Financial Analysis Project – AdventureWorks2022

Introduction

For this project, the **AdventureWorksDW2022** database will be used, containing data from *Adventure Works Cycles,* a fictitious multinational company that manufactures bicycles, parts, and accessories, headquartered in the United States with operations in multiple countries.

The main objective of this project is to analyze **U.S. sales data denominated in USD** to generate strategic insights that enable a better understanding of regional and product performance, profitability, and sales trends over time.

The project will follow the **CRISP-DM (Cross-Industry Standard Process for Data Mining)** methodology. Starting from defining the business objectives and exploring the data in **SQL Server**, to preparing, modeling, and visualizing the results in **Power BI**. The analysis will be driven by **key business questions** aiming to **uncover insights** into revenue, cost, profit, and overall performance across regions and products.

Key Questions

This analysis will aim to answer five main business questions:

1. What is the total revenue, cost, and profit from U.S. sales in USD?
2. Which regions in the U.S. generate the highest revenue and profit?
3. Which products or categories contribute most to revenue and profit?
4. What is the profitability margin across regions and products?
5. How has the revenue and profit evolved over time (yearly or quarterly trends)?

By addressing these questions, it will be possible to identify high-performing regions and products, assess profitability and efficiency, and uncover trends that support strategic business decisions.

Data Exploration

The exploratory data analysis and data preparation were conducted in **Microsoft SQL Server Management Studio (SSMS)** using **SQL queries**. The objective of this stage was to

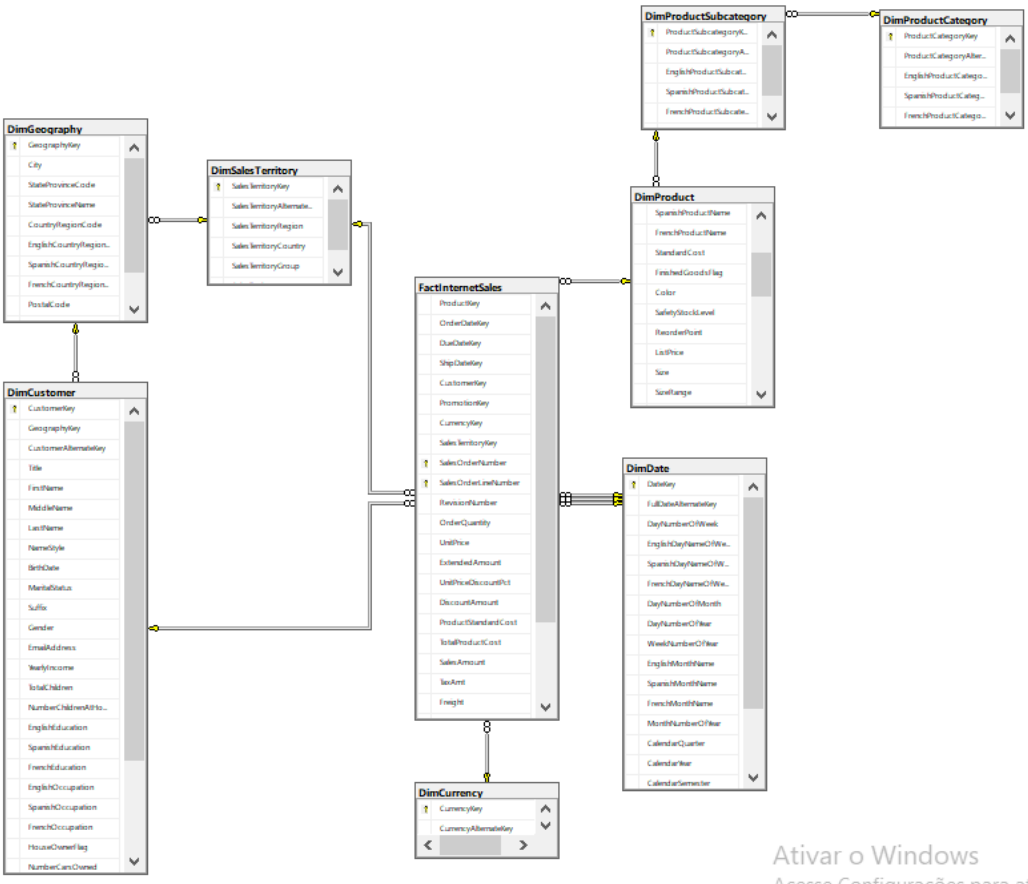
understand the dataset, identify potential data quality issues, and ensure that only accurate and relevant records would be used in the visualization phase in Power BI.

After analyzing the available data, the main tables identified for this project are:

- **FactInternetSales**: Stores all internet sales transactions. Includes sales amount, total product cost, product key, sales territory key, order date key, and currency key.
- **DimProduct**: Contains product information such as product name, category, and subcategory.
- **DimDate**: Provides the date hierarchy for trend analysis (year, quarter, month).
- **DimSalesTerritory**: Contains geographical information such as country, and region.
- **DimCurrency**: Contains information about the currency used in each transaction.

Table Relationships:

- **FactInternetSales** is related to **DimProduct** via **ProductKey**
- **FactInternetSales** is related to **DimDate** via **OrderDateKey**
- **FactInternetSales** is related to **DimSalesTerritory** via **SalesTerritoryKey**
- **FactInternetSales** is related to **DimCurrency** via **CurrencyKey**



After identifying the main tables and understanding their relationships, a more in-depth analysis of the data was performed. The goal was to gain initial insights, explore the available information, and properly map the data that will later be imported into Power BI.

- **Table: DimCurrency**

  Understand which currencies exist in the database and where.

The initial exploration of the database revealed that there are **105 different currencies** registered in the dataset.

```
SELECT
    *
FROM
    DimCurrency
```

%

Results | Messages

	CurrencyKey	CurrencyAlternateKey	CurrencyName
	92	CHF	Swiss Franc
	93	BDT	Taka
	94	SIT	Tolar
	95	TTD	Trinidad and Toba...
	96	TND	Tunisian Dinar
	97	TRL	Turkish Lira
	98	GBP	United Kingdom P...
	99	UYU	Uruguayan Peso
0	100	USD	US Dollar
1	101	KRW	Won
2	102	JPY	Yen
3	103	CNY	Yuan Renminbi
4	104	ZWD	Zimbabwe Dollar
5	105	PLN	Zloty

- **Table: FactInternetSales + DimCurrency + DimSalesTerritory**

  FactInternetSales table contains **33,400 rows** of transactions in **USD (U.S. Dollars)**.

```sql
SELECT
    C.CurrencyAlternateKey,
    COUNT(*) AS RowsNumber
FROM
    FactInternetSales AS S
INNER JOIN
    DimCurrency AS C
ON
    S.CurrencyKey = C.CurrencyKey
GROUP BY
    C.CurrencyAlternateKey
ORDER BY
    RowsNumber DESC
```

Results | Messages

CurrencyAlternateKey	RowsNumber
USD	33400
AUD	12988
CAD	7135
GBP	6740
DEM	76
FRF	59

From the **33,400 transactions** containing USD as the currency, only **21,318** are inside the **United States**. There are **12,082 transactions** outside the United States. That indicates that USD transactions also appear in countries outside the U.S. – a point that required further attention to ensure accurate analysis.

```sql
SELECT
    COUNT(*) AS NumberOfRows_US
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
```

```sql
SELECT
    COUNT(*) AS NumberOfRowOutside_US
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry <> 'United States'
```

Results | Messages

NumberOfRows_US
21318

NumberOfRowOutside_US
12082

USD appears in unexpected non-US regions: **France** and **Germany**.

```
SELECT
    C.CurrencyAlternateKey,
    T.SalesTerritoryCountry,
    T.SalesTerritoryRegion
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry <> 'United States'
```

Results | Messages

CurrencyAlternateKey	SalesTerritoryCountry	SalesTerritoryRegion
USD	France	France
USD	France	France
USD	Germany	Germany
USD	France	France
USD	France	France
USD	France	France
USD	France	France

It was also observed that within the **United States**, there were transactions recorded in **CAD (Canadian Dollars)**. To maintain data consistency and precision, filters were applied to include only transactions where both the **SalesTerritoryCountry = 'United States'** and **CurrencyAlternateKey = 'USD'**.

```sql
SELECT
    T.SalesTerritoryCountry,
    COUNT(*) AS RowsNumber
FROM
    FactInternetSales AS S
INNER JOIN  DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
GROUP BY
    T.SalesTerritoryCountry
ORDER BY
    RowsNumber DESC

SELECT
    COUNT(*) AS NUMBERROWS
FROM
    FactInternetSales AS S
INNER JOIN  DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
```

