SALES ANALYSIS REPORT

DATA ANALYTICS AND VISUALIZATION

Contents

1. **Introduction and Business Problem**

   This report presents a comprehensive analysis of retail sales data to uncover actionable insights that support strategic business decisions.

   Our team of five was assigned the task of transforming raw retail sales data into actionable insights using Power BI for data transformation and visualization. The provided dataset consisted of 2,100 records containing key dimensions such as product categories, profit and sales data, country-level performance metrics, and customer segments. To ensure the accuracy, consistency, and reliability of our analysis, we undertook a comprehensive data preparation process to address the following key questions:

   1. Which month and year recorded the highest profit?

   2. In which countries or regions is the company achieving the most notable success?

   3. Which products and customer segments show the most promise for continued investment?

   To achieve these objectives, the report follows a structured methodology, beginning with data preparation (cleaning, transformation, and validation), followed by exploratory data analysis (EDA) to detect patterns, trends, and outliers. Interactive Power BI dashboards enable dynamic exploration of key insights, empowering stakeholders to make timely, informed decisions.

2. Data Cleaning and Preparation

2.1. Initial Data Assessment

Our initial evaluation of the dataset revealed several critical data quality challenges that required systematic attention. Upon loading the dataset, we discovered significant errors in the "Unit Sold" column, alongside substantial missing data, with approximately 400 null values identified in both the "Product" and "Discount Band" columns. This high number of missing values represented nearly 19% of our dataset, potentially impacting the completeness and reliability of our analysis. Furthermore, our preliminary assessment uncovered inconsistent string formatting across multiple columns, including irregular capitalization and spelling variations in country names and product categories, which could significantly hinder accurate data aggregation and analysis if left unaddressed.

2.2. Data Type Verification and Duplicate Removal

We implemented a comprehensive data cleaning strategy, beginning with a systematic verification of data types across all columns using the provided data dictionary as our reference guide. Following error handling, we executed a thorough text normalization process wherein all string values were standardized through a two-step approach: first converting all text to lowercase, then applying proper capitalization (for example, transforming "mexico" to "Mexico"). This standardization proved crucial for ensuring consistent analysis across regions and products. To maintain data integrity, we then identified and removed duplicate entries by analyzing unique combinations of five key columns: "Segment," "Country," "Product," "Units Sold," and "Date." This deduplication process yielded impressive results, reducing the number of null values in the "Product" column from 400 to just 19, significantly enhancing the dataset's overall quality and analytical reliability.

2.3. Managing Missing Values and Additional Transformation

The final phase of our data preparation focused on data transformation strategies.

In the following steps, we focused on sorting and removing rows with many null values. the remaining categorical columns containing missing values, we employed a mode-based replacement strategy, specifically using "Vtt" as the replacement value for the

"Product" column where more than ten entries were missing. This decision was based on the need to maintain data consistency while preserving as much of the original dataset as possible.

To enhance our analytical capabilities, we created several derived columns, including a calculated profit margin metric and a regional classification system that grouped countries into meaningful geographical clusters. Additionally, we developed a product categorization framework based on terrain types (road bikes, mountain bikes, and general-purpose bikes), enabling more nuanced segmentation analysis.

3. Data Analysis and Visualization

Month	Total Profit	Total Sales	Profit Margin (%)
January	2,442,086.04	19,823,285.04	24.81
February	3,432,682.17	21,809,434.17	22.48
March	2,009,600.61	16,760,579.61	24.24
April	2,788,168.71	20,887,440.21	21.57
May	2,485,920.18	18,630,633.18	22.36
June	4,418,667.26	28,542,187.26	23.20
July	2,740,677.36	24,265,762.86	22.62
August	2,373,199.26	17,593,867.26	22.36
September	3,573,470.54	21,765,394.54	22.91
October	6,879,562.04	43,342,862.04	23.69
November	2,740,205.00	25,302,835.00	23.60
December	5,434,659.96	34,734,457.96	24.24
Total	**41,318,899.13**	**293,458,739.13**	**23.37**

Month	Total Profit	Total Sales	Profit Margin (%)
January	1,628,057.36	13,215,523.36	24.81
February	2,284,134.78	14,511,902.78	22.48
March	1,339,733.74	11,173,719.74	24.24
April	1,858,184.14	13,922,665.14	21.57
May	1,657,280.12	12,420,422.12	22.36
June	2,944,913.44	19,023,293.44	23.20
July	1,816,811.68	16,162,842.68	22.62
August	1,582,132.84	11,729,244.84	22.36
September	2,046,264.48	12,797,394.48	22.48
October	3,563,971.84	24,751,639.84	23.37
November	1,209,200.40	10,768,428.40	22.48
December	4,051,531.80	23,997,575.80	24.81
Total	**25,982,216.62**	**184,474,652.62**	**23.20**

Year
- [ ] 2013
- [x] 2014
- [ ] 2015
- [x] 2016

While October emerged as an outstanding month for the company, achieving profits of $6.9 million and sales totaling $43.34 million over four years, December had the highest profits of $2.03 million for 2014 and 2016 (Please refer to main dashboard).

