A Time Series Analysis of Airline Pricing Behavior

Case Study Jakarta (CGK) - Denpasar (DPS) Market

Abstract

Since the aircraft grew into the most popular transportation used by tourists. Price competition between airlines becomes a very interesting issue. This study examines the behavior of airfare from Jakarta (CGK) to Denpasar (DPS) through online media (official website). Data is collected from 6 airline websites such as Garuda Indonesia, Air Asia, Citilink, Lion Air, Sriwijaya and Batik Air for 25 days prior to departure date. This duration is compounded because of the characteristics of Indonesian tourists (domestic) who generally do the planning (reservation) travel less than one month. The selected departure date is 9 to 13 May, where the date is a long holiday (peak season). Observations and data recording are done consistently 4 times a day at 6 am 12 noon, 6 pm and 12 pm on all departure hours of 9 to 13 May. The data is then calculated to find the average and compare on each day. The study found that airline ticket prices tend to start declining since 5 or 4 days before departure and will continue to decrease in price until the day of departure. But the decline in ticket prices is also accompanied by a decrease in ticket availability. This information is certainly very useful for tourists to determine the timing of booking air tickets before traveling.

Keywords: time series analysis, domestic airline, pricing behavior

1. Introduction

Air transportation is increasingly in demand by travelers as a means of travel, both for the business traveler and leisure traveler because it is viewed more efficiently and effectively. This phenomenon occurs internationally, nationally and locally. Statista [31] notes that commercial aircraft carry more than 3.8 billion passengers and generate revenues worth 501 billion U.S dollars in 2016. Air transport also plays an important role in tourism and contributes to economic growth, especially in developing countries. Data 2016 shows that the number of international tourist arrivals increased from 1.19 billion arrivals in 2015 to 1.23 billion in 2016; more than half of tourists chose to reach their destination by air transportation. The licensing industry is also able to provide 62.7 million directly generated worldwide jobs.

The huge potential for future transportation growth has attracted the attention of investors to invest in this industry. This phenomenon is characterized by the appearance of the Low-Cost Carrier (LCC) in recent years which is considered to have revolutionized the air transportation industry and is believed to be the beginning of price competition period, especially in short-haul services [26]; [14]; [16]; [28]. Nevertheless, keep in mind that there are several routes where competition between airlines looks uncompetitive [24]. Therefore, it

should be emphasized that the behavior of price changes on each flight route may be different [22].

In Indonesia, air transport business competition is very competitive, where most airlines are classified as a low-cost carrier (LCC) [15]. This phenomenon makes Java Island received the title as the 5th densest flight path in the world [8]. In terms of routes, three Indonesian aviation routes are included in the top 15 of the World, including Denpasar (DPS) to Jakarta (CGK) is the 13th busiest route in the world, below Surabaya to Jakarta (10) and above Makassar to Jakarta (15) [33]. This growth is estimated to be higher along with the re-recognized airline of Indonesia by the European Union, where they have lifted the ban on flying all Indonesian airlines. So all certified airlines are free from this ban because of the improvement of the safety aspect of flight [9].

This improvement is believed to be the role of the government that is able to control ticket price competition which is considered to have an effect on the decreasing of safety and security factors. Nevertheless, this presumption has not been fully scientifically proven. Therefore, it is important for policymakers to obtain information related to market sensitivity to price changes [12]. Especially if the market only prices sensitive, but put aside the safety factor. This is where the role of government to analyses and conduct price interference to ensure security and safety of passengers [7]. An example is how deregulation affects the aviation industry in Singapore, Indonesia, Malaysia, and Thailand. This is followed by the emergence of various LCC versions, for example, Airline owns low-cost version i.e. Tiger Airways and Jetstar Asia, Garuda Indonesia owns i.e. Citilink [28]. In Indonesia, the government's role is set forth in the Regulation of the Minister of Transportation No. 14 of 2016 on the mechanism of calculation formulation and stipulation of the upper and lower limits of passengers on domestic commercial scheduled commercial air transport class services.

