

# **Modern Business Intelligence**

## **Assignment 2: Designing a Dashboard with Real – world Data**

**Submitted By: Sherodhi Sharma**

**S4024088**

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## Introduction

This report details the process of designing a dashboard to provide actionable insights for FootwearTech's board of directors regarding their United States footwear retail strategy. The analysis begins with a comprehensive data cleaning and processing phase in part 1 of the report, utilizing Tableau Prep Builder to refine the raw Adidas sales dataset. We'll also see the descriptive summary and metadata of the cleaned dataset to understand what we're dealing with better. These crucial steps ensures the accuracy and relevance of the data by filtering for footwear products and sales records from 2021, handling missing values and duplicates, and streamlining the dataset for efficient analysis.

Following the data preparation, the report transitions to part 2 of the report, data visualization and dashboard development phase. This section outlines the strategic selection of key performance indicators and the application of effective visual design principles within Tableau Desktop. The resulting dashboards are designed to offer a clear and interactive exploration of sales trends, competitive performance, marketing channel effectiveness, and profitability drivers. Ultimately, the insights derived from these dashboards aim to empower FootwearTech's board to make informed decisions concerning market expansion, product strategies, and sales channel optimization within the U.S. market.

## Part 1: Data Cleaning and Processing

### 1.1 Data Cleaning Process

The data cleaning and processing for this analysis was conducted using Tableau Prep Builder to ensure the dataset met the specified requirements for Footwear Tech's analysis. Also, Tableau Prep Builder is way easier to track down all the steps which were performed in cleaning the data. Even though Excel has formulas involved with cleaning, I've chosen Tableau as it was just some clicks with effortless tabs on every step involving the process.

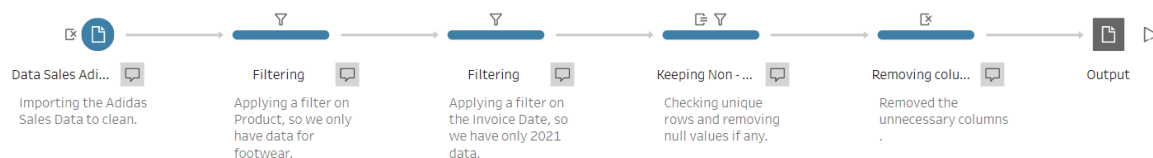


Figure 1: Flow for cleaning process

To ensure the dataset used for analysis aligns with the project's scope and provides reliable insights, a structured data preparation process was followed using Tableau Prep. The original Adidas sales dataset was first imported and then filtered to include only **footwear products**, as per the project's requirement to focus on

footwear retail strategies. Subsequently, a date filter was applied to retain only **sales records from the year 2021**, ensuring temporal relevance to the board's interests.

The dataset was further refined by **removing duplicates** and handling any **null values**, guaranteeing data accuracy and integrity. To simplify the dataset and improve performance within Tableau, **unnecessary or irrelevant columns** were removed. The final cleaned dataset was then exported for use in creating the descriptive statistics and further for visualizations and dashboards in Tableau Desktop.

### Key Cleaning Steps:

- **Importing Data:** Loaded the raw Adidas sales dataset into Tableau Prep.
- **Filtering by Product:** Applied a filter to keep only *footwear* products.
- **Filtering by Date:** Retained records with invoice dates in *2021* only.
- **Removing Nulls and Duplicates:** Ensured data quality by cleaning incomplete or repeated rows. Also, checked for unique values by creating a new column to see if there were any repetitions.
- **Dropping Unused Columns:** Eliminated unnecessary fields like the unique column which was just created to verify the data's uniqueness, in order to streamline the dataset.
- **Exporting Clean Data:** Output the final cleaned dataset for the use of dashboard creation.

