

Flight Delays of FireFly Airlines for a Five Days Period

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Abstract—Flight delays usually occur at airports due to several reasons. These delays affect passengers and would cause several dissatisfactions among them and delays also create financial constraint for airlines as some delays are due to technical faults which had to be repaired by the airlines. This paper had denoted the delays of FireFly Airlines at Subang Airport for a period of five days. Scatter plots and trendlines were produced to represent these delays and correlations were made between the time of the day and the duration of delays. The results were intriguing and several discussions and conclusions were made.

Keywords—Flight Delays, Airlines, Aircraft Maintenance, Passenger Traffic, Correlations

INTRODUCTION

Flight delays are norms in flight operations. Airlines aspire to prevent it but it do occur. Airlines have adopted several approaches to minimize delays. One of them is to optimize the maintenance of the aircrafts so that technical delays would be less severe. According to Zamkova and et. al., factors that contributed to flight delays are maintenance of aircraft, defects of aircraft, operating procedures, and others [1]. They further stated that delays are cumulative in nature in some cases and initial delay would create subsequent delays [1].

Song and et. al. stated that flight delays cause financial loss amounting to billions and this had created consternation in the economy as well [2]. They also mentioned that passengers were not satisfied with flight delays and the image and reputation of airlines had taken a beating due to these delays [2]. It is imperative for delays to be analyzed in order to provide a meaningful solution to the delays. This paper denoted the delays of FireFly Airlines for a designated period where the delays and trends of the delays were analyzed. This gave proper perspective of the underlying situation.

There were also delays due to human factors. Harridon stated that if the human factors are left unchecked, it would lead to incidents and catastrophic events could possibly occur [3]. Harridon stipulated that it is essential to detect early the problems in aviation in order to search for feasible solutions [3]. In aviation, financial constraint occurs often and it is vital for airlines or companies to mitigate predicaments early in order to prevent a full scale financial meltdown where we had observed several aviation companies had ceased operations due to financial limitation.

LITERATURE REVIEW

Airlines are subjected to various factors that influence their flight operations. These ranges from technical issues till human performances. Without proper maintenance or care of the fleet of aircrafts, the flight operations would be incurring hiccups and subsequently lead to delays. According to Britto and et. al., flight delays had caused inconveniences to passengers and there were cases where passengers were stranded on an airplane at the tarmac for 9 hours [4]. This is very distressful for passengers and it had given a very bad reputation to the aviation industry. Hence, delays should be minimized and solutions should be procreated to address these delays.

There are several methods to collect data of delays. Airlines sustain and record data of delays of their flights in order to improve their services. Another way to collect data of delays is through the usage of FlightRadar24 which is an apps that track real time the dynamic movements of aircrafts. The apps also records the delays of flights and the duration of the delays. Kalagireva and et. al. had utilized FlightRadar24 for their tracking project and they stated that FlightRadar24 is adequate to be used and

offered substantial benefits to the users [5]. FlightRadar24 used ADS-B transponders to track the aircraft and Multi-lateration was also utilized to provide breadth of tracking [5].

Several airlines had taken proactive initiatives to lessen the delays. But in order to take these initiatives, delays have to be analyzed in an in depth fashion. Zhou and et. al. had utilized causal analysis and example analysis to discreetly analyze flight delays at selected airports [6]. Utilizing these methods, they unearthed several interesting features of delays such as airports capacities tend to be saturated which contributed to delays and small airports have higher degree of delays [6]. With these information, airlines could mitigate the delays in a more structured way.

Delays are indication that the aviation organizations are not productive. Harridon had studied productivity in aviation organizations and unproductive organizations would bleed their financial means in the long run [7]. Harridon also stated that it is vital to find solutions with regards to low productivity and producing optimum solutions is through dissection of the problems [7]. Hence our paper is important as it dissected the delays of FireFly Airlines and with this the airlines could find meaningful solutions to eradicate or minimize the delays.

In order to track the delays, we had utilized FlightRadar24 to track the aircrafts and peruse the database of delays that had occurred. According to Nuryantini and et. al., FlightRadar24 is an adequate apps that track aircraft in an efficient manner [8]. The apps can be used to denote the motions and dynamic movements of aircrafts and components of the movement such as vectors, angular velocity, and others can be delineated for further study [8]. This is very useful to analyze any anomalies in the movements of aircraft due to technical issues or due to improper flight operations.

Many engineers and scientists had actuated numerous research upon flight delays in order to fully comprehend the discrete nature of these delays. Tang had studied flight delays extensively in order to make projections of future delays [9]. These projections were produced using several algorithms such as Logistic Regression, Support Vector Machine, Decision Tree, and others [9]. This is applauded as more solutions are needed as flight delays are widespread throughout the world and airlines have delays that cause significant issues to them.

