Business Intelligence Analysis for Cannondale Bicycle Corporation

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1.0 INTRODUCTION

Cannondale Bicycle Corporation is a significant player in the bicycle business, constantly pushing the boundaries of bicycle design and technology. The company is well-known for its varied product line, which includes road bikes, mountain bikes, electric bikes, and accessories, and it continues devoted to producing cutting-edge solutions that meet the changing needs of cyclists worldwide. Cannondale remains a global cycling community forerunner, focusing on sustainability and performance.

1.1 PROBLEM STATEMENT

Although well-known and with a solid reputation for manufacturing top-notch motorcycles and accessories, the company's sales profitability continues to decline. This problem poses a serious risk to the organization's ability to continue growing and being sustainable. Recent market evaluations highlight the bicycle industry's expanding significance, driven by a growing global consciousness of environmental sustainability and health (Cao and Shen, 2019). According to Salmeron-Manzano and Manzano-Agugliaro (2018), there is a significant anticipated growth in the global bicycle market in the upcoming years due to the increasing demand for environmentally friendly transportation options and a growing awareness of personal health and fitness. But as the market grows, the level of competition also rises. Cannondale has to navigate this complex environment where sales profitability is measured in terms of stability, flexibility, and customer appeal. Consumer spending patterns have shifted due to economic uncertainty exacerbated by global events (Loxton et al., 2020). Businesses must deal with immediate difficulties while also planning for long-term resilience. Establishing sales profitability necessitates a careful approach that balances cost-effectiveness, market responsiveness, and the capacity to forecast and adjust to economic trends. This report aims at developing a data driven approach by harnessing the power of business intelligence, a revolutionary tool, capable of providing Cannondale with actionable

insights to inform decision-making. By employing BI tools, Cannondale can combine and analyze enormous statistics spanning sales transactions, consumer activities, and market trends.

2.0 THEORETICAL FRAMEWORK

2.1 FACTORS INFLUENCING SALES PROFITABILITY IN THE BICYCLE MARKET

A wide range of factors that go beyond traditional economic theories influence profitability in bicycle sales. The increasing popularity of e-bikes and the incorporating of innovative technologies into bicycle accessories are essential market developments (Westland, Mou and Yin, 2019). Comprehending and conforming to these patterns is crucial for enterprises looking to increase sales profitability. Consumer preferences play a central role in shaping the bicycle market (Tian, Wang and Shi, 2021). Beyond the intrinsic qualities of bicycles, factors such as sustainability, brand perception, and lifestyle choices influence purchasing decisions. Companies that grasp these nuances and tailor their product offerings accordingly are positioned to meet consumer demands and enhance overall profitability. Economic conditions, such as fluctuations in disposable income and the broader economic climate, impact consumer spending on non-essential items such as bicycles (Zhu and Liu, 2021). For Cannondale, a comprehensive understanding of these economic dynamics is crucial for crafting adaptive strategies that mitigate the impact of economic uncertainties. Competitive dynamics further emphasize the challenges and opportunities within the bicycle market. The strategies rival companies adopt, market saturation, and the emergence of new entrants contribute to the evolving competitive landscape. Cannondale's ability to differentiate its products, innovate in response to market demands, and strategically position itself within this competitive framework is pivotal for sustained sales profitability.

2.2 BUSINESS INTELLIGENCE LAYER

Business intelligence (BI) encompasses various tools and technologies to collect, facilitate access, and analyze data (Ramakrishnan et al., 2018). The primary objective of BI is to assist enterprise

users in making more informed and effective business choices. Business intelligence framework consists of three layers the data, logic and the presentation layer as discussed below.

