

MINI PROJECT

Baggage Add-on Analysis in Flight Ticketing

1. Background

Airline ticketing transactions often include optional baggage add-ons that contribute additional revenue. However, errors during the baggage issuance process can lead to revenue leakage, customer dissatisfaction, and operational inefficiencies.

As a ticketing agent, baggage issuance accuracy becomes increasingly critical on high-volume routes, where transaction pressure is higher. This analysis focuses on understanding baggage add-on patterns, identifying high-impact routes, and highlighting areas that require closer operational monitoring.

2. Objective

The objectives of this analysis are:

- To analyze baggage add-on transaction patterns by route and airline
- To identify routes with the highest baggage transaction volume
- To detect potential issuance errors
- To provide data-driven recommendations to improve accuracy and revenue

3. Dataset Description

The dataset contains simulated flight ticketing transactions with baggage add-ons. The dataset is a simulated ticketing dataset designed to represent real-world airline baggage transactions.

Key variables include:

- Booking ID
- Flight date
- Route
- Airline
- Ticket price
- Baggage add-on indicator
- Baggage fee
- Issued error flag

A sample of the dataset is shown below to illustrate the data structure. The full dataset is provided in the appendix.

booking_id	flight_date	route	airline	ticket_price	baggage_add_on	baggage_fee	issued_error
1002	2025-01-02	DPS-SIN	Lion Air	1,800,000	1	250	Yes
1015	2025-01-15	DPS-SIN	AirAsia	1,650,000	1	200	No
1038	2025-02-07	CGK-SIN	Garuda	2,100,000	0	0	No
1064	2025-03-05	CGK-DPS	Citilink	1,300,000	1	150	No
1091	2025-04-01	CGK-KUL	Lion Air	1,250,000	0	0	No

4. Data Preparation

The following data preparation steps were performed before analysis:

- Ensured baggage fee is zero when no baggage add-on is selected
- Verified consistency between baggage add-on and baggage fee
- Created an issued_error flag to identify incorrect baggage issuance
- Standardized route and airline naming for pivot analysis

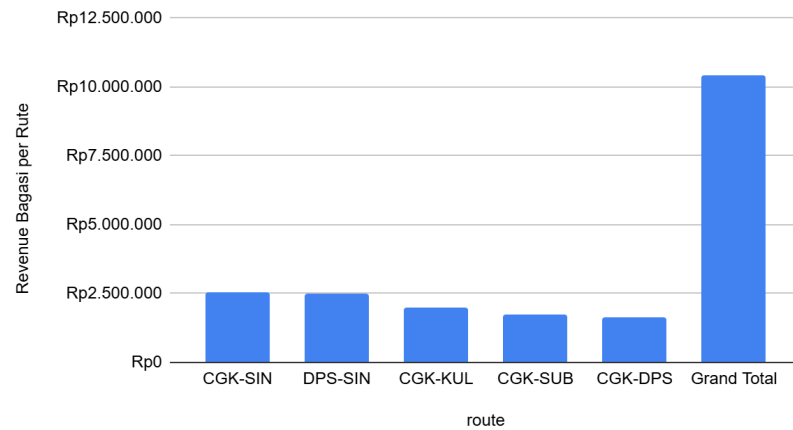
5. Analysis

Analysis 1 — Baggage Transaction by Route

Route	Revenue Bagasi per Rute
CGK-SIN	Rp2.550.000
DPS-SIN	Rp2.500.000
CGK-KUL	Rp2.000.000
CGK-SUB	Rp1.750.000
CGK-DPS	Rp1.650.000
Grand Total	Rp10.450.000

Pivot analysis shows that **DPS-SIN** has the highest number of baggage add-on transactions compared to other routes.

