Active User Behavior & Segmentation

Analyst Insight – OCA Indonesia

Virtual Internship Program RevoU & Telkom Indonesia

MikhaelPutraIswanto

Tuesday, 27 Januari 2026

Background & Business Problem

Business Background

OCA Indonesia, a Communications Platform as a Service solution solution by **Telkom Indonesia**, supports large-scale omnichannel messaging across multiple channels and clients. enables customer engagement through **WhatsApp, SMS, Email, and Voice Call**. However, growing usage complexity makes it **challenging** to **identify user behavior differences and channel effectiveness**. Clustering-based segmentation enables clearer insights into behavioral patterns, channel performance, and optimization opportunities.

Background & Business Problem

Business Problem

How can OCA Indonesia leverage user behavior clustering to identify **distinct customer segments**, enable more relevant and **personalized** messaging, detect **early signals** of **potential churn**, and uncover **upsell opportunities** to improve delivery success and engagement in the next quarter?

DARCI

Decision : C-Level Executive
Approver : Head of Business
Responsible : Data Analyst
Consulted : Product Managers Marketing & Campaign
Informed : Operational Teams & Management

EXECUTIVE SUMMARY

Problem

How can OCA Indonesia leverage user behavior clustering to identify distinct customer segments, enable more relevant and personalized messaging, detect early signals of potential churn, and uncover upsell opportunities to improve delivery success and engagement in the next quarter?

Objective

To understand and segment OCA Indonesia users based on behavioral patterns in order to enable personalization, early churn detection, and targeted upsell strategies that improve delivery success and customer engagement.

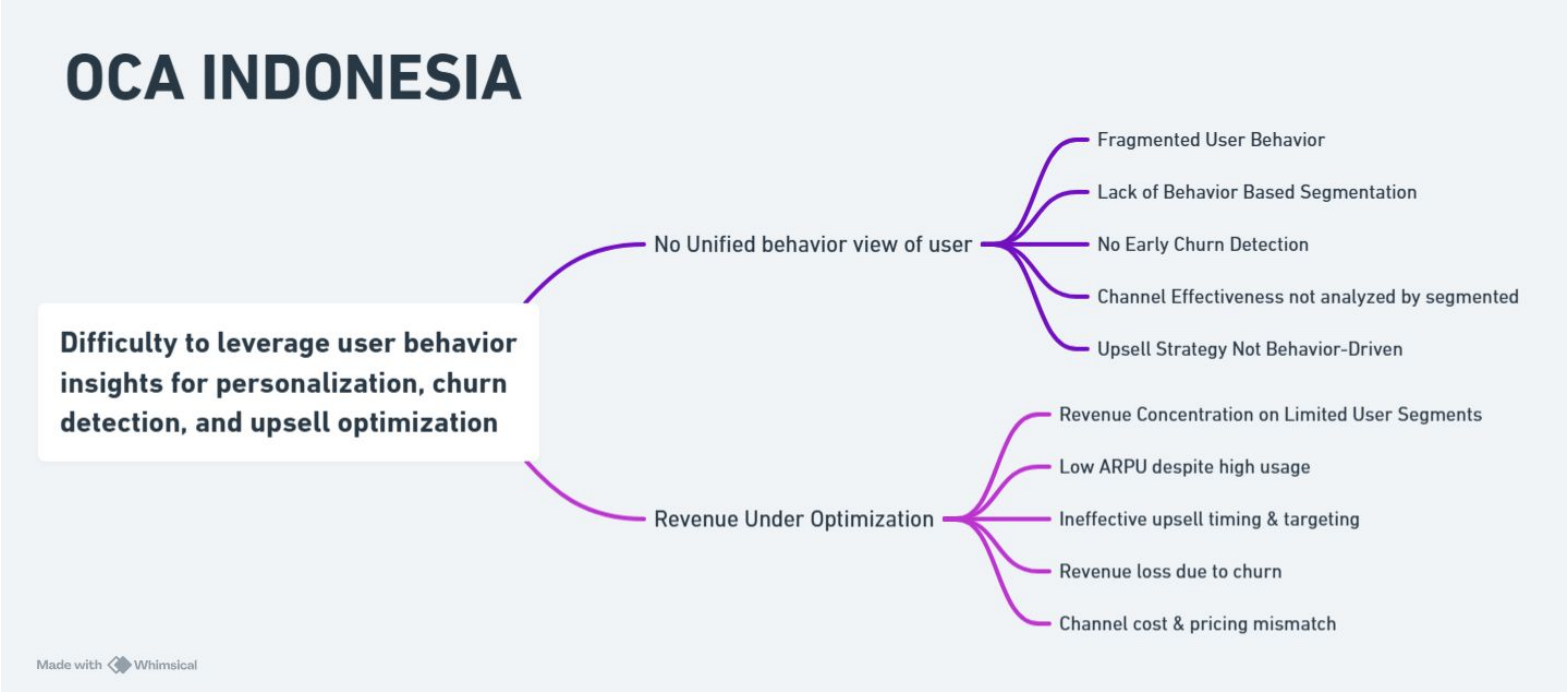
Findings

Growth depends on WhatsApp and Email, revenue concentrated in few Power Users, while quality-driven silent churn and missing mid-tier threaten scalability despite uniform engagement patterns.