Month	Total Profit	Total Sales	Profit Margin (%)
January	814,028.68	6,607,761.68	24.81
February	1,135,587.39	7,214,371.39	22.55
March	669,866.87	5,586,859.87	24.24
October	1,781,985.92	12,375,819.92	23.37
November	604,600.20	5,384,214.20	22.48
December	2,025,765.90	11,998,787.90	24.81
Total	**7,031,834.96**	**49,167,814.96**	**24.01**

Month - Total Sale and Total Profits

Figure 1. Total Profit for 2014 and 2016 for 4ᵗʰ Quarter

In contrast, March and November marked the least profitable months, with earnings not surpassing $800,000 per year between 2014 and 2016 (Refer to Figure 1). These periods of fluctuations in sales and profit across different regions reflect possible seasonal effects

and differences in consumer demand, which may signal opportunities for strategic adjustments.

The following sections of the report will provide a thorough analysis of the organization's product and customer segment performance, along with any regional trends and growth opportunities. These insights will guide our recommendations on how and where the retail organization should concentrate its investment efforts to maximize profitability.

3.1. Product Performance Analysis

Between 2013 and 2016, the organization sold approximately 2.78 million bikes, demonstrating a steady demand for its product range. The data visualizations presented in Figure 2 and Figure 3 highlight the profit and sales trends of key products over the four-year period.

Product Performance Summary

Product	Total Sales	Total COGS	Total Profit
Amarilla	10,547,521.29	8,387,626.00	2,159,895.29
Carretera	13,215,149.41	11,179,466.00	2,035,683.41
Montana	9,432,407.47	8,667,758.00	764,649.47
Paseo	30,054,036.75	25,423,301.00	4,630,735.75
Velo	20,515,093.28	17,772,741.00	2,742,352.28
Vtt	19,615,946.80	16,894,836.00	2,721,110.80
Total	**103,380,155.00**	**88,325,728.00**	**15,054,427.00**

Table 1. Products Performance Summary: 2013 – 2016 Q4 Analysis (Product Analysis Dashboard)

Among the various products, Paseo (leisure bike) consistently outperformed its competitors, particularly in the fourth quarter, where it achieved approximately $30.05 million in sales as well as $4.63 million in profit. This suggests that seasonal factors, such as holiday shopping trends, may contribute to the product's peak sales performance.
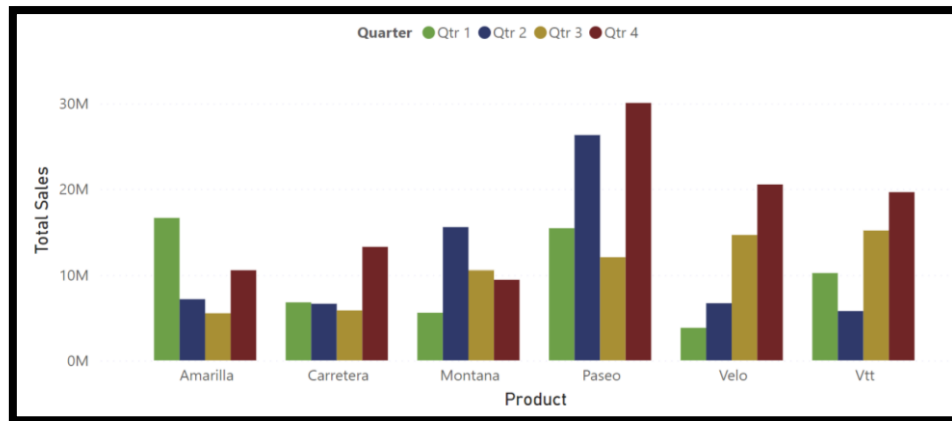
Figure 2. Total Sales of Products by Quarter

