JRSSEM 2023, Vol. 03, No. 05, 1277 – 1297
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

COMPARISON ANALYSIS OF FUEL ON MANUAL AND SYSTEMATIC FLIGHT PLAN ON CITILINK AIRLINES ON THE JAKARTA-SURABAYA ROUTE USING AIRBUS A320 AIRCRAFT

Ahmad Mubarok[1]
Jadon Pieter Elia Tirtanto[2]
Ariyono Setiawan[3]
Daniel Dewantoro Rumani[4]
Akademi Penerbang Indonesia Banyuwangi, Indonesia[1,2,3,4]
Email: ahmadamoeba@gmail.com[1], jadon.tirtanto@gmail.com[2], kukuh3prasetyo@gmail.com[3], danielrumani@gmail.com4
*Correspondence: ahmadamoeba@gmail.com

ABSTRACT: A Flight Plan is an essential element for achieving efficiency. Prior to operating a flight, a Flight Plan must be prepared. The flight operations officers (FOOs) utilize Airbus's NavBlue application to create a systematic Flight Plan. They can also manually generate a Flight Plan using the FCOM (Flight Crew Operating Manual) guidebook. This research focuses on the differences in fuel planning between the systematic and manual methods of Flight Plan creation, as there are variations between the two approaches. Qualitative methodology is used to gather and analyze secondary data, including both manual and systematic Flight Plans, weather and environmental data, as well as aircraft technical documents and fuel tank capacities. The anticipated outcome of this research is to provide valuable insights for the aviation industry in enhancing operational efficiency.

Keywords: Aviation, Flight Planning, FOO, FCOM, NavBlue

INTRODUCTION

Flight is a transportation activity that involves the use of aircraft for various purposes, such as passenger and cargo transportation, this statement is quoted in accordance with Law Number 1 of 2009. Flights always have something to do with planning a flight, just before the flight is operated, of course, there is a flight plan or in the aviation world commonly called *Flight Planning* (Altus, 2009). Pilots before carrying out the flight must know about the flight plan in order to understand everything written in the flight plan *such* as *weather package*, NOTAM (*Notice to Airmen*), MEL/CDL (*Minimum Equipment List/Configuration Deviation List), validity time*, flight number, aircraft registration, ETD/ETA (*Estimated Time Departure/Estimated Time Arrival*), route used, *Load Manifest,* Fuel Components,

DOI: 10.59141/jrssem.v3i05.599 https://jrssem.publikasiindonesia.id/index.php/jrssem/index

etc. (Citilink, 2022). All these things are important components in the *flight plan* so that pilots can operate flights safely and efficiently (Rosenow et al., 2021).

Efficiency in aviation always involves cost related *from various aspects, especially in the aspect of* fuel *used in airline flights that use LCC (*Low-cost Carrier*)* (Kos Koklic et al., 2017). Like PT Citilink Indonesia, it is very influential on the *costs* that must be incurred to a minimum without compromising security and safety on flights. One flight, Citilink's Airbus A320 aircraft can fly thousands of kilos in order to operate a flight (Sáez & Prats., 2020).

Flights in Indonesia that currently count quite high in volume are Citilink flights with the Jakarta-Surabaya route (Djoyohadikusumo, 2018). High flight volume concerns the revenue that will be generated by the airline for higher *profits* (Cronrath, 2017). In order to get the amount of *fuel* needed efficiently for flight operations, the FOO (*Flight Operation Officer*) crew will plan and calculate the amount of fuel needed by the aircraft (Butt, 2015). The FOO crew will make a *Flight Plan* using Airbus' *official application/*website *called NavBlue which can make* a computerized flight *plan and* made systematically to become a *flight plan*. In addition to NavBlue, FOO can also make *flight plans* manually using Airbus' official guidebook called FCOM (*Flight Crew Operating Manual*). From making *flight plans* systematically and manually, in its contents even though it uses the same regulations, there are differences from the *fuel* part which can be a *cost-related problem* that needs to be avoided in LCC airlines (Horiguchi et al., 2017).

Due to differences *in fuel content made systematically and manually, this is a problem with the funds spent by LCC airlines because* the costs *incurred can be higher and can cause losses in* fuel expenditure. The benefits that can be obtained in this study can be a new breakthrough for efficiency for Citilink airlines in order to reduce spending on *fuel and* provide corrections to the minimum possible fuel calculation section efficiently and remain in safety procedures. The world of aviation has a very wide scope and is one of the companies that can get a large income.

Historically, Citilink's efficiency has not come from existing systems. To maintain the stability of Airbus A320 products, Airbus relies on the NavBlue app as a guide to ensure that products remain in accordance with the instructions provided by the manufacturer. If the planning process is carried out manually and not in accordance with procedures, it will have a negative impact or can be detrimental to the Airbus A320 product itself. If you want to make changes to your *flight plan* to make it more efficient, they must be adjusted and approved by Airbus. Citilink made several changes to improve their efficiency and reduce the load on the aircraft. The changes include not providing newspapers and manual books of pilots physically on board but replacing them with EFB (*Electronic*

Flight Bag). In addition, they also do not provide snacks on flights with a duration of one hour to one and a half hours, so as to eliminate catering trolleys that put additional burden on the aircraft. Citilink also reduces the weight on passenger seats by reducing the use of sponges in them, but still ensures passenger comfort in accordance with regulations. In addition, on flights with a duration of one hour to one and a half hours, the water tank for the lavatory *is not fully filled to reduce the burden on the aircraft, even Citilink conducted research in one hour of flight how many passengers use* the lavatory on the plane. Citilink also replaced the aircraft carpet with a thinner one to reduce the overall weight of the aircraft.

Through various research conducted, Citilink managed to reduce the burden of aircraft up to 138 KG on each aircraft they owned. Citilink also conducted research related to the use of *braking systems* on aircraft when landing, including the distance required by pilots to breaking both on short and long runways. In braking, Citilink still uses the momentum of the aircraft to stop, so the weight of the aircraft also affects this and fuel use when landing. The composition of the flight crew also affects the weight of the aircraft. The more crew there is, the heavier the aircraft. Therefore, Citilink reduced the number of flight crew from 2/6 to 2/4 under normal flight conditions. All steps taken by Citilink in research and load reduction of this aircraft are carried out with the approval of the Airbus A320 manufacturer.

One of the success factors of the airline is approaching with *stable* Supply and Demand(Dožić & Kalić, 2015). Air transportation is becoming the main choice of people today and gaining high popularity. In addition, the airline operator business is also attractive because of the promising profit potential. The aviation industry is a competitive and dynamic sector, providing opportunities for business development and financial growth. The airline business consists of three main elements: product competition, crew business, and fuel business. Product competition relates to the type of product used by the airline. The crew business involves the management and development of human resources who are experts in the field of aviation. While the fuel business is very important because of the large use of fuel in aviation. Efficient use of fuel is a key factor for the success and sustainability of the airline's business. Therefore, the author is interested in conducting research entitled "Analysis of *Fuel Calculation* on *Flight Plan* Manually and Systematically on Citilink Airlines Jakarta-Surabaya Route Using Airbus A320 Aircraft".

As described above, the author wants to conduct deeper research related to the calculation of *fuel* carried on Citilink's A320 flight on the Jakarta-Surabaya route with the title "Comparative Analysis of *Fuel* on Flight Plan *Manually and Systematically on*

Citilink Airlines Jakarta-Surabaya Route Using Airbus A320 Aircraft".

METHOD

Research Design

Human admiration for something is what starts about knowledge and science, humans have a tendency to find out more about science so that it encourages a desire to find out about things that are questionable and can be answered (Siyoto & Sodik, 2015). The research design must be able to explain what, why and how the problems raised to be investigated using the correct methodology and principles (Gulo, 2002).

This research relies on qualitative methods to collect and analyze data. Qualitative research is a scientific research approach that aims to obtain a deep understanding and explanation of a phenomenon. The way used to achieve this goal is by collecting data through techniques such as observation, interviews, and analysis of texts or documents. Qualitative research has the ability to produce new contributions in the form of theories or test the correctness of existing theories. Research is a scientific process that aims to gain new understanding or improve existing understanding of a phenomenon or problem under study and to increase knowledge and understanding of a particular phenomenon or problem. The research process involves important stages, namely data collection, data analysis, and interpretation of results carried out systematically and measurably using established scientific methods (Harahap, 2020).

