presence in other airlines by buying shares therein (Table I). Emirates purchased a 43.6% stake in Sri Lanka Air in 1998 and sold it back to the Sri Lankan government in 2010. Since then, it has not invested in any other airline. In contrast, Qatar and Etihad made significant investments in several other airlines (Table I). Qatar plans to acquire shares in airlines that will allow it to extend its network through code sharing and utilise some of its older aircrafts by leasing them to new partners. Meanwhile, Etihad invested heavily in struggling airlines, believing it could turn things around and make a profit. However, this has not been the case, and Etihad has been forced to swallow more failed investments. Qatar Airways' recent investment in Rwanda Air, and the Rwanda Airport, is another example of its attempt to expand its presence on the African continent.

Table 1. Investments by Emirates, Qatar, and Etihad

Airline	Investment	Comments
Emirates Airline	• Sri Lankan Airlines, acquiring a 43.6% stake	The only investment Emirates had ended in 2010
Qatar Airways	• IAG (British Airways, Aer Lingus, Iberia): 21.46% • LATAM Airlines: 10% • Cathay Pacific: 9.6% • Air Italy: 49% • China Southern Airlines: 5% • 49% stake in Rwanda Air	Qatar Airways' investment in Air Italy ended in 2020.
Etihad Airways	• 29.2% stake in Air Berlin • 49.8% stake in Niki • 49% stake in Air Serbia • 40% stake in Air Seychelles • 49% stake in Alitalia • 24% stake in Jet Airways • 21.8% stake in Virgin Australia	Alitalia declared bankruptcy in 2018

4.3 RESEARCH ON THE THREE SUPER CONNECTORS

The rise of the Gulf carriers has profoundly impacted the aviation industry (Durganhee, 2013). Their explosive growth, as demonstrated by the near doubling of their combined passenger numbers between 2008 and 2013, has made them the new force in the world of air travel and confirms the Gulf as a critical node of global travel and trade flow (Hooper *et al.*, 2011). Their massive expansion has piqued the curiosity of both practitioners and academics, because of their strong investment profile and international performance. Nonetheless, they have also provoked several arguments and debates on how they conduct and manage their businesses. Several publications and reports have examined and explored their strategies, achievements, and business models (Table II). A common tendency when researching these three SCs is to analyse their network and fleet size development, as well as distortion in the competition, factoring in government subsidisation.

Table 2. Research on the three super connectors

	Title	Authors	Comments
1	Mission statements of international airlines: a content analysis	Kemp and Dwyer (2003)	Airlines' mission statement analysis
2	The changing dynamics of the Arab Gulf based airlines and an investigation into the strategies that are making Emirates a global challenger	O'Connell (2006)	Examines the changing dynamics of the region's airlines and researches the core principles; investigates why Gulf-based airlines are outperforming the world's airlines
3	Aviation growth in the Middle East: impacts on incumbent players and potential strategic reactions	Vespermann *et al.* (2008)	Competition and traffic patterns
4	From hub to tourist destination–An explorative study of Singapore and Dubai's aviation-based transformation	Lohmann *et al.* (2009)	Analyses the developments in Singapore and Dubai by examining interactions between their airlines, airports, governments, and tourism authorities
5	Strategic management of services in the Arab Gulf States	Kassem and Habib (2011)	Examines Gulf Air's early development and strategic planning
6	The development of the Gulf region's air transport networks–The first century	Hooper *et al.* (2011)	Evolution of air transport networks in Asia and the Gulf region
7	Can Gulf carriers sustain their current growth rate?	Alamdari (2011)	Performance and sustainability
8	Potential for Abu Dhabi, Doha, and Dubai Airports to reach their traffic objectives	Murel and O'Connell (2011)	Expansions, strategies, and hub development
9	The rise of the Arabian Gulf carriers: an insight into the business model of Emirates Airline	O'Connell (2011)	Strategy and business model

10	Political-geographic interpretations of massive air transport developments in Gulf cities	Derudder *et al.* (2013)	Geopolitical and geographical advantages
11	Building blocks: the Gulf gateways are working flat out to ensure their airport infrastructure can handle the growth strategies of the region's global network carriers	Morrison and Kingsley-Jones (2015)	Development and strategy
12	The growth of Gulf airlines: implications for airports, passengers and competitors	Grimme (2015)	Growth and competition among the European airlines
13	U.S. airlines reveal evidence they say proves Gulf Carriers get unfair subsidies	Clampet and Schaal (2015)	Competition and impact on U.S. airlines
14	Commentary: U.S. white paper on Gulf carriers distorts my academic report	O'Connell (2015)	Competition and impact on U.S. carriers
15	The impact of Gulf carrier competition on U.S. airlines	Dresner *et al.* (2015)	Competition and impact on U.S. carriers
16	Gulf Airlines and the changing map of global aviation	Ulrichsen (2015)	Questions the sustainability of the three aggressively expanding airlines within such a concentrated region (and market)
18	Gulf carriers against the trend? A conceptual framework of motivations and downsides related to joining multi-partner alliances in the airline industry	Werne (2016)	Alliance's selection
19	Low-cost carriers in the Middle East and North Africa: prospects and strategies	Morrison and Mason (2016)	Low-cost carriers in the Middle East
20	Persian Gulf and Turkish airlines in Africa	Pirie (2017b)	Expansion of the Gulf carriers in Africa

21	Gulf airline subsidisation: should the European Union and the United States collaborate to combat this alleged threat?	Moon (2018)	Subsidisation of Gulf airlines
22	Airline business strategy	Lohmann and Spasojevic (2018)	Strategy
23	A study into the hub performance Emirates, Etihad Airways and Qatar Airways and their competitive position against the major European hubbing airlines	O'Connell and Bueno (2018)	Competition and performance
24	Do the Gulf airlines distort the level playing field?	Douglas (2019)	Gulf carriers and subsidisations
25	Viewing the Middle East big three (MEB3) carriers as heterogeneous	Aquilina-Spagnol *et al.* (2020)	Future development and strategy
26	The economics of Africa's floriculture air-cargo supply chain	Button (2020)	Competition and impact on the U.S.
27	The role of Qatar Airways in the economic development of Qatar: before and during the Gulf crisis	Petcu (2021)	Examines the Qatar Airways crisis before and during the Gulf crisis (blockade)
28	Analysis of the dispute between American and Gulf carriers in aviation	Fernando (2021)	Competition and dispute

5. DISCUSSION AND CONCLUSION

Aviation has played a pivotal role in global poverty by creating international routes that connect people and continents. The Middle East has had no success in regional cooperation initiatives. The closest regional collaboration was Gulf Air in 1973. The significance of regional cooperation should be discussed as a crucial factor and key stepping stone in achieving borderless skies. As such, the EU has shown the importance of cooperation that extends past a sovereign nation and into a regional grouping. The need for a national airline is strongly felt worldwide, with prestige and political communication perhaps being the most obvious reasons. As the role of airlines continues to expand, the existing bilateral framework is rapidly becoming

incapable of accommodating the industry's technological revolution. There is a need for a universal liberalisation mechanism and updated air transport network strategies. Consequently, these efforts must be consistent and harmonised on a regional level, with ICAO making inroads in encouraging the methodical global development of civil aviation. Moreover, air transport within the Arab states is of great importance due to the vast geographical dimensions of the region and absence of a modern ground transportation system. With its rich history and common descendants, the Arab states share countless economic, social, and cultural characteristics. Thus, there is an urgent need to develop close cooperation within the region to meet the ever-increasing cost of air transport and establish collaboration to overcome technical difficulties. Here, ACAO must play a substantial role in creating a spirit of cooperation on civil aviation matters among the Arab countries. Both ICAO and ACAO can introduce a discourse among the Arab nations to establish an agreement on how to open our skies and ease air movement. This might ignite other initiatives towards more freedom and joint efforts, such as aerial navigation and a radar control system parallel to the block system in the EU. Furthermore, regional training centres and authorised maintenance hubs should be developed to reduce the cost and time required to develop skilled local personnel. Finally, the three SCs can negotiate a better future for the region's air transport industry. Their massive investment in developing highly technical infrastructure and airport hubs can help smaller airlines codeshare, allowing them to act as feeders to their hubs so that passengers can benefit from the vast network. Moreover, with coordination and better management, smaller regional airlines can persuade their governments to establish a joint, less restrictive visa arrangement and more liberalisation of existing bilateral agreements. They can invest in negotiating the building blocks of a joint single sky agreement, if not with the whole Arab nation, then at least on the Asian side of the Middle East.

6. LIMITATIONS AND FUTURE RESEARCH

The limitations of this study include the difficulties in analysing government subsidies due to the confidentiality of the subject. Future studies could explore the benefits of investing in other airlines as well as the implications of those that fail.

REFERENCES

AACO (2018), Arab Air Carriers Organization. Available from: https://arab.org/directory/arab-air-carriers-organization/ (accessed on 29/1/2022).

Aquilina-Spagnol, C., Ellis, D. and Pagliari, R. (2020), 'Viewing the Middle East Big Three (MEB3) Carriers as Heterogeneous', Transportation Research Procedia, 51, 323–332. DOI: 10.1016/j.trpro.2020.11.035.

Bailey, C., Holyoak, A. and Snider, J. (2019), 'An Analysis of the Effects of the Aviation Industry in the United Arab Emirates', Embry-riddle Aeronautical University.

Bina, C. (2017), 'Iran's Oil, the Theory of Rent, and the Long Shadow of History: A Caveat on Oil Contracts in the Islamic Republic', Revue Internationale des Études du Développement, 1, 63–90. DOI: 10.3917/ried.229.0063.

Bose, I. (2018), 'The Strategic Environment of the Aviation Industry in UAE: A Case Study on Etihad Airways', IIUM Journal of Case Studies in Management, 9, 21–27.

Butt, G. (2011), History in the Arab Skies: Aviation's Impact on the Middle East, Nicosia, Cyprus: Rimal Publications.

Button, K. (2020), 'The Economics of Africa's Floriculture Air-Cargo Supply Chain', Journal of Transport Geography, 86, 102789. DOI: 10.1016/j.jtrangeo.2020.102789.

Clampet, J. and Schaal, D. (2015), 'US Airlines Reveal Evidence They Say Proves Gulf Carriers Get Unfair Subsidies', Skift, 05.

Derudder, B., Bassens, D. and Witlox, F. (2013), 'Political-geographic Interpretations of Massive Air Transport Developments in Gulf Cities', Political Geography, 36, A4–A7. DOI: 10.1016/j.polgeo.2012.12.008.

Douglas, I. (2019), 'Do the Gulf Airlines Distort the Level Playing Field?', Journal of Air Transport Management, 74, 72–79. DOI: 10.1016/j.jairtraman.2018.09.008.