Revenue Bagasi per Rute

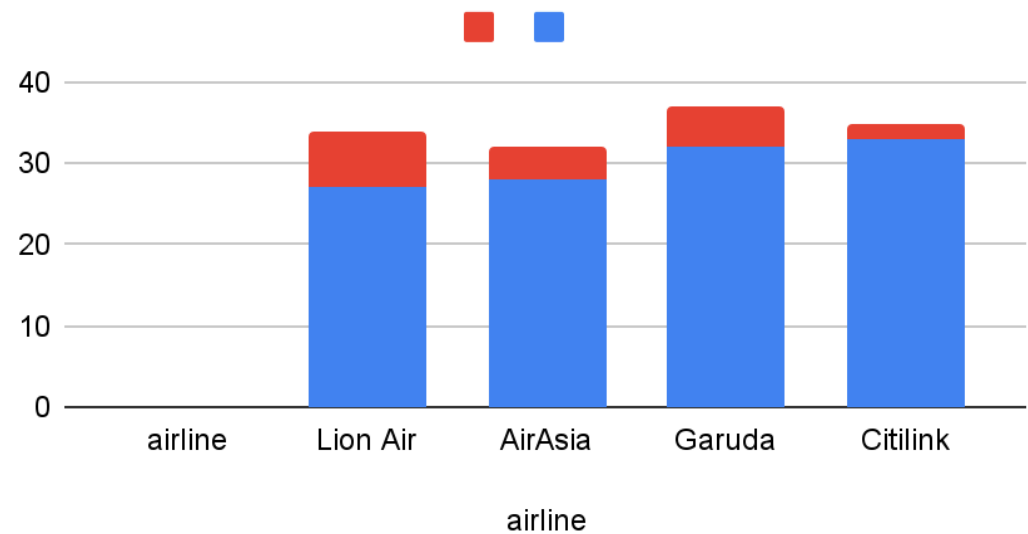


The analysis shows that DPS–SIN has the highest baggage add-on transaction volume. This route therefore represents a high-impact area where even small operational issues could result in significant revenue loss.

 Analysis 2 — Issued Error by Analysis

Airline	COUNT of booking_id	SUM of error flag	%
Lion Air	27	7	25,93%
AirAsia	28	4	14,29%
Garuda	32	5	15,63%
Citilink	33	2	6,06%
Grand Total	120	18	

Baggage Transactions by Arlines



Volume vs. Error Anomaly: Statistical analysis reveals a stark contrast between transaction volume and failure rates. **Lion Air** exhibits a significantly higher error rate compared to its peers. Conversely, **Citilink** manages the highest operational volume while maintaining the lowest error frequency.

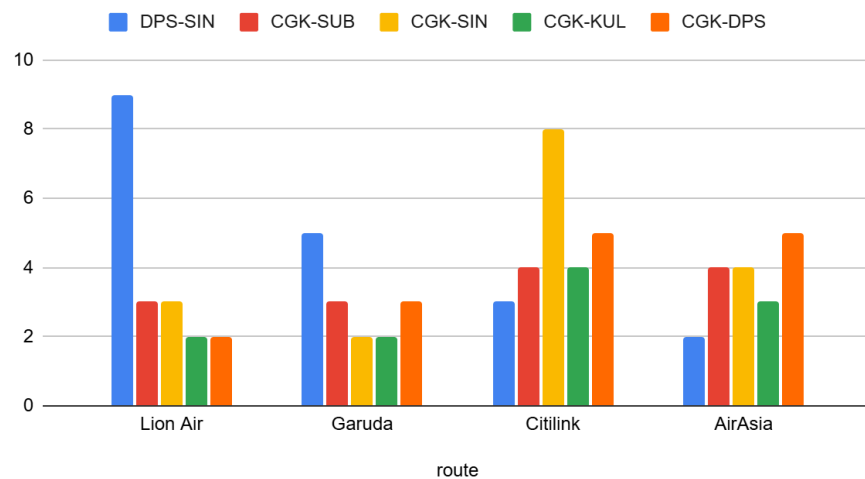
Technical Conclusion: These results demonstrate that high transaction volume is not the root cause of "issued errors." Instead, the issues appear to be systemic and specific to certain carrier infrastructures. For instance, **Lion Air** continues to experience frequent failures despite having a lower volume than Citilink, pointing toward internal technical inefficiencies.