This study uses a qualitative approach to analyze and test the calculations made to make a *flight plan* systematically with NavBlue and manually with FCOM.

Research Variables

In this study, the variable studied was the calculation of fuel on the *Flight Plan* on the flight from Jakarta to Surabaya.

Object of Research

In this study, the object of study is the process of calculating *fuel* on Airbus A320 aircraft in planning flights from Jakarta to Surabaya. The object of research can include *manual and systematic fuel calculation methods on Airbus A320 aircraft, the amount of fuel needed to fly from Jakarta to Surabaya with Airbus A320 aircraft, and the effectiveness of manual and systematic fuel calculation methods* in minimizing unnecessary fuel use and increasing fuel use efficiency on Airbus A320 aircraft used by Citilink airlines on the Jakarta-Surabaya route.

Data Collection Techniques

This study used secondary data that had been collected to conduct the analysis. To collect data, researchers used document collection techniques related to fuel calculations on Airbus A320 aircraft. The documents collected include *a manually and systematically calculated flight plan, data on weather and environmental conditions, as well as*

technical documents of the aircraft and fuel tank capacity.

Data Analysis Techniques

The comparative analysis method was used in this study to analyze the data by comparing two or more data. In this study, this method was used to compare fuel calculations on *flight plans* carried out manually and systematically on Airbus A320 aircraft. *The flight plan* manual that has been made has validation from Mr. Pepy Aji as *Training Manager* of PT Citilink Indonesia. By using the comparison analysis method, researchers can see the differences and similarities between the two types of calculations and determine which one is more effective or efficient.

RESULT AND DISCUSSION

Research Results

Systematic Block Fuel Usage Data

In this study, the authors analyzed *block fuel* usage data from ten *flight plans* with CGK-SUB routes systematically created using Airbus' NavBlue application. Each flight *plan* is systematically prepared by considering factors such as flight distance, route, weather conditions, and characteristics of Airbus A320 aircraft used by Citilink. The authors collected the estimated fuel data generated by the app for each flight studied as follows;

Table 1: *NavBlue Block Fuel Usage* Data

No.	*Flight Number*	*ACFT Reg.*	*Date/ ETD*	*Origin / Dest. / Altn. Airport*	*Payload*	*Block Fuel*
1.	CTV252	PK-GQA	13 Jun 23 / 2300Z	CGK – SUB / DPS	15700 kg	7144 kg
2.	CTV722	PK-GLU	13 Jun 23 / 1030Z	CGK – SUB / DPS	14640 kg	7358 kg
3.	CTV716	PK-GLW	14 Jun 23 / 0600Z	CGK – SUB / DPS	15180 kg	7111 kg
4.	CTV720	PK-GLX	14 Jun 23 / 0715Z	CGK – SUB / DPS	13300 kg	7003 kg
5.	CTV722	PK-GQI	14 Jun 23 / 1040Z	CGK – SUB / DPS	14500 kg	6768 kg
6.	CTV726	PK-GLN	14 Jun 23 / 1145Z	CGK – SUB / DPS	13400 kg	7094 kg
7.	CTV710	PK-GLQ	15 Jun 23 / 0215Z	CGK – SUB / DPS	14700 kg	7067 kg
8.	CTV716	PK-GLQ	14 Apr 23 / 0510Z	CGK – SUB / DPS	16000 kg	7186 kg
9.	CTV716	PK-GLS	15 Nov 22/ 0455Z	CGK – SUB / UPG	15700 kg	8210 kg
10.	CTV714	PK-GQD	10 Sep 22 / 0100Z	CGK – SUB / DPS	14900 kg	6619 kg

From the analysis of these data, the author can see *a consistent and measurable* pattern of block fuel use in a systematic *flight plan*. These results illustrate the efficiency of fuel use that can be achieved through a computerized and systematic flight planning approach.

Manual Block Fuel *Calculation* Data

In this study, the authors collected *block fuel* calculation data from ten *flight plan* manuals to analyze fuel use in flight operations. Each *flight plan* manual is carefully calculated using Airbus' official guidebook, the FCOM (*Flight Crew Operating Manual*). The data collected includes fuel estimates for each flight, including factors such as distance, route, weather conditions, and aircraft type used.

Table 2: Data Perhitungan *Flight Plan Manual*

No.	*Flight Number*	*ACFT Reg.*	*Date/ ETD*	*Origin / Dest. / Altn. Airport*	*Payload*	*Block Fuel*
1.	CTV252	PK-GQA	13 Jun 23 / 2300Z	CGK – SUB / DPS	15700 kg	7108 kg
2.	CTV722	PK-GLU	13 Jun 23 / 1030Z	CGK – SUB / DPS	14640 kg	7053 kg
3.	CTV716	PK-GLW	14 Jun 23 / 0600Z	CGK – SUB / DPS	15180 kg	7042 kg
4.	CTV720	PK-GLX	14 Jun 23 / 0715Z	CGK – SUB / DPS	13300 kg	6848 kg
5.	CTV722	PK-GQI	14 Jun 23 / 1040Z	CGK – SUB / DPS	14500 kg	6631 kg
6.	CTV726	PK-GLN	14 Jun 23 / 1145Z	CGK – SUB / DPS	13400 kg	6994 kg
7.	CTV710	PK-GLQ	15 Jun 23 / 0215Z	CGK – SUB / DPS	14700 kg	6922 kg
8.	CTV716	PK-GLQ	14 Apr 23 / 0510Z	CGK – SUB / DPS	16000 kg	7097 kg
9.	CTV716	PK-GLS	15 Nov 22/ 0455Z	CGK – SUB / UPG	15700 kg	8062 kg
10.	CTV714	PK-GQD	10 Sep 22 / 0100Z	CGK – SUB / DPS	14900 kg	6658 kg

From the analysis of the data, we can see variations *in* block fuel *usage between different flight plans*. This information is important for evaluating the efficiency of fuel use in manual flight operations.

Discussion of Research Results

Calculations on NavBlue

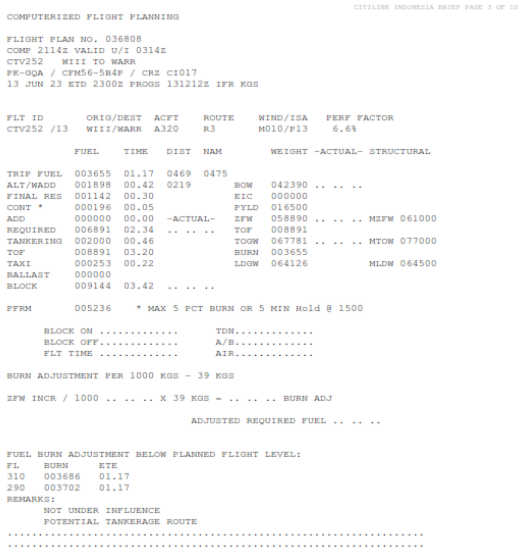
This research was calculated using the NavBlue website to make ten *flight plans*. Here are the flight numbers and flight dates of each *flight plan*:

a) CTV252 on June 13, 2023.
b) CTV722 on June 13, 2023.

c) CTV716 on June 14, 2023.
d) CTV720 on June 14, 2023.
e) CTV722 on June 14, 2023.
f) CTV726 on June 14, 2023.
g) CTV710 on June 15, 2023.
h) CTV716 on April 14, 2023.
i) CTV716 on November 15, 2022.
j) CTV714 on September 10, 2022.

Through *the* NavBlue website, calculations are carried out involving various aspects such as flight routes, weather conditions, and other relevant factors. Using the NavBlue computerized system, *flight plans* can be made systematically and efficiently, considering these factors to optimize fuel use. The results of this calculation provide information about the estimated use of *block fuel* on each *flight plan*.

