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Financial performance and customer service: An examination using activity-based costing of 38 international airlines

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A B S T R A C T

This study looks at the financial performance of a set of large international airlines from North America, Europe, Latin America, Asia, and the Middle East. Efficiency measures are related to their strategically focused expenditures on operations and on customer services. The results, based on data envelopment analysis, indicate that operation management, including that of customer service attribute evaluation, may be improved through the adoption of activity-based costing analysis.

1. Introduction

The trend towards increasingly commercially driven markets for international air services accompanying the liberalization of many bilateral air service agreement, and the repeated financial crises in the airline industry, has caused large carriers to reassess the way they operate and the nature of the customer services that they offer. A major perceived area of cost savings is time in transit and flight costs, but there are also likely potential savings to be made from improved operational processes and elimination of other inefficiencies. The activity-based costing (ABC) systems offer a potential way to help identify ways to control costs and enhance customer series. It is not only concerned with allocating costs more precisely but also seeks to improve inefficiency. In this paper, we explore the relationship between financial performance and customer service using data envelopment analysis (DEA) as part of the ABC process.

2. Methodology

The ABC system, which has its basis in activity costing and input–output accounting, has developed over the past 20 years as a tool for improving the behavioral, business and accounting practices in industrial organizations (Anderson, 1995; Compton, 1996).[1] In a business organization, the ABC methodology assigns an organization's resource costs through activities to the products and the services that it provides to its customers. It is generally used as a tool for understanding product and customer cost and profitability based on the production or performing processes. As such, ABC has largely been used to support strategic decisions such as pricing, outsourcing, and the identification and measurement of process improvement initiatives.

In more detail, the approach initially involves dividing the production procedure into a series of activities and allocating overhead costs to each. This model assigns more indirect costs into direct costs compared to conventional costing models. Then, based on the levels of these activities consumed by the final products or services being produced, it allocates overhead cost to each of these. Production costs are thus allocated through a "cost driver method" in two stages to minimize distortions. In focusing on the costs associated with activities, ABC can also evaluate whether those activities add value, thus providing a way to assess efficiency and/or enhance customer services. It also has the practical appeal to many firms that it is focused on activities, not responsibilities, and so is seen as less threatening to the mangers of the various intra-business functions under review.[2]

To examine this efficiency aspect within an ABC context we deploy a long established, and well-tried programming technique; data envelopment analysis[3] as part of an ABC process in assessing the performance of international airlines. While there are alternative techniques, generally involving some form of stochastic

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[1] As explained by Peter F. Drucker (1999), traditional cost accounting focuses on what it costs to do something, for example, to cut a screw thread; activity-based costing also records the cost of not doing, such as the cost of waiting for a needed part. In this way, activity-based costing records the costs that traditional cost accounting does not do.

[2] ABC is not without its limitations, and in particular, manually driven ABC can bean inefficient use of resources; it can be expensive and difficult to implement for small gains, but running against this it covers a broader-broad band of activities than many alternative.

[3] Cooper et al. (1999) is a comprehensive text that explains DEA models and applications and provides further reading as well as DEA-Solver software.

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frontier analysis, the DEA methodology avoids the need for an initial specification of a functional form for the efficiency frontier. The basic idea of DEA, as with stochastic approaches, is to identify the most efficient decision-making unit (DMU). In this context, efficiency is the ratio of the weighted sum of a firm's outputs to the weighted sum of its inputs. Once the efficiency scores are derived, they are regressed against a set of financial and operating variables that include the percentage of passenger operations, passenger revenue at the average load factor, international passenger revenue-kilometers as a percentage of passenger revenue-kilometers, scheduled service revenues as a percentage of revenues, sales, indirect cost, fixed assets, and receivable turnover in days.

In terms of anticipated relationships and expected signs, studies by Caves et al. (1983) and others have shown evidence of a positive correlation between average load factors and financial performance while Oum and Yu's work (1999) suggests that average load factor is a reflection of an airline's choice of aircraft and flight frequencies. Fethi et al. (2002) find that an increase in the international focus of an airline leads to spatial disparities in its financial environment. The share of scheduled service revenues is anticipated to have a positive impact on operational efficiency; scheduled flights require different products and marketing than charter flights that allows a rationalization of routines and greater overall efficiency.