Analysis 3 — Baggage Transaction Volume by Route

SUM of baggage_add_on	airline				
route	Lion Air	Garuda	Citilink	AirAsia	Grand Total
DPS-SIN	9	5	3	2	19
CGK-SUB	3	3	4	4	14
CGK-SIN	3	2	8	4	17
CGK-KUL	2	2	4	3	11
CGK-DPS	2	3	5	5	15
Grand Total	19	15	24	18	76

Error analysis reveals that issuance errors occur more frequently on routes with higher transaction volume, particularly **DPS-SIN**

TRANSAKSI BAGASI



This suggests that operational pressure on high-volume routes may increase the likelihood of errors.

6. Key Insights

- DPS–SIN is the highest-volume route for baggage add-on transactions
- Higher transaction volume is not the root cause of errors. Citilink demonstrates superior scalability by handling the highest volume with the lowest error rate (6.06%).
- Lion Air represents a significant operational bottleneck, recording the highest error rate (25.93%) despite having a lower transaction volume than Citilink. This points to carrier-specific technical inefficiencies.
- DPS-SIN is a high-risk, high-value zone due to frequent Lion Air errors, requiring urgent action to stop revenue leakage

7. Recommendations

- Prioritize additional quality control checks on **DPS–SIN** due to its high baggage transaction volume
- Implement error monitoring dashboards for high-impact routes
- Provide targeted refresher training for agents handling high-volume baggage issuance
- Regularly review baggage issuance performance to reduce revenue leakage
- Optimizing high-volume routes can help reduce issuance errors while protecting baggage revenue.

8. Conclusion

By analyzing baggage revenue, transaction volume, and issued error patterns, this project highlights key operational focus areas where process improvements can deliver both efficiency gains and revenue protection.

9. Tools Used

- Microsoft Excel / Google Sheets
- Pivot Tables
- Data Visualization (Charts)

Appendix – Raw Dataset

This appendix contains the full raw ticketing transaction dataset used in the analysis. The data is provided for transparency and reference purposes.

booking_id	flight_date	route	airline	ticket_price	baggage_add_on	baggage_fee	issued_error	payment_method	total revenue	error flag
1001	1/1/2025	DPS-SIN	Lion Air	Rp2.129.626,00	0	Rp0	Yes	Credit Card	Rp2.129.626,00	1
1002	1/2/2025	CGK-KUL	Citilink	Rp1.511.774,00	1	Rp250.000	No	Credit Card	Rp1.761.774,00	0
1003	1/3/2025	CGK-SUB	Garuda	Rp2.441.093,00	1	Rp200.000	Yes	E-Wallet	Rp2.641.093,00	1
1004	1/4/2025	CGK-KUL	AirAsia	Rp1.161.079,00	1	Rp150.000	No	Transfer	Rp1.311.079,00	0
1005	1/5/2025	CGK-KUL	AirAsia	Rp1.068.452,00	1	Rp150.000	No	Credit Card	Rp1.218.452,00	0
1006	1/6/2025	CGK-SIN	Citilink	Rp806.081,00	1	Rp200.000	No	Credit Card	Rp1.006.081,00	0
1007	1/7/2025	CGK-SUB	AirAsia	Rp1.683.237,00	1	Rp150.000	No	E-Wallet	Rp1.833.237,00	0
1008	1/8/2025	CGK-SUB	Garuda	Rp2.361.909,00	0	Rp0	No	Credit Card	Rp2.361.909,00	0
1009	1/9/2025	CGK-SUB	Citilink	Rp1.258.986,00	1	Rp0	No	Transfer	Rp1.258.986,00	0
1010	1/10/2025	CGK-KUL	Garuda	Rp810.078,00	0	Rp0	No	E-Wallet	Rp810.078,00	0
1011	1/11/2025	DPS-SIN	Citilink	Rp722.671,00	0	Rp0	No	Credit Card	Rp722.671,00	0
1012	1/12/2025	CGK-SUB	Citilink	Rp2.166.976,00	1	Rp0	No	E-Wallet	Rp2.166.976,00	0
1013	1/13/2025	CGK-KUL	Lion Air	Rp2.104.104,00	0	Rp0	No	Credit Card	Rp2.104.104,00	0
1014	1/14/2025	CGK-SIN	Garuda	Rp2.359.066,00	1	Rp250.000	No	Credit Card	Rp2.609.066,00	0
1015	1/15/2025	DPS-SIN	AirAsia	Rp751.663,00	1	Rp250.000	No	Credit Card	Rp1.001.663,00	0
1016	1/16/2025	CGK-SIN	AirAsia	Rp1.764.284,00	1	Rp250.000	Yes	Transfer	Rp2.014.284,00	1
1017	1/17/2025	DPS-SIN	Garuda	Rp1.011.955,00	0	Rp0	No	Transfer	Rp1.011.955,00	0
1018	1/18/2025	CGK-KUL	AirAsia	Rp1.882.459,00	0	Rp0	Yes	E-Wallet	Rp1.882.459,00	1
1019	1/19/2025	CGK-DPS	AirAsia	Rp2.066.970,00	1	Rp0	No	Credit Card	Rp2.066.970,00	0
1020	1/20/2025	DPS-SIN	Garuda	Rp812.547,00	1	Rp250.000	No	Credit Card	Rp1.062.547,00	0
1021	1/21/2025	CGK-SIN	Citilink	Rp1.610.681,00	1	Rp250.000	No	Transfer	Rp1.860.681,00	0
1022	1/22/2025	CGK-KUL	Garuda	Rp2.307.618,00	1	Rp250.000	No	Credit Card	Rp2.557.618,00	0

