DATA ANALYSIS
FOR ADVENTURE WORKS

UNDERSTANDING DATA ANALYSIS HELPS BUSINESSES MAKE INFORMED DECISIONS, OPTIMIZE PERFORMANCE, AND DRIVE GROWTH.

HTTPS://WWW.ADVENTURE-WORKS.COM/

Adventure Works OVERVIEW

Headquarters: Bothell, Washington, USA
Industry: High-end bicycle manufacturing
Product Lines:
•Bicycles: Mountain, Road, Touring, BMX, and Kids' bikes
•Components: Handlebars, Brakes, Chains, Frames, and moreAccessories & Clothing: Helmets, Jerseys, Shorts, Gloves, etc.
Market Presence: Operations in North America, Europe, and Asia
Manufacturing Facilities:
•Acquired Importadores Neptuno in Mexico, producing critical subcomponents for final assembly in Bothell.
Sales Channels:
•Primary distribution through retail resellers in Australia, Canada, France, Germany, the UK, and the USA.Direct-to-consumer sales via the company's website.
Strategic Goals:
•Expand market share by focusing on top customers.Enhance product availability through online platforms.Reduce production costs to improve profitability.

OUR APPROACH TO DATA ANALYSIS

- Data Collection & Cleaning: We began with collecting and cleaning data to ensure accuracy, consistency, and reliability for analysis.
- Exploratory Data Analysis (EDA): Performed EDA to uncover patterns, trends, and anomalies within the dataset.
- SQL for Data Handling: Used SQL for efficient data extraction, transformation, and analysis to support data-driven decision-making.
- Visualization & Dashboarding: Utilized Excel, Tableau, and Power BI to design interactive dashboards that deliver actionable insights.

TOOLS FOR DATA ANALYSIS

Spreadsheets

Excel was used for data cleaning, transformation, and preliminary analysis. It helped in structuring raw data and identifying initial trends.

Data Visualization

Tableau and Power BI were utilized to design dynamic dashboards, enabling in-depth visual analysis and interactive insights

Intelligence

SQL facilitated efficient data extraction, querying, and management. It ensured scalable handling of large datasets and supported decision-making.

EXCEL DASHBOARD KPI'S

- **Sales Amount & Production Cost**

Tracks total revenue and production expenses.
Formula: =SUM(Sales), =SUM(Cost)

- **Total Number of Customers**

Indicates the customer base size.
Formula: =COUNTA(Customer_ID)

- **Avg. Revenue per Customer**

Measures revenue generated per customer.
Formula: =Total Sales / Total Customers

- **Time-wise Sales (Year/Month/Quarter)**

Analyzes sales trends over time.

1. Tip: Use Pivot Table with date grouping.

- **Top 5 / Top 10 Customers by Revenue**

Identifies high-value customers.
Tip: Sort & filter in Pivot Table.

- **Revenue by Region / Country**

Compares revenue contribution by location.
Tip: Use Region/Country in Pivot Table Rows.

- **Repeat Customer Rate**

Measures customer loyalty.
Formula: =Repeat Customers / Total Customers

EXCEL DASHBOARD

TABLEAU DASHBOARD KPI'S

- **Total Sales Revenue**

Measures overall income from sales transactions.

- **Total Orders**

Total number of completed purchases.

- **Avg. Order Value**

Revenue per order on average.
Formula: Total Sales / Total Orders

- **Avg. Revenue per Customer**

Evaluates customer profitability.

- **Total Profit**

Net gain after deducting costs.
Formula: Sales - Cost

- **Category/Sub-category Revenue**

Revenue breakdown by product hierarchy.

- **Top 5 Products by Profit**

Highlights most profitable products.

- **Country-wise Customer Volume**

Shows distribution of customer base.

- **Profit Growth Rate**

Measures profit increase over time.
Formula: (Current Profit - Previous Profit) / Previous Profit

- **Sales Growth Rate**

Tracks revenue growth across periods.

