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Analysis of Aircraft Turnaround Time

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Abstract:

The term 'turnaround' in airport operations refers to the period beginning when a flight arrives at an airport and ending when the aircraft takes off again. Unfortunately, turnaround operations are known to play a primary role in aircraft flight delays.In order for an airline company to achieve maximum profit it has to reduce the aircraft on-ground time. However, due to maintenance task require by the manufacturer which is related to the safety of an aircraft and the maintenance tasks as specified in the checklists and as scheduled by the manufacturer/owner/operator and approved by the concerned airworthiness authority it is hard to reduce the aircraft ground time .Then if the airline has to increase their profit then they have to decrease the aircraft turnaround time which is the only variable. Most carrier will try to reduce their turnaround time to be as low as

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possible. However, some of the airline cannot handle it well enough and will cause the delay of the aircraft departure, which in turn will result in a loss of profit. Data has been collected through the survey method with the help of questionnaire. The present study reveals that low- cost airlines has shown a better result in aircraft turnaround time which prove that we can use the solution and also come out with new solution like folding seat to reduce the aircraft turnaround. Besides that, some of the solutions may be applied and used by the low-cost airlines which can improve their low turnaround time.

Key words: turnaround time, aircraft delays, aircraft on-ground time, airline profit, maintenance.

Introduction

In order for an airline to make a profit it has to increase the aircraft air-borne time. Most of the time the aircraft is on ground mainly during maintenance and aircraft turnaround time. So, in order for an airline company to achieve maximum profit it has to reduce the aircraft on-ground time. However, due to maintenance task require by the manufacturer which is related to the safety of an aircraft and the maintenance task such as A-check and C-check was schedule by the manufacturer it is hard to reduce the aircraft ground time because it is quite fixed. Then if the airline has to increase their profit then they have to decrease the aircraft turnaround time which is variable. When an aircraft reaches the airport, most of the airline stay there and depart again after this duration of time which is known as aircraft turnaround time. During aircraft turnaround time, the aircraft undergo some task and servicing like refueling, unloading and loading baggage, passenger disembarking and boarding, catering and line maintenance checks. However, most of the airlines cannot achieve that in an efficient way that cause a delay of an aircraft for longer turnaround time. According to Aerospace ID 2007, in 2005 from June to November, all the aircrafts got delayed for duration of

total 605 hours that means an average of 17.4 minutes delayed per aircraft in UK Airport. UK Airport was the top 10 of the busiest airport. As we know, when the aircraft delay especially for those large airport it will have large impact to the airlines as well as the passenger and this is known as the knock on effects (reactionary delays) This is because the ATC needs to reschedule and find a slot for the aircraft and this may take up an hour. Due to this reason, the cost of delay for every minute is around £50 and estimated £650million is loss every year. If the turnaround time can be reduced then the airlines can increase their profit and reduce their loss which is caused by the delay of the turnaround time. Thus these are the factors that affect the aircraft turnaround time which is a major problem that most of the airlines are facing off. Keeping in view the above facts the present study is carried out to discuss ways to minimize the delay and reduce the aircraft turnaround time. Most of the airlines have the aim to lessen the aircraft turnaround time and increase airborne time to make more profit for the airlines.

Materials and Methods

The aim is to produce a detailed solution and ways that will minimize flight delays caused i.e., a delay in turnaround time (TAT) of the aircraft.

Objectives

1. Determine the factors that cause the delays in the aircraft turnaround time.
2. To analyze the ideal turnaround time for different aircraft fleet.
3. Collect the data for the aircraft turnaround time in different airlines.
4. Determine the operational time in servicing of the aircraft.

5. Identify the suitable solution to reduce the aircraft turnaround time.

Data collection

The following data collection will include the time required for different type of aircraft to undergo servicing and maintenance. The reason for us to acquire the information on servicing and maintenance is because it allows us to estimate how the task will cause delay due to the increase of subtask that exists in the main procedure. Sometimes, when the aircraft touches down, minor servicing and maintenance are needed to be carried out immediately at the tarmac. Thus, if an aircraft is grounded for maintenance and servicing, the operators should estimate the time required for all the maintenance and servicing to be completed and to know whether that the grounding will cause delay to the next departure. Once the time required for maintenance and servicing are identified, we can reschedule the aircraft for later departure or take into consideration whether to swap the aircraft or continue the fight with minor delay. As result, we can either prevent delays or reduce the delay.