Dresner, M., Eroglu, C., Hofer, C., Mendez, F. and Tan, K. (2015), 'The Impact of Gulf Carrier Competition on US Airlines', Transportation Research Part A: General, 79, 31–41.

Durganhee, A. (2013), 'Gulf Airlines Shake Up Aviation Alliances. CNN Travel'. Available from: http://www.cnn.com/2013/01/16/travel/gulf-airlines-alliances/ (accessed on 26/12/2021).

Elashiq, S. (1987), 'The Arab Civil Aviation Council (ACAC)', doctoral dissertation. Available from: https://escholarship.mcgill.ca/downloads/4m90dw62r (accessed on 12/06/2021).

Fernando, A. (2021), 'Analysis of the Dispute Between American and Gulf Carriers in Aviation', thesis, Liberty University. Virginia, USA.

Grimme, W. (2015), 'The Growth of Gulf Airlines-Implications for Airports, Passengers and Competitors', Institute of Air Transport and Airport Research Center, German Aerospace Center.

Henderson, J.C. (2014), 'Global Gulf Cities and Tourism: A Review of Abu Dhabi, Doha and Dubai', Tourism Recreation Research, 39, 1, 107–114. DOI: 10.1080/02508281.2014.11081329.

Hooper, P., Walker, S., Moore, C. and Al Zubaidi, Z. (2011), 'The Development of the Gulf Region's Air Transport Networks—the First Century', Journal of Air Transport Management, 17, 6, 325–332. DOI: 10.1016/j.jairtraman.2011.02.001.

Joshan, S. and Maertens, S. (2020), 'Low Cost Carriers in the Middle East and North Africa (MENA) Region: Emergence and Barriers to Development', Journal of Transport Geography, 87. DOI: 10.1016/j.jtrangeo.2020.102799, 102799.

Kassem, M.S. and Habib, G.M. (2011), Strategic Management of Services in the Arab Gulf States, Berlin, Germany: De Gruyter.

Kemp, G. (2012), The East Moves West: India, China, and Asia's Growing Presence in the Middle East, Washington DC: Brookings Institution Press.

Kemp, S. and Dwyer, L. (2003), 'Mission Statements of International Airlines: A Content Analysis', Tourism Management, 24, 6, 635–653. DOI: 10.1016/S0261-5177(03)00049-9.

Lohmann, G., Albers, S., Koch, B. and Pavlovich, K. (2009), 'From Hub to Tourist Destination—an Explorative Study of Singapore and Dubai's Aviation-Based Transformation', Journal of Air Transport Management, 15, 5, 205–211. DOI: 10.1016/j.jairtraman.2008.07.004.

Lohmann, G. and Spasojevic, B. (2018), 'Airline Business Strategy', The Routledge Companion to Air Transport Management, London: Routledge, 139–153.

Moon, S.H. (2018), 'Gulf Airline Subsidization: Should the European Union and the United States Collaborate to Combat this Alleged Threat', Georgia Journal of International and Comparative Law, 47, 233.

Morrison, M. and Kingsley-Jones, M. (2015), 'Building Blocks: the Gulf Gateways are Working Flat Out to Ensure Their Airport Infrastructure can Handle the Growth Strategies of the Region's Global Network Carriers', Airline Business.

Morrison, W.G. and Mason, K. (2016), 'Low cost Carriers in the Middle East and North Africa: Prospects and Strategies', Research in Transportation Business and Management, 21, 54–67. DOI: 10.1016/j.rtbm.2016.09.005.

Murel, M. and O'Connell, J.F. (2011), 'Potential for Abu Dhabi, Doha and Dubai Airports to Reach Their Traffic Objectives', Research in Transportation Business and Management, 1, 1, 36–46. DOI: 10.1016/j.rtbm.2011.06.004.

O'Connell, F. (2015), 'Commentary: US White Paper on Gulf Carriers Distorts My Academic Report', Air Transport World, 26.

O'Connell, J. and Williams, G. (2010), 'Air Transport Development in the Middle East: A Review of the Process of Liberalisation and its Impact', Journal of Air Transport Studies, 1, No. 1, 1–19. DOI: 10.38008/jats.v1i1.112.

O'Connell, J.F. (2006), 'The Changing Dynamics of the Arab Gulf Based Airlines and an Investigation into the Strategies that are Making Emirates into a Global Challenger', World Review of Intermodal Transportation Research, 1, 1, 94–114. DOI: 10.1504/WRITR.2006.011154.

O'Connell, J.F. (2011), 'The Rise of the Arabian Gulf Carriers: An Insight into the Business Model of Emirates Airline', Journal of Air Transport Management, 17, 6, 339–346. DOI: 10.1016/j.jairtraman.2011.02.003.

O'Connell, J.F. and Bueno, O.E. (2018), 'A Study into the Hub Performance Emirates, Etihad Airways and Qatar Airways and Their Competitive Position Against the Major European Hubbing Airlines', Journal of Air Transport Management, 69, 257–268. DOI: 10.1016/j.jairtraman.2016.11.006.

Petcu, C. (2021), 'The Role of Qatar Airways in the Economic Development of Qatar: Before and During the Gulf crisis', Gulf Studies, Singapore: Springer, 325–345. DOI: 10.1007/978-981-15-8735-1_19.

Pirie, G. (2017a), 'Air Empire: British Imperial Civil Aviation', 1919–39, Manchester: Manchester University Press.

Pirie, G. (2017b), 'Persian Gulf and Turkish Airlines in Africa', The Economics and Political Economy of African Air Transport, London: Routledge, 80–98.

Satia, P. (2014), 'Drones: A History from the British Middle East', Humanity: An International Journal of Human Rights, Humanitarianism, and Development, 5, 1, 1–31. DOI: 10.1353/hum.2014.0002.

Squalli, J. (2014), 'Airline Passenger Traffic Openness and the Performance of Emirates Airline', Quarterly Review of Economics and Finance, 54, 1, 138–145. DOI: 10.1016/j.qref.2013.07.010.

Tan, A.K.J. (2016), 'The Future of Multilateral Liberalization of Air Transport in Asia', In Duval, D.T. (ed.), Air Transport in the Asia Pacific, London: Routledge, 279–296.

Ulrichsen, K.C. (2015), 'Gulf Airlines and the Changing Map of Global Aviation'. Available from: http://www.bakerinstitute.org/research/gulf-carriers-sustaining-rapid-ascent/ (accessed on 12/04/2022).

Vespermann, J., Wald, A., and Gleich, R. (2008), 'Aviation Growth in the Middle East—Impacts on Incumbent Players and Potential Strategic Reactions', Journal of Transport Geography, 16, 6, 388–394. DOI: 10.1016/j.jtrangeo.2008.04.009.

Watson, D. (2013), 'British Overseas Airways Corporation 1940–1950 and its Legacy', Journal of Aeronautical History Paper, 3, 136–161.

Werne, T.V. (2016), 'Gulf Carriers Against the Trend? A Conceptual Framework of Motivations and Downsides Related to Joining Multi-partner Alliances in the Airline Industry', Master's thesis, Aalto University School of Business.

ACKNOWLEDGEMENTS

I would like to thank Professor Bertrand (Emlyon Business School) for his encouragement and support in the early stages of this research. I thank Editage for editing this manuscript.

AUTHOR'S BIO

Hamad Al Thani holds a master's degree in airline efficiency and is a doctoral student in a joint program between Durham University and Emlyon Business School. His primary areas of interest include airline efficiency, mergers and acquisitions, airline CEOs' discourse, and non-parametric measures such as 'Data Envelopment Analysis'. Address: Salwa Road, P.O. Box. 14715, Doha, Qatar, Tel: +97455511435, Email: halthani@hotmail.com.

A STRUCTURED LITERATURE REVIEW ON DESTINATION BRANDING THROUGH IN-FLIGHT MAGAZINES

Ioulia Poulaki
Department of Business Administration, University of the Aegean, Chios, Greece

Eirini Vlassi
School of Economics and Management, Neapolis University Pafos, Pafos, Cyprus

ABSTRACT

The aim of this research note is to investigate the literature on the identification of brand identity elements of tourist destinations in airline magazines distributed in flight. The methodology followed concerns a relevant literature review for the years 2008-2023. Academic journals with a citation score of 1.0 or higher in the field of tourism and marketing were initially selected from the Scopus database. As the effort did not bring results, a search was carried out in the entire Scopus database, without the above criteria. The keywords used are inflight magazines, in-flight magazines, destination brand, destination branding, destination image, destination identity, however the search resulted in a very small number of articles (27) of which only four (4) were considered as relevant to the subject under consideration. Thus, any criteria that could be used for the review process were re-examined and the search was conducted on a less 'rigorous' basis, Google Scholar, in order to enrich the data and generate a comprehensive discussion of the research question. Finally, only nine (9) articles were collected for analysis (content and textual), while the findings further highlight the research gap that exists in the literature and the need for further research.

KEYWORDS

in-flight magazines; destination branding; tourism destination; airlines; promotion; destination identity

1. INTRODUCTION

Tourism literature well discusses destination branding in terms of definition and context. Pereira et al. (2012) postulate that destinations provide tourists with an integrated experience through the consumption of an amalgama of tourism products and services, under the brand name of the destination. Undoubtedly, each destination provides a different tourist product, which is also composed of the individual characteristics of each place, in terms of climate, natural beauty, architectural landscape and culture of the local inhabitants (Urry and Larsen, 2011). If the destinations offered the same product, then consumers would not seek for a different destination on each trip. Evidently, destinations strongly pursue the revisit, precisely because they know that tourists usually seek different experiences on each trip (Rasoolimanesh et al., 2021), to enrich their knowledge and images since they carry the primordial quality of the traveler. In fact, tourists tend to develop a destination image driven by previous experiences, advertisements, common beliefs, media and word of mouth, setting expectations that will or will not be met during their stay at the destination (Moustaka and Constantoglou, 2021). To this extend, Buhalis (2000) asserts that a destination is a perceptual concept which differs for each consumer based on specific factors such as travel experience, purpose of travel and cultural background, as well as on demographic and psychographic characteristics.

Having the above in mind and given that in-flight magazines usually present, through extensive articles and photo galleries, destinations related with their network, it is worth investigating the influence that these presentations have in the overall perception of a potential tourist toward a destination. That is to say, how in-flight magazines contribute to destination branding and place image. Before proceeding with this main research question, it is worth mentioning the four elements of destination branding (Figure 1) as developed by Hankinson (2004) who asserts that a) relationships with visitors, b) primary service relationships, c) media relationships and d) brand infrastructure relationships, shape destination branding as a term. All these elements are driven by the core brand of the destination which is composed of personality, positioning and reality. Therefore, the authors consider media relationships as an element of destination branding that should depict the personality (local culture and landscape) of a destination, its positioning within tourism market, by choosing to represent and promote (through images and/or personas) destination's reality.

