

# End-to-End Data Analytics Project: Optimizing Kimia Farma's Profitability 2020-2023

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EXPLORE MY PROJECT



## INTRODUCTION

**Kimia Farma**, is a leading pharmaceutical company in Indonesia engaged in the production, distribution, and sale of pharmaceuticals and other health products. The company also provides integrated healthcare services, including pharmacies, clinics and clinical laboratories. Kimia Farma has been part of Indonesia's public health development for more than 100 years.



Kimia Farma was established in 1817 by the Dutch East Indies Government under the name NV Chemicalien Handle Rathkamp & Co, making it the first pharmaceutical company in Indonesia.

# PROJECT OBJECTIVE



This project aims to evaluate Kimia Farma's business profitability in 2020-2023. Through data analysis using SQL and interactive visualization, we will identify key trends, quantify performance metrics, and provide strategic insights to support better business decision making.

**Dataset Overview:** This project uses the Kimia Farma product sales transaction dataset with the following characteristics:

**Data Structure:** Consists of four relational tables:

- **kf\_final\_trancation** (8 columns): Records detailed information about product transactions such as, transaction\_id, date, branch\_id, customer\_name, product\_id, price, discount\_percentage and rating.
- **kf\_kantor\_cabang** table (6 columns): Contains information about branch\_id, branch\_category, branch\_name, city, province, and rating.
- **kf\_inventory** (5 columns): Has information about inventory, branch\_id, product\_id, product\_name and opname\_stock.
- **kf\_product** table (4 columns): Records product information such as product\_id, product\_name, product\_category and price.

**Data Time Range:** Data is available for 2020-2023.



# SQL QUERY ANALYSIS

## Overall Query Objective:

- To consolidate transaction data (kf\_final\_transaction), branch data (kf\_kantor\_cabang), inventory data (kf\_inventory), and product data (kf\_product) into a single denormalized dataset.
- To calculate key metrics such as net\_sales and gross\_profit based on defined business logic.
- To prepare this data for further business performance analysis.

## SQL Query

```
WITH KIMIA_FARMA_1 AS (  
  SELECT  
    f.transaction_id as transaction_id,  
    f.date as date_transaction,  
    k.branch_id as branch_id,  
    k.branch_name as branch_name,  
    k.kota as city,  
    k.provinsi as province,  
    k.rating as branch_rating,  
    f.rating as transaction_rating,  
    f.customer_name as customer_name,  
    f.discount_percentage as discount,  
    f.price as price,  
    f.price - f.discount_percentage as net_sales,  
    CASE  
      WHEN f.price > 500000 THEN '30%'  
      WHEN f.price > 300000 AND f.price < 500000 THEN '25%'  
      WHEN f.price > 100000 AND f.price < 300000 THEN '20%'  
      WHEN f.price > 50000 AND f.price < 100000 THEN '15%'  
      ELSE '10%'  
    END AS gross_laba_percentage  
  FROM `my_project.kf_kantor_cabang` as k  
  LEFT JOIN `my_project.kf_final_transaction` as f  
    ON k.branch_id = f.branch_id  
) ,
```

```
),  
KIMIA_FARMA_2 AS (  
  SELECT  
    i.branch_id as branch_id,  
    p.product_id as product_id,  
    p.product_name as product_name,  
    p.price as actual_price,  
    FROM `my_project.kf_inventory` as i  
  LEFT JOIN `my_project.kf_product` as p  
    ON i.product_id = p.product_id  
)  
SELECT  
  KIMIA_FARMA_1.transaction_id,  
  KIMIA_FARMA_1.date_transaction,  
  KIMIA_FARMA_1.branch_id,  
  KIMIA_FARMA_1.branch_name,  
  KIMIA_FARMA_1.customer_name,  
  KIMIA_FARMA_2.product_id,  
  KIMIA_FARMA_2.product_name,  
  KIMIA_FARMA_1.city,  
  KIMIA_FARMA_1.province,  
  KIMIA_FARMA_1.branch_rating,  
  KIMIA_FARMA_1.transaction_rating,  
  KIMIA_FARMA_1.discount,  
  KIMIA_FARMA_2.actual_price,  
  KIMIA_FARMA_1.net_sales,  
  (KIMIA_FARMA_1.net_sales * (CAST(REPLACE(KIMIA_FARMA_1.gross_laba_percentage, '%', '') AS FLOAT64) / 100.0)) AS gross_profit  
FROM KIMIA_FARMA_1  
LEFT JOIN KIMIA_FARMA_2 ON KIMIA_FARMA_1.branch_id = KIMIA_FARMA_2.branch_id  
ORDER BY 15 DESC;
```

