Data-Driven Insights from PhonePe Transactions & User Engagement

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Problem Statement

Brief overview of PhonePe's challenges:

- Uneven transaction growth across states

- Varying device usage and app engagement

- Unclear insurance adoption trends

- Need for data-driven strategy and expansion

Objectives

- Decode transaction dynamics over time and geography

- Analyze user behavior by device and location

- Evaluate insurance policy adoption

- Measure transaction growth rates

- Visualize top-performing regions

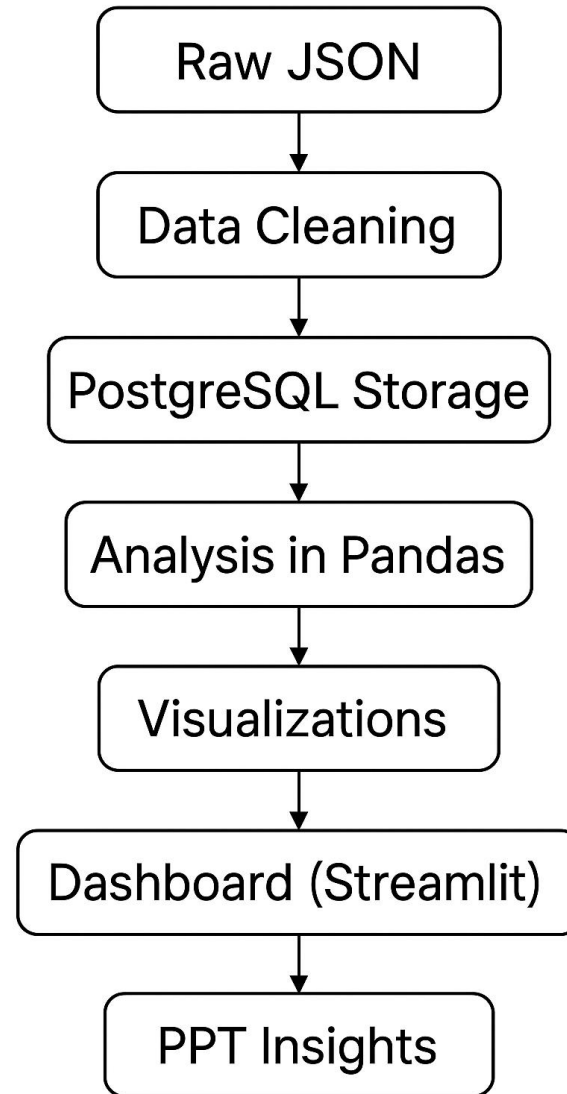# Data Sources

Data obtained from:

- Aggregated transactions

- User engagement metrics

- Device brand usage

- Insurance transactions

- Regional quarterly statistics

Format: JSON → Cleaned → CSV → DataFrame

Tools & Technologies

- Python (Pandas, Matplotlib, Seaborn)

- Streamlit for interactive dashboard

- PostgreSQL for structured data

- Powerpoint for visual storytelling

Workflow Diagram

Raw JSON

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Data Cleaning

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PostgreSQL Storage

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Analysis in Pandas

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Visualizations

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Dashboard (Streamlit)

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PPT Insights

Decoding Transaction Dynamics on PhonePe Insights

- Maharashtra consistently leads in total digital transactions across all four quarters, followed by Uttar Pradesh, Karnataka, and West Bengal.

- There is a clear overall upward trend in total transactions quarter over quarter, indicating increased digital payment adoption.

- High-growth states like Telangana, Andhra Pradesh, and Gujarat show a noticeable rise in their transaction share over time.

- Smaller states and union territories (e.g., Ladakh, Mizoram, Andaman & Nicobar) contribute very little, and their growth is nearly flat — suggesting low digital penetration or population.

- Karnataka, Maharashtra, and Uttar Pradesh consistently show the darkest blue shades, indicating the highest transaction volumes across all quarters.