Results | Messages

SalesTerritoryCountry	RowsNumber
United States	21344

NUMBERROWS
21318

26 rows in the **United States** had **CAD** currency. Which explains the mismatch from the number of transactions above.

```sql
SELECT
    C.CurrencyAlternateKey
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey <> 'USD'
    AND SalesTerritoryCountry = 'United States'
```

Results | Messages

CurrencyAlternateKey
CAD
CAD
CAD
CAD
CAD
CAD
CAD
CAD
CAD
CAD
CAD
CAD
CAD

uery executed successfully. | DESKTOP-OTS73KL (16.0 RTM) | DESKTOP-OTS73KL\Leonar... | AdventureWorksDW2022 | 00:00:00 | 26 rows

After defining the correct scope for U.S. transactions, a check for **duplicate rows** was performed, and **no duplicates were found**, confirming that each order and product combination appeared only once. Each SalesOrderNumber equals 1.

```sql
SELECT
    SalesOrderNumber,
    ProductKey,
    COUNT(*) AS cnt
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
GROUP BY
    SalesOrderNumber,
    ProductKey
HAVING
    COUNT(*) > 0
```

Results | Messages

SalesOrderNumber	ProductKey	cnt
SO51309	214	1
SO51400	214	1
SO51403	214	1
SO51404	214	1
SO51436	214	1
SO51437	214	1
SO51449	214	1
SO51508	214	1
SO51585	214	1
SO51590	214	1
SO51677	214	1

Query executed successfully. | DESKTOP-OTS73KL (16.0 RTM) | DESKTOP-OTS73KL\Leonar... | AdventureWorksDW2022 | 00:00:00 | 21.318 rows

Subsequently, to confirm data completeness, a **null value check** was conducted across the dataset, confirming that there were **no missing values** in the relevant fields used for analysis.

```sql
SELECT
    COUNT(*) AS TotalRows,
    SUM(CASE WHEN ProductKey IS NULL THEN 1 ELSE 0 END) NullProductKey,
    SUM(CASE WHEN OrderDateKey IS NULL THEN 1 ELSE 0 END) AS NullOrderDateKey,
    SUM(CASE WHEN SalesAmount IS NULL THEN 1 ELSE 0 END) AS NullSalesAmount
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
```

Results | Messages

TotalRows	NullProductKey	NullOrderDateKey	NullSalesAmount
21318	0	0	0

After validating the dataset, it was found that the **U.S. Sales Territory** is divided into **five regions**: Southwest, Northwest, Southeast, Northeast, and Central. This structure was important for regional comparison and performance analysis later in the project.

```sql
SELECT DISTINCT
    C.CurrencyAlternateKey,
    T.SalesTerritoryCountry,
    T.SalesTerritoryRegion
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
```

Results | Messages

CurrencyAlternateKey	SalesTerritoryCountry	SalesTerritoryRegion
USD	United States	Northeast
USD	United States	Southwest
USD	United States	Northwest
USD	United States	Southeast
USD	United States	Central

- **Table: DimDate**

In relation to time, the dataset contains sales data from **2005 to 2014**.

```sql
SELECT DISTINCT
    DATEPART(YEAR, D.FullDateAlternateKey) AS YEAR
FROM
    DimDate AS D
ORDER BY
    DATEPART(YEAR, D.FullDateAlternateKey)
```

Results | Messages

YEAR
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

However, **only the years 2010 to 2014** include actual sales transactions. Therefore, all analysis will focus exclusively on this period to ensure data relevance.

```sql
SELECT
    D.CalendarYear,
    SUM(S.SalesAmount) AS Revenue,
    SUM(S.TotalProductCost) AS Cost,
    SUM(S.SalesAmount - S.TotalProductCost) AS Profit
FROM
    FactInternetSales AS S
INNER JOIN DimDate AS D
ON S.OrderDateKey = D.DateKey
INNER JOIN DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
GROUP BY
    D.CalendarYear
ORDER BY
    D.CalendarYear
```

Results | Messages

CalendarYear	Revenue	Cost	Profit
2010	14833,8982	8839,1833	5994,7149
2011	2458285,1726	1476689,7775	981595,3951
2012	1437048,73	833050,1295	603998,6005
2013	5461224,32	3161996,2252	2299228,0948
2014	17542,85	7733,2658	9809,5842

- **Table: FactInternetSales + DimSalesTerritory + DimCurrency + DimDate**

The next step involved the calculation of **Revenue, Cost, Profit, and Margin % per region** within the United States. The analysis revealed that the **Southwest region** achieved the highest total profit, followed by **Northwest, Southeast, Northeast,** and **Central**. Interestingly, the regions with the highest total profit tend to have the lowest margins, while the regions with the smaller total profits have higher margins. Meaning that some regions may generate high revenue and profit through volume, while others operate with more efficient pricing or cost structures. These insights will be extremely valuable to guide management decisions regarding pricing strategies, regional performance evaluations, and resource allocation.

```sql
SELECT
    T.SalesTerritoryRegion,
    SUM(S.SalesAmount) AS Revenue,
    SUM(S.TotalProductCost) AS Cost,
    SUM(S.SalesAmount - S.TotalProductCost) AS Profit,
    SUM(S.SalesAmount - S.TotalProductCost)/SUM(S.SalesAmount) * 100 AS MarginPercent
FROM
    FactInternetSales AS S
INNER JOIN
    DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN
    DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
GROUP BY
    T.SalesTerritoryRegion
ORDER BY
    Profit DESC
```

Results | Messages

SalesTerritoryRegion	Revenue	Cost	Profit	MarginPercent
Southwest	5717806,0722	3346206,6256	2371599,4466	41,47
Northwest	3649356,7512	2129915,9172	1519440,834	41,63
Southeast	12238,8496	6906,4234	5332,4262	43,56
Northeast	6532,4682	3629,7059	2902,7623	44,43
Central	3000,8296	1649,9092	1350,9204	45,01

To ensure accuracy of all aggregated results, the **sum of revenues per region** was compared with the **total revenue for the U.S.,** confirming that both values matched.

```sql
WITH RegionalRevenue
AS
(
    SELECT
        T.SalesTerritoryRegion,
        SUM(S.SalesAmount) AS RevenueRegion
    FROM
        FactInternetSales AS S
    INNER JOIN DimCurrency AS C ON S.CurrencyKey = C.CurrencyKey
    INNER JOIN DimSalesTerritory AS T ON S.SalesTerritoryKey = T.SalesTerritoryKey
    WHERE
        C.CurrencyAlternateKey = 'USD'
        AND T.SalesTerritoryCountry = 'United States'
    GROUP BY
        T.SalesTerritoryRegion
)

SELECT
    (SELECT
        SUM(SalesAmount)
    FROM
        FactInternetSales AS S
    INNER JOIN DimCurrency AS C ON  S.CurrencyKey = C.CurrencyKey
    INNER JOIN DimSalesTerritory AS T ON S.SalesTerritoryKey = T.SalesTerritoryKey
    WHERE
        C.CurrencyAlternateKey = 'USD'
        AND T.SalesTerritoryCountry = 'United States') AS TotalRevenue_US,
    SUM(RevenueRegion) AS SumRegionalRevenue
FROM
    RegionalRevenue
```

Results | Messages

TotalRevenue_US	SumRegionalRevenue
9388934,9708	9388934,9708

The same validation was applied to the **sum of annual revenues**, which also aligned with the total U.S. revenue, confirming that the aggregation and filters were correctly applied.

```sql
WITH YearsRevenue
AS
(
    SELECT
    D.CalendarYear,
    SUM(S.SalesAmount) AS RevenueYear,
    SUM(S.TotalProductCost) AS Cost,
    SUM(S.SalesAmount - S.TotalProductCost) AS Profit
FROM
    FactInternetSales AS S
INNER JOIN DimDate AS D
ON S.OrderDateKey = D.DateKey
INNER JOIN DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
GROUP BY
    D.CalendarYear
)

SELECT
    (SELECT
        SUM(SalesAmount)
    FROM
        FactInternetSales AS S
    INNER JOIN DimCurrency AS C ON  S.CurrencyKey = C.CurrencyKey
    INNER JOIN DimSalesTerritory AS T ON S.SalesTerritoryKey = T.SalesTerritoryKey
    WHERE
        C.CurrencyAlternateKey = 'USD'
        AND T.SalesTerritoryCountry = 'United States') AS TotalRevenue_US,
    SUM(RevenueYear) AS SumYearsRevenue
FROM
    YearsRevenue
```

Results | Messages

TotalRevenue_US	SumYearsRevenue
9388934,9708	9388934,9708

- **Table: FactInternetSales + DimProduct + DimProductSubcategory + DimSalesTerritory + DimCurrency**

