

# Implementation

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-The implementation of the AdventureWorks Business Intelligence Project followed a structured, phase-based approach to ensure accuracy, consistency, and high-quality analytical outputs. The process included data preparation, modeling, exploration, visualization, and dashboard development. The steps below describe the full technical workflow used during implementation.

## 1. Data Acquisition & Importing

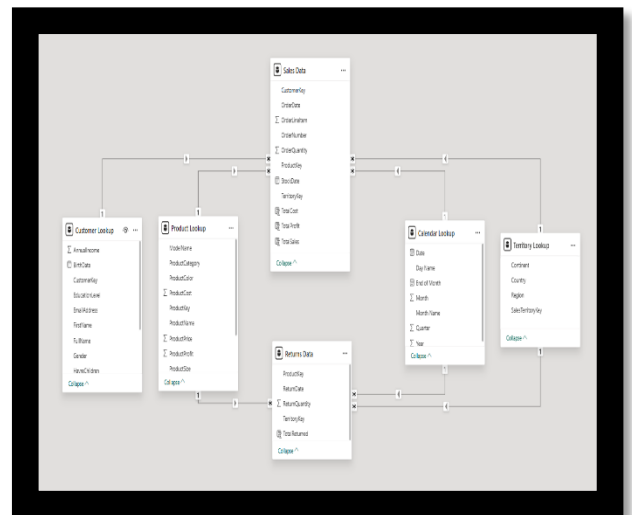
The first step was to collect and import all relevant tables from the **AdventureWorksDW** database.

- **Fact Tables:**

- FactInternetSales
- FactResellerSales

- **Dimension Tables:**

- DimProduct
- DimProductSubcategory
- DimProductCategory
- DimCustomer
- DimGeography
- DimDate



Schema which Identifies the  
Tables relationships

Relationships of tables are already more explained within the Schema

## **2. Data Cleaning & Transformation**

### **1. Structural Optimization**

- Column Removal: Eliminated irrelevant/unused columns (Pritik, email, source columns) to reduce dataset size and complexity
- Column Management: Performed data type conversions and registered new columns while managing old ones
- Column Creation: Added new calculated columns for business metrics and analysis

### **2. Data Quality Enhancement**

- Error Handling: Addressed missing values, duplicates, and common data errors
- Value Standardization:
- Standardized gender field values
- Replaced placeholder/underscored values
- Handled unknown values in ProductSize & ProductStyle fields
- Format Consistency: Standardized date formats and numeric fields throughout the dataset

### **3. Text Data Processing**

- Field Reorganization: Split, merged, and trimmed text fields as needed
- Name Field Standardization: Formatted and combined name columns for consistency
- Text Cleaning: Applied trimming and formatting to ensure text data uniformity

### **4. Business Logic & Calculations**

- Metric Creation: Added calculated columns for product profit and other business metrics
- Data Validation: Verified numeric columns used in calculations (Sales Amount, Cost, Profit fields)
- Conditional Transformations: Applied business rules for handling specific data scenarios

## **5. Data Integration**

- Calendar Table Preparation: Processed and standardized date dimension tables
- Automated Merging: Implemented folder merging automation for efficient data consolidation
- This ensured high data quality and prepared the dataset for modeling.

-Some changes which illustrated found [Here](#)

## **3. Merging Product Category & Subcategory Tables**

To simplify reporting and improve analysis readiness:

- **DimProductCategory** and **DimProductSubcategory** were merged using ProductCategoryKey.
- The resulting table contained:
  - Product Category
  - Product Subcategory
  - Product Details

**Screenshots provided** clearly show:

- Category table before merging
- Subcategory table before merging
- Final product table with merged fields

This step streamlined product-related KPIs and ensured consistent category hierarchy.

## **4. Data Modeling**

A relational star-schema model was designed to link fact and dimension tables. Using Power BI's *Model View*, relationships were created based on primary and foreign keys.

Key relationships included:

- **FactInternetSales** → **DimProduct** via ProductKey
- \*\*DimProduct → DimProductSubcategory → DimProductCategory`
- **FactInternetSales** → **DimDate** via OrderDateKey
- \*\*DimCustomer → DimGeography`

The final ER-style model ensured:

- One-to-many cardinalities in all directions
- Correct filtering context across dashboards
- Optimized performance for DAX calculations

## **5. Creating Calculated Columns & Measures (DAX)**

To support KPIs and dashboards, several DAX expressions were created:

**Examples:**

- **Total Sales** = SUM(FactInternetSales[SalesAmount])
- **Total Cost** = SUM(FactInternetSales[TotalProductCost])
- **Total Profit** = [Total Sales] – [Total Cost]
- **Profit Margin %** = DIVIDE([Total Profit], [Total Sales])