- Telangana, Tamil Nadu, and Gujarat also exhibit significant growth, especially in the latter quarters.

- A few states like Punjab and Rajasthan show strong mid-level volumes but slightly slower growth rates compared to top performers.

- Smaller and less populated regions like Lakshadweep, Ladakh, and Mizoram show consistently low transaction volumes.

- Most states demonstrate a positive quarter-on-quarter growth in transaction volumes, suggesting an increasing trend in digital payment adoption.

- The total transaction amount increased steadily from Q1 to Q4, reflecting broader growth in digital or financial activity.

- Maharashtra, Karnataka, Uttar Pradesh, and Tamil Nadu appear to contribute significantly to the total transaction amounts, as seen by the larger bands in each bar.

- The composition remains relatively consistent, suggesting no sudden market shifts, but rather organic, state-wise growth.

- States like Tripura, Mizoram, Ladakh, and others make up very thin slices, indicating low total transaction amounts.

Device Dominance and User Engagement Analysis Insights

- Xiaomi leads with the highest number of registered users, followed by Samsung, Vivo, and Oppo, showing their strong market penetration.

- Apple and Realme hold a moderate share, but far below the top Android brands.

- A long tail of brands like COOLPAD, HMD Global, Lava, Infinix, Micromax, etc., have minimal user registrations.

- The dominance of Android-based brands over Apple suggests that services are more popular or accessible via mid-range smartphones.

- Peer-to-peer payments show explosive growth, becoming the dominant category by a large margin after 2020.

- Merchant payments also saw strong growth, especially post-2021, but still trail behind peer-to-peer volumes.

- Recharge & bill payments and Financial Services have grown steadily but modestly.

- 'Others' remains consistently low and flat, indicating it contributes very little to the total volume.

- The widening confidence band for peer-to-peer suggests increasing variability or uncertainty in transaction values over time.

- Xiaomi (25.1%), Samsung (19.4%), and Vivo (18.1%) dominate, collectively accounting for over 60% of all registered users.

- Oppo (12.1%) and Others (8.4%) also hold notable shares.

- Brands like Apple (2.8%), Motorola (2.1%), and OnePlus (1.9%) have relatively smaller but premium niches.

- Many brands (Tecno, Micromax, Infinix, etc.) contribute less than 1%, indicating fragmented usage in the lower tiers.

Insurance Penetration and Growth Potential Analysis

- Karnataka and Maharashtra consistently lead in policy sales across quarters.

- Most states see a dip in Q2, possibly indicating a seasonal slowdown.

- A strong rebound in Q3 and Q4 is visible across many states, indicating renewed demand or strategic pushes later in the year.

- States like Tamil Nadu, Uttar Pradesh, and West Bengal show healthy mid-tier performance.

- Several smaller states/UTs (e.g., Lakshadweep, Mizoram, Arunachal Pradesh) remain consistently low, highlighting under-penetration.

- Total insurance value has steadily grown over time, especially post-2021 Q3, with a significant rise in 2024.

- Tamil Nadu, Karnataka, and Maharashtra are leading contributors to the total insurance value.

- States like Uttar Pradesh, West Bengal, and Telangana also show increasing contributions, becoming more prominent in 2023–2024.

- Some states (e.g., Sikkim, Mizoram, and Lakshadweep) contribute minimally, indicating either low adoption or population.   contd...

- A brief plateau or slowdown appears around late 2022 to early 2023, possibly due to external factors (e.g., market conditions, policy changes).

- Karnataka and Maharashtra consistently lead in the number of insurance policies sold across all quarters.

- Steady quarter-on-quarter growth is visible in most states, with Q4 showing peak sales across the board.

- States like Tamil Nadu, Uttar Pradesh, and West Bengal are emerging strong mid-tier contributors with notable growth.

- States toward the right (low policy count) remain largely flat, suggesting low market penetration or population base.

- Kerala and Telangana show good but slower growth, possibly hinting at market saturation or policy preferences.