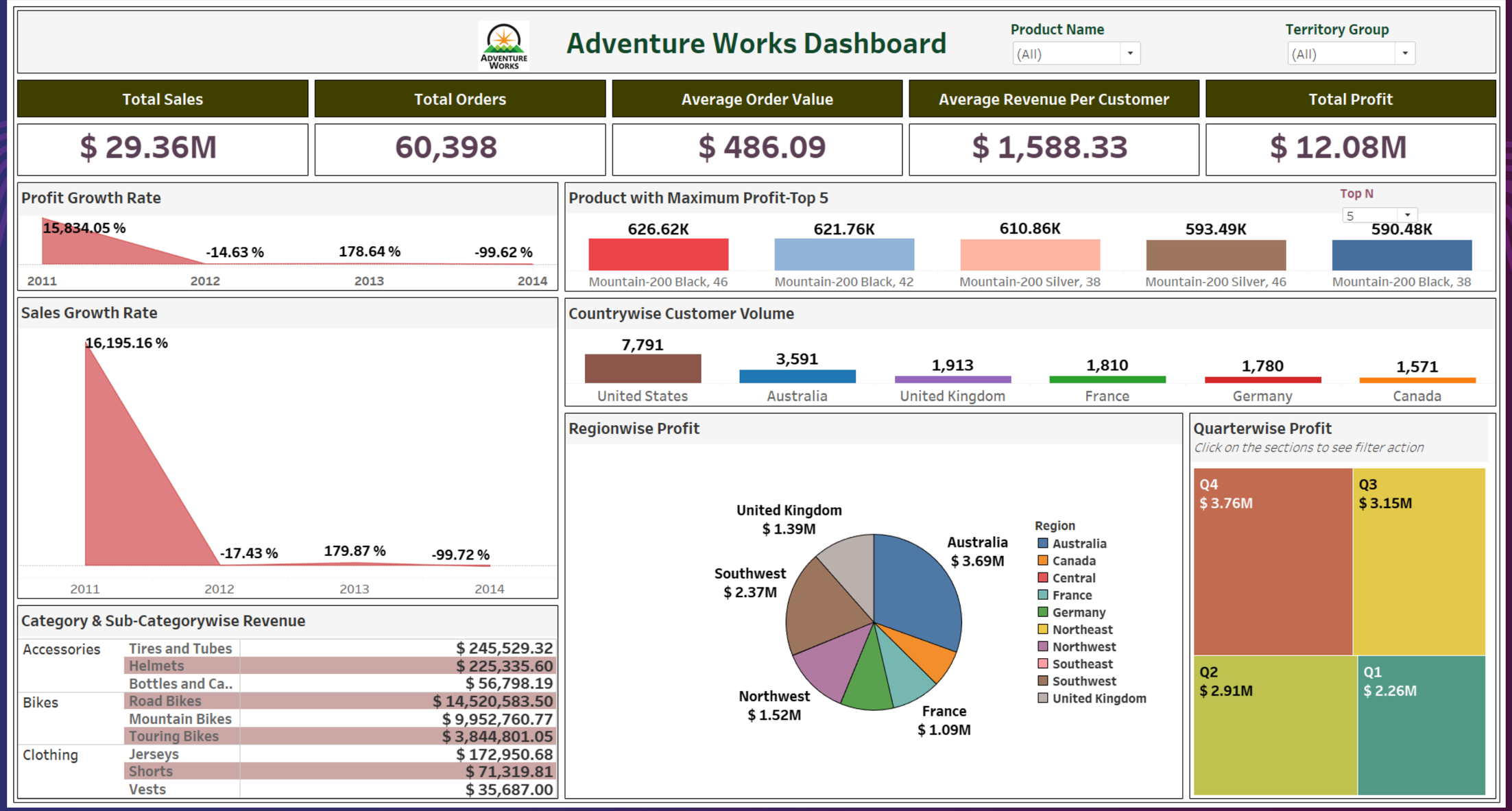
- **Region-wise Profit**

Geographical profit comparison.

- **Quarter-wise Profit**

Profit trend across fiscal quarters.

TABLEAU DASHBOARD



POWER BI DASHBOARD KPI'S

- **Avg. Order Fulfillment Time**

Measures delivery efficiency.

- **Avg. Freight & Shipping Cost**

Tracks logistics expenses per order.
Formula: Total Cost / Total Orders

- **Avg. Profit per Order**

Profitability per transaction.
Formula: Total Profit / Total Orders

- **Sales Order Count by Occupation/Income**

Demographic segmentation of sales.

- **Revenue Contribution by Gender**

Analyzes gender-based revenue share.

- **FY-wise Sales Drilldown**

Deep-dive into yearly sales trends.

- **Total Sales, Cost & Profit by Year**

Annual performance overview.

- **Top 10 Product Profitability**

Identifies high-profit items.

- **Product Affinity by Age/Gender**

Correlates product preference to buyer profiles.