1023	1/23/2025	DPS-SIN	Citilink	Rp2.499.678,00	1	Rp200.000	No	Transfer	Rp2.699.678,00	0
1024	1/24/2025	CGK-DPS	AirAsia	Rp842.483,00	0	Rp0	No	Credit Card	Rp842.483,00	0
1025	1/25/2025	CGK-DPS	AirAsia	Rp1.358.271,00	0	Rp0	No	E-Wallet	Rp1.358.271,00	0
1026	1/26/2025	CGK-SUB	AirAsia	Rp914.835,00	1	Rp250.000	No	Credit Card	Rp1.164.835,00	0
1027	1/27/2025	CGK-SUB	Lion Air	Rp1.101.896,00	0	Rp0	No	Credit Card	Rp1.101.896,00	0
1028	1/28/2025	CGK-SIN	Citilink	Rp784.896,00	0	Rp0	Yes	Transfer	Rp784.896,00	1
1029	1/29/2025	DPS-SIN	Lion Air	Rp1.177.095,00	1	Rp250.000	No	Credit Card	Rp1.427.095,00	0
1030	1/30/2025	DPS-SIN	Lion Air	Rp771.295,00	1	Rp0	Yes	Credit Card	Rp771.295,00	1
1031	1/31/2025	CGK-SUB	Garuda	Rp1.443.974,00	1	Rp0	No	Transfer	Rp1.443.974,00	0
1032	2/1/2025	DPS-SIN	Lion Air	Rp1.587.121,00	1	Rp0	No	E-Wallet	Rp1.587.121,00	0
1033	2/2/2025	DPS-SIN	Garuda	Rp2.021.831,00	0	Rp0	Yes	E-Wallet	Rp2.021.831,00	1
1034	2/3/2025	CGK-DPS	Garuda	Rp2.048.224,00	1	Rp200.000	Yes	Transfer	Rp2.248.224,00	1
1035	2/4/2025	CGK-SUB	Lion Air	Rp2.405.738,00	1	Rp0	No	Transfer	Rp2.405.738,00	0
1036	2/5/2025	CGK-KUL	Citilink	Rp1.756.731,00	0	Rp0	No	Transfer	Rp1.756.731,00	0
1037	2/6/2025	CGK-SUB	Citilink	Rp2.215.448,00	1	Rp200.000	No	Transfer	Rp2.415.448,00	0
1038	2/7/2025	CGK-KUL	Citilink	Rp1.525.816,00	1	Rp0	No	Transfer	Rp1.525.816,00	0
1039	2/8/2025	CGK-DPS	Citilink	Rp1.074.705,00	1	Rp0	No	E-Wallet	Rp1.074.705,00	0
1040	2/9/2025	CGK-SIN	Citilink	Rp2.320.118,00	1	Rp250.000	No	E-Wallet	Rp2.570.118,00	0
1041	2/10/2025	DPS-SIN	Lion Air	Rp2.358.845,00	1	Rp150.000	No	Transfer	Rp2.508.845,00	0
1042	2/11/2025	CGK-DPS	Lion Air	Rp1.254.594,00	0	Rp0	No	Credit Card	Rp1.254.594,00	0
1043	2/12/2025	DPS-SIN	AirAsia	Rp847.718,00	0	Rp0	Yes	Transfer	Rp847.718,00	1
1044	2/13/2025	CGK-SIN	Citilink	Rp2.057.563,00	1	Rp0	No	Credit Card	Rp2.057.563,00	0
1045	2/14/2025	CGK-SIN	Lion Air	Rp1.345.263,00	1	Rp0	No	Transfer	Rp1.345.263,00	0
1046	2/15/2025	CGK-DPS	AirAsia	Rp2.107.321,00	1	Rp250.000	No	Transfer	Rp2.357.321,00	0
1047	2/16/2025	CGK-SIN	Citilink	Rp1.708.239,00	1	Rp200.000	No	E-Wallet	Rp1.908.239,00	0
1048	2/17/2025	CGK-KUL	Garuda	Rp807.512,00	1	Rp150.000	No	Credit Card	Rp957.512,00	0
1049	2/18/2025	CGK-SIN	AirAsia	Rp847.443,00	1	Rp150.000	No	Credit Card	Rp997.443,00	0