# SQL QUERY ANALYSIS

## Results

Row	transaction_id	date_transaction	branch_id	branch_name	customer_name	product_id	product_name
1	TRX9716434	2020-03-15	49864	Kimia Farma - Apotek	Robert Vasquez	KF313	Psycholeptics drugs, Anxiolytic ...
2	TRX5525483	2023-05-11	29460	Kimia Farma - Apotek	Michael Lowe	KF540	Other analgesics and antipyretics, Salicylic acid and derivatives
3	TRX1938815	2021-10-03	66113	Kimia Farma - Apotek	Andrea Boyd	KF981	Other analgesics and antipyretics, Salicylic acid and derivatives
4	TRX5525483	2023-05-11	29460	Kimia Farma - Apotek	Michael Lowe	KF485	Psycholeptics drugs, Anxiolytic ...
5	TRX2250173	2022-07-11	41750	Kimia Farma - Apotek	Ashley Bender	KF629	Anti-inflammatory and antirheumatic products, non-steroids, Acetic acid derivatives and related substances

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city	province	branch_rating	transaction_rating	discount	actual_price	net_sales	gross_profit
Banda Aceh	Aceh	4.3	3.1	0.0	503300	997500.0	299250.0
Ciamis	Jawa Barat	4.5	3.2	0.0	744200	997500.0	299250.0
Bekasi	Jawa Barat	4.0	4.9	0.0	314600	997500.0	299250.0
Ciamis	Jawa Barat	4.5	3.2	0.0	300800	997500.0	299250.0
Ciamis	Jawa Barat	4.2	4.0	0.0	273900	997500.0	299250.0

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Row	transaction_id	date_transaction	branch_id	branch_name	customer_name	product_id	product_name
6	TRX5525483	2023-05-11	29460	Kimia Farma - Apotek	Michael Lowe	KF381	Anti-inflammatory and antirheumatic products, non-steroids, Propionic acid derivatives
7	TRX2673442	2022-06-24	20505	Kimia Farma - Apotek	Linda Lopez	KF262	Psycholeptics drugs, Hypnotics ...
8	TRX3621082	2020-12-07	58103	Kimia Farma - Apotek	Anne Smith	KF321	Other analgesics and antipyretics, Salicylic acid and derivatives
9	TRX2560624	2021-02-11	12027	Kimia Farma - Apotek	Ricky Riley	KF151	Other analgesics and antipyreti...
10	TRX2560624	2021-02-11	12027	Kimia Farma - Apotek	Ricky Riley	KF250	Anti-inflammatory and antirheumatic products, non-steroids, Propionic acid derivatives

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city	province	branch_rating	transaction_rating	discount	actual_price	net_sales	gross_profit
Ciamis	Jawa Barat	4.5	3.2	0.0	564100	997500.0	299250.0
Cilacap	Jawa Tengah	4.5	3.6	0.0	149800	997500.0	299250.0
Karawang	Jawa Barat	4.7	4.8	0.0	386100	997500.0	299250.0
Pangkalpinang	Bangka Belitung	4.8	3.0	0.0	723800	997500.0	299250.0
Pangkalpinang	Bangka Belitung	4.8	3.0	0.0	688600	997500.0	299250.0

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# SQL QUERY ANALYSIS

## 1. CTE: KIMIA\_FARMA\_1

- **Objective:** To combine transaction data with branch information and calculate preliminary sales metrics.
- **Tables used:** kf\_final\_transaction (abbreviated as f) and kf\_office\_branch (abbreviated as k).
- **JOIN type:** LEFT JOIN from kf\_office\_branch to kf\_final\_transactions on branch\_id. This means all branches of will be included, even if no transactions are recorded.
- **Resulting columns:** transaction\_id, transaction\_date, branch\_id, branch\_name, city, province, branch\_rank, transaction\_rank, customer\_name, discount (directly from f.discount\_percent), price.
- **net\_sales:** Calculated as f.price - f.discount\_percentage.
- **gross\_profit\_percentage:** Calculated using a CASE WHEN statement based on f.price to set a rate-based gross profit percentage (e.g., '30%', '25%').