- **Avg. Purchase Frequency per Year**

Customer buying pattern.
Formula: Total Orders / Unique Customers

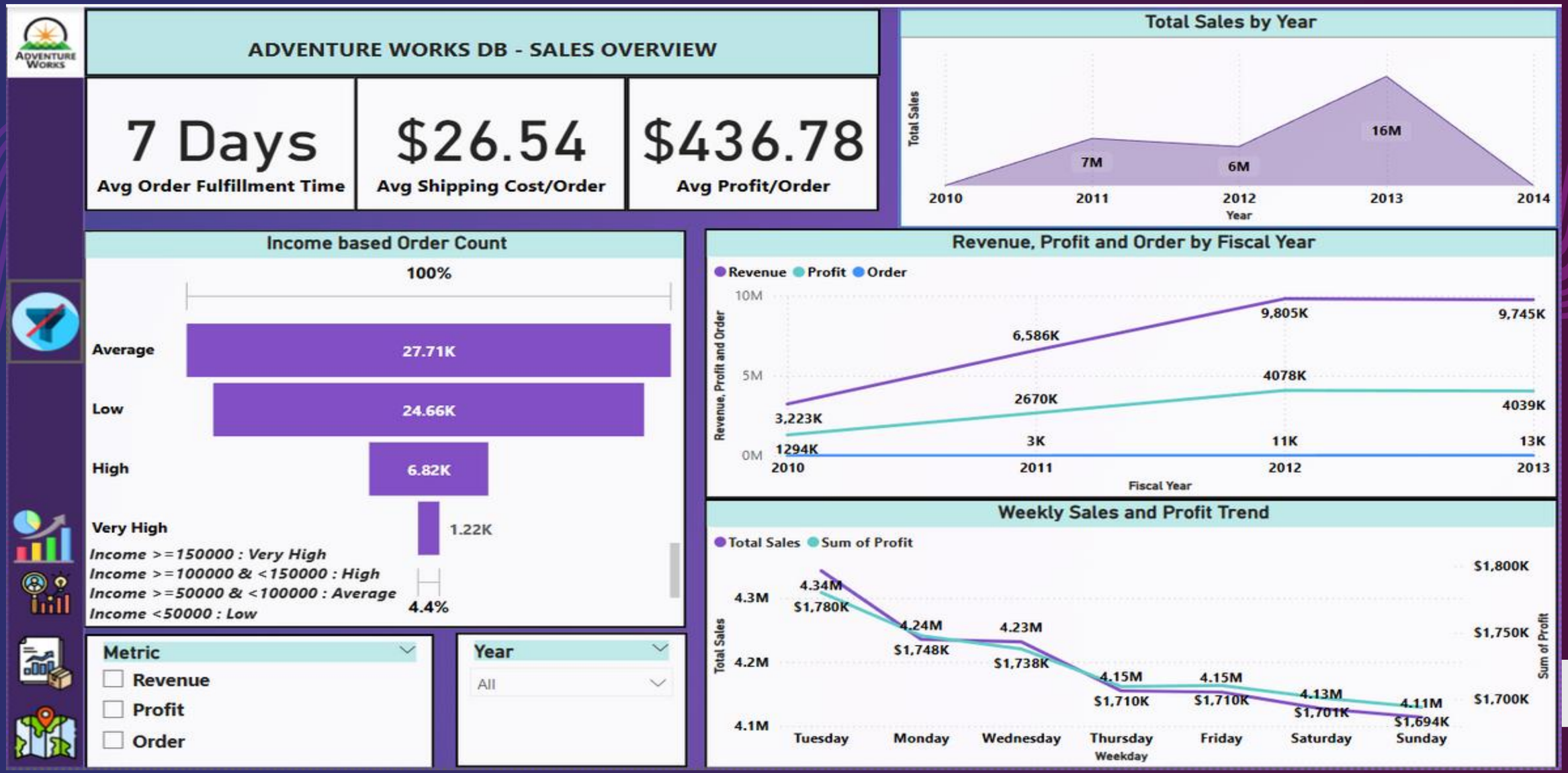
- **Sales Trends Over Time**

Visualizes sales progression chronologically.

