RETAIL ANALYSIS

FINAL PROJECT PRESENTATION

2025

TABLE OF CONTENTS

presentation presentation presentation presentation

	Column	Data Type		Relationships
		Qualitative	Quantitative	
1	TransactionID	Nominal		
2	CustomerID	Nominal		
3	Date	Ordinal		
4	Time	Ordinal		
5	Age		Discrete	
6	Gender	Nominal		
7	Income	Ordinal		
8	CustomerSegment	Nominal		
9	Country	Nominal		
10	State	Nominal		
11	City	Nominal		
12	ZipCode	Nominal		
13	Products	Nominal		
14	ProductCategory	Nominal		
15	ProductBrand	Nominal		
16	ProductType	Nominal		
17	ShippingMethod	Nominal		
18	OrderStatus	Nominal		
19	PaymentMethod	Nominal		
20	TotalPurchase → Quantity		Discrete	= Sales/Price
21	Amount → Price		Continuous	= Sales/Quantity
22	TotalAmount → Sales		Continuous	= Quantity*Price
23	Ratings		Discrete	
24	Feedback	Ordinal		

Dương Nhã Điền

Data Cleaning

Initial number of rows: 65,121

Blanks:

Blanks in columns																							
Transaction	CustomerID	Date	Time	Age	Gender	Income	CustomerSe	Country	State	City	ZipCode	Products	ProductCate	ProductBran	ProductTyp	ShippingMe	OrderStatus	PaymentMe	IPurchases	Amount	TotalAmount	Ratings	Feedback
0	0	0	70	0	0	0	0	0	0	0	72	0	0	0	0	0	0	0	0	80	77	0	0

Moreover, cells filled with the word "NA" are also considered and highlighted.

- **Time** (70 NA) and **ZipCode** (72 NA) → DELETED
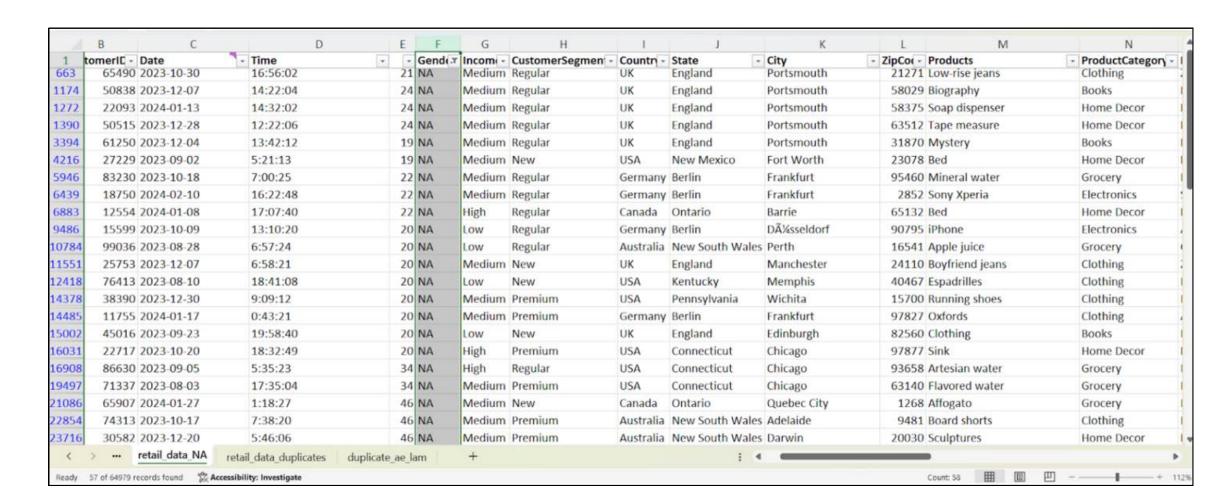- **Amount** (80 NA), **TotalAmount** (77 NA) → can be calculated

Cells containing "NA":

TotalPurchase (64 NA): can be calculated

Data Cleaning

Initial number of rows: 65,121

Cells containing "NA":

- **Age:** 37 NA
- **Gender:** 57 NA
- **Income:** 69 NA
- **CustomerSegment:** 53 NA
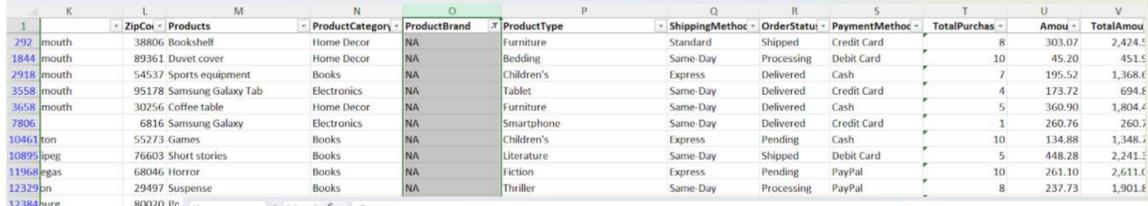- **Ratings, Feedback:** both have 41 NA
- **Shipping method:** 58 NA
- **OrderStatus:** 60 NA

→ Delete because we could not know or calculate these information.

