

# E-commerce Data Analysis Report

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## Summary

This project presents a comprehensive Power BI dashboard analyzing an e-commerce dataset, providing insights into sales trends, customer behavior, product performance, and RFM segmentation. The dashboard is designed for business stakeholders to monitor performance and make data-driven decisions. The dashboard includes interactive slicers (Year, Month, Country, City, Category) to update core insights dynamically.

## 1. Data Preparation

Cleaned and transformed raw E-commerce data using Microsoft Excel to ensure data quality and enable accurate analysis. Used Power BI for data visualization and interactive dashboard, and DAX for Custom measures, KPIs, and dynamic filtering logic.

### ETL Process Highlights:

- Exploratory Analysis:** Generated summary statistics, identified missing values, and removed duplicated rows, and examined column uniqueness.
- Outliers Handling:** Replaced every outlier in the **ProductUnitPrice** column in a certain product category with the average unit price of that product category.
- Data Correction:** Changed the values in the **CategoryName** column to the correct ones.
- Feature Engineering:** Created the **F\_Score**, **R\_score**, **M\_Score**, **RFM\_Score**, and **Customer tier** for deeper analysis.

## 2. Key Metrics Overview

Metric	Value	Insight
Revenue	\$1.27M	Total sales revenue over three years
Gross Profit	\$1.20M	Indicates strong profitability, with minimal cost impact
Total Orders	830	Total number of orders processed in the system
Sold Items	51K	Total units sold
Average Items per Order	62	Indicates multi-item purchasing behavior
Average Order Value (AOV)	\$1.53K	High average order size, indicating large transaction volumes
Average Monthly Revenue	\$105.48K	Better performance tracking over time
Avg Monthly Rev Growth 1996–1997	48.28%	Indicates strong business expansion during 1996–1997
Avg Monthly Rev Growth 1997–1998	71.37%	Even stronger growth into 1998 suggesting continued scaling

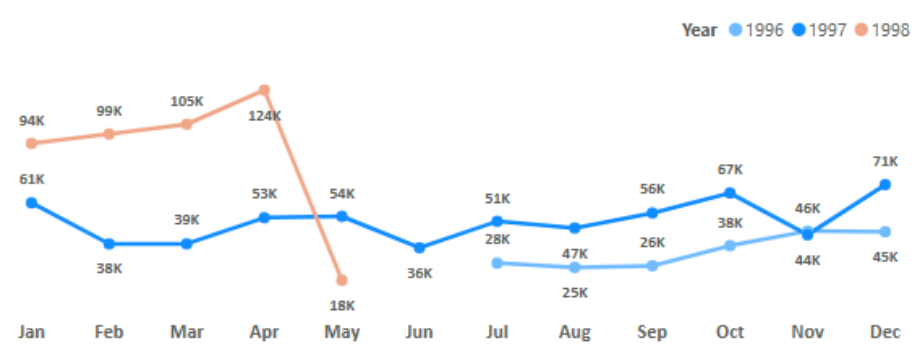
Total Leads	91	No. of customer contacts or potential buyers entered system
Paid Customers	89	High conversion from leads to purchases
Conversion Rate	97.80%	Exceptional efficiency in converting interest into purchases
Repeat Purchase Rate	98.88%	Strong repeat buying behavior, signal of satisfaction
Customer Lifetime Value (CLTV)	\$14.22K	Each customer contributes significantly over their lifetime
Shipping Cost % of Revenue	5.13%	Low shipping cost, positive contribution to margin

### 3. Dashboard Highlights

#### A. Sales Analysis

- Monthly Revenue by Year
  - 1996 started low but ending strongly, with December revenue at **\$45K**.
  - 1997 shows steady growth month-over-month, finishing at a peak of **\$71K** in December.
  - 1998 begins strong, peaking in **April (\$124K)**, but drops sharply in **May (\$18K)**, this could be due to seasonal trends, data limits, or market changes.