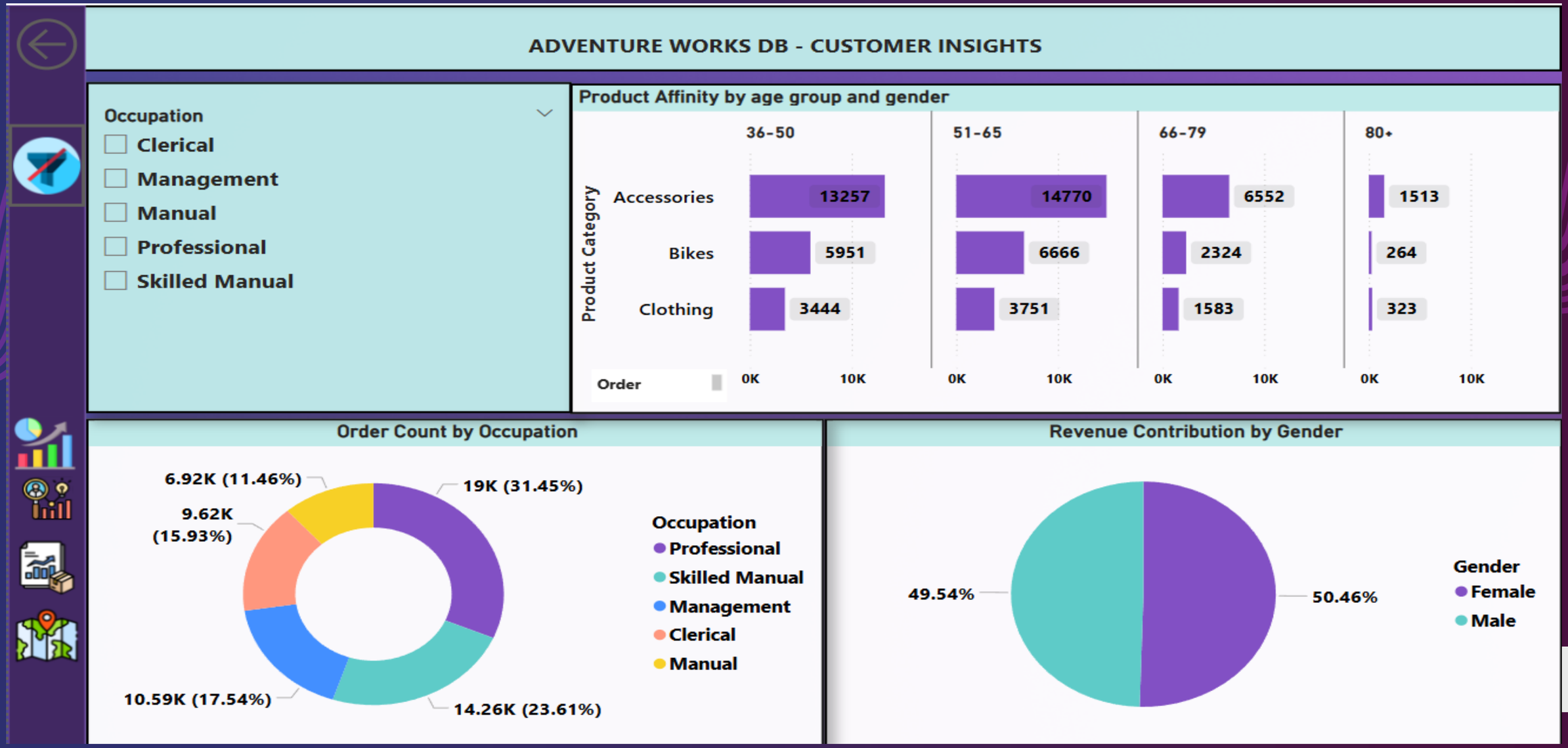
- Tooltip Sales Details

On-hover insights for data points.