Price is a factor that is considered important and gets attention for economists and also for consumers [13]; [36], compared with service factor. However, research related to price competition among airlines is still limited [26]. This results in consumers relying on more intuition and non-scientific information in deciding the right time to book flight tickets while traveling. It is often assumed that the price of flight tickets, both on LCC and full service, increases statically from time to time, and peaks until several days before departure [25]. This assumption is also often used as a basis for consumers to make reservations long before departure time. But Bilotkach [4] notes that airlines with large market share tend to

lower prices as they approach the departure time (if many seats are not filled), unlike airlines with small market share.

McAfee & Te Velde [18] states that price changes are generally more driven by consumers themselves. While Gerardi & Shapiro [11] noted that price elasticity in leisure travelers is higher compared with business traveler. So one of the strategies to determine the price made by the airline is to divide the ticket type between advance-purchase requirements or non-refundable tickets, and Saturday night stay-overs. Nogales et al. [19] argue that there are several factors that generally affect the dynamics of ticket prices, including high-frequency flights, weekend periods, holiday periods, and high demand. Currently, price behavior is strongly influenced by the rise of Internet media that creates increasingly fierce competition [21]; [32]; [16]; [10].

So many factors that can influence price movements make this issue interesting to study. Nevertheless, this study focuses on identifying the behavior of airfare prices with the Jakarta (CGK) to Denpasar (DPS) route. This issue was chosen because the price movement has attracted much attention, especially for consumers (tourists). At this time tourists can only estimate price movements through non-academic information circulating around them. The selected route is the busiest domestic route for the tourist route. While the online media (website) was chosen because internet users in Indonesia in 2017 has reached 54.68% or as many as 143.26 million people [1]. This data shows that most of Indonesia's population has been accustomed to using technology as part of the lifestyle. The limitations of this study are not yet tested from the side of the passenger and passenger capacity [6]. Park [23] notes that there are 11 factors that influence passengers to purchase airline tickets, including in-flight service, reservation-related service, airport service, reliability, employee service, flight availability, perceived price, passenger satisfaction, perceived value, airline image, and overall service quality. The author hopes that this research can be the foundation of future research from a different perspective.

2. Literature Review

Much research is being used to dissect the scope of this study, which is related to air transport and behavior. According to Santorizki [27] nature or general velocity can be used into four, namely:

a. The resulting product cannot be stored, touched, but can be removed with the use of time.
b. The elastic demand, Demand for emergency services is demand derived, i.e. as demand for another.
c. Always Adapt technology, dynamic moving company. The technological equation is not only in the field of machinery but also in other fields, such as management, methods, rules, and procedures, policies.
d. There is always government interference, as is generally the activities relating to others, except for passengers and operators (in this case wisdom), a large amount of investment, and guarantee safety.

It is principally a service function such as: Implementing a safe, orderly and regularly, comfortable, and economical way.

While the types of companies can be accessed by three groups, namely:

a. Direct Air Carriers are airlines that directly provide and use air transport services, such as Scheduled airlines (schedule or regular), charter (air charter), general aviation (general aviation)
b. Indirect Airline: Non-aviation Company, but also as a link to the smooth process of air transport services that have been provided. Examples: cargo, forwarder, air express, and others.
c. While LCC (Low-Cost Carrier) has features like No frills (no food), utilizing internet booking for direct sales, no tickets, and tickets from the secondary airport (cheaper) point to point. Includes component prices consisting of published rates, insurance, taxes, and fees.

Dynamic pricing, also known as revenue management, is a combination of competitive prices to increase profits. This technique is very useful to produce a product called as follows. First, the product ends at a point in time, such as a hotel room, flight, generated electrical product, or product dated ("sell before"). Second, the capacity remains well in advance and or can be increased only with relatively high marginal cost. This characteristic generates enormous prices in sales costs, as the cost of sales will affect the potential for subsequent sales that might deprive the profits. Visitor strategy and value make sales price dynamic [18]. In addition, prices also affect the spread of prices, where prices for the same route from A-B may vary between airline companies [20].