## 2. CTE: KIMIA\_FARMA\_2

- **Purpose:** To combine inventory data with product information.
- **Tables Used:** kf\_inventory (aliased as i) and kf\_product (aliased as p).
- **JOIN Type:** LEFT JOIN from kf\_inventory to kf\_product on product\_id. This ensures each inventory item is linked to its product details.
- **Generated Columns:** branch\_id, product\_id, product\_name, actual\_price.

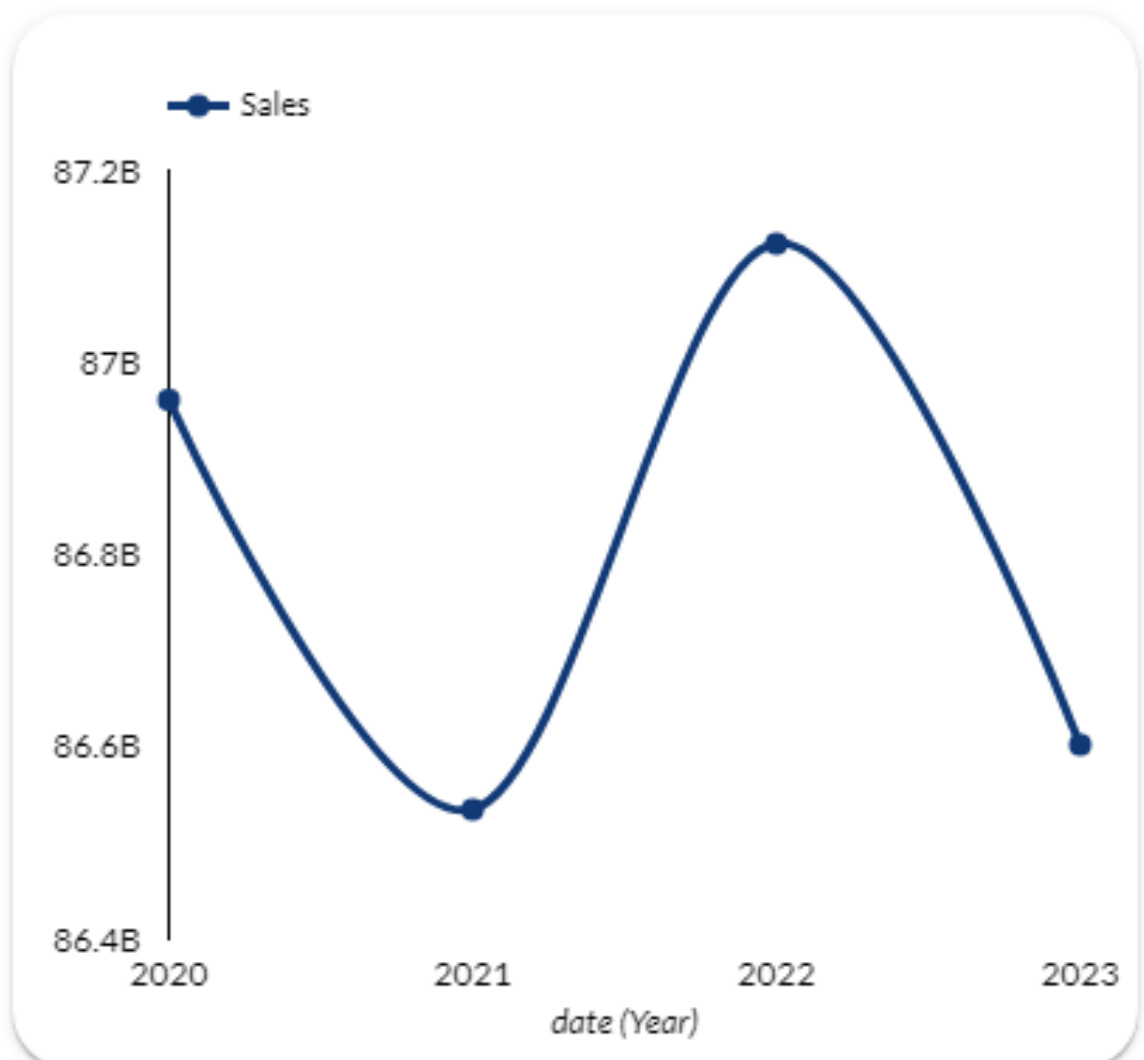
## 3. Main Query (Final SELECT Statement)