CTV252 13 Juni 2023



```
                                                          CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 036808
COMP 2114Z VALID U/I 0314Z
CTV252   WIII TO WARR
PK-GQA / CFM56-5B4P / CRZ CI017
13 JUN 23 ETD 2300Z PROGS 131212Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV252 /13   WIII/WARR  A320    R3       M010/P13    6.6%

           FUEL    TIME   DIST  NAM        WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL  003655  01.17  0469  0475
ALT/WADD   001898  00.42  0219        BOW   042390 .. .. ..
FINAL RES  001142  00.30              EIC   000000
CONT *     000196  00.05              PYLD  016500
ADD        000000  00.00  -ACTUAL-    ZFW   058890 .. .. .. MZFW 061000
REQUIRED   006891  02.34  .. .. ..   TOF   008891
TANKERING  002000  00.46              TOGW  067781 .. .. .. MTOW 077000
TOF        008891  03.20              BURN  003655
TAXI       000253  00.22              LDGW  064126          MLDW 064500
BALLAST    000000
BLOCK      009144  03.42  .. .. ..

PFRM       005236    * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 39 KGS

ZFW INCR / 1000 .. .. .. X 39 KGS = .. .. .. BURN ADJ

                                ADJUSTED REQUIRED FUEL .. .. ..


FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN     ETE
310   003686   01.17
290   003702   01.17
REMARKS:
      NOT UNDER INFLUENCE
      POTENTIAL TANKERAGE ROUTE
.....................................................................
.....................................................................
```

Figure 1: CTV252 13 Juni 2023 *Computerized Flight Plan*

In flight plan *CTV252 dated June 13, 2023 in Figure 2, the calculation on the* computerized flight plan *states as follows;*

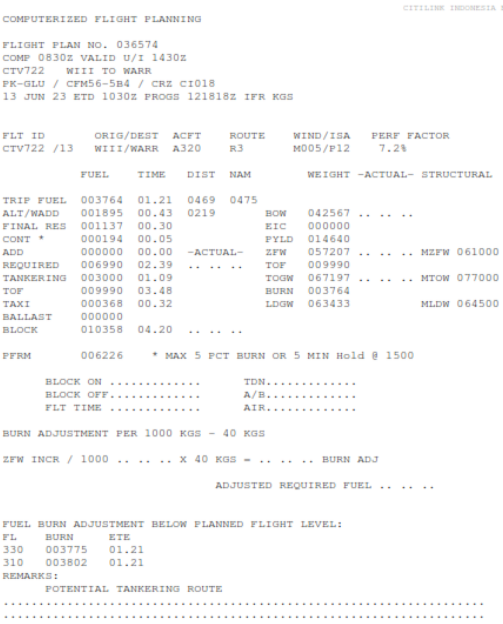
Table 1: CTV252 13 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	16500 kg
Trip Fuel	3655 kg
Alternate Fuel	1898 kg
Holding Fuel	1142 kg
Contingency Fuel	196 kg
Taxi Fuel	253 kg
Block Fuel - Tankering	**7144 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GQA registration and here get the results on the* block fuel *carried on the flight as much as 7144 kg with* a

payload of 16500 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV722 13 Juni 2023



```
                                                    CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 036574
COMP 0830Z VALID U/I 1430Z
CTV722   WIII TO WARR
PK-GLU / CFM56-5B4 / CRZ CI018
13 JUN 23 ETD 1030Z PROGS 121818Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV722 /13   WIII/WARR  A320    R3       M005/P12    7.2%

           FUEL    TIME   DIST  NAM        WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL  003764  01.21  0469  0475
ALT/WADD   001895  00.43  0219       BOW   042567 .. .. ..
FINAL RES  001137  00.30             EIC   000000
CONT *     000194  00.05             FYLD  014640
ADD        000000  00.00  -ACTUAL-   ZFW   057207 .. .. .. MZFW 061000
REQUIRED   006990  02.39  .. .. ..   TOF   009990
TANKERING  003000  01.09             TOGW  067197 .. .. .. MTOW 077000
TOF        009990  03.48             BURN  003764
TAXI       000368  00.32             LDGW  063433          MLDW 064500
BALLAST    000000
BLOCK      010358  04.20  .. .. ..

PFRM       006226    * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 40 KGS

ZFW INCR / 1000 .. .. .. X 40 KGS = .. .. .. BURN ADJ

                              ADJUSTED REQUIRED FUEL .. .. ..

FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN     ETE
330   003775   01.21
310   003802   01.21
REMARKS:
      POTENTIAL TANKERING ROUTE
.....
.....
```

Figure 2: CTV722 13 Juni 2023 *Computerized Flight Plan*

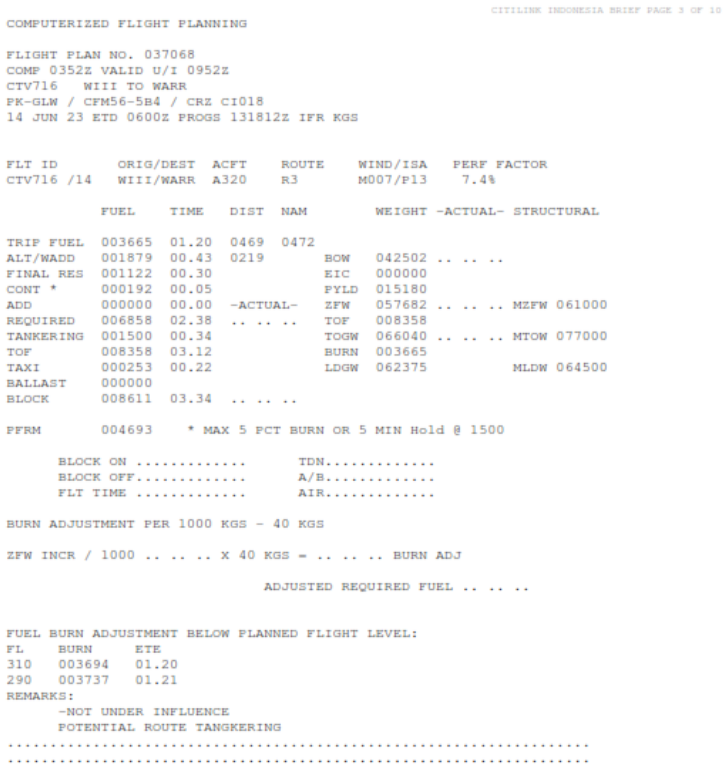
In flight plan *CTV722 dated June 13, 2023 in Figure 3, the calculation on the* computerized flight plan *states as follows;*

Table 2: CTV722 13 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	14640 kg
Trip Fuel	3764 kg
Alternate Fuel	1895 kg
Holding Fuel	1137 kg
Contingency Fuel	194 kg
Taxi Fuel	368 kg
Block Fuel - Tankering	**7358 kg**

From the results of the flight plan *calculation systematically using* Airbus's NavBlue website, the aircraft used used used PK-GLU registration and here get results *on* the block fuel *carried on the flight as much as 7358 kg with* a payload of 14640 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV716 14 Juni 2023



```
                                                    CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 037068
COMP 0352Z VALID U/I 0952Z
CTV716   WIII TO WARR
PK-GLW / CFM56-5B4 / CRZ CI018
14 JUN 23 ETD 0600Z PROGS 131812Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV716 /14   WIII/WARR  A320    R3       M007/P13    7.4%

           FUEL    TIME   DIST  NAM        WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL  003665  01.20  0469  0472
ALT/WADD   001879  00.43  0219       BOW   042502 .. .. ..
FINAL RES  001122  00.30             EIC   000000
CONT *     000192  00.05             FYLD  015180
ADD        000000  00.00  -ACTUAL-   ZFW   057682 .. .. .. MZFW 061000
REQUIRED   006858  02.38  .. .. ..   TOF   008358
TANKERING  001500  00.34             TOGW  066040 .. .. .. MTOW 077000
TOF        008358  03.12             BURN  003665
TAXI       000253  00.22             LDGW  062375          MLDW 064500
BALLAST    000000
BLOCK      008611  03.34  .. .. ..

PFRM       004693    * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 40 KGS

ZFW INCR / 1000 .. .. .. X 40 KGS = .. .. .. BURN ADJ

                            ADJUSTED REQUIRED FUEL .. .. ..

FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN     ETE
310   003694   01.20
290   003737   01.21
REMARKS:
      -NOT UNDER INFLUENCE
      POTENTIAL ROUTE TANGKERING
.....................................................................
.....................................................................
```

