# ****AdventureWorks Sales & Profit Insights Report****

**Dataset Source:** Kaggle  
**Analysis Period:** May 2011 – June 2014

### ****Overview****

The AdventureWorks dataset contains multiple related tables, including **Category**, **Sales**, **Order Records**, **Country**, and **Product**, with record counts ranging from 10 to over 123,000.  
The objective of this analysis is to evaluate sales performance by category, subcategory, price, region, delivery performance, and discount trends, providing actionable insights into revenue and profit across the given timeframe.

### ****Methodology****

#### ****Pre-Data Cleaning****

Before detailed cleaning, irrelevant and empty columns were removed in Excel to simplify analysis. Examples include:

* **Sales Table:** Removed columns such as SalesOrderNumber, ShipToAddress, BillToAddress, RevisionNumber, CreditCardID, CurrencyRateID, and others.
* **SalesOrderDetail Table:** Removed CarrierTrackingNumber, rowguid, ModifiedDate.
* **Product Table:** Removed unused and fully null columns such as SafetyStockLevel, ReorderPoint, Weight, SellEndDate, DiscontinuedDate, etc.
* Similar cleanups were applied to **Product Category**, **Product SubCategory**, **Customer**, and **Territory** tables.

These fields were excluded because they either lacked data or were not relevant for deeper sales analysis.

#### ****Importing & Data Wrangling****

* Imported cleaned data into Jupyter Notebook.
* Dropped additional null-heavy columns (PurchaseOrderNumber, SalesPersonID, StoreID).
* Converted object data types to datetime where applicable and floats to integers.
* Filled missing categorical fields with "Unknown" and numeric fields with 0.
* Checked for and reviewed outliers in columns such as Sales, UnitPrice, and StandardCost.
* Saved final cleaned data into CSV files.

#### ****Data Analysis & Modeling****

* Performed SQL-based exploratory queries in Azure Data Studio.
* Built a Power BI data model integrating **7 related tables**, enabling dynamic analysis via relationships between sales, products, customers, territories, and time.

### ****Key Insights – Page 1: Business Overview****

1. **Total Orders:** 31K orders placed.
2. **Successful Orders:** 28K orders successfully shipped and accepted.
3. **Total Revenue:** $123.22M.
4. **Total Profit:** –$44M, reflecting losses primarily from heavy promotions and discounts.
5. **On-Time Delivery:** Constant across all records (due to dataset being artificial).
6. **Total Customers:** 20K unique customers.
7. **Best Year (2013):**
   * Orders: 14K (highest)
   * Revenue: $48.97M (highest)
   * Profit loss: –$19M (largest yearly loss)
8. **Sales by Category:** Bikes generated the highest revenue ($95M); Accessories had the lowest sales.
9. **Profit by Category:** Accessories had the smallest loss; Bikes had the largest loss (–$37M).
10. **Top 2 Subcategories by Sales:** Road Bikes (#1), Mountain Bikes (#2).
11. **Revenue by Country:** U.S. had the highest revenue; Germany had the lowest.
12. **Top Territories by Orders:**

* #1: Australia (6,843 orders)
* #2: Southwest US (6,224 orders)
* Lowest: Northeast US (352 orders)

1. **Top Customers:** Customer IDs 11091 & 11176, each with 28 orders.
2. **Seasonality:** March recorded the most orders; June had the fewest.

### ****Key Insights – Page 2: Sales Trend Analysis****

1. **Month-over-Month Revenue Growth (MoM):**
   * March: +166.52% (highest)
   * May: +104.29% (second highest)
   * July: +7.47% (lowest)
2. **Year-over-Year Revenue Growth (YoY):**
   * 2012: +166%
   * 2013: +30% (sharp slowdown from 2012)
   * 2014: +7%, indicating weakening performance largely due to excessive discounting.

### ****Recommendations****

* Implement robust **customer segmentation** to better target profitable groups.
* Strengthen **product data management** to avoid missing category details.
* Reevaluate promotional strategies — reduce blanket discounts to protect margins.
* Improve **data collection & storage processes** to ensure completeness and accuracy.

### ****Limitations****

* Missing data on store details and customer demographics.
* Artificially constant delivery times limit logistics analysis.
* Poor data handling practices reduced the richness of available insights.

### ****Summary****

Between 2011 and 2014, AdventureWorks consistently reported revenue but sustained heavy losses due to over-discounting. Data management shortcomings and incomplete product categorization reduced analytical depth. Corrective steps in pricing strategy, customer targeting, and data governance are necessary to improve profitability and decision-making.