

Patterns Behind Purchases: End-to-End Analysis For Global E-Commerce

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INTRODUCTION

This project analyzes global e-commerce sales data to uncover patterns in customer purchasing behavior, revenue performance, and market trends. Using SQL, Python, and Tableau, the analysis explores how sales vary across product categories, countries, and time, with a focus on identifying driven key revenue and seasonal demand. The insights are designed to support data-driven decisions in pricing, inventory planning, and market strategy.

BUSINESS PROBLEM

The business faces lack of visibility into which markets, products, and time periods drive revenue, therefore, make it difficult to optimizing pricing, inventory, and market strategy. Differences in purchasing behavior across large-population markets such as Unites States, China, and India further complicate decision-making, while revenue concentration increases risk without insights.

DATA OVERVIEW

	Order_ID	Country	Category	Unit_Price	Quantity	Order_Date	Total_Amount
0	1	Germany	Electronics	285.82	7	6/12/2025	2000.74
1	2	Pakistan	Toys	132.00	9	1/14/2025	1188.00
2	3	Australia	Fashion	481.65	9	8/27/2025	4334.85
3	4	UAE	Grocery	244.36	3	3/13/2025	733.08
4	5	Germany	Sports	403.97	5	5/23/2025	2019.85
...
1195	1196	China	Sports	274.52	6	6/3/2025	1647.12
1196	1197	Canada	Sports	481.57	1	2/4/2025	481.57
1197	1198	UK	Sports	42.42	6	3/20/2025	254.52
1198	1199	USA	Books	186.01	1	3/8/2025	186.01
1199	1200	UAE	Electronics	116.56	6	2/3/2025	699.36

- Table: sales_data
- This dataset has 1200 rows and 7 columns.
- Key Columns Used:
 - Order_ID, Country, Category, Unit_price, Quantity, Order_Date, Total_Amount.

METHODOLOGY

- Used SQL and Python to clean, aggregate, and analyze sales data, calculating core performance metrics (orders, revenue, average order value) and evaluating product, country, and unit-economic performance.
- Conduct time-series and seasonal analysis to identify monthly revenue trends and compare product demand across peak and off-peak periods.
- Visualized key insights in Tableau through interactive dashboards to support ,market comparison, trend analysis, and execute decision-making.

OVERALL SALES PERFORMANCE

- From January 1 to November 1, 2025, the company generated **\$1,512,252.98 in total revenue**, with an **average order value of \$1,260.21**, indicating a high-value purchasing pattern.

MARKET ANALYSIS (COUNTRY-LEVEL)

Total Revenue by Country

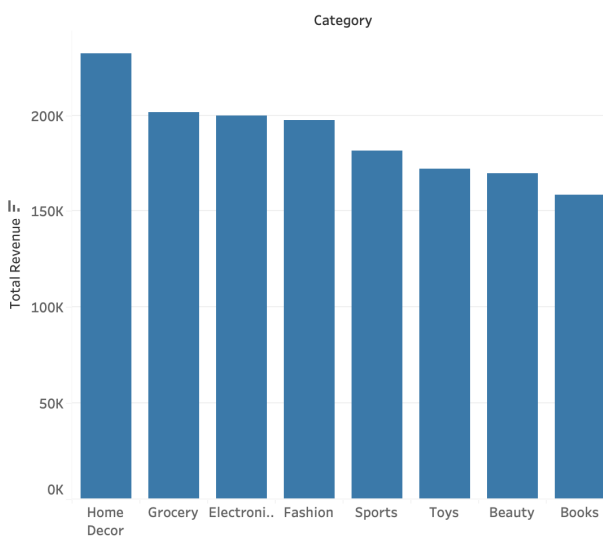
Country	Average Order Value	Total Order	Total Revenue	% of Revenue
USA	\$1.44K	143	\$206.12K	13.63%
UAE	\$1.46K	127	\$185.63K	12.28%
Germany	\$1.41K	118	\$165.84K	10.97%
Brazil	\$1.32K	123	\$162.25K	10.73%
India	\$1.17K	130	\$152.19K	10.06%
Australia	\$1.26K	120	\$151.04K	9.99%
China	\$1.24K	108	\$134.43K	8.89%
Pakistan	\$1.18K	111	\$131.48K	8.69%
Canada	\$0.97K	116	\$112.64K	7.45%
UK	\$1.06K	104	\$110.64K	7.32%

- The revenue distribution shows that sales are well diversified across countries, with no single market dominating. The top 5 countries hold for ~58% of total revenue, indicating a healthy spread of demand rather than over-reliance on one region.
- USA generates the highest revenue (\$206.12K, 13.63%), driven by a strong average order value (\$1.44K) and solid order volume.
- India has one of the highest order counts (130) but a lower average order value (\$1.17K), suggesting high demand but more price-sensitive purchasing.