Figure 3: CTV716 14 Juni 2023 *Computerized Flight Plan*

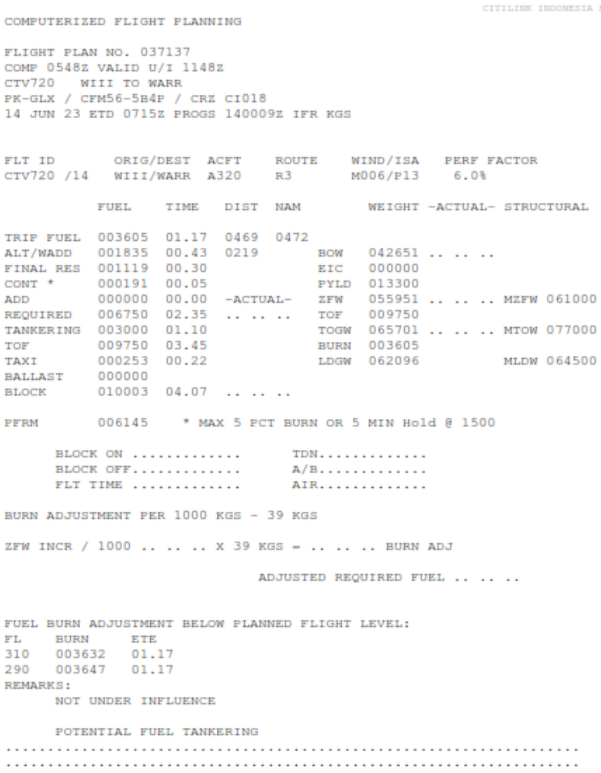
In flight plan *CTV716 dated June 14, 2023 in Figure 4, the calculation on the* computerized flight plan *states as follows;*

Table 3: CTV716 14 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	15180 kg
Trip Fuel	3665 kg
Alternate Fuel	1879 kg
Holding Fuel	1122 kg
Contingency Fuel	192 kg
Taxi Fuel	253 kg
Block Fuel - Tankering	**7111 kg**

From the results of the calculation of the flight plan *systematically using* Airbus's *NavBlue website, the aircraft used used used PK-GLW registration and here get the results* on the block fuel *carried on the flight as much as 7111 kg with a* payload *of* 15180 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV720 14 Juni 2023



```
                                                    CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 037137
COMP 0548Z VALID U/I 1148Z
CTV720   WIII TO WARR
PK-GLX / CFM56-5B4P / CRZ CI018
14 JUN 23 ETD 0715Z PROGS 140009Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV720 /14   WIII/WARR  A320    R3       M006/P13    6.0%

           FUEL    TIME   DIST  NAM        WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL  003605  01.17  0469  0472
ALT/WADD   001835  00.43  0219       BOW   042651 .. .. ..
FINAL RES  001119  00.30              EIC   000000
CONT *     000191  00.05              PYLD  013300
ADD        000000  00.00  -ACTUAL-    ZFW   055951 .. .. .. MZFW 061000
REQUIRED   006750  02.35  .. .. ..    TOF   009750
TANKERING  003000  01.10              TOGW  065701 .. .. .. MTOW 077000
TOF        009750  03.45              BURN  003605
TAXI       000253  00.22              LDGW  062096          MLDW 064500
BALLAST    000000
BLOCK      010003  04.07  .. .. ..

PFRM       006145    * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 39 KGS

ZFW INCR / 1000 .. .. .. X 39 KGS = .. .. .. BURN ADJ

                              ADJUSTED REQUIRED FUEL .. .. ..


FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL     BURN      ETE
310    003632    01.17
290    003647    01.17
REMARKS:
      NOT UNDER INFLUENCE

      POTENTIAL FUEL TANKERING
.....................................................................
.....................................................................
```

Figure 4: CTV720 14 Juni 2023 *Computerized Flight Plan*

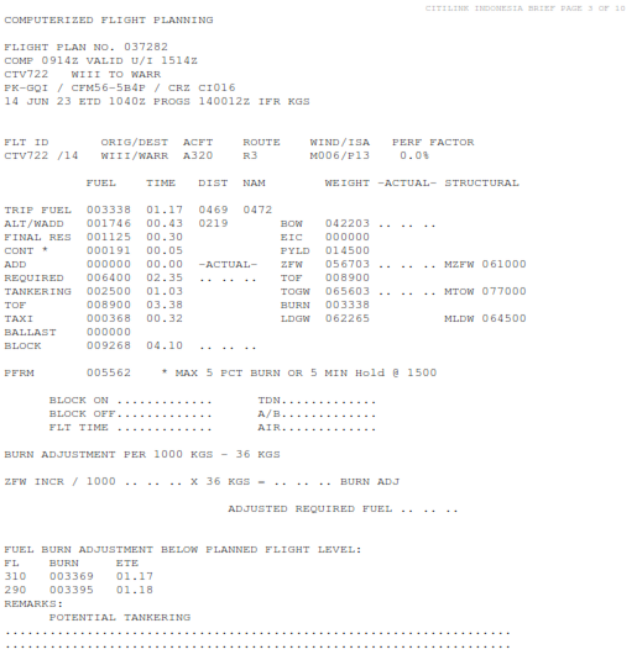
In flight plan *CTV720 dated June 14, 2023 in Figure 5, the calculation on the* computerized flight plan *states as follows;*

Table 4: CTV720 14 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	13300 kg
Trip Fuel	3605 kg
Alternate Fuel	1835 kg
Holding Fuel	1119 kg
Contingency Fuel	191 kg
Taxi Fuel	253 kg
Block Fuel - Tankering	**7003 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GLX registration and here get results* on the block fuel *carried on the flight as much as 7003 kg with* a payload of 13300 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV722 14 Juni 2023



```
                                                    CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 037282
COMP 0914Z VALID U/I 1514Z
CTV722   WIII TO WARR
PK-GQI / CFM56-5B4P / CRZ CI016
14 JUN 23 ETD 1040Z PROGS 140012Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV722 /14   WIII/WARR  A320    R3       M006/P13    0.0%

            FUEL    TIME   DIST  NAM         WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL   003338  01.17  0469  0472
ALT/WADD    001746  00.43  0219        BOW   042203 .. .. ..
FINAL RES   001125  00.30              EIC   000000
CONT *      000191  00.05              PYLD  014500
ADD         000000  00.00  -ACTUAL-    ZFW   056703 .. .. .. MZFW 061000
REQUIRED    006400  02.35  .. .. ..    TOF   008900
TANKERING   002500  01.03              TOGW  065603 .. .. .. MTOW 077000
TOF         008900  03.38              BURN  003338
TAXI        000368  00.32              LDGW  062265          MLDW 064500
BALLAST     000000
BLOCK       009268  04.10  .. .. ..

FFRM        005562     * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 36 KGS

ZFW INCR / 1000 .. .. .. X 36 KGS = .. .. .. BURN ADJ

                              ADJUSTED REQUIRED FUEL .. .. ..

FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN      ETE
310   003369    01.17
290   003395    01.18
REMARKS:
      POTENTIAL TANKERING
.....
.....
```

Figure 5: CTV722 14 Juni 2023 *Computerized Flight Plan*

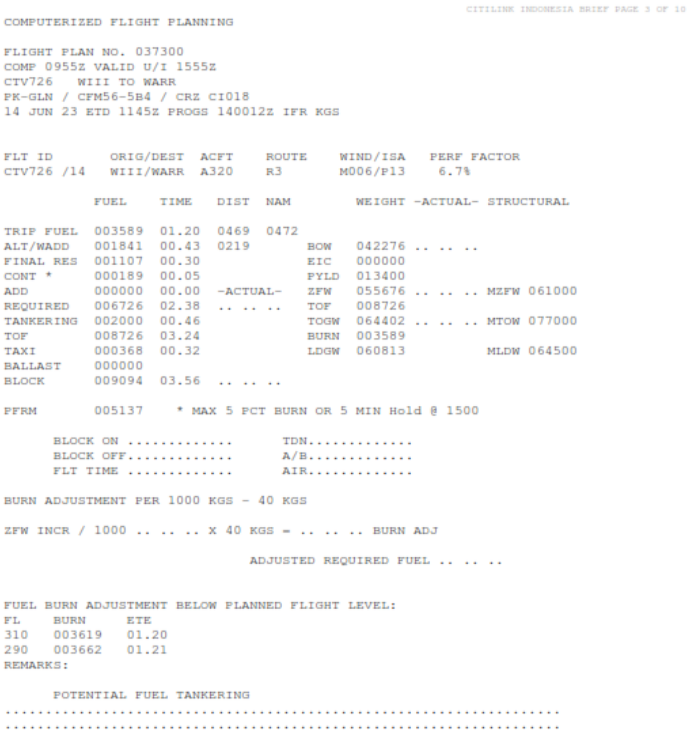
In flight plan *CTV722 dated June 14, 2023 in Figure 6, the calculation on the* computerized flight plan *states as follows;*

