Journal of Transportation Technologies, 2022, 12, 357-368
https://www.scirp.org/journal/jtts
ISSN Online: 2160-0481
ISSN Print: 2160-0473

Empirical Study of Parameters of Airlines Sustainability in Nigerian Domestic Network

Chigozie Oguguo Amaechi[1], Callistus Chukwudi Ibe[1], Ejem Agwu Ejem[2], Geraldine Nkechinyere Okeudo[1]

[1]Department of Transport Management Technology, Federal University of Technology, Owerri, Nigeria
[2]Department of Supply Chain Management, Federal University of Technology, Owerri, Nigeria
Email: gozyalbright@yahoo.com, callistusibe@yahoo.com, ejem.ejem@futo.edu.ng, geraldine.okeudo@futo.edu.ng

How to cite this paper: Amaechi, C.O., Ibe, C.C., Ejem, E.A. and Okeudo, G.N. (2022) Empirical Study of Parameters of Airlines Sustainability in Nigerian Domestic Network. *Journal of Transportation Technologies*, **12**, 357-368.
https://doi.org/10.4236/jtts.2022.123022

Received: April 4, 2022
Accepted: June 25, 2022
Published: June 28, 2022

Abstract

Sustainability was investigated in the ability to reliably anticipate airline market share, which is critical for effective business strategy. As a result, a model was created to address the issue of airline market share across all Nigerian airport routes. The model took into account the explanatory variables average fares paid by various airlines passengers, number of competitors at each route, frequency of flight, and the total number of enplaned passengers. The model illustrated how it may be used to determine an airline's sustainability. It was observed that all of the parameters in the model were statistically significant and exhibited the predicted signs. As a result, the market share of Nigerian airlines can assess the sustainability of Nigerian airlines. As a result, it is proposed that the federal government and aviation regulatory bodies provide a level playing field to all commercial airline operators, without any kind of protectionism. Airlines' services should be completely deregulated, and the forces of perfect market competition should drive the airline's overall health. The government should provide a fair and supportive climate for airline operators as soon as possible. The ease of doing airline business must be implemented honestly and competitively. The degree of competition has a detrimental impact on the airline's market share, especially if the airline operates in a regulated market. As a result, perfect competition for the airline should be promoted.

Keywords

Airlines, Passengers, Sustainability, Patronage, Competition and Flight

1. Introduction

The air transportation industry is a vital service sector that supports other sig-

nificant economic sectors such as tourism, manufacturing, international commerce, and business, as well as contributing to the national GDP [1]. Furthermore [2] portrayed it as essential to the US economy, with the government bailing it out in times of crisis and taxing it when required. Over the last few decades, the goal of long-term profitability and competitive advantages has influenced many company strategies [3]. The operating settings in which airlines operate are far from uniform. The diversity of policies, geographies, and economies throughout the world necessitates the development of a set of tailored strategies, which can be reflected in broad templates or business models built to adapt to specific needs. The purpose of this study is to examine the most sustainable of such business models in the Nigerian context, by first identifying the current business models pursued by airlines in the country, followed by a study of their sustainability from two key perspectives: market presence and product and organizational architecture. Although there is a wealth of literature on airline business models and their evolution in shifting global contexts, there has been little investigation into their relevance in the Nigerian context. The Nigerian environment is diverse enough to necessitate its own set of tactics, some of which may be distinct enough to be part of a new strategy template or business model.

In the last few decades, the search for sustainable-term profitability and competitive advantages has influenced many company strategies. The operational settings in which airlines find themselves are far from uniform. The diversity of regulations, geographies, and economies throughout the world necessitate the development of a set of tailored strategies, which can be represented in broad templates or business models geared to address the problems posed by unique operating environments. This study investigated the most sustainable business model in the Nigerian context. The main objective of this paper is to determine the main factors affecting market share of airline at the specific airport.