Recommendations

Prioritize quality fixes for Power Users, focus on WhatsApp and Email, activate mid-tier via value-based upsell, and embed behavior-driven lifecycle management to reduce churn and revenue concentration.

Root Cause Analyze



Project Objective

Behavioral Understanding Objective

Analyze user behavior across channels and time to identify distinct usage patterns.

Segmentation Objective (RFM & Clustering)

Create meaningful user segments using RFM and clustering techniques based on behavioral and transactional metrics.

Revenue & Value Identification Objective

Identify high-value and high-potential user segments to optimize revenue contribution.

Churn Risk Detection Objective

Detect early behavioral signals of potential churn across user segments.

Channel & Engagement Optimization Objective

Evaluate channel effectiveness and engagement patterns across segments to improve delivery success.

Project Scope & Dataset

Focus Area

- User 360 & Segmentation
- Revenue & Profitability Mapping
- Risk & Opportunity Detection

X Exclusion

- Net Profit , because we don't have metric cost
- Customer Sentiment, because we don't have detail satisfied user

Dataset

- 122.749 transactions
- 20 unique users
- Main metric : user_id, channel_diversity, message_volume, active_days_df, tenure, success_rate, total_revenue, recency_days, is_dormant

Metriks Used

Nama	Detail
user_id	Key points.
channel_diversity	Number of unique channels (1 = Mono, >1 = Omni).
message_volume	Total transaction_id.
usage_frequency	daily engagement rate
active_days_df	Total unique transaction days (Consistency Indicator).
active_hours_df	Total unique transaction hours (Consistency Indicator).
transaction_id	count of transaction
total_price	how much user paid to ger monetary
created_at	date when user transaction

Metriks Used

Nama	Detail
avg_daily_volume	Average speed of messages sent by users per day
usage_trend	User performance indicators for the past week. Are they diligent (up) or lazy (down)
failure_rate	Percentage of messages that failed to send.
risk_category	User churn status
success_rate	Percentage of messages successfully delivered.
segment_name	User based on money and number of transactions.
hourly_data	Summary of transactions per hour
usage	Percentage of usage of a particular channel.

METHODOLOGY

Business Understanding

Measure channel effectiveness and segment user to gain strategies that improve delivery success and customer engagement.

Data Collection

Message transactions of OCA Indonesia (Whatsapp, Email, SMS, Call) from January - March 2025

Data Cleaning

Format datetime, remove duplicate, unified data, and calculated derived features (e.g., average transactions per day, tenure, ARPU)

Analyze

Exploratory data analysis (distribution by channel, time, status) and Clustering by K=3 combined score

Data Visualization

Use Histogram, Bar chart, Scatterplots, amd cluster summaries

Data Presentation

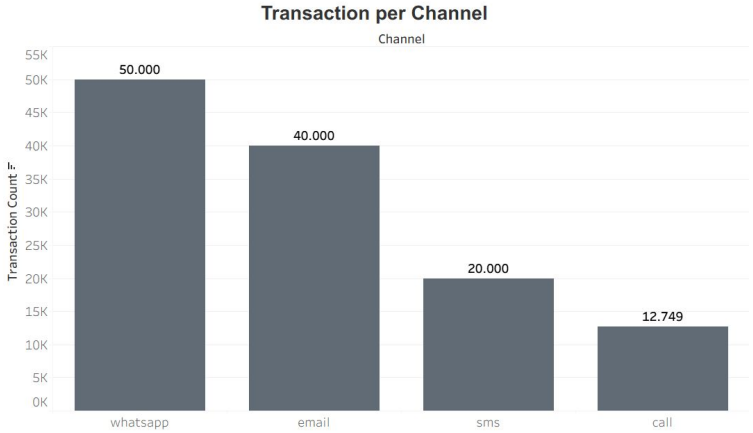
Cluster insight (high, medium, and low users) and cluster recommendation with high, medium

Exploratory Data Analysis

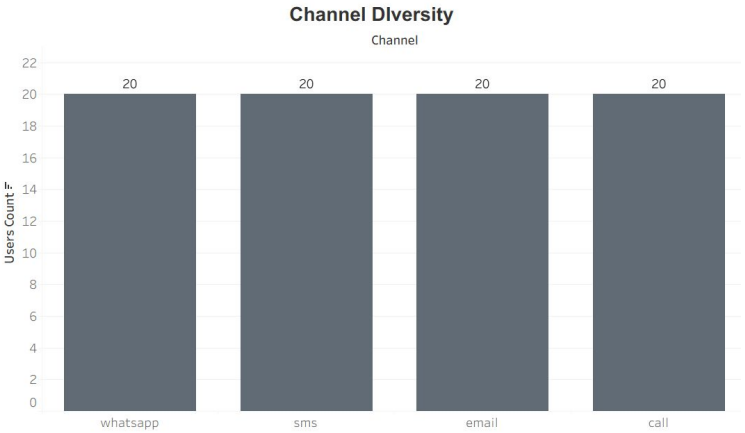
20 Users

Total Transaction	122.748
Total Revenue	Rp. 25.946.370
Success Rate	79.54%
ARPU	Rp. 1.297.321