Finally, the analysis identified the **Top 10 products sold in the United States**. All of them were **bicycles**, specifically from the **Mountain** and **Road Bike** subcategories, indicating that these two are the main revenue drivers for the U.S. market.

```sql
SELECT TOP 10
    PC.EnglishProductCategoryName,
    PS.EnglishProductSubcategoryName,
    P.EnglishProductName AS Product,
    SUM(S.SalesAmount) AS Revenue,
    SUM(S.TotalProductCost) AS Cost,
    SUM(S.SalesAmount - S.TotalProductCost) AS Profit
FROM
    FactInternetSales AS S
INNER JOIN DimProduct AS P
ON S.ProductKey = P.ProductKey
INNER JOIN  DimProductSubcategory AS PS
ON P.ProductSubcategoryKey = PS.ProductSubcategoryKey
INNER JOIN DimProductCategory AS PC
ON PS.ProductCategoryKey = PC.ProductCategoryKey
INNER JOIN DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    C.CurrencyAlternateKey = 'USD'
    AND SalesTerritoryCountry = 'United States'
GROUP BY
    PC.EnglishProductCategoryName,
    PS.EnglishProductSubcategoryName,
    P.EnglishProductName
ORDER BY
    Revenue DESC
```

Results | Messages

EnglishProductCategoryName	EnglishProductSubcategoryName	Product	Revenue	Cost	Profit
Bikes	Mountain Bikes	Mountain-200 Black, 46	525060,9256	285737,6701	239323,2555
Bikes	Mountain Bikes	Mountain-200 Silver, 42	485872,1892	264424,4853	221447,7039
Bikes	Road Bikes	Road-150 Red, 48	483066,45	293124,717	189941,733
Bikes	Mountain Bikes	Mountain-200 Silver, 46	473277,9576	257505,3334	215772,6242
Bikes	Mountain Bikes	Mountain-200 Silver, 38	453889,47	247001,3395	206888,1305
Bikes	Mountain Bikes	Mountain-200 Black, 38	452031,0654	246030,1715	206000,8939
Bikes	Road Bikes	Road-150 Red, 62	447283,75	271411,775	175871,975
Bikes	Mountain Bikes	Mountain-200 Black, 42	443096,9972	241168,4176	201928,5796

Summary:

An initial data exploration and preparation phase was conducted from **AdventureWorksDW2022** to build a USD-only, US-focused dataset for Power BI. Initial scans found **105 different currencies.** There are **33,400** transactions recorded in USD globally; **21,318** of those are inside the United States. During the cleaning process, transactions outside the US and non-USD records inside the US (e.g., CAD) were removed. Data validation was performed on row counts, and totals; Nulls and duplicates were checked, date coverage was inspected, revenue metrics were calculated, and the Top 10 performing products were identified (all bikes - Mountain or Road) The dataset is now validated and ready to import into Power BI.

Power BI Data Preparation, Cleaning, and Modeling

For the import of the **FactInternetSales** table, a SQL query was used to filter **only transactions in the United States** and **only in USD currency.** This approach ensures that the fact table contains **clean and relevant data**, aligned with the project objectives. A screenshot of the query and the resulting table preview from Power Query are attached to illustrate this filtering.

```sql
SELECT
    *
FROM
    FactInternetSales AS S
INNER JOIN DimSalesTerritory AS T
ON S.SalesTerritoryKey = T.SalesTerritoryKey
INNER JOIN DimCurrency AS C
ON S.CurrencyKey = C.CurrencyKey
WHERE
    T.SalesTerritoryCountry = 'United States'
    AND C.CurrencyName = 'US Dollar'
```

SalesTerritoryCountry	SalesTerritoryGroup	SalesTerritoryImage	CurrencyKey2	CurrencyAlternateKey
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
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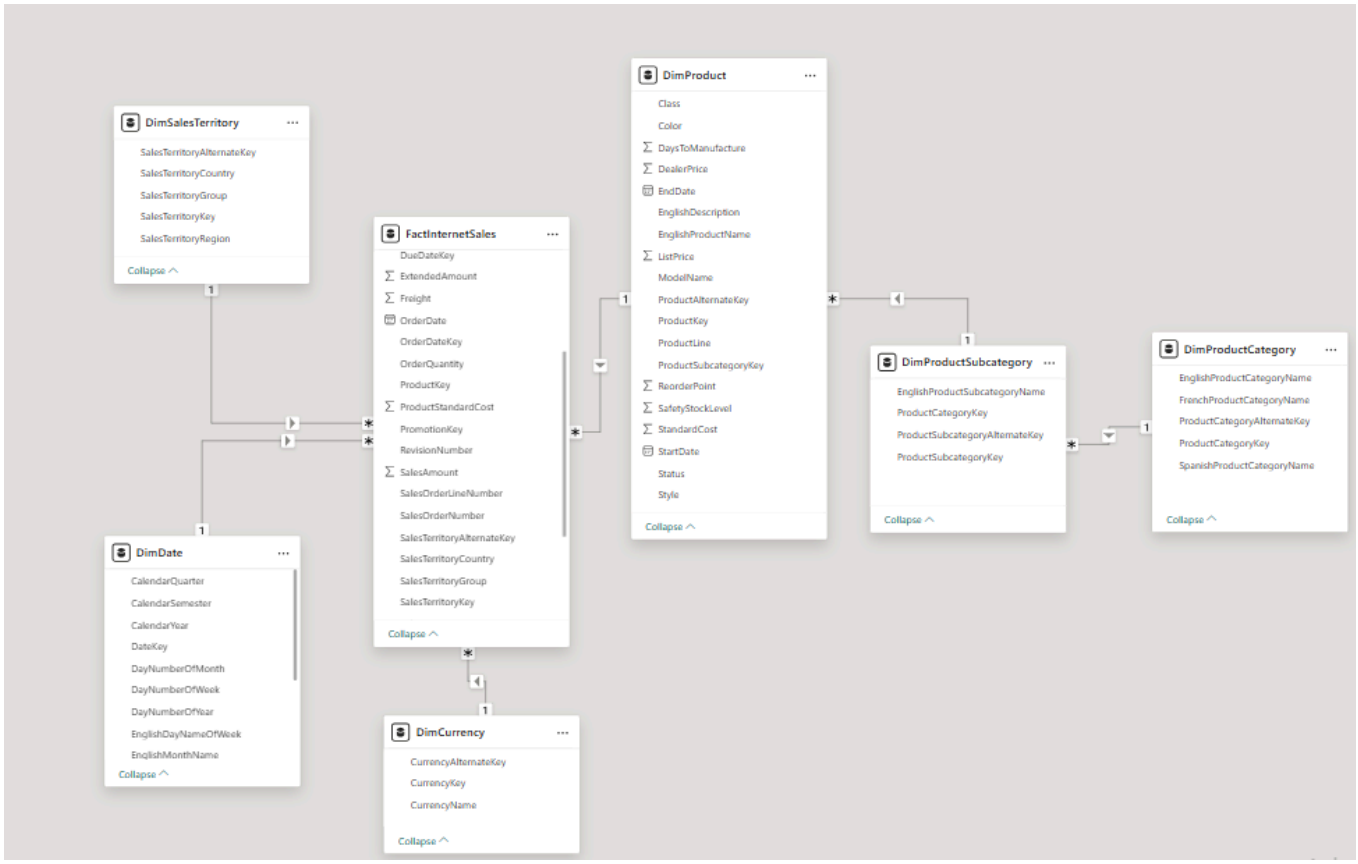
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD
United States	North America	Binary	100	USD

The **product tables**: **DimProduct, DimProductSubcategory, and DimProductCategory,** were imported in full, as they are essential for analyzing products, subcategories, and categories in the project.

The **dimension tables: DimSalesTerritory, DimCurrency, and DimDate**, were also imported fully. These tables are relatively small and importing them in full made the process simpler while still allowing all necessary relationships and calculations in Power BI.

Before building the model, all tables were reviewed to ensure the **columns had the correct data types** (text, number, date) avoiding potential issues in reports and calculations.

After this check, the tables were organized into a **snowflake schema**, with **FactInternetSales** as the central fact table and the dimensions: **DimProduct, DimProductSubcategory, DimProductCategory, DimSalesTerritory, DimCurrency, and DimDate**, connected through verified relationships.