In terms of passenger/cargo mix, Oum and Yu (1999) argue that this can be particularly important in Asian and European markets where the latter accounts for a large portion of output of many Asian and European carriers based in export-oriented countries. The economic of carrying passenger and cargo is different; cargo for example is usually carried one-way, while passengers generally make round trips. Average flight length captures economies of distance that Trethaway (1984) and others have demonstrated affects costs.

Activity-based cost accounting breaks down cost estimation into four stages:

- identify activities,
- assign resource costs to activities,
- identify outputs,
- link activity costs to outputs.

ABC differs from traditional cost accounting that assigns costs directly to outputs (Cooper and Kaplan, 1992). The information on costs, activities, and outputs that ABC generates can be used in DEA that seeks individual producing units that are getting the most output of their inputs for each activity or profit center. Together ABC and DEA can provide a two-dimensional portrayal of a business across individual operating units and individual inputs and outputs.

2.1. Stage 1: activity-based costing

We distinguished between two basic activities: providing services for passengers and carrying out transactions. Distinguishing between these is the basis of any carrier's route planning; essentially projecting what market conditions on various routes will look like in a decade or so and to then preparing for these changes well in advance. One aspect of the ABC approach is to emphasizes drivers; factors that drive costs and that drive income. There is a major difference between cost drivers for providing services and cost drivers for carrying out transactions with regard to a route. Providing services for customers involves providing them with access to flight transactions anywhere in the country using a variety of technologies; whereas route services are geographically specific.

Table 1
Airline efficiency values.

Airline	Country	Efficiency value
British Airways	United Kingdom	0.99
Virgin Atlantic	United Kingdom	1.00
American Airlines	United States	1.00
Continental Airlines	United States	1.00
Delta Airlines	United States	1.00
Northwest Airlines	United States	1.00
Trans World Airline	United States	0.94
United Airlines	United States	1.00
US Airways	United States	0.82
Aerolineas Argentinas	Argentina	1.00
Austrian Airlines	Austria	0.86
Biman Bangladesh	Bangladesh	0.91
Lloyd Aereo Boliviano	Bolivia	1.00
Air Canada	Canada	0.85
Canadian Airlines	Canada	0.84
Lan Chile	Chile	1.00
Cathay Pacific	China, Hong Kong	1.00
Avianca Colombia	Colombia	0.75
Czech Airlines	Czech Republic	1.00
Air France	France	1.00
Lufthansa	Germany	0.97
Air India	India	0.91
All Nippon Airways	Japan	0.73
Japan Airlines	Japan	1.00
Kuwait Airways	Kuwait	0.86
Malaysia Airlines	Malaysia	0.94
Aeromexico	Mexico	0.93
Mexicana	Mexico	0.91
KLM Royal Dutch Airlines	Netherlands	1.00
Pakistan International Airlines	Pakistan	0.84
LOT	Poland	0.86
Asiana	Republic of Korea	1.00
Korean Air	Republic of Korea	1.00
Scandinavian	Scandinavia	0.77
Singapore Airlines	Singapore	1.00
Iberia	Spain	0.91
Srilankian	Sri Lanka	0.99
Thai Airways International	Thailand	1.00

2.2. Stage 2: data envelopment analysis

Our use of ABC involves generating data on cost drivers for separate services and transactions that are then fed into a DEA to measure the relative efficiency of each. For the input-oriented model, efficiency measures the proportions of inputs used by a relatively efficient airlines to produce its current level of output, with the most efficient carriers having values of one. DEA analysis does not provide guidance as to the potentially most efficient use of resources but rather it develops as benchmarks a list of airlines that are at the frontier of efficiency of those in the market. It may be possible to be more efficient than these, but no current airline, or at least none in the data set, is at that level.

Table 2
Mean values of Tobit regression variables.

Variables	Mean	Minimum	Maximum
International percentage of operations	73.35	13.238	100
Load factor: ton-kilometers (%)	60.39	42.34	82.53
Percentage of operating revenues from passenger services (%)	81.12	58	99
Scheduled service revenues as a percentage of revenues (%)	91.74	79	99
Operations focus ($/ATKm)	0.25	0.178	0.728
Ticketing, sales, promotion focus ($/revenue passengers)	0.04	0.012	0.072
Indirect cost ($thousands)	268	12	1589
Fixed assets ($thousands)	3571	123	56,854
Receivable turnover (days)	28	10	58