Initial number of rows: 65,121

Cells containing "NA":

- **ProductCategory:** 63 NA
- **ProductBrand**: 53 NA
- **Country**: 63 NA

→ **Can be joined, using the 'Product' column for ProductCategory and ProductBrand; City column for Country**

=> **64,318 remaining rows after checking NA**

Data Cleaning

Check 1

- **Check duplicates using =CONCATENATE(TransactionID, CustomerID, Products)**

=> **86** duplicated values

→ **Delete** all because a distinct transaction cannot have the same TransactionID, CustomerID, Products at the same time

Check 2

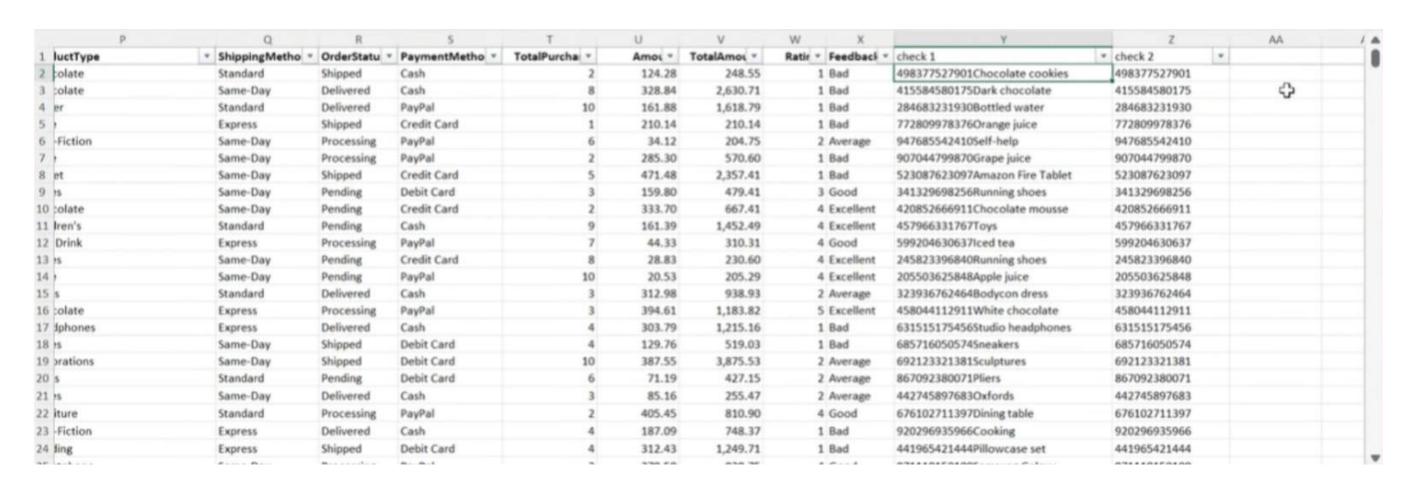- **Check duplicates using =CONCATENATE(TransactionID, CustomerID)**
- **Keep these rows, because some transactions can have the same customer, but cannot have the same product**

Check 3

- **Sort the data based on Date, then Time**
- **Keep the transaction that occurs first**

=> **64,052** rows remaining after cleaning duplicated values

Value errors

- **ProductType: Replace BlueStar AC and Mitsubishi...AC → Air-conditioner**
- **City "Düsseldorf" has an error: "DÃ¼sseldorf"**

Data Cleaning

Value errors

- City "**Münster**" has an error: "**MÃ¼nster**"

Column errors

Fix the names in the Product and City columns.

- Example: **LG G - Apple → Incorrect**
- (**Fix**: Filter the Electronics category and assign the correct brand name based on the first word of the **Product name**. For **Apple** products, detect based on the first letters such as **"iP"** or "**Macbook**", then assign the brand as Apple.)

M		N		O	
Products	▼	**ProductCatego** ▼		**ProductBrand**	▼
LG G		Electronics		Apple	

