Determinants of Price Formation for Air Transport Services

Joanna Hawlena[1], Anna Mazurek-Kusiak[2]

Abstract:

Purpose: The purpose of this paper is to present the impact of the most important price formation determinants on the development of air transport.
Design/Methodology/Approach: Research on the factors determining the price strategy of carriers is based on available literature, documents developed by IATA and the Civil Aviation Authority, materials of companies constructing Airbus and Boeing aircraft as well as on own empirical research.
Findings: The empirical research carried out indicates the crucial importance of quality and price in creating the unique services and added value. The pursuit of strategic policy consists in defining the company's directional goals and areas of its operation, as well as determining the principles of efficiency of allocation and use of assets. It is also necessary to develop the market rules for the price-making process in the management system and specify ways of behaving in crisis situations.
Practical implications: The key factor determining the competitive advantage of service providers are modern methods of price formation and improving the quality of services. Data can be compared with other countries.
Originality/Value: Since the choice of strategy appropriate for a given enterprise depends on its material situation, assets, management and relations with the environment, in which it operates, in particular the position it occupies on the market, the present study gives an insight in the determination of price formation in a unique way able to be adopted by the air transport industry taking into consideration all aspects mentioned above.

Keywords: Air transport, quality of services, travel classes, pricing policy.

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[1]*University of Life Sciences in Lublin, Faculty of Agrobioengineering, Department of Tourism and Recreation, hawlena@interia.pl*
[2]*Corresponding author, University of Life Sciences in Lublin, Faculty of Agrobioengineering, Department of Tourism and Recreation, anna.mazurek@up.lublin.pl*

1. Introduction

The first two decades of the 21st century were a period of a boom in the air transport. Statistical data on recent years testify to an increase in the volume of transport services carried out under this branch of transport despite periodic declines due to the world events. The main factors affecting the improvement in the economic situation and the increase in the rate of air transport are the overall development of the world economy measured by the increase in GDP and reduction in air travel prices, higher incomes at the disposal of consumers, changing lifestyle and processes of urbanization, as well as higher level of people's qualifications (Groβ and Schröder, 2007).

Activities of the world's largest airlines offering international air transport indicate a high degree of supply concentration in the market. For many years, the transport share of the ten largest air carriers have been above 50% of the offered capacity among twenty major carriers representing 80% of the total capacity (Chang and Hung, 2013).

The purpose of the paper is to identify the individual elements shaping the price formation procedure in air transport. The following hypothesis was put forward:

H1: The tarrif-price previously specified is currently subject to multi-criteria verification up to the specific case of the negotiated price.

2. Price Policy Goals

The issue of a proper price formation is very important in the activities of air transport companies, because price as an element of marketing, is the basis of consumer market decisions. On the other hand, it is an economic tool regulating the level of demand and supply of services on the market and determines the company's income. In this situation, a price strategy should be developed that would act as an active marketing tool, a source of financial profits, as well as a regulator of service demand and supply (Rose *et al.*, 2005). It seems necessary to set a pricing policy that is an important element of company's management. The relationship between price, income and demand is determined by price elasticity of demand (formula 1), income elasticity of demand (formula 2) and cross elasticity (substitution, mixed) (formula 3) (Kendall and Arellano, 2019).

Price elasticity coefficient of demand:

$$EQD_A P_A = \frac{\Delta QD_A}{QD_A} \div \frac{\Delta P_A}{P_A} \tag{1}$$

$EQD_A P_A$ - price elasticity coefficient of demand for good A;
ΔQD_A - change in demand for good A (final demand minus initial demand);

QD_A - initial demand for good A;
ΔP_A - price change for good A (final price minus initial price);
P_A - initial price for good A.

Income elasticity coefficient of demand:

$$EQD_A I = \frac{\Delta QD_A}{QD_A} \div \frac{\Delta I}{I} \qquad (2)$$

$EQD_A I$ - income elasticity coefficient of demand for good A;
ΔQD_A - change in demand for good A (final demand minus initial demand);
QD_A - initial demand for good A;
ΔI - income change for good A (final income minus initial income);
I – tourists' initial income.

