

DATA ANALYTICS PROJECT

WEBSITE ANALYTICS

&

CONVERSION RATE OPTIMIZATION

(Ecommerce case study using SQL, Python, Power BI and Excel)

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SUBMITTED TO - Skillytixs

DATE - 02 Oct 2025







PROBLEM STATEMENT

ClickWave, a mid-sized e-commerce company, is experiencing high website traffic but low conversions. Despite attracting visitors, the conversion funnel is underperforming due to:

-  **High bounce rates on product pages**
-  **Poor user experience during checkout**
-  **Traffic sources misaligned with user intent**

The company needs to analyse user traffic behavior (pageviews, sessions, bounce rates, user flow, and device types) to:

-  **Explore and clean the website traffic dataset**
-  **Identify user behaviour patterns and bounce points**
-  **Visualize conversion funnels using Power BI**
-  **Segment users by device, source, or region**



PROJECT OVERVIEW

DESCRIPTION :

This project analyzes e-commerce website data to understand user behavior, traffic sources, and purchase patterns. Using SQL, Power BI, Excel, and Python, we aim to provide insights that improve conversion rates and business decision-making.

OBJECTIVES :

- **Clearly list the main goals of the project:**
- **Analyze user sessions, traffic sources, and devices.**
- **Identify top landing pages and bounce rates.**
- **Understand customer purchasing behavior.**
- **Build dashboards (Power BI & Excel) for visualization.**
- **Apply Python for deeper data analysis.**
- **Generate actionable insights for business growth.**



TOOLS & DATA USED



TOOLS USED :



Excel → (To Perform Data Cleaning & Data Validation)



Python → (To Analyse Bounce Rate, Funnel Count and Conversion Rate)



SQL → (To Analyse user segmentation and bounce patterns)



Power BI → (To Design An Interactive Dashboard)



DATASETS USED :



Users Table : To Store information about website visitors.

Key Columns:

- **user_id** → Unique identifier for each user
- **country** → User's location



Sessions Table : To Tracks user visits (*sessions*) to the website.

Key Columns:

- **session_id** → Unique identifier for each session
- **user_id** → Links to Users table
- **device** → Device used (*mobile, desktop, tablet*)
- **date** → Date of the session



Events Table : To Stores user actions during sessions.

Key Columns:

- **event_id** → Unique identifier for each event
- **session_id** → Links to Sessions table
- **type** → Type of action (e.g., *add_to_cart, purchase*)
- **item_id** → Product involved
- **date** → Date of the event



Items Table : It Contains product catalog details.

Key Columns:

- **item_id** → Unique identifier for each item
- **item_name** → Product name
- **category** → Product category



EXECUTION & VISUALS



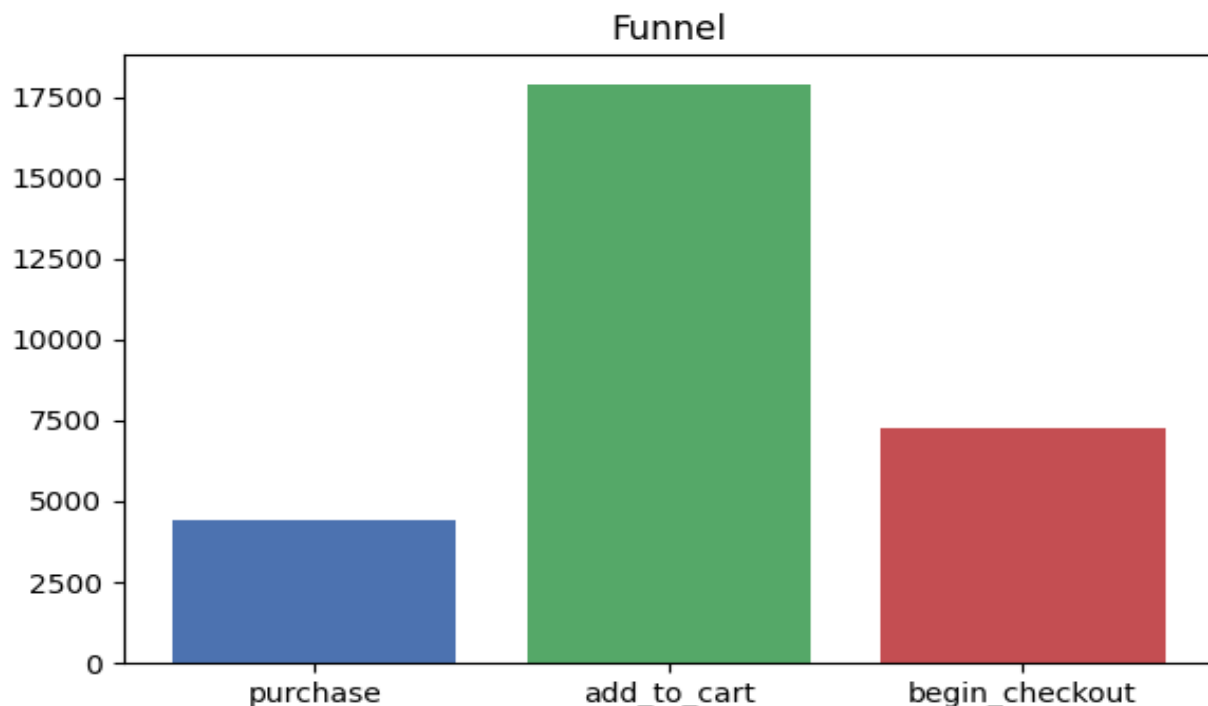
DATA PREPARATION - EDA (EXCEL) :