2. Literature Review

The word "sustainability" originally came from the Latin word called "sustinere" this means "to hold" [4]. There is a wealth of literature on airline sustainability modelling that uses a range of methodologies. Country economic indicators have been regarded as critical indicators for predicting performance in numerous airline sustainability modelling studies since the early 2000s. Previous research has confirmed that Gross Domestic Product [5], Human Development Index [6] [7], and Foreign Direct Investment [8] are the primary country economic key indicators that influence airline performance. As a result, the combination of those indicators was identified as the economic performance latent variable in this study. In this study, we define financial performance as a collection of well-known financial metrics. The most widely used performance metrics in airline sustainability modelling include total assets [9] [10], operational profit [7], and total revenue [11]. The combination of total assets, operational profit, and total revenue is defined as the financial performance hidden variable in this study. [6] [12] con-

ducted studies that validated the influence of nation economic variables on airline financial performance.

Since the early 1990s, operational performance metrics have been widely used by a large number of organizations to measure present performance, identify requirements for improving performance, and enable the attainment of far-fetched strategic goals [13]. Recently, operational performance measures have gained global traction as a growing number of organizations and businesses around the world have shifted their focus and reliance away from the traditional method based primarily on financial performance measures and toward a variety of non-traditional value indices [13]. The primary operational performance measures in the airline business are revenue passenger per kilometre, revenue ton-kilometres [14] [15], and the number of departures [9]. Previous research has shown that operational performance has an influence on financial performance, both logically and practically, and that the link between economic performance and operational performance is validated [16].

Many researchers have been drawn to Classical-SEM in recent years as a frequently used technique for tasks such as data analysis in airline disciplines such as sustainability [17], low cost [18], job satisfaction [19], and service quality [20]. This application gives an improved form of linear regression with the main purpose of investigating the hypothesis that observes a covariance matrix for a collection of measured indicators equal to the covariance matrix provided by the hypothesized model. The normal distribution of residuals is a critical assumption in linear analysis. Otherwise, a typical technique can be used to compute the sample covariance matrix. Bayesian-SEM allows researchers to use previous information to update current information for the parameters of interest. To gather current information, the Gibbs sampler [21] is used. The Gibbs sampler [21] is used to collect samples of variable size to summarize the posterior distribution for defining the parameters of interest. Point estimates, standard deviations, and interval estimates may be generated using these samples to conclude. The Bayesian technique is appealing because it allows previous knowledge to be used to update current information about the parameters of interest.

The company's business plan explained how it produces money and competes in its sector [22]. The profit margin of a firm is affected by the business model it chooses [23]. In the airline sector, there are two primary business models: network (full-service) and low-cost (discount) airlines. The network carrier model implements a diversification strategy by increasing domestic destinations, covering international flights, offering varied seating arrangements (business, economy, and first-class), maintaining a complex structure of hubs, and delivering high-quality service. Low-cost (discount) airlines, on the other hand, focus on reduced airfares. To save operational expenses, bargain airlines offer shorter routes, and point-to-point destinations rather than through complex hubs, and flights are mostly domestic. Discount airlines use a similar model aircraft fleet, a minimal infrastructure, a single seating layout, and fewer amenities and flight ser-

vices than network airlines [24].

[25] investigated the relationship between profitability and airline business models as proposed by [24] and discovered that network airlines had a higher long-term consistent profit margin than their low-cost counterparts. Potter also noted that, although retaining high operational expenses, the old network (full-service) business model provides adequate service differentiation, resulting in larger profit margins in the long term. As a competitive advantage, [26] proposed that airlines include corporate culture into their business models. Given the airline industry's severe rivalry, the choice of a business model remains important to the airline's profit margin [23].

3. Methodology

The type of data used in this study is a time series. As a result, the researcher employs time series econometrics on the variables to investigate the impact of sales growth, liquidity, leverage, asset tangibility, leasing cost, and fuel cost on the dependent variable profit. Furthermore, regression analysis is a mathematical way of accomplishing this. Multiple Regression Analysis refers to a regression analysis that contains more than two explanatory variables [27]. Finally, multiple regression models may handle a large number of associated explanatory variables. Naturally, when we add additional elements to our model for explaining dependent variable variation, we can explain more of the variation in dependent variable variation. As a result, multiple regression analysis may be utilized to develop more accurate models for predicting the dependent variable.