This strategy is also influenced by consumer behavior that is always changing, especially routes that are generally tourist routes. As one part of tourism products [2], [3],

[35], [36], [29], air transportation is one element that is often used by tourists [30]. While the reservation method that is generally used is online media which is felt more effective and efficient [34]. This transaction speed makes prices tend to be very competitive and easily change according to real-time demand data. Tourists at this time have also begun to realize to estimate the time of transportation ticket reservations, especially waiting for the moment of price which tends to be low or declining. However, various studies show that the character of domestic tourists (Indonesia) tends to make preparations or bookings for tourist trips shorter than the time of departure compared to international tourists.

3. Research Methodology

This data is collected from 6 airline websites such as Garuda Indonesia, Batik Air, Air Asia, Citilink, Lion Air and Sriwijaya for 25 days prior to departure. This duration is compounded because of the characteristics of Indonesian tourists (domestic) who generally do the planning (reservation) travel less than 1 month. The selected departure date is the 9th-13th of May, where the date is a long holiday (peak season) and the selected airline ticket class is economy. Observations and data recording are done consistently 4 times a day at 6 am 12 noon, 6 pm and 12 pm on all departure hours (ETD) 9th-13th of May. The data is then calculated on average and compared changes per day. To get the ticket price per day (in average), the simplification of calculation is as follows.

Airfare per day = $\frac{O1+O2+O3+O4}{N}$

Where O: is the average price at the time of observation (6 am, 12 am, 6 pm, 12 pm)
N: is the number of observations per day

While $O = \frac{S1+S2+S3+S4+S5.....}{s}$

Where S : is the ticket price at a certain time (departure time) in accordance with the departure schedule available on every airline (Ex: Estimate Time Departure (ETD) of Garuda Indonesia per day are 7:05, 7:45, 9:35, 11:30, 13:10, 14:25, 16:30, 17:15, 18:40, 20:50, 21:10, 21:40).
s: is the amount of ETD availability per day

Airfare per day is then compared starting from 25 days before departure until the day of departure and presented in the form of a time series chart.

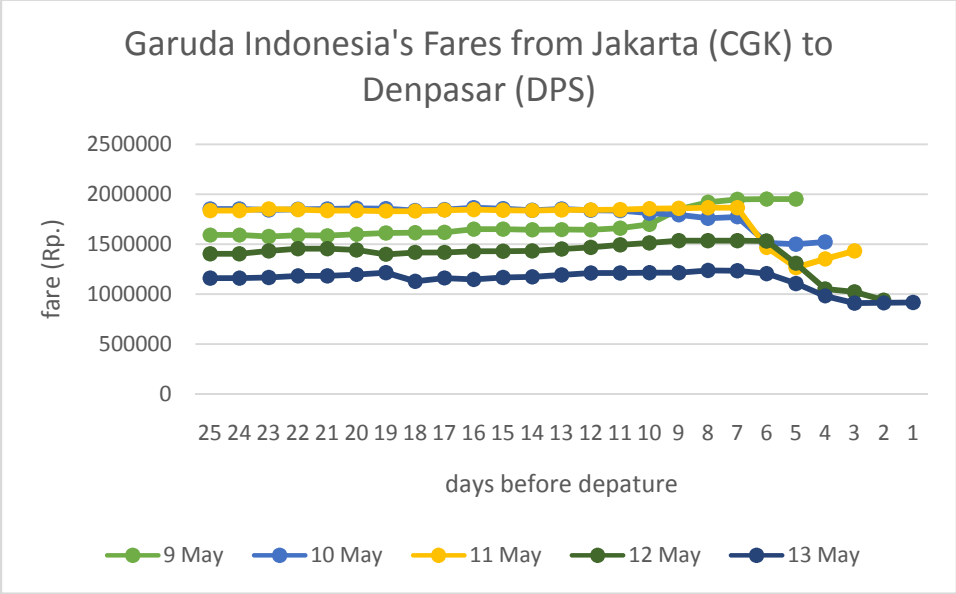
4. Results and Discussions

4.1 Results

During the data collection process (25 days), data are categorized by the date of departure from the date of 9th-13th of May (5 departure dates per airline). The five departure dates are regularly monitored four times per day. The data from the four observations are then performed on average and will be displayed in graphical form. The graph will illustrate the change in price per day from day 25 before departure until 1 day before departure. The grouping of airlines is divided into two parts, the full-service group (Garuda Indonesia and Batik Air) and LCC (Air Asia, Lion Air, Sriwijaya Air, and Citilink) based on observations, the data obtained as follows.