- ✓ Used Power Query for cleaning, validation, and type checks
- ✓ Built pivot tables and cross-verified SQL vs Power BI outputs for accuracy
- ✓ Ensured data consistency across tools

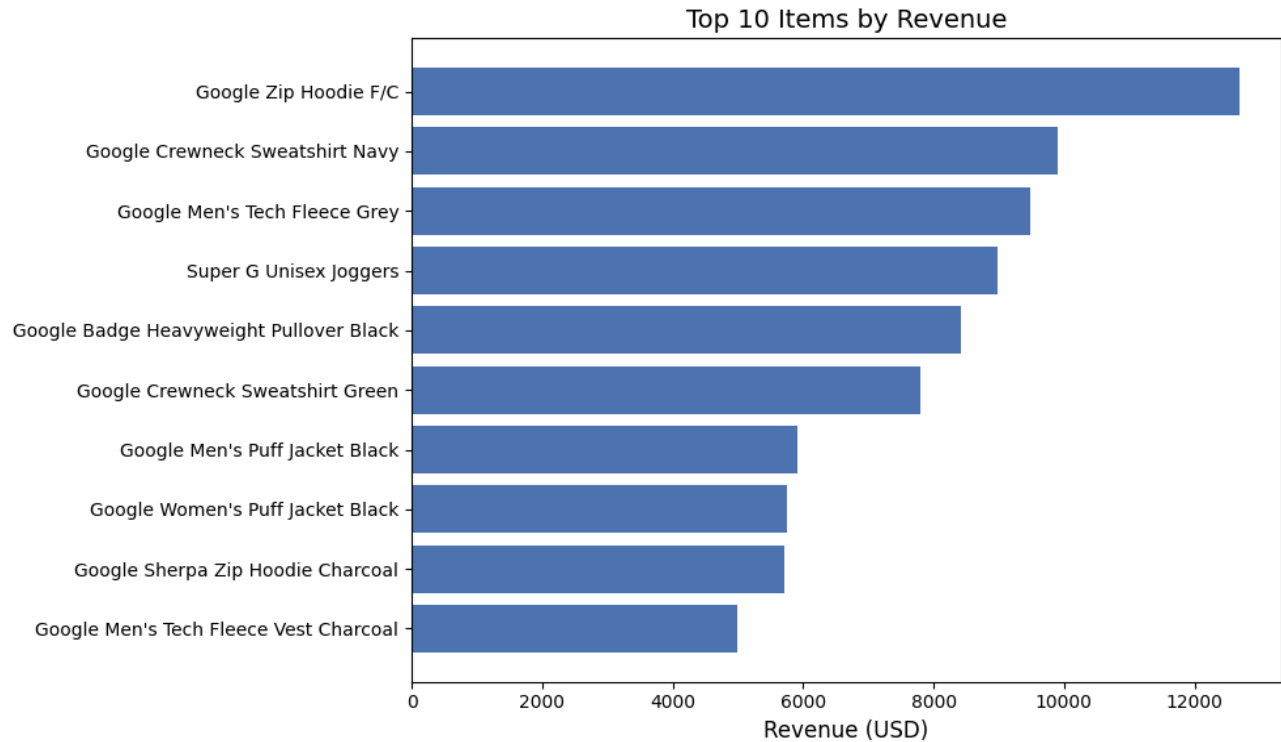


FUNNEL ANALYTICS (PYTHON) :