Transaction Analysis for Market Expansion Insights

- Odisha, West Bengal, and Jammu & Kashmir show the highest transaction growth percentages, signaling strong digital adoption or improved financial outreach.

- States like Punjab, Chhattisgarh, and Chandigarh, though traditionally more developed in infrastructure, have lower relative growth, indicating possible market saturation or lower recent momentum.

- Andaman & Nicobar Islands stand out with a high growth rate, despite being a smaller region, hinting at successful penetration or recent digital onboarding efforts.

- Variation in error bars suggests inconsistent performance or data volatility in some states (e.g., Ladakh, Lakshadweep), which may need deeper investigation.

- Central and western states (like MP, Gujarat, Maharashtra) show moderate growth, aligning with steady development and adoption trends.

- There is a positive correlation: states with higher previous transactions generally show higher growth, indicating scalable digital behavior.

- Several bubbles (states) deviate from the general trend, showing high growth despite low past transactions (e.g., some smaller states or UTs), which signals rapid digital adoption or policy intervention.

- Conversely, a few large bubbles with high previous transactions but low or even negative growth (visible as points below the x-axis) may highlight market saturation, data anomalies, or external disruptions.

- West Bengal, Telangana, and Odisha show strong and consistent growth, positioning them as stable contributors.

- Maharashtra, Uttar Pradesh, and Tamil Nadu clearly dominate with the highest transaction volumes, maintaining their lead across all quarters.

- The trend across most states is upward, indicating consistent growth quarter-on-quarter, showcasing broad adoption.

- The gap between top-tier and mid-tier states widens over time, suggesting uneven growth acceleration.

- No major drops are visible, implying stability and positive momentum in digital transactions across states.

- A few states like Odisha, Jharkhand, and Tripura are in the lower segment, but their slopes are steadily rising, indicating potential for breakout growth.

- Seasonal or policy-driven spikes aren't strongly visible—growth appears gradual and organic.

- Maharashtra, Madhya Pradesh, Uttar Pradesh, and Rajasthan show the highest app open counts, with Rajasthan leading in app engagement, possibly due to aggressive outreach or digital penetration.

- While most states have more app opens than registered users, the magnitude of difference varies, revealing user engagement or repeat usage trends.

- States like Delhi, Kerala, and Punjab show relatively lower engagement gaps, hinting at either saturation or lower reusability of the app.

- North-Eastern and Union Territories (e.g., Mizoram, Nagaland, Ladakh, etc.) show low absolute numbers, which could result from limited connectivity, population size, or awareness.

- Jharkhand, Odisha, and Telangana show strong engagement, with total app opens far exceeding registration counts, suggesting active repeat usage or community-driven adoption.

User Engagement and Growth Strategy Insights

- Uttarakhand, Arunachal Pradesh, and Himachal Pradesh lead the chart with the highest engagement rates — users in these states are opening the app frequently, suggesting high utility or dependency.

- Jammu & Kashmir, Mizoram, Ladakh, and Sikkim also show strong app usage per user, highlighting intensive engagement despite smaller user bases.

- Surprisingly, large states like Maharashtra, Rajasthan, and Uttar Pradesh, despite high total usage, show lower per-user engagement, possibly indicating passive or one-time users.

- Delhi, Haryana, and Punjab show particularly low engagement rates, pointing to a need for re-engagement strategies or content/policy improvements.

- Uttar Pradesh, Maharashtra, and Madhya Pradesh stand out with very large bubbles, indicating both high user bases and high app engagement.

- Rajasthan and Karnataka also show efficient scaling, with significant app open volumes relative to user base.

- Despite having a relatively lower user base, Tamil Nadu and Bihar maintain moderate app open volumes, indicating either regular usage or effective awareness campaigns.