a. Full service

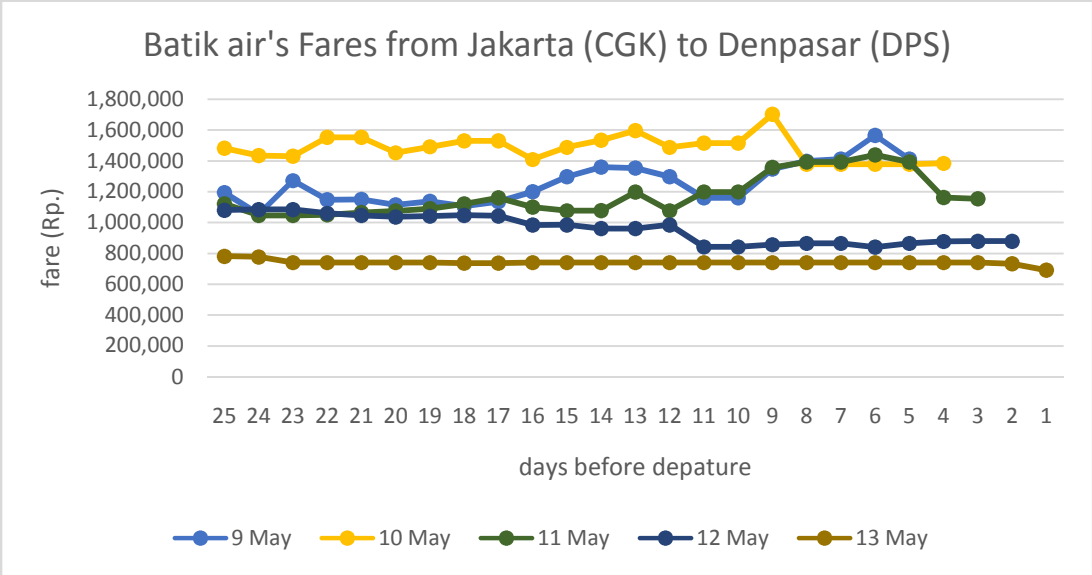
Chart 01
Pricing behavior of Garuda Indonesia from Jakarta (CGK) to Denpasar (DPS), 9th-13th of May



Based on the graph above, the movement of Garuda Indonesia airline ticket prices for Flight on May 9th tends to increase slowly and then increase significantly the 10th day before departure. This phenomenon is due on that day is the beginning of a long holiday which is generally desirable for passengers who want to take a vacation and stay longer. While on May 10, prices tend to stabilize until the 9th day before departure slightly decreased in price, then on the 6th day before departure again decreased significantly until the departure date. For flight on May 11, the price looks stable enough until the 6th day before departure and decreases significantly on the 3rd day before departure and then starts back up slowly until the departure date. Flight on May 12 also tends to be stable, with only a slight increase and a decline in prices, then on the 5th day before departure has drastically decreased in price until

the date of departure. For the 13th flight, the price changes are not too significant, only slightly changed, but the price decreased significantly on the 6th day before departure until the departure date of departure.

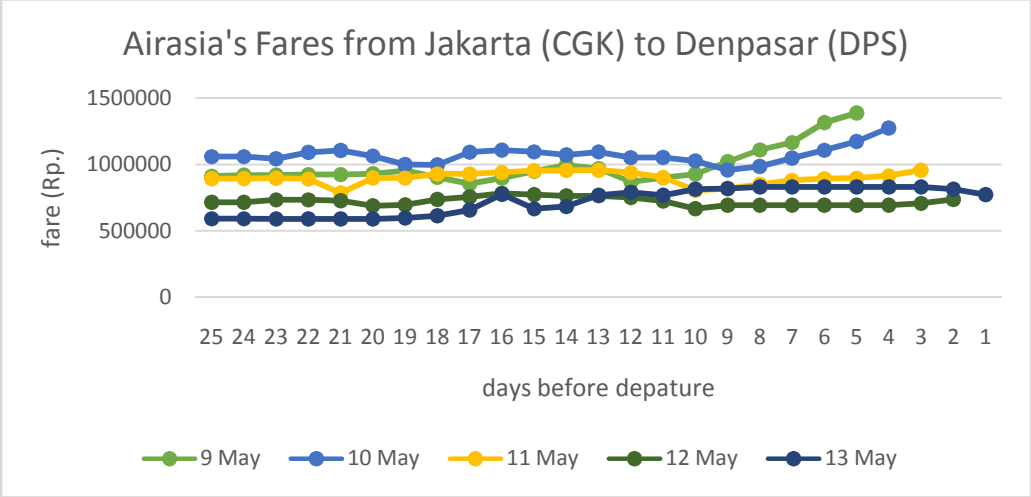
Chart 02
Pricing behavior of Batik Air from Jakarta (CGK) to Denpasar (DPS), 9th-13th of May



