ANALYSIS OF AVTUR DEMAND DIFFERENCE AT AFT HUSEIN SASTRANEGARA BEFORE AND AFTER RELOCATION OF FLIGHTS TO KERTAJATI AIRPORT
(Data Source: 2022-2025)

Kezia Prasetyana Panjaitan[1], Iwan Setiawan[2], Hariadi Ismail[3]
Vocational School of International Logistics and Business University, Bandung, Indonesia[1]
Vocational School of International Logistics and Business University, Bandung, Indonesia[2]
Vocational School of International Logistics and Business University, Bandung, Indonesia[3]
keziaprasetyana1@gmail.com[1], iwan.setiawan@ulbi.ac.id[2], hariadiismail@ulbi.ac.id[3]

Abstract

The aviation industry influences a country's national and international mobility. One of the factors affecting the smooth running of this industry is the availability of jet fuel. This study therefore analyses the impact of relocating flights from Husein Sastranegara Airport to Kertajati Airport on the demand for aviation turbine fuel (ATF) at the Husein Sastranegara ATF terminal. Adopting a quantitative approach, the study compares 36 data points, comprising 18 points before and 18 points after the relocation, from May 2022 to April 2025. Descriptive statistical analysis, a paired sample t-test and simple linear regression analysis were conducted to validate the model. The results show the following: (1) A significant decrease in avtur demand, from 1,791.83 KL/month to 469.89 KL/month. (2) The t-test results show a significant difference with a very large effect size. (3) Regression analysis confirms that the decline in avtur demand is primarily due to relocation. These findings support the derived demand theory, which states that jet fuel demand depends on the intensity of flight operations.

Keywords: *Aviation fuel, flight relocation, derived demand, AFT Husein Sastranegara, Kertajati Airport.*

Abstrak

Industri penerbangan menjadi salah satu faktor yang mempengaruhi mobilitas suatu negara baik secara national maupun international. Selain itu, faktor yang mempengaruhi kelancaran industri ini salah satunya ialah ketersediaan avtur. Maka dari penelitian ini menganalisis dampak relokasi penerbangan dari Bandara Husein Sastranegara ke Bandara Kertajati terhadap permintaan Aviation Turbine Fuel (avtur) di Aviation Fuel Terminal (AFT) Husein Sastranegara. Dengan menggunakan pendekatan kuantitatif, penelitian ini membandingkan 36 data terdiri dari 18 data sebelum dan 18 data sesudah relokasi dari Mei 2022 – April 2025. Analisis yang dilakukan dengan analisis statistik deskriptif dan uji paired sample t-test, serta analisis regresi linier sederhana untuk memvalidasi model. Hasil penelitian menunjukkan: (1) Terjadinya penurunan signifikan permintaan avtur dari 1.791,83 KL/bulan menjadi 469,89 KL/bulan; (2) hasil uji-t menunjukkan perbedaan yang cukup signifikan dengan effect size sangat besar; (3) analisis regresi mengkonfirmasi relokasi sebagai faktor dominan terjadinya penurunan permintaan avtur. Temuan ini mendukung teori derived demand bahwa permintaan avtur bergantung pada intensitas operasional penerbangan.

Kata Kunci: *Avtur, relokasi penerbangan, derived demand, AFT Husein Sastranegara, Bandara Kertajati.*

1. Introduction

The aviation industry plays an important role in national and international mobility, whether for cargo, commercial, business or military purposes. Following its recovery from the impact of the pandemic, this sector has shown significant growth, driven by technological advances and increasing demand for air transportation. One important factor driving transportation in the aviation industry is Avtur (Aviation Turbine Fuel).

Avtur is a type of jet fuel that plays a crucial role in ensuring the smooth operation of domestic and international flights. Adequate Avtur availability is essential for the smooth operation of flights at every airport. The Aviation Fuel Terminal (AFT) is responsible for managing this at an airport.

The AFT is managed by PT. Pertamina Patra Niaga, which is responsible for managing and distributing avtur, thereby ensuring its availability at every airport. The distribution of Avtur involves a complex logistics system including processing, storage and distribution to various airports as required. Good coordination between various parties is required for this process, including fuel producers, airport operators, and related logistics entities.

In Bandung, flight operations are handled by Husein Sastranegara International Airport, which serves various types of flights, including commercial, private jet, government and military ones. The Husein Sastranegara Aviation Fuel Terminal (AFT) supports the smooth operation of the airport by supplying aviation fuel to aircraft from the refinery.