## 1.2 Dataset Metadata

### Dataset Structure

- Records: 5,567 entries after cleaning and filtering
- Time Period: January 1, 2021 - December 31, 2021
- Geographic Scope: United States
- Product Focus: Adidas footwear products only

### Column Descriptions

Column Name	Data Type	Description
Retailer	Text	Name of the retail store or online platform where the sale occurred
Retailer ID	Text/Numeric	Unique identifier for each retailer

Column Name	Data Type	Description
Invoice Date	Date	Date when the sale was recorded (filtered to include only 2021 dates)
Region	Text	Geographic region within the United States
State	Text	US state where the sale occurred
City	Text	City where the sale occurred
Product	Text	Name/model of the Adidas footwear product sold (filtered to include only footwear products)
Price per Unit	Currency (USD)	Cost per individual unit of the product
Units Sold	Numeric	Quantity of items sold in the transaction
Total Sales	Currency (USD)	Total monetary value of the sale
Operating Profit	Currency (USD)	Profit generated after deducting operating expenses
Operating Margin	Percentage	Operating profit as a percentage of total sales
Sales Method	Text	Channel through which the sale was conducted (e.g., In-store, Online, Outlet)

## 1.2 Descriptive Statistics of Cleaned Dataset

After the cleaning process, the following descriptive statistics were generated using Excel. I chose to use **Excel over Tableau** due to its built-in *Analyze Data* tool, which quickly provided key summaries and insights with minimal effort. In contrast, performing the same descriptive analysis in Tableau would have required multiple steps involving manual aggregations and calculations. Using Excel allowed me to save time and focus on the primary objective – building meaningful dashboards in Tableau – without delaying insights for stakeholders. Excel's Data Analysis tool then provided me with these statistics:

Key Metrics Summary

Statistic	Price per Unit (\$)	Units Sold	Total Sales (\$)	Operating Profit (\$)
Mean	41.47	254.61	85,586.72	31,670.21
Median	41.00	176.00	8,610.00	4,032.60
Mode	40.00	225.00	100,000.00	21,000.00
Standard Deviation	13.75	207.25	131,264.70	49,205.72
Minimum	7.00	0.00	0.00	0.00
Maximum	95.00	1,150.00	810,000.00	338,625.00
Count	5,567	5,567	5,567	5,567

1.3 Analysis of Descriptive Statistics

Price per Unit

The price per unit of footwear products in the dataset ranges from \$7 to \$95, with an average price of approximately \$41.47. The distribution of prices appears relatively normal, though it exhibits a slight positive skew (0.33), indicating a tendency for some higher-priced products to push the average upward. The most frequently occurring price (mode) centers around \$40, suggesting that most products fall within the mid-price range, which may be ideal for mass-market positioning.

Units Sold

On average, each transaction results in 254.61 units sold. However, the distribution shows a high positive skew of 1.34, which means the majority of transactions involve smaller quantities, while a few significantly larger orders pull the average higher. The maximum number of units sold in a single transaction is 1,150, emphasizing the existence of occasional bulk purchases that could be tied to large retailers or special promotions.

Total Sales

The average (mean) total sales value per transaction is \$85,586.72, yet the median is only \$8,610.00. This substantial disparity, along with a skewness value of 1.92, indicates a highly skewed distribution where a small number of high-value transactions disproportionately inflate the average. The highest recorded transaction

value stands at \$810,000.00, underlining the impact that large corporate or wholesale orders can have on overall sales metrics.

## Operating Profit

The average operating profit across transactions is \$31,670.21. Similar to total sales, the profit data demonstrates high positive skewness (2.09) and elevated kurtosis (4.75), suggesting a distribution with many modest profit figures and a few extreme outliers. These extreme values may result from high-margin products or favorable retailer agreements, while the majority of transactions yield moderate profitability levels.

### 1.4 Concerns and Issues during Data Cleaning

1. **Null Values:** There wasn't a presence of null values in Units Sold, Total Sales, and Operating Profit fields which suggests potential recording errors as it's impossible that there weren't any cancelled orders or changed minds about the purchase.
2. **Data Distribution:** The significant difference between mean and median values for Total Sales and Operating Profit indicates a highly skewed distribution, which may impact analytical conclusions if not properly accounted for.
3. **Potential Outliers:** The maximum values for Units Sold (1,150), Total Sales (\$810,000), and Operating Profit (\$338,625) are significantly higher than the average, suggesting potential outliers that should be verified for accuracy.

These descriptive statistics provide a solid foundation for developing visualizations and dashboards that will help FootwearTech's board of directors make informed decisions about their US footwear retail strategy.