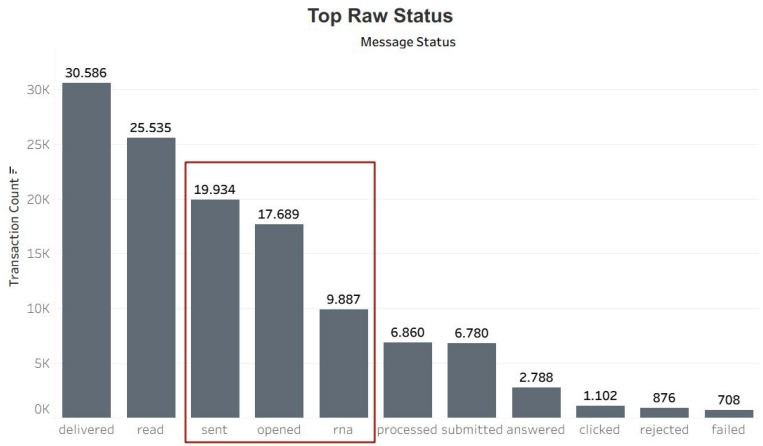
Behavioral Understanding



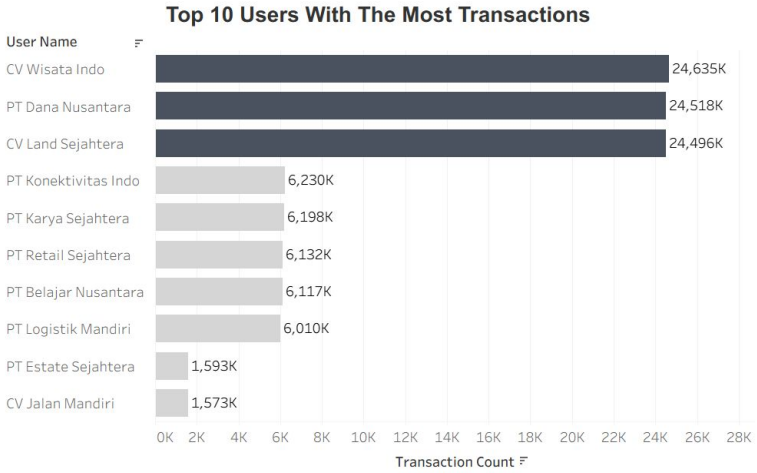
- WhatsApp and Email **dominate** overall transaction, while SMS and Call remain marginal channels, suggesting that **optimization efforts** should prioritize WA and Email as the **main drives** of user communication



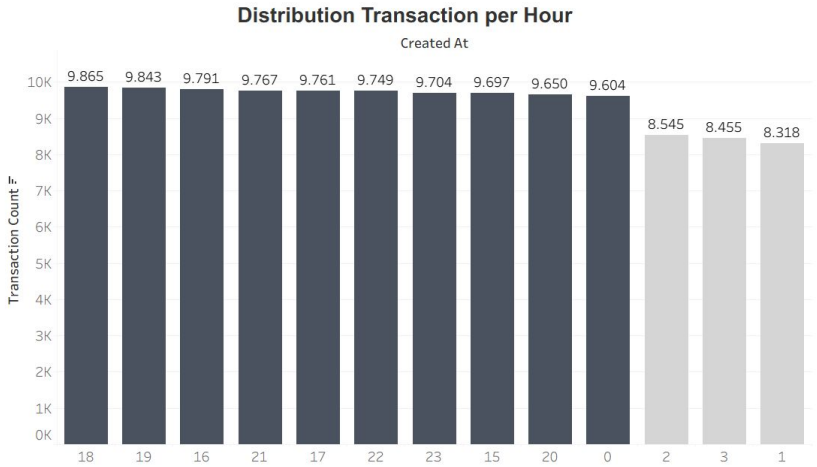
Users are evenly distributed across all channels, indicating strong **omnichannel** adoption.

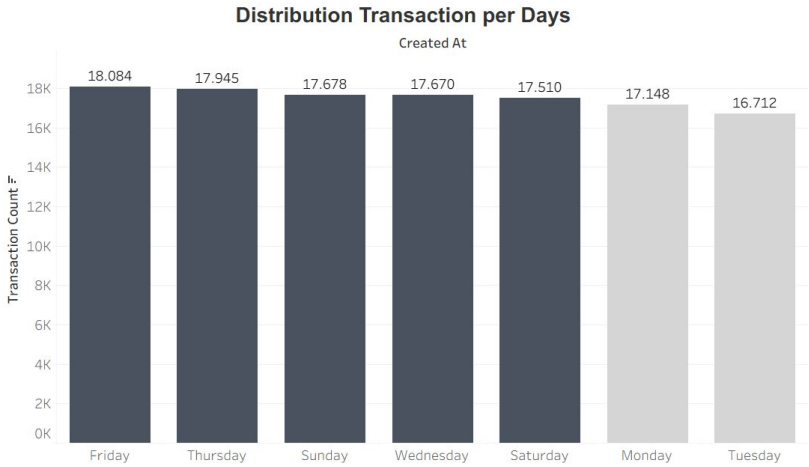


- Most transactions reach the delivered and read stages, showing that the **majority of messages are successfully transmitted** and consumed, but the **relatively high** numbers in sent, opened, and RNA (Ring No Answer) **highlight delivery bottlenecks**, while the very low clicked rate indicates weak engagement