Other notable performers include Velo (general bike) and VTT (mountain bike), which also recorded strong sales and profitability during the same period, each generating sales of approximately $20 million. The consistent performance of these products highlights the potential for strategic investment and expansion in these categories.
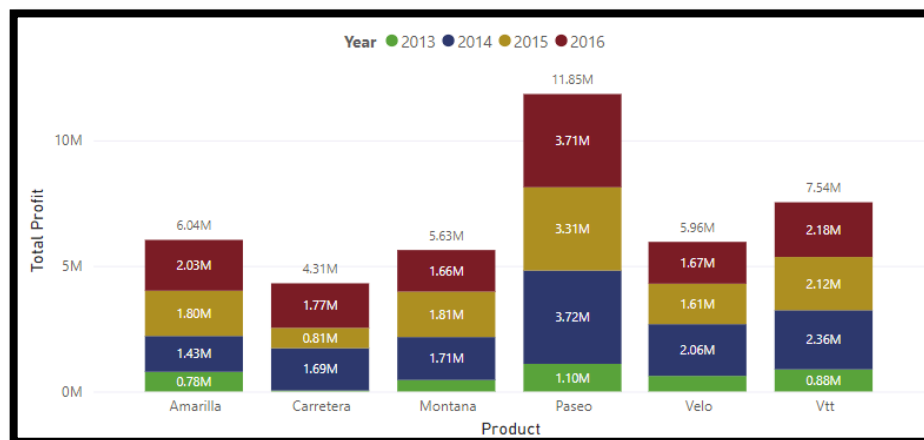

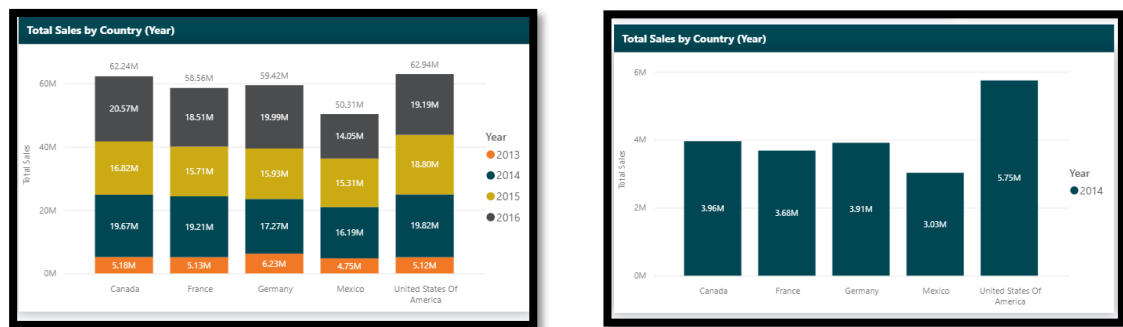Figure 3. Total Profit of Products by Year

3.2. Regional Analysis

Figure 4. Total Sales by Country (Region Analysis Dashboard)

From 2013 to 2016, the USA was the top region in sales, generating about $63 million, with consistent quarterly sales over $4.1 million and a peak of $5.75 million in Q3 2014 (Refer to the Main Dashboard). The fourth quarter, boosted by holidays like Thanksgiving and Christmas, saw increased consumer spending due to effective marketing. Canada followed closely with $62.2 million, benefiting from seasonal surges during October's Thanksgiving. Germany was the most profitable market, earning $9 million, with October driving over $600,000 in quarterly profits through targeted promotions. France also saw strong seasonal profits of $8.9 million, influenced by cultural trends.
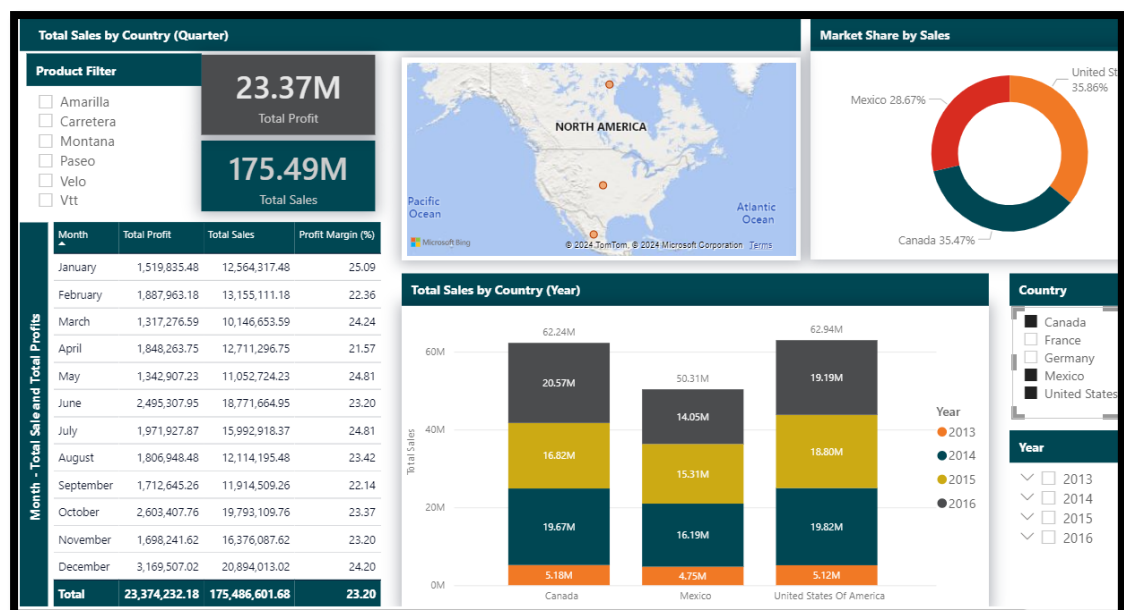