From the data we have collected from the technicians, they have always faced this kind of issues and problems. Hence, by implementing a survey and interview as part of our project we would be able to have a clearer picture on the task that needs to be carried out for the different incident and time required for each task. By preparing a questionnaire that would be answered by the technician, which would include suggestions from the technicians themselves on ways to prevent delays and how to reduce the possibility of prolonging the turnaround time. After the interviews have been done, we will have a more definite answer on the time required and the possible extra task that would need to be carried out.

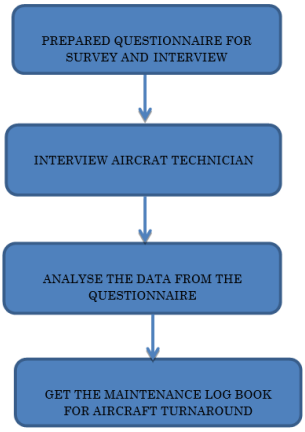

Fig. 1. Data Collection Process

Interview

Interviews were carried out with the aircraft technicians to find out the timing and the task that was carried out during servicing and maintenance. The survey questionnaire is mentioned below:

1. What are the tasks that need to be carried out during aircraft turnaround time?
2. What is the duration require to carry out each task?
3. Which task will cause the delay to happen?
4. How they reduce the delay if something happen?
5. How much work force is required for finishing one turnaround?
6. What is the standard turnaround that is set by the carrier/company?
7. On an average, how many delays are caused during an aircraft turnaround?
8. Do you carry out light maintenance like wheels change during aircraft turnaround?

9. How do you maintain the safety of the technician and aircraft while achieving the aircraft turnaround time within the given schedule?
10. What is your suggestion to improve the current aircraft turnaround time?

The survey was conducted with technicians from Air Asia as Air Asia has the lowest turnaround time in Malaysia, which we can use it as a reference and formulate a solution for MAS to improve their aircraft turnaround time.

Internet

As Boeing makes the majority of the aircraft that is operated by MAS, we will base our ideas around the manufacturer's suggestion. As Boeing is the manufacturer for the aircraft, we have to follow their included task and the time required for every aircraft models. As mentioned before this, during aircraft turnaround time, the maintenance procedures that would be carried out are stated in the maintenance manual. So in essence, it would be more valuable if we can refer to the suggestions made by the manufacturer. The information that gathered are usually from the internet, through vigorous searching and we are able to obtain useful information that includes the task that would be carried out during the aircraft turnaround process. It also includes the different configuration of the ground equipments that would be needed to use during the aircraft's turnaround for different models.

Results and Discussion

Interview Results

This interview was carried out with the aircraft technicians to know what the time taken and the task that needed to be carried out during servicing and maintenance.

1. What are the tasks needed to be carried out during aircraft turnaround time?
   Aircraft servicing (engine, idg, starter, hydraulic, accumulators).
2. What is the approximate duration to carry out each task?
   Depends.
3. Which task will cause the delay to happen?
   Extra task(unscheduled maintenance) .
4. How do they reduce the delay in case of unscheduled maintenance?
   Allocate more man power.
5. What is the work force required for finishing one turnaround?
   2 to 3.
6. What is the standard turnaround that is set by the carrier/company?
   Around 30 minutes.
7. On an average, how many delays are caused during an aircraft turnaround?
   Depends on various factors such as man power, number of flights and weather condition.
8. Do you carry out light maintenance like wheels change during aircraft turnaround?
   No if the wear and tear are within limits as stated in the AMM.
9. How do you maintain the safety of the technician and aircraft while achieving the aircraft turnaround time within the given schedule?
   Obey the aircraft MM and avoid rushing the work but try to finish it within the allocated time.
10. What is your suggestion to improve the current aircraft turnaround time?
    Carry out detailed and more proper maintenance during night halt

The definition of aircraft TAT

Aircraft turnaround time is the time between the aircraft has reached the airport terminal with the engine shut down until the time the engine starts. During this period of time, there are lot of tasks that are needed to be carried out such as refueling, loading and unloading baggages, embarking and disembarking of passengers, servicing and maintenance. According to CAA, 30% of the delays of the aircraft departure occur duringaircraft turnaround time. One of the main reasons is the number of tasks that are needed to be carried out. The delays during take-off and during landing are significantly lower than delays due to aircraft TAT because the only risk that aircraft faces during take-off/landing is the local weather conditions and some minor technical issues. While for the technical issue normally will occur before departure and it will consider as the delay during aircraft TAT.