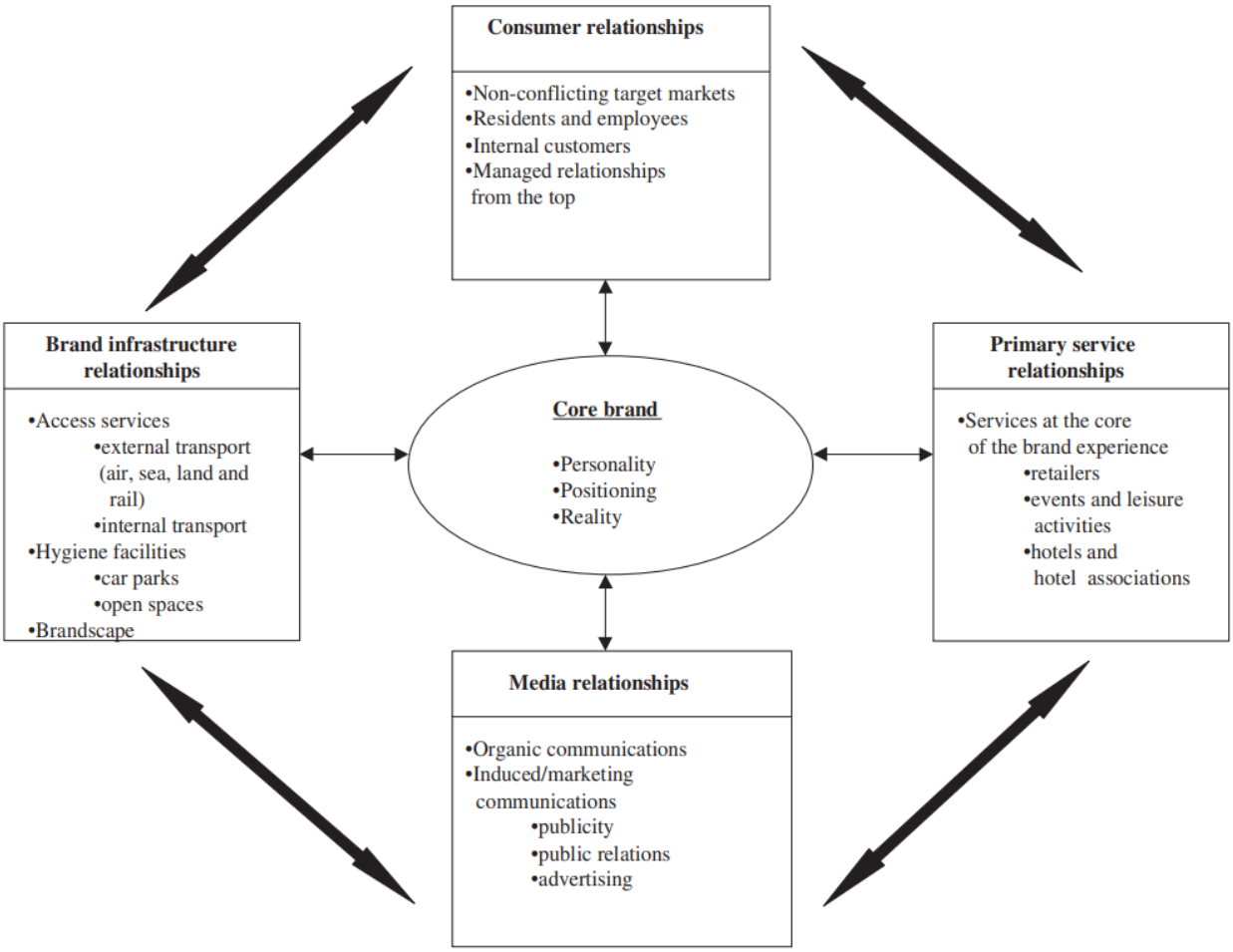


Figure 1. The four elements of destination branding

Source: Hankison, 2004

Given the aforementioned, the authors seek to identify these particular attributes of media relationships as an element of destination branding and place image focusing on in-flight magazines.

2. RESEARCH METHODOLOGY

The methodology used for the development of this research note is a structured literature review, summarizing and synthesizing the selected literature applying content and textual analysis techniques while reviewing. By presenting a comprehensive background of the literature regarding the studied fields, theoretical and conceptual frameworks were developed, the authors aim at highlighting the international experience (Poulaki et al., 2022) on destination branding through in-flight

magazines. All the presented information was gathered from official scientific databases for the years 2008-2023. Academic journals with a citation score of 1.0 or higher in the field of tourism and marketing were initially selected from the Scopus database. As the effort did not bring results, a search was carried out in the entire Scopus database, without the above criteria. The keywords used are inflight magazines, in-flight magazines, destination brand, destination branding, destination image, destination identity, however the search resulted in a very small number of articles (27) of which only four (4) were considered as relevant to the subject under consideration. Thus, any criteria that could be used for the review process were re-examined and the search was conducted on a less 'rigorous' basis, Google Scholar, in order to enrich the data and generate a comprehensive discussion of the research question. Finally, only nine (9) articles were collected for analysis, highlighting the research gap that exists in the literature and the need for further research.

When it comes to the content analysis, as a review technique, Neuendorf (2017) lists several definitions that have been formulated from time to time. Two of them concerns Berelson's definition, according to which, "content analysis is a research technique for the objective, systematic and quantitative description of the content of communication" and Krippendorff who argued that "content analysis is a research technique through of which valid and verifiable conclusions are drawn from the texts within the general framework used". In conclusion, the method in question is an attempt to condense and standardize the verbal and non-verbal messages transmitted by each transmitter to each possible receiver.

Moreover, textual analysis as a literature review technique refers to a qualitative research form using specific tools, focusing on the underlying ideological and cultural assumptions of a text. It is widely used within the field of communications as it is a trans-disciplinary method that is also present in a number of the social sciences and humanities, while it may complement other qualitative methods within these disciplines such as content analysis (Arya, 2020). In this paper, textual analysis tool is used as a complementary material for the assessment of qualitative data, such as their main topics and most frequent words, exactly as it used by Albuquerque and Gomes Dos Santos (2023) in the identification of the most frequent terms, which includes the presentation of illustrative word clouds.

3. FINDINGS

According to the methodology followed, the authors perform the analyses seeking to identify those messages documenting that the existing literature on the contribution of in-flight magazines to destination branding.

3.1 Content Analysis

The content analysis refers to a structured literature review give in tabular form as follows tables 1,2.

Table 1. Structured Literature Review

Qualitative Analysis	***Authors***	***Year of publication***	***Research Methodology***	***Research Aim***
Content Analysis	Thrurlow and Jaworski	2003	72 aviation magazines reviewed Issues from June/July/August 2001 Regions: Asia and Australia (14), Africa and Middle East (11), Americas and Caribbean (17), Europe (32)	The aim was to identify the global nature of in-flight magazines. This is expressed through: a) Use of English Language; b) Use of world-famous cities and celebrities; c) Show global route maps.
	Small, Harris and Wilson	2008	Seven issues of Air New Zealand magazine (February 2005 to August 2005). Five issues of Qantas: The Australian Way (February, April, May, July and August 2005). Analyzed the content of 1009 ads	Inflight magazine advertising audience research. 260 ads related to travel and tourism. 104 of these involved individuals.
Content Analysis and Visual Analysis	Subotić	2017	The complete archive (252 issues) of JAT Review (in-flight magazine of Yugoslav airlines).	Tracing the reconstruction of the identity of Yugoslavia identity over time.
Visual Analysis	Martikainen and Adriani	2022	The cover images of two in-flight magazines—Ulisse (Alitalia) and Blue Wings (Finnair): 90 cover images published between January 2016 and February 2020	Cover images and visual rhetoric as an image shaping strategy. 11 of the 13 covers depicted dreamy destinations as the in-use effects created dreamlike qualities. Analysis of the

				characteristics of Blue Wings cover images depicting people.
	Lawson	2013	73 pages of real estate advertisements in five magazine issues were randomly sampled from in-flight magazines on domestic flights between May 2008–December 2009.	Representations of real estate as a means of capturing environmental and social views in China during the period 2008-2009. Its purpose is to investigate how well rhetorical texts communicate and influence relevant ethical views on environmental protection and social equality.
Comparative Analysis	Vlassi, Deirmentzoglou, Agoraki, Papatheodorou	2023	Comparative analysis between Blue inflight magazine (6 issues from 2019 and only 3 from 2020) and Vogue Greece magazine (12 issues in total).	This chapter attempts to highlight the interdependence between fashion and elements of destination identity by focusing on how destination attributes are portrayed in in-flight and fashion magazines.

Table 2. Suggestions for future research found in the Literature Review

Authors	***Questions for Future Research***
Martikainen and Adriani (2022)	How customers perceive in-flight magazine cover images?
Subotić (2017)	International relations - How states present themselves to international and domestic others – both visually and textually – can give us information about their priorities, concerns, and desires, which can then help us guide their actions in a more detailed political context?
Small, Harris and Wilson (2008)	Investigating consumer response to dominant messages – Understanding in-flight readings of magazine advertisements.
Vlassi, Deirmentzoglou, Agoraki, Papatheodorou (2023)	Examining the interaction between fashion and tourism to identify how it affects potential visitors' destination selection process and behavior. Qualitative research is proposed through interviews with four different audiences, fashion and in-flight magazine editors, fashion magazine readers and airline passengers.

3.2 Textual Analysis

Further to the above, a textual analysis aims at crosscheck the main purpose of the selected papers related with the destination branding through in-flight magazines. As mentioned in the methodology section, the keywords of the research in academic databases were:

- inflight magazines
- in-flight magazines
- destination brand
- destination branding
- destination image
- destination identity

Textual analysis for the research of *Vlassi, Deimertzoglou, Agoraki and Papatheodorou (2023)* indicates in descending order the words:

destination
fashion
tourism
brand
magazine
branding
Greece
Images
vogue
Marketing

Indeed, the text brings up "inflight" and "Aegean" (airline) but it seems that destination branding through in-flight magazines is not the core subject in this paper.

Additionally, textual analysis for the research of *Thurlow and Jaworski (2003)* selects the words in descending order as follows:

- Magazines
- Flight
- Global
- Airlines
- International
- English
- World
- National

while the words travel, tourism and destinations appear in a lower ranking indicating that destination branding through in-flight magazines is not the core subject in this paper.

