GA4 Ecommerce Analysis Using BigQuery (SQL)

– Final Report

1. Executive Summary

This project analyzes ecommerce user behavior using Google Analytics 4 (GA4) event-level data available in BigQuery.
Despite strong website traffic and user engagement, the business experiences low conversion rates and limited revenue growth.

The objective of this analysis was to identify:

- Why users are not converting into customers
- Where users drop off in the purchase funnel
- What drives revenue and what limits growth
- Which actions the business should take to improve performance

Using SQL-based analysis on raw GA4 data, the project uncovers key funnel inefficiencies, revenue drivers, traffic source patterns, and retention gaps, and translates them into actionable business recommendations.

2. Business Context

The ecommerce business receives a high volume of visitors and product views. Users actively browse products and engage with the website, but only a small fraction complete purchases. Marketing investments are ongoing, but leadership lacks clarity on conversion bottlenecks, revenue drivers, and customer retention.

This analysis supports business decisions related to:

- Conversion optimization
- Revenue growth
- Marketing effectiveness
- Product strategy
- Customer retention

3. Dataset & Tools

Dataset

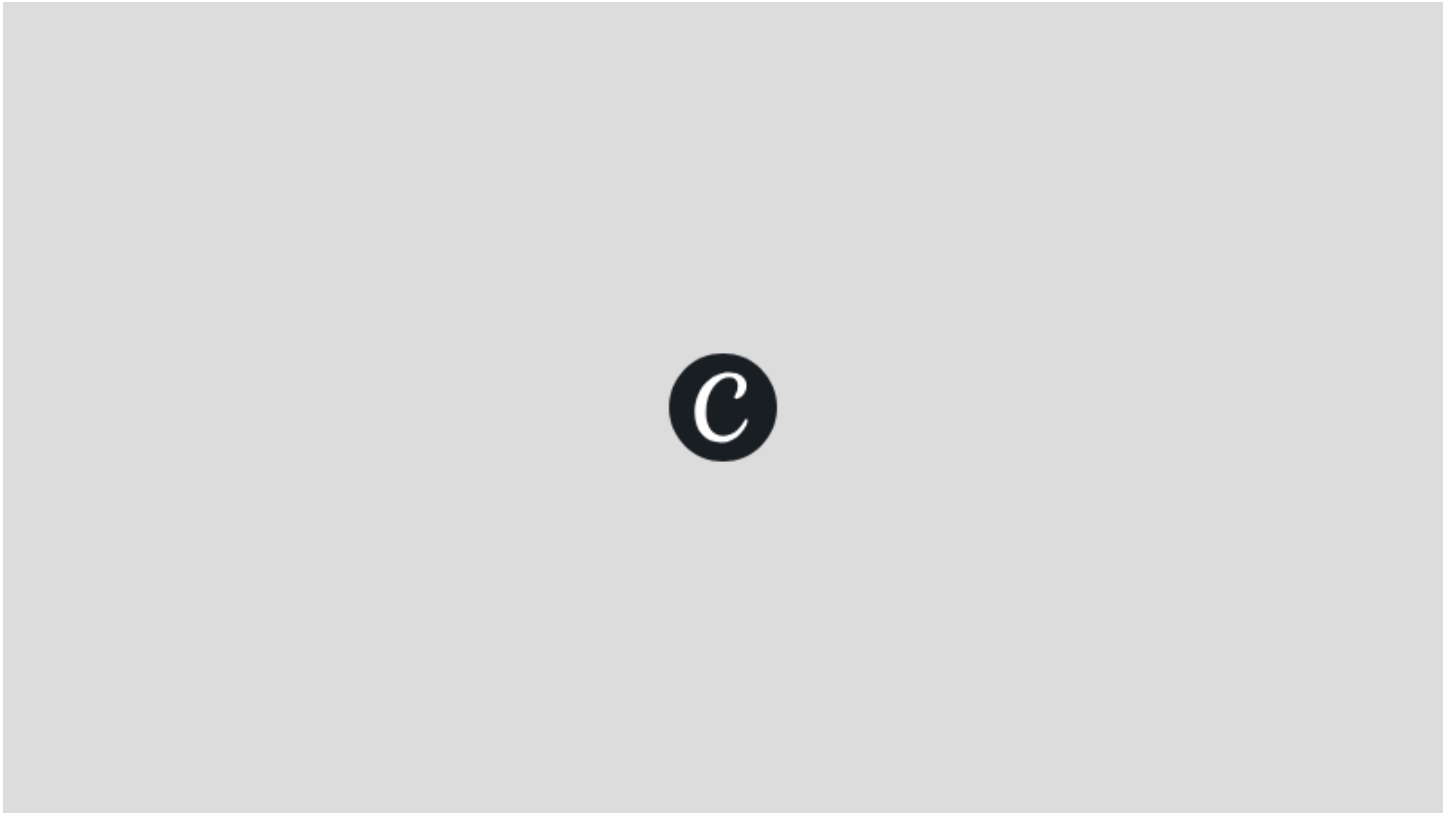
- **Source:** GA4 Demo Ecommerce Dataset (Public BigQuery)
- **Table:** bigquery-public-data.ga4_obfuscated_sample_ecommerce.events_*
- **Data Type:** Event-level ecommerce data
- **Key Events:** page_view, view_item, add_to_cart, purchase
- **Product Data:** Nested items array within purchase events