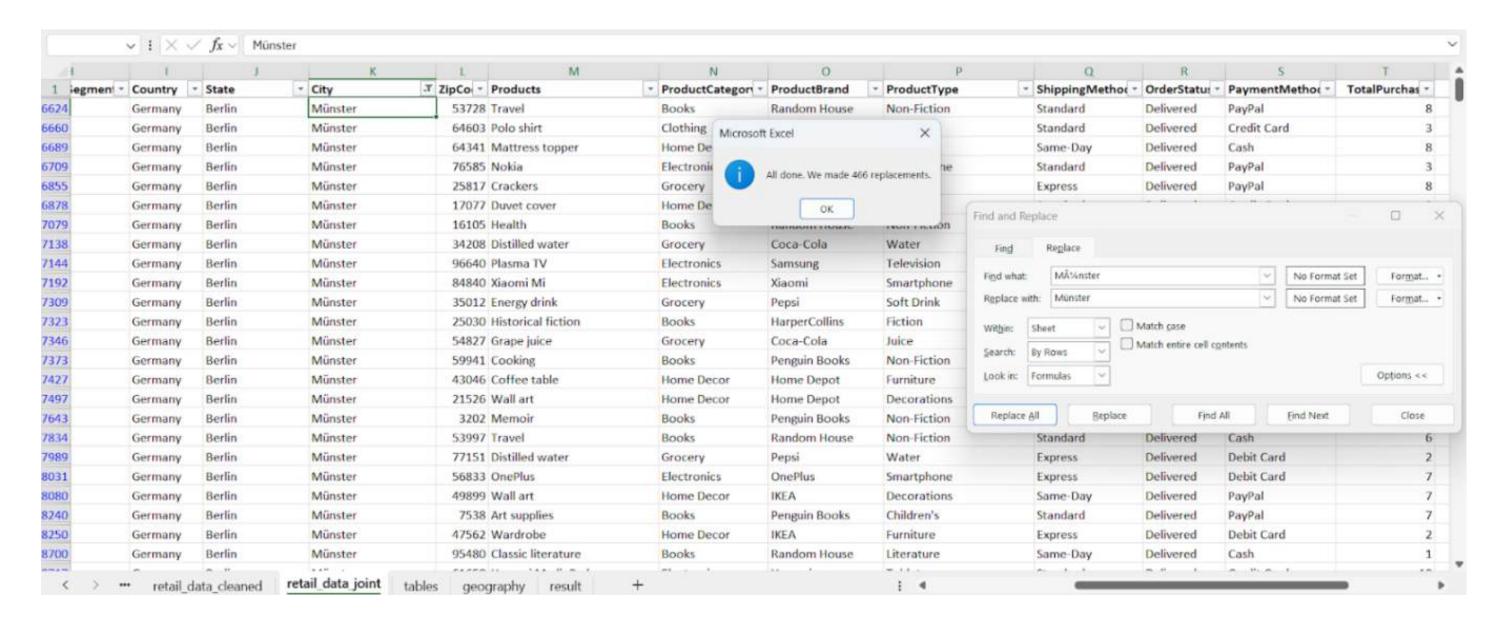**Fix the Country and State name:**

- Example: **USA - Oregon - New York → Incorrect**
- (**Fix**: Create a new **Geography table** using existing city data. Use AI to generate a correct Geography table with Country, State, and City fields, then join it back to the main dataset.)

Country	▼	State	▼	City	▼
USA		Oregon		New York	

The scale for Ratings and Feedback is incorrect (e.g., both **3 and 4 are labeled "Good"**)
→ **Fix**: Join with a corrected scale table.

W	X
Rati ▼	**Feedback** ▼
2	Average
4	Good
2	Average
2	Average
4	Good
1	Bad
3	Good
4	Excellent

Dương Nhã Điền

Column errors

Tables created for joining:
- Geography
- Product
- Ratings

	ProductBrand		Ratings	FeedbackUpdate		Country	State	City
1	ProductBrand		Ratings	FeedbackUpdate		Country	State	City
2	Apple		1	Very bad		Australia	Australian Capital Territory	Canberra
3	Sony		2	Bad		Australia	New South Wales	Albury-Wodonga
4	Samsung		3	Average		Australia	New South Wales	Sydney
5	Whirepool		4	Good		Australia	New South Wales	Wollongong
6	Mitsubhisi		5	Excellent		Australia	Northern Territory	Darwin
7	BlueStar					Australia	Queensland	Brisbane
8	Huawei					Australia	Queensland	Cairns
9	Amazon					Australia	Queensland	Gold Coast
10	Google					Australia	Queensland	Mackay
11	HP					Australia	Queensland	Toowoomba
12	Xiaomi					Australia	Queensland	Townsville
13	Acer					Australia	South Australia	Adelaide
14	Lenovo					Australia	Tasmania	Hobart
15	Dell					Australia	Tasmania	Launceston
16	Nokia					Australia	Victoria	Ballarat
17	Asus					Australia	Victoria	Bendigo
18	Motorola					Australia	Victoria	Geelong
19	Microsoft					Australia	Victoria	Melbourne
20	Razer					Australia	Western Australia	Perth
21	LG					Canada	British Columbia	Kelowna
22	OnePlus					Canada	British Columbia	Vancouver
23						Canada	British Columbia	Victoria
24						Canada	Manitoba	Winnipeg
25						Canada	Newfoundland and Labrador	St. John's
26						Canada	Nova Scotia	Halifax
27						Canada	Ontario	Barrie
28						Canada	Ontario	Hamilton
29						Canada	Ontario	Kitchener
30						Canada	Ontario	London
31						Canada	Ontario	Oshawa
32						Canada	Ontario	Ottawa
33						Canada	Ontario	Toronto

Data Cleaning

Column errors fixing

Geography:

`J4    fx    =XLOOKUP([@City], tables_to_join!$I$2:$I$132, tables_to_join!$H$2:$H$132, "Not Found", 0)`

	Age	Gender	Income	CustomerSegment	Country	State	City	ZipCode	Products	ProductCategory	ProductBrand	ProductType	ShippingMethod	OrderStatus	PaymentMethod	Tota
4	22	Female	Medium	Premium	Germany	North Rhine-Westphalia	Düsseldorf	67971	Floor-standing AC	Electronics	Mitsubhisi	Air-conditioner	Express	Delivered	Cash	
6	43	Female	Medium	Regular	UK	Scotland	Glasgow	15018	Motorola Moto	Electronics	Motorola	Smartphone	Same-Day	Processing	Debit Card	
9	26	Male	Medium	Premium	Germany	North Rhine-Westphalia	Bielefeld	83557	Top-freezer refrigerator	Electronics	Whirepool	Fridge	Express	Delivered	Credit Card	
13	48	Male	High	Regular	USA	Texas	Austin	91521	LCD TV	Electronics	Samsung	Television	Standard	Delivered	Credit Card	