Another sort of airline sustainability analysis is the cost function. In this sort of study, researchers look at two categories of cost indicators. The first sort of cost indicator is determined by operational performance:

$$\text{Cost indicator} = f\left(\text{operational indicators}\right)$$

Based on the aforementioned function, [28] created their models. The second sort of indicator is a financial indicator, which is a function of cost and operational indicators;

$$\text{Financial indicator} = f\left(\text{cost indicators}, \text{operational indicators}\right)$$

Based on the aforementioned function, [29] [30] created their models. However, combining two forms of modelling, particularly with the leveraging of a country's economic performance, is uncommon. Therefore, this study considers cost performance as the fourth latent variable with a combination of operating cost, labour cost, and fuel cost indicators based on the [28] study.

Figure 1 depicts the predicted study model with latent variables, and their indicators demonstrate the influence of economic performance on cost performance and operational performance on financial performance. The diagram shows how the first three constructions are linked. As a result, the current study model incorporates four constructs.

Market share modelling was employed as a sustainability metric for the airline

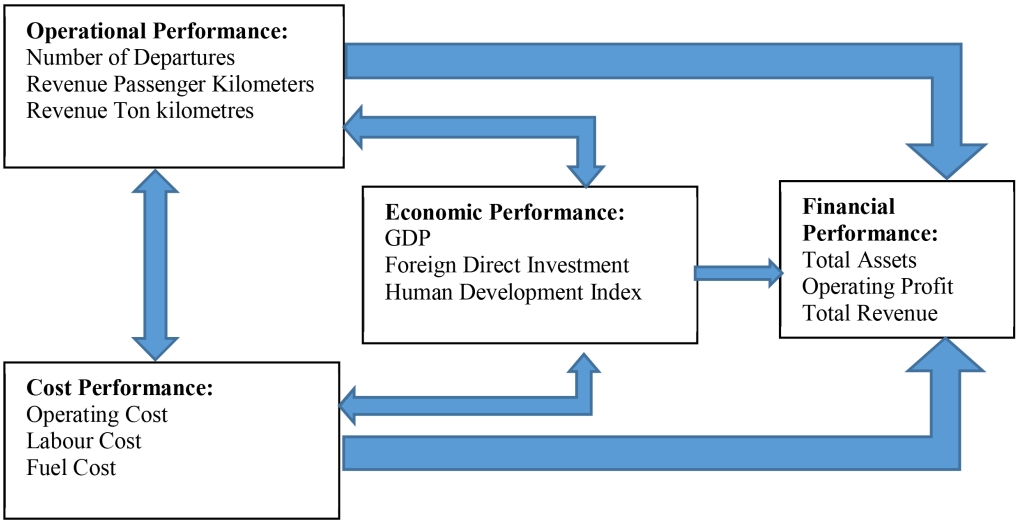

Figure 1. A research modelling framework.

business in this study. Under the research modelling approach described above, regression analysis was done to identify the best set of explanatory variables to include in the model. Given the objective of this model (estimating market share for the leading airline at a certain airport) and the goal of constructing a robust model, having too many variables might be difficult to interpret, evaluate, and maintain. Another issue with a high number of variables is the presence of multicollinearity, which can reduce model accuracy. Panel data is used in the regression analysis given in this article. The market is the dependent variable at the airport. It is measured as a percentage of the number of passengers carried by airlines at the selected airport, annually.

The explanatory variables used in the multiple linear regression models were:

Fare = the average ticket price on the route calculated as flag airline annual revenue divided by the total number of passengers in that year.

Freq = the frequency share of the airline at that airport measures the number of flights offered by an airline at the particular airport with the total number of flights offered by all airlines operating at that airport.

Comp = the number of competitors per destination at that airport measures the level of competition at the airport and is calculated as the total number of airlines operating at the airport.

PAX = the number of passengers carried by airlines measured by the total number of passengers lifted by the flag airline.

The factors considered to describe the value of a market share may be loosely divided into two groups. The first group comprises variables that characterize some airline features, whereas the second set includes variables that account for market factors linked to rivals. The regression analysis is performed aggregately of all the airlines, and the estimate equation is provided as a linear function by:

$$\text{LnMS} = C + \beta_1 \text{LnFare} + \beta_2 \text{LnComp} + \beta_3 \text{LnFreq} + \beta_4 \text{LnPax} + e$$

Table 1 shows the summary findings of descriptive statistics. R and R^2 variables

Table 1. Descriptive statistics of factors in market share modelling.