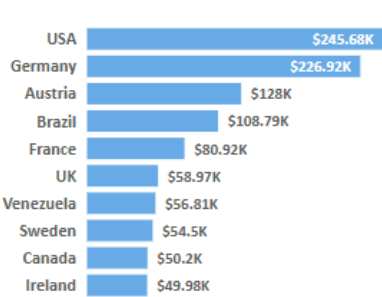
Monthly Revenue by Year



**Insight:** The peak in April 1998 and sudden drop thereafter highlights a possible external disruption or seasonality effect.

- Top Countries by Revenue
  - USA leads with **\$245.68K**, followed closely by **Germany** at **\$226.92K**.
  - Other top contributors include **Austria, Brazil, and France**, showing strong international diversity in the customer base.

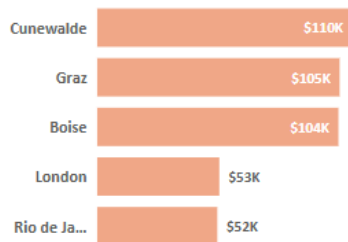
Top 10 Countries by Revenue



- **Top Cities by Revenue**

- **Cunewalde** tops with **\$110K**, followed closely by **Graz** and **Boise**, each around **\$105K–\$104K**.
- These cities show significant purchasing power despite not being global metropolises, which may indicate B2B purchases or regional campaigns

**Top 5 Cities by Revenue**



- **Daily Sales Patterns**

- **Tuesday** is the highest-performing day of most weeks.
- Sales on **Mondays** and **Fridays** are more volatile.
- **Weeks 8 and 16** are particularly strong with over **\$50K** each, hinting at possible seasonal campaigns or product launches.

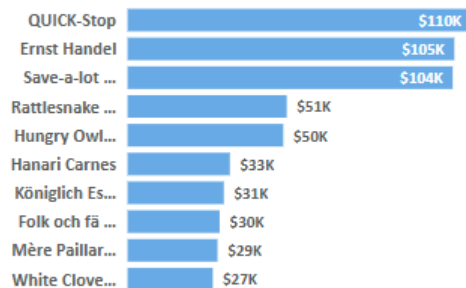
Week Number	Mon	Tue	Wed	Thu	Fri	Total
1			\$6.93K	\$4.45K	\$4.99K	\$16.37K
2	\$2.83K	\$22.42K	\$4.07K	\$1.24K	\$5.88K	\$36.44K
3	\$1.91K	\$7.02K	\$3.26K	\$15.09K	\$7.58K	\$34.87K
4	\$5.07K	\$8.46K	\$4.76K	\$16.26K	\$2.89K	\$37.44K
5	\$6.58K	\$6.01K	\$4.15K	\$9.04K	\$4.59K	\$30.36K
6	\$18.28K	\$1.83K	\$6.10K	\$4.49K	\$2.43K	\$33.13K
7	\$9.55K	\$5.44K	\$2.59K	\$2.80K	\$4.36K	\$24.74K
8	\$13.29K	\$4.30K	\$18.91K	\$13.60K	\$0.93K	\$51.02K
9	\$4.48K	\$5.34K	\$4.43K	\$11.27K	\$3.48K	\$29.00K
10	\$3.09K	\$6.14K	\$5.34K	\$2.56K	\$6.48K	\$23.62K
11	\$2.53K	\$7.16K	\$6.68K	\$4.16K	\$8.51K	\$29.04K
12	\$6.22K	\$2.88K	\$13.17K	\$7.26K	\$4.15K	\$33.67K
13	\$3.48K	\$4.08K	\$4.23K	\$9.86K	\$18.23K	\$39.89K
14	\$9.48K	\$8.55K	\$13.07K	\$2.97K	\$5.34K	\$39.41K
15	\$6.38K	\$2.62K	\$8.60K	\$5.58K	\$4.79K	\$27.99K
16	\$8.55K	\$11.01K	\$3.51K	\$4.46K	\$34.40K	\$61.92K
17	\$4.51K	\$14.45K	\$12.51K	\$6.12K	\$5.77K	\$43.36K
18	\$7.55K	\$6.20K	\$5.06K	\$8.16K	\$6.27K	\$33.23K
19	\$5.13K	\$8.02K	\$3.72K	\$4.29K	\$0.80K	\$21.96K
20	\$2.69K	\$1.94K	\$3.47K	\$0.14K	\$0.36K	\$8.59K
21	\$12.14K	\$0.47K	\$1.92K	\$0.21K	\$4.60K	\$19.34K
22	\$0.24K	\$3.55K	\$2.36K	\$0.88K	\$3.27K	\$10.31K
23	\$2.94K	\$1.99K	\$2.14K	\$0.52K	\$3.92K	\$11.51K
24	\$0.49K	\$2.20K	\$0.64K	\$4.28K	\$0.16K	\$7.76K
25	\$0.89K	\$3.02K	\$1.50K	\$2.85K	\$2.15K	\$10.40K
26	\$1.41K	\$0.48K	\$0.32K	\$1.32K	\$0.33K	\$3.86K