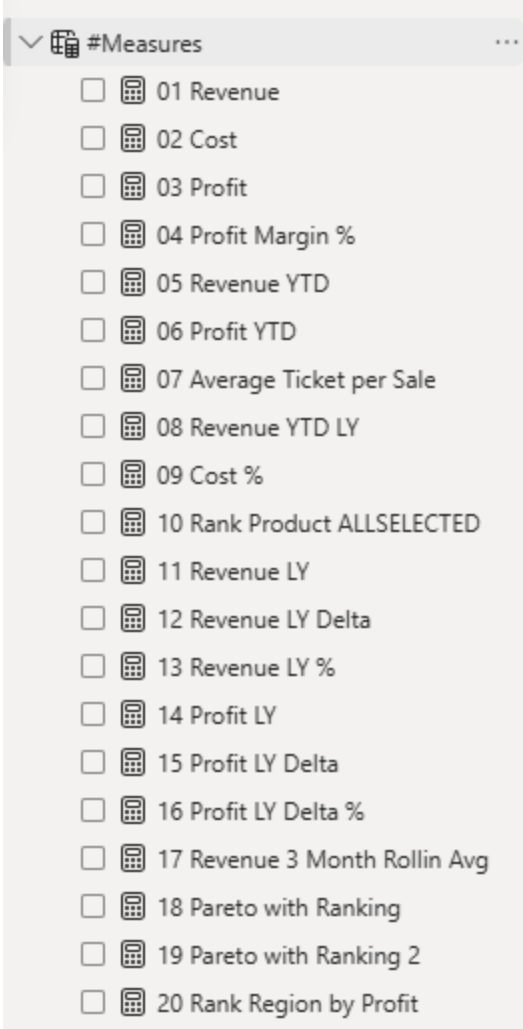


Dashboard Construction

The first step in creating the dashboard was to set up DAX measures. These measures help turn the AdventureWorksDW2022 data into clear numbers that can be analyzed by time, region, and product.

Creating these measures made it possible to answer the main business questions with confidence. Each one has a specific role in the project, helping to understand the data and find useful insights.

DAX Measures:



01 Revenue: Calculates total revenue.

```
01 Revenue = SUM(FactInternetSales[SalesAmount])
```

02 Cost: Calculates total cost.

```
02 Cost = SUM(FactInternetSales[TotalProductCost])
```

03 Profit: Calculates profit.

```
03 Profit = [01 Revenue] - [02 Cost]
```

04 Profit Margin %: Calculates profitability as a percentage of revenue.

```
04 Profit Margin % =
DIVIDE(
    [03 Profit],
    [01 Revenue]
)
```

05 Revenue YTD: Calculates revenue year-to-date.

```
05 Revenue YTD =
TOTALYTD(
    [01 Revenue],
    DimDate[FullDateAlternateKey]
)
```

06 Profit YTD: Shows cumulative profit year-to-date.

```
06 Profit YTD =
TOTALYTD(
    [03 Profit],
    DimDate[FullDateAlternateKey]
)
```

07 Average Ticket per Sale: Calculates average revenue per transaction.

```
07 Average Ticket per Sale =
DIVIDE(
    [01 Revenue],
    COUNTROWS(FactInternetSales)
)
```

08 Revenue YTD LY: Calculates revenue year-to-date last year.

```
08 Revenue YTD LY =
CALCULATE(
    [05 Revenue YTD],
    DATEADD(
        DimDate[FullDateAlternateKey],
        -1,
        YEAR
    )
)
```

09 Cost %: Calculates cost %.

```
09 Cost % =
DIVIDE(
    [02 Cost],
    [01 Revenue]
)
```

10 Rank Product ALLSELECTED: Ranks products by revenue.

```
10 Rank Product ALLSELECTED =
VAR RNK =
    RANKX(
        ALLSELECTED(DimProduct),
        [01 Revenue],
        ,
        DESC
    )
RETURN
IF(
    [01 Revenue],
    RNK
)
```

11 Revenue LY: Shows last year revenue.

```
11 Revenue LY =
VAR LY =
    CALCULATE(
        [01 Revenue],
        SAMEPERIODLASTYEAR(DimDate[FullDateAlternateKey])
    )
RETURN
IF(
    [01 Revenue],
    LY
)
```

12 Revenue LY Delta: Shows difference from last year revenue.

```
12 Revenue LY Delta =
VAR LYDELTA =
    [01 Revenue] - [11 Revenue LY]
RETURN
IF(
    [11 Revenue LY],
    LYDELTA
)
```

13 Revenue LY %: Shows percentage change in revenue from last year.

```
13 Revenue LY % =
DIVIDE(
    [12 Revenue LY Delta],
    [11 Revenue LY]
)
```

14 Profit LY: Calculates last year's profit.

```
14 Profit LY =
VAR PLY =
    CALCULATE(
        [03 Profit],
        SAMEPERIODLASTYEAR(DimDate[FullDateAlternateKey])
    )
RETURN
IF(
    [03 Profit],
    PLY
)

```

15 Profit LY Delta: Calculates change in profit from last year.

```
15 Profit LY Delta =
VAR PLYD =
    [03 Profit] - [14 Profit LY]
RETURN
IF(
    [14 Profit LY],
    PLYD
)
```

16 Profit LY Delta %: Shows percentage change in profit from last year.

```
16 Profit LY Delta % =
DIVIDE(
    [15 Profit LY Delta],
    [14 Profit LY]
)
```

17 Revenue 3 Months Rolling Avg: Revenue over last 3 months.

```
17 Revenue 3 Month Rollin Avg =
AVERAGEX(
    DATESINPERIOD(
        DimDate[FullDateAlternateKey],
        MAX(DimDate[FullDateAlternateKey]),
        -3,
        MONTH
    ),
    [Revenue]
)
```

18 Pareto with Ranking: Shows cumulative revenue % for products to apply 80/20 analysis.

```
18 Pareto with Ranking =
VAR ranking = [10 Rank Product ALLSELECTED]
VAR TotalRevenue = CALCULATE([01 Revenue], ALLSELECTED(DimProduct))
VAR acumulado =
        CALCULATE(
            [01 Revenue],
            FILTER(
                ALLSELECTED(DimProduct),
                [10 Rank Product ALLSELECTED] <= ranking
            )
        )
RETURN
DIVIDE(
    acumulado,
    TotalRevenue
)
```

19 Pareto with Ranking 2: 80/20 distribution. Top products generating ~80% of revenue.

```
19 Pareto with Ranking 2 =
VAR RevProd =
    MAXX(
        ALLSELECTED(DimProduct),
        [10 Rank Product ALLSELECTED]
    )
RETURN
DIVIDE(
    [10 Rank Product ALLSELECTED],
    RevProd
)
```

20 Rank Region by Profit: Ranks region by profit.

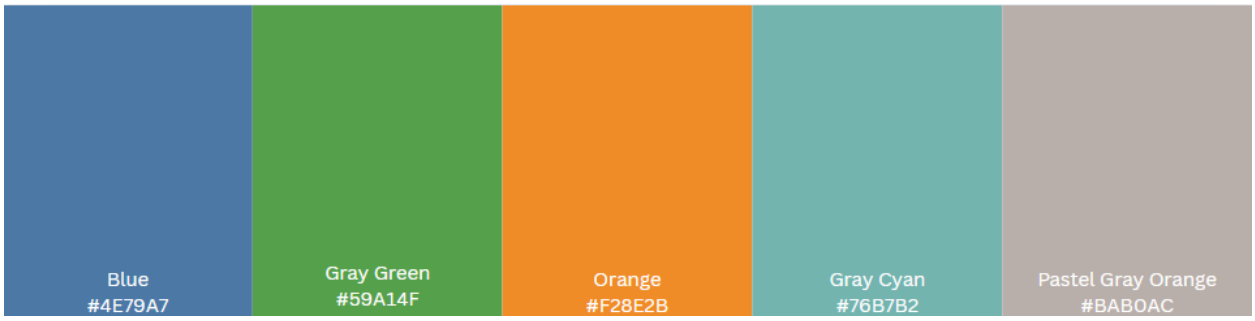
```
20 Rank Region by Profit =
RANKX(
    ALLSELECTED(DimSalesTerritory[SalesTerritoryRegion]),
        [03 Profit],,
        DESC
)
```

Dashboard Design

After setting up the data model, the next step was to define the dashboard layout. A light background was chosen to keep the interface clean, while contrasting accent colors highlight key metrics. Customer color themes were imported into Power BI via a JSON file, ensuring visual consistency across all pages. The layout and color palette were selected to emphasize the most relevant information, and maintain a minimalistic, business-focused style.

financial_project_pallete_finalv.json

```
{
    "name": "Financial_Project_AdventureWorksDW2022",
    "dataColors" : [
                    "#4E79A7",
                    "#59A14F",
                    "#F28E2B",
                    "#76B7B2",
                    "#BAB0AC"
                ]
}
```