Furthermore, textual analysis for the research of *Small, Harris and Wilson (2008)* ranks in descending order the words:

Magazines
Tourism
New Zealand
In-flight
Qantas
Advertisements
Travel

while airlines, global, people, discourse, travelers and business, are words that have been lower ranked. The terms brand, branding, destination, image or identity are not met in this specific textual analysis. Consequently, destination branding through in-flight magazines is not the core subject in this paper.

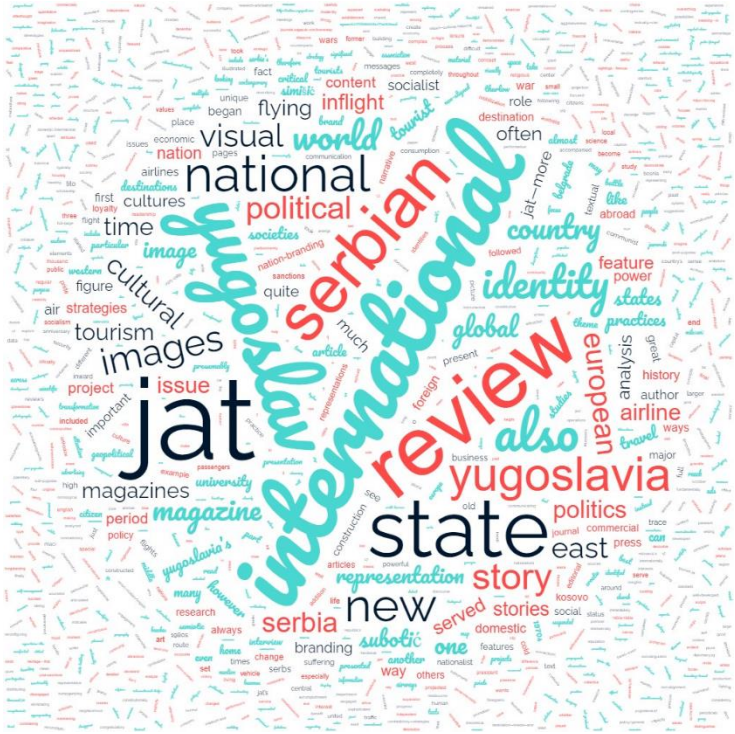
Moreover, textual analysis for the research of *Martikainen and Adriani (2022)* indicates the following words as leading ones in paper's subject matter:

- Management
- People
- Visual
- Image
- cover
- Impression
- Magazine
- Corporate

while travel, infight, airlines, destinations, depicted and celebrities are by far lower in word ranking. In any case, neither does this article explore destination branding through in-flight magazines as main topic.

In addition to the previous paper, textual analysis for the research of *Subotic (2017)* indicates in descending order the following words:

- international
- Yugoslav
- JAT (airline)
- Review
- State
- Yugoslavia
- National
- identity



while it further depicts in a lower degree the words country, global, political, images, Serbia, showing that destination branding through in-flight magazines was definitely not the main subject of the paper.

Finally, textual analysis for the research of *Lawson (2013)* outputs a word cloud that highlights the words:

- Real estate
- Advertisements
- Environmental
- Development
- Chinese
- Urban
- Social
- Cities

while it also depicts marketing, nature, property and land in a lower level. In any case, another research on in-flight magazines does not cover destination branding despite that marketing essence of the paper.

Summarizing the findings of both analyses, they indeed indicate that airlines' in-flight magazines feature tourist destinations that are either served by their network or located near the airports where they operate. However, none of the papers indicate that destination branding constitutes the primer aim of these research efforts. Nonetheless, the methodologies resulting from the review do not accurately seek to capture important questions such as:

A) Are the characteristics and typology of the presented tourism destinations clearly captured?

B) Does the presentation of tourism destinations address specific target markets, or does it cover every type of tourist?

C) Do airlines ultimately seek the effective promotion of tourism destinations or the strengthening of the flights of their networks? For these research questions, the authors propose the methodological framework for future research, acknowledging the existing research gap.

4. CONCLUSIONS

Undoubtedly, there is a gap in the literature regarding destination branding through in-flight magazines. In fact, there are no research efforts on this topic which is indeed of particular importance given the significant rise in air travel coupled with the fact that the share of air transport in international arrivals reaches 58%, demonstrating the volume of passengers - potential tourists who have access to magazines and have time to read them during a flight. Thus, articles related with destinations constitute an information that will reach the receiver who is actually devoted to what they are reading. Therefore, this research note underlines that the role of in-flight magazines in shaping the identity of the tourist destination has not been extensively analyzed by the literature and in the future, in-flight magazine case studies should be carried out as well as more qualitative research in this direction. Furthermore, quantitative research should be implemented to identify the impact of in-flight magazine content on public perception of the destination. Undoubtedly, synergies in tourism are essential, as it is a combination of activities, while transportation in itself is not a product with demand, while transportation is required to reach destinations. Therefore, results of such research and studies could be a trigger for collaborations between tourism destination management organizations and airlines in order to present the destinations in an appropriate and targeted manner and also to enhance airline flights. Evidently, the knowledge of tourist destination management organizations regarding the characteristics and types of each destination can contribute to its perfect presentation to the large traveling public that is reached through airline flights.

REFERENCES

Albuquerque, F. and Gomes Dos Santos, P. (2023). Recent Trends in Accounting and Information System Research: A Literature Review Using Textual Analysis Tools. FinTech Vol. 2 (2), pp: 248-274. https://doi.org/10.3390/fintech2020015

Arya, A. (2020). An Overview of Textual Analysis as a Research Method for Cultural Studies. International Journal for Innovative Research in Multidisciplinary Field, Vol. 6 (3). https://www.ijirmf.com/wp-content/uploads/IJIRMF202003030.pdf

Hankinson, G. (2004). Relational network brands: Towards a conceptual model of place brands. Journal of Vacation Marketing Vol. 10(2), pp: 109–121. https://doi.org/10.1177/135676670401000202

Lawson, G. (2013). A rhetorical study of in-flight real estate advertisements as a potential site of ethical transformation in Chinese cities. Cities, 31, 85-95.

Martikainen, J., & Adriani, R. (2023). Cover Images of Inflight Magazines as Airlines' Methods of Impression Management: Alitalia's Ulisse Magazine and Finnair's Blue Wings Magazine. Corporate Reputation Review, 26(1), 64-80.

Moustaka, A. and Constantoglou, M. (2021). Destination Image as Means of Branding and Marketing: Evidence from a Mountainous City Destination in Greece. Journal of Tourism Management Research Vol. 8(1). https://doi.org/10.18488/journal.31.2021.81.30.47

Neuendorf, K., 2017, The Content Analysis Guidebook. California: Sage Publications, Inc.

Pereira, R., Correia, A. and Schutz, R. (2012). Destination Branding: A Critical Overview. Journal of Quality Assurance in Hospitality & Tourism Vol. 13(2), pp. 81-102. https://dx.doi.org/10.1080/1528008X.2012.645198

Poulaki, I., Karioti, V. and Tsoulogianni, C. (2023). Women in Tourism Industry: From Glass Ceiling Effect to #MeToo Movement. In: Katsoni, V. (eds) Tourism, Travel, and Hospitality in a Smart and Sustainable World. IACuDiT 2022. Springer Proceedings in Business and Economics. Springer, Cham. https://doi.org/10.1007/978-3-031-29426-6_20

Rasoolimanesh, S. M., Seyfi, S., Hall, M. and Hatamifar, P. (2021). Understanding memorable tourism experiences and behavioural intentions of heritage tourists, Journal of Destination Marketing & Management, Vol. 21, https://doi.org/10.1016/j.jdmm.2021.100621.

Subotić, J. (2018). jat—More than flying: Constructing Yugoslav identity in the air. East European Politics and Societies, 32(04), 671-692.

Small, J., Harris, C., & Wilson, E. (2008). A critical discourse analysis of in-flight magazine advertisements: The 'social sorting of airline travellers?. Journal of Tourism and Cultural Change, 6(1), 17-38.

Thurlow, C., & Jaworski, A. (2003). Communicating a global reach: Inflight magazines as a globalizing genre in tourism. Journal of sociolinguistics, 7(4), 579-606.

Urry, J. and Larsen, J. (2011). The Tourist Gaze 3.0. London: SAGE Publications Ltd.

Vlassi, E., Deirmentzoglou, G., Agoraki, K., Papatheodorou, A., (2023). When tourism & fashion co-create place brand. In Fashion and Tourism. Parallel Stories. Emerald.

AUTHORS' BIO

Dr **Ioulia Poulaki** is an Assistant Professor of Tourism Business Administration in the Department of Business Administration at the University of University of the Aegean, Greece. She also collaborates with Hellenic Open University in the undergraduate program "Tourism Management". She has ten years of experience in the air transport industry in commercial and operational departments. Her research interests focus on the fields of Air Transport Management, Tourism Distribution Channels, Digital Tourism and Tourism Development. https://orcid.org/0000-0001-6861-7136 Email: i.poulaki@aegean.gr

Dr **Eirini Vlassi** is currently a lecturer of management and marketing of tourism business and tourism destinations in Neapolis University Pafos, Cyprus. She is also an adjunct lecturer in the MBA in Aviation and Tourism Management offered by the Frankfurt University of Applied Sciences, Germany in collaboration with the University of the Aegean. She has also participated in the development and promotion of the official digital guide of the city of Athens called "This is Athens". Email: e.vlassi.2@nup.ac.cy

PRIORITIZING CRISIS MANAGEMENT APPROACHES IN THE AIRLINE INDUSTRY. EVIDENCE FROM GREECE

Konstantinos Chrysafis
Department of Tourism Economics and Management, University of the Aegean, Greece.

Georgia Papadopoulou
Department of Tourism Economics and Management, University of the Aegean, Greece.

ABSTRACT

The global airline industry has faced a considerable downturn, because of the recent COVID-19 pandemic crisis. Numerous measures had to be taken from governments and the airline industry itself in order to survive the pandemic crisis. The Greek airline industry is the main case of this study. The main goal of this study is to prioritize the appropriateness of crisis management approaches in the domestic airline market. To achieve that, Fuzzy MCDM (Multi-Criteria Decision Making) is employed (consequently a set of criteria and their weighting). The criteria are extracted using the thematic analysis and synthesis method gathering data from the international literature and news. The MCDM analysis is implemented in a fuzzy setting due to the inherent uncertainty in the airline market. The results of this study demonstrate that the actions better characterizing the crisis operations of the domestic airline companies fall under the knowledge-based management approach.

Keywords: crisis management; airline industry; uncertain environments; operations management; tourism industry; COVID-19

1. INTRODUCTION

In order to provide a good and sufficient definition of the concept "crisis", three basic perspectives have been identified in worldwide literature so far. These are the corporate-business management perspective, the organizational perspective, and the public administration perspective.