## B. Customer Analysis

- **Top 10 Customers by Revenue**

**QUICK-Stop (\$110K), Ernst Handel (\$105K), and Save-a-lot Markets (\$104K)** dominate, showing concentration of revenue among top-tier customers.

**Top 10 Customers by Revenue**

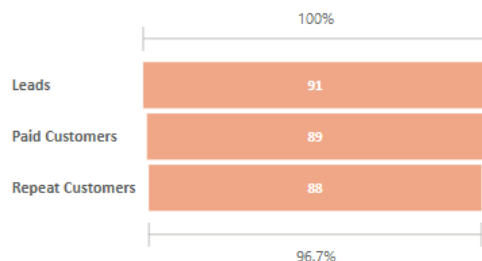


**Insight:** A small elite customer base is driving a large portion of your revenue—loyalty-focused strategies here yield big returns.

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- **Converting Funnel (Leads → Paid → Repeat)**

- **91 leads → 89 paid → 88 repeat**
- Nearly **97%** of paid customers repeat meaning conversion engines are strong.

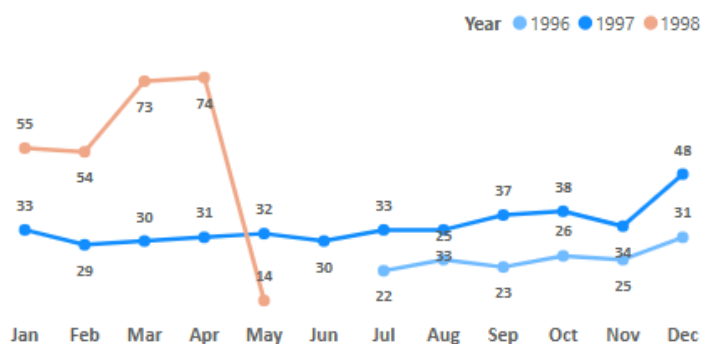


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- **Customers Count by Year (1996–1998)**

- 1996 starts low **22** in July, then trends up to **31** by December.
- 1997 starts rising to **33** in January, then trends up to **48** by December.
- 1998 spikes to **74** by April. Partial 1998 data underrepresent full-year potential.

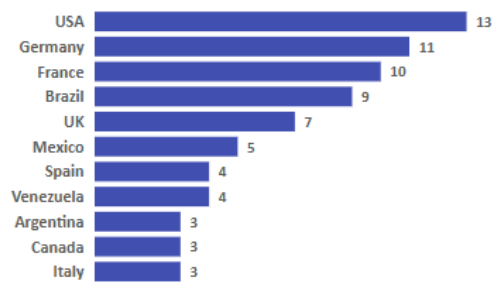
**Customers Count by Year**



- **Top 10 Countries by Customer Count**

- USA (13), Germany (11), France (10), Brazil (9), UK (7)
- Strong customer base in core geographies; opportunities to drive deeper retention or expansion in Europe and South America.