	N Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
Market Share	633	17.05	23.102	533.693	1.457	0.097	1.564	0.194
Fare	633	48863.49	5849.712	34219133.412	0.360	0.097	−.650	0.194
Competitors	633	7.18	1.892	3.578	0.147	0.097	−.715	0.194
Frequency	633	1025.54	3005.707	9034274.657	9.247	0.097	128.552	0.194
Passengers	633	96617.75	365974.022	133936984454.016	11.453	0.097	163.382	0.194
Valid N (listwise)	633							

have an excellent match, according to statistics. The R^2 values indicate that a high part of the airline market share might be explained by a few variables. In the regressions, the F statistic indicates that the variables are significant. This finding should be understood more broadly in the sense that the number of observations is sufficient to demonstrate any link between the specified explanatory factors and the dependent variable.

The Nigeria Civil Aviation Authority's yearly bulletin and other pertinent sources provided the majority of the data for this study. The data collection spans the years 2015 to 2019, with over 663 data points collected along all routes in the domestic network. Market level factors, which are used to explain an airline's overall market share, are the same for all similar city-pairs in a market. As a result, the statistics for these variables are reported in terms of routes.

3.1. Empirical Results

Although a rough parameter, the value of a given airline's market share might be highly significant information for the airline's senior management, who must be aware of the airline's position against its competitors in certain sectors of the market or even in the total market at all times. Airlines have a better chance of increasing their income by gaining a larger share of the market. To achieve this aim, the airline may employ a variety of tactics. An airline may choose to boost frequency on specific routes, but others may choose to offer more seats by employing larger aircraft. The approach employed will be heavily reliant on management decisions, which will modify the product to satisfy their clients while also sustaining profitable growth. However, market share will also be determined by airline rivals and their ability to operate effectively in the market. Market share may be stated in a variety of ways depending on the variable being considered (total number of passengers, frequencies, number of available seats, etc.). The research calculates market share by dividing the total number of passengers carried by airlines by the total number of passengers transported at a certain airport.

The study looks at whether factors, among many that are recognized in the literature, might impact an airline's market share at a certain airport. Although

the same set of explanatory factors may have a different influence on multiple airlines due to market diversities (characterized by population size, country economy, market penetration, (non)existence of domestic air traffic, and so on), the study seeks to identify common factors to design a robust model. As a result, the model developed in this manner might be used to predict the market share of any chosen airline.

The level of market share reveals the carrier's degree of monopolistic power. A large market share results in more monopolistic power, whereas a low market share results in little or no monopoly power. This is why it is essential to investigate the elements that influence it. The final list of these characteristics is difficult to discern, but what is more essential is to identify the one with the greatest effect on the specific market.

Airline Market Share Model:

$$\begin{aligned}\text{LnMS} &= 21.329 - 2.177\text{LnFare} - 1.384\text{LnComp} \\ &\quad + 0.557\text{LnFreq} + 1.006\text{LnPax} + e\end{aligned}$$

According to results from the regression analysis, it could be concluded that all selected variables have a strong influence on the market share and are significant, due to t statistic, Table 2. It is worth noting that the positive sign of passengers and negative sign of fare, frequency and the number of competitors could be implying that stronger competition, high fare and frequent flying from domestic airlines is unhealthy in Nigeria's domestic market *i.e.* competitive environment, increased fare and frequent flying hurts domestic market share as long as it does not come from low-cost carriers. As it was mentioned above, these four variables are deemed as the most significant for all selected airlines and therefore are taken into consideration for model design.

Table 2. Estimated results for aggregate market share model.

Variable	Parameter Estimates
Fare	−2.177*** [0.001]
Competitors	−1.384*** [0.000]
Frequency	0.557*** [0.000]
Passengers	1.006*** [0.000]
Constant	21.329*** [0.002]
R^2	0.564
Adjusted R^2	0.561

1. Model: dependent variable = Ln(Market Share); 2. standard errors in brackets are robust to heteroskedasticity and serial correlation; 3. *p < 0.05, **p < 0.01, ***p < 0.001; statistics of the first stage.

3.2. Discussion

For an airline, the ability to accurately predict the market share of its competitors at specific airports could be crucial for an efficiently tailored business strategy. The model developed in this study deals with the issue of airline market share at the route level. Several explanatory variables, such as the number of competitors, frequency of flying, fares charged and the number of passengers carried have been considered by the model. The model is illustrated with real data and is applicable to demonstrate how it could be used for calculating an airline's market share.