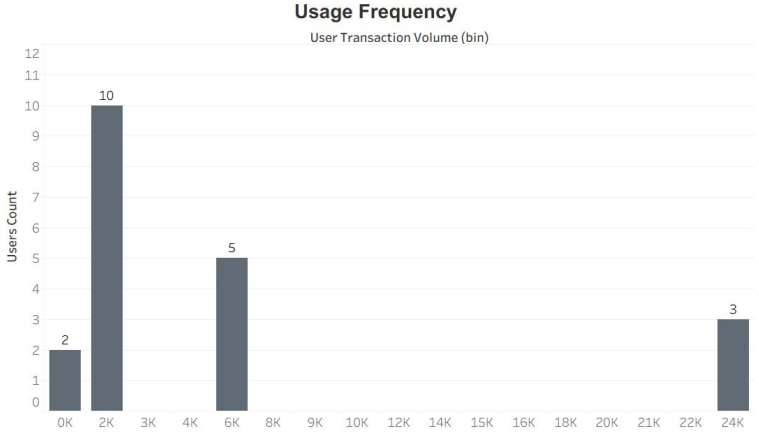
OCA's usage is **highly concentrated** in the top three users generating over 24M transactions, creating **high dependency risk.** while mid-tier clients show growth constraints highlighting urgent retention needs and clear upsell opportunities.





- Message traffic peaks from 17:00 to 00:00 and remains **active overnight**, creating **prolonged server load**. This opens opportunities for **premium priority routing** and off-peak traffic optimization.

While Friday shows the **highest transaction** volume, weekday to weekend variation remains moderate 1.372 transactions (~7%), requiring **full infrastructure readiness daily**. Maintenance is best scheduled during low-traffic early Tuesday hours.



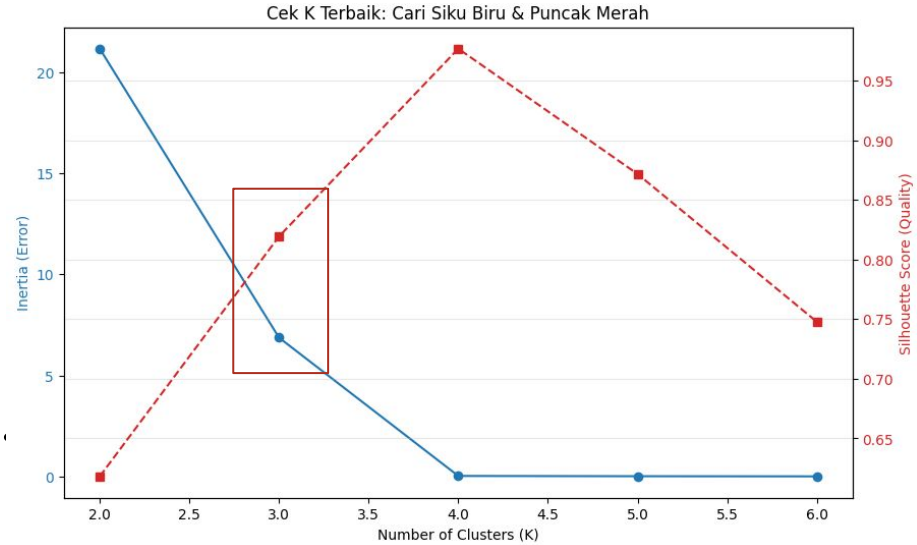
- OCA's user base is **highly polarized,** with a **missing mid-tier** that signals pricing **gaps in user growth progression** and highlights strong upsell potential from lower-volume users.

Usage Frequency (Time)

Hour of..	Sunday	Monday	Tuesday	Created At Wednesday	Thursday	Friday	Saturday
0	1.426	1.406	1.332	1.275	1.407	1.339	1.419
1	1.195	1.203	1.147	1.097	1.240	1.217	1.219
2	1.221	1.224	1.218	1.133	1.268	1.268	1.213
3	1.176	1.244	1.182	1.123	1.264	1.246	1.220
15	1.366	1.299	1.313	1.457	1.458	1.444	1.360
16	1.406	1.272	1.341	1.435	1.457	1.454	1.426
17	1.430	1.388	1.296	1.435	1.432	1.425	1.355
18	1.388	1.409	1.325	1.473	1.428	1.474	1.368
19	1.467	1.344	1.303	1.467	1.434	1.475	1.353
20	1.405	1.387	1.326	1.399	1.375	1.415	1.343
21	1.355	1.331	1.328	1.491	1.396	1.465	1.401
22	1.473	1.319	1.266	1.469	1.392	1.429	1.401
23	1.371	1.322	1.335	1.416	1.395	1.433	1.432

OCA Indonesia users are definitive **'Night Owls,'** peaking between 7 PM and 11 PM, particularly on Wednesdays and Thursdays. To maximize impact, engagement strategies must shift from standard office hours to these evening slots, utilizing the 1 AM–3 AM lull strictly for maintenance.