Financial constraints clad airlines due to delays and this deter airlines from expanding their operations in terms of adding new routes and adding new aircrafts. Moreira mentioned that airlines expanded their routes based upon several parameters such as exploitation of opportunities, assessment of their own competencies, legal and political aspects, and others [10]. Moreira stressed upon competencies where if the assessments indicated that the airlines are competent enough in their flight operations, the airlines are “allowed” to expand their operations [10]. If not, it is not feasible or profitable to expand the flight operations. This showed us that expanding the aviation businesses requires the decrease of delays and it is substantial to investigate delays in a more in depth fashion in order to actuate the expansion of the aviation organization.

The expansion of airlines would also benefit the nation. Harridon stipulated that the economy of a nation depends upon the financial success of companies and these companies would supplement incomes to the nation via taxes [11]. Thus, it is imperative for airlines to streamline their flight operations so that their contributions to the nation are significant and in continuous fashion. Harridon stated that a period of 10 years or more should be studied to pinpoint whether there are improvements upon the operations of the organization [11].

Flight delays have several repercussions upon aviation organizations and passengers. Gao and et. al. had made promising insights upon forecasting of flight delays where they had utilized historical data of flights at certain airports and had integrated these data with weather data that are readily available [12]. In the end, they had obtained results that were favourable where these results indicated that their approach is optimum to be used for delay predictions. Gao and et. al. had used K-Means Clustering and Partial Least Squares Regression to make the flight delay predictions and they were optimistic in using these methods in their future projects [12].

METHODOLOGY

The methodology of the research in shown in Fig. 1.

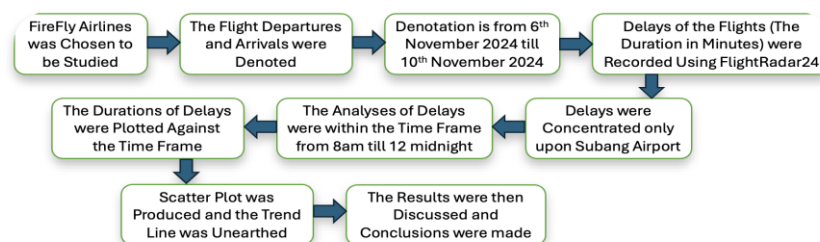


Fig. 1. The Methodology of the Research

FireFly Airlines was chosen to be the subject of the research. Their flight departures and arrivals were observed and noted. Observations were from the date 6th November 2024 till 10th November 2024. Observations were concentrated upon the delay

of flights of FireFly Airlines where the delays were extracted from FlightRadar24. The durations of delays were denoted in minutes. The delays were only focused upon Subang Airport. We had chosen an arbitrary time frame to observe the delays which is from 8am till 12 midnight for the designated 5 days. This is also in accordance to the fact that most flights at Subang Airport are within that time frame. The durations of delays were plotted against this time frame which produced several scatter plots. The trendlines were then unearthed for these scatter plots and mathematical equations were produced to represent the data of these scatter plots. The results were then discussed and conclusions were made. Correlations between time of the day and delays were unearthed based upon the trendlines produced and these correlations were denoted as positive correlation or negative correlation or no correlation.

RESULTS AND DISCUSSION

The results are shown in Fig. 2 till Fig. 6. In Fig. 2, the flight delays on 6th November 2024 are shown. For the departure, the trendline shows an increase of delays as the time of the day goes by. There were six delays for the departure and the most prominent delay would be the delay between 1400 hours till 1500 hours where the delay was more than 55 minutes. This is a point of concern and should be mitigated to appease the passengers. The trendline shows a positive correlation which indicates as the time of the day increases, the duration of delay increases as well. As for the arrival, the trendline shows an increase of delays as time goes by. This is also a positive correlation between those two entities. The prominent delay for arrival would be from 1500 hours to 1600 hours where the duration of delay peaked at 68 minutes. For arrival there is a total of five delays on 6th November 2024.