In the first perspective, corporate-business management, the definition of "crisis" is directly related to the two basic concepts that characterize a company, growth and survival. Two of the perspective's founders (Krystek, 1987; Schulten, 1995) describe a crisis as a process that results in a threat to the business's survival during or after the occurrence of an unanticipated phenomena or event, as well as one or more negative consequences on the business's growth rate. In addition to these approaches, Burtscher (1996) defines the crisis as a condition that endangers the company's strategic plan's implementation. Fink (2002) quotes a dual (and more optimistic) approach to this perspective, claiming that the crisis shapes new data that may bring the organization to a worse or better position in respect to the one before its emergence.

The organization-level perspective defines a crisis as an emergency situation that has a negative impact on the two main dimensions that characterize an organization, namely reputation and performance (Ziek, 2015). Furthermore, the same author mentions that significant conflicts between stakeholders emerge during the crisis. Using the same reasoning, Coombs (2019) defines a crisis as a series of unanticipated events that raise the insecurity of stakeholders' expectations. Furthermore, according to Combs (2019), the crisis might be economic, environmental, health-related, or even security-related, and it can cause considerable problems in the two distinctive characteristics of an organization, namely reputation and performance.

The third perspective is that of public administration, where the crisis is described as a circumstance in which public administration institutions and processes struggle to manage the crisis's consequences (Walby, 2015). According to the same author, the main types of crises in public administration are the following: a. the financial crisis, which is associated with the emergence of difficulties in financial governance, b. the economic crisis, which has an impact on macroeconomic figures, c. the fiscal crisis, which has a negative impact on public benefits, and d. the political crisis, which is associated with the malfunction of governance models.

In the international literature on crisis management, many elements are assigned in connection to the crisis stage (Rotting, 1976; Muller, 1986; Schulten, 1995; Smith, 2004). Coombs (2015) recently defined crisis management as a series of steps aimed at managing

the crisis and smoothing its effects at various levels. The same author attributes four major characteristics to the concept of "crisis management": prevention and preparation (in the pre-crisis phase), reaction (during the crisis), and revision (in the phase after the crisis). The following question emerges as a result of this definition. Is risk management a component of crisis management or an independent process? Dorfman and Cather (2013) define risk management as the process of identifying and managing risk in relation to company's strategic planning. This process includes setting goals, identifying risks, developing management techniques, establishing performance indicators, and monitoring growth. Wut et al. (2021), underline that risk management should be a critical step within the crisis management process. This results from the fact that one or more unaddressed risks may trigger a crisis.

In this research paper the aim is to analyze the crisis management approaches in the airline industry and to perform their prioritization using multi-criteria analysis. For the implementation of the prioritization, a set of criteria will be formulated as well as their weighting, which will be extracted from an analytical study of the international literature and news. The multi-criteria analysis will be implemented in a fuzzy environment due to the inherent uncertainty in the airline market. The result of the research will be a set of criteria for prioritizing crisis management approaches and the prioritization of these approaches in the Greek aviation industry. This method can also be applied to the international aviation industry.

The paper is organized as follows: In section 2, the international literature on crisis management approaches in general and in the aviation industry is analyzed. In section 3, the type of data used in the research (primary) as well as the steps of the applied methodology is described. In section 4 the findings of the study are listed in detail and in section 5 the discussion of these results in relation to previous studies on this topic. Finally, the last section concludes.

2. LITERATURE REVIEW

2.1. Crisis Management Approaches

As far as crisis management is concerned, it is considered that there are three phases. These are prevention, response and recovery (Hale et al., 2005). Managers must decide the tactics they will follow to manage the crisis, which will greatly influence the perception of interest groups about the company itself, with the main consideration being its reaction time (Alpaslan et al., 2009). The COVID-19 pandemic concerns the global tourism market as an

event that needs to be addressed with specific crisis management methods that include disaster and risk management (Wutet al., 2021). Albers and Rundshagen (2020) examined the COVID-19 responses from European airline companies and concluded that even though crises create new opportunities, takeovers are not expected as long as COVID-19 evolves.

Three dominant approaches to crisis management are found in international literature.

Knowledge management is a group of techniques for gathering, processing and managing information for a company or an organization (Grand and Girard, 2015). It is a set of steps aimed at achieving business goals such as increasing performance, better positioning in the market, adopting innovations and lessons learned for their future utilization (Gupta and Sharma, 2004). Many researchers have studied knowledge management as a reliable approach to crisis management (Alavi and Leinder, 2001; Wang, 2005; Evans and Elphic, 2005; Mistilis and Sheldon, 2006; Scott et al., 2008; Wang, 2009; Jia et al. al., 2011; Blackman et al., 2011; Jia et al., 2012; Paraskevas et al., 2013). The main function of this approach has to do with the identification of knowledge groups, the main knowledge management activities and processes and how this knowledge can be used to manage a crisis situation. This approach includes three stages. 1. Crisis prevention and planning (pre-crisis, pre-event/pre-dromal), 2. Strategic Implementation (during crisis, emergency-intermediate), 3. Resolution Evaluation and Feedback (post-crisis, long-term resolution and feedback). In the first stage, knowledge acquisition, creation and storage take place. The second stage includes knowledge retrieval, dissemination and application. In the third stage, knowledge internalization and feedback take place.

Another approach to crisis management is the lifecycle-based one. Coombs (2011) states that the lifecycle of a crisis should be separated into stages. Lauge et al. (2009), consider three main phases in the lifecycle of a crisis. The first is the pre-crisis phase where actions should be implemented in order to limit the risk that could lead to a crisis. These actions include signal detection where those in charge detect the signs and analyze them, crisis prevention where the looming crisis should be prevented to the maximum extent possible, crisis preparation where a plan should be drawn up to manage the crisis, continuous update of the plan, training of the crisis management team, identification of vulnerabilities and the development of communication structures. The second is the crisis-event phase where actions should be implemented to resolve the crisis. This phase includes crisis acknowledgment where crisis identification is done and crisis response where, depending on the type of crisis, an attempt is made to normalize the consequences and side effects of the crisis. The last phase is the post crisis phase where actions are implemented for crisis recovery, crisis evaluation and preparation for the next one. A set of significant applications

of this approach is indicated (Faunkler, 2001; Henderson, 2007; Sawalha et al., 2013; Tokakis et al., 2019; Paraskevas and Quek, 2019; Berbekova et al., 2021; Leta and Chan, 2021)

The last of the three approaches examined in this paper is the strategy-based management approach. Ritchie (2004) presenting such a crisis management approach emphasizes that for achieving effective crisis management, integrated strategic approaches should be employed. Despite the fact that the management of a sustained crisis presents differences in relation to the management of an immediate crisis, many similarities are observed regarding the stages of the crisis in its strategic management: 1. The pre-event stage, 2. the stage just after or before the crisis emergence aiming to the strategic reduction of crisis effects, 3. the stage related to resolving the crisis, 4. the stage related to the long term recovery and lessons learned for possible future crises. Despite the similarity in the stages of the crisis, the main characteristics and particularities of each crisis should be taken into account in the development of a strategy for crisis management and the satisfaction of all stakeholders. Many researchers have studied crisis management from a strategic perspective (Comfort, 2007; Davies and Walters, 1998; Huang et al., 2008; Johnston et al., 2007; Jones, 2016; Khan et al., 2008; Li et al., 2022; Momani and Alzaghal, 2009; Paraskevas et al., 2007; Sun et al., 2022; Wang and Ritchie, 2010; Wilks and Moore, 2003). The pillars of crisis management in this approach are: 1. Crisis prevention and planning which includes the preventive plan and the strategy plan, 2. Strategic implementation which includes strategic assessment, crisis communication, resource allocation, and stakeholders' satisfaction and 3. The resolution, assessment and experience gained which lead to normality.

The strategies followed in order to manage the COVID-19 crisis in the airline industry include the cutbacks, the persistence, the innovation and the exit. Cut referσ to the management of expenses and reductions of assets and its short-term survival organization, persistence refers to the way of maintaining the status quo of the company, innovation refers to renewing the company strategically and the exit refers to the cessation of a company's activities either in whole or in part (Albers, &Rundshagen, 2020).The importance of communication with customers and stakeholders during and following a crisis is emphasized by previous studies (Helm and Tolsdorf, 2013; Ham and Kim, 2019; Wei and Kim, 2021)

2.2. The Airline Industry

The main form of international tourism and travel is air transport (Papatheodorou, 2002). Due to the pandemic, which grounded airplanes for a long time, in recent years the heads

of airline companies have had to solve a particularly difficult exercise. They should manage to maintain the companies' competitive advantage, so that when the heavy cloud of the health crisis passes, they will be able to increase their market share or even not lose the existing one (Delevegos, 2022).International Air Transport Association (IATA) has shown that in 2020 the airline industry lost more than 118.5 billion dollars, with direct government interventions of 35 billion in Europe for the backing of the airline industry, and 70 billion in the USA and an average of 3-4 years is required for the full recovery (Reporters United, 2021).

According to IATA airlines will return to profit in 2023 for the first time since 2019, despite slowing global growth and as they recover from the crisis caused by Covid-19, the International Air Transport Association announced. After narrowing losses in 2022, airlines are expected to make a net profit of $4.7 billion in 2023. IATA General Director indicated that the main characteristic of the airlines during the Covid-19 crisis was resilience. Governments in many countries have had to bail out airlines as travel has ground to a halt to slow the spread of the coronavirus and the industry suffered losses of $137.7 billion in 2020 at the height of travel restrictions. IATA expects passenger traffic to return in 2023 to 85.5% of pre-crisis levels (Euronews, 2022).

More than 3,000 planes remained grounded, while travel was down more than 90%. This caused American Delta to lose almost 60% of its market value, while United Airlines lost 70%. In Greece, Aegean Airline's market value fell by 45%. The losses of the major European airlines were similar (Ligerou, 2020).

Most airlines suffered huge losses from fuel price hikes in 2020 as demand soared during the Covid-19 pandemic and were left holding contracts for delivery at much higher prices (AirNews, 2021).