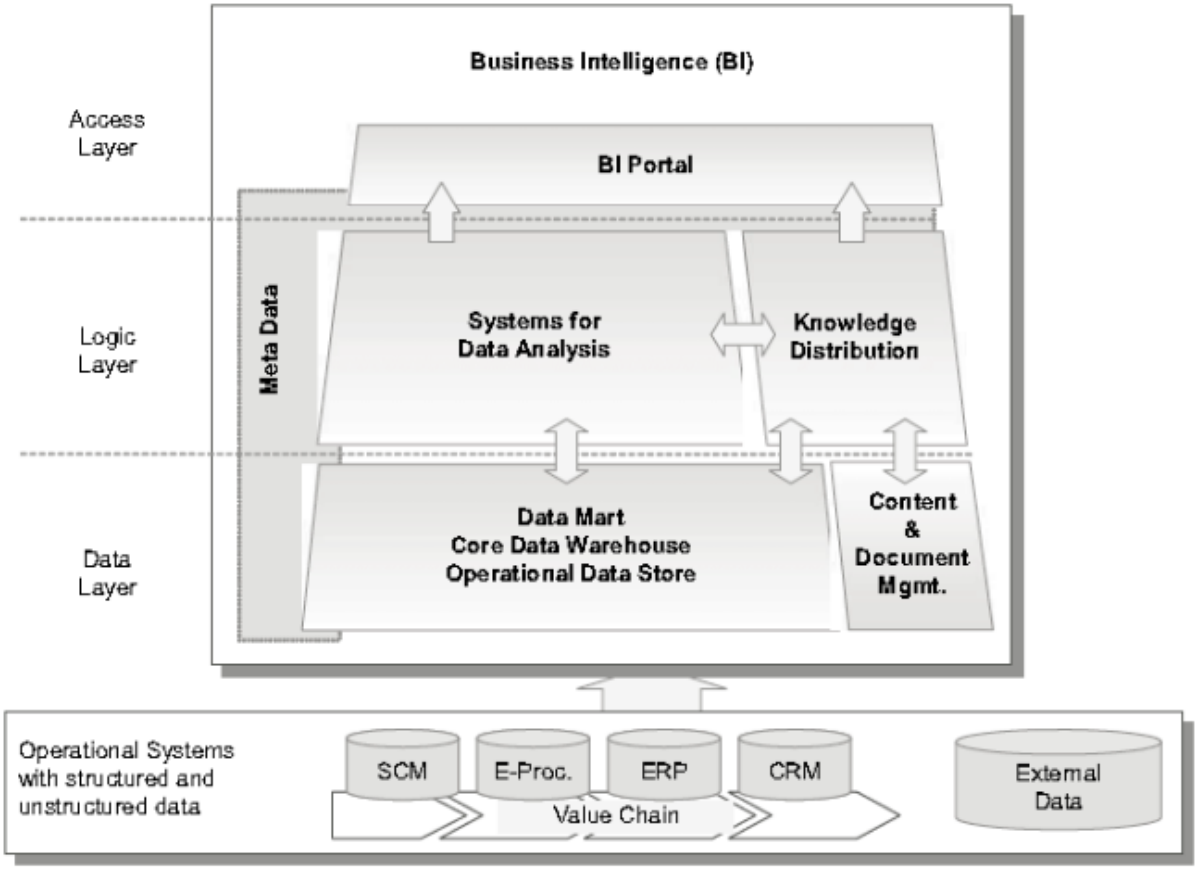

Figure 1 Business Intelligence Framework

Data Layer

The data layer is where raw data from diverse sources such as databases, spreadsheets, and external feeds converge (Tripathi and Bagga, 2020). The primary objective is to ensure the incoming data's quality, accuracy, and consistency. Data integration techniques, including Extract, Transform, and Load (ETL) processes, are employed to harmonize disparate datasets, creating a unified and standardized source for analysis. After the integration process, the data is stored in a central repository known as a data warehouse, which is designed to efficiently organize, manage, and store

vast data. The architecture of this layer, whether on-premises or in the cloud, is chosen based on scalability, performance requirements, and the organization's overall data strategy.

Analysis/Logic Layer

The logic layer is critical in customizing the data to correspond with the organization's specific demands and objectives. It entails developing business-relevant key performance indicators (KPIs), metrics, and analytical models (Vugec et al., 2020). Decision rules, calculations, and algorithms are applied to the integrated data to generate actionable insights. For example, trends, anomalies, and correlations can be found, allowing for a better understanding of the elements driving sales profitability in the case of Cannondale Bicycle Corporation. This layer uses statistical and machine learning models to forecast future trends, assess risk, and optimize business operations. These predictive analytics capabilities enable firms to change from reactive to proactive, predicting market movements and making educated decisions ahead of time. This layer also assures data quality by detecting and correcting anomalies, outliers, and inaccuracies generated throughout the data integration process. This layer enforces data governance principles, ensuring consistency and reliability in the analytical results.