However, Husein Sastranegara International Airport is facing dynamic changes due to the operation of Kertajati International Airport as an alternative airport in the West Java region. Most flight routes have been relocated from Husein Sastranegara Airport to Kertajati Airport, which has affected aviation activities and the demand for aviation fuel at the Husein Sastranegara Aviation Fuel Terminal (AFT). This is illustrated in Figure 1.

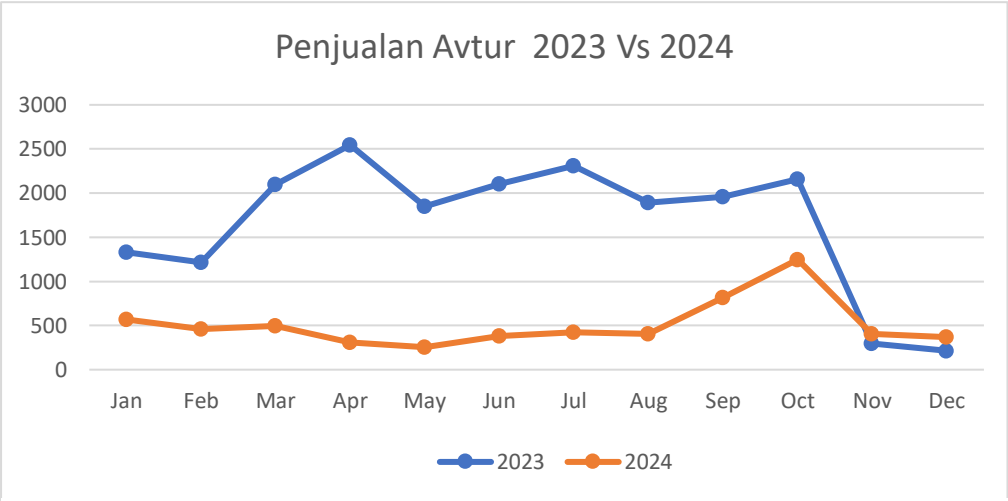

Figure 1 Aviation fuel sales in 2023 vs 2024
Source: Internal Data

The relocation of flights from Husein Sastranegara Airport to Kertajati Airport is expected to reduce flight frequency at Husein Airport, thereby directly impacting the decline in jet fuel demand at the AFT. This study therefore aims to analyse the extent of this impact.

2. Method

This study uses explanatory research with a quantitative approach to analyse the causal relationship between flight relocation (independent variable) and jet fuel demand (dependent variable). The type of research chosen is Ex Post Facto because the relocation event has occurred naturally, so researchers can only analyse its impact on jet fuel demand (Siregar, 2013). Data analysis uses the IBM SPSS Statistics 27 system and Microsoft Excel 2021.

2.1 Research Variables

This study involves two variables, namely the independent variable and the dependent variable.

a. The independent variable is the official policy to transfer flights from Husein Sastranegara Airport to Kertajati Airport. This is measured using a dichotomous scale with dummy variable indicators, as shown in Table 3.1 below:

Table 1. Independent Variable

Label	***Dummy variable***
Before Relocation	0
After Relocation	1

Source: processed by researcher, 2025.

b. The dependent variable is measured in kilolitres per month, based on the distribution report of PT Pertamina Patra Niaga AFT Husein Sastranegara. This report covers a period of 36 months, consisting of 18 months before and 18 months after the relocation. The data are shown in Table 2 below:

Table 1 Jet Fuel Demand Data Before Relocation (Kilolitres)

	The month of	**Jet Fuel Demand Data (Kilolitres)**
Before Relocation	1	2100,22
	2	2103,51
	3	1967,67
	4	1356,29
	5	1375,49
	6	1279,37
	7	1168,34
	8	1443,69
	9	1330,88
	10	1218,05
	11	2097,12
	12	2544,93
	13	1848,11
	14	2100,86
	15	2311,94
	16	1891,08
	17	1957,04
	18	2159,30

Source: Internal Data

2.2 Data Sources and Collection Techniques

Data Sources

a. Primary Data: Monthly reports on aviation fuel distribution by PT Pertamina Patra Niaga AFT Husein Sastranegara for the period May 2022–April 2025. Semi-structured interviews were also conducted to obtain qualitative information regarding the impact of relocation.
b. Secondary Data: Official government documents, passenger statistics and supporting literature from books, journals and scientific articles.