Table 5: CTV722 14 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	14500 kg
Trip Fuel	3338 kg
Alternate Fuel	1746 kg
Holding Fuel	1125 kg
Contingency Fuel	191 kg
Taxi Fuel	368 kg
Block Fuel - Tankering	**6768 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GQI registration and here get results* on the block fuel *carried on the flight as much as 6768 kg with a* payload of 14500 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV726 14 Juni 2023



```
                                                        CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 037300
COMF 0955Z VALID U/I 1555Z
CTV726   WIII TO WARR
PK-GLN / CFM56-5B4 / CRZ CI018
14 JUN 23 ETD 1145Z PROGS 140012Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV726 /14   WIII/WARR  A320    R3       M006/P13    6.7%

           FUEL    TIME   DIST  NAM        WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL  003589  01.20  0469  0472
ALT/WADD   001841  00.43  0219       BOW   042276 .. .. ..
FINAL RES  001107  00.30             EIC   000000
CONT *     000189  00.05             PYLD  013400
ADD        000000  00.00  -ACTUAL-   ZFW   055676 .. .. .. MZFW 061000
REQUIRED   006726  02.38  .. .. ..   TOF   008726
TANKERING  002000  00.46             TOGW  064402 .. .. .. MTOW 077000
TOF        008726  03.24             BURN  003589
TAXI       000368  00.32             LDGW  060813          MLDW 064500
BALLAST    000000
BLOCK      009094  03.56  .. .. ..

PFRM       005137    * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 40 KGS

ZFW INCR / 1000 .. .. .. X 40 KGS = .. .. .. BURN ADJ

                              ADJUSTED REQUIRED FUEL .. .. ..

FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN     ETE
310   003619   01.20
290   003662   01.21
REMARKS:

      POTENTIAL FUEL TANKERING
.....................................................................
.....................................................................
```

Figure 6: CTV726 14 Juni 2023 *Computerized Flight Plan*

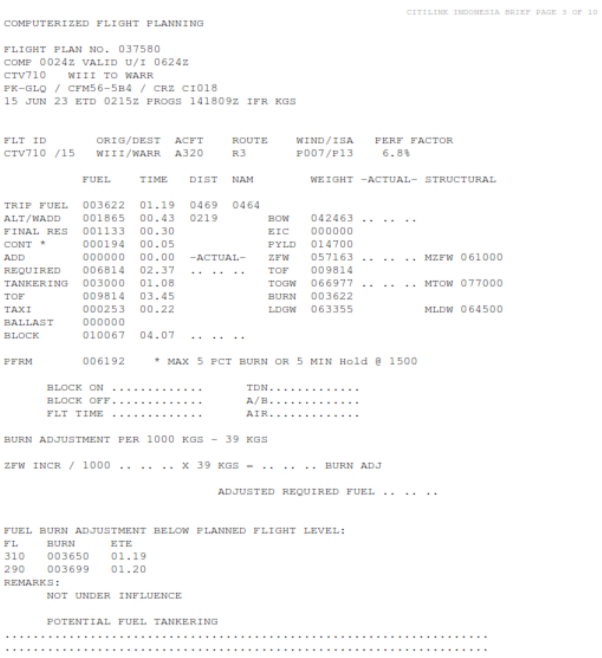
In flight plan *CTV726 dated June 14, 2023 in Figure 7, the calculation on the* computerized flight plan *states as follows;*

Table 6: CTV726 14 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	13400 kg
Trip Fuel	3589 kg
Alternate Fuel	1841 kg
Holding Fuel	1107 kg
Contingency Fuel	189 kg
Taxi Fuel	368 kg
Block Fuel - Tankering	**7094 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GLN registration and here get results* on the block fuel *carried on the flight as much as 7094 kg with a* payload of 13400 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV710 15 Juni 2023



```
                                                    CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 037580
COMP 0024Z VALID U/I 0624Z
CTV710   WIII TO WARR
PK-GLQ / CFM56-5B4 / CRZ CI018
15 JUN 23 ETD 0215Z PROGS 141809Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV710 /15   WIII/WARR  A320    R3       P007/P13    6.8%

             FUEL    TIME   DIST  NAM         WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL   003622  01.19  0469  0464
ALT/WADD    001865  00.43  0219        BOW   042463 .. .. ..
FINAL RES   001133  00.30              EIC   000000
CONT *      000194  00.05              FYLD  014700
ADD         000000  00.00  -ACTUAL-    ZFW   057163 .. .. .. MZFW 061000
REQUIRED    006814  02.37  .. .. ..    TOF   009814
TANKERING   003000  01.08              TOGW  066977 .. .. .. MTOW 077000
TOF         009814  03.45              BURN  003622
TAXI        000253  00.22              LDGW  063355          MLDW 064500
BALLAST     000000
BLOCK       010067  04.07  .. .. ..

PFRM        006192     * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 39 KGS

ZFW INCR / 1000 .. .. .. X 39 KGS = .. .. .. BURN ADJ

                                ADJUSTED REQUIRED FUEL .. .. ..


FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN      ETE
310   003650    01.19
290   003699    01.20
REMARKS:
      NOT UNDER INFLUENCE

      POTENTIAL FUEL TANKERING
.....................................................................
.....................................................................
```

Figure 7: CTV710 15 Juni 2023 Computerized Flight Plan

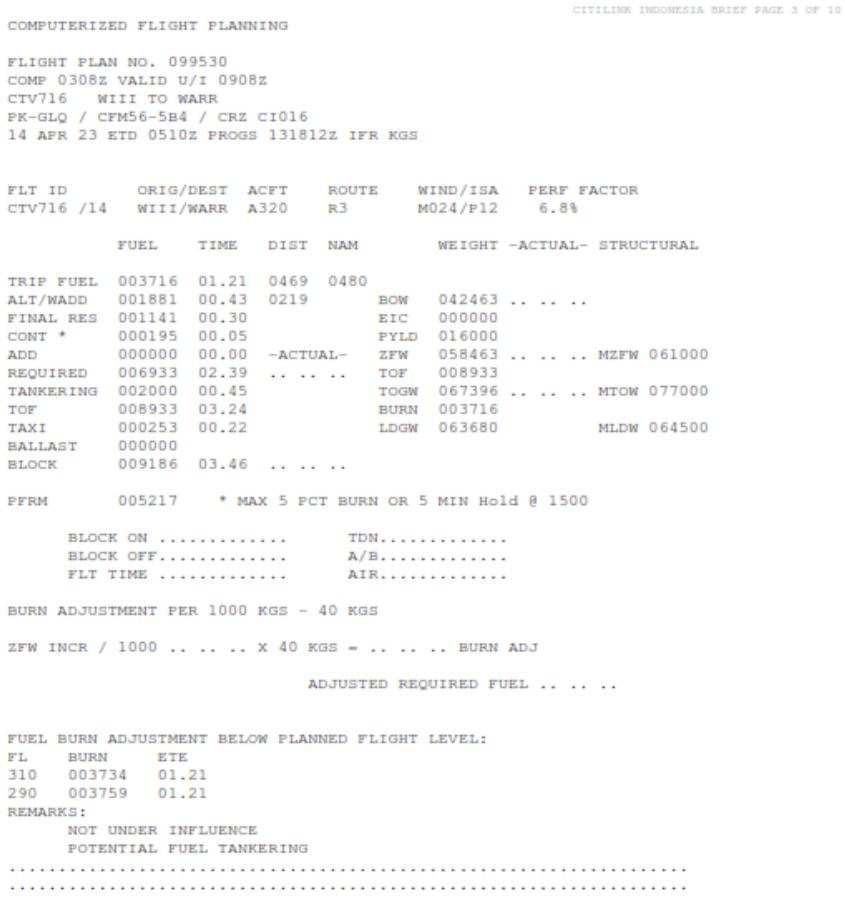
In flight plan *CTV710 dated June 15, 2023 in Figure 8, the calculation on the* computerized flight plan *states as follows;*