Dashboard Presentation

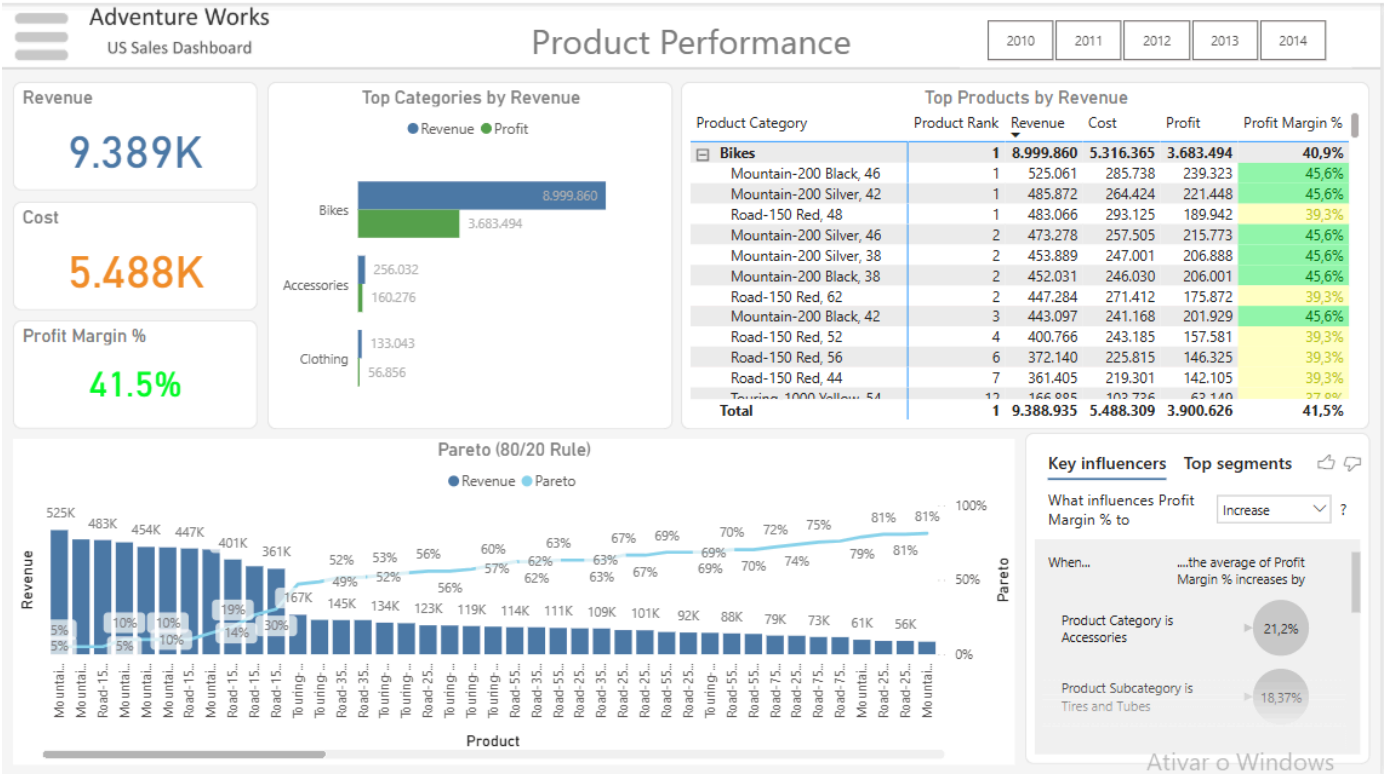
To answer the project's questions, three interactive dashboards were developed. Each dashboard focuses on a different analysis area.

Executive Overview

The first dashboard provides a summary of **US sales performance**, presenting key financial metrics and trends over time. There are four **KPI Cards (Revenue, Cost, Profit, and Average Ticket per Sale).** Also, there are visuals which detail the performance evolution and comparisons. The **horizontal bar chart** displays the **Revenue by Region** to help identify which region generates the most sales. The **line chart** tracks **Profit Margin % by Year** to show the changes in profitability over time. The **combo chart** compares **Profit and Revenue by Month** to show monthly performance patterns. The **clustered column chart** compares the **Revenue vs. Cost by Year** to provide a view of efficiency. And the last graph, the **line graph** shows **Revenue YTD and Revenue YTD LY** to make it easier to compare year-over-year performance.

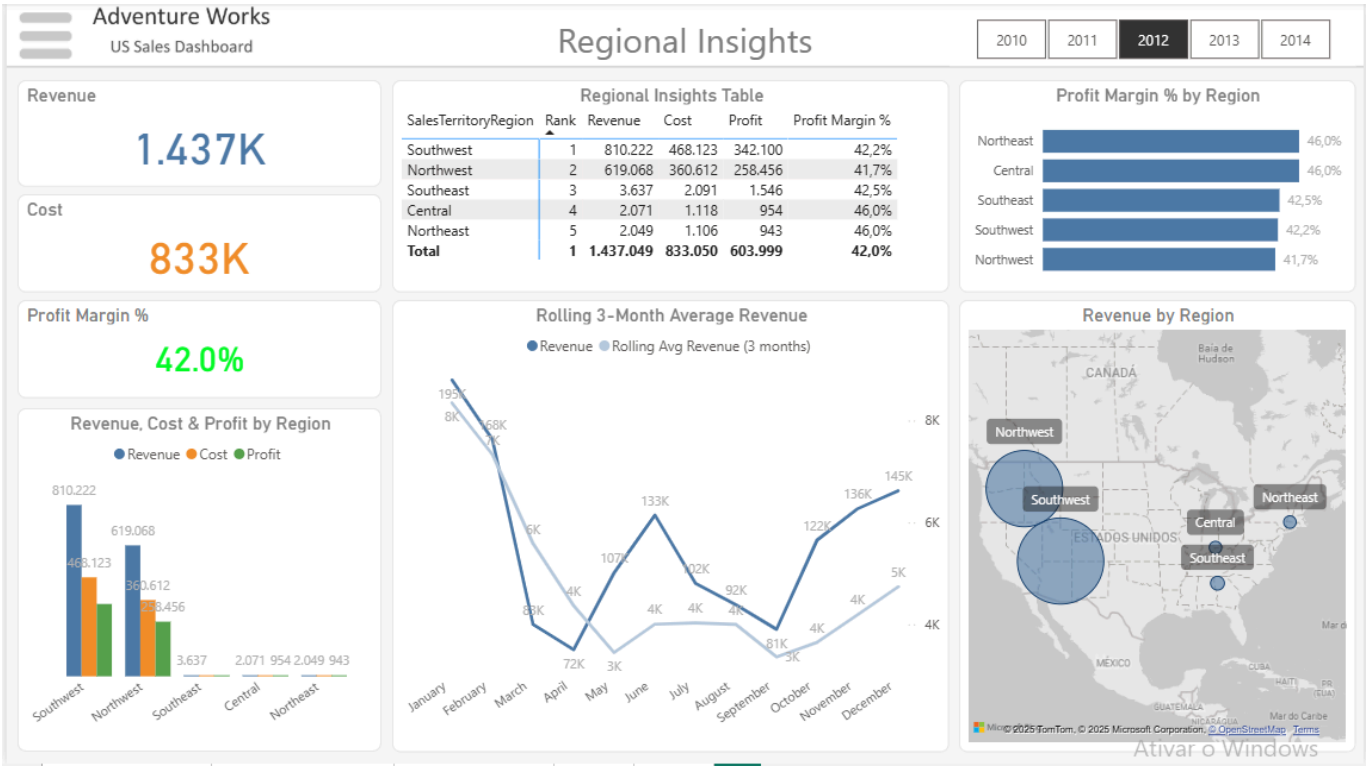
Product Performance

This dashboard focuses on identifying which product categories and products contribute the most to the company's profitability. There are three **KPI cards (Revenue, Cost, and Profit Margin %)** to provide an overview of the company's performance at the product level. The **horizontal bar chart** highlights the **Top Categories by Revenue** to offer a view of which categories are driving the highest revenue and profit. By its side, there is a **matrix table** listing the **Top Products by Revenue**, it details their **Rank, Revenue, Cost, Profit, and Profit Margin %.** To further analyze the contribution, a **Pareto 80/20 chart** demonstrates how a small portion of the products is responsible for the majority of its revenue, which reinforces the idea of product prioritization. Lastly, a **Key Influencers visual** helps identify which attributes are influencing **Profit Margin %** to either increase or decrease.