**Top 10 Countries by Customers Count**

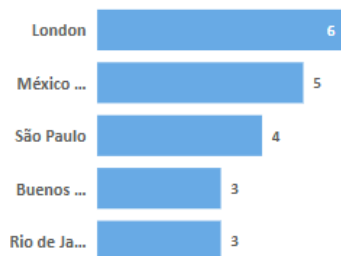


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- **Top 5 Cities by Customer Count**

London (6), Mexico City (5), São Paulo (4)

**Top 5 Cities by Customers Count**



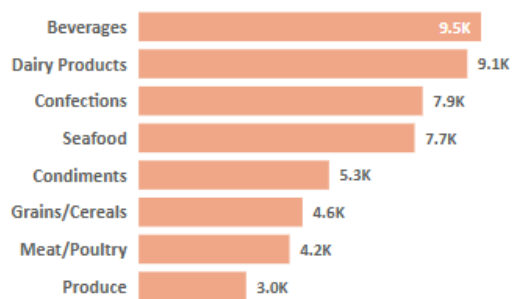
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### **C. Product Analysis**

- **Quantity Sold by Product Category**

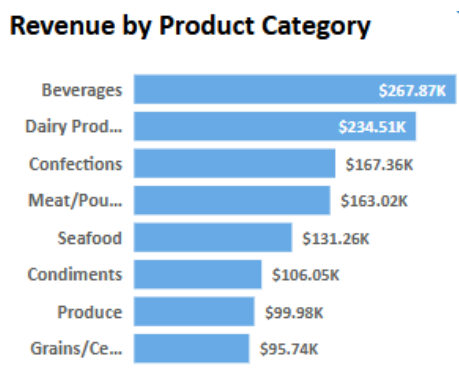
Highest volumes in **Beverages (9.5K units)** and **Dairy Products (9.1K)**.

**Quantity Sold by Product Category**



- **Revenue by Product Category**

**Beverages (\$267K)** and **Dairy Products (\$234K)** lead the pack, which makes sense as they are the most categories sold.

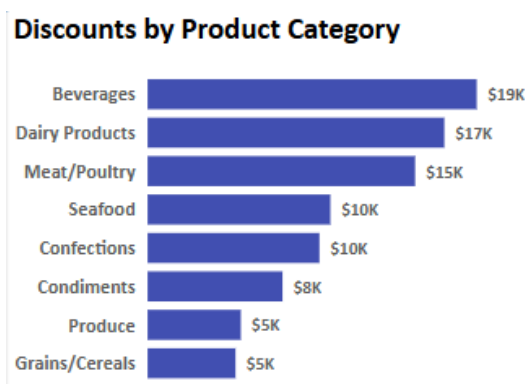


**Insight:** Promotional focus on these categories can amplify earnings; second-tier products may benefit from bundling.

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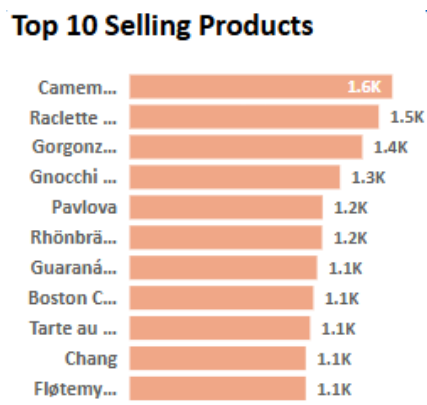
- **Discount Amounts by Product Category**

Major discounts in **Beverages (\$19K)**, **Dairy Products (\$17K)**, **Meat/Poultry (\$15K)**.



- **Top 10 Selling Products (by units)**

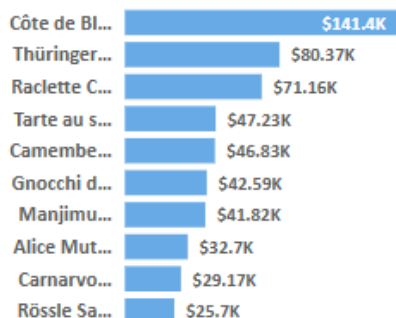
**Camembert Pierrot (1.6K units)** leads in volume, then **Raclette Courdavault (1.5K units)**.



- **Top 10 Products by Revenue**

Côte de Blaye leads with (\$141K), then Thüringer Rostbratwurst (\$80K), and Raclette Courdavault (\$71K)

#### Top 10 Products by Revenue



- **Inventory Health Table**

Products like **Alice Mutton**, **Chef Anton's Gumbo Mix**, and **Thüringer Rostbratwurst** are at **0 stock**, which are high-performing products, resulting in revenue loss.