Segmentation

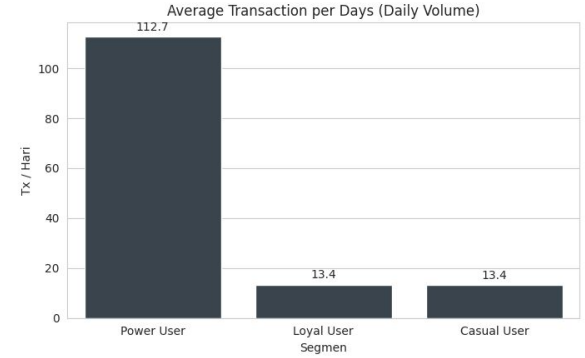


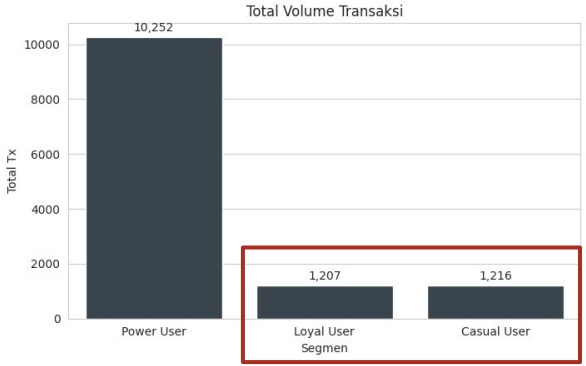
Based on the **Elbow Method and silhouette** analysis, user segmentation was performed using a combination of **log-transformed** frequency, **log-transformed** monetary value, and **active days** as a proxy for recency (due to uniform recency values). This analysis indicates that the optimal number of clusters is K = 3.

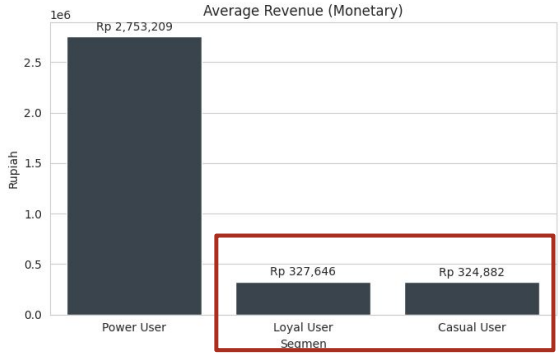
Segmentation

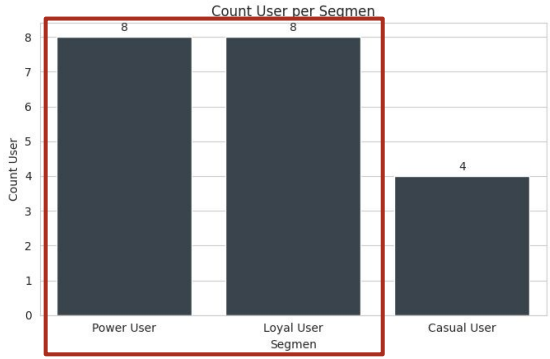
No	Segment	Characteristics	Suggest Actions
1	POWER USER	Revenue Driver Declining Trend High Operational Consistency	Immediate Retention (Account-Based Marketing) Lock-in Mechanism with volume-based incentives or annual contract SLA Guarantee
2	LOYAL USER	No Value Differentiation, identic with casual user High Volatility & Churn Unpredictable Pattern	Re-Segmentation Strategy Gamification & Upselling Churn Prevention Campaign with win back campaign via WhatsApp/Email with a user decline trend above 30%
3	CASUAL USER	Omni-Channel Ready After-Hour Behavior Moderate Risk	Low-Touch Activation Time-Based Nudging before prime time Entry-Level Monetization

Revenue & Value Identification Objective









OCA's business is highly dependent on **8 Power Users** who **dominate transactions** and revenue, while **Loyal** and **Casual Users have nearly identical performance** and **lag far behind**. Therefore, the strategy needs to prioritize Power User retention and redefine non-power segmentation.

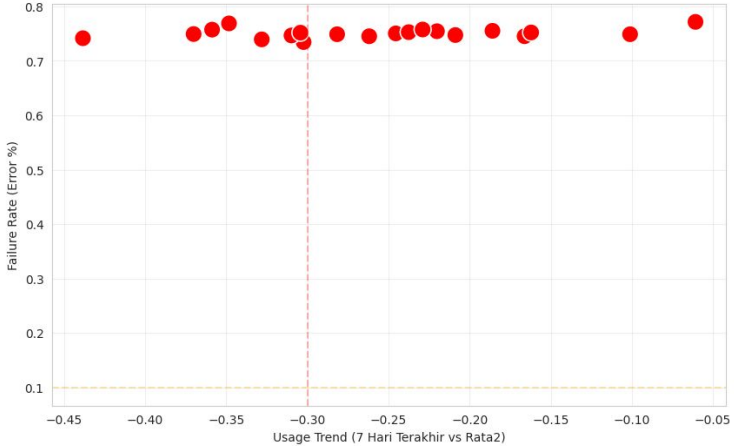
Revenue & Value Identification Objective