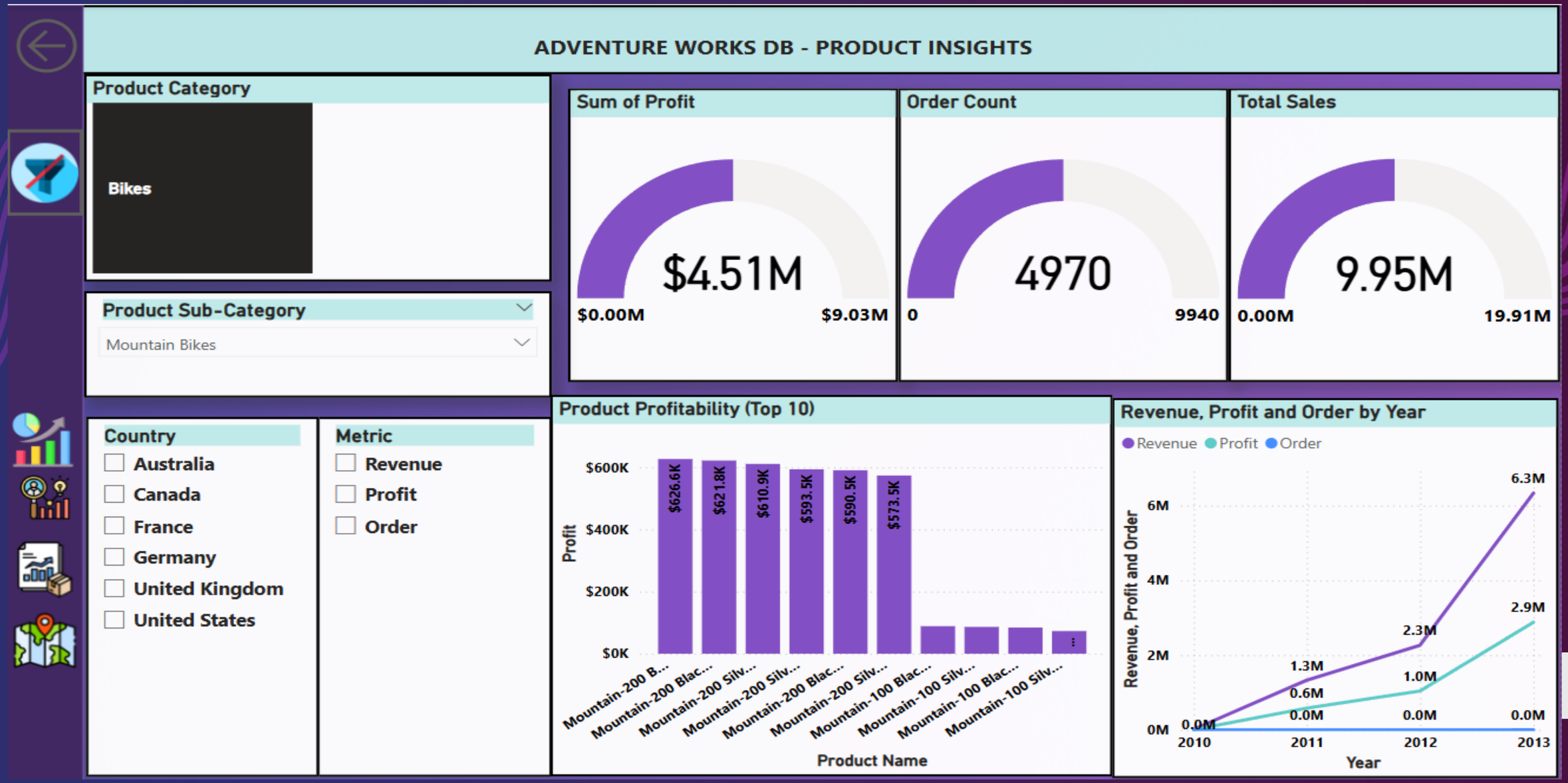
POWER BI DASHBOARD



POWER BI DASHBOARD



POWER BI DASHBOARD



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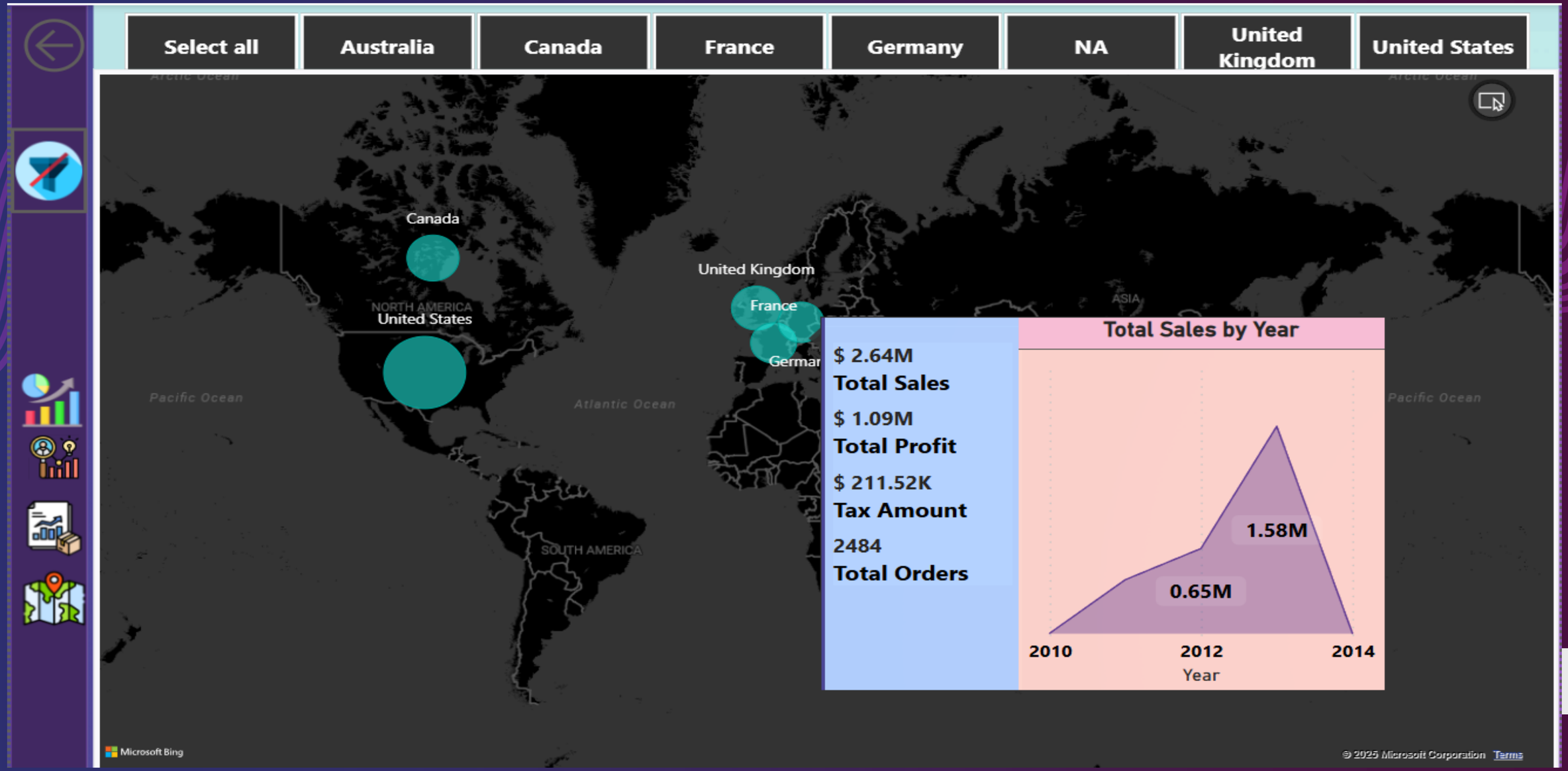


SQL ANALYSIS

- **Total Sales / Total Profit**

Overall revenue and profit from all transactions.

- **Production Cost**

Total cost of manufacturing goods.