- **Purpose:** To merge the results from KIMIA\_FARMA\_1 (transactions & branches) with KIMIA\_FARMA\_2 (inventory & products) and calculate the final gross profit.
- **JOIN Type:** LEFT JOIN from KIMIA\_FARMA\_1 to KIMIA\_FARMA\_2 based on  $\text{KIMIA\_FARMA\_1.branch\_id} = \text{KIMIA\_FARMA\_2.branch\_id}$ .
- **Generated Columns:** All selected columns from KIMIA\_FARMA\_1 and KIMIA\_FARMA\_2 (transaction\_id, date\_transaction, branch\_id, branch\_name, customer\_name, product\_id, product\_name, city, province, branch\_rating, transaction\_rating, discount, actual\_price, net\_sales).
- **gross\_profit:** Calculated as  $\text{KIMIA\_FARMA\_1.net\_sales} * (\text{CAST}(\text{REPLACE}(\text{KIMIA\_FARMA\_1.gross\_laba\_percentage}, '%', '')) \text{ AS FLOAT64}) / 100.0$ . This applies the tier-based gross profit percentage (derived in KIMIA\_FARMA\_1) to the net\_sales to get the gross profit value.
- **ORDER BY 15 DESC:** Sorts the results by the 15th column (gross\_profit) in descending order, displaying transactions with the highest gross profit at the top.