user_name	user_id	monetary	frequency	active_days
CV Wisata Indo	user_3	Rp 5,207,310	19,367	91
PT Dana Nusantara	user_2	Rp 5,198,910	19,351	91
CV Land Sejahtera	user_1	Rp 5,125,530	19,222	91
PT Retail Sejahtera	user_7	Rp 1,327,690	4,853	91
PT Karya Sejahtera	user_5	Rp 1,310,570	4,848	91
PT Logistik Mandiri	user_6	Rp 1,294,970	4,725	91
PT Belajar Nusantara	user_8	Rp 1,284,620	4,799	91
PT Konektivitas Indo	user_4	Rp 1,276,070	4,854	91

There is **extreme polarization** among OCA users, with **“The Big 3”** (CV Wisata Indo, PT Dana Nusantara, CV Land Sejahtera) **dominating revenue and traffic** with a **value** almost 4 times that of other users. Uniquely, the **retention rate is perfect** because all users are fully active for 91 days, indicating that the OCA system has become a daily (operational) necessity. However, there is stagnation among mid-tier users whose transaction profiles are uniform, with no one standing out to grow into a new Power User.

Churn Risk Detection

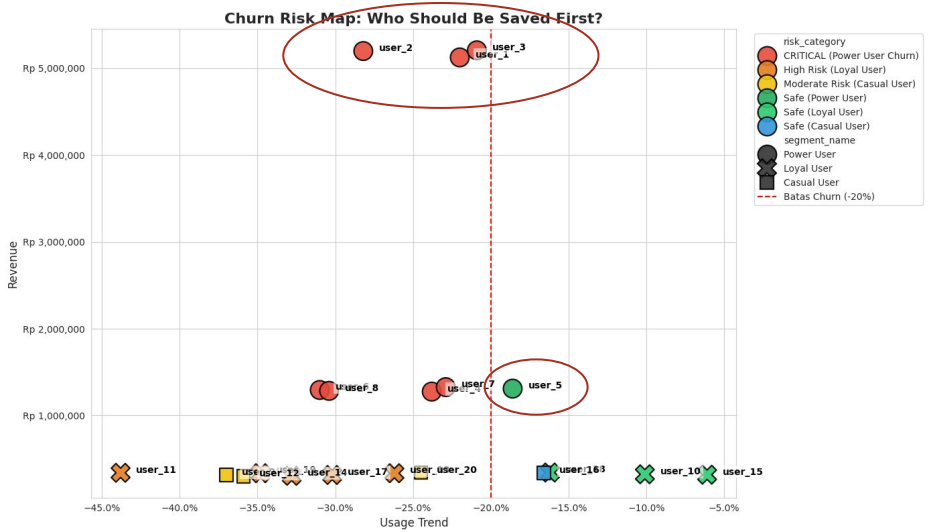
With zero recency, churn is detected via early warning signals, not inactivity.



user_id	segment_name	churn_probability	usage_trend	failure_rate	avg_daily_last_7d	avg_daily_prev
user_11	Loyal User	High Risk (Quality Issue)	-43.8%	74.2%	7.9	14.0
user_9	Casual User	High Risk (Quality Issue)	-37.0%	74.9%	8.6	13.6
user_12	Casual User	High Risk (Quality Issue)	-35.9%	75.7%	8.4	13.1
user_19	Loyal User	High Risk (Quality Issue)	-34.8%	76.9%	9.0	13.8
user_14	Loyal User	High Risk (Quality Issue)	-32.8%	73.9%	9.1	13.6
user_6	Power User	High Risk (Quality Issue)	-31.0%	74.7%	36.7	53.2
user_8	Power User	High Risk (Quality Issue)	-30.4%	75.2%	37.6	54.0
user_17	Loyal User	High Risk (Quality Issue)	-30.2%	73.4%	9.3	13.3
user_2	Power User	High Risk (Quality Issue)	-28.2%	74.9%	156.1	217.4
user_13	Loyal User	High Risk (Quality Issue)	-26.2%	74.5%	10.0	13.5

Even though users are still **active** (recency = 0), a sharp **decline in usage trend** (≤ -30%) accompanied by a consistently **high failure rate** (~75%) indicates a risk of early churn triggered by service quality issues. High RNA encourages transaction failures and causes users to gradually reduce volume (“silent churn”), which has the potential to develop into actual churn if not addressed immediately.