Price movements on Batik Air airline for flight on 9 May tend to fluctuate significantly until the date of departure, recorded a jump on the 6th day before departure and the highest increase occurred on the day before departure. For May 10th, price changes are also quite significant, the highest increase occurred on the 8th day before departure, then dropped on the 7th day before departure, and the price was again stable until the departure date. For May 11, price changes tend to rise up to the departure date of departure. For May 12, price changes tend to stabilize and then decline on the 11th day before departure, and again stabilized until the departure date. For May 13th, price movements tend to be stable until the date of departure.

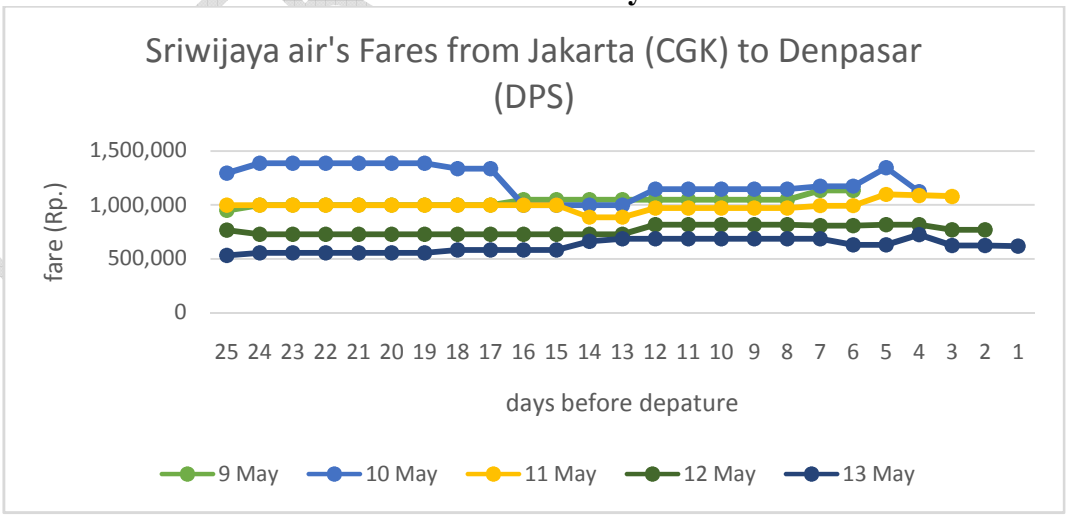
b. Low-Cost Carrier

Chart 03
Pricing behavior of AirAsia from Jakarta (CGK) to Denpasar (DPS), 9th-13th of May



Ticket price movement for flight on May 9th tends to be standard and has increased significantly since the 9th day before departure until departure date. For flight on May 10, ticket prices tend to go up but not significant enough compares other dates, then up from day 8 before departure until departure date. For flight on May 11, prices tend to be stable until the departure date. For flight on May 12, prices also tend to be stable until the departure date of departure. Air Asia's ticket price for a flight on May 13 tends to be standard and only a slight increase on the 15th day check before departure, and back down, then back up slowly until the 2nd day before departure then backs down before the departure date.