# KIMIA FARMA PERFORMANCE ANALYSIS

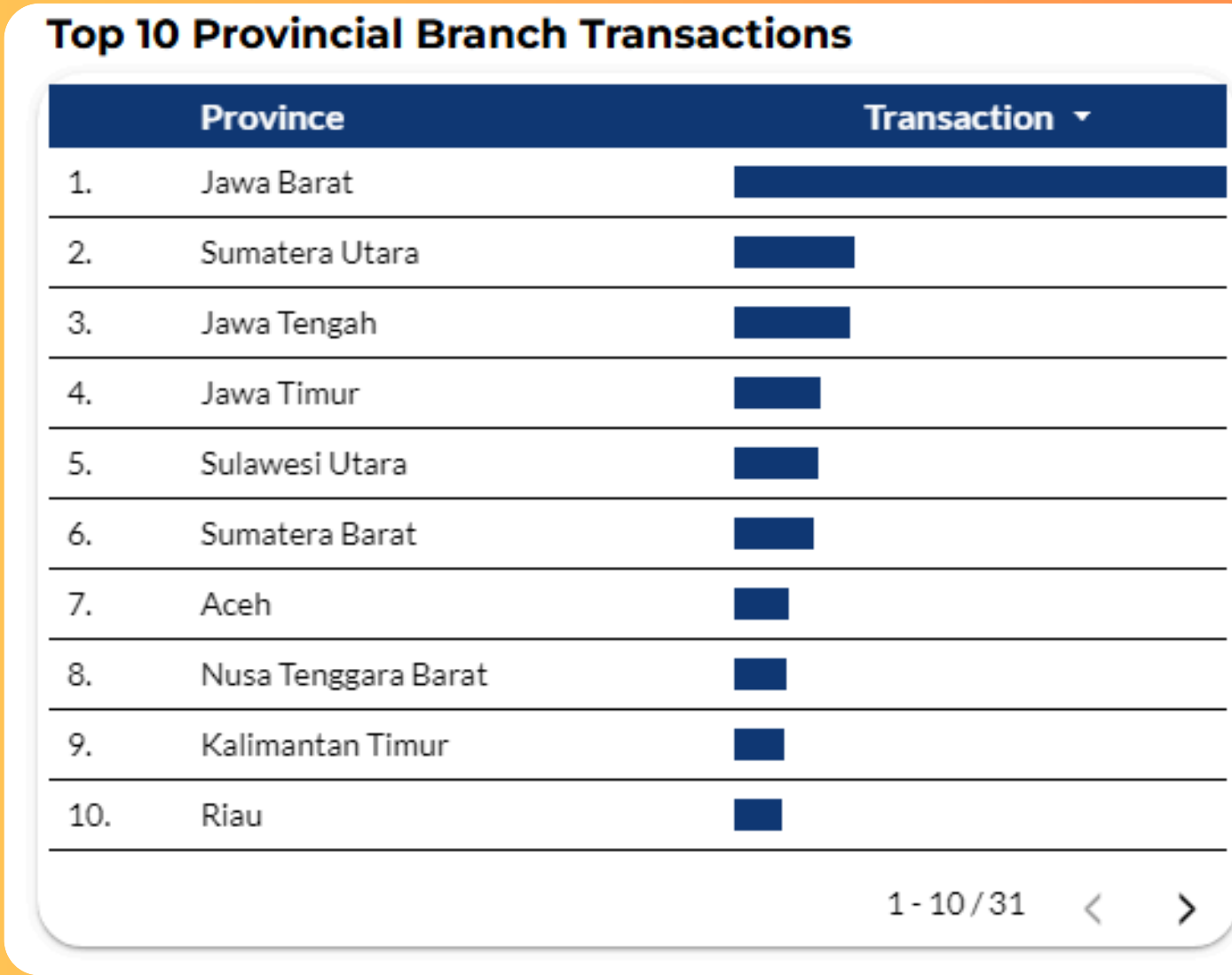
Sales Metrics Year 2020-2023



## INSIGHT

- **Sensitivity to Consumer Shifts:** The significant decline in revenue from 2020 to 2021 indicates that business performance is heavily influenced by changes in consumer behavior triggered by external factors, such as the COVID-19 pandemic, where many consumers shifted to online purchases and reduced visits to physical stores.
- **Market Resilience & Post-Pandemic Opportunities:** The strong increase in revenue in 2022 indicates that Kimia Farma has highly desirable health products (high demand) and is able to capitalize on the momentum of the post-pandemic economic recovery.
- **Internal Vulnerabilities:** The decline in revenue in 2023, specifically due to "operational issues", indicates internal weaknesses that need to be addressed. This is in contrast to the decline at the beginning of the pandemic, which was caused by external factors.

# KIMIA FARMA PERFORMANCE ANALYSIS



## INSIGHT

- **Strong Correlation with Population:** The data shows a very strong correlation between a province's population and transaction volume. West Java, as the most populous province, dominates the total transactions significantly, with almost 4 times the value of the second-placed province.
- **Market Concentration:** There is a very large market concentration in one region (West Java). While this demonstrates the strength of dominance in a key market, too much reliance on one region can be a risk if that market experiences volatility.
- **Regional Market Potential:** The provinces in positions 2 to 4 (North Sumatra, Central Java, East Java) show substantial market potential. Although their transactions are far below those of West Java, their transaction values position them as important regional markets worth developing.

# KIMIA FARMA PERFORMANCE ANALYSIS

Top 10 Nett Sales of Provincial Branches

Province		Net Sales ▾
1.	Jawa Barat	<div></div>
2.	Sumatera Utara	<div></div>
3.	Jawa Tengah	<div></div>
4.	Jawa Timur	<div></div>
5.	Sulawesi Utara	<div></div>
6.	Sumatera Barat	<div></div>
7.	Aceh	<div></div>
8.	Nusa Tenggara Barat	<div></div>
9.	Kalimantan Timur	<div></div>
10.	Riau	<div></div>

1 - 10 / 31 < >

## INSIGHT

- **Extreme Market Dominance:** Nett Sales in West Java (\$102.57B) dominate in the extreme, more than four times that of the second ranked province. This demonstrates the success of the business model in West Java, but also creates a very high revenue dependency on one region.
- **Transaction-Sales Correlation:** The data confirms that Nett Sales is directly proportional to the number of transactions. The province with the highest transactions (West Java) also has the highest net sales.
- **Growth Potential Outside Java:** Despite the dominance, the provinces ranked 2-4 (North Sumatra, Central Java, East Java) show significant regional market potential. The long distance from West Java indicates a great opportunity to increase net sales in these regions.

Top 5 Highest Branch Ratings vs. Top 5 Lowest Transaction Ratings

Branch Rating		Transaction Rating
1.	3.9	3
2.	5	3
3.	4.3	3
4.	4.8	3
5.	4.9	3

1 - 5 / 252 < >

## INSIGHT

- **Quality vs. Performance Gap:** There is a consistent gap between branch quality (which is rated high, with an average of 4.5 out of 5) and transaction performance (which is consistently at 3). This indicates that even though the quality of service or branch facilities is good, it has not successfully been converted into a significant increase in transaction volume or value.
- **Systemic Issue:** This pattern occurs across five different branches, indicating that the problem is not an isolated incident but is likely a systemic issue affecting several branches broadly.
- **Untapped Potential:** These branches have a strong foundation. Their already high quality is a significant asset. The challenge is to find a way to optimize this potential and drive more transactions.