## Part 2: Data Visualization and Dashboard

### 2.1 Appropriate Measures for Visualizations

The dashboards leverage a range of carefully selected measures that provide clear and actionable insights for FootwearTech's board of directors. Revenue performance is evaluated using **Total Sales (USD)** and **Units Sold**, which together highlight both the financial and volume-based success of footwear products. To assess profitability, metrics such as **Operating Profit (USD)** and **Operating Margin (%)** are utilized to understand absolute profit contributions and comparative efficiency across retailers and sales methods. Additionally, **Operating Margin over Time** helps to track profitability fluctuations throughout 2021, offering a view into performance trends. For competitive analysis, the dashboards incorporate comparative metrics like **Sales by Retailer**, **Sales by Product**, and **Sales by Region or State**, enabling performance benchmarking across various dimensions. Lastly, **Temporal Metrics** such as

monthly and quarterly sales trends are employed to uncover patterns in seasonality and long-term growth, helping to inform strategic planning.

## 2.2 Visual Elements Application

The dashboards utilize a range of visual design principles to ensure clarity, consistency, and ease of insight extraction. A consistent green- gold colour palette is applied to all profitability metrics, reinforcing thematic coherence, while colour intensity is strategically used – such as darker shades on the Sales Map – to intuitively indicate higher sales volumes by geography. Differentiated colours also help distinguish between product categories, including subtle yellow and green variations for men’s and women’s footwear lines, as well as unique shades for each sales method (In-store, Online, Outlet), enabling clear channel comparisons. In terms of sizing, visual elements such as bar length and circle size are proportional to data values, making it easy to assess rankings and relative importance at a glance. For instance, in the Sales vs. Margin plot, the circle size reflects the impact of each sales method, while the shaded intensities on the map communicate regional sales concentration effectively. The choice of chart types supports their respective purposes – area charts highlight time-based trends, circular plots are used for relational comparisons, bar charts support category ranking, and the map visualization delivers geographic context for data interpretation.

## 2.3 Dashboard Layout and Interactive Features

Two comprehensive dashboards were developed to serve the strategic decision-making needs of FootwearTech’s board.