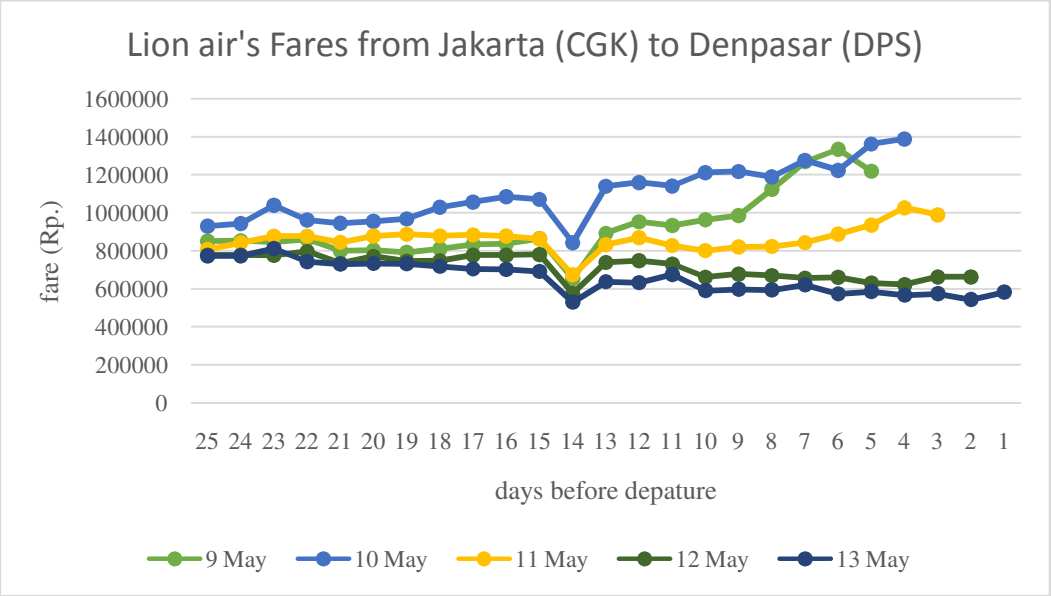
Chart 04
Pricing behavior of Sriwijaya Air from Jakarta (CGK) to Denpasar (DPS), 9th-13th of May



Ticket price movements on Sriwijaya airlines, for flight on 9 of May did not experience any significant increase and decrease until the date of departure. For the flight on May 10th, there was a significant increase and decrease in the price, the most decrease

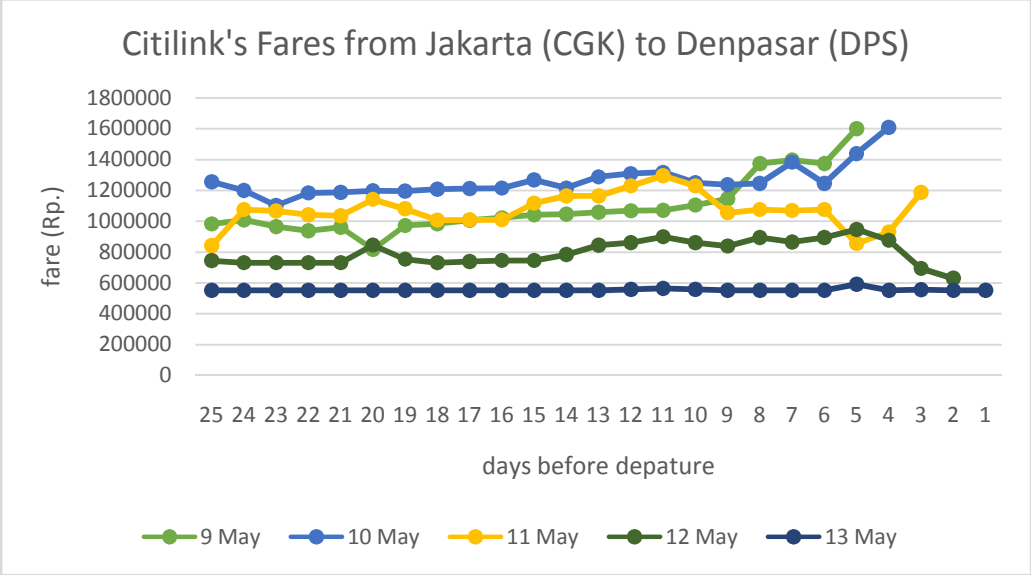
occurred on the 13th day before departure, then tend to stabilize and return on the 9th day before departure, and again stabilized, but again increased on the day before departure. For flight May 11, it tends to be stable and only slightly decreased until the departure date. For flight on May 12th, it tended to be stable and only slightly increased, but gradually decreased until the departure date. For flight on 13 of May, prices tend to be stable and only slightly decrease and increase until the departure date.