Table 7: CTV710 15 Juni 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	14700 kg
Trip Fuel	3622 kg
Alternate Fuel	1865 kg
Holding Fuel	1133 kg
Contingency Fuel	194 kg
Taxi Fuel	253 kg
Block Fuel - Tankering	**7067 kg**

From the results of the flight plan *calculation systematically* using Airbus's NavBlue website, the aircraft used used using PK-GLN registration and here get results *on the block fuel* carried on the flight as much as 7067 kg with a *payload* of 14700 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV716 14 April 2023



```
                                                        CITILINK INDONESIA BRIEF PAGE 3 OF 10
COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 099530
COMP 0308Z VALID U/I 0908Z
CTV716   WIII TO WARR
PK-GLQ / CFM56-5B4 / CRZ CI016
14 APR 23 ETD 0510Z PROGS 131812Z IFR KGS


FLT ID       ORIG/DEST  ACFT    ROUTE    WIND/ISA   PERF FACTOR
CTV716 /14   WIII/WARR  A320    R3       M024/P12    6.8%

           FUEL    TIME   DIST  NAM        WEIGHT -ACTUAL- STRUCTURAL

TRIP FUEL  003716  01.21  0469  0480
ALT/WADD   001881  00.43  0219       BOW   042463 .. .. ..
FINAL RES  001141  00.30              EIC   000000
CONT *     000195  00.05              PYLD  016000
ADD        000000  00.00  -ACTUAL-    ZFW   058463 .. .. .. MZFW 061000
REQUIRED   006933  02.39  .. .. ..    TOF   008933
TANKERING  002000  00.45              TOGW  067396 .. .. .. MTOW 077000
TOF        008933  03.24              BURN  003716
TAXI       000253  00.22              LDGW  063680          MLDW 064500
BALLAST    000000
BLOCK      009186  03.46  .. .. ..

PFRM       005217    * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

      BLOCK ON .............      TDN.............
      BLOCK OFF.............      A/B.............
      FLT TIME .............      AIR.............

BURN ADJUSTMENT PER 1000 KGS - 40 KGS

ZFW INCR / 1000 .. .. .. X 40 KGS = .. .. .. BURN ADJ

                              ADJUSTED REQUIRED FUEL .. .. ..


FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:
FL    BURN     ETE
310   003734   01.21
290   003759   01.21
REMARKS:
      NOT UNDER INFLUENCE
      POTENTIAL FUEL TANKERING
.....................................................................
.....................................................................
```

Figure 8: CTV716 14 April 2023 *Computerized Flight Plan*

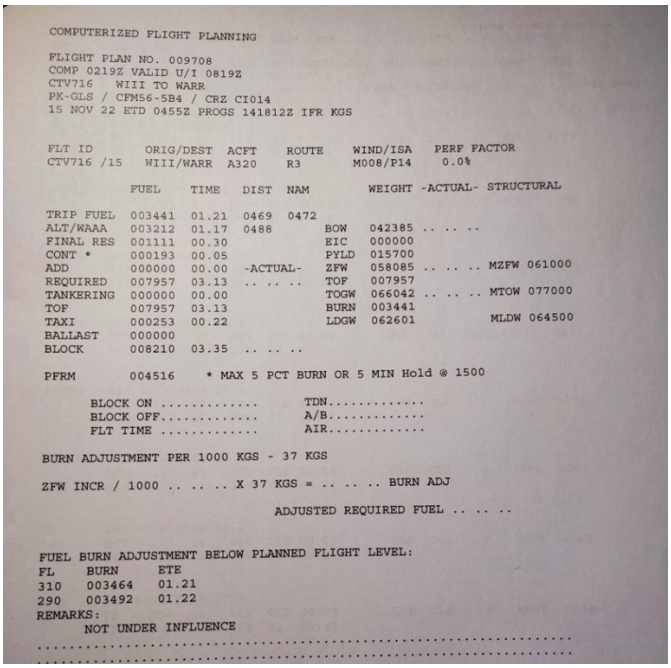
In flight plan *CTV716 dated April 14, 2023 in Figure 9, the calculation on the* computerized flight plan *states as follows;*

Table 8: CTV716 14 April 2023 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	16000 kg
Trip Fuel	3716 kg
Alternate Fuel	1881 kg
Holding Fuel	1141 kg
Contingency Fuel	195 kg
Taxi Fuel	253 kg
Block Fuel - Tankering	**7186 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GLQ registration and here get results* on the block fuel *carried on the flight as much as 7186 kg with* a payload of 16000 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV716 15 November 2022



COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 009708
COMP 0219Z VALID U/I 0819Z
CTV716 WIII TO WARR
PK-GLS / CFM56-5B4 / CRZ CI014
15 NOV 22 ETD 0455Z PROGS 141812Z IFR KGS

FLT ID	ORIG/DEST	ACFT	ROUTE	WIND/ISA	PERF FACTOR
CTV716 /15	WIII/WARR	A320	R3	M008/P14	0.0%

	FUEL	TIME	DIST	NAM		WEIGHT -ACTUAL-	STRUCTURAL
TRIP FUEL	003441	01.21	0469	0472			
ALT/WAAA	003212	01.17	0488		BOW	042385	
FINAL RES	001111	00.30			EIC	000000	
CONT *	000193	00.05			PYLD	015700	
ADD	000000	00.00	-ACTUAL-		ZFW	058085	MZFW 061000
REQUIRED	007957	03.13	.. .. ..		TOF	007957	
TANKERING	000000	00.00			TOGW	066042	MTOW 077000
TOF	007957	03.13			BURN	003441	
TAXI	000253	00.22			LDGW	062601	MLDW 064500
BALLAST	000000						
BLOCK	008210	03.35	.. .. ..				

PFRM 004516 * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

BLOCK ON ..... TDN.....
BLOCK OFF..... A/B.....
FLT TIME ..... AIR.....

BURN ADJUSTMENT PER 1000 KGS - 37 KGS

ZFW INCR / 1000 .. .. .. X 37 KGS = ... BURN ADJ

ADJUSTED REQUIRED FUEL .. .. ..

FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:

FL	BURN	ETE
310	003464	01.21
290	003492	01.22

REMARKS:
NOT UNDER INFLUENCE
.....
.....

Figure 9: CTV716 15 November 2022 *Computerized Flight Plan*

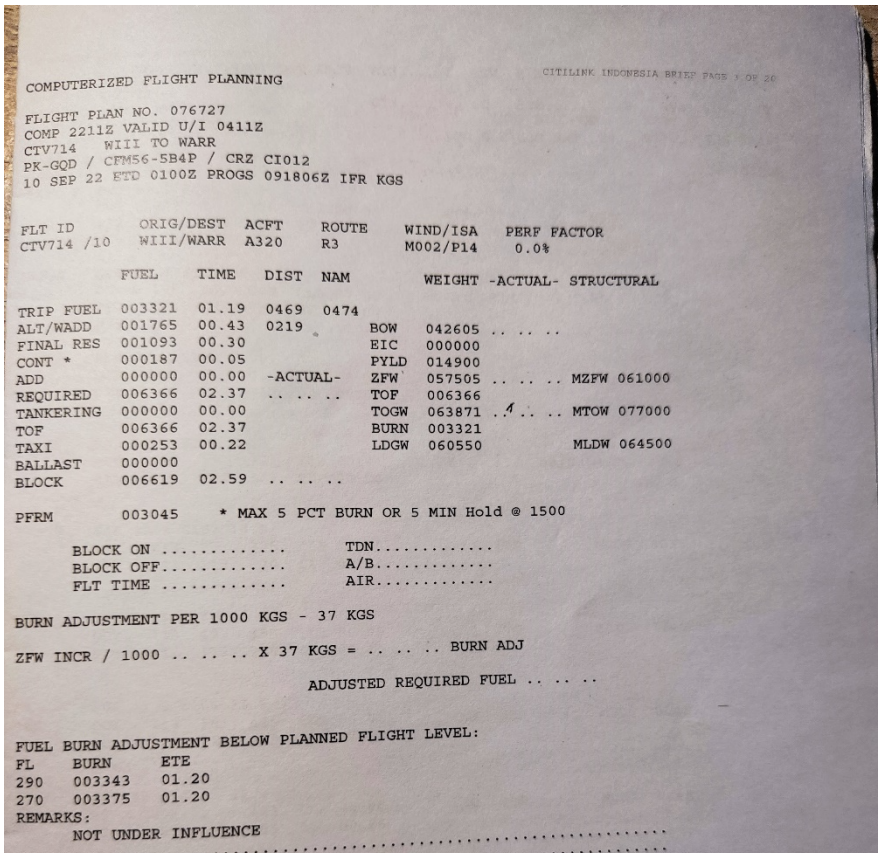
In flight plan *CTV716 dated November 15, 2022 in Figure 10, the calculation on the* computerized flight plan *states as follows;*