### Footwear Sales & Market Landscape - 2021

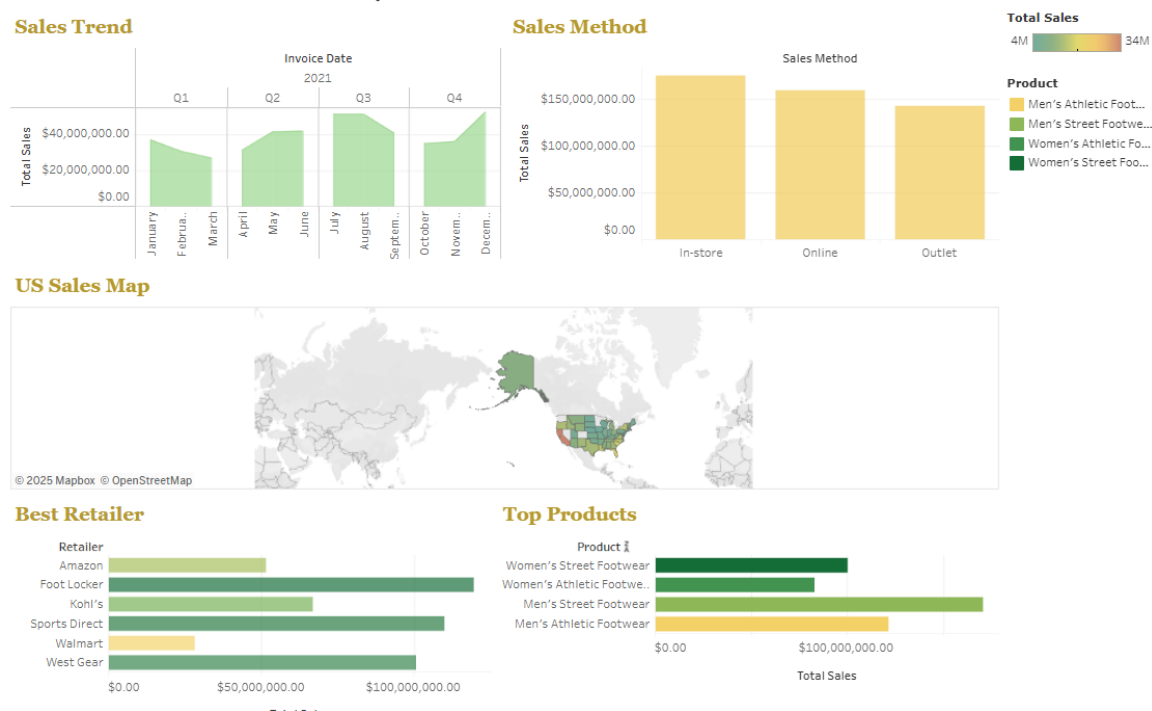


Figure 2: Dashboard 1: Footwear Sales & Market Landscape - 2021



The first dashboard, *“Footwear Sales & Market Landscape – 2021,”* delivers a macro-level view of the sales environment. Its layout is carefully structured: the top section features a sales trend area chart that spans the full width, offering temporal insights into monthly sales fluctuations. The middle section juxtaposes a bar chart of sales methods with a geographic sales map, balancing distribution channel performance with regional patterns. At the bottom, best retailer and top product bar charts provide competitive intelligence. Interactive features enhance usability, including zoom and pan controls on the map for detailed state-level analysis, also a filter on the region to see various perspectives, a product category filter for focused exploration, informative tooltips on hover, and a colour legend for intuitive interpretation of product segmentation and sales volume.