# KIMIA FARMA PERFORMANCE ANALYSIS

Gross Profit by Province



## INSIGHT

- **Centralized Profit Dominance:** West Java Province dominates profit significantly with a total profit of Rp 26.94 billion, which is more than 4 times that of the second-ranked province, North Sumatra (Rp 6.51 billion). This confirms that the high transaction volume in West Java is the main driver of the company's profit.
- **Strong Correlation Between Transactions and Profit:** The data shows a direct correlation between transaction value and profit. The three provinces with the highest transaction values (West Java with \$198.72K, North Sumatra with \$48.18K, and Central Java with \$46.49K) are also the highest contributors to gross profit.
- **Regional Profit Disparity:** There is a very large profit gap between regions, from the highest profit in West Java (Rp 26.94 billion) to the lowest profit in West Papua (Rp 572.94 million). This indicates the presence of untapped market potential or operational issues in regions with low profit.

# SUMMARY

## SALES METRICS YEAR 2020-2023



### INSIGHT

- Business performance is highly sensitive to external factors, such as the shift in consumer behavior to online purchasing during the pandemic.
- The company showed resilience with a significant increase in revenue in 2022, driven by high demand for healthcare products.
- The revenue decline in 2023 is due to internal weaknesses ("operational issues"), which require immediate improvement.



### RECOMMENDATION

- Strengthen investments in e-commerce platforms and online sales channels to anticipate shifts in consumer behavior.
- Conduct in-depth analysis to identify and rectify root causes of operational issues that led to revenue decline in 2023.
- Continue to monitor healthcare demand trends and adjust product portfolio to maintain growth momentum.
- Develop contingency plans to deal with future volatility in market or economic conditions.

## TOP 10 PROVINCIAL BRANCH TRANSACTIONS



### INSIGHT

- There is a strong correlation between population and transaction volume, with West Java dominating the market significantly.
- High market concentration in West Java could be a risk in case of volatility.
- Other provinces (North Sumatra, Central Java, East Java) show great regional market potential to be developed.



### RECOMMENDATION

- Focus market expansion in provinces with large population to maximize market share.
- Diversify sales strategy to other provinces to reduce dependency on West Java.
- Conduct in-depth analysis of mid-ranked provinces to find new growth opportunities.
- Replicate successful strategies from West Java to other provinces to increase transaction volume.

# SUMMARY

## TOP 10 NET SALES OF PROVINCIAL BRANCHES



### INSIGHT

- Net Sales are highly concentrated in West Java, creating high revenue dependency.
- There is a strong correlation between the number of transactions and Net Sales.
- There is significant growth potential in other regional markets such as North Sumatra and Central Java.



### RECOMMENDATION

- Diversify sales to other provinces to reduce dependency on West Java.
- Analyze key success factors in West Java and replicate to other potential markets.
- Increase number of transactions and net sales in strategic provinces such as North Sumatra and Central Java.

## TOP 5 HIGHEST BRANCH RATINGS VS. TOP 5 LOWEST TRANSACTION RATINGS



### INSIGHT

- There is a significant gap between high branch quality ratings and low transaction ratings.
- This pattern occurs across many branches, indicating a systemic issue.
- These branches have great untapped potential to increase transactions.



### RECOMMENDATION

- Conduct a deep analysis to find the root cause of the low transaction ratings.
- Develop a targeted local marketing strategy to increase traffic and conversions.
- Provide staff with training on more proactive sales techniques.

# SUMMARY

## GROSS PROFIT BY PROVINCE



### INSIGHT

- West Java dominates profit with Rp 26.94 billion, more than 4 times that of the second province.
- There is a strong correlation between transaction value and profit; the province with the highest transactions also has the highest profit.
- There is a large profit gap between regions, from the highest (Rp 26.94 billion) to the lowest (Rp 572.94 million).



### RECOMMENDATION

- Develop an expansion strategy in leading provinces besides West Java to reduce dependency.
- Analyze obstacles in low-performing markets (such as West Papua) to find expansion opportunities.
- Replicate successful strategies from West Java to other provinces to increase profit.



## GET IN TOUCH

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## GET IN TOUCH

# Thank You

THE END