Product Name:


```
DATE    fx    =LET(
                  productName, M6,
                  brands,tables_to_join!$B$2:$B$22,
                  isAppleProduct, OR(
                      LEFT( productName, 2) = "iP",
                      ISNUMBER(SEARCH("MacBook", productName))
                  ),
                  matchIndex, XMATCH(TRUE, ISNUMBER(SEARCH(brands, productName)), 0),
                  IF(
                      isAppleProduct,
                      "Apple",
                      IF(ISNUMBER(matchIndex), INDEX(brands, matchIndex), "Unknown")
                  )
              )
```

	Age	Gender	Income	CustomerSegment	Country	State	City	ZipCode	Products	ProductCategory	ProductBrand	ProductType	ShippingMethod	OrderStatus	PaymentMethod	Tota
4	22	Female	Medium	Premium	Germany	North Rhine-Westphalia	Düsseldorf	67971	Floor-standing AC	Electronics	Mitsubhisi	Air-conditioner	Express	Delivered	Cash	
6	43	Female	Medium	Regular	UK	Scotland	Glasgow	15018	Motorola Moto	Electronics	)	Smartphone	Same-Day	Processing	Debit Card	
9	26	Male	Medium	Premium	Germany	North Rhine-Westphalia	Bielefeld	83557	Top-freezer refrigerator	Electronics	Whirepool	Fridge	Express	Delivered	Credit Card	

Ratings:

`X4    fx    =VLOOKUP(W4,tables_to_join!$D$2:$E$6,2)`

	ode	Products	ProductCategory	ProductBrand	ProductType	ShippingMethod	OrderStatus	PaymentMethod	TotalPurchas	Amou	TotalAmou	Rati	Feedback
4	71	Floor-standing AC	Electronics	Mitsubhisi	Air-conditioner	Express	Delivered	Cash	10	499.82	4,998.20	3	Average
6	18	Motorola Moto	Electronics	Motorola	Smartphone	Same-Day	Processing	Debit Card	10	499.79	4,997.93	1	Very bad
9	57	Top-freezer refrigerator	Electronics	Whirepool	Fridge	Express	Delivered	Credit Card	10	499.65	4,996.45	3	Average
13	21	LCD TV	Electronics	Samsung	Television	Standard	Delivered	Credit Card	10	499.48	4,994.76	4	Good

Amount = 0 → delete

→ **64,050 rows for final analysis**

Data Cleaning

Additional column created for analysis:

- **Quarter**: in the format "Q1, 2024" → for the slicers to work with quarters
- **Time_Bin:** classified the time into 6 bins (4 hours each bin)
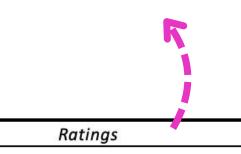- **Weekday:** get the weekday from the Date column with the format "ddd"

```
1  Time_Bin =
2  VAR BinNumber = INT(HOUR('retail_data_joint'[Time]) / 4)
3  VAR StartHour = BinNumber * 4
4  VAR EndHour = StartHour + 4
5  RETURN
6  FORMAT(StartHour, "00") & ":00 to " & FORMAT(EndHour, "00") & ":00"
```

```
1  Weekday =
2  FORMAT(WEEKDAY('retail_data_joint'[Date], 2), "0")
3  & " - " & FORMAT('retail_data_joint'[Date], "ddd")
```

Dương Nhã Điền

Descriptive Statistics

TotalPurchase	
Mean	5.35
Standard Error	0.01
Median	5.00
Mode	2.00
Standard Deviation	2.87
Sample Variance	8.22
Kurtosis	-1.22
Skewness	0.07
Range	9.00
Minimum	1.00
Maximum	10.00
Sum	342,941.00
Count	64050

Amount	
Mean	254.60
Standard Error	0.56
Median	254.30
Mode	474.60
Standard Deviation	141.04
Sample Variance	19,892.20
Kurtosis	-1.20
Skewness	0.01
Range	489.99
Minimum	10.01
Maximum	500.00
Sum	16,307,396.08
Count	64050

TotalAmount	
Mean	1,362.82
Standard Error	4.45
Median	1,036.62
Mode	4,746.01
Standard Deviation	1,125.89
Sample Variance	1,267,631.58
Kurtosis	0.21
Skewness	0.99
Range	4,988.98
Minimum	10.36
Maximum	4,999.34
Sum	87,288,483.33
Count	64050

most customers rate around the middle to slightly positive range

attract a good proportion of younger customers

Ratings	
Mean	3.15
Standard Error	0.01
Median	3.00
Mode	4.00
Standard Deviation	1.33
Sample Variance	1.76
Kurtosis	-1.18
Skewness	-0.23
Range	4.00
Minimum	1.00
Maximum	5.00
Sum	201,766.00
Count	64050