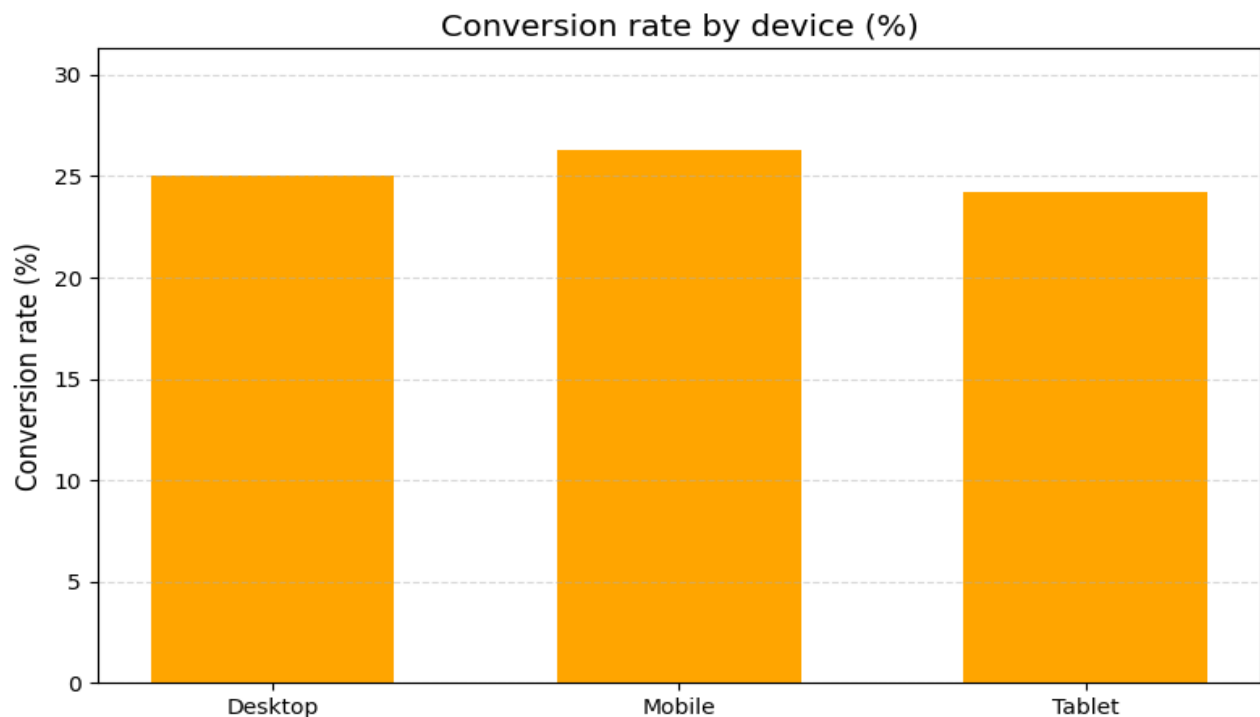
- ✓ Analysed session-level event data in Python to measure user behavior, segment by device and traffic source, and model funnel stages—revealing bounce rate, session revenue, and key drop-offs in conversion performance
- ✓ Visualizations :
 - Funnel Chart (Vertical Bar Chart) : Displayed drop-offs at each stage of the purchase journey



- **Top 10 Items by Revenue (Horizontal Bar Chart) : Ranked products by total revenue contribution**







- **Conversion Rate by Device (Vertical Bar Chart) : Compared conversion performance across desktop, mobile, and tablet segments**