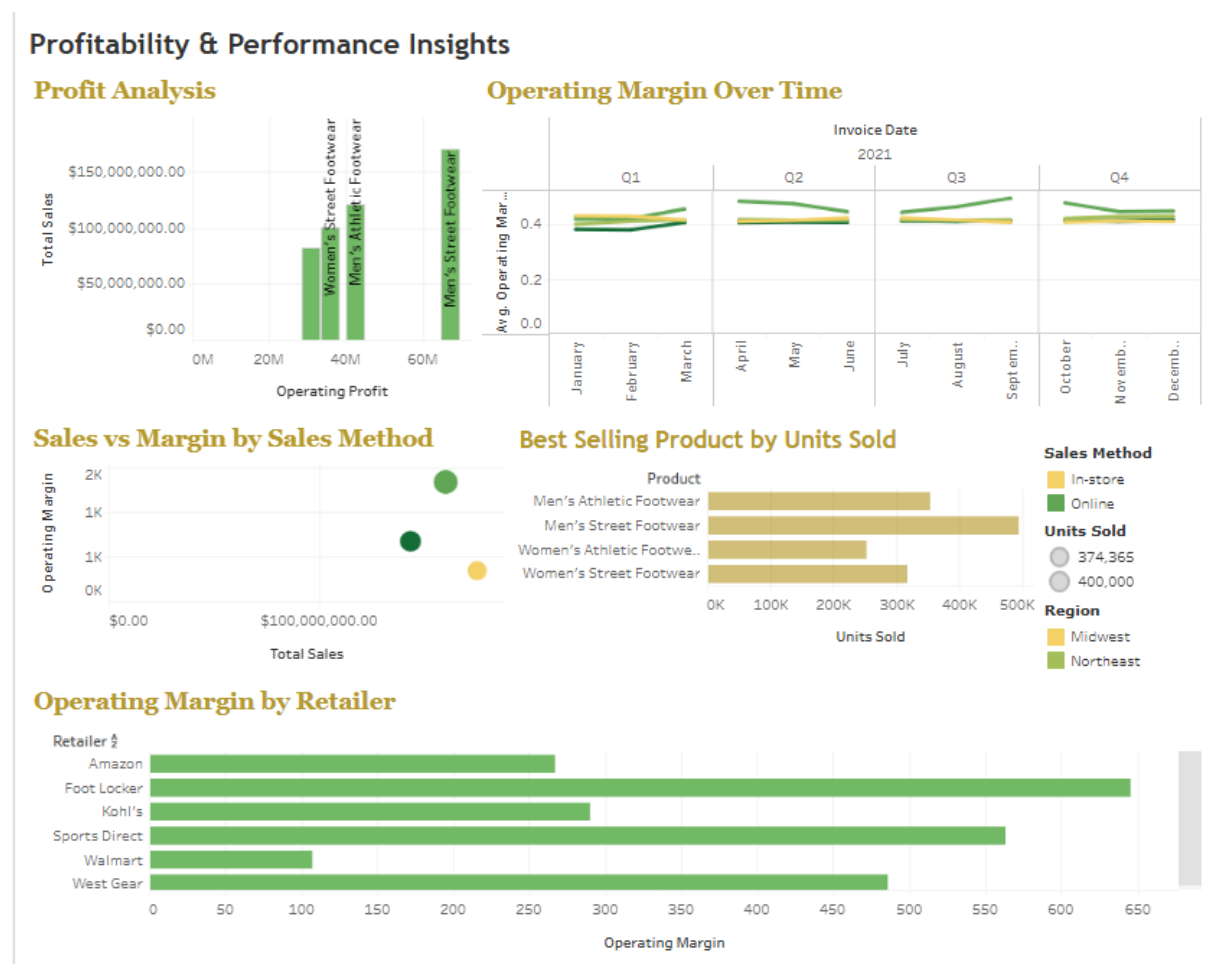


Figure 3: Dashboard 2: Profitability & Performance Insights

The second dashboard, *“Profitability & Performance Insights,”* concentrates on core profitability metrics. The top section combines a profit analysis plot with a time-based operating margin trend, revealing financial performance across months. The middle section focuses on comparative efficiency, with a circle plot of sales versus margin by sales method, alongside a best-selling products chart that highlights volume leaders. The dashboard concludes with an operating margin by retailer chart, providing a benchmark for profitability across competitors. Interactivity is

built in through filters for region, product and sales method, time-period selection for quarterly margin analysis, and size legends that visually represent unit sales in product comparisons. Together, these dashboards present a cohesive narrative, bridging market dynamics with operational efficiency to guide strategic planning.

## 2.4 Insights for Board of Directors

### Sales Trends

The dashboards reveal several significant sales trends:

1. **Temporal Pattern:** The Sales Trend area chart shows consistent growth throughout 2021, with notable increases in Q3 and Q4. Peak performance in July can be the reason of 4<sup>th</sup> of July and December shows the highest sales volume, suggesting strong holiday season performance. The high sales are directly proportional to our holidays. Reason of certain sales and selling strategies which are comparatively high at those times of the year.
2. **Product Performance:** Men's Athletic Footwear and Men's Street Footwear dominate sales, with Women's Athletic Footwear showing competitive performance. This suggests a market opportunity to strengthen the women's footwear offerings in new retail locations.
3. **Geographic Concentration:** The US Sales Map reveals stronger sales in the Northeast and parts of the Midwest, with notable performance in several southern states. This geographic insight can directly inform new store location decisions.

### Marketing Campaign Effectiveness

While specific marketing campaign data isn't available, the dashboards provide proxy insights:

1. **Channel Performance:** In-store sales outperform both online and outlet channels, suggesting physical retail remains a strong channel for footwear. This validates FootwearTech's strategy to expand physical store presence.
2. **Seasonal Performance:** The Sales Trend visualization shows higher sales in specific months, suggesting seasonal marketing efforts (like back-to-school and holiday promotions) have been effective for the footwear category.
3. **Product Focus:** The significant performance gap between best-selling categories indicates that targeted marketing for specific product lines has been effective. This insight can inform which products should receive promotional emphasis in new locations.

## **Strategies for Future Sales**

The dashboards offer clear strategic guidance to support FootwearTech's expansion into the U.S. market. Analysis of the product mix reveals that Men's Athletic and Street Footwear are the highest revenue generators, indicating they should be central to merchandising strategies in new stores. At the same time, the strong unit sales observed in Women's Footwear suggest untapped potential that could be harnessed through targeted marketing campaigns. Profitability insights from the Operating Margin by Retailer chart show considerable variance among competitors; notably, Foot Locker and Sports Direct achieve higher margins, implying that a premium retail strategy may enhance profitability for FootwearTech. From a geographic perspective, the Sales Map identifies states with strong current demand, offering a data-driven basis for prioritizing store openings. Lastly, the stable Operating Margin over Time, despite fluctuations in sales volume, indicates consistent profitability year-round. This supports a strategy of continuous operation with seasonally adjusted inventory to match demand peaks.