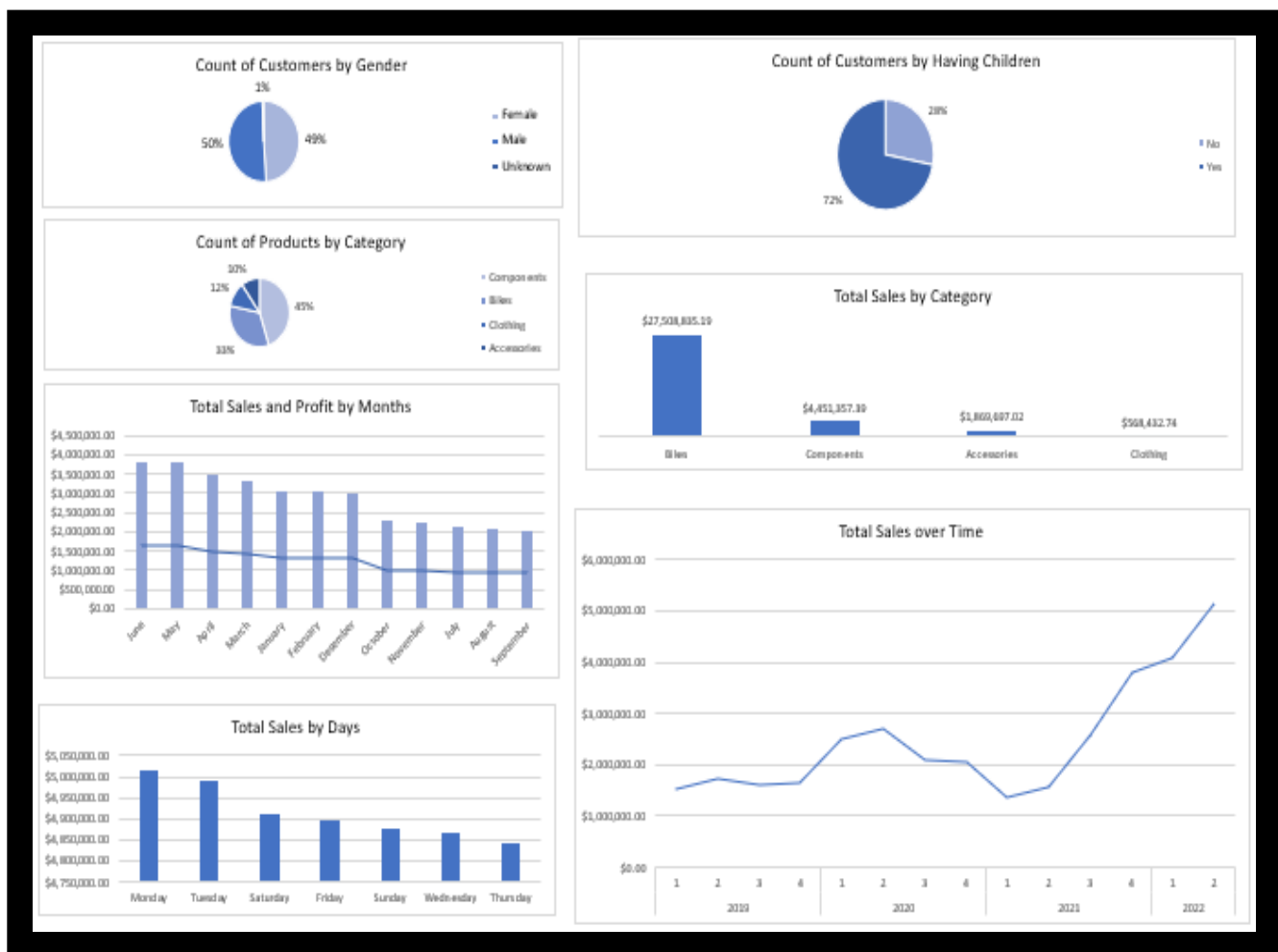
## 6-Exploratory Data Analysis (EDA)

Before building dashboards, EDA was conducted to understand key patterns:

- Sales distribution by country
- Top-selling customers
- Category-level profitability
- Quarterly sales fluctuations
- Return rates by product

This step helped guide KPI selection and dashboard layout decisions.

As Shown in Following Graphs , most insightful KPIS



## 7- Building the Interactive Dashboard

Using Power BI Desktop, the visual dashboard was designed based on UI/UX best practices.

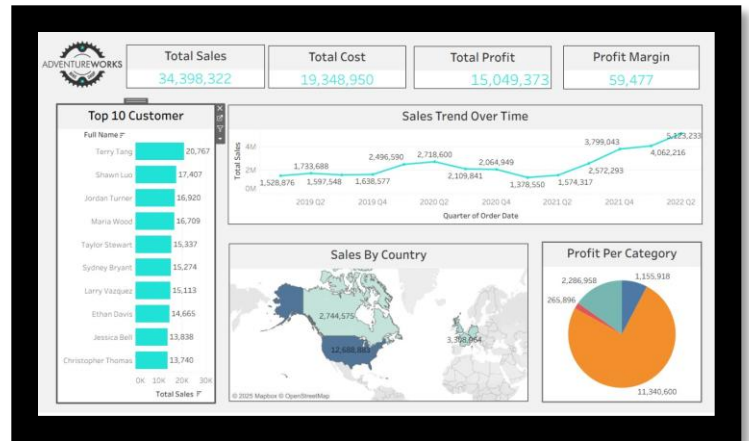
The dashboard includes:

### Top Metrics Cards

- Total Sales
- Total Cost
- Total Profit
- Profit Margin

### Visual Components

- **Line Chart:** Sales Trend Over Time
- **Map Visualization:** Sales by Country
- **Donut/Pie Chart:** Profit per Category
- **Bar Chart:** Top 10 Customers



A page of the Dashboard



Main board of the Dashboard



## 8. Validation & Performance Testing

The dashboard was thoroughly tested to ensure accuracy and reliability:

- DAX measures validated against sample calculations
- Relationship filters tested for correctness
- Visual interactions checked (cross-filtering, drill-down)
- Performance optimized using:
  - Column reduction
  - Efficient star schema
  - Disabling unnecessary auto-date hierarchies

## Data\_Cleaning