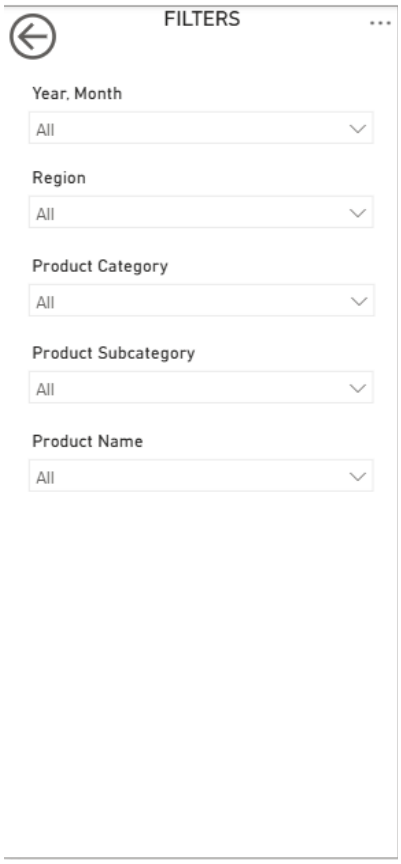
Regional Insights

The third dashboard explores **how performance varies across U.S. regions.** The dashboard contains the same three **KPI cards (Revenue, Cost, and Profit Margin %)** to offer an overview of financial performance by region. A **clustered column chart** shows **Revenue, Cost, and Profit by Region** to demonstrate which region generates the strongest financial outcome. The **Regional Insights Table** brings key metrics like **Rank, Revenue, Cost, Profit, and Profit Margin %** for each region to provide insights. A **line chart** displays **Revenue** and the **Rolling 3-Month Average Revenue** to show performance trends over time. A **horizontal bar chart** shows **Profit Margin % by Region** to help identify which regions are the most efficient. Lastly, a **map** presents the geographic distribution, where the bubble sizes reflect **Revenue by Region.**



Navigation Menu

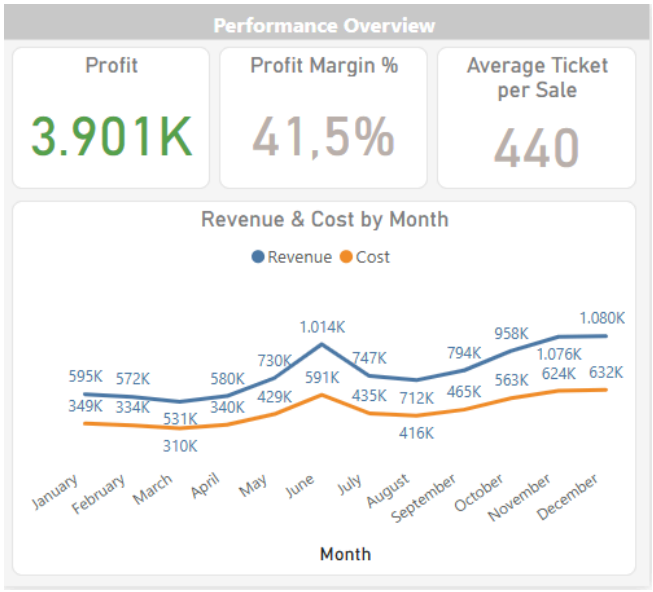
In order to improve the dashboard's usability and interaction, a collapsible navigation menu was created to the left side of the dashboard, which allows users to interact and easily switch between the main dashboards. The menu appears when clicking on the button pressing **Ctrl**. When opening the menu, there is the possibility to filter the data by **Year, Month, Region, Product Category, Product Subcategory, and Product Name.** The main idea behind the creation of the **Navigation Menu** was to keep a clean layout while also keeping the navigation always accessible. This design helps maintain the focus on the visuals while also offering a structured flow through the entire analysis.



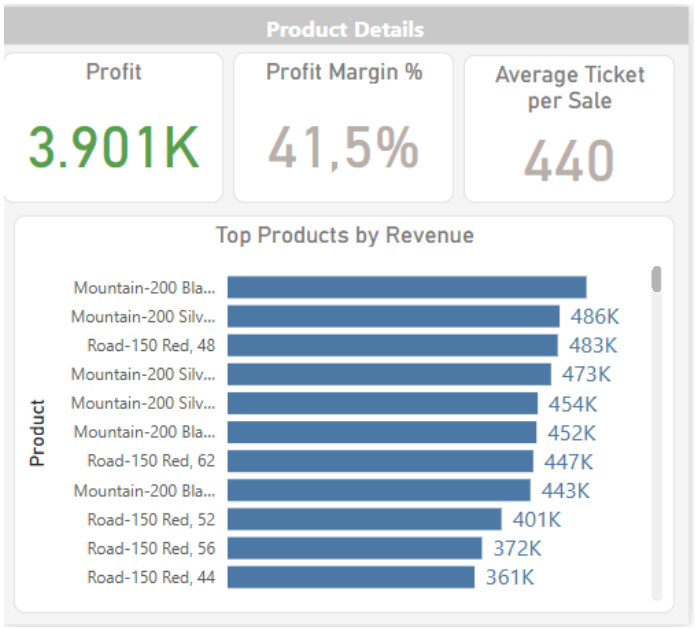
Tooltip Pages

The purpose behind the creation of the **tooltips** is to provide contextual details without overcrowding the main dashboards. When hovering over the charts, tooltips will reveal complementary metrics and visuals, which allows deeper insights within the visualization. There was also an idea behind linking the **tooltips —** when the graph is showing a temporal trend, hovering over it will show a tooltip with products, or categories. And when the graph is showing products or categories, hovering over it will show temporal trends.

- **Tooltip 1: Performance Overview**
    - It has three cards (**Profit, Profit Margin %,** and **Average Ticker per Sale**.
    - **Line Chart** displaying **Revenue and Cost by Month**.
    - The purpose of this tooltip is to provide context when exploring **non-temporal visuals**, such as how cost and revenue trends behave over time for the selected region or category.



- **Tooltip 2: Product Details**
  - It has three cards (**Profit, Profit Margin %,** and **Average Ticker per Sale**.
  - **Horizontal bar chart** displaying **Top Products by Revenue**.
  - The purpose of this tooltip is to provide context to temporal analyses by revealing which **products** are driving the performance at specific time points.



Key Insights

After analyzing the data through the three dashboards, important findings were identified regarding **US sales performance**.

- **Overall Performance:**

Between 2010-2014, U.S. sales totaled **$9.39M** in **revenue**, **$5.49M** in **cost**, and **$3.90M** in **profit.** The profit margin varied from **40-55%.** Growth peaked in **2013,** mainly driven by volume expansion and new product categories.

- **Early Stage (2010-2011):**

Operations began in the **Southwest and Northwest**. Revenue grew from **$15k to $2.46M,** with consistent **~40% margins** and high **average tickets (~$3K).** Only **Road and Mountain bikes** were sold in the beginning, with **Mountain bikes** having the highest margin (**~43.8%).** Sales were **seasonal**, peaking **mid-year (June)** and again in **Q4**. Profit grew steadily until June, then dropped, and rebounded late in the year.

- **Expansion & Diversification (2012):**

The company expanded nationally, **Southeast, Central, and Northeast** regions appeared. **Revenue** dipped to **$1.44M**, but **margins improved to 42%,** which shows better efficiency. **Accessories (62.6%)** and **Clothing (49%)** were introduced, highly profitable segments. Key influencers for this year were related to the commercialization of **Accessories** or **Tires & Tubes**. Those were the main reasons for an increase in profit margin %. **Southwest and Northwest** led in volume, while the smaller new regions achieved **higher margins (up to 46%).**

- **Growth & Consolidation (2013):**

Strongest year. **$5.46M** in **revenue**, **$2.3M** in **profit**, and **42.1% margin.** Clear **seasonality** with mid-year and end-year peaks. **Mountain bikes** led sales and profitability (**~45.4% margin**); **Touring bikes** overtook **Road bikes** for second place. **Accessories** remained key margin drivers **(62.6%)**, with **Jerseys** lowering its profitability **(23%),** and **socks, gloves, shorts, and vests** driving the profitability up (**62.6%). Southeast** achieved the highest **profit margin (43.9%)**, despite lower total revenue. The **Pareto** rule here explained that the **top ~27 products (mostly bikes)** generated **80% of revenue.**

- **High-Margin Shift (2014 - Partial Data):**

Only January was recorded for the year of 2014. **$18K** in **revenue**, **55.9% margin**, highest to date. It focused entirely on **Accessories** and **Clothing**; no bike sales were recorded. **Accessories (62.6%)** and **Clothing (43.6%)** dominated for the year. **Jerseys** were responsible

for reducing **margin (~~38%)**. **Northwest** led in revenue; **Southeast** had the highest margin (**~62%).**