- **Avg. Revenue per Customer**

Profitability per customer.
Formula: Total Revenue / Unique Customers

- **Avg. Order Value**

Average sale per order.
Formula: Total Revenue / Total Orders

- **Gender-wise Order Quantity**

Sales distribution by gender demographics.

- **Country-wise & Region-wise Sales**

Geographical breakdown of sales performance.

- **Year-wise / Quarter-wise / Month-wise Trends**

Tracks financial KPIs over time (Sales, Cost, Profit).

- **Region-wise Production Cost – Top 7**

Highest cost-incurring regions.

- **Fiscal Year-wise Profit**

Annual profitability tracking.

- **Sales Territory Group-wise Orders**

Order distribution across sales groups.

- **Category & Sub-category-wise Sales**

Product-level sales performance.

- **Sub-category-wise Orders**

Volume of orders by sub-category.

- **Year-wise Sales & Profit Growth Rate**

Tracks business growth over years.
Formula: (Current - Previous) / Previous

- **Least Selling Products**

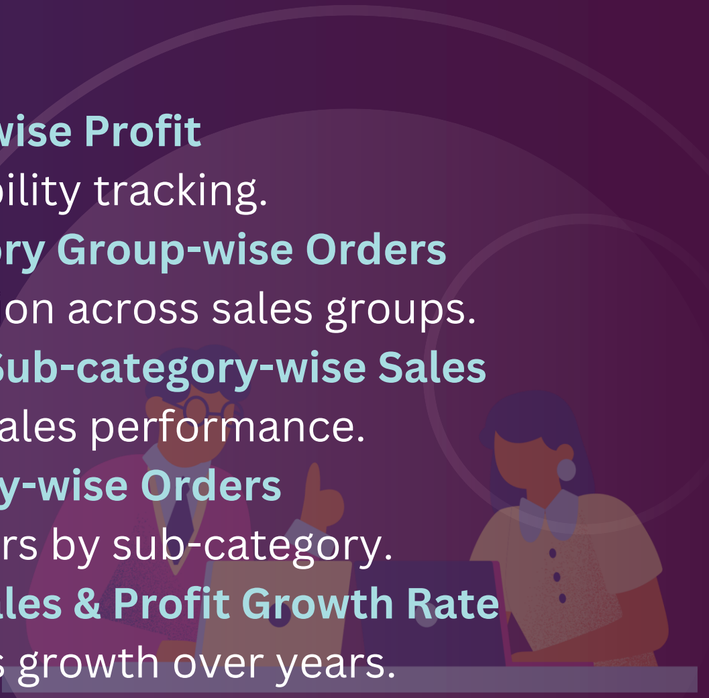
Underperforming products to optimize.

- **Customer Volume – Region & Country (Top 7)**

Top locations by customer count.

- **Top 5 Products by Maximum Profit**

Highlights best-performing products.



SQL ANALYSIS

```sql
#2 Total Profit
select concat(round((sum(SalesAmount)-sum(ProductStandardCost))/1000000,2),'M')
as TotalProfit from sales;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

TotalProfit
12.08M

```sql
#3 Production Cost
select concat(round(sum(ProductStandardCost)/1000000,2),'M') as ProductionCost from sales;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

ProductionCost
17.28M

```sql
#4 Average Revenue per Customer (Total Revenue/Unique Customers)
select round(sum(SalesAmount)/count(distinct CustomerKey),2) as AverageRevenuePerCustomer
from Sales;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

AverageRevenuePerCustomer
1588.33

```sql
#1 Total Sales
select concat(round(sum(SalesAmount)/1000000,2),'M') as TotalSales from sales;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

TotalSales
29.36M

```sql
#5 Average Order value (Total Revenue/Total Orders)
select round(sum(SalesAmount)/count(OrderDateKey),2) as AverageOrderValue from sales;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

AverageOrderValue
486.09

```sql
#6 Genderwise Order Quantity
select case
when c.Gender='M' then 'Male'
when c.Gender='F' then 'Female'
else c.Gender
end as Gender,sum(s.OrderQuantity) as TotalOrderQuantity from dimcustomer c
inner join sales s on c.CustomerKey=s.CustomerKey
group by c. Gender;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Gender	TotalOrderQuantity
Male	30381
Female	30017

```sql
#7 Countrywise Sales
select st.SalesTerritoryCountry as Country,concat(round(sum(s.SalesAmount)/1000000,2),'M') as Sales
from dimsalesterritory st inner join sales s on st.SalesTerritoryKey=s.SalesTerritoryKey
group by Country order by sum(s.SalesAmount) desc;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Country	Sales
United States	9.39M
Australia	9.06M
United Kingdom	3.39M
Germany	2.89M
France	2.64M
Canada	1.98M

SQL ANALYSIS

```
59    #8 Yearwise Sales
60    select OrderDateYear as OrderYear, concat(round(sum(SalesAmount)/1000,2),'K') as TotalSales
61    from sales group by OrderYear order by sum(SalesAmount) desc;
62
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