Age	
Mean	35.42
Standard Error	0.06
Median	32.00
Mode	20.00
Standard Deviation	15.02
Sample Variance	225.68
Kurtosis	-0.79
Skewness	0.66
Range	52.00
Minimum	18.00
Maximum	70.00
Sum	2,268,332.00
Count	64050

moderate engagement across the customer base

varied product pricing and spending habits

few high-value customers, while the majority spend much less

Business Overview

	TransactionID	CustomerID	Date	Time	Age	Gender	Income	CustomerSegment	Country	State	City	ZipCode	Products	ProductCategory	ProductBrand	ProductType	ShippingMethod	OrderStatus	PaymentMethod	TotalPurchas	Amou	TotalAmou	Ratin	Feedback
2	4983775	27901	2024-01-10	16:54:07	22	Male	Low	Premium	UK	England	Bristol	48704	Chocolate coo	Grocery	Nestle	Chocolate	Standard	Shipped	Cash	2	124.28	248.55	1	Bad
3	4155845	80175	2024-01-06	14:38:26	46	Male	Medium	New	Australia	New South	Wollong	39820	Dark chocolate	Grocery	Nestle	Chocolate	Same-Day	Delivered	Cash	8	328.84	2,630.71	1	Bad
4	2846832	31930	2024-01-02	0:00:47	56	Female	Medium	Regular	UK	England	Portsmo	38173	Bottled water	Grocery	Coca-Cola	Water	Standard	Delivered	PayPal	10	161.88	1,618.79	1	Bad
5	7728099	78376	2024-02-07	18:29:59	49	Male	Low	Regular	UK	England	Portsmo	82975	Orange juice	Grocery	Coca-Cola	Juice	Express	Shipped	Credit Card	1	210.14	210.14	1	Bad
6	9476855	42410	2024-02-03	6:22:00	21	Female	Low	Regular	UK	England	Portsmo	83903	Self-help	Books	Penguin Books	Non-Fiction	Same-Day	Processing	PayPal	6	34.12	204.75	2	Average
7	9070447	99870	2024-02-27	13:51:11	38	Male	Medium	Regular	UK	England	Portsmo	2916	Grape juice	Grocery	Coca-Cola	Juice	Same-Day	Processing	PayPal	2	285.30	570.60	1	Bad
8	5230876	23097	2024-01-07	17:33:45	67	Male	Low	Regular	UK	England	Portsmo	14668	Amazon Fire Ta	Electronics	Apple	Tablet	Same-Day	Shipped	Credit Card	5	471.48	2,357.41	1	Bad
9	3413296	98256	2024-02-06	1:59:20	26	Male	Low	Regular	UK	England	Portsmo	43602	Running shoes	Clothing	Adidas	Shoes	Same-Day	Pending	Debit Card	3	159.80	479.41	3	Good
10	4208526	66911	2023-12-16	4:00:08	24	Female	Low	Regular	UK	England	Portsmo	71994	Chocolate mou	Grocery	Nestle	Chocolate	Same-Day	Pending	Credit Card	2	333.70	667.41	4	Excellent
11	4579663	31767	2024-02-16	20:44:42	28	Male	High	Regular	UK	England	Portsmo	15127	Toys	Books	Penguin Books	Children's	Standard	Pending	Cash	9	161.39	1,452.49	4	Excellent
12	5992046	30637	2024-02-08	12:07:52	34	Female	High	Regular	UK	England	Portsmo	79514	Iced tea	Grocery	Pepsi	Soft Drink	Express	Processing	PayPal	7	44.33	310.31	4	Good
13	2458233	96840	2023-10-29	13:43:05	65	Male	Low	Regular	UK	England	Portsmo	85074	Running shoes	Clothing	Adidas	Shoes	Same-Day	Pending	Credit Card	8	28.83	230.60	4	Excellent
14	2055036	25848	2024-02-21	22:28:09	40	Male	High	Regular	UK	England	Portsmo	42516	Apple juice	Grocery	Coca-Cola	Juice	Same-Day	Pending	PayPal	10	20.53	205.29	4	Excellent
15	3239367	62464	2023-12-14	20:24:39	58	Female	High	Regular	UK	England	Portsmo	15160	Bodycon dress	Clothing	Zara	Dress	Standard	Delivered	Cash	3	312.98	938.93	2	Average
16	4580441	12911	2023-11-11	15:38:31	69	Male	High	Regular	UK	England	Portsmo	27283	White chocola	Grocery	Nestle	Chocolate	Express	Processing	PayPal	3	394.61	1,183.82	5	Excellent
17	6315151	75456	2023-10-03	4:34:26	38	Female	High	Regular	UK	England	Portsmo	87547	Studio headph	Electronics	Sony	Headphones	Express	Delivered	Cash	4	303.79	1,215.16	1	Bad
18	6857160	50574	2023-10-17	6:40:06	46	Male	Low	Regular	UK	England	Portsmo	52548	Sneakers	Clothing	Nike	Shoes	Same-Day	Shipped	Debit Card	4	129.76	519.03	1	Bad
19	6921233	21381	2023-11-26	16:09:33	67	Male	Medium	Regular	UK	England	Portsmo	36935	Sculptures	Home Decor	Home Depot	Decorations	Same-Day	Shipped	Debit Card	10	387.55	3,875.53	2	Average