Product	Units In Stock	Units On Order	Reorder Units
Alice Mutton	0	0	50
Chef Anton's Gumbo Mix	0	0	50
Perth Pasties	0	0	50
Thüringer Rostbratwurst	0	0	50
Northwoods Cranberry Sauce	6	0	44
Nord-Ost Matjeshering	10	0	40
Mozzarella di Giovanni	14	0	36
Gumbär Gummibärchen	15	0	35

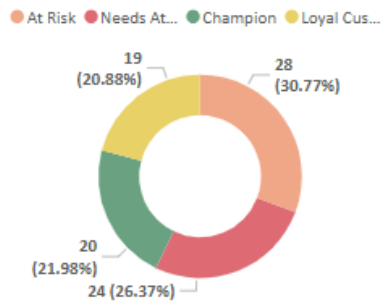
**Insight:** Stockouts threaten sales—automate replenishment particularly for top sellers.

## D. RFM Segmentation

- **Segment Distribution**

Segment	% of Customers	Traits & Implications
Champions	<b>21.98%</b>	Very recent, frequent, highest spenders. Core brand advocates
Loyal Customers	<b>20.88%</b>	Frequent buyers with substantial spending. Stability-focused segment
At risk	<b>30.77%</b>	Historically valuable but haven't purchased recently. Requires reactivation
Needs attention	<b>26.37%</b>	Low-medium recency/frequency/value—growth potential

### Customer Count by RFM Segment



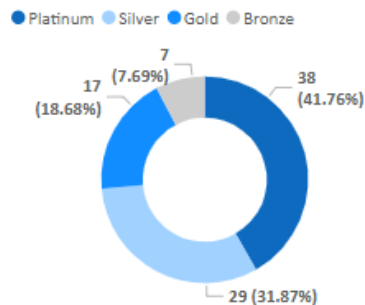
- Nearly **57%** of customers are At Risk or Need Attention—an opportunity-rich cohort.

**Insight:** Effective segmented campaigns can convert many into loyal or champion users.

### Customer Tiers

Tier	Traits
Platinum	Customer who spent more than <b>\$10K</b>
Gold	Customer who spent <b>more than \$5K</b>
Silver	Customer who spent <b>more than \$1K</b>
Bronze	Customer who spent <b>less than or equal \$1K</b> , or made <b>no purchases</b> yet

### Customer Count by Customer Tier



- Platinum (**71.76%**), Gold (**18.68%**), Silver (**31.87%**), Bronze (**7.69%**)
- Platinum and Gold tiers align with Champions and Loyal segments.
- Tier-based pricing, loyalty points, or referral incentives could move mid-tier customers upward.

### RFM Score Table

- Customers like **Ernst Handel** and **Save-a-lot Market** are Champions with a **5** RFM score and Platinum tier with over **\$100K** each.
- These customers should receive VIP treatment, personalized outreach, and priority product access.