Figure 5. Total Sales & Profit for North American Region (Region Analysis Dashboard).

Across North America, including Mexico, the region collectively contributed $175 million in sales and $23.37 million in profits. Localized surges during national festivities in Mexico and cultural holidays in other regions underscore the importance of tailoring marketing strategies to align with regional events. These top-performing regions consistently succeeded by capitalizing on seasonal demand, effective promotions, and consumer behavior linked to cultural and public holidays.

3.3. Customer Segment and Discount Analysis

3.3.1. Customer Segment Analysis

Figure 6. Total Sales and Discount by Segment (Customer Segment Analysis Dashboard)

Upon conducting a thorough analysis of customer segment performance, we found that the Government and Small Business segments emerged as the primary drivers of the organization's overall profitability. The discount band analysis (refer to figure 6) further revealed that the Government and Small Business segments heavily relied on "High" discounts to drive sales, with Small Business also leveraging "Medium" discounts for a substantial portion of its revenue. In contrast, the Enterprise and Channel Partner segments exhibited minimal reliance on discounts, which could suggest that the organizations focused primarily on quality products and value-added services over pricing strategies.

The Midmarket segment shows promising potential, earning $8 million in profit with a margin of 28.49%, supported by moderate discounting. This represents an

opportunity for growth through targeted sales strategies. On the other hand, the Enterprise segment faces significant challenges, reporting a loss of $516,000 despite employing heavy discounting tactics.
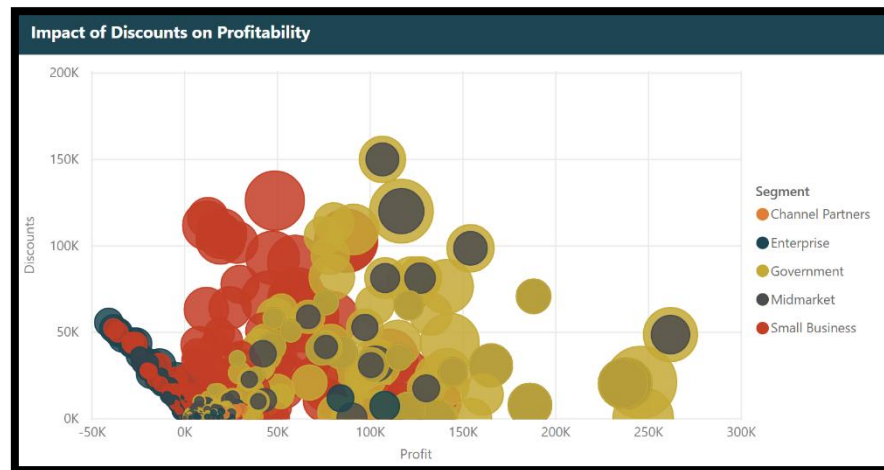
3.3.2. Impact of Discount on sales and profit

Figure 7. Impacts on Discounts on Profitability (Discount Analysis Dashboard)