The tourist segment is expected to bring in $522 billion in revenue. The demand of the passengers is expected to reach 85.5% of 2019 levels during 2023. Much of this expectation considers the uncertainties of China's Zero COVID-19 policies. COVID-19 that constrain both domestic and international markets. However, passenger numbers are expected to exceed 4 billion since 2019, with 4.2 billion travelers expected to fly. Passenger return, however, is expected to decline (-1.7%) as lower energy costs are transferred to the consumer, although passenger demand growing faster (+21.1%) than passenger capacity (+18.0 %) (Rokou, 2022). The economic and geopolitical environment faces sundry potential and future risks to the outlook for 2023. The risk of some economies slipping into recession remains, although there are signs that there could be an easing of aggressive rate hikes to fight inflation from early 2023. Such a downturn could affect passenger and cargo services'

demand. Airlines have built pliability into their business models to handle economic accelerations and slowdowns that affect demand. The profitability of each airline is zero. Every passenger is expected to contribute an average of $1.11 to the industry's net profits. Global economic return continues to improve. The only region which has returned to profitability in 2022 is North America. Europe and the Middle East are the next two regions which joined North America in 2023, while Africa, Asia Pacific and Latin America will remain in the red (Rokou, 2022).

Nearly 70% of the passengers are traveling as much or more than before the COVID-19 pandemic, as per a recent poll revealed by IATA in eleven global markets. And, while the financial situation concerns 85% of travelers, 57% have no intention of curtailing their travel habits. 91% of the travelers said air connectivity is crucial to the economy, 90% indicated that air travel is necessary for modern life, while 87% believed that air travel has a positive effect on societies (Rokou, 2022).

Air ticket prices show a 22% increase in 2023 compared to 2022. It was preceded by a 21.7% increase in 2021-2022. One reason is inflation in Europe; another is high demand, the imbalance between supply and demand. As airlines run short of staff, which, as they seek to absorb losses from the pandemic, they do not intend to cover, the number of flights has decreased. At the same time, despite the economic difficulties caused by the energy crisis and punctuality, the demand for air travel is constantly increasing. The airlines face three serious problems: accumulated debts; very high salaries of their executives; doubling of the price of fuel. Indeed, in 2022 the price of fuel has increased by 50% from 2021. 1/3 of the price of an airline ticket represents the expense of kerosene. So, for example, Lufthansa will make 34,000 fewer flights this summer than in 2019 (Athens Voice, 2023).

2.3. Aegean Airlines Group

Greece closed its borders to international passengers on the 13th of March 2020. This caused a 98% reduction in flights to Greece, while billions of euros were owed to passengers for canceled flights (Aegean Group, 2021).

The COVID-19 pandemic, which spread to Europe and Greece on early 2020, is the most powerful shock the airline industry has ever faced. The main effect of the pandemic, the Aegean Airlines Group experience, was a rapid drop in flights' demand, because of its impact on demand for planning business or leisure travel and as a cause of unprecedented restrictive measures imposed by the governments for the restriction of the pandemic, during 2020 and 2021. The vaccination program and its growth rate and the implementation of the green certificate in Europe in 2021, smoothed out the business environment and consumer

behavior. From June 2021 and onwards, this had as a consequence the relaxation of the restrictive measures.

From the beginning of 2020, and throughout 2021, the Group immediately take the following actions:

- *Implementation of the necessary procedures for the best passengers and staff's protection and, under the new conditions of the pandemic.* This action is part of the lifecycle-based management approach and more specifically with the crisis-event phase where actions should be implemented to resolve the crisis.
- *Dynamic and flexible network management so that it adapts directly to the changing market conditions.*This action describes the strategy-based management approach, where integrated strategic approaches should be employed.
- *Consecutive negotiations with the main suppliers of products and services to manage cost reduction, but also to create adaptability and flexibility to changing conditions.*This action is taken through the knowledge-based management approach, where the business is trying to achieve business goals such as increasing performance and better positioning in the market.
- *Utilization of the state's horizontal measures for workers and businesses.*This is based on the lifecycle-based management approach and more specifically on the crisis-event phase where actions are implemented to resolve the crisis.
- *Capital and cash shielding.*This action refers to the strategy-based crisis management and the knowledge based crisis management approach.

Aegean Airlines since the beginning of 2021 supported the "National Operational Immunization Plan – Operation Freedom", transporting throughout the domestic network vaccines, the necessary accompanying personnel and equipment for the implementation of the vaccination program in the region. 717 flights were implemented with 786 free tickets.

In 2021, aiming to make it easier for young people to travel, Aegean undertook to "double" the value of prepaid Freedom Pass cards, while at the same time triple the Miles+Bonus miles of every flight that carried out using the Freedom Pass, contributing to the national effort to return to regularity through the vaccination program (Aegean Group, 2021).

The Group of the Aegean made all necessary adaptations to operational level to fully comply with all new health protocols. At the same time, they implement new enhanced health and safety measures but also aircraft decontamination process. Aegean Airlines introduced Hygiene Attendants, who took care of all the necessary safety and prevention measures. Hygienists assisted passengers to observe all safety measures during boarding, flight and

during disembarking and thereby ensuring that air travel remains the safest mode of travel not only for themselves but also for their fellow passengers and cabin crew.

Risk factors that may affect business and financial condition of the Group are the following:

- COVID-19 outbreaks or possible new mutations with consequent new travel restrictions.
- The European economy and Greece may negatively affect the tourism market and lead to a decline in air traffic.
- Geopolitical developments and turmoil in neighboring countries may negatively impact demand.
- Future oversupply of airline seats and intense competition could lead to a decline in average revenue per passenger as well as reduced flight occupancy.
- There may be significant increases in fuel costs.
- Possible imposition of environmental taxes or other charges and inability to pass on costs to end consumers (Aegean Group, 2021).

Aegean seeks to proceed with recruitment for specialties that do not only concern the cabin crew, but also support the wider operation of the airline. Namely, it is looking for data analysts for the commercial department, IT controllers, aircraft painters and people to staff the call centers. Airbus A320 pilots and co-pilots could not be missing from the list, with the airline's fleet consisting, until 2026 of 46 new Airbus 320 and 321neo. The airline seeks to create the new generation of pilots, with its new scholarship program in progress, with the aim that within the next three years 120 young men and women will become the future captains of Aegean and Olympic Air aircraft. According to aviation industry players, the broader goal is for the industry to boost its GDP footprint, which can only happen if airlines become a pillar of expertise. Sky Express is also recruiting, looking for captains for Airbus A320s and ATR turboprops. The airline is also looking for workers for cabin crew, IT and marketing departments, accounting and call center, among others (Delevegos, 2022).

3. DATA AND METHODOLOGY

Fuzzy approach was used to evaluate the collected data for the goals of this paper. To familiarize the reader with the methodology's principles, Fuzzy TOPSIS method is introduced.

3.1. Fuzzy Topsis Method

Chai et al. (2013) emphasized the usefulness of the fuzzy set theory in conjunction with Multicriteria Decision Making Analysis in modeling alternatives selection process in uncertain

conditions. Furthermore, as Chai et al. (2013) assert, the prevalent tendency in latest studies is to blend decision-making processes with the formulation of appropriate decision models to tackle complicated alternatives selection issues, particularly when there is uncertainty. This argument leads to the use of fuzzy TOPSIS (Chen, 2000) rather than the classic TOPSIS technique.

For the alternatives selection process, the Fuzzy TOPSIS approach is applicable. The use of this strategy results in the best approach selection, in accordance with the company's policy. The Fuzzy TOPSIS method's criteria are consistent with all of the financial and management restrictions imposed by the company's internal and external environments. Lima et al. (2014) emphasize the primary advantages of the Fuzzy TOPSIS approach over alternative MCDM method. To begin, they say that the insertion of alternatives has no effect on the final ranking in Fuzzy TOPSIS. This exhibits objectivity in the comparative evaluation of the alternatives. According to Lima et al. (2014), the additional criteria have no effect on the relevance of the criterion or their ranking order, and because the criteria matrix is constructed using the arithmetic mean of fuzzy numbers, any weight will never be zero. Furthermore, when it comes to the correlation of data supplied by decision makers, Fuzzy TOPSIS outperforms Fuzzy AHP. Additionally, an increase of decision makers leads to increased complexity when compared to Fuzzy AHP approach calculations. Lastly, Fuzzy TOPSIS has no limit on the number of options and criteria that may be applied.

Linguistic variables, which are produced as positive triangular fuzzy numbers, are employed for the weights of criteria and the evaluations of alternatives. The weight of each criterion in this technique can be specified either directly or by utilizing pairwise comparisons (Hsu and Chen, 1994). The decision makers consider the weights of the criteria and the ratings of alternatives in relation to the linguistic factors. Regarding the decision group, it consists of $\mathbf{k}$ decision makers $\mathbf{D_r(r = 1,..,k)}$. $\mathbf{W}$ describes the weights of $\mathbf{jth}$ criterion $\mathbf{Cj}$. $\mathbf{X_{ij}}$ describes the ratings of the $\mathbf{ith}$ alternative $\mathbf{Ai}$ with respect to criterion $\mathbf{j}$ by the $\mathbf{rth}$ decision maker. Lima et al. (2014), present the following steps for the Fuzzy TOPSIS method:

i. The first step consists in the aggregation of the criteria weights and ratings of the alternatives. Calculate the importance of the criteria and the rating of alternatives by using equations (1) and (2) :

$$w_j = \frac{1}{k}[w_j^1 + w_j^2 + \cdots + w_j^k] \quad (1)$$

$$x_j = \frac{1}{k}[x_j^1 + x_j^2 + \cdots + x_j^k] \quad (2)$$

ii. Create the fuzzy decision matrix using the criteria weights and alternative ratings from equations (3) and (4):

$$D = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_n \end{array} \begin{array}{c} \begin{array}{ccc} C_1 & \dots & C_m \end{array} \\ \begin{bmatrix} x_{11} & \cdots & x_{1m} \\ \vdots & \ddots & \vdots \\ x_{n1} & \cdots & x_{nm} \end{bmatrix} \end{array} \quad (3)$$

$$W = \frac{1}{k}[w_1 + w_2 + \cdots + w_m] \quad (4)$$

The fuzzy choice matrix of possibilities is then normalized using a linear scale transformation. The fuzzy decision matrix is generated in its normalized version as follows:

$$R = [r_{ij}]_{m*n} \quad (5)$$

$$\widetilde{r_{ij}} = \left(\frac{l_{ij}}{u_j^+}, \frac{m_{ij}}{u_j^+}, \frac{u_{ij}}{u_j^+}\right) \text{ and } u_j^+ = max\ (x_i u_{ij}) \text{ - benefit criteria} \quad (6)$$

$$\widetilde{r_{ij}} = \left(\frac{l_j^-}{u_{ij}^+}, \frac{l_j^-}{m_{ij}^+}, \frac{l_j^-}{l_{ij}^+}\right) \text{ and } l_j^- = max\ (x_i l_{ij}) \text{ - cost criteria} \quad (7)$$

The weighted normalized decision matrix may be constructed by multiplying the criterion weights, w, by the elements, r, of the normalized form (from the fuzzy decision matrix).