Tools Used

- Google BigQuery
- SQL
- GA4 data model understanding
- GitHub for documentation

4. Data Validation Summary

Before analysis, data quality and reliability were validated.



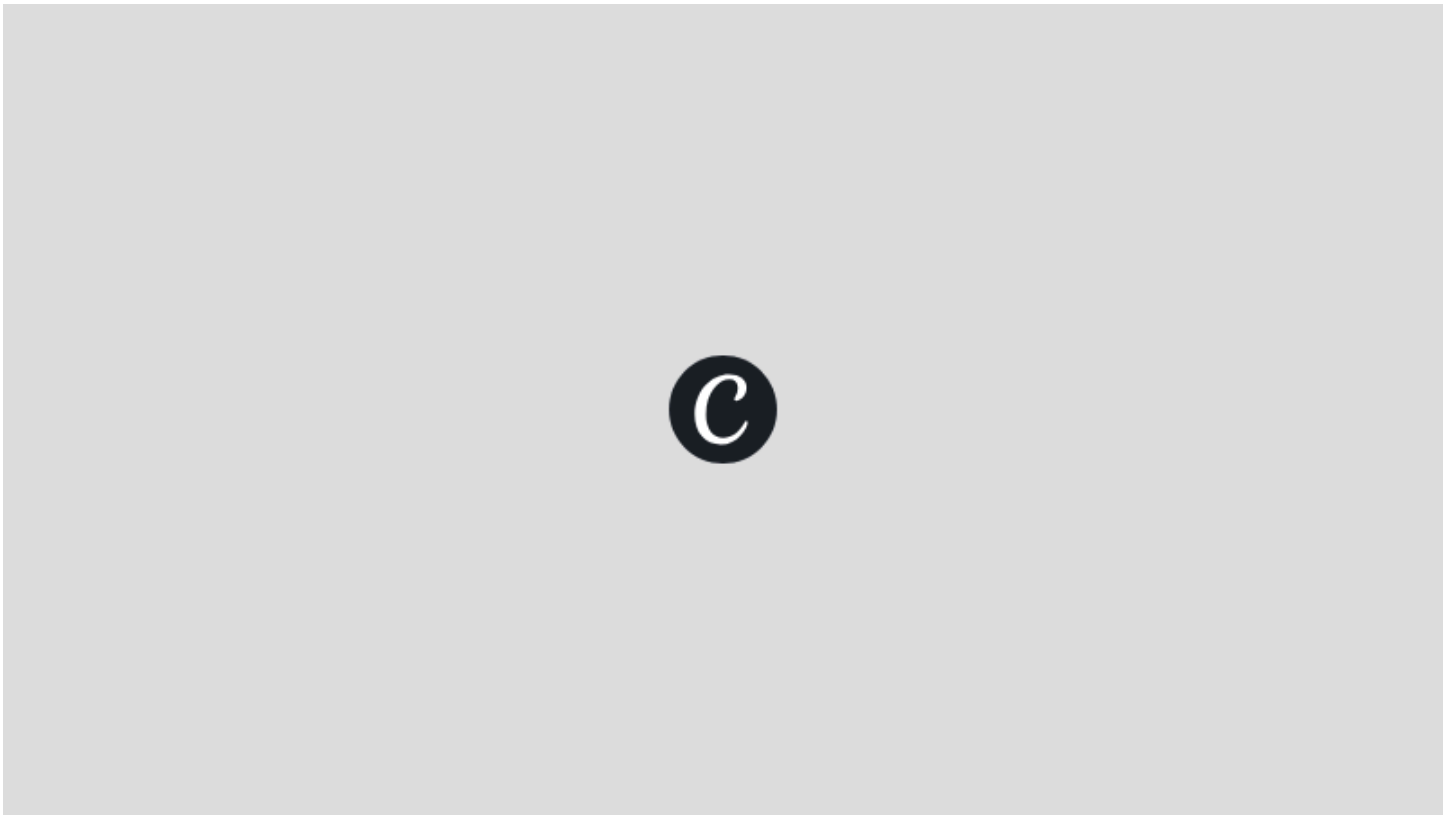
Key Findings:

- Total events: **4.29M**
- Missing user IDs: **0**
- Date coverage: Continuous
- Revenue values: Valid and non-negative
- Product-level tracking: Present and usable

Conclusion:
The dataset is complete and reliable for user-level, funnel, and revenue analysis.

5. Analysis & Key Findings

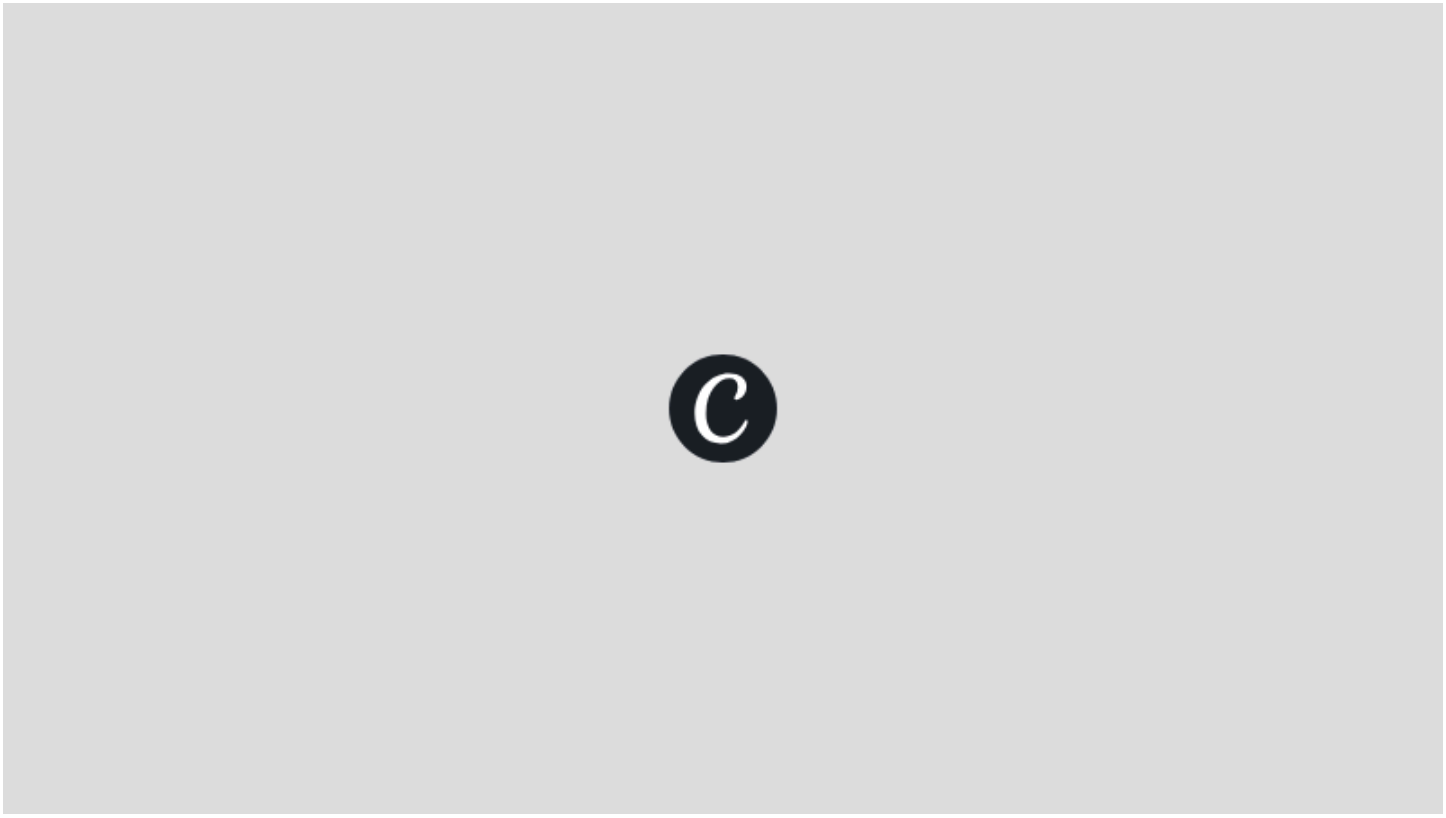
5.1 User Behavior Overview

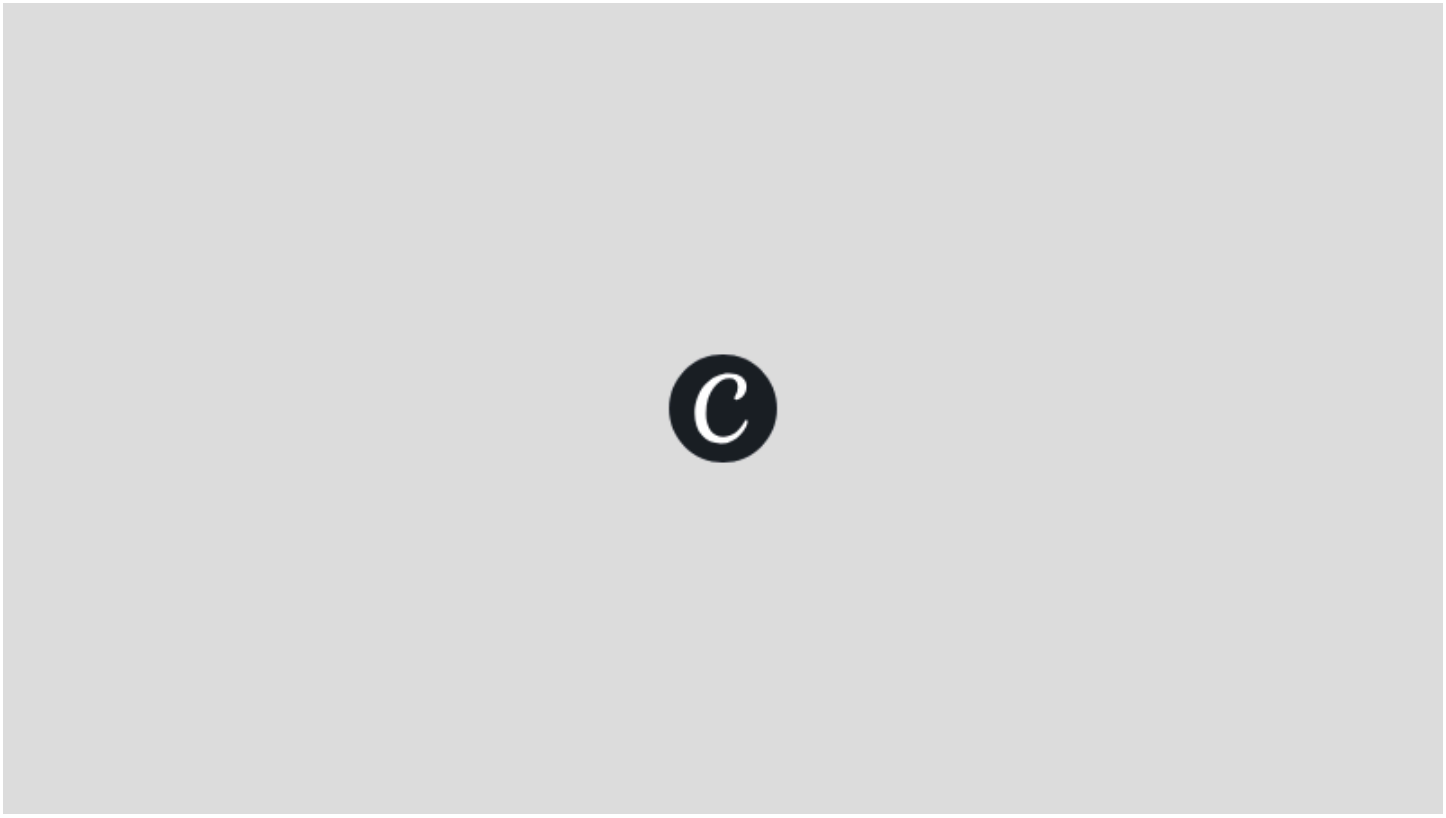


- High volume of page views and engagement events
- Strong product browsing activity (view_item)
- Very low purchase events relative to traffic