Collection Techniques

a. Direct observation at the DPPU location.
b. A study of documentation relating to distribution reports and policies related to relocation.
c. Semi-structured interviews with operational staff and other relevant parties.

2.3 Data Analysis Techniques

The data were analysed quantitatively using the following software: IBM SPSS Statistics 27 and Microsoft Excel Office 2021. The analysis involved the following steps:

1. Descriptive statistics Analysis were used to summarise the characteristics of the data (mean, standard deviation, minimum and maximum).
2. A paired sample t-test was performed to measure significant differences in jet fuel demand before and after relocation, at a significance level of $\alpha = 0,05$.
3. Simple linear regression analysis to test the effect of the number of flights on jet fuel demand.
4. Classical Assumption Test, which includes:
    a. Normality test (Shapiro-Wilk): The aim of the normality test is to establish whether the residuals of the regression model are normally distributed. In this study, the Shapiro–Wilk test was used for samples of 50 or fewer.
    b. Heteroscedasticity test (Glejser Test, bootstrapping is used if necessary): The aim of the heteroscedasticity test is to determine whether there is residual variance in each predictor value in the regression model. In this study, the Glejser Test method was used to conduct the test by regressing the absolute residual value against the independent variable.
    c. Autocorrelation test (Durbin-Watson Test, first difference applied if autocorrelation occurs).

3. Result and Discussion

3.1 Descriptive Statistical Analysis

Descriptive statistical analysis of aviation fuel demand data was conducted. This was done before and after relocation (May 2022 – April 2025). The analysis shows a significant decline.

Table 3 Analisis Statistik Deskriptif

Variables	Before Relocation	After Relocation	Decrease
Minimum (Kilolitres)	1168	215	81,59%
Maximum (Kilolitres)	2545	1248	50,96%
Mean (Kilolitres/month)	1791,83	469,89	73,78%
Standard Deviation	427,27	241,13	43,56%
Mean flights/month	416	153	63,22%

Source: IBM SPSS Statistics 27, 2025

On average, demand for aviation fuel decreased by 73.78% before and after the relocation, with demand amounting to 1,791.83 KL and 469.89 KL per month, respectively. This demonstrates the significant impact that the relocation of flights had on demand for aviation fuel.

3.2 Paired Sample T-test

Based on the results of Paired Samples Correlations analysis, there is a moderate correlation between the values before and after relocation.

Table 4 Paired Sample T-test

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Sebelum_relokasi - Setelah_Relokasi	1321.94444	386.34098	91.06144	1129.82160	1514.06729	14.517	17	<,001

Source: IBM SPSS Statistics 27, 2025

The results of the paired-sample t-test revealed a significant difference in values before and after relocation ($t(17) = 14.52$, $p < 0.001$). The average difference in values was 1,321.94 (SD = 386.34), with a 95% confidence interval ranging from 1,129.82 to 1,514.07. This suggests that relocation significantly impacted the decline in the values of the studied variables.

3.3 Simple Linear Regression Analysis

The Coefficients table shows the regression equation:

$$Y = 1791.833 - 1321.944X$$

The constant of 1791.833 represents the average demand for jet fuel in the absence of relocation (X = 0). The regression coefficient of -1,321.944, with a p-value of less than 0.001, shows that for each relocation (X = 1), demand for jet fuel decreases by 1,321.944 units. The significant ($p < 0.001$) t-value of -11.432 confirms that relocation significantly affects the decline in jet fuel demand.

Meanwhile, the standardised coefficient (beta) value of -0.891 indicates that relocation has a very strong negative effect on jet fuel demand. This negative direction is consistent with the research hypothesis that flight relocation will reduce jet fuel demand at AFT Husein

Sastranegara. The beta value, close to -1, suggests that almost all variations in jet fuel demand can be attributed to relocation.

3.4 Classic Assumption Test

a. Normality: The residuals are normally distributed (Sig. KS = 0.200; SW = 0.590 > 0.05).
b. Heteroscedasticity: Heteroscedasticity occurs (Glejser Sig. = 0.019 < 0.05), but the bootstrap method produces stable results.
c. Autocorrelation: Initial Durbin-Watson value = 0.983 (autocorrelation present). After first difference transformation, DW value = 2.205 → assumption fulfilled.

3.5 Discussion

The results of the study suggest that relocating flights to Kertajati Airport has significantly impacted the decline in jet fuel demand at Husein Sastranegara Airport. The 73.78% decline reinforces the derived demand theory, whereby jet fuel demand depends on flight frequency.