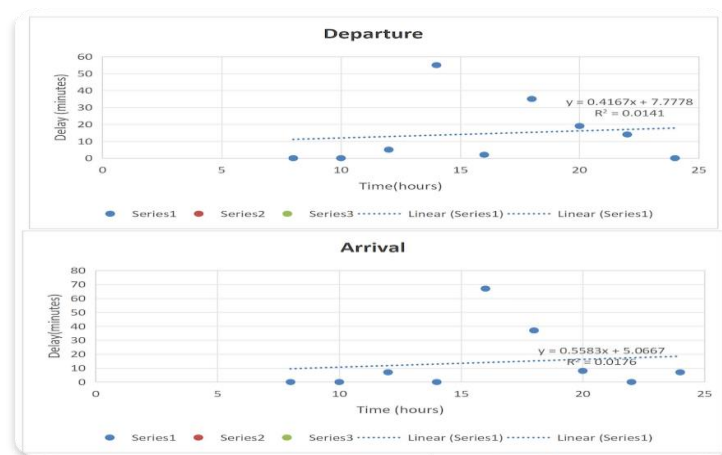


Fig. 2. The Flight Delay on 6th November 2024

Fig. 3 shows the delays on 7th November 2024. For the departure, we can observe there is a total of eight delays where one delay had peaked at 290 minutes. This is enormous and the issue should be mitigated further. The trendline for departure showed an increase which indicated a positive correlation between time of the day and duration of delay. For the arrival, there were four delays where one delay had peaked at 85 minutes. The trendline also showed a positive correlation but the gradient is different from the trendline of the departure. This indicated that the rate of the duration of delay is different from departure and arrival. We had also inquired from several sources with regards to the delays and there were perhaps indications that indicated that some of the delays were due to technical faults of the aircraft. The aircrafts of FireFly Airlines were intensely utilized due to the number of aircrafts that are perhaps low. There were plans to increase these numbers which would lessen the stresses and strains upon the current fleet of aircrafts. We are truly supportive of this as this would decrease the delays of the flights.

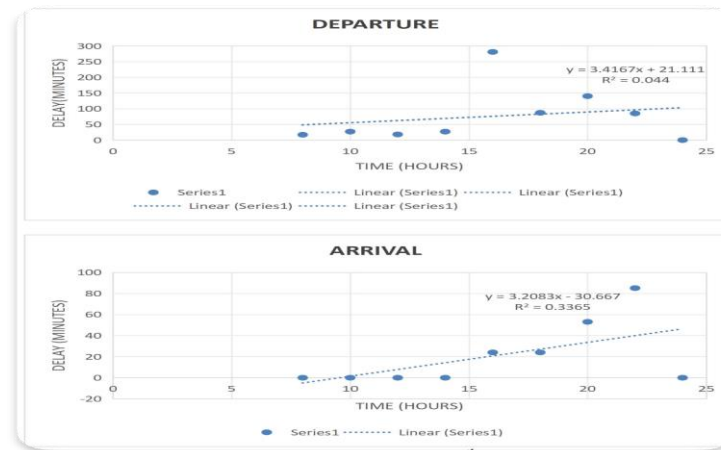


Fig. 3. The Flight Delay on 7th November 2024

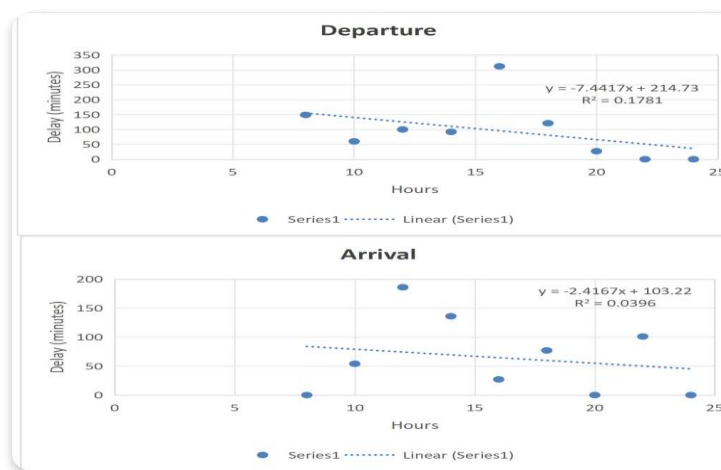


Fig. 4. The Flight Delay on 8th November 2024

Fig.4 shows the delays for the date 8th November 2024. The delays for this date are interesting as the trendlines for both departure and arrival showed negative correlations between time of the day and the duration of delay. As the day goes by, the durations of the delays decreased for both departure and arrival. This is a good trend which is to decrease any delays. However, it has to be noted that for departure, there were seven delays and for arrival, there were six delays. The highest duration of delay for departure was 310 minutes while the highest duration of delay for arrival was 190 minutes.

Meanwhile for Fig. 5 the departure and arrival showed a positive correlation between time of the day and the duration of delay. For departure, there were six delays with one delay having a duration of delay of 200 minutes. For arrival, there were also 6 delays where the zenith of the delay was 180 minutes. The highest duration of delay for departure and arrival occurred at night since is after 2000 hours. Perhaps this is a domino effect where during the morning and throughout the day the delays accumulated since the aircrafts of FireFly Airlines are usually utilized more than once in one day. This then affected certain flight schedules.