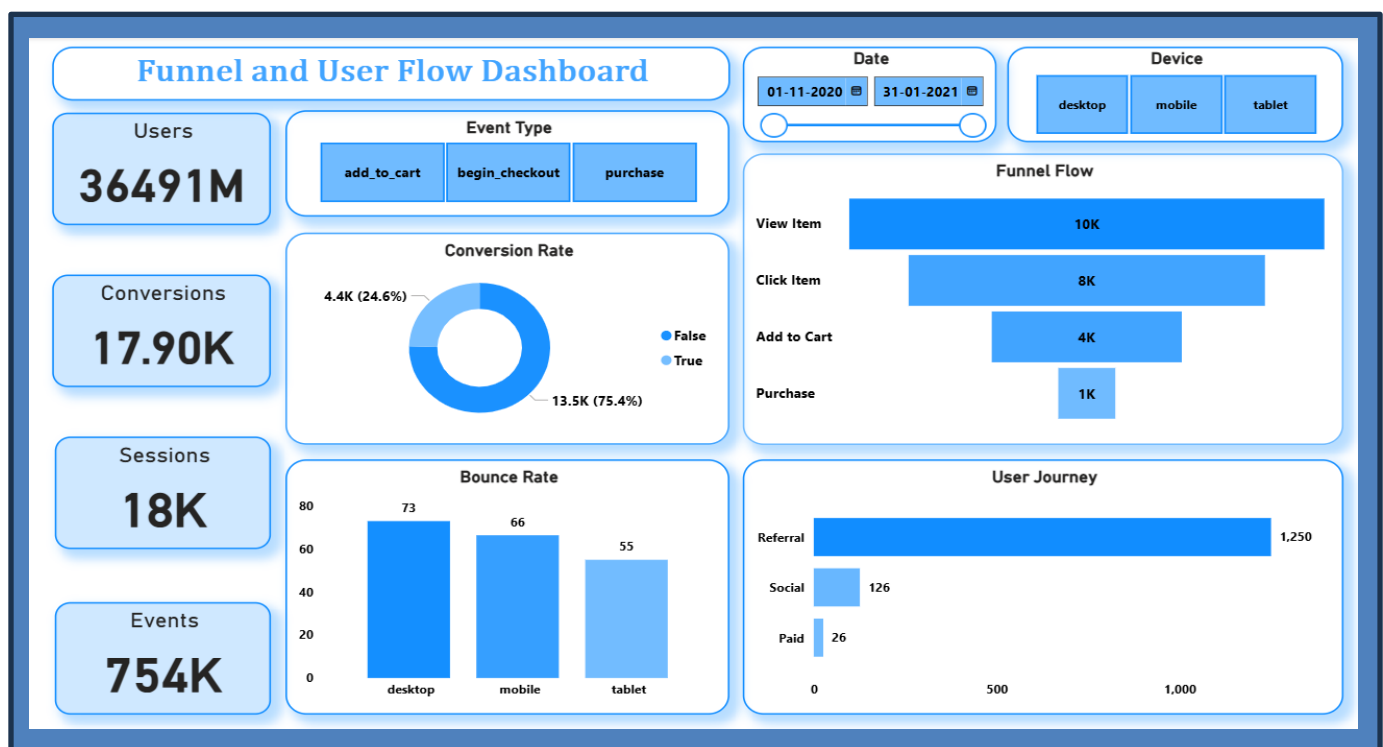


USER SEGMENTATION ANALYSIS (SQL) :

- ✓ Analysed user segmentation, funnel drop-offs, and bounce patterns to uncover mobile conversion gaps.
- ✓ Identified loyal desktop users driving session revenue and high-LTV behaviors through funnel and session-level metrics.

DASHBOARD DESIGN (Power BI) :

- ✓ Built a dynamic dashboard titled “Funnel & User Flow Dashboard” to track key performance metrics:
 -  **Users: 36491M**
 -  **Sessions: 18K**
 -  **Events: 754K**
 -  **Conversions: 17.9K**
- ✓ Visualized conversion rate, bounce rate, funnel flow, and user journey using donut, Horizontal bar, funnel, and vertical bar charts.



CHALLENGES & RESOLUTIONS

CHALLENGES :

❖ **High Bounce Rates on Product Pages**

- **Cause:** Poor page load speed, weak product descriptions, lack of trust signals, or irrelevant traffic.
- **Impact:** Users leave without engaging, hurting conversion potential.

❖ **Unsegmented User Behavior**

- **Cause:** Lack of device, region, or source-based segmentation.
- **Impact:** Missed insights into how different user groups behave and convert.

❖ **Limited Funnel Visibility**

- **Cause:** Incomplete tracking setup or lack of funnel visualization.
- **Impact:** Hard to pinpoint where users drop off or what drives conversion.

RESOLUTIONS :

❖ **Bounce Rate Reduction**

- **Improve product page UX:** faster load times, better visuals, clear CTAs.
- **Add trust signals:** reviews, ratings, return policies.

❖ **User Segmentation**

- **Segment by device type, region, and traffic source in Power BI.**
- **Compare bounce rates, session durations, and conversion rates across segments.**

❖ **Checkout Optimization**

- **Simplify forms and reduce steps.**
- **Enable guest checkout and autofill.**
- **Ensure mobile responsiveness and transparent pricing.**

LEARNINGS & CONCLUSION




LEARNINGS :

- **Product pages had high bounce rates due to weak content and mismatched user expectations.**
- **Power BI enables dynamic segmentation, allowing real-time filtering by device, region, and source to uncover actionable insights.**
- **Traffic sources lacked intent, leading to high visits but low conversions.**

CONCLUSION :

ClickWave's conversion challenges stem from misaligned traffic, unoptimized product pages, and checkout friction, especially for mobile users. By cleaning and analysing traffic data, segmenting users, and visualizing the funnel in

Power BI, we identified:

-  **Where users drop off and why**
-  **Which segments convert better**
-  **Where Bounce Rate is High or Low and Why**

Next Steps:

- **Revamp product pages with clearer messaging and trust signals**
- **Simplify and optimize the checkout flow, especially for mobile**
- **Refine traffic acquisition to target high-intent users**
- **Continue monitoring segmented funnel performance to guide iterative improvements**