1050	2/19/2025	DPS-SIN	Lion Air	Rp2.219.163,00	1	Rp0	Yes	E-Wallet	Rp2.219.163,00	1
1051	2/20/2025	DPS-SIN	Garuda	Rp1.073.616,00	1	Rp200.000	No	E-Wallet	Rp1.273.616,00	0
1052	2/21/2025	DPS-SIN	Garuda	Rp1.357.409,00	1	Rp150.000	Yes	E-Wallet	Rp1.507.409,00	1
1053	2/22/2025	DPS-SIN	Garuda	Rp1.386.976,00	1	Rp200.000	No	E-Wallet	Rp1.586.976,00	0
1054	2/23/2025	CGK-KUL	AirAsia	Rp2.114.447,00	1	Rp200.000	No	Credit Card	Rp2.314.447,00	0
1055	2/24/2025	CGK-SUB	Lion Air	Rp1.075.037,00	0	Rp0	No	Credit Card	Rp1.075.037,00	0
1056	2/25/2025	CGK-DPS	Garuda	Rp1.744.107,00	0	Rp0	No	Transfer	Rp1.744.107,00	0
1057	2/26/2025	DPS-SIN	Citilink	Rp1.507.364,00	0	Rp0	No	Transfer	Rp1.507.364,00	0
1058	2/27/2025	CGK-SIN	Garuda	Rp817.796,00	1	Rp0	No	E-Wallet	Rp817.796,00	0
1059	2/28/2025	DPS-SIN	Garuda	Rp2.040.575,00	0	Rp0	No	E-Wallet	Rp2.040.575,00	0
1060	3/1/2025	CGK-SIN	AirAsia	Rp1.941.082,00	1	Rp150.000	No	E-Wallet	Rp2.091.082,00	0
1061	3/2/2025	CGK-SIN	AirAsia	Rp1.690.198,00	1	Rp150.000	No	Transfer	Rp1.840.198,00	0
1062	3/3/2025	DPS-SIN	Lion Air	Rp1.398.376,00	0	Rp0	No	Transfer	Rp1.398.376,00	0
1063	3/4/2025	CGK-KUL	Citilink	Rp969.544,00	1	Rp150.000	No	Transfer	Rp1.119.544,00	0
1064	3/5/2025	CGK-SIN	AirAsia	Rp1.080.002,00	0	Rp0	Yes	Transfer	Rp1.080.002,00	1
1065	3/6/2025	CGK-SIN	Garuda	Rp1.398.002,00	0	Rp0	No	Transfer	Rp1.398.002,00	0
1066	3/7/2025	DPS-SIN	Lion Air	Rp2.288.015,00	1	Rp200.000	Yes	Transfer	Rp2.488.015,00	1
1067	3/8/2025	CGK-SIN	Garuda	Rp1.290.978,00	0	Rp0	No	Transfer	Rp1.290.978,00	0
1068	3/9/2025	CGK-SIN	Garuda	Rp2.277.363,00	0	Rp0	No	E-Wallet	Rp2.277.363,00	0
1069	3/10/2025	DPS-SIN	AirAsia	Rp2.279.159,00	1	Rp0	No	E-Wallet	Rp2.279.159,00	0
1070	3/11/2025	DPS-SIN	Lion Air	Rp1.607.317,00	1	Rp150.000	Yes	E-Wallet	Rp1.757.317,00	1
1071	3/12/2025	CGK-DPS	Citilink	Rp1.088.215,00	0	Rp0	No	E-Wallet	Rp1.088.215,00	0
1072	3/13/2025	CGK-KUL	Citilink	Rp1.021.184,00	1	Rp200.000	No	Transfer	Rp1.221.184,00	0
1073	3/14/2025	CGK-KUL	AirAsia	Rp2.171.091,00	0	Rp0	No	Credit Card	Rp2.171.091,00	0
1074	3/15/2025	CGK-SIN	AirAsia	Rp1.368.234,00	0	Rp0	No	Transfer	Rp1.368.234,00	0
1075	3/16/2025	CGK-KUL	Lion Air	Rp1.078.480,00	1	Rp250.000	No	Credit Card	Rp1.328.480,00	0
1076	3/17/2025	CGK-SIN	Citilink	Rp732.711,00	1	Rp0	No	E-Wallet	Rp732.711,00	0