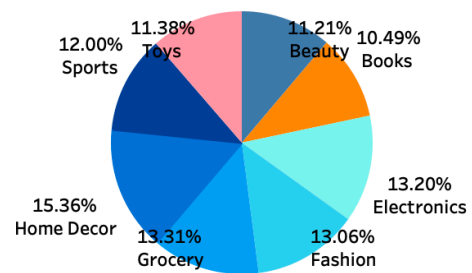
PRODUCT & CATEGORY ANALYSIS

Top-performing products and category-level demand patterns.

Revenue by Category



Product Category Revenue Share

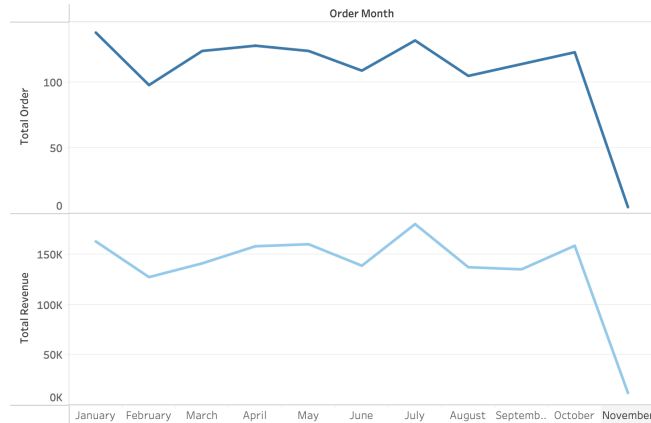


- Revenue is fairly balanced across categories, but there is a few segments clearly act as primary drivers. The spread suggests the business is not dependent on any product line, which lowers risk and support in growing.
- Home decor is the strongest category, leading revenue by a noticeable margin, which indicating strong customer demand and representing core revenue pillar.

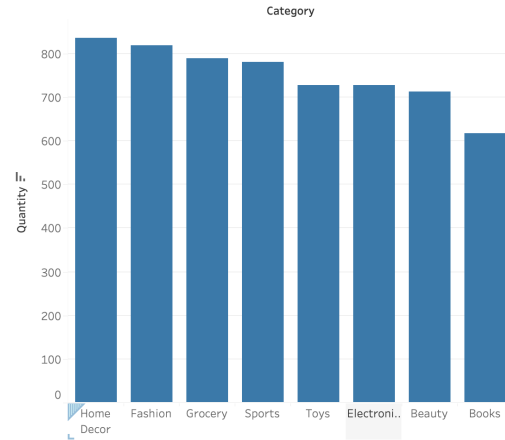
SEASONALITY & TREND ANALYSIS

Top performance of products and category level demand patterns

Monthly Revenue Trend



Top Products by Month



- Home Decor and Fashion are the highest-selling categories by quantity, showing strong and consistent customer demand. These categories bring traffic and repeat purchases.
- Revenue fluctuates moderately month-to-month, indicating stable demand with natural seasonal variation
- There are opportunities to boost traditionally slower months through targeted marketings.
- High volume categories are showing a consistent revenue stream across the year, while mid-year demand shoots for amplify earnings, which is indicating strong customer engagement rather than one-time purchase.

UNIT ECONOMICS ANALYSIS

Pricing versus volume dynamics across product categories

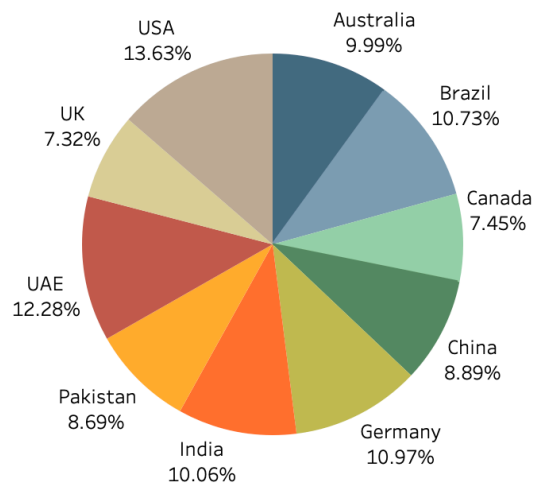
Unit Economics

Category	Average Unit Pri..	Total Units	Total Revenue
Home Decor	275	836	232,276
Grocery	260	789	201,355
Electronics	268	727	199,642
Fashion	241	818	197,469
Sports	240	780	181,434
Toys	239	728	172,038
Beauty	239	713	169,459
Books	249	617	158,579

- The data shows that top-earning categories are not just expensive but they combine strong pricing with high sales volume.
- Therefore the opportunities lies in optimizing underperforming categories through pricing strategy, positioning, or targeted promotion aiming for better align with customer demand.