The values of R^2 suggest that the large proportion of flag airline market share could be explained by selected variables. The F statistic in all regressions shows that the variables are significant. In the aggregate market share modelling, fare coefficients from model estimations are large (−2.177) and in line with signs in the literature. The number of competitors (−1.384) exhibited the correct signs since competition affects market share adversely. This was expected because this parameter measures the level of competition which normally has a negative influence on the market share of the airline especially if that airline previously operated in the regulated market.

The estimated frequency coefficient (0.557) indicates that potential travellers prefer routes with high flight frequency, and the marginal effects of different airline market are different. Although coefficients of passengers indicate that travellers prefer routes with higher travel demand, only the model estimates suggest significantly different marginal effects for the different numbers of airline passengers. The model estimates show that an increase in the number of passengers on routes has a larger impact of utility on market share.

One-way ANOVA was used to investigate whether there are differences between the variables (Passengers, Fare, Competitors, and Frequency). Table 3 includes the results of this analysis for the market share characteristics of airlines across the various routes. The results indicate that the market shares of airlines in Nigeria are affected by the modelling parameters (p-value = 0.000). Consequently, operational and financial factors (Passengers, Fare, Competitors, and Frequency) by themselves appear to have a great impact on the market share performance of airlines in Nigeria.

Significant differences were found in the airline market share business model

Table 3. ANOVA of market share modelling variables.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2888.142	4	722.035	202.790	.000[b]
	Residual	2235.997	628	3.561		
	Total	5124.139	632			

a. Dependent variable: market share; b. predictors: (constant), passengers, fare, competitors, frequency.

($F = 202.790$, $p < 0.001$), thereby rejecting Hypothesis H_{01}. This implies that, as inferred by the literature, the individual strategy of each airline affects its performance, and in this case, also it is market share characteristics.

Although a rough parameter, the value of a specific airline's market share could be very valuable information for airline top management who, at all times, must be aware of the airline's position against its competitors in specific segments of the market or even in the overall market. By gaining larger portions of markets, airlines have a chance to maximize their revenue. To achieve this aim, the airline may employ a variety of tactics. An airline may choose to boost frequency on specific routes, but others may choose to offer more seats by employing larger aircraft. The approach employed will be heavily reliant on management decisions, which will modify the product to satisfy their clients while also sustaining profitable growth. However, market share will also be determined by airline rivals and their ability to operate effectively in the market.

Understanding the elements that are the primary drivers of an airline's market share in a certain market may have a significant impact on its operational and marketing strategies [31]. Similarly, due to differences in the nation's economy, market size and structure, airport network layout, and so on, constructing a generic model for determining an airline's market share at a given airport poses a difficult problem. This study produced a model that can be used to find explanatory variables that have the greatest impact on the market share of the investigated airline as well as estimate the future market share of the most relevant variables.

4. Conclusion

The Nigerian airline industry has been so unstable over the years. The airline industry contributes to the reduction of unemployment and increases growth and development. The value of the market share of a specific airline, although a rough parameter, could be very valuable information for the airline's top management who, at every moment, has to be aware of the airline's position against its competitors in certain segments of the market or even in the overall market. By gaining higher portions of markets, airlines have a chance to maximize their revenue. Market share modelling was used in the process of selecting the most suitable set of explanatory variables to be included in the model. Having in mind the purpose of this model (market share estimation for the dominant airline at the particular airport) and the aim of developing the robust model, too many variables could be very hard to understand and analyze and very expensive to maintain. The values of R^2 suggest that the large proportion of flag airline market share could be explained by selected variables. The F statistic in all regressions shows that the variables are significant. In the aggregate market share modelling, fare coefficients from model estimations are large (−2.177) and in line with signs in the literature. The number of competitors (−1.384) exhibited the correct signs since competition affects market share adversely. This was expected

because this parameter measures the level of competition which normally has a negative influence on the market share of the airline especially if that airline previously operated in the regulated market. The estimated frequency coefficient (0.557) indicates that potential travellers prefer routes with high flight frequency, and the marginal effects of different airline market are different. Although coefficients of passengers indicate that travellers prefer routes with higher travel demand, only the model estimates suggest significantly different marginal effects for the different numbers of airline passengers.