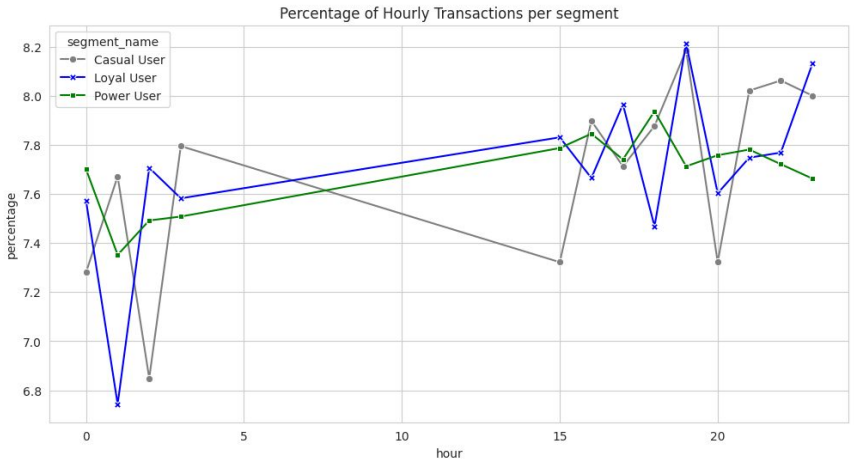
Churn Risk Detection

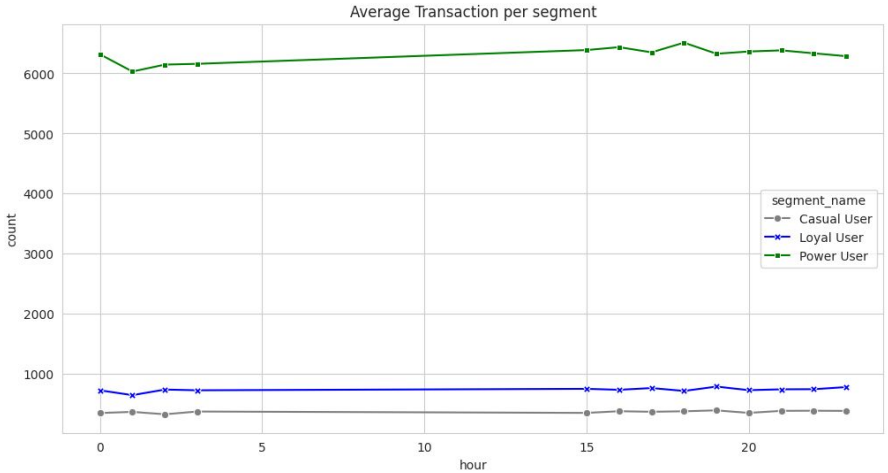


user_id	risk_category	usage_ trend	revenue	success _rate
user_15	Safe (Loyal User)	-6.1%	Rp 318,840	22.8%
user_19	High Risk (Loyal User)	-34.8%	Rp 336,210	23.1%
user_7	CRITICAL (Power User Churn)	-22.9%	Rp 1,327,690	24.2%
user_12	Moderate Risk (Casual User)	-35.9%	Rp 300,770	24.3%
user_5	Safe (Power User)	-18.6%	Rp 1,310,570	24.5%
user_1	CRITICAL (Power User Churn)	-22.0%	Rp 5,125,530	24.6%
user_4	CRITICAL (Power User Churn)	-23.8%	Rp 1,276,070	24.7%
user_8	CRITICAL (Power User Churn)	-30.4%	Rp 1,284,620	24.8%
user_18	Safe (Loyal User)	-16.2%	Rp 344,080	24.8%
user_20	Moderate Risk (Casual User)	-24.5%	Rp 342,240	25.0%

Although all users appear to be **actively logged in**, data **from the last 7 days** shows a **sharp decline** in product usage. The highest churn risk comes from key Power Users (Users 1–3), with a usage decline of up to −28%, indicating **silent churn**. Saving “The Big 3” is a critical priority because their impact on cash flow is much greater than that of other users.

Channel & Engagement Optimization





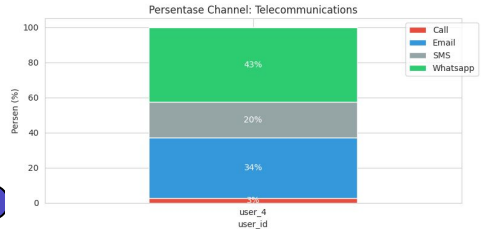
- No. High-volume users **do not show unique hourly patterns**. All user segments are **active at the same time** (starting at ±3:00 p.m., peaking at ±7:00 p.m.). The only difference is in **consistency**, Power Users are more stable and planned, while Casual Users are **more volatile**. No special timing strategy is needed for High-volume users.

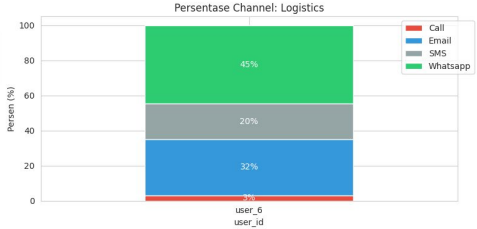
Analysis of transaction patterns proves that Power Users do not have “**special hours**” or **unique time patterns**. They are active in the same time zone as other users, becoming busy in the afternoon and peaking at 7 p.m.