When examining profitability patterns, we discovered that higher discount levels often fail to generate proportional increases in profit. Some cases actually show negative profitability when substantial discounts are applied, particularly evident in transactions where discount amounts were very high **(Refer to Figure 7).**
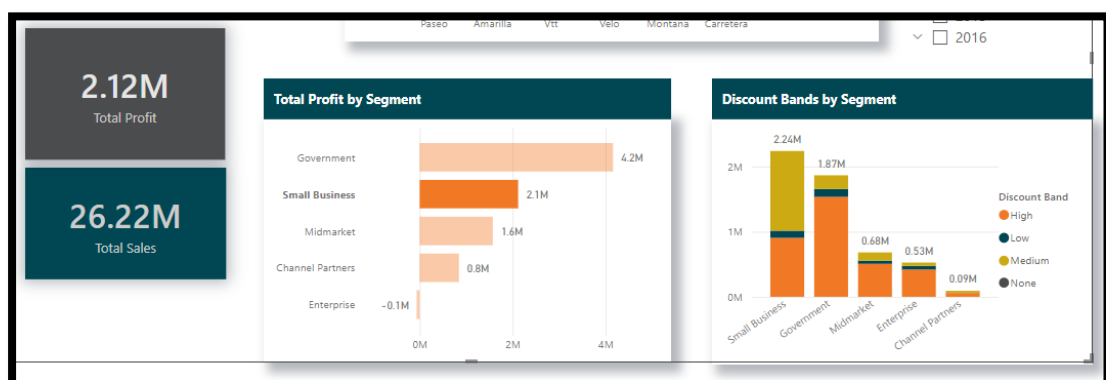

Figure 8. Total Profit by Segment & Discount Impact on Segment

In contrast, the Small Business segment presented a more complicated scenario. Although it recorded significant sales of $26.22 million, particularly in the Canadian market, its profits were only 50% of those generated by the Government segment. This shortfall could be linked to the Small Business segment's heavy reliance on steep discounts, which, while boosting sales volume, significantly eroded profit margins. With a profit margin of just 6.76% **(Refer to Figure 9)**, the Small Business segment served as a cautionary example of the risks associated with over-discounting and the challenging balance between pursuing sales growth and maintaining profitability.

Segment Profitability Table

Segment	Total Profit	Avg of Profit Margin (%)	Min of Profit	Max of Profit
Government	20,975,036.36	29.25	285.60	262,200.00
Small Business	9,774,740.50	6.76	-38,046.25	136,535.00
Midmarket	8,047,614.21	28.49	285.60	262,200.00
Channel Partners	3,037,674.06	73.02	2,423.52	30,919.68
Enterprise	-516,166.00	3.52	-40,617.50	108,147.00
Total	41,318,899.13	27.92	-40,617.50	262,200.00

Figure 9. Segment Profitability Table (Customer Segment Analysis Dashboard)

4. Key Findings and Recommendations

4.1. Key Findings

Our analysis reveals distinct performance patterns across multiple dimensions. October emerges as the peak performing month, generating $6.9 million in profits and $43.34 million in sales, while March and November show lower profitability, not exceeding $800,000 between 2014-2016. Paseo leads product performance with $30.05 million in sales and $11.85 million in profits, particularly strong in Q4.

Regional analysis shows North America dominating with combined sales of $184 million and profits of $25.36 million, led by the USA's $63 million in sales. In the customer segments, the Government sector leads profitability with $21 million in profits and a 29.25% margin, while the Channel Partners segment demonstrates exceptional efficiency

with a 73.02% profit margin on $3 million in sales. The Enterprise segment requires attention, currently operating at a $516,000 loss despite various discount strategies.

4.2. Recommendations

4.2.1. Short Term

First, we recommend intensifying marketing efforts for the Paseo product line, particularly in North America where sales peak during holiday seasons. This should include targeted promotions for Black Friday and Christmas periods to capitalize on the proven $30.05 million sales potential. Implementing immediate adjustments to the discount strategy could significantly improve the organization's profit margin while increasing sales volume.

4.2.2. Medium to Long Term

The mid to long term strategy should focus on regional expansion and segment optimization. We recommend developing specialized marketing programs for the German and French markets, targeting autumn and cultural events where profits consistently exceed $600,000 per quarter. For the Government segment, which generates $20.98 million in profit with a 29.25% margin, develop value-added services and specialized product packages to further strengthen this relationship. Additionally, create a structured plan to expand the Channel Partners segment, leveraging its impressive 73.02% profit margin through new strategic partnerships.

5. Conclusions

The interplay of seasonal trends, regional preferences, and strategic discount applications heavily influences the success of the bicycle retail industry. As suggested by our comprehensive analysis of retail sales data in this report, a uniform approach to sales and marketing for all customer segments or product categories is inadequate, as each has distinct characteristics within various customer segments and regional markets.

Additionally, the varying performance across products and regions presents both challenges and opportunities. Our analysis also suggests that sustainable growth depends on

implementing targeted strategies that acknowledge these differences, while carefully managing discount policies across segments.

In summary, our findings emphasize the critical importance of adopting a data-driven, customized approach to market strategy. By leveraging these insights to develop targeted initiatives, respond to specific segment needs, and optimize discount strategies, the organization can enhance its competitive position and achieve sustainable growth across its diverse market portfolio.