20	8670923	80071	2023-09-17	1:25:11	41	Female	Low	Regular	UK	England	Portsmo	17549	Pliers	Home Decor	Home Depot	Tools	Standard	Pending	Debit Card	6	71.19	427.15	2	Average
21	4427458	97683	2023-11-04	14:44:24	31	Female	Low	Regular	UK	England	Portsmo	57256	Oxfords	Clothing	Nike	Shoes	Same-Day	Delivered	Cash	3	85.16	255.47	2	Average
22	6761027	11397	2023-08-31	0:34:27	29	Female	Low	Regular	UK	England	Portsmo	49782	Dining table	Home Decor	Home Depot	Furniture	Standard	Processing	PayPal	2	405.45	810.90	4	Good
23	9202969	35966	2024-02-20	7:34:49	69	Male	Low	Regular	UK	England	Portsmo	41418	Cooking	Books	HarperCollins	Non-Fiction	Express	Delivered	Cash	4	187.09	748.37	1	Bad
24	4419654	21444	2023-10-30	18:07:26	30	Male	Medium	Regular	UK	England	Portsmo	42579	Pillowcase set	Home Decor	Bed Bath & Beyond	Bedding	Express	Shipped	Debit Card	4	312.43	1,249.71	1	Bad
25	9711181	50100	2024-01-13	16:41:07	54	Female	Low	Regular	UK	England	Portsmo	44803	Samsung Gala	Electronics	Sony	Smartphone	Same-Day	Processing	PayPal	3	279.58	838.75	4	Good
26	6573179	55594	2023-11-13	1:04:00	41	Male	Low	Regular	UK	England	Portsmo	50743	Puffer jacket	Clothing	Adidas	Jacket	Express	Delivered	Credit Card	6	422.39	2,534.32	5	Excellent
27	6650415	98788	2023-09-03	11:03:16	29	Male	Medium	Regular	UK	England	Portsmo	70549	Fantasy	Books	Penguin Books	Fiction	Same-Day	Processing	Credit Card	10	147.88	1,478.85	2	Average
28	7978896	28489	2023-12-07	6:27:17	43	Male	Medium	Regular	UK	England	Portsmo	52638	Nuts	Grocery	Nestle	Snacks	Express	Processing	Credit Card	3	199.82	599.47	1	Bad
29	4615607	22945	2024-01-26	17:05:34	26	Female	Low	Regular	UK	England	Portsmo	30472	Detective	Books	HarperCollins	Thriller	Express	Pending	Debit Card	9	386.98	3,482.86	1	Bad
30	3326402	67949	2024-02-20	3:39:48	54	Male	Medium	Regular	UK	England	Portsmo	18758	Cheese snacks	Grocery	Nestle	Snacks	Standard	Processing	PayPal	3	242.86	728.57	2	Average
31	8942113	72626	2024-01-25	17:48:38	58	Male	Low	Regular	UK	England	Portsmo	21841	Blanket	Home Decor	Bed Bath & Beyond	Bedding	Same-Day	Processing	Cash	1	212.30	212.30	2	Average
32	6219631	26736	2023-08-30	19:19:22	67	Female	Medium	Regular	UK	England	Portsmo	4692	OLED TV	Electronics	Samsung	Television	Express	Shipped	PayPal	8	221.54	1,772.30	4	Good
33	8748941	77875	2024-01-14	21:18:43	65	Male	Medium	Regular	UK	England	Portsmo	5563	HDR TV	Electronics	Sony	Television	Standard	Shipped	PayPal	3	399.37	1,198.12	3	Good
34	7018142	67530	2023-08-23	1:40:06	50	Male	Low	Regular	UK	England	Portsmo	67486	Crew neck tee	Clothing	Adidas	T-shirt	Standard	Processing	PayPal	7	178.03	1,246.24	4	Excellent
35	7567107	27353	2024-01-30	2:34:45	60	Female	Low	Regular	UK	England	Portsmo	11524	Literary fiction	Books	Random House	Literature	Same-Day	Shipped	Cash	2	180.16	180.16	3	Good
36	5343974	66428	2023-11-28	19:22:50	48	Female	Medium	Regular	UK	England	Portsmo	89333	Pomegranate j	Grocery	Coca-Cola	Juice	Standard	Shipped	Cash	1	315.72	315.72	1	Bad
37	9084403	89815	2024-02-26	2:31:09	26	Male	Low	Regular	UK	England	Portsmo	80499	Literary fiction	Books	Random House	Fiction	Standard	Shipped	Cash	3	291.40	874.21	4	Excellent
38	2300962	11602	2023-12-13	18:26:04	37	Male	Low	Regular	UK	England	Portsmo	9715	Over-ear headp	Electronics	Sony	Headphones	Express	Pending	Debit Card	4	126.82	507.28	4	Excellent
39	5820774	46908	2023-10-14	8:02:34	54	Male	Medium	Regular	UK	England	Portsmo	19707	Adventure	Books	Penguin Books	Fiction	Same-Day	Processing	Cash	5	402.12	2,010.58	4	Excellent
40	5648072	89211	2024-02-25	23:22:49	27	Female	Medium	Regular	UK	England	Portsmo	56517	Horror	Books	Penguin Books	Fiction	Same-Day	Shipped	PayPal	2	168.02	336.04	1	Bad
41	8810446	93866	2023-09-23	16:15:39	32	Female	Medium	Regular	UK	England	Portsmo	64222	Sculptures	Home Decor	IKEA	Decorations	Same-Day	Processing	Credit Card	5	188.72	943.60	1	Bad