A simple regression model corroborates the t-test results, demonstrating a high R^2 value (79.4%) and a substantial negative regression coefficient. However, the presence of heteroscedasticity and autocorrelation suggests that the statistical model needs to be improved or that other control variables should be added, such as factors relating to aviation policy, market conditions and Pertamina's distribution strategy.

4. Conclusion

The results of research on the Analysis of Differences in Jet Fuel Demand at AFT Husein Sastranegara Before and After the Relocation of Flights to Kertajati Airport show that the flight relocation policy had a significant impact on the decline in jet fuel demand. Jet fuel demand experienced a very large decline after the relocation, proving that there was a real difference between the conditions before and after the policy. Statistical analysis reinforces these findings by showing a strong and significant effect of the relocation on the decline in jet fuel consumption.

Furthermore, the regression results confirm that the relocation has a negative relationship with jet fuel demand, contributing greatly to explaining the changes that occurred. Although there are indications of violations of classical assumptions such as heteroscedasticity and autocorrelation, these problems were successfully overcome through the use of bootstrapping methods and data transformation so that the analysis results remained valid. Theoretically, these findings support the concept of derived demand, which asserts that jet fuel demand is highly dependent on the intensity of flight operations. The decline in flight activity due to relocation has been shown to cause a drastic decrease in aircraft fuel consumption. In addition, the use of the bootstrapping method has also been proven effective in maintaining the validity of results and can be applied to other quantitative studies that use data with unstable characteristics.

REFERENCES

Adisasmita, Sakti A. (2014). *Tatanan Bandar udara Nasional*. Yogyakarta: Graha Ilmu.

Naviandri. (23 Januari 2025). *Optimalisasi Bandara Husein Sastranegara Penting untuk Dukung Sektor Pariwisata*. Media Indonesia.

TNI Angkatan Udara. (n.d.). *TNI AU dan AU AS latihan di Lanud Husein Sastranegara*. TNI.mil.id. Diakses dari https://tni.mil.id/view-15782-tni-au-dan-au-as-latihan-di-lanud-husein-sastranegara.html

Xue, D., Liu, Z., Wang, B., & Yang, J. (2021*). Impacts Of COVID-19 On Aircraft Usage And Fuel Consumption: A Case Study On Four Chinese International Airports.* Journal of Air Transport Management, *95*, 102106. https://doi.org/10.1016/j.jairtraman.2021.102106

Tłoczyński, D., Wach-Kloskowska, M., & Susmarski, S. (2021). *The Impact Of COVID 19 On The Aviation Fuel Supply Chain In The Face Of Changes In Air Traffic Service: Case Study Of One Of The Polish Airports.* European Research Studies Journal, 24(4B), 623-633.

Mankiw, N. G. (1998). *Principles Of Economics*. The Dryden Press. ISBN 0-03-024502-8. https://books.google.co.id/books?hl=id&lr=&id=xoztFMavGCcC&oi=fnd&pg=PA3&dq=mankiw&ots=5W2wAvL4up&sig=jvfk8iVG-sNCCLW5bmWyHR3-F3Y&redir_esc=y#v=onepage&q=mankiw&f=false

Salaverry, J., & White III, M. D. (2009). *Improving Procurement Through Regression Analysis: A Case Study Of Predicting Argentine Jet Fuel Prices* (Master's thesis, Naval Postgraduate School, Monterey, California).

Li, Y., Jin, X., & Fang, Y. (2023). *Jet Fuel Price Risk And Proxy Hedging In Spot Markets*. *Energies*, *16*(17), 6302. https://doi.org/10.3390/en16176302

Murcia, A., Altuntas, M., & Yildiz, A. (2022*). The Relationship Among Eco-Friendly Technologies, Civil Aviation And Environmental Quality*. Gaziantep University Journal of Social Sciences, *21*(2), 1480–1495. https://doi.org/10.21547/jss.1099282

Listiari, G. A. P. L., & Setiawati, N. L. P. L. S. (2025*). Analisis Peramalan Dan Pengendalian Persediaan Bahan Bakar Avtur Dengan Metode EOQ Di Aviation Fuel Terminal Ngurah Rai.* Jurnal Global Ilmiah, 2(7), April 2025. ISSN: 3026-5207.

Fox, J. (2016). *Applied regression analysis and generalized linear models* (3rd ed.). SAGE Publications.