Finding:
User interest exists, but engagement does not translate into purchases.

5.2 Funnel Analysis





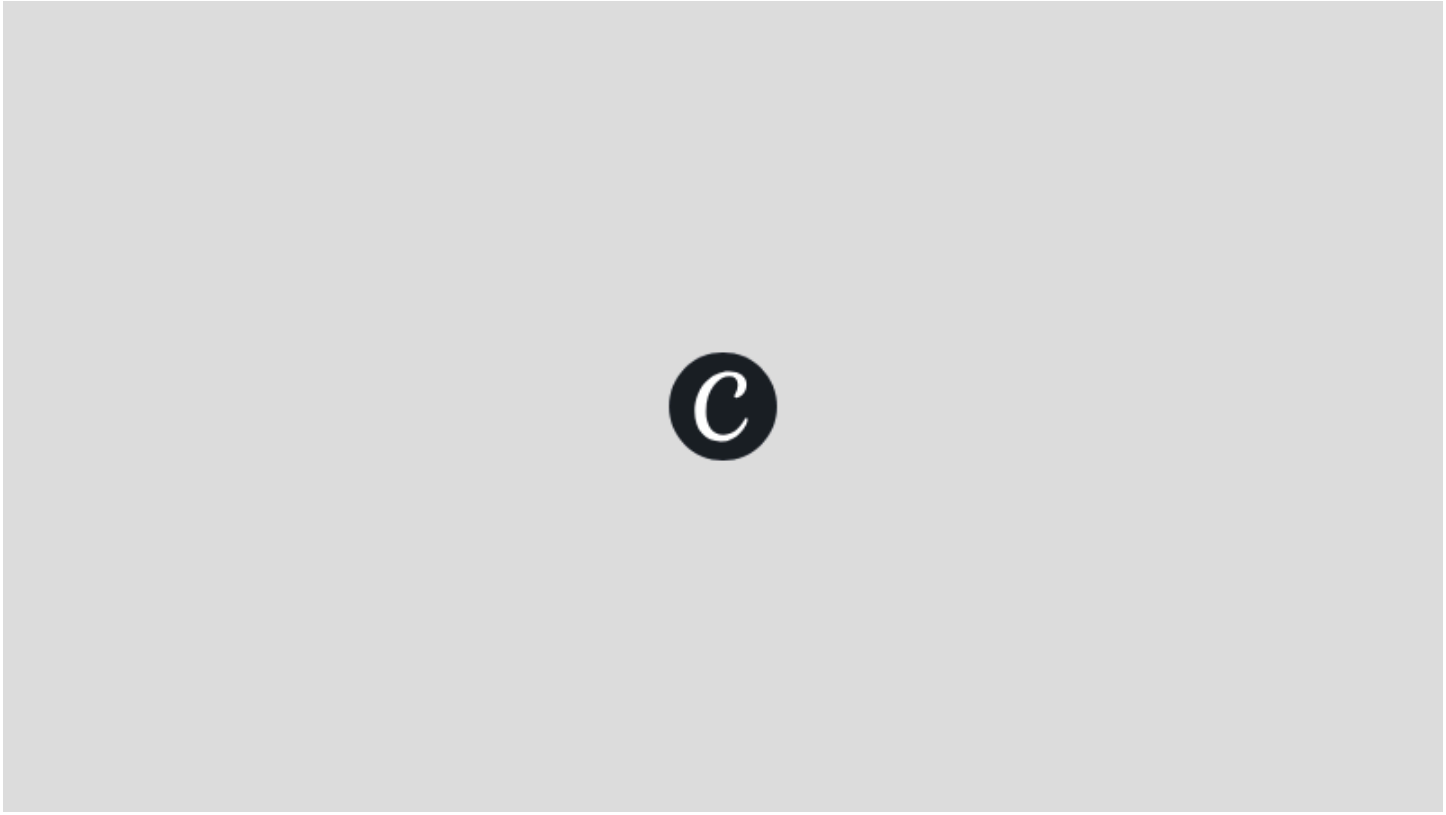
Finding:
The largest drop-off occurs **after add_to_cart**, indicating checkout friction.