⇒ **A retail company selling a wide range of products to customers across 5 countries**

Dashboard

Overview of Sales Performance

- Monitor overall business performance and trends
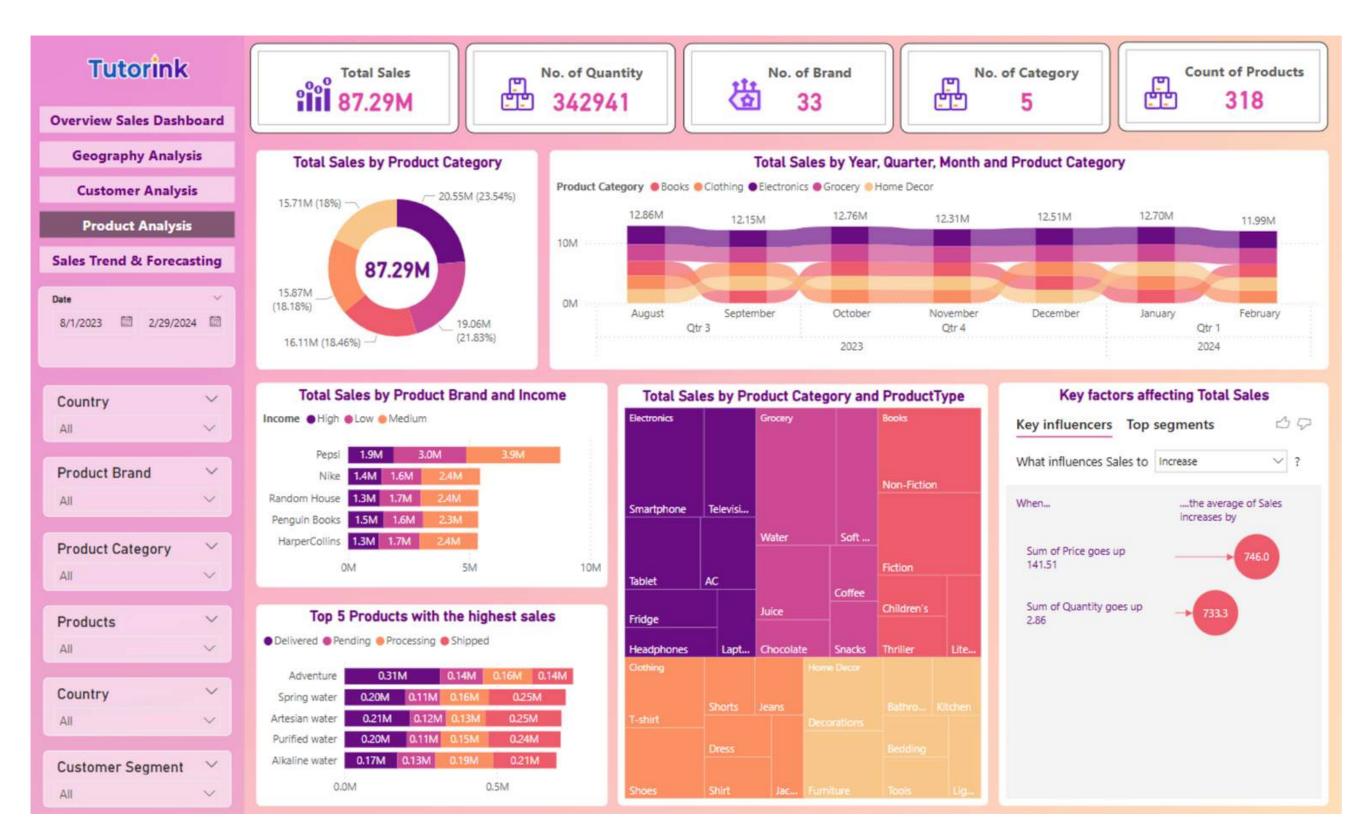
Dashboard

Geography Analysis

- Identify high-performing markets and regional opportunities
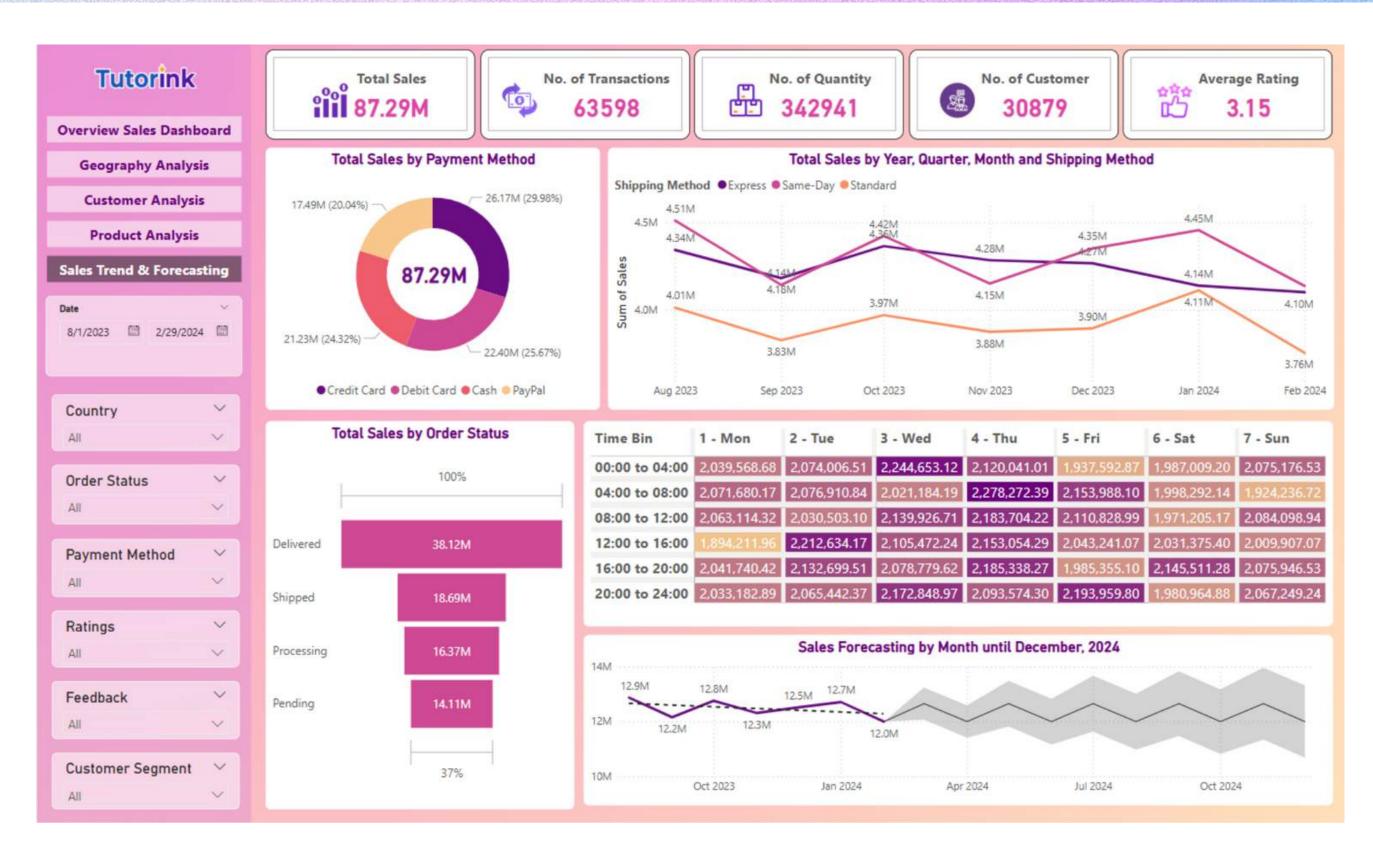
Dashboard