1077	3/18/2025	CGK-DPS	Citilink	Rp1.491.971,00	1	Rp0	No	Transfer	Rp1.491.971,00	0
1078	3/19/2025	DPS-SIN	Citilink	Rp1.201.157,00	1	Rp0	No	E-Wallet	Rp1.201.157,00	0
1079	3/20/2025	DPS-SIN	Garuda	Rp884.423,00	1	Rp0	No	Transfer	Rp884.423,00	0
1080	3/21/2025	DPS-SIN	Citilink	Rp1.216.349,00	1	Rp250.000	Yes	E-Wallet	Rp1.466.349,00	1
1081	3/22/2025	CGK-KUL	Garuda	Rp2.452.290,00	0	Rp0	No	Credit Card	Rp2.452.290,00	0
1082	3/23/2025	CGK-DPS	Lion Air	Rp1.612.495,00	1	Rp0	No	Credit Card	Rp1.612.495,00	0
1083	3/24/2025	CGK-KUL	Garuda	Rp2.406.493,00	0	Rp0	No	Credit Card	Rp2.406.493,00	0
1084	3/25/2025	CGK-KUL	Lion Air	Rp1.524.792,00	1	Rp250.000	No	Transfer	Rp1.774.792,00	0
1085	3/26/2025	CGK-DPS	Citilink	Rp2.485.954,00	0	Rp0	No	Credit Card	Rp2.485.954,00	0
1086	3/27/2025	CGK-DPS	Citilink	Rp833.272,00	0	Rp0	No	Transfer	Rp833.272,00	0
1087	3/28/2025	CGK-DPS	Lion Air	Rp1.467.836,00	1	Rp0	No	Credit Card	Rp1.467.836,00	0
1088	3/29/2025	CGK-DPS	AirAsia	Rp1.686.001,00	1	Rp200.000	No	Credit Card	Rp1.886.001,00	0
1089	3/30/2025	DPS-SIN	Lion Air	Rp1.402.335,00	1	Rp250.000	No	Transfer	Rp1.652.335,00	0
1090	3/31/2025	CGK-SUB	AirAsia	Rp1.507.789,00	1	Rp250.000	No	Transfer	Rp1.757.789,00	0
1091	4/1/2025	CGK-SUB	Garuda	Rp2.391.985,00	0	Rp0	Yes	Credit Card	Rp2.391.985,00	1
1092	4/2/2025	CGK-DPS	Garuda	Rp1.826.081,00	0	Rp0	No	Transfer	Rp1.826.081,00	0
1093	4/3/2025	CGK-SUB	Garuda	Rp702.869,00	0	Rp0	No	Credit Card	Rp702.869,00	0
1094	4/4/2025	CGK-SUB	Citilink	Rp1.481.474,00	1	Rp250.000	No	Transfer	Rp1.731.474,00	0
1095	4/5/2025	CGK-DPS	Garuda	Rp1.154.351,00	1	Rp250.000	No	E-Wallet	Rp1.404.351,00	0
1096	4/6/2025	CGK-SUB	AirAsia	Rp2.060.828,00	1	Rp200.000	No	E-Wallet	Rp2.260.828,00	0
1097	4/7/2025	CGK-KUL	Garuda	Rp1.336.584,00	0	Rp0	No	E-Wallet	Rp1.336.584,00	0
1098	4/8/2025	CGK-SIN	Lion Air	Rp1.318.467,00	1	Rp250.000	No	E-Wallet	Rp1.568.467,00	0
1099	4/9/2025	CGK-SIN	Lion Air	Rp1.838.848,00	1	Rp0	No	E-Wallet	Rp1.838.848,00	0
1100	4/10/2025	CGK-DPS	Citilink	Rp738.467,00	1	Rp250.000	No	Credit Card	Rp988.467,00	0
1101	4/11/2025	DPS-SIN	Lion Air	Rp1.736.685,00	1	Rp0	No	E-Wallet	Rp1.736.685,00	0
1102	4/12/2025	CGK-DPS	AirAsia	Rp1.577.844,00	1	Rp200.000	No	E-Wallet	Rp1.777.844,00	0
1103	4/13/2025	DPS-SIN	Garuda	Rp1.180.047,00	0	Rp0	No	E-Wallet	Rp1.180.047,00	0