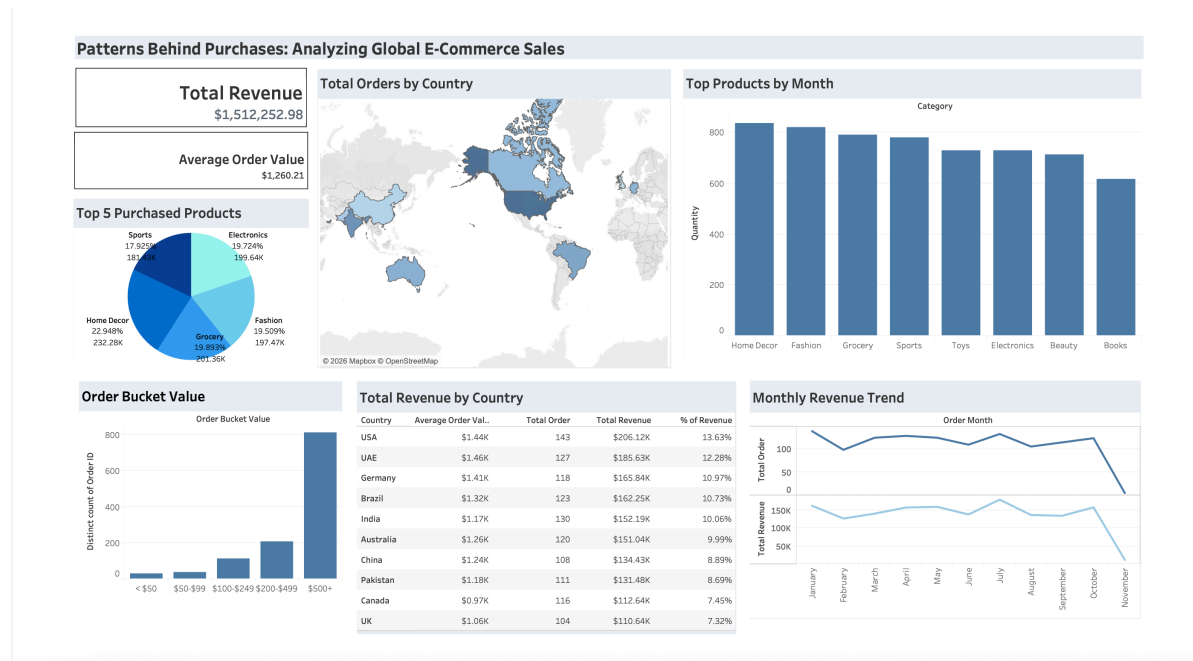
REVENUE CONCENTRATION & RISK

Dependency on key markets and high-value orders



- USA and UAE markets represent the core global revenue engine and should be priority region for retention and growth strategies. Business performance is sensitive to these markets (currency, regulations, competition, logistics).
- This balanced pie chart reduced geographic risk while showing extensive opportunities in mid-tier regions such as China and Pakistan through selected expansion and game plan.

RESULTS & KEY INSIGHTS



The business generated \$1.51M in revenue with a high average order value (\$1,260), driven mainly by a small set of countries, including USA, UAE, Germany, Brazil, and India. Demand is strongest in categories such as Home Decor and Fashion, which is indicating revenue is primarily dominated by large purchases. Revenue is directed by diversified markets, balanced pricing, and maintained relatively stable throughout the year with mid-year peaks during July, followed by a noticeable decline towards the final month.

BUSINESS RECOMMENDATIONS

Should focus on high-performing countries with localized product and marketing strategies, and strengthen premium bundles and loyalty programs to maintain on high-value orders. Align inventory and promotion with mid-year demand peaks, and further deep dive into the late-year revenue drop to improve forecasting and planning.

CONCLUSION

The analysis indicates that the business operates on a well-diversified revenue foundation, with balanced geographic contributions, strong category performance, and stable demand patterns. High-performing lifestyle categories act as primary revenue contributors, while mid-tier ones provide consistent volume that supports predictable cash flow. Monthly trends show moderate seasonality, suggesting steady customer engagement rather than irregular volatility.

Instead of being indicative of systemic deficiencies, lower-performing segments seem to be optimization opportunities, suggesting room for focused modifications in positioning, pricing, or market tactics. All things considered, the data points to the company's position for long-term growth, supported by a variety of revenue streams and measurable approaches to boost sales and margin effectiveness.