Cross elasticity coefficient of demand:

$$EQD_A P_A = \frac{\Delta QD_A}{QD_A} \div \frac{\Delta P_B}{P_B} \qquad (3)$$

$EQD_A P_B$ - mixed elasticity coefficient of demand for good A;
ΔQD_A - change in demand for good A (final demand minus initial demand);
QD_A - initial demand for good A;
ΔP_B - change in the price of the substitution or complementary good B (final price minus initial price);
P_B - initial price of a substitution or complementary good B.

The price elasticity coefficient of demand answers the question: *how will demand change when the price changes by one unit* (Huang *et al.,* 2013). The income elasticity coefficient of demand answers the question: *how will demand change when the income changes by one unit*. The cross elasticity coefficient (also called substitution and cross elasticity) answers the question: *how will the demand for one good changes when the price of the substitution good changes by one unit*. The values of these coefficients are important elements of price formation in air transport (Kidokoro and Zhang, 2018).

The goal of the pricing policy is to increase revenues from transport activities on both passenger and freight markets. European liberalization, that ultimately covered transport between EU countries and internal ones, means an access by EU carriers to all internal routes of the member states, lifting restrictions and division of offered capacity, freedom to set transport charges by carriers and selling services and surplus transfers, as well as prohibiting agreements between carriers that are competitive (Morlotti *et al.,* 2017). The ease of imitating the competitors could allow new airlines to enter the global markets, but they face difficulties due to capital, quality and access to distribution channels. For large carriers operating on

the market for many years, able to provide services on a larger scale at lower unit costs, the situation seems to be favorable as it forces competitors to offer services at a similar price level, which is often an insurmountable barrier for them (Martinez-Garcia and Royo-Vela, 2010).

### 3. Procedure for Price Formation in Air Transport

Despite the cooperation, there is a competitive struggle on the air transport market to attract as many passengers as possible. The pricing policy is based on immediate reaction to all offers and changes introduced by competitors. Process of setting prices for transport services should take into account the reaction of consumers to the relationship between characteristics of the service and its price. This is important, because it affects the effectiveness of pricing policy (Porter, 1996). It may not be very effective if prices are set at a low level in a market segment dominated by quality criteria (Hawlena *et al.,* 2019). High pricing policy in transport market segments dominated by material motivation may also be ineffective. The price determination should therefore be preceded by a detailed analysis of the valuation mechanism in individual market segments (Zou *et al.*, 2014).

The market segments, to which the price offer is addressed are travels for business, family reasons, emigration, tourism. Air transport creates the possibility of transporting passengers between specific airports with a scheduled or charter plane specially rented for the purpose of performing a given transport (Whitelegg, 2003). Charter transport involves the use of negotiable prices. Air fares are of a sectional nature. Their rates are set for specific transport sections. These rates are not calculated directly depending on the number of kilometers traveled on a given route, although when determining them, this factor cannot be ignored. A characteristic feature is that for each section served by airlines, several rates apply, which is due to different transport classes, the type of equipment used, the scale of purchase of services and the date of travel (Espino *et al.*, 2008).

3.1 Distance and Travel Route

The distance and route of the flight differentiate the level of the fare when they affect the price of flight. In air traffic, it often happens that the price per kilometer decreases as the distance increases. Considering the distance, the international air transport market can be divided into short-range markets (up to 1000 km), medium-range (1000 km to 4000 km) and long-range (over 4000 km) (Figure 1).

Figure 1. *Division of international air transport*

Short-range	Medium-range	Long-range

1 000 km   4 000 km
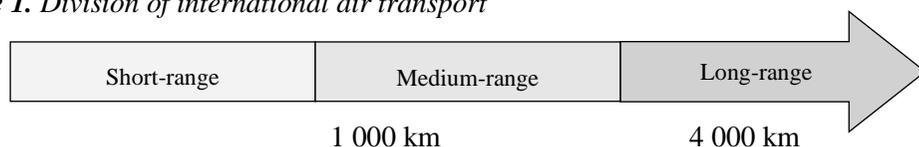
Source: *Own study.*

Different airlines operate on individual markets. The costs of modernization or extension of the aircraft are very high and therefore strong companies with an extensive fleet operate between the continents. Aircraft operation on short-range routes is characterized by significantly higher unit costs than on medium- and long-range routes. In a situation where costs have a direct impact on ticket prices, air transport is more efficient and thus competitive for long-range flights. The direct conclusion is that the following passenger-kilometer offered is cheaper than the previous one. This is mainly influenced by the average number of seats on the plane, the average length of the flight (regardless of the length of flight, there are many fixed costs, e.g. airport charges or costs related to the ground handling of the aircraft), as well as the average use of the aircraft - daily or total, which when flying over longer distances is also greater (Hoszman, 2019b). This largely explains the possibility of offering more favorable prices for transport services (per 1 passenger-kilometer transport performance) on longer international routes, especially intercontinental than on domestic and short international routes.
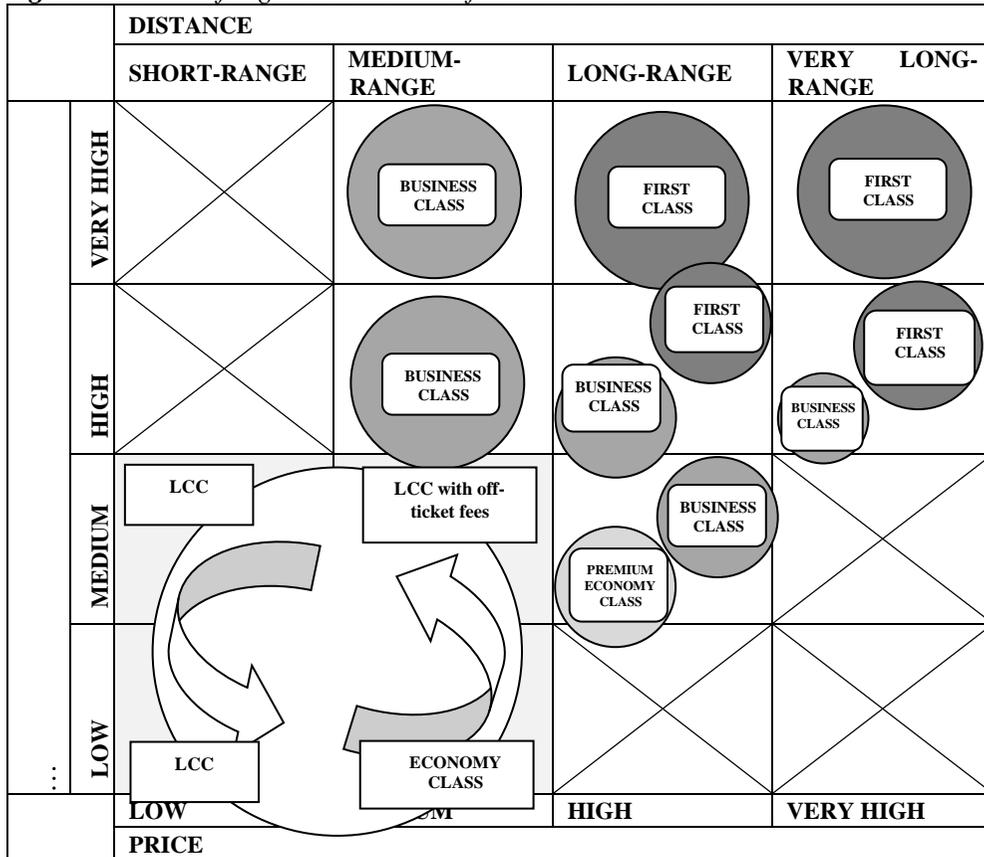
2.2 Travel Comfort

Differentiation of tariff rates due to travel comfort results from the multi-class air travel system, primarily in international connections. Most airplanes operating on intercontinental routes have three travel classes: First Class marked F, Business Class marked C and Economy Class marked Y. First Class (the most expensive) is available only on intercontinental routes (Figure 2). Within Europe, buying a ticket for this class of flights is not possible (Liwiński, 2009).

Figure 2 presents model of selecting the segment and class of the air service, during which the price, comfort and distance were taken into account. As part of these determinants, Enonomy, Premium Economy, Business and First were located in the market space of the flight class. The tourist class offered by Low-Cost Carriers (LCC) was also taken into account (Hawlena, 2012). Within Europe, it is not possible to buy a First Class flight ticket (Mazurek-Kusiak *et al.,* 2017). People, who use this type of travel, have at their disposal a cabin that turns into a bedroom. They can use the shower, ironing board, bar and shops (Airbus A 380 at Emirates) (Hawlena, 2017). In the Business Class, airlines offer comfortable travel conditions consisting of increased space between the seats (they can be adapted to the sleeping option), pleasant cabin decor, better kitchen and careful service.

Before and during a journey (during a stopover), First Class and Business Class passengers can use separate rooms at airports called business lounges. How prices on individual routes are shaped can be seen on the example of an air connection Warsaw - New York route by the PLL LOT airline. In winter, the cheapest round-trip ticket cost USD 498, for a Business Class ticket, it was necessary to pay USD 2188, and for a First Class ticket - even USD 4614. Price differentiation depending on the comfort offered is possible when the perceived class differences are sufficiently large. It seems that this postulate is fully met in air transport.

Figure 2. *Model of segment and class of air service selection*

DISTANCE			
SHORT-RANGE	MEDIUM-RANGE	LONG-RANGE	VERY LONG-RANGE

VERY HIGH	✕	BUSINESS CLASS	FIRST CLASS	FIRST CLASS
HIGH	✕	BUSINESS CLASS	BUSINESS CLASS / FIRST CLASS	BUSINESS CLASS / FIRST CLASS
MEDIUM	LCC	LCC with off-ticket fees	PREMIUM ECONOMY CLASS / BUSINESS CLASS	✕
LOW	LCC	ECONOMY CLASS	✕	✕

LOW		HIGH	VERY HIGH
PRICE			

Source: *Own study.*

4. Travel Date and Ticket Purchase Time

Date of the flight, as an element of the transport rate differentiation, results from the seasonality of demand distribution for air services. The increased number of passengers using airline services during the summer gives carriers the opportunity to increase prices and service intensities on specific connections. In a situation of reduced demand, PLL LOT S.A. applies numerous abatements and discounts that increase the number of passengers using the company's services. Differentiation of ticket prices on the route Warsaw - New York is as follows:

- Spring tariff (from April 1 to June 15) - USD 598 (except holidays);
- Summer tariff (from June 16 to October 15) - USD 698;
- Winter tariff (from October 16 to March 31) - USD 498 (except holidays).

Ticket prices increased by USD 200 during the summer compared to the winter period. Seasonality of demand also applies to parts of the week. Weekend tariffs are

the rule. They mainly concern flights to the USA and Canada. Every flight on the international route from Friday to Sunday inclusive is more expensive by 50 USD. On domestic flights, the weekend starts from Saturday and lasts until Sunday.

Considering the date of ticket purchase, we deal with the "first minute" and "last minute" formulas. The first minute formula is more popular, i.e., very early ticket purchase (airline tickets can be bought a year before the planned flight). Young people often use the last minute formula, because they are more mobile. They often have their bags packed and wait until the last minute to take advantage of the special occasion.

5. Yield Management Price Optimization System

The use of Yield Management techniques is a must for airlines not only to increase their profits, but also to survive in an environment of increasing competition. This has become particularly important in the era of air transport deregulation and "open sky" policies. Pricing policy offices were created to ensure the conditions for maximum profit through dynamic management of capacity, prices and sales opportunities in a given time perspective. The YM system can forecast the filling of a given flight on the day of departure six months in advance. However, it is important:

- to centralize the price decision;
- full records and control of prices used worldwide;
- absolute reservation discipline (making reservations in a class appropriate to the rate) and eliminating artificial blocks (reservations) of places;
- correct data flow.

Precise forecasting of flight loading divided into booking classes is possible due to the use of complex logarithms. Yield Management hopes for particularly high revenue growth under the following conditions:

- inflexible production capacities with high fixed costs;
- forfeiture of services in the absence of an outlet;
- booking (reservation) of services in advance;
- high demand uncertainty;
- buyer segmentation.

To achieve the YM goals, an extensive database is needed. It should include:

- historical data related to the demand structure;
- historical data related to the booking process;
- price elasticities, aggregated by time and by segments;
- data on events (e.g. conferences) that generate demand;

- data on competitors (offers, capacity, prices, etc.) (Chevalier and Mazzalovo, 2012).

The Yield Management system is carried out as part of *peak load pricing*. It enables optimal price management and, as a consequence, an increase in revenues at individual destinations and on particular days of the week, month and year (Hoszman, 2019a).

6.   The Frequent Flyer System as a Process Supporting Pricing Policy

The so-called Marketing Participation Programs, that make the service more attractive and allow to keep in touch with regular customers, are more and more often applied. They are designed to reward customers who often use the service (Barrett, 2004). American Airlines (AA) was one of the first companies to offer free or discounted benefits to its regular customers in the early 1980s. A passenger who often uses the services of a carrier can receive various privileges from airlines such as better seats, reduced or free tickets, possibility of free carrying of additional luggage etc.

Enterprises providing other services were also interested in the Marketing Participation Program. The Mariott Hotel network has created the Honorary Guests Program, and the Hyatt - Golden Passports Program. Regular guests receive a certain sum of miles, receive discounts or even free nights. Credit card issuing companies have also benefited from their experience, as they award points based on the frequency of card use and the amount of purchases. Some companies have established cooperation in this area, creating a network that awards points to their clients also in the event that they use the services of a partner company, e.g., additional miles on the account were obtained for staying in hotels cooperating with the Intercontinental and Orbis programs, as well as for car rental in rental companies participating in the AVIS and Hertz programs etc.

At present, passengers of Polish Airlines are participants of the Miles and More loyalty program run together with Lufthansa (Hwang *et al.,* 2020). It is the largest program in the world with 7 million participants. For LOT passengers, participation in it means the opportunity to collect and use miles on all airline connections in the Star Alliance (Boniecki, 2019) and on connections of 19 other carriers (Table 1).

Rapid changes in the market environment require continuous observation and analysis of the behavior of participating entities, changing methods of competition (including the comprehensive development of an optimal price strategy), market conditions and consumer needs and preferences. The need to properly control these processes requires recognition of current consumer expectations, as their decisions affect the amount of revenues of service providers. In such conditions, source studies on the optimal price level setting and preferences for choosing the travel class are opportunities to obtain information on the size of consumer groups preferring

specific service standards, which is an important element of implementing an effective policy for improving the profitability.

Table 1. *Directions of free flights and the number of miles needed (in thousands)*

From/to	Class	Europe	North America	South America	North Africa	Southern Africa	Southeast Asia	Central Asia
Europe	Economy	35	60	80	40	60	80	100
	Business	50	112	142	70	112	142	192
North America	Economy		35	60	80	100	80	80
	Business		60	112	142	192	142	142
South America	Economy			35	100	60	100	100
	Business			60	192	112	192	192
North Africa	Economy				35	40	60	80
	Business				60	70	112	142
Southern Africa	Economy					35	80	100
	Business					60	142	192
Southeast Asia	Economy						35	40
	Business						60	70
Central Asia	Economy							35
	Business							60

Source: Own study based on data from Star Aliance, The whole world with Miles & More and Star Alliance, https://www.miles-and-more.com/pl/pl/general-information/help-and-contact/help/award-chart.html (25-03-2020).

7. Conclusions

The choice of strategy appropriate for a given enterprise depends on its material situation, assets, management and relations with the environment, in which it operates, in particular the position it occupies on the market. The pursuit of strategic policy consists in defining the company's directional goals and areas of its operation, as well as establishing the rules for the efficiency of allocation and use of assets. It is also necessary to develop the market rules of operation in the management process and define ways of behaving in crisis situations. The international situation (in particular the threat of terrorist attacks, wars and epidemics) as well as expansion of low-cost carriers will have the greatest impact on air transport prices. To some extent, it will also be important to conclude the large-scale strategic alliances, code-share agreements and marketing research on local markets.

Recent world events (in particular the outbreak of the coronavirus) have caused a sharp decline in demand for air transport services, and the airlines have suspended their operations (only the "flight home" program allowing the use of the service to return from abroad has been maintained). Once flights resume, the pricing policy

will be very important. The criteria presented in the paper do not cover all circumstances affecting the diversification of prices of air transport services, but they illustrate the problem of determining the right pricing strategy for the company and making relevant decisions.

References:

Barrett, S.D. 2004. How do the demands for airport services differ between full service carriers and low-cost carriers? Journal of Air Transport Management, 10, 33-39.

Boniecki, D., Marciszewska, E. 2019. Liberalization, globalization, cooperative relations in air transport, [in:] A. Hoszman, (ed.) Aviation business, SGH Oficyna Wydawnicza, Warszawa, 58-62.

Chang, L.Y., Hung, S.C. 2013. Adoption and loyalty toward low cost carriers: the case of Taipei-Singapore passengers. Transportation Research Part E: Logistics and Transportation Review, 50, 29-36.

Chevalier, M., Mazzalovo, G. 2012. Luxury Brand Management, A World of Privilege. Singapure, John Wiley & Sons, 154.

Espino, R., Martín, J.C., Roman, C. 2008. Analyzing the effect of preference heterogeneity on willingness to pay for improving service quality in an airline choice context. Transportation Research Part E: Logistics and Transportation Review, 44(4), 593-606.

Grob, S., Schröder, A. 2007. Basic Business Model of European Low Cost Airlines – An Analysis of Typical Characteristic, In Grob, A., Schröder, S. (Eds.), Handbook of Low Cost Airlines. Berlin, Erich Schmidt Verlag, 31-50.

Hawlena, J. 2012. The low-cost air transport market and the development of the tourism sector. Radom, the "SPATIUM" Scientific and Publishing Institute, 129.

Hawlena, J. 2017. High price strategy in air transport. Buses-Logistics, 10, 53-59.

Hawlena, J., Dudek, M., Kasztelan, A. 2019. Quality determinants in the process of providing low-cost passenger air services in Poland. Radom, the "SPATIUM" Scientific and Publishing Institute, 63-73.

Hoszman, A., 2019a. Airline Economics, [in:] A. Hoszman, (ed.) Aviation Business, SGH Oficyna Wydawnicza, Warsaw, 88-90.

Hoszman, A. 2019b. Airline Economics, [in:] A. Hoszman, (ed.) Aviation Business, SGH Oficyna Wydawnicza, Warsaw, 90-92.

Huang, J., Leng, M., Parlar, M. 2013. Demand functions and decision modeling: A comprehensive survey and research directions. Decision Sciences, 44, 557-609.

Hwang, Y.H., Gao, L., Mattila, A.S. 2020. What recovery options to offer for loyalty reward program members: Dollars vs. Miles? International Journal of Hospitality Management, 87, 102-109.

Kendall, L.K., Arellano, F. 2019. Incorporating price elasticity in financial forecasting models: From theory to practice and implementation. Journal of Education for Business, 94(4), 217-227.

Kidokoro, Y., Zhang, A. 2018. Airport congestion pricing and cost recovery with side business. Transportation Research Part A: Policy and Practice, 114(A), 222-236.

Liwiński, J. 2009. Airbus 40 years of innovation. Aircraft, 12, 5-8.

Martinez-Garcia, E., Royo-Vela, M. 2010. Segmentation of low-cost flights users at secondary airports. Journal of Air Transport Management, 16(4), 234-237.

Mazurek-Kusiak, A., Hawlena, J., Kwiatkowski, A. 2017. Luxury transport services in tourism. Radom, the "SPATIUM" Scientific and Publishing Institute, 146-156.

Morlotti, C., Cattaneo, M., Malighetti, P., Redondi, R. 2017. Multi-dimensional price elasticity for leisure and business destinations in the low-cost air transport market: Evidence from EasyJet. Tourism Management, 61, 23-34.

Porter, M.E. 1996. What is the strategy? Harvard Business Review, 74(6), 61-78.

Rose, J.M., Hensher, D.A., Greene, W.H. 2005. Recovering costs through price and service differentiation: accounting for exogenous information on attribute processing strategies in airline choice. Journal of Air Transport Management, 11(6), 400-407.

Star Aliance. 2020. The whole world with Miles & More and Star Alliance, https://www.miles-and-more.com/pl/pl/general-information/help-and-contact/help/award-chart.html.

Whitelegg, D. 2003. Touching down: labor, globalization and the airline industry. A Radical Journal of Geography, 35, 244-263.

Zou, B., Elke, M., Hansen, M., Kafle N. 2014. Evaluating air carrier fuel efficiency in the US airline industry. Transportation Research, Part A: Policy and Practice, 59, 306-330.