Acknowledgements

We will also like to acknowledge our colleagues in the aviation industry; Kingsley Chima, Ayodele Omueti, Percival Uwaechue, Engr. Maxwell Brown and the Nigeria Airways (WT) and Virgin Nigeria (VK) unite family. To Engr. Francis Igwe and Franka Akpasubi of NCAA, we deeply appreciate your support.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Ogunsanya, A. (2007) Transport Sector Reforms. In: Saliu, H., Amali, E. and Olawepo, R., Eds., *Nigerian's Reforms Programme*: *Issues and Challenges*, Ventage Publisher, Ibadan, 285-302.

[2] Reagan, R. (1982) An Analysis of President Reagan's Budget Revisions for Fiscal Year 1982. The Congress of the United States, Congressional Budget Office, Washington DC. https://www.cbo.gov

[3] Herszenhaut, M. (2010) Strategies of Low-Cost Airlines in Emerging Countries. Lambert Academic Publishing, Saarbrücken.

[4] Sakalasooriya, N. (2021) Conceptual Analysis of Sustainability and Sustainable Development. *Open Journal of Social Sciences*, **9**, 396-414. https://doi.org/10.4236/jss.2021.93026

[5] Ramanathan, R. (2001) The Long-Run Behaviour of Transport Performance in India: A Cointegration Approach. *Transportation Research Part A*: *Policy and Practice*, **35**, 309-320. https://doi.org/10.1016/S0965-8564(99)00060-9

[6] Ismail, N.A. and Jenatabadi, H.S. (2014) The Influence of Firm Age on the Relationships of Airline Performance, Economic Situation and Internal Operation. *Transportation Research Part A*: *Policy and Practice*, **67**, 212-224. https://doi.org/10.1016/j.tra.2014.06.010

[7] Jenatabadi, H.S. and Ismail, N.A. (2014) Application of Structural Equation Modelling for Estimating Airline Performance. *Journal of Air Transport Management*, **40**, 25-33. https://doi.org/10.1016/j.jairtraman.2014.05.005

[8] Rangarajan, S. and Prasad, V.A. (2014) In the Indian Airline Industry-Will, the Flight Be Smooth? *Emerald Emerging Markets Case Studies*, **4**, 1-18. https://doi.org/10.1108/EEMCS-05-2013-0057

[9] Lee, B.L. and Worthington, A.C. (2014) Technical Efficiency of Mainstream Airlines

and Low-Cost Carriers: New Evidence Using Bootstrap Data Envelopment Analysis Truncated Regression. *Journal of Air Transport Management*, **38**, 15-20. https://doi.org/10.1016/j.jairtraman.2013.12.013

[10] Liu, C.M. (2009) Entry Behaviour and Financial Distress: An Empirical Analysis of the US Domestic Airline Industry. *Journal of Transport Economics and Policy*, **43**, 237-256.

[11] Barros, C.P. and Couto, E. (2013) Productivity Analysis of European Airlines, 2000-2011. *Journal of Air Transport Management*, **31**, 11-13. https://doi.org/10.1016/j.jairtraman.2012.10.006

[12] Moon, J., Lee, W.S. and Dattilo, J. (2015) Determinants of the Payout Decision in the Airline Industry. *Journal of Air Transport Management*, **42**, 282-288. https://doi.org/10.1016/j.jairtraman.2014.11.009

[13] Carastro, M.J. (2010) Nonfinancial Performance Indicators for US Airlines: A Statistical Analysis. PhD. Thesis, University of Phoenix, Tempe.

[14] Ouellette, P., Petit, P., Tessier-Parent, L.P. and Vigeant, S. (2010) Introducing Regulation in the Measurement of Efficiency, with an Application to the Canadian Air Carriers Industry. *European Journal of Operational Research*, **200**, 216-226. https://doi.org/10.1016/j.ejor.2008.11.041

[15] Cui, Q. and Li, Y. (2016) Airline Energy Efficiency Measures Considering Carbon Abatement: A New Strategic Framework. *Transport. Transportation Research Part D: Transport and Environment*, **49**, 246-258. https://doi.org/10.1016/j.trd.2016.10.003

[16] Button, K. and Neiva, R. (2014) Economic Efficiency of European Air Traffic Control Systems. *Journal of Transport Economics and Policy*, **48**, 65-80.