$$\check{V} = [\check{v}_{ij}]_{m*n} \quad (8)$$

$$\check{v}_{ij} = x_{ij} * \check{w}_j \quad (9)$$

Using the following equations, define the Fuzzy Positive and Fuzzy Negative Ideal Solutions (FPIS,A+) and (FNIS,A-).

$$A^+ = \{\check{v}_1^+, \check{v}_2^+, \dots, \check{v}_m^+) \quad (10)$$

$$A^- = \{\check{v}_1^-, \check{v}_2^-, \dots, \check{v}_m^-) \quad (11)$$

Where $\check{v}_1^+ = (1,1,1)$ and $\check{v}_1^- = (0,0,0)$

The distances of options d j+ and d j- from v _j+ and v _j- must then be computed using the following equations:

$$d_j^+ = \sum_{j=1}^n d_v(\check{v}_{ij}, \tilde{v}_j^+) \quad (12)$$

$$d_j^- = \sum_{j=1}^n d_v(\check{v}_{ij}, \tilde{v}_j^-) \quad (13)$$

$$D(x,z) = \sqrt{\frac{1}{3}[(l_x - l_z)^2 + (m_x - m_z)^2 + (u_x - u_z)^2} \quad (14)$$

The closeness coefficient, CCi, is calculated next.

$$CCi = \frac{d_i^+}{d_i^+ + d_i^-} \quad (15)$$

Lastly, the ranking of alternatives based on the proximity coefficient calculation must be done in decreasing order, with the ideal option being closest to the FPIS and farthest from the FNIS. Chen's linguistic variables for weights (up) and alternative evaluations (down) are based on Chen's (2000):

Very Low – VL : (0, 0, 0.1)
Low – L : (0, 0.1, 0.3)
Medium Low – ML : (0.1, 0.3, 0.5)
Medium – M : (0.3, 0.5, 0.7)
Medium High – MH : (0.5, 0.7, 0.9)
High – H : (0.7, 0.9, 1)
Very high – VH : (0.9, 1, 1)

Table 1. Chen's linguistic variables for the criteria weights

Very Poor – VP: (0, 0, 1)
Poor – P : (0, 1, 3)
Medium Poor – MP : (1, 3, 5)
Medium – M : (3, 5, 7)
Medium Good – MG : (5, 7, 9)
Good – G : (7, 9, 10)
Very Good – VG : (9, 10, 10)

Table 2. Chen's linguistic variables for the alternatives evaluation

3.2. Criteria and Alternatives

The following criteria resulting from the thematic synthesis of the international literature and international news were used to analyze the above methods:

a. speed of implementation
b. ease of method
c. speed of results
d. implied cost
e. staff training time
f. best fitting the Greek airline industry
g. best fitting the hygienic crises (COVID-19)

The above criteria are also consistent with on the three, presented above, crisis management approaches

4. RESULTS

The linguistic variables are quantified via triangular fuzzy numbers as seen above. Following the Fuzzy TOPSIS method's steps (Tables 3-11) the final ranking of the alternatives can be computed. Five experts in the Greek airline industry were asked to give their opinions. Using the experts' criteria weights evaluations and the alternatives' ratings, the alternative 1 (knowledge-based management approach) results to be the optimal one (as shown in Table 11).

	Expert 1	*Expert 2*	*Expert 3*	*Expert 4*	*Expert 5*
Criterion 1	VH	VH	VH	H	VH
Criterion 2	VH	H	VH	VH	VH
Criterion 3	MH	MH	M	M	M
Criterion 4	ML	M	M	M	ML
Criterion 5	VH	VH	VH	H	VH
Criterion 6	VH	VH	VH	H	VH
Criterion 7	VH	VH	VH	VH	VH

Table 3. Expert ratings for the weights of criteria

W1			W2			W3			W5			W5			W6			W7		
0,86	0,98	1	0,86	0,98	1	0,38	0,58	0,78	0,22	0,42	0,62	0,86	0,98	1	0,86	0,98	1	0,9	1	1

Table 4. Weights of criteria for short-term level

Criteria	Scenarios	Experts				
		E1	E2	E3	E4	E5
	A1	G	VG	G	MG	G
C1	A2	M	MP	M	MP	MG
	A3	M	M	MP	MP	MP
	A1	MG	G	M	MG	VG
C2	A2	MP	M	MP	MP	M
	A3	M	M	MP	MP	M
	A1	M	M	M	MG	MG
C3	A2	M	MP	MG	M	M
	A3	G	G	MG	MG	MG
	A1	G	VG	G	VG	VG
C4	A2	P	P	P	VP	VP
	A3	VP	VP	VP	VP	MP
	A1	P	VP	VP	VP	VP
C5	A2	VG	VG	G	VG	VG
	A3	M	MG	M	M	M
	A1	G	VG	G	G	VG
C6	A2	P	P	P	VP	VP
	A3	VP	VP	P	VP	VP
	A1	MG	MG	MG	G	MG

C7	A2	MP	MP	P	VP	MP
	A3	P	P	P	P	VP

Table 5. Experts' Scenarios ratings for the seven criteria

	C1			***C2***			***C3***			***C4***			***C5***			***C6***			***C7***		
A1	7,0	8,8	9,8	5,8	7,6	9,0	3,8	5,8	7,8	8,2	9,6	10,0	0	0,2	1,4	9,0	10,0	10,0	5,4	7,4	9,2
A2	2,6	4,6	6,6	1,8	3,8	5,8	3,8	5,8	7,8	0	0,6	2,2	8,6	9,8	10,0	8,6	9,8	10,0	0,6	2,0	3,8
A3	1,8	3,8	5,8	2,2	4,2	6,2	5,8	7,8	9,4	0	0,2	1,4	3,4	5,4	7,4	8,2	9,6	10,0	0	0,8	2,6

Table 6. The fuzzymatrix

	C1			***C2***			***C3***			***C4***			***C5***			***C6***			***C7***		
A1	0,7143	0,8980	1,0000	0,6444	0,8444	1,0000	0,4043	0,6170	0,8298	0,8200	0,9600	1,0000	0	0,0200	0,1400	0,9000	1,0000	1,0000	0,5870	0,8043	1,0000
A2	0,2653	0,4694	0,6735	0,2000	0,4222	0,6444	0,4043	0,6170	0,8298	0	0,0600	0,2200	0,8600	0,9800	1,0000	0,8600	0,9800	1,0000	0,0652	0,2174	0,4130
A3	0,1837	0,3878	0,5918	0,2444	0,4667	0,6889	0,6170	0,8298	1,0000	0	0,0200	0,1400	0,3400	0,5400	0,7400	0,8200	0,9600	1,0000	0	0,0870	0,2826

Table 7. The fuzzy normalized matrix

	C1			***C2***			***C3***			***C4***			***C5***			***C6***			***C7***		
A1	0,6143	0,8800	1,0000	0,5542	0,8276	1,0000	0,1536	0,3579	0,6472	0,1804	0,4032	0,6200	0	0,0196	0,1400	0,7740	0,9800	1,0000	0,5283	0,8043	1,0000
A2	0,2282	0,4600	0,6735	0,1720	0,4138	0,6444	0,1536	0,3579	0,6472	0	0,0252	0,1364	0,7396	0,9604	1,0000	0,7396	0,9604	1,0000	0,0587	0,2174	0,4130
A3	0,1580	0,3800	0,5918	0,2102	0,4573	0,6889	0,2345	0,4813	0,7800	0	0,0084	0,0868	0,2924	0,5292	0,7400	0,7052	0,9408	1,0000	0	0,0870	0,2826

Table 8. The fuzzy weighted normalized matrix

	C1	*C2*	*C3*	*C4*	*C5*	*C6*	*C7*
A1	0,233	0,276	0,646	0,625	0,949	0,131	0,295
A2	0,576	0,621	0,646	0,948	0,152	0,152	0,784
A3	0,648	0,582	0,549	0,969	0,513	0,174	0,885

Table 9. Distances of Scenarios from S+

	C1	*C2*	*C3*	*C4*	*C5*	*C6*	*C7*
A1	0,847	0,815	0,436	0,440	0,082	0,924	0,801
A2	0,489	0,453	0,436	0,080	0,907	0,907	0,272
A3	0,416	0,493	0,546	0,050	0,552	0,891	0,171

Table 10. Distances of Scenarios from S-

A1	0,5943
A2	0,4249
A3	0,4457

Table 11. Clos0eness coefficient for each Scenario

5. CONCLUSIONS

This study focuses on the crisis management approaches in the airline industry and to perform their prioritization using multi-criteria analysis. For the implementation of the prioritization, a set of criteria formulated, which extracted from an analytical study of the international literature and news. The multi-criteria analysis implemented in a fuzzy environment due to the inherent uncertainty in the airline market. The result of this study was a set of criteria for prioritizing crisis management approaches and the prioritization of these approaches in the Greek aviation industry. This study and its results will be useful for policy makers and managers who are focusing on adapting new approaches to face a crisis in their business in an effective way.

Following are the findings that can be drawn for the Greek airline market from both the thematic synthesis used to examine how the Aegean Group handled the crisis, and the analysis of expert opinions through the Fuzzy TOPSIS method: The most effective approach for managing crises concern actions to sustain business operations, improve business performance, maintain and grow market share, adopt novel and best practices, and utilize the experience that was gained for a potential future crisis. The fact that the methodology has only been applied to the Greek market is a drawback of the current study. The usage of a specific MCDM approach, Fuzzy TOPSIS, is another restriction. As a direction for future research could be set a. the implementation of the proposed methodology in the global airline industry and b. the usage of an alternative MCDM method.

REFERENCES

Aegean Group (2021) Annual reports & Information Bulletins. Annual reports & Information Bulletins | About Aegean (aegeanair.com)

AirNews (2021) Energy crisis: How are airlines affected? Ενεργειακή κρίση: Πως επηρεάζονται οι αερομεταφορείς; - Airnews (In Greek).

Alavi, M. and Leidner, D.E. (2001) Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. MIS Quarterly, 25(1), 107-136.

Albers, S. and Rundshagen, V. (2020) European airlines' strategic responses to the COVID 19 pandemic (January-May 2020). Journal of Air Transport Management, 87, 101863.

Alpaslan, C.M., Green, S.E. and Mitroff, I.I. (2009) Corporate Governance in the Context of Crises: Towards a Stakeholder Theory of Crisis Management. Journal of Contingencies & Crisis Management, 17(1), 38-49.

Athens Voice (2023) Why are plane tickets getting more expensive?.Γιατί ακριβαίνουν τα αεροπορικά εισιτήρια (athensvoice.gr) (InGreek).

Burtscher, J.G. (1996) WertorientiertesKrisenmanagement, Diss.