1104	4/14/2025	CGK-SIN	Citilink	Rp2.407.923,00	0	Rp0	No	E-Wallet	Rp2.407.923,00	0
1105	4/15/2025	CGK-DPS	Garuda	Rp1.807.447,00	1	Rp0	No	Transfer	Rp1.807.447,00	0
1106	4/16/2025	CGK-KUL	Garuda	Rp1.639.903,00	0	Rp0	No	Credit Card	Rp1.639.903,00	0
1107	4/17/2025	CGK-SUB	AirAsia	Rp828.391,00	0	Rp0	No	E-Wallet	Rp828.391,00	0
1108	4/18/2025	DPS-SIN	Lion Air	Rp1.139.430,00	0	Rp0	Yes	E-Wallet	Rp1.139.430,00	1
1109	4/19/2025	CGK-SUB	Lion Air	Rp1.717.026,00	0	Rp0	Yes	E-Wallet	Rp1.717.026,00	1
1110	4/20/2025	CGK-SUB	Garuda	Rp2.359.280,00	1	Rp0	No	Credit Card	Rp2.359.280,00	0
1111	4/21/2025	CGK-DPS	Citilink	Rp956.687,00	1	Rp150.000	No	Transfer	Rp1.106.687,00	0
1112	4/22/2025	CGK-SUB	Lion Air	Rp2.474.027,00	1	Rp250.000	No	Credit Card	Rp2.724.027,00	0
1113	4/23/2025	CGK-KUL	Citilink	Rp807.450,00	0	Rp0	No	Transfer	Rp807.450,00	0
1114	4/24/2025	CGK-SUB	Lion Air	Rp871.890,00	1	Rp0	No	E-Wallet	Rp871.890,00	0
1115	4/25/2025	CGK-DPS	Citilink	Rp1.138.741,00	1	Rp150.000	No	E-Wallet	Rp1.288.741,00	0
1116	4/26/2025	CGK-KUL	AirAsia	Rp981.974,00	0	Rp0	No	Credit Card	Rp981.974,00	0
1117	4/27/2025	CGK-SIN	Citilink	Rp2.148.685,00	1	Rp200.000	No	Credit Card	Rp2.348.685,00	0
1118	4/28/2025	CGK-SUB	AirAsia	Rp816.381,00	0	Rp0	No	Transfer	Rp816.381,00	0
1119	4/29/2025	CGK-DPS	AirAsia	Rp2.221.701,00	1	Rp0	No	Transfer	Rp2.221.701,00	0
1120	4/30/2025	CGK-SIN	Citilink	Rp2.320.197,00	1	Rp250.000	No	Credit Card	Rp2.570.197,00	0