Company Name	Customer ID	Recency	Frequency	Monetary	R Score	F Score	M Score	RFM Score	RFM Segment	Customer Tier
Alfreds Futterkiste	ALFKI	9924	6	\$4,273	3	2	2	2.33	At Risk	Silver
Ana Trujillo Emparedados y helados	ANATR	9960	4	\$1,403	2	2	1	1.67	Needs Attention	Silver
Antonio Moreno Taquería	ANTON	9995	7	\$7,024	1	3	3	2.33	At Risk	Gold
Around the Horn	AROUT	9923	13	\$13,391	3	5	4	4.00	Loyal Customer	Platinum
Berglunds snabbköp	BERGS	9960	18	\$24,928	2	5	5	4.00	Loyal Customer	Platinum
Blauer See Delikatessen	BLAUS	9904	7	\$3,240	4	3	2	3.00	At Risk	Silver
Blondel père et fils	BLONP	10011	11	\$18,534	1	4	4	3.00	At Risk	Platinum
Bólido Comidas preparadas	BOLID	9940	3	\$4,233	2	1	2	1.67	Needs Attention	Silver
Bon app'	BONAP	9897	17	\$21,963	5	5	5	5.00	Champion	Platinum
Bottom-Dollar Markets	BOTTOM	9909	14	\$20,802	4	5	5	4.67	Champion	Platinum
B's Beverages	BSBEV	9919	10	\$6,090	3	4	3	3.33	Loyal Customer	Gold
Cactus Comidas para llevar	CACTU	9905	6	\$1,815	4	2	1	2.33	At Risk	Silver
Centro comercial Moctezuma	CENTC	10554	1	\$101	1	1	1	1.00	Needs Attention	Bronze
Chop-suey Chinese	CHOPS	9911	8	\$12,349	4	3	4	3.67	Loyal Customer	Platinum
Comércio Mineiro	COMMJ	9911	5	\$3,811	4	2	2	2.67	At Risk	Silver
Consolidated Holdings	CONSH	10000	3	\$1,719	1	1	1	1.00	Needs Attention	Silver
Die Wandernde Kuh	WANDK	9910	10	\$9,588	4	4	3	3.67	Loyal Customer	Gold
Drachenblut Delikatessen	DRACD	9899	6	\$3,763	5	2	2	3.00	At Risk	Silver
Du monde entier	DUMON	9976	4	\$1,616	1	2	1	1.33	Needs Attention	Silver
Eastern Connection	EASTC	9905	8	\$14,761	4	3	4	3.67	Loyal Customer	Platinum
Ernst Handel	ERNSH	9898	30	\$104,875	5	5	5	5.00	Champion	Platinum
Familia Arquibaldo	FAMIA	10084	7	\$4,108	1	3	2	2.00	Needs Attention	Silver
FISSA Fabrica Inter. Salchichas S.A.	FISSA				1	1	1	1.00	Needs Attention	Bronze
Foies gourmandes	FOLIG	10032	5	\$11,667	1	2	4	2.33	At Risk	Platinum
Folk och få HB	FOLKO	9906	19	\$29,568	4	5	5	4.67	Champion	Platinum
France restauration	FRANR	9940	3	\$3,172	2	1	2	1.67	Needs Attention	Silver
Franchi S.p.A.	FRANS	9903	6	\$1,546	5	2	1	2.67	At Risk	Silver
Frankenversand	FRANK	9924	15	\$26,657	3	5	5	4.33	Champion	Platinum
Furia Bacalhau e Frutos do Mar	FURIB	9945	8	\$6,427	2	3	3	2.67	At Risk	Gold
Galería del gastrónomo	GALED	9959	5	\$837	2	2	1	1.67	Needs Attention	Bronze