5.3 Revenue Performance

- Total revenue: **362,165**
- Purchase events: **5,692**
- Average revenue per purchase: **~69**

Finding:
Revenue is low relative to traffic and engagement levels.

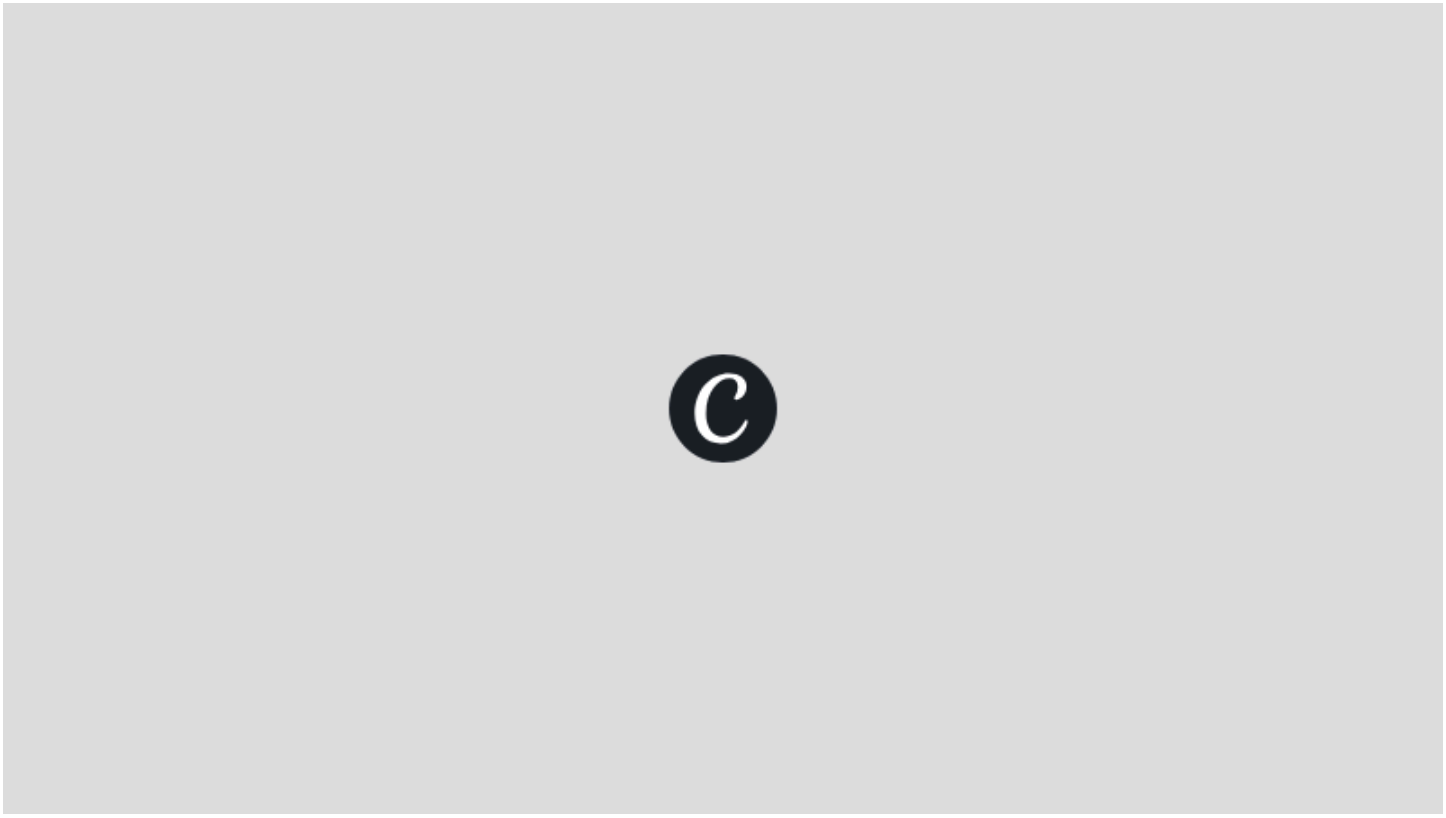
5.4 Product Performance



- A small number of products contribute a large share of revenue
- Top products significantly outperform others

Finding:
Revenue is concentrated among a few high-performing products.