Dashboard Preview
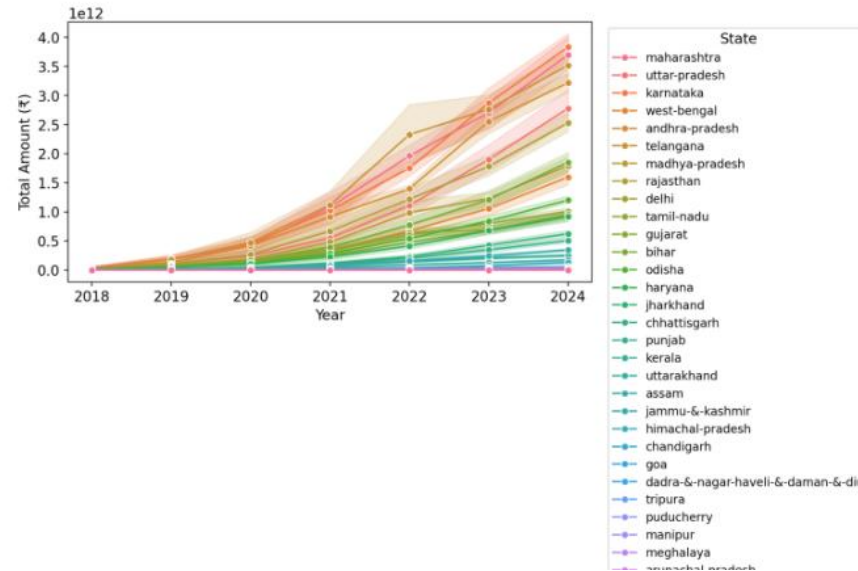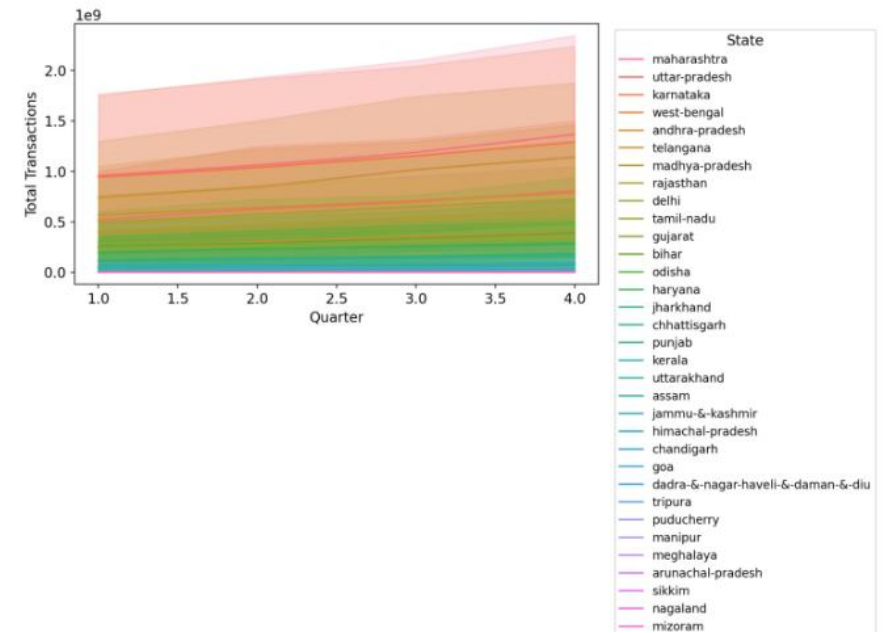
Conclusion

The PhonePe Data Analysis and Dashboard project successfully transforms large-scale, raw digital payments data into actionable business insights. By analyzing transactions, user engagement, insurance penetration, and device usage trends across states and time periods, the project reveals clear regional and temporal patterns in platform activity. The interactive Streamlit dashboard provides an intuitive way for stakeholders to explore trends such as rising insurance adoption, growing transaction volumes, and device brand engagement disparities. This enables data-driven decision-making for targeted marketing, strategic expansion, and performance optimization. Ultimately, the project empowers PhonePe to better understand its user base, identify growth opportunities, and maintain its competitive edge in India's digital payments ecosystem.