OrderYear	TotalSales
2013	16351.55K
2011	7075.53K
2012	5842.49K
2014	45.69K
2010	43.42K

```
72    #11 Regionwise Production Cost- Top 7
73    select st.SalesTerritoryRegion as Region,concat(round(sum(s.ProductStandardCost)/1000000,2),'M') as ProductionCost
74    from dimsalesterritory st
75    inner join sales s on st.SalesTerritoryKey=s.SalesTerritoryKey
76    group by Region order by sum(s.ProductStandardCost) desc limit 7;
77
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

Region	ProductionCost
Australia	5.38M
Southwest	3.35M
Northwest	2.13M
United Kingdom	2M
Germany	1.71M
France	1.56M
Canada	1.15M

```
63    #9 Yearwise Quarterwise Sales
64    select OrderDateYear as Year, QuarterOrderDate as Quarter, concat(round(sum(SalesAmount)/1000000,2),'M') as Sales
65    from sales group by Quarter,Year order by sum(SalesAmount) desc;
66
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Year	Quarter	Sales
2013	Q4	5.33M
2013	Q3	4.37M
2013	Q2	3.97M
2013	Q1	2.68M
2011	Q4	2.04M
2011	Q3	1.81M
2011	Q2	1.8M
2012	Q4	1.7M
2012	Q3	1.45M
2011	Q1	1.42M
2012	Q1	1.38M
2012	Q2	1.31M
2014	Q1	0.05M
2010	Q4	0.04M

```
66    #10 Monthwise  Production Cost and Sales Amount
67    select month(OrderDate) as SiNo,MonthNameOrderDate as Month,
68    concat(round(sum(ProductStandardCost)/1000000,2),'M') as ProductionCost ,
69    concat(round(sum(SalesAmount)/1000000,2),'M') as Sales
70    from sales group by SiNo, Month order by SiNo;
71
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

SiNo	Month	ProductionCost	Sales
1	January	1.1M	1.87M
2	February	1.03M	1.74M
3	March	1.13M	1.91M
4	April	1.15M	1.95M
5	May	1.3M	2.21M
6	June	1.73M	2.94M
7	July	1.42M	2.41M
8	August	1.58M	2.69M
9	September	1.49M	2.54M
10	October	1.72M	2.92M
11	November	1.75M	2.98M
12	December	1.88M	3.21M

SQL ANALYSIS

```sql
#16 Yearwise Sales Growth Rate
with cte as(
select OrderDateYear as Year, round(sum(SalesAmount),2) as TotalSales from sales group by Year
)
select Year, TotalSales,concat(round((TotalSales-lag(TotalSales) over(order by Year))/lag(TotalSales) over(order by Year)*100,2
),'%') as SalesGrowthRate from cte;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Year	TotalSales	SalesGrowthRate
2010	43421.04	NULL
2011	7075526.38	16195.16%
2012	5842485.41	-17.43%
2013	16351550.34	179.87%
2014	45694.72	-99.72%

```sql
#13 Sales Territory Group wise Orders
select st.SalesTerritoryGroup as TerritoryGroup,count(OrderDateKey) as Orders
from dimsalesterritory st
inner join sales s on st.SalesTerritoryKey=s.SalesTerritoryKey
group by SalesTerritoryGroup order by Orders desc ;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

TerritoryGroup	Orders
North America	28964
Europe	18089
Pacific	13345

```sql
#14 Category and SubCategory wise sales
select p.ProductCategoryName as category,p.EnglishProductSubcategoryName as Subcategory,
concat(round(sum(SalesAmount)/1000,2),'K') as Sales from dimproduct p
inner join sales s on p.ProductKey=s.ProductKey
group by category,Subcategory order by sum(SalesAmount) desc ;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

category	Subcategory	Sales
Bikes	Road Bikes	14520.58K
Bikes	Mountain Bikes	9952.76K
Bikes	Touring Bikes	3844.8K
Accessories	Tires and Tubes	245.53K
Accessories	Helmets	225.34K
Clothing	Jerseys	172.95K
Clothing	Shorts	71.32K
Accessories	Bottles and Cages	56.8K
Accessories	Fenders	46.62K
Accessories	Hydration Packs	40.31K
Accessories	Bike Stands	39.59K
Accessories	Bike Racks	39.36K
Clothing	Vests	35.69K
Clothing	Gloves	35.02K
Clothing	Caps	19.69K
Accessories	Cleaners	7.22K
Clothing	Socks	5.11K

```sql
#15 Subcategorywise Orders
select  p.EnglishProductSubcategoryName as Subcategory,count(OrderDateKey) as Orders
from dimproduct p
inner join sales s on p.ProductKey=s.ProductKey
group by Subcategory order by Orders desc ;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Subcategory	Orders
Tires and Tubes	17332
Road Bikes	8068
Bottles and Cages	7981
Helmets	6440
Mountain Bikes	4970
Jerseys	3332
Caps	2190
Touring Bikes	2167
Fenders	2121
Gloves	1430
Shorts	1019
Cleaners	908
Hydration Packs	733
Socks	568
Vests	562
Bike Racks	328
Bike Stands	249

SQL ANALYSIS