Visualization/Presentation

The Presentation layer is the interface via which complex data is converted into clear, actionable insights. This layer employs numerous tools and approaches to graphically portray information, making it accessible to a broad audience regardless of technical proficiency (Tripathi and Bagga, 2020). Visualization tools like charts, graphs, dashboards, and reports convey patterns, trends, and relationships within data. The primary purpose of this layer is to improve data interpretability, allowing stakeholders to absorb insights naturally. Cannondale Bicycle Corporation, for example,

might employ interactive dashboards to visually show sales performance, product trends, and geographical variances to improve sales profitability. Visualizations aid in identifying crucial information that can be ignored in raw data, allowing for a quick understanding of enormous datasets (Bordeleau, Mosconi and Santa-Eulalia, 2018). Interactivity is a critical feature in this layer, allowing users to explore the data dynamically. Users can drill down into specific data points, filter information based on criteria, and manipulate visual elements to gain a more detailed and nuanced perspective. This interactivity empowers decision-makers to tailor the presentation to their specific needs and focus on the most relevant aspects of the data. The Visualization/Presentation layer plays a crucial role in storytelling. Arranging visual elements enables users to communicate findings effectively and persuasively; this is important for conveying insights to non-technical stakeholders, facilitating better understanding and alignment across the organization.

2.3 BUSINESS INTELLIGENCE TO MITIGATE DECLINE IN SALES PROFITABILITY

In the dynamic landscape of the bicycle industry, where market trends fluctuate quickly, and consumer preferences evolve (Westland, Mou and Yin, 2019), employing business intelligence (BI) emerges as a strategic need for organizations like Cannondale Bicycle Corporation to prevent sales profitability declines. BI is critical in collecting tools available to firms confronting issues in maintaining or improving their financial performance. Cannondale gains the capacity to delve into the complexities of its sales data, detecting patterns, correlations, and potential areas of inefficiency that may contribute to falling profitability by utilizing BI technologies. The real-time insights BI provides enable Cannondale to respond quickly to market shifts. For example, BI systems can examine past sales data to find product performance trends, allowing the company to fine-tune its product offers in response to consumer demand. Cannondale's proactive approach

allows the company to integrate its inventory management and production strategies with market dynamics, avoiding overstock situations and missing opportunities due to underestimating demand. Business intelligence (BI) solutions facilitate the utilization of predictive data (Ramakrishnan et al., 2018), enabling Cannondale to anticipate future sales trends and proactively modify its strategic approach. Moreover, the utilization of machine learning algorithms in the analysis of historical sales data assists in identifying the key factors that contribute to profitability; this enables Cannondale to make well-informed decisions regarding its product offers, pricing strategies, and targeted marketing endeavors. Through the utilization of customer segmentation data, Cannondale has the potential to concentrate its marketing endeavors on specific demographic groups, thereby reducing advertising costs and enhancing the efficacy of promotional programs. Moreover, the implementation of business intelligence-driven customer relationship management (CRM) enables the facilitation of personalized customer engagement, fostering brand loyalty, and promoting repeat business (Lahtinen, 2019). These factors are crucial for achieving sustained sales success in the long run. Strategic pricing decisions, another essential part of profitability, can benefit significantly from BI analytics. By examining market trends, competition pricing tactics, and historical sales data, Cannondale may improve its pricing structure to remain competitive while retaining profit margins. Cannondale's data-driven pricing strategy keeps the company adaptable in a market where pricing dynamics can affect consumer choices.

3.0 DATA ANALYSIS

Data analysis is a pivotal component of the research methodology, which systematically examines and interprets raw data to derive meaningful insights (Theofanidis and Fountouki, 2018). It involves applying statistical and computational techniques to transform data into actionable information. For this study, the data was obtained from Kaggle, a popular platform for datasets, providing a comprehensive dataset for Cannondale Bicycle Corporation with 17 columns and

34,864 rows. The dataset includes sales figures, product details, customer information, and market indicators. Ensuring the cleanliness of the data before analysis is crucial for the reliability of results. Measures taken to clean the Kaggle dataset include handling missing values, checking for outliers, and standardizing data formats. The study will utilize visualizations to reveal patterns in customer purchasing behavior, identify high-performing products, and highlight market trends; this will serve as the foundation for evidence-based decision-making, allowing Cannondale to formulate targeted strategies to address the decline in sales profitability.

3.1 EVIDENCE OF BUSINESS INTELLIGENCE SYSTEM