Table 9: CTV716 15 November 2022 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	15700 kg
Trip Fuel	3441 kg
Alternate Fuel	3212 kg
Holding Fuel	1111 kg
Contingency Fuel	193 kg
Taxi Fuel	253 kg
Block Fuel	**8210 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GLS registration and here get results* on the block fuel *carried on the flight as much as 8210 kg with* a payload of 15700 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

CTV714 10 September 2022



COMPUTERIZED FLIGHT PLANNING

FLIGHT PLAN NO. 076727
COMP 2211Z VALID U/I 0411Z
CTV714 WIII TO WARR
PK-GQD / CFM56-5B4P / CRZ CI012
10 SEP 22 ETD 0100Z PROGS 091806Z IFR KGS

FLT ID	ORIG/DEST	ACFT	ROUTE	WIND/ISA	PERF FACTOR
CTV714 /10	WIII/WARR	A320	R3	M002/P14	0.0%

	FUEL	TIME	DIST	NAM		WEIGHT -ACTUAL-	STRUCTURAL
TRIP FUEL	003321	01.19	0469	0474			
ALT/WADD	001765	00.43	0219		BOW	042605	
FINAL RES	001093	00.30			EIC	000000	
CONT *	000187	00.05			PYLD	014900	
ADD	000000	00.00	-ACTUAL-		ZFW	057505	MZFW 061000
REQUIRED	006366	02.37	.. .. ..		TOF	006366	
TANKERING	000000	00.00			TOGW	063871	MTOW 077000
TOF	006366	02.37			BURN	003321	
TAXI	000253	00.22			LDGW	060550	MLDW 064500
BALLAST	000000						
BLOCK	006619	02.59	.. .. ..				

PFRM 003045 * MAX 5 PCT BURN OR 5 MIN Hold @ 1500

BLOCK ON ..... TDN.....
BLOCK OFF..... A/B.....
FLT TIME ..... AIR.....

BURN ADJUSTMENT PER 1000 KGS - 37 KGS

ZFW INCR / 1000 .. .. .. X 37 KGS = ... BURN ADJ

ADJUSTED REQUIRED FUEL .. .. ..

FUEL BURN ADJUSTMENT BELOW PLANNED FLIGHT LEVEL:

FL	BURN	ETE
290	003343	01.20
270	003375	01.20

REMARKS:
NOT UNDER INFLUENCE

Figure 10: CTV714 10 September 2022 *Computerized Flight Plan*

In flight plan *CTV714 dated September 15, 2022 in Figure 11, the calculation on the* computerized flight plan *states as follows;*

Table 10: CTV714 10 September 2022 *Computerized Flight Plan*

Aircraft weight and fuel information	
Payload (Berat Beban)	14900 kg
Trip Fuel	3321 kg
Alternate Fuel	1765 kg
Holding Fuel	1093 kg
Contingency Fuel	187 kg
Taxi Fuel	253 kg
Block Fuel	**6619 kg**

From the results of the flight plan *calculation systematically using Airbus's NavBlue website, the aircraft used used used PK-GQD registration and here get results* on the block fuel *carried on the flight as much as 6619 kg with* a payload of 14900 kg. This calculation is calculated using the system and using formulas or rules that are in accordance with Airbus' official manual, FCOM (*Flight Crew Operating Manual*).

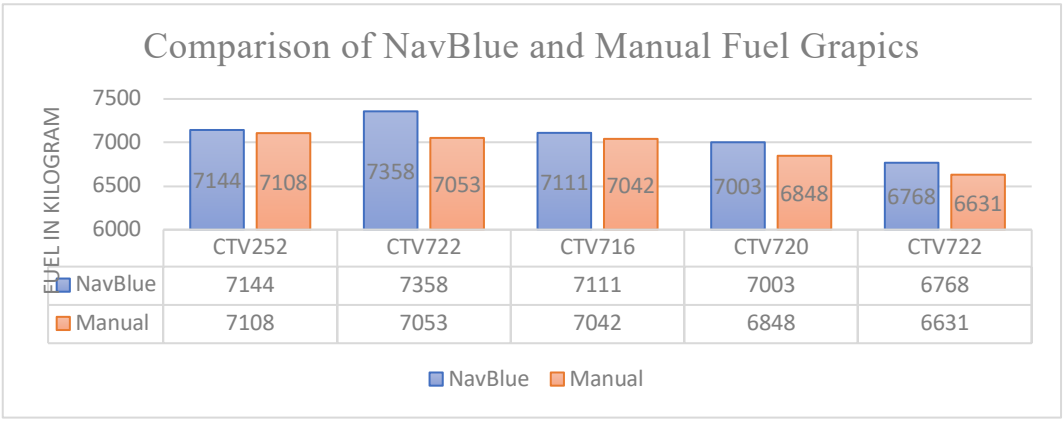
Comparison *of Systematic and Manual* Flight Plan

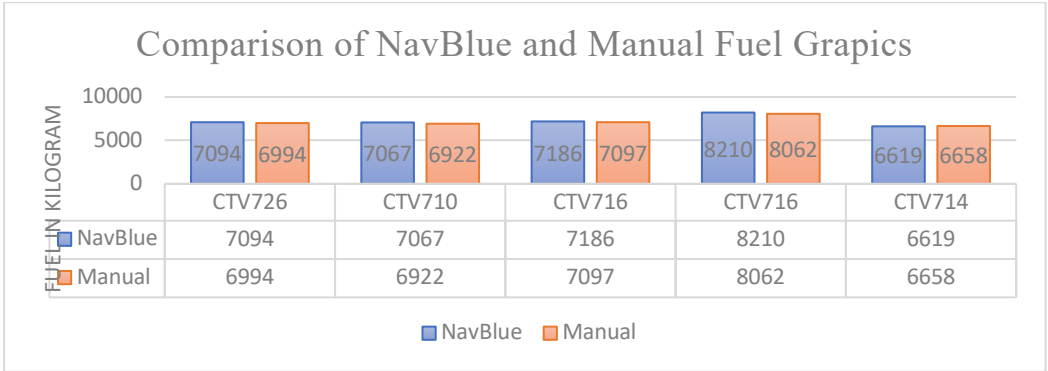
After performing systematic and manual *flight plan* calculations as discussed in sections 4.2.1 and 4.2.2, the author made a comparison between the two methods and found a difference in the amount of *block fuel*. Interestingly, manual calculations result in *a more efficient* amount of block fuel compared to *systematically calculated flight plans*. This shows that manual calculations in flight planning are able to provide more accurate and optimal estimates of fuel use. For comparison, it will be listed in the table below.

Table 11: Block *Fuel Comparison* from *NavBlue Flight Plan* and *Flight Plan Manual*

No.	***Flight Number***	**ACFT Reg.**	***Date***	***Block Fuel***		**Block Fuel *Comparison***
				Computerized Flight Plan	***Manual Flight Plan***	
1.	CTV252	PK-GQA	13/06/23	7144 kg	7108 kg	-36 kg
2.	CTV722	PK-GLU	13/06/23	7358 kg	7053 kg	-305 kg
3.	CTV716	PK-GLW	14/06/23	7111 kg	7042 kg	-69 kg
4.	CTV720	PK-GLX	14/06/23	7003 kg	6848 kg	-155 kg
5.	CTV722	PK-GQI	14/06/23	6768 kg	6631 kg	-137 kg
6.	CTV726	PK-GLN	14/06/23	7094 kg	6994 kg	-100 kg
7.	CTV710	PK-GLQ	15/06/23	7067 kg	6922 kg	-145 kg
8.	CTV716	PK-GLQ	14/04/23	7186 kg	7097 kg	-89 kg
9.	CTV716	PK-GLS	15/11/22	8210 kg	8062 kg	-148 kg
10.	CTV714	PK-GQD	10/09/22	6619 kg	6658 kg	+39 kg

Table 12: Comparison of NavBlue and Manual fuel graphics





By doing calculations manually, the author can find out the comparison of each *flight plan* made systematically and manually. There are several corrections that must be made in the manual calculation so that you can get a more specific *block fuel* in Airbus's official guidebook, FCOM. However, that doesn't mean that NavBlue itself doesn't use the same regulations and guidelines. The author believes that NavBlue already has its own calculation correction so that it can get a higher *block fuel* because there are *templates* or other formulas that are not applied in the guidebook for making *flight plans* manually. The correction is in the NavBlue system which certainly cannot be accessed carelessly so the author only makes a *flight plan* based on existing data and made by the NavBlue system.