```sql
#19 Country by Customer Volume Top 7
select st.SalesTerritoryCountry as Country,count(distinct s.CustomerKey) as CustomerVolume from dimsalesterritory st
inner join sales s on st.SalesTerritoryKey=s.SalesTerritoryKey
group by Country order by CustomerVolume desc limit 7;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Country	CustomerVolume
United States	7819
Australia	3591
United Kingdom	1913
France	1810
Germany	1780
Canada	1571

```sql
#20 Top 5 Product with Maximum Profit
select p.EnglishProductName as Product, concat(round(sum(s.SalesAmount-s.ProductStandardCost)/1000,2),'K') as TotalProfit
from sales s inner join dimproduct p on s.ProductKey=p.ProductKey
group by Product order by sum(s.SalesAmount-s.ProductStandardCost) desc limit 5;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

Product	TotalProfit
Mountain-200 Black, 46	626.62K
Mountain-200 Black, 42	621.76K
Mountain-200 Silver, 38	610.86K
Mountain-200 Silver, 46	593.49K
Mountain-200 Black, 38	590.48K

```sql
#17 Least Selling Products
select p.EnglishProductName as Product,concat(round(sum(s.SalesAmount)/1000,2),"k") as TotalSales from dimproduct p
inner join sales s on p.ProductKey=s.ProductKey
group by Product order by sum(s.SalesAmount) limit 10;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

Product	TotalSales
Racing Socks, L	2.43k
Racing Socks, M	2.68k
Bike Wash - Dissolver	7.22k
Patch Kit/8 Patches	7.31k
Touring Tire Tube	7.43k
Road Tire Tube	9.48k
Classic Vest, S	10.67k
Half-Finger Gloves, L	10.85k
Half-Finger Gloves, S	11.95k
Half-Finger Gloves, M	12.22k

```sql
#18 Region by Customer Volume Top 7
select st.SalesTerritoryRegion as Region,count(s.CustomerKey) as CustomerVolume from dimsalesterritory st
inner join sales s on st.SalesTerritoryKey=s.SalesTerritoryKey
group by Region order by CustomerVolume desc limit 7;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

Region	CustomerVolume
Australia	13345
Southwest	12265
Northwest	8993
Canada	7620
United Kingdom	6906
Germany	5625
France	5558

```sql
#21 Yearwise Profit Growth Rate
with ProfitData as(
select OrderDateYear as Year, round(sum(SalesAmount-ProductStandardCost),2) as TotalProfit
from sales group by Year ),
ProfitGrowth as(
select Year, TotalProfit, round(lag(TotalProfit) over(order by Year),2) as PreviousYearProfit,
case when lag(TotalProfit) over(order by Year) is null then null
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Year	TotalProfit	PreviousYearProfit	ProfitGrowthRate
2010	17849.02	NULL	NULL
2011	2844071.44	17849.02	15834.05%
2012	2428003.91	2844071.44	-14.63%
2013	6765345.53	2428003.91	178.64%
2014	25549.93	6765345.53	-99.62%

IMPROVING BUSINESS OPERATIONS

Data analysis enables Adventure Works Cycles to make smarter, faster decisions by turning raw sales and customer data into actionable insights. It helps the company:

Strategic Insights from Data

- Identifies high-value customers through purchase frequency segmentation
- Optimizes regional sales strategies (e.g., strong performance in the U.S.)
- Highlights top-performing age groups and product categories
- Reveals trends that support market expansion goals

Operational Benefits

- Improves profit margins by analyzing e-commerce vs. direct sales
- Supports inventory and supply chain decisions
- Enables data-driven decisions across departments through dashboards

CHALLENGES IN DATA ANALYSIS

Data Structure Complexity
Resolved using Power Query and data modeling

Tableau Visualization Formatting
Resolved through format optimization and layout tweaking

Optimizing Dashboard Performance
•Handling large datasets and complex filters in Power BI led to performance lag. By optimizing queries, restructuring data models, and leveraging team expertise, we fine-tuned performance for seamless real-time updates.

THANK YOU!

WE SINCERELY APPRECIATE YOUR TIME AND ATTENTION THROUGHOUT OUR PRESENTATION. THIS PROJECT HAS BEEN A VALUABLE LEARNING EXPERIENCE, ALLOWING US TO EXPLORE VARIOUS TOOLS AND TECHNIQUES TO ANALYZE DATA EFFECTIVELY. WE EXTEND OUR HEARTFELT GRATITUDE TO OUR MENTORS, TEAMMATES, AND EVERYONE WHO SUPPORTED US DURING THIS JOURNEY. YOUR GUIDANCE AND FEEDBACK HAVE BEEN INSTRUMENTAL IN SHAPING OUR INSIGHTS AND REFINING OUR WORK. WE WELCOME ANY QUESTIONS OR SUGGESTIONS AND LOOK FORWARD TO MEANINGFUL DISCUSSIONS. THANK YOU ONCE AGAIN!