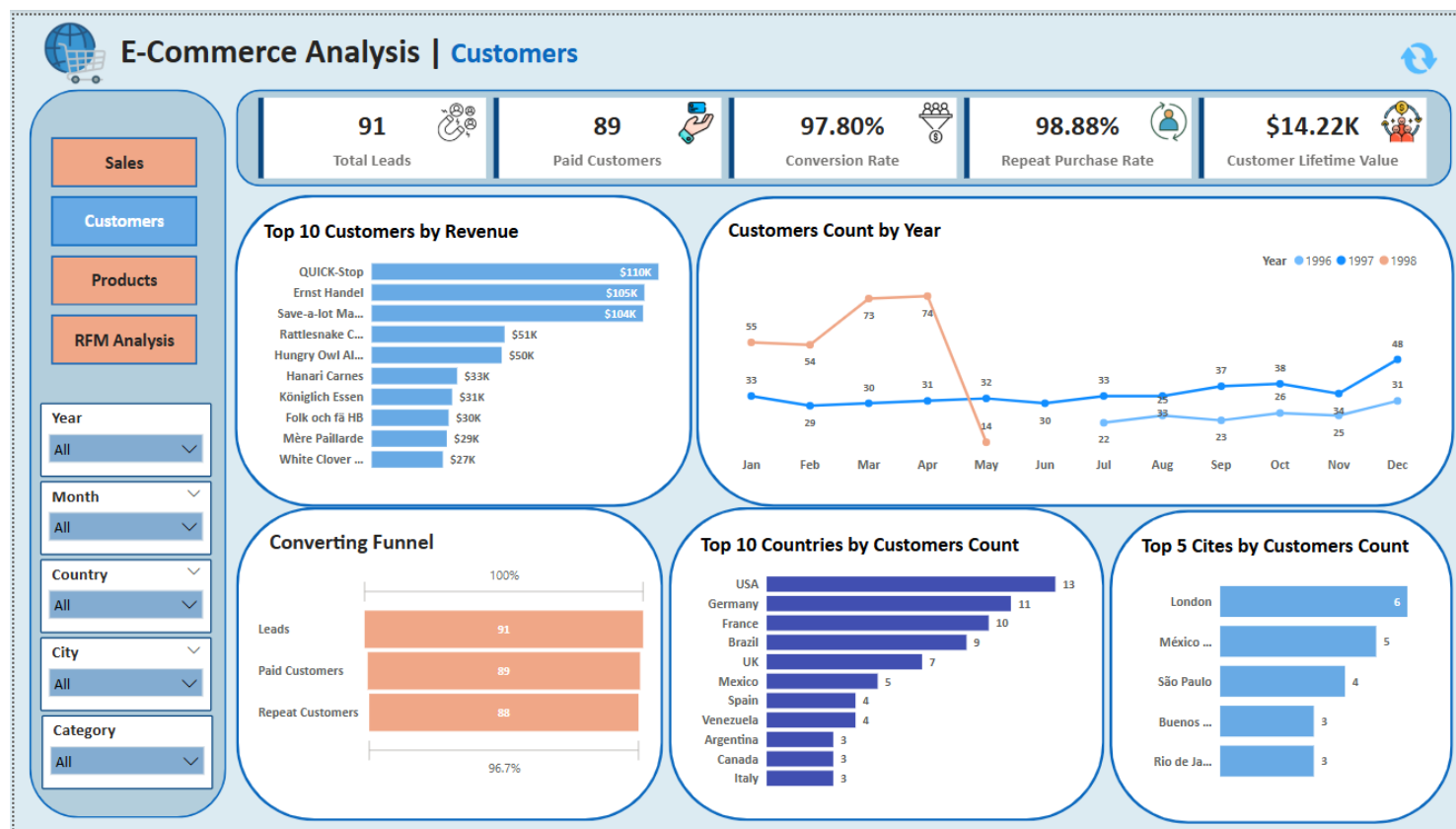
## 4. Insights

- High conversion and repeat purchase rates indicate efficient conversion funnel & strong customer loyalty.
- Revenue is heavily concentrated in the top customers and specific regions, making retention and regional focus critical.
- Average Monthly Revenue Growth 1996–1997 shows an increase of 48.28% and even a bigger increase of 71.37% in the average Monthly Revenue Growth 1997–1998 which confirm that the sharp decline in 1998 revenue is due to partial 1998 data.
- Customer count grew significantly in 1997, but 1998 shows a drop due to partial data.
- Weekday trends show peak sales on Tuesdays and Wednesdays, presenting ideal timing for campaigns.
- A significant share of customers is either at risk or need attention, while a core group of loyal customers drives profitability.

## 5. Recommendations

- **Expand Lead Generation:** Invest in content marketing, partnerships, and regional ads to grow the acquisition funnel.
- **Improve Lead Conversion:** Enhance onboarding and use automated follow-ups to convert late-stage prospects.
- **Nurture Top Customers:** Launch loyalty or VIP programs to retain high-value accounts and reduce churn risk.
- **Targeted Local Campaigns:** Focus efforts on high-revenue cities and countries with personalized marketing.
- **Capitalize on Midweek Sales:** Schedule promotions early in the week to align with peak buying behavior.
- **Win Back At-Risk Customers:** Use tailored discounts, re-engagement emails, and exclusive offers.
- **Stockouts threaten sales:** automate Inventory replenishment particularly for top sellers Products.

### A. Sales Analysis



C. Product Analysis