Identify the factors that contribute to delays in the aircraft departure time

The factors can broadly be classified into ground crew, air traffic control and weather.

Ground Crew

When the aircraft has arrived and parked at the allocated bay, the ground crews are required to carry out tasks such as:

A. Unload luggage
B. Load luggage
C. Disembark passenger
D. Embark passenger
E. Servicing
F. Maintenance

It would take more time to unload the baggages for large commercial aircrafts as number of passengers will be more

Commercial aircrafts not only carry passengers but also carry cargos as well to maximize the profit. So, if a cargo is stuck in the cargo bay and the luggage cannot be removed from the aircraft this will cause the next flight to delay. This will eventually lead to a series of delays if no corrective action is taken.

Passengers also indirectly contribute to delays of the aircraft. For example, Airbus A380 has total of 853 seats and if the aircraft is fully loaded then it requires more time to disembark passenger. So, the time required will depend upon the number of passengers. That is the reasons why the low cost airlines will not choose to use the large aircraft as their fleet because of wastage of time due to lower aircraft turnaround time. Besides that, the embark passenger is one of the most important key factor because lot of passengers do not know where their seat are located and if this occurs at the wide body aircrafts then it will take longer time and as a result the delay in the departure of the flight.

In order to maintain the aircraft air-borne it requires the technicians to carry out servicing such as refueling, engine oil level check and etc. So, if the aircraft has some issue like the fuel bowser is notavailable then it would cause the aircraft to delay. Besides that, technician may face problems during maintenance and lack of manpower which leads to aircrafts delays. Well, in term of maintenance some of the aircrafts may undergo some kind of accident or incident which require changing parts or inspections such as tire change, brake change, lightning strike or even bird strike. Bear in mind that all this maintenance is not in the list which needs to be carried out during aircraft turnaround time so if this occurs then the ground crew has to carry out additional maintenance which will contribute to the delay of the aircraft.

Air Traffic Control

Air traffic control is the one who control the movement of the aircrafts which includes giving the clearance for takeoff, landing and taxiing. Therefore, for some airports that are considered as busy airport like Hartsfield-Jackson Atlanta, which is the busiest airport in the world, they have a higher chance of airport traffic jam due the amount of aircrafts that need to take off and land during almost the same time. This is the reason why the low cost airlines choose to fly from non-busy airport. So, they will be able to reduce the risk of delay. Sometime due to some event like Olympic and FIFA, suddenly will have lots of aircrafts flying to the airport and causing lack of parking slots. Due to this event, some of the aircrafts are not allowed to taxi to the parking bay which in the end will cause the aircrafts to delay.

Weather

Some of the airports or countries are prone to have lots of unpredictable weather like tornado, strong wind, fog and snow. Due to this reason the aircraft will undergo delays due to the low visibilities and the risk of occurring accidents. Besides that, although some of the aircrafts are installed with the Instrument Landing System but sometimes the pilot will choose to abort the landing due to the same reason or due to strong crosswind. However, this factor cannot be improved unless the aircraft manufacturer produces a more capable aircraft which able to handle this kind of weather condition.

Conclusions

Based on the questionnaire we can see that, Airasia hardly has delays in departure of the aircrafts because they know how to utilize their available man power. Normally, in order to depart one aircraft it only requires 2 or 3 manpower and all this includes refueling, engine oil servicing and other task that

needs to be carried out during aircraft turnaround time. In other words, Airasia hire highly efficient worker who can do their job independently. Besides this, one of the main problems that the line maintenance crew faces is that the unknown maintenance that needs to be carried out during aircraft turnaround time. During this time, it may require more man power to complete the task. So, for Airasia they are trying to minimize the risk of delay during aircraft turnaround time by allocating more man power and to have some aircraft to back up or to swap with other aircraft. So, with this information, as a full service airlines MAS ,which their selling point is on time performance, they can refer to this example where the low cost airlines are able to prevent the delays of aircraft turnaround time by having more efficient labor.

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