Customer Analysis

- Understand target audiences and drive personalized strategies

Dashboard

Product Analysis

- Identify bestsellers, underperformers, and opportunities for assortment optimization

Dashboard

Sales Trend & Forecasting

- Enable data-driven decisions for inventory planning, marketing strategies, and operational efficiency

Questions & Answers EDA

What are the key insights?

OVERVIEW DASHBOARD

Key Question: How did our sales perform from August 2023 to February 2024?

GEOGRAPHY ANALYSIS

Q1: Where do we perform best by region, and what does that mean for strategy?

GEOGRAPHY ANALYSIS

Q1: Where do we perform best by region, and what does that mean for strategy?

Q2: What is the relationship between product quantity and average ratings by State?

CUSTOMER ANALYSIS

Q1: How do demographics shape spending behavior and product preferences?

CUSTOMER ANALYSIS

Q1: How do demographics shape spending behavior and product preferences?

Q2: What are their payment preferences, and what do they reveal?

PRODUCT ANALYSIS

Q1: **What product and brand trends should shape our portfolio strategy?**

PRODUCT ANALYSIS

Q1: What product and brand trends should shape our portfolio strategy?

Q2: What drives total sales - volume or price?

SALES TRENDS & FORECASTING

Q1: What are the current sales behaviors, and where can we improve?

SALES TRENDS & FORECASTING

Q1: What are the current sales
behaviors, and where can we improve?

Q2: What does the forecast tell us?

SALES TRENDS & FORECASTING

Q1: What are the current sales behaviors, and where can we improve?

Q2: What does the forecast tell us?

Q3: When should we push marketing efforts?

Solutions & Recommendations

Prioritize High-Margin Products and Responsive Pricing

- **Issue Addressed:** Sales are influenced by both volume and price, but no strategy is in place to optimize this dynamic.
- **Solution:**
  - Identify products with strong price sensitivity (e.g., Spring Water, Adventure products)
  - Run A/B pricing experiments to find optimal price points.
  - Promote frequently purchased items with volume discounts, and create product bundles around top-selling or high-margin items to increase average order value.

Solutions & Recommendations

Capitalize on Peak Shopping Hours and Days

- **Issue Addressed:** Peak transactions occur between 00:00–04:00 on Wednesdays and 4:00-8:00 on Thursdays, but this window is underutilized.
- **Solution:**
  - Launch limited-time offers or promotions during early-morning windows on high-performing days.
  - Coordinate email campaigns and digital ads to hit inboxes and screens 30–60 minutes before peak times.

Solutions & Recommendations

Personalize Marketing Based on Customer Segments and Regions

- **Issue Addressed:** Sales performance varies significantly across income segments and cities, but marketing efforts are not yet differentiated.
- **Solution:**
  - Segment customers based on income and geography (e.g., medium-income customers in Portsmouth and Chicago), and create localized promotions or loyalty offers.
  - Use behavioral data to tailor messaging, such as emphasizing premium quality for high-income customers or value bundles for medium-income groups.

Task Allocation

PIC	Task	Contribution
Dương Nhã Điền	Data Understanding + Data Cleaning + Slides + Dashboard	100%
Trần Hạnh Hiền Trang	Descriptive Statistics + Basic Charts + Slides	100%
Bùi Trần Mai Thy	Questions & Answers for EDA + Slides	100%
Nguyễn Phương Anh Thư	Questions & Answers for EDA + Solutions + Slides + Dashboard	100%
Hoàng Thanh Thiên Ân		100%

Thank you

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