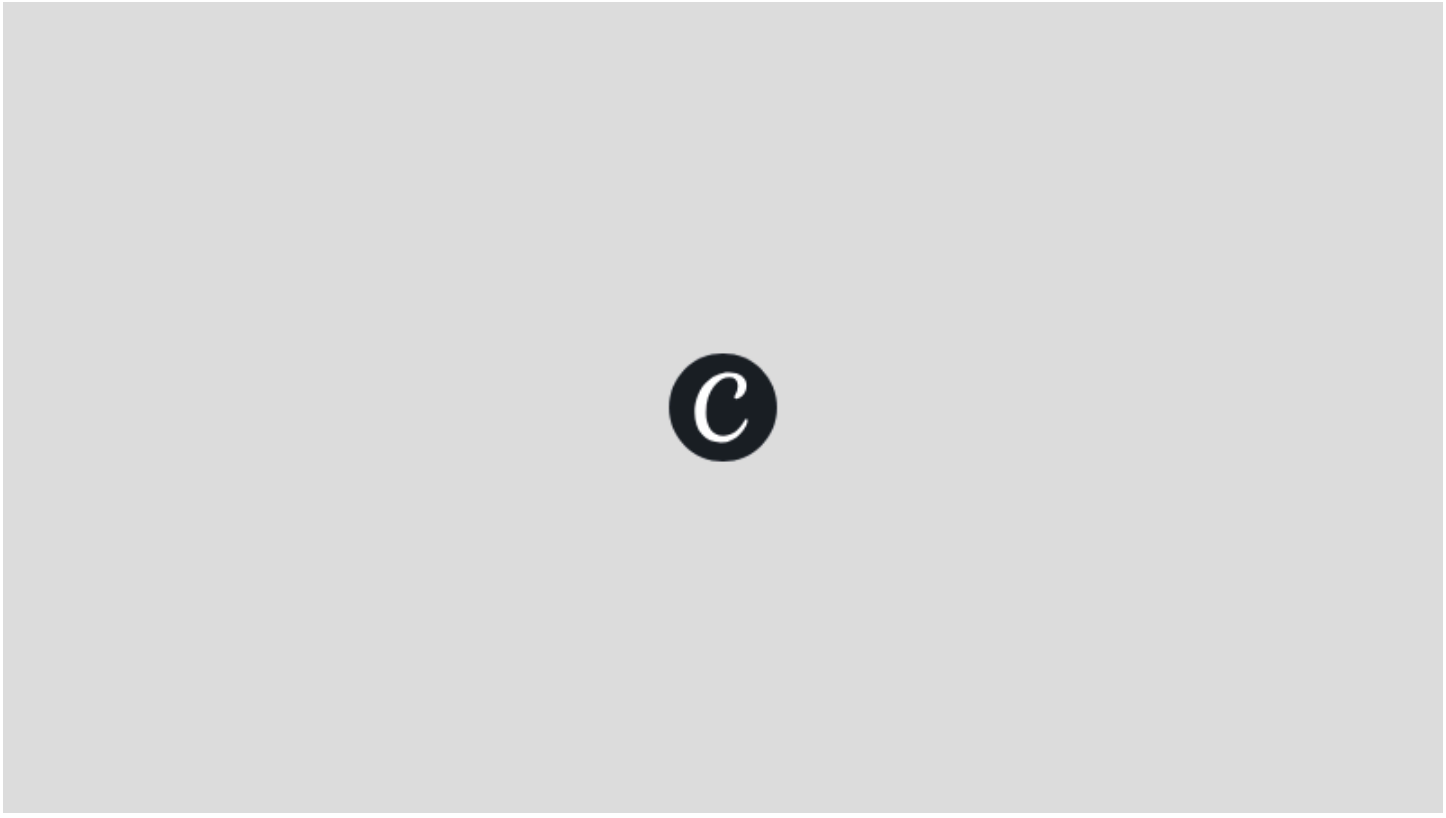
5.5 Traffic Source Analysis



- Organic (Google) and Direct traffic dominate
- Other sources contribute significantly less

Finding:
Traffic volume is strong, but conversion quality needs evaluation per channel.

5.6 Retention Analysis



- Total users: **~270K**
- New users: **~257K**
- Returning users: Very low

Finding:
The business is highly dependent on new users, indicating weak retention.

6. Key Business Problems Identified

1. High traffic but low conversion rate
2. Significant checkout-stage drop-off
3. Revenue growth not proportional to engagement
4. Over-reliance on a small set of products
5. Heavy dependence on new users
6. Limited insight from GA4 UI dashboards alone

7. Business Recommendations

Conversion Optimization

- Simplify checkout process
- Reduce number of checkout steps
- Enable guest checkout
- Improve trust signals (secure payment, return policy)

Revenue Growth

- Introduce upselling and cross-selling
- Bundle high-performing products
- Focus on conversion optimization rather than only traffic growth

Product Strategy

- Promote top revenue-generating products
- Feature high-performing products on homepage and campaigns
- Review underperforming products

Marketing Optimization

- Strengthen SEO and organic traffic strategies
- Evaluate conversion quality by traffic source
- Reallocate spend toward high-performing channels

Retention Strategy

- Implement email remarketing

- Introduce loyalty programs
- Personalize offers for repeat users

8. Business Impact

If recommendations are implemented, the business can expect:

- Improved conversion rates
- Higher revenue per user
- Better marketing ROI
- Stronger customer retention
- Data-driven decision-making instead of dashboard-based assumptions

9. Conclusion

This project demonstrates a complete Data Analyst workflow using GA4 event-level data and BigQuery SQL.
By validating data, analyzing user behavior, identifying funnel bottlenecks, and translating insights into business actions, the project moves beyond reporting to true decision support.

The analysis explains **why strong traffic does not convert into revenue** and provides a clear roadmap for improving ecommerce performance.