- **Takeaways:**

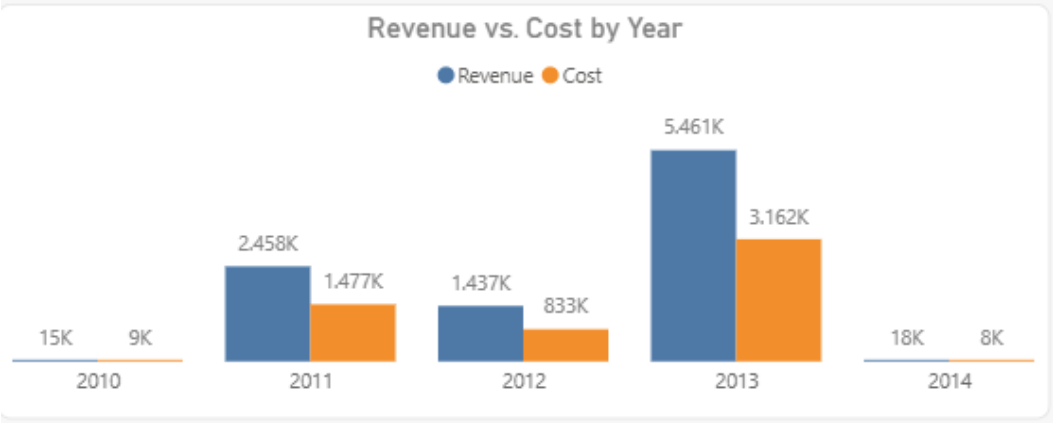
Revenue grew while maintaining strong margins. **Western regions** (Southwest and Northwest) drove most revenue; **Eastern/Central regions** achieved better efficiency. **Accessories and Clothing** became huge profit drivers, while **Bikes** stayed volume leaders. The **Pareto** rule gave the insight that a small % of SKUs consistently generated ~80% of sales. Some key influencers to have a higher profitability were to low the costs and focus on **Accessories/Tires & Tubes**. **The year of 2013** had an unusually low average tickets but high revenue. It is possible that the reason behind that was bulk sales or promotions.

Questions

1. **What is the total revenue, cost, and profit from U.S. sales in USD?**

Across all available years (2010-2014), total U.S. sales amount to approximately **$9.39M** in **Revenue, $5.48M** in **Cost, $3.91M** in **Profit** and **~41.5%** in **Average Profit Margin.** The steady profitability, even during the first years (expansion), suggests that the company had a solid cost control and consistent pricing strategy. The company started small in **2010**, which had only $15K in revenue (likely its first year of operation), and then reached a strong peak in **2013** with $5.46M in revenue. In **2014** it went down again but only January data is available.

These insights indicate a **rapid growth between 2011 and 2013**, which was mostly driven by bike sales (Road and Mountain), with accessories and clothing starting to appear more towards the end.



Regional Insights Table

SalesTerritoryRegion	Rank	Revenue	Cost	Profit	Profit Margin %
Southwest	1	5.717.806	3.346.207	2.371.599	41,5%
Northwest	2	3.649.357	2.129.916	1.519.441	41,6%
Southeast	3	12.239	6.906	5.332	43,6%
Northeast	4	6.532	3.630	2.903	44,4%
Central	5	3.001	1.650	1.351	45,0%
Total	**1**	**9.388.935**	**5.488.309**	**3.900.626**	**41,5%**

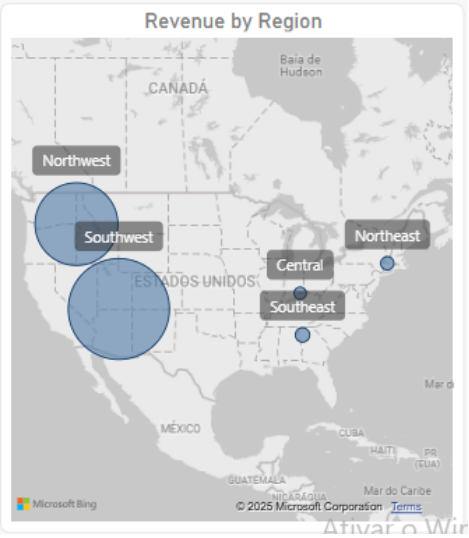
2. **Which regions in the U.S. generate the highest revenue and profit?**

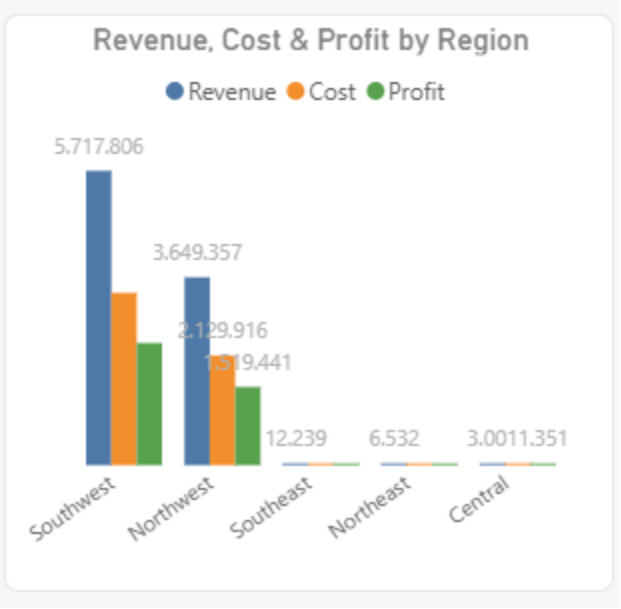
Southwest and Northwest are the leaders every year for both revenue and profit. These two regions represent the company's core markets, accounting for the majority of total sales in all years. Their **profit margins** vary between **39% and 42%**, which is slightly lower than the other smaller regions due to their high sales volume and possibly more competitive pricing.

Southeast shows strong profitability (up to **43.9% in 2013)** even though its revenue is smaller. That indicates a potential for margin-driven growth if the company opts to expand there.

Central and Northeast appeared in 2012-2013 with small sales (most likely test markets), but with **higher average ticket values**, which was due to fewer, high-priced orders.

The **West regions** drive by volume, while the other **emerging regions** show a really good potential for higher margins and should be targeted for strategic growth.



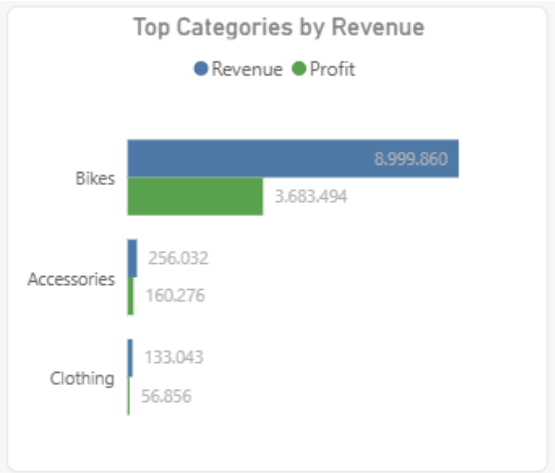


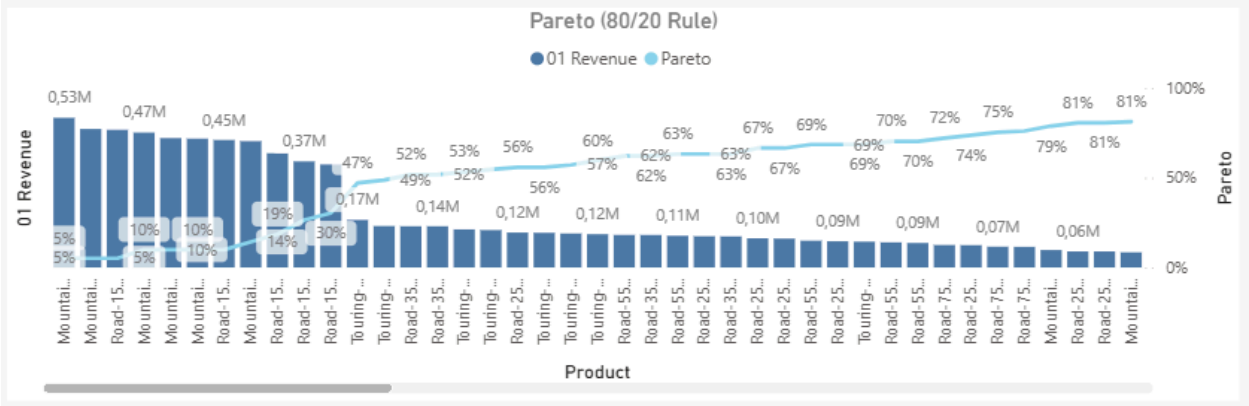
3. **Which products or categories contribute most to revenue and profit?**

Bikes are clearly the dominant revenue driver throughout all the years. **Road and mountain bikes** consistently lead sales. **Mountain bikes** deliver a slightly higher profit margin (43-46%) compared to **Road bikes** (~39%). **Touring bikes** appeared for the first time in 2012, which indicates product diversification.

Accessories emerged as a **high-margin category** (~62.6%) in 2012. **Tires & Tubes** have the strongest effect on profit margin, increasing average margin by over **19%**. **Clothing** contributes in a moderate way to revenue. However, it has a **wide profit margin range** (23-62%), depending on the type of the item. Jerseys tend to reduce the overall profit margin by **38%**, while **shorts, gloves, and socks** improve it significantly.