Chai, J., Liu, J.N.K. and Ngai, E.W.T. (2013) Application of decision-making techniques in supplier selection: a systematic review of literature. Expert Systems with Applications, 40, 3872-3885

Chen, C.T. (2000) Extensions of the TOPSIS for group decision-making under fuzzy environment. Fuzzy sets and systems, 114, 1-9

Comfort, L. (2007) Crisis management in hindsight: cognition, communication, coordination, and control, Public Administration Review, 67(1), 189-1.

Coombs, W.T. (2011) Political Public Relations and Crisis Communication: A Public Relations Perspective, in: Stromback, J. and Kiousis, S. (Eds.), Political Public Relations Routledge, UK, pp. 208-226.

Coombs, W.T. (2015) Ongoing Crisis Communication (4th ed.), Sage, Thousand Oaks, CA.

Coombs, W.T. (2019) Ongoing crisis communication (5th ed.). Thousand Oaks, California: Sage Publications, Inc.

Davies, H. and Walters, M. (1998) Do all have to become disasters? Risk and risk mitigation, Property Management, 16(1), 5-9.

Delevegos, D. (2022) Airlines are hiring. Οι αεροπορικές εταιρείες προχωρούν σε προσλήψεις | Moneyreview.gr (In Greek).

Dorfman, M.S. and Cather, D.A. (2013) Introduction to Risk Management and Insurance. 10th edition. New Jersey: Pearson Education, Inc.

Euronews (2022) IATA: Return to profit for airlines from 2023 IATA: Επιστροφήστακέρδηγιατιςαεροπορικέςεταιρείεςαπότο 2023 | Euronews (In Greek).

Evans, N. and Elphick, S. (2005) Models of crisis management and evaluation of their value for strategic planning in the international travel industry. International Journal of Tourism Research, 7, 135-150

Faulkner, B. (2001) Towards a framework for tourism disaster management, Tourism Management, 22(2), 135–147.

Filev D.P. and Yager, R.R. (1997) Operations on fuzzy numbers via fuzzy reasoning, Fuzzy sets and systems, 91(2), 137-142

Fink, S. (2002) Decision Making in Crisis: The Piper Alpha Disaster. Managing Crisis: Threats, Dilemmas, Opportunities 6, 103-118.

Girard, J.P. and Girard, J.L. (2015) Defining knowledge management: Toward an applied compendium. Online Journal of Applied Knowledge Management, 3(1), 14.

Gupta, J. and Sharma, S. (2004) Creating Knowledge Based Organizations. Boston: Idea Group Publishing. ISBN 978-1-59140-163-6.

Hale, J.E., Dulek, R.E. and Hale, D.P. (2005) Crisis response communication challenges. Journal of Business Communication, 42(2), 112-134.

Ham, C.D. and Kim, J. (2019) The role of CSR in crises: integration of situational crisis communication theory and the persuasion knowledge model. Journal of Business Ethics, 158(2), 353-372.

Helm, S. and Tolsdorf, J. (2013) How does corporate reputation affect customer loyalty in a corporate crisis?. Journal of Contingencies and Crisis Management, 21(3), 144-152.

Henderson, J.C. (2007) Managing crises: UK civil aviation, BAA airports and the august 2006 terrorist threat. Tourism and Hospitality Research, 8(2), 125-136.

Hoise, P. and Smith, C. (2004) Preparing for crisis: On-line security management education. Research and Practice in Human Resource Management, 12(2), 90-127.

Hsu, W.K, Lian K.S.J. and Huang, S.H. (2020) An assessment model based on a hybrid MCDM approach for the port choice of liner carriers. Research in Transportation Business & Management, 34, 100426.

Huang, Y.C., Tseng, Y.P. and Petrick, J.F. (2008) Crisis Management Planning to Restore Tourism After Disasters, Journal of Travel & Tourism Marketing, 23(2-4), 203-221.

Jiaa, Z., Shia, Y., Jiab, Y. and Lia, D. (2012) A Framework of Knowledge Management Systems for Tourism Crisis Management, 2012 International Workshop on Information and Electronics Engineering (IWIEE), Procedia Engineering 29, 138-143.

Johnston, D., Becker, J., Gregg, C., Houghton, B., Paton, D., Leonard, G. and Garside, R. (2007) Developing warning and disaster response capacity in the tourism sector in coastal Washington, USA. Disaster Prevention and Management, 16(2), 210-216.

Jones, T.E. (2016) Evolving approaches to volcanic tourism crisis management: An investigation of long-term recovery models at Toya-Usu Geopark. Journal of Hospitality and Tourism Management, 28, 31-40.

Khan, H., Vasilescu, L.G. and Khan, A. (2008) Disaster management cycle – a theoretical approach. Management & Marketing, 6(1), 43-50.

Klir, G.J. and Yuan, B., (1995) Fuzzy sets and fuzzy logic: theory and applications (Englewood Cliffs, NJ: Prentice Hall).

Krystek, U. (1987) Unternehmungskrisen. Gabler.

Lauge, A., Sarriegi, J.M. and Torres, J.M. (2009) The dynamics of crisis lifecycle for emergency management. In The 27th International Conference of the System Dynamics Society (pp. 1-20).

Leta, S.D. and Chan, I.C.C. (2021) Learn from the past and prepare for the future: A critical assessment of crisis management research in hospitality. International Journal of Hospitality Management, 95, 102915.

Li, Z., Wang, X., Li, X. and Yuen, K.F. (2022) Post COVID-19: Health crisis management for the cruise industry'. International Journal of Disaster Risk Reduction, 71, 102792.

Ligerou, N. (2020) How the coronavirus brought airlines to their knees - The financial crisis in numbers. Πώς ο κορωνοϊός «γονάτισε» τις αεροπορικές εταιρείες - Η οικονομική κρίση σε αριθμούς (protothema.gr) (In Greek).

Lima J.R., F.R., Osiro, L. and Carpinetti, L.S.R., (2014) A comparison between Fuzzy AHP and Fuzzy TOPSIS methods to supplier selection. Applied Soft Computing, 21, 191-209.

Mistilis, N. and Sheldon, P. (2011) Knowledge management for tourism crises and disasters. Tourism Review International, 10(1/2), 39-46.

Momani, N. and Alzaghal, M. (2009) Early warning systems for disasters in Jordan: current and future trends. Journal of Homeland Security and Emergency Management, 6(1), 1-15.

Mȯller, R. (1986) Krisenmanagement in der Unternehmung. PeterLang.

Papatheodorou, A. (2002) Civil aviation regimes and leisure tourism in Europe. Journal of Air Transport Management, 8(6), 381–388.

Paraskevas, A. and Arendell, B. (2007) A strategic framework for terrorism prevention and mitigation in tourism destinations. Tourism Management, 28, 1560-1573.

Paraskevas, A. and Quek, M. (2019) 'When castro seized the Hilton: Risk and crisis management lessons from the past', Tourism Management, Vol. 70, 419-429.

Reporters United (2021) Aegean Airlines response to questions from Reporters United. Aegean Airlines response to questions from Reporters United - R•U

Ritchie, B. (2004) Chaos, crises and disasters: A strategic approach to crisis management in the tourism industry, Tourism Management, 25, 669-683.

Roting, P. (1976) Organisation und Krisen-Management. ZO, 1, 13–20.

Rokou, T. (2022) IATA: Airlines Cut Losses in 2022 – Return to Profits in 2023. IATA: Οι αεροπορικές εταιρείες μειώνουν τις απώλειες το 2022 - Επιστροφή στα κέρδη το 2023 - TravelDailyNewsGreece& Cyprus (In Greek).

Sawalha, I.H., Jraisat, L.E. and Al-Qudah, K.A.M. (2013) Crisis and disaster management in Jordanian hotels: practices and cultural considerations. Disaster Prevention and Management: An International Journal, 22(3), 210-228.

Schulten, M.F. (1995) Krisenmanagement Verlag for Wissenschaft und Forschung.

Sun, S., Zhong, L., Law, R., Zhang, X., Yang, L. and Li, M. (2022) A Proposed DISE Approach for Tourist Destination Crisis Management, Sustainability, 14, 11009.

Tokakis, V., Polychroniou, P. and Boustras, G. (2019) Crisis management in public administration: The three phases model for safety incidents. Safety Science, 113, 37-43.

Walby, S., (2015) Crisis, Polity Press, UK

Wang, W.T. and Belardo, S. (2005) "Strategic Integration: A Knowledge Management Approach to Crisis Management," Proceedings of the 38th Annual Hawaii International Conference on System Sciences (HICSS'05) - Track 8, Hawaii, USA, 2005.

Wang, W.T. (2009) The role of knowledge management in achieving effective crisis management: a case study. Journal of Information Science, 35(6).

Wang, J. and Ritchie, B.W. (2010) A theoretical model for strategic crisis planning: Factors influencing crisis planning in the hotel industry, International Journal of Tourism Policy, 3(4), 297-313.

Wei, L. and Kim, N. (2021) Within-and between-person (s) emotional reactions toward crisis communication. Corporate Communications: An International Journal, 26(2), 420–437

Wilks, J. and Moore, S. (2003) Tourism Risk Management for the Asia Pacific Region: An Authoritative Guide for Managing Crises and Disasters, Gold Coast Campus, Griffith University, Queensland.

Wut, T.M., Xu, J.B. and Wong, S.M. (2021) Crisis management research (1985–2020) in the hospitality and tourism industry: A review and research agenda. Tourism Management, 85.

Zadeh, L.A. (1965) Fuzzy Sets, Information and Control, 8, 338-353.

Ziek, P. (2015) Crisis vs. Controversy. Journal of Contingencies and Crisis Management, 23(1), 36-41.

AUTHORS' BIO

Konstantinos Chrysafis is an Assistant Professor in the Department of Tourism Economics ans Management at the University of the Aegean, Chios, Greece. He has been teaching courses in Financial Management, Operations Management, Crisis Management, etc. He has published various papers in international peer-reviewed scientific journals, and he serves as a reviewer for many international journals of reputed scientific standing. He has been working at the Ministry of Finance in Greece as a Financial Analyst and Strategy and Business Planner and as a Program/Project Manager for the Independent Authority for Public Revenue. Email: kchrysafis@aegean.gr.

Georgia Papadopoulou is an Assistant Professor in the Department of Tourism Economics and Management at the University of the Aegean, Chios, Greece. She has been teaching courses in Tourism Economics, Project Management and Operations Management. Her research interests include tourism economics, tourists' behavior, tourism management and cruise transport. She has published papers on cruise tourism, tourists' motivations, terrorism and tourism in international journals and chapters in books. She has also presented her work in international conferences. Email: gpapadopoulou@aegean.gr.