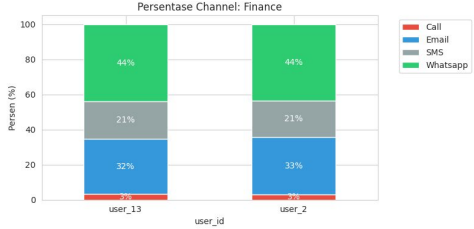
omni communication assistant

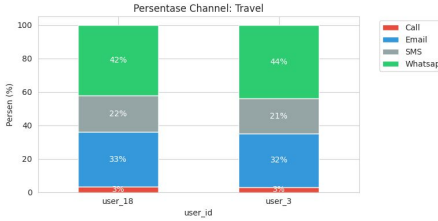
Telkom Indonesia
the world in your hand

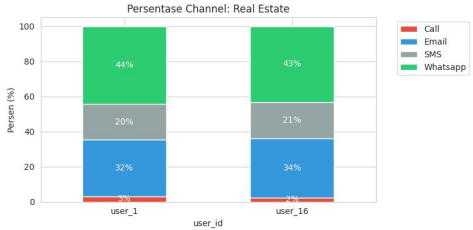
Channel & Engagement Optimization

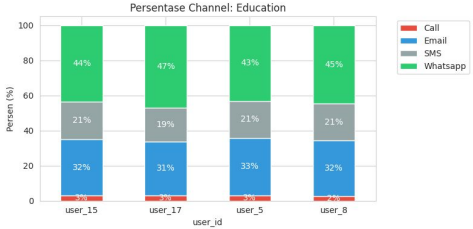


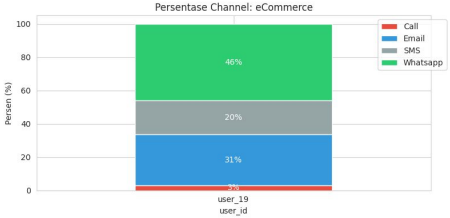


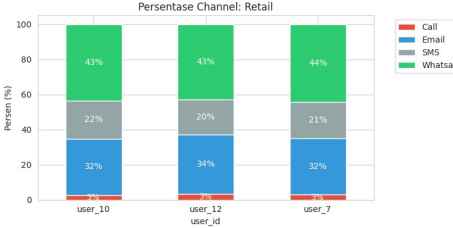


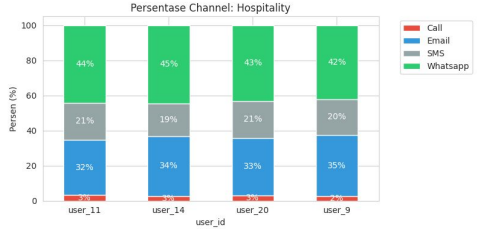












Data shows that all users are **omni-channel**, with consistent usage patterns across industries **WhatsApp dominates**, followed by **email**, while SMS and calls play a minor role. Since there are no mono-channel users, upsell strategies involving the addition of channels are irrelevant. Revenue **opportunities** lie in **cross-selling quotas** and **premium add-ons** on the most frequently used main channels, especially WhatsApp and email.

DESCLAIMER
"The data provided is a representation of the original data which amount has been adjusted. The data used is NOT representation of original data, adjusted for educational purposes and does not reflect the actual business condition of the company."

Summary Insight

Behavioral	WA & Email are the core growth engines Usage is heavily concentrated in a few top clients High delivery success but elevated RNA and low engagement User activity peaks at night (7 - 11 PM) with sustained overnight load
Segmentation	User segmentation using log-transformed frequency, monetary value, and active days (as a recency proxy) indicates three optimal clusters (K = 3) based on Elbow and Silhouette analysis. (Power User, Loyal user, and Casual User)
Revenue	A small group of Power Users led by “The Big 3” dominates transactions and revenue Retention is artificially perfect Loyal and Casual users show stagnant and nearly identical performance There is no natural pipeline for new Power Users

Summary Insight

Churn Risk	Despite zero recency, usage has dropped sharply (≤ −30%) alongside a persistently high failure rate (~75%) High RNA is a key driver of transaction failures The highest churn risk sits with Power Users, especially “The Big 3 Retaining the top users is critical to cash flow stability
Engagement	High-volume (Power) users do not exhibit unique hourly behavior The key difference across segments is consistency, not timing All users are fully omnichannel Channel-based upsell is not relevant

Recommendation

Timing	Detail	Recommendation
Short Term fix quality and save Power Users	Protect revenue, reduce silent churn, improve delivery quality.	Prioritize quality fixes for Power Users (“The Big 3”) Implement a behavior-based Early Warning System Focus on optimizing WhatsApp and email only Adjust operations to night-peak usage (7–11 PM)
Mid Term activate the missing middle	Reduce dependence on top users and activate mid-tier users.	Redefine segmentation beyond volume Build a “Next Power Users” pipeline Shift upsell strategy from channel to value
Long Term build a scalable, quality-led growth engine	Scalable system, balanced revenue, controlled churn.	Institutionalize behavior-based lifecycle management Reduce revenue concentration risk Develop quality-led product differentiation Predictive churn & growth modeling

THANKS!

Do you have any questions?

mikhaelput@gmail.com
081932613746

Appendix