In 2010-2011, **top 5 products** generated **~80% of revenue.** In 2013, it had more product diversification, **top 27 products** generated 80% of total revenue. This is an indicator of company growth and broader sales distribution across SKUs.



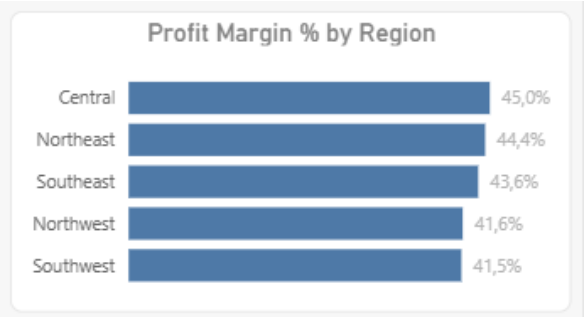


4. **What is the profitability margin across regions and products?**

In 2010-2011, profit margin varied around **39-40%**, for both **Southwest and Northwest.** In 2012-2013, the average increased to **42-43%**, with new regions showing higher margins. In 2014, overall margin peaked at **55.9%**, mainly driven by the dominance of accessories and clothing in January sales.

Accessories were the best profitability driver: **~62.6%**. **Clothing** was the second one with **~43-44%**, but very sensitive to product type. **Bikes** had **~41-45%** even though it had the largest share of revenue.

Bikes clearly bring the revenue, and **accessories** bring the profit. A good idea here is to maintain a balanced portfolio of both categories in order to have more sustainable growth in the future.



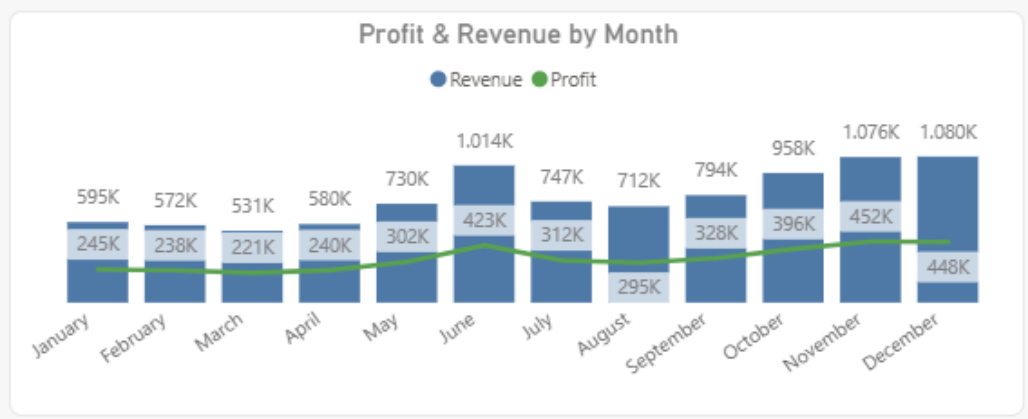
Top Products by Revenue

Product Category	Product Rank	Revenue	Cost	Profit	Profit Margin %
⊞ Bikes	1	8.999.860	5.316.365	3.683.494	40,9%
⊞ Accessories	12	256.032	95.757	160.276	62,6%
⊞ Clothing	17	133.043	76.187	56.856	42,7%
Total	**1**	**9.388.935**	**5.488.309**	**3.900.626**	**41,5%**

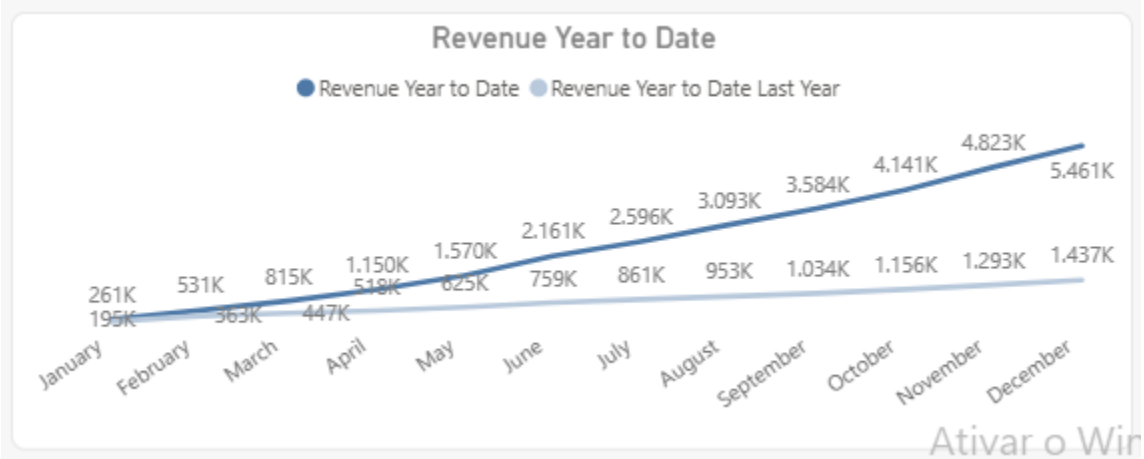
5. **How have revenue and profit evolved over time (yearly or quarterly trends)?**

In **2010**, which was the company's launch year, only **$15K** in revenue from limited sales in the **Southwest and Northwest**. Only bikes were sold. In **2011**, the expansion started, revenue grew to **$2.46M,** steady **39.9% margin**, and seasonal peaks mid-year and by the end of the year again. In **2012**, it went down to **$1.44M**. **Central, Southeast, and Northeast** regions appeared. Introduction of **accessories and clothing** started to diversify income sources. In **2013,** it is where it peaked. **$5.46M in revenue, $2.3M in profit** while having a **42.1%** margin. Consistent growth from January to June, dips in July to August, then recovers strongly in Q4. Profitability rises due to a better **product mix (accessories and clothing)**. In **2014**, only January, strong **55.9% margin**, but limited to only accessories and clothing, no bikes. Which means that the company opted for a shift toward higher-margin products.

Rapid expansion from **2011 to 2013** then followed by a product diversification and a focus on profitability in **2013 and 2014**.



2013



Summary

During the years from **2010 to 2014,** the company evolved from a small, regional bike seller into a more diversified retailer with national presence and different product categories. Revenue skyrocketed from **$15K** in **2010** to **$5.46M in 2013**. The average profit margin remained consistent during all years, which proves consistent cost efficiency. The company initially started its operations in the **Southwest and Northwest**, then gradually expanded to the **Southeast, Central, and Northeast** by **2012-2013**.

In **2010-2011** the company only sold **bikes (road and mountain).** Starting in **2012,** the company diversified its products to **accessories and clothing**, which were huge for margin gains. **Accessories** had the highest margin (**~62.6%**), then **clothing (~43%),** followed by bikes with **~41-45%.**

Average ticket per sale varied by region, with **higher values in new markets** (Central and Northeast) **and lower values in mature regions** (Southwest, Northwest). Which indicates that mature regions relied on high volume sales, more than new regions.

Sales were stronger in **June, October,** and **December** across several years. Profit margin improved during the years, rising from **~39% to 42%+**, showing that the company improved its efficiency and diversification.

Final Recommendations

The first recommendation is to expand in high-margin regions, mainly the **Southeast and Northeast** which have a higher profit margin despite having lower sales volume. What could be done here is trying to increase the **targeted marketing**, offer different **localized promotions,** and also invest in these regions to scale without sacrificing margins. Additionally, continue to diversify the product mix offered. Continue growing with accessories and clothing, specially in subcategories like tires, tubes, gloves, and socks, which improved overall profitability.

Optimize the pricing in mature regions, **Southwest and Northwest**. Profit margins are lower in these regions due to its volume-based competition. A good idea would be to introduce **loyalty programs or bundle deals** to raise average ticket value. Regarding inventory and different seasons, there is a need to strengthen its inventory planning around different seasons. The peaks in June, October, and December suggest a focus on bikes. Optimize the stock and marketing around these periods in order to avoid shortages and maximize sales.

The final recommendation is to focus on **profitability intelligence.** Use key insights like the Pareto rule, and rolling average to continue monitoring what is driving margins. Focus on the few products that are bringing the most profit. Usually 80% of the company's profit or revenue is driven by 20% of its products. Identify and prioritize these key SKUs. Align the marketing, pricing, and promotional strategies around the top-performing items to sustain growth and profitability.

Conclusion

To wrap up, while doing this project, I got a clear picture of how the dataset AdventureWorks performs across different regions, products, and time periods. I was able to identify what drives most of the company's revenue and profit, understand its seasonal trends, and see where there was room for improvement. The insights and recommendations aim to help the company grow in the most profitable areas, strengthen its product mix, and plan better

around peak seasons. Overall, this analysis was important because it showed the importance of using data to make smarter business decisions and improve long-term results.