[17] Jenatabadi, H.S. (2013) Impact of Economic Performance on Organizational Capacity and Capability: A Case Study in the Airline Industry. *International Journal of Business and Management*, **8**, 112-120. https://doi.org/10.5539/ijbm.v8n17p112

[18] Hsu, C.J., Yen, J.R., Chang, Y.C. and Woon, H.K. (2016) How Do the Services of Low-Cost Carriers Affect Passengers' Behavioural Intentions to Revisit a Destination? *Journal of Air Transport Management*, **52**, 111-116. https://doi.org/10.1016/j.jairtraman.2015.12.006

[19] Kim, S.L. and Cho, Y.S. (2016) Study on Internal Service Quality, Job Satisfaction and Customer Satisfaction in Airline Industry. *Journal of the Korea Society of Computer and Information*, **21**, 113-121. https://doi.org/10.9708/jksci.2016.21.3.113

[20] Park, E., Lee, S., Kwon, S.J. and Del Pobil, A.P. (2015) Determinants of Behavioural Intention to Use South Korean Airline Services: Effects of Service Quality and Corporate Social Responsibility. *Sustainability*, **7**, 12106-12121. https://doi.org/10.3390/su70912106

[21] Geman, S. and Geman, D. (2015) Stochastic Relaxation, Gibbs Distributions and the Bayesian Restoration of Images. *Journal of Applied Statistics*, **20**, 25-62. https://doi.org/10.1080/02664769300000058

[22] Malone, T., Weill, P., Lai, R., D'Urso, V., Herman, G., Apel, T.G. and Woerner, S. (2006) Do some Business Models Perform Better than Others? MIT Sloan Research Paper No. 4615-06, Massachusetts Institute of Technology, Cambridge, MA. https://doi.org/10.2139/ssrn.920667

[23] Easton, P.D., McAnally, M.L., Fairfield, P., Zhang, X. and Halsey, R.F. (2010) Financial Statement Analysis & Valuation. 2nd Edition, Cambridge Business Publishers, Westmont.

[24] Collins, D. L., Román, F.J. and Chan, H.C. (2011) An Empirical Investigation of the

Relationship between Economic Sustainability and Profitability Persistence and Firms' Choice of the Business Model: Evidence from the U.S. Airline Industry. *Journal of Management Accounting Research*, **23**, 37-70. https://doi.org/10.2308/jmar-10124

[25] Potter, G. (2011) Discussion of an Empirical Investigation of the Relationship between Economic Sustainability and Profitability Persistence and Firms' Choice of the Business Model: Evidence from the U.S. Airline Industry. *Journal of Management Accounting Research*, **23**, 71-76. https://doi.org/10.2308/jmar-10153

[26] Flamholtz, E.G. and Randle, Y. (2012) Corporate Culture, Business Models, Competitive Advantage, Strategic Assets and the Bottom Line. *Journal of Human Resource Costing & Accounting*, **16**, 76-94. https://doi.org/10.1108/14013381211284227

[27] Wooldridge, J.M. (2010) Econometric Analysis of Cross-Section and Panel Data. 2nd Edition, MIT Press, Cambridge, MA.

[28] Zuidberg, J. (2014) Identifying Airline Cost Economies: An Econometric Analysis of the Factors Affecting Aircraft Operating Costs. *Journal of Air Transport Management*, **40**, 86-95. https://doi.org/10.1016/j.jairtraman.2014.06.007

[29] Johnston, A. and Ozment, J. (2013) Economies of Scale in the US Airline Industry. *Transportation Research Part E*: *Logistics and Transportation Review*, **51**, 95-108. https://doi.org/10.1016/j.tre.2012.09.002

[30] Oum, T.H. and Zhang, Y. (1991) The Utilisation of Quasi-Fixed Inputs and Estimation of Cost Functions: An Application to Airline Costs. *Journal of Transport Economics and Policy*, **25**, 121-134.

[31] Hansen, M.M., Gillen, D. and Djafarian-Tehrani, R. (2001) Aviation Infrastructure Performance and Airline Cost: A Statistical Cost Estimation Approach. *Transportation Research Part E*: *Logistics and Transportation Review*, **37**, 1-23. https://doi.org/10.1016/S1366-5545(00)00008-9