Chart 05
Pricing behavior of Lion Air from Jakarta (CGK) to Denpasar (DPS), 9th-13th of May



Ticket price movements on Lion Air airlines, for Flight nine, have decreased significantly ten days before departure, then have a steep increase of up to two days before departure and back down one day before departure until departure date. For Flight on May 10, there was a significant rise and fall in prices, the most decrease occurred on the 12th day before departure, they tend to be stable until the day of departure. For Flight on May 11, it tends to be stable and decreases on the 11th day before the departure date, then tends to fall and rise until the departure date. For Flight on May 12, it tends to be stable and only declines in price on the 12th day before the day of departure, but gradually falls and stabilizes until the departure date. For Flight on May 13, prices tend to steady decline on the 13th day before departure and decrease gradually until the departure date.

Chart 06
Pricing behavior of Citilink from Jakarta (CGK) to Denpasar (DPS), 9th-13th of May

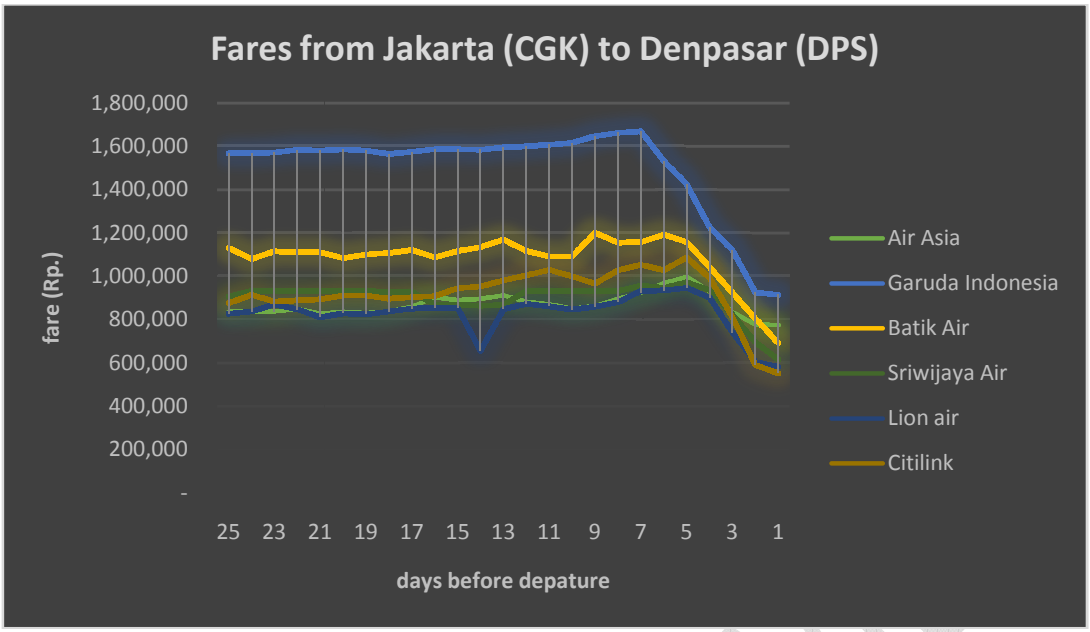


Ticket price movement on Citilink airline, for Flight on 9th does not experience a significant change of departure until departure date. For Flight on May 10, it tends to be stable until the day of departure, but a slight increase and decrease in the four days prior to departure until the day of departure. For Flight on May 11, it tends to be stable and decreases on the 2nd day before the departure date, then tends to gradually rise until the departure date. For Flight on May 12, it tends to be stable and only decline in price on the 3rd day before the day of departure, but gradually decreases and stabilizes until the departure date. For Flight on May 13th, prices tend to be stable until the departure date.