## **Effectiveness of Different Marketing/Sales Channels**

The dashboards offer clear insights into sales channel effectiveness that are crucial for shaping FootwearTech's market strategy. The Sales Method bar chart indicates that In-store sales lead overall, closely followed by online channels, while Outlet stores contribute a smaller yet notable share. This confirms the sustained importance of physical retail and reinforces the need for an integrated omnichannel approach. Further, the Sales vs Margin by Sales Method plot reveals that Online sales yield the highest operating margin – approaching 2% – followed by In-store sales at around 1%, with Outlet stores delivering the lowest profitability. These findings suggest that future physical stores should adopt a premium positioning rather than a discount model. Additionally, region-level filtering combined with sales method data uncovers variations in channel performance across geographies, supporting tailored, location-specific retail strategies.

## **Sales of Competitors**

The dashboards offer valuable intelligence into the competitive landscape within the US footwear market. Foot Locker clearly stands out as both the highest-volume and most profitable retailer, achieving an impressive operating margin of approximately 650%, positioning it as the benchmark for competitive excellence. Other strong performers include Sports Direct, West Gear, and Kohl's. The considerable variation in profitability across retailers suggests diverse strategic positioning – Foot Locker's high margins imply a premium, brand-focused model, while Walmart's lower margins indicate a volume-driven, discount-based approach. Notably, Amazon demonstrates moderate sales volumes paired with solid profitability, highlighting the potential of well-executed online retail strategies. These insights, particularly the contrast between specialty and general retailers, provide a strategic foundation for FootwearTech's own market positioning and location planning.

### **3. Use Cases**

#### **3.1 Use case 1: Strategic Store Location Planning**

The board of directors can leverage the "Footwear Sales & Market Landscape" dashboard to make data-driven decisions about optimal locations for new FootwearTech retail stores. Using the 2021 footwear sales data, board members could filter the map to focus on the Northeast region, identify states with dark green coloration (high sales), check which retailers are performing well in those areas, and determine if the regional product preferences align with FootwearTech's strengths. This analysis might reveal that Connecticut represents an opportunity due to high regional sales, moderate competition from existing retailers, and strong performance in men's athletic footwear – FootwearTech's planned flagship category.

#### **3.2 Use case 2: Optimizing Profitability and Pricing Strategy**

The "Profitability & Performance Insights" dashboard enables the board to develop sophisticated pricing and margin strategies for the new retail locations by noticing that Foot Locker achieves superior margins while focusing heavily on Men's Athletic Footwear. They could then examine the "Operating Margin over Time" chart to confirm that Q4 maintains strong margins despite typically being a heavy promotional period. Finally, they might use the "Sales vs Margin by Sales Method" visualization to determine that new stores should emphasize the premium in-store experience while developing a complementary online presence to capture the higher margins of that channel. These insights lead to a balanced channel strategy that optimizes both revenue and profitability.

### **4. Conclusion**

The two dashboards developed for FootwearTech's board of directors effectively synthesize critical sales, profitability, and competitive data within the U.S. footwear market. By employing thoughtful visualization techniques and interactive features, these tools transform raw data into actionable intelligence, directly addressing the board's key information needs. The insights gleaned from these dashboards illuminate significant sales trends, reveal the effectiveness of various marketing and sales channels, provide a clear understanding of the competitive landscape, and highlight crucial profitability drivers.

Specifically, the dashboards offer a data-driven foundation for FootwearTech's strategic expansion into the U.S. market. The identification of optimal geographic locations based on current demand, the prioritization of high-performing product categories, and the understanding of effective channel strategies are all crucial elements for successful new store development. Furthermore, the competitive analysis provides valuable benchmarks for FootwearTech's own market positioning and pricing strategies. Ultimately, these dashboards serve as dynamic tools that will empower the board to make informed decisions, optimize resource allocation, and

navigate the complexities of the U.S. retail environment, thereby increasing the likelihood of a successful and profitable market entry and sustained growth.