From the comparison of *flight plans* systematically and manually, the author can prove that there is indeed a difference in each flight plan *in the* block fuel section *and calculations have been made that are included with how much the difference between each* flight plan . Of the ten flight plans *calculated, there is one* flight plan that is different from other flight plans, namely the flight plan on flight number CTV714 on September 10, 2022, the difference is that from all *manual flight plans* , only the flight has more *block fuel* than *the* flight plan systematically which has a greater difference of 39 kg. It also explains that the FCOM handbook itself has *a template* with reference to pre-existing data such as aircraft weight, aircraft characteristics, flight distance, flight time and other factors. However, in this study, the author will only discuss the comparison of making *flight plans* systematically with manually and found these differences.

With this research, the author can use this manual calculation as a reference to develop a more sophisticated and computerized flight planning system, taking into account the factors that have been tested in manual calculations. By doing so, the authors can improve our overall operational efficiency and contribute to better fuel economy and environmental impact reduction in the aviation industry.

***Fuel Saving* Bulanan**

From the difference *in fuel obtained in systematic and manual calculations, the impact that can be obtained from this is* fuel saving. Citilink can make an average of ten flights from the CGK-SUB route in one day, if it is made on average in monthly, then the flights carried out can reach two hundred and eighty in one month. For monthly *fuel saving* that can be seen in the table below.

Table 13: *Fuel Saving* Bulanan

No.	*Flight Number*	Jumlah Selisih *fuel*	*Fuel Saving* Bulanan
1.	CTV252	-36 kg	Rata-r

2.	CTV722		-305 kg	
3.	CTV716		-69 kg	
4.	CTV720		-155 kg	
5.	CTV722		-137 kg	
6.	CTV726		-100 kg	
7.	CTV710		-145 kg	
8.	CTV716		-89 kg	
9.	CTV716		-148 kg	
10.	CTV714		+39 kg	
Rata-rata 10 penerbangan sehari		=	-114.5 kg	-3206 kg

The table above provides an overview of monthly *fuel* comparisons that can be used as a reference to see fuel usage patterns and potential savings over a longer period of time.

Annual Fuel Saving

By comparing *fuel* calculations systematically and manually, the difference obtained can be an important factor in *fuel saving*. In addition to the previous monthly comparison, to get a more comprehensive picture, the author attaches an annual *fuel* comparison in the following table:

Table 14: *Fuel Saving* Tahunan

No.	*Flight Number*	Jumlah Selisih *fuel*	*Fuel Saving* Tahunan
1.	CTV252	-36 kg	Rata-rata *fuel* sebulan x 12 bulan
2.	CTV722	-305 kg	
3.	CTV716	-69 kg	
4.	CTV720	-155 kg	
5.	CTV722	-137 kg	
6.	CTV726	-100 kg	
7.	CTV710	-145 kg	
8.	CTV716	-89 kg	
9.	CTV716	-148 kg	
10.	CTV714	+39 kg	
Rata-rata *fuel* 10 penerbangan sehari		= -114.5 kg	
Rata-rata *fuel* penerbangan sebulan		= -3206 kg	-38.472 kg

The table above provides an overview of annual fuel comparisons that can be used as a reference to identify fuel usage patterns and potential savings over a longer period of time.

CONCLUSION

Based on the comparison between systematic and manual *flight plan* calculations , it can be concluded that the two calculations have

differences and it can be seen from the results that manual calculations have *more efficient block fuel*. While there are corrections that need to be made in manual calculations to obtain more specific *block fuel* according to official manuals such as Airbus' FCOM, this does not indicate that NavBlue does not use the same regulations and guidelines. The author believes that NavBlue has its own calculation corrections that may not be applied in manual calculations. This research provided the basis for the development of a more sophisticated and computerized flight planning system considering time-tested factors in manual calculations. Thus, the authors can improve overall operational efficiency and contribute to better fuel economy and environmental impact reduction in the aviation industry.

REFERENCE

Altus, S. (2009). *Effective flight plans can help airlines economize. Boeing Aero.*

Ari, A. K. (2021). Sejarah, Jenis, Dan Spesifikasi Pesawat Penerbangan Sipil. Jurnal Ilmu Teknik, 1(2).

Butt, A. A. (2015). *Roles and responsibilities of flight operations officer* (Doctoral dissertation, University Of Management And Technology).

Cronrath, E. M. (2017). *The airline profit cycle: A system analysis of airline industry dynamics*. Abingdon: Taylor & Francis Group.

Djoyohadikusumo, S. (2018). Pengaruh *customer satisfaction* terhadap *customer loyalty* pada pembelian tiket *online* pesawat di Surabaya. Calyptra, 6(2), 1222-1240.

Dožić, S., & Kalić, M. (2015). *Three-stage airline fleet planning model. Journal of Air Transport Management*, *46*, 30–39. https://doi.org/10.1016/j.jairtraman.2015.03.011

Gulo, W. (2002). Metodelogi penelitian. Jakarta: PT Grasindo.

Harahap, N. (2020). Penelitian kualitatif. Medan: Wal ashri Publishing.

Harjati, L., & Venesia, Y. (2015). Pengaruh Kualitas Layanan Dan Persepsi Harga Terhadap Kepuasan Pelanggan Pada Maskapai Penerbangan Tiger Air Mandala. *Journal Widya Ekonomika*, *64*.

Horiguchi, Y., Baba, Y., Kashima, H., Suzuki, M., Kayahara, H., & Maeno, J. (2017). *Predicting Fuel Consumption and Flight Delays for Low-Cost Airlines. Proceedings of the AAAI Conference on Artificial Intelligence*, 31(2), 4686-4693. https://doi.org/10.1609/aaai.v31i2.19095

Kim, Y. K., & Lee, H. R. (2011). *Customer satisfaction using low-cost carriers*. *Tourism Management*, *32*(2), 235–243. https://doi.org/10.1016/j.tourman.2009.12.008

Kos Koklic, M., Kukar-Kinney, M., & Vegelj, S. (2017). *An investigation of*

customer satisfaction with low-cost and full-service airline companies. *Journal of Business Research*, *80*, 188–196. https://doi.org/10.1016/j.jbusres.2017.05.015

Pemerintah Republik Indonesia. (2009). Undang-Undang Nomor 1 Tahun 2009 tentang Penerbangan. Jakarta: Sekretariat Negara.

PT Citilink Indonesia. (2022). *Operation Manual Part A*. Tangerang: Citilink Indonesia.

PT Citilink Indonesia. (2022). *Operation Manual Part B: Flight Crew Operating Manual Airbus A320 Fleet FCOM*. Tangerang: Citilink Indonesia.

Rosenow, J., Lindner, M., & Scheiderer, J. (2021). *Advanced flight planning and the benefit of in-flight aircraft trajectory optimization*. *Sustainability (Switzerland)*, *13*(3), 1–18. https://doi.org/10.3390/su13031383

Sáez, R., & Prats, X. (2020). *Comparison of Fuel Consumption of Continuous Descent Operations with Required Times of Arrival Path Stretching vs. Powered Descents*.

Sedarmayanti. (2014). Manajemen Sumber Daya Manusia Reformasi Birokrasi dan Manajemen Pegawai Negeri Sipil. Bandung: Refika Aditama.

Siyoto, S., & Sodik, M. A. (2015). Dasar metodologi penelitian. Yogyakarta: Literasi Media Publishing.

Yoga, M. (2023). Perlindungan Hukum Bagi Penumpang Pesawat Komersil Yang Dibatalkan Akibat Pandemi Covid-19 (Studi Pada Maskapai Penerbangan Garuda Indonesia).