In Fig. 6 the delays were also prominent. The highest duration of delay for departure was 300 minutes and for arrival it was 170 minutes. The rates of delays for departure and arrival were not similar where arrival sees a huge rate of delay. There were eight delays for departure while there were seven delays for arrival. For the period of 5 days, each day was clad with delays. This is a grave concern. The responses that we gained showed that the aircrafts were over utilized and it is worthwhile to implement a much in depth Predictive Maintenance Programme that would predict more accurately the time frame of failures of components of aircrafts. With such prediction, the company could make projections on the acquirement of spare parts at a much earlier time frame and this would minimize technical delays.

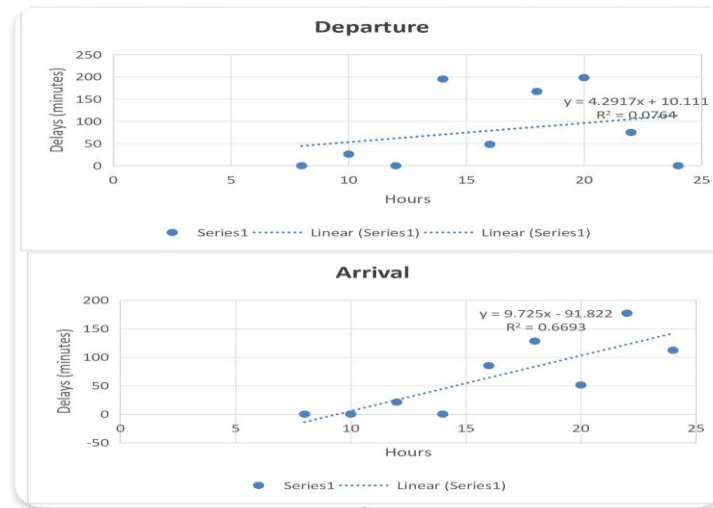


Fig. 5. The Flight Delay on 9th November 2024

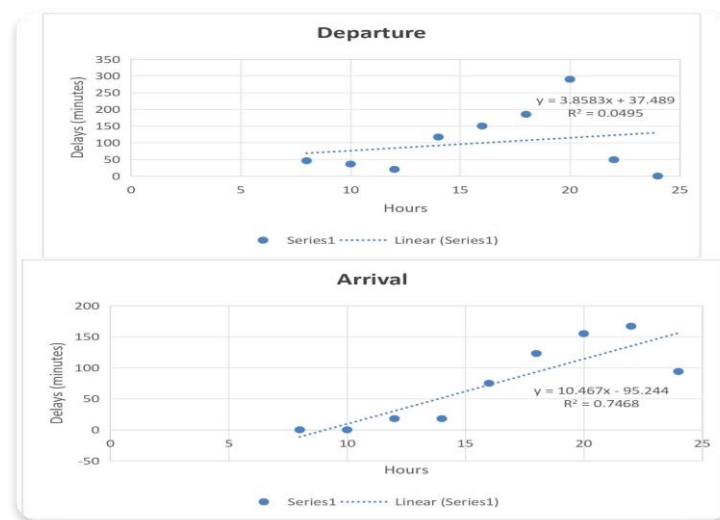


Fig. 6. The Flight Delay on 10th November 2024

Obviously by peering the results, we had observed that the delays kept propagating. Jha and et. al. mentioned the additional resources that were consumed due to these delays and these resources are fuel, labour, and financial capital [13]. In order to streamline the operations of FireFly Airlines, it is imperative to reduce the flight delays as the delays would increase the operational expenditure of the airlines as stipulated by Jha and et. al. in their paper [13]. Reduction of flight delays require distinct analysis of delays and Ding and et. al. had analyzed delays in terms of passengers boarding, baggage loading, departure time, and others [14]. Within this context, they had managed to denote several correlations between delays and designated parameters which is useful to procreate solutions.

CONCLUSION

FireFly Airlines had been bogged with flight delays and this had caused several consternations. It is not only Firefly Airlines, but other airlines had gone through similar fate. The data collected showed that the delays of flights of Firefly Airlines kept increasing throughout the day for the designated five days period but there was a day where the delays had decreased. From other resources it was shown that FireFly Airlines had taken certain measures to decrease the delays in order to complement their expansion plan. This is commendable and we look forward to analyze and study the flight operations of Firefly Airlines in the coming future to denote the improvement that was planned.

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