4.2 Discussion

After getting the pattern of ticket price movement for 25 days of observation for departure date 9-13 may. Furthermore, airfare per day 9-13 may be averaged and compared between airlines. The comparison of the price behavior of each airline can be seen in the following chart.

Chart 07
Comparison of airline pricing behavior from Jakarta (CGK) to Denpasar (DPS)



Based on the chart above, it can be seen that the airline Garuda Indonesia has the highest average ticket price compared to other airlines, but the price has decreased very sharply approached six days before departure until departure day. While the price of tickets for Air Batik airline is in the second highest position, where the behavior of ticket prices tend to fluctuate and then decreased significantly before five days before departure until departure day. From the flight side of LCC, Sriwijaya Air tends to have a stable price behavior or does not experience sharp changes until four days before departure day, but just like other flights, the price will drop sharply enter four days before departure until departure day. For Citilink Airlines, the characteristics are almost similar to Sriwijaya Air, where the prevailing prices tend to stabilize and start to decline sharply since 4 days before departure until departure day. AirAsia basically has a similar price movement characteristic, but has experienced a price increase at five days before departure and slowly began to fall until the day of departure. Lion Air Airlines, which have the lowest prices compared to other airlines, began to decline 13 days before departure, and gradually increased non-significant, then prices dropped sharply four days before departure until departure day. On average, a comparison of the six airline price changes can be seen as follows.

Table 01

Comparison of airline pricing behavior from Jakarta (CGK) to Denpasar (DPS)

Airlines	Average ticket price 25 days before departure (Rp.)	Average ticket price the day before departure (Rp.)	% price changes	% average price changes per day
Garuda Indonesia	**1.567.790**	**914.429**	**-41,67**	**2,085**
Batik Air	**1.132.050**	**691.500**	**-38,92**	**1,872**
Air Asia	**833.855**	**772.403**	**-7,37**	**0,249**
Sriwijaya Air	**907.020**	**615.683**	**-32,12**	**1,468**
Lion Air	**827.789**	**582.301**	**-29,66**	**0,992**
Citilink	**875.356**	**551.800**	**-36,96**	**1,591**

Source: data analysis, 2018

Based on the above table, the average price changes from 25 days before departure to the average ticket price the day before departure, respectively occupied by Garuda Indonesia, Batik Air, Citilink, Sriwijaya Air, Lion Air, and Air Asia. The data shows that full-service airlines tend to experience significant changes compared to LCC airlines. Similarly, the average daily ticket price changes, where the full-service airline experienced an average change of more than 1.8% per day (1.87% for Batik Air and 2.08% for Garuda Indonesia). This phenomenon shows per day, full-service airline prices changed at least 1.8% both decreased and vice versa. LCC airlines tend to have a lower percentage (less than 37%) on the average change in price changes from 25 days before departure to the average ticket price the day before departure. While the average change in ticket prices per day, LCC airlines experienced an average change of no more than 1.6% per day. This indicates that LCC airline ticket prices tend to be more stable.

5. Conclusions

The study found that airline ticket prices tend to start declining since 5 or 4 days before departure and will continue to decrease in price until the day of departure. But the decline in ticket prices is also accompanied by a decrease in ticket availability. These findings also break the "myth" that is trusted by consumers or tourists that make a plane ticket long before the departure date is the right decision. Although the study found that the price of tickets, both full-service and LCC tend to fall near the day of departure, keep in mind that the seat availability factor also needs to be considered in deciding the right time to buy airline tickets.

In terms of comparison of air ticket price behavior, full-service airlines tend to have significant change characteristics compared to LCC airlines. Based on the data, Air Asia became the LCC airline with a fairly stable price change (not experiencing significant price changes) in comparison with five other airlines. This research is expected to be a reference

for the traveler to decide the right time to purchase tickets. However, the researcher realizes that price changes are determined by so many factors, because the behavior of prices on other airlines with different routes may have different price-change behaviors. Researchers really hope that further research can be comprehensively reviewed, both from the supply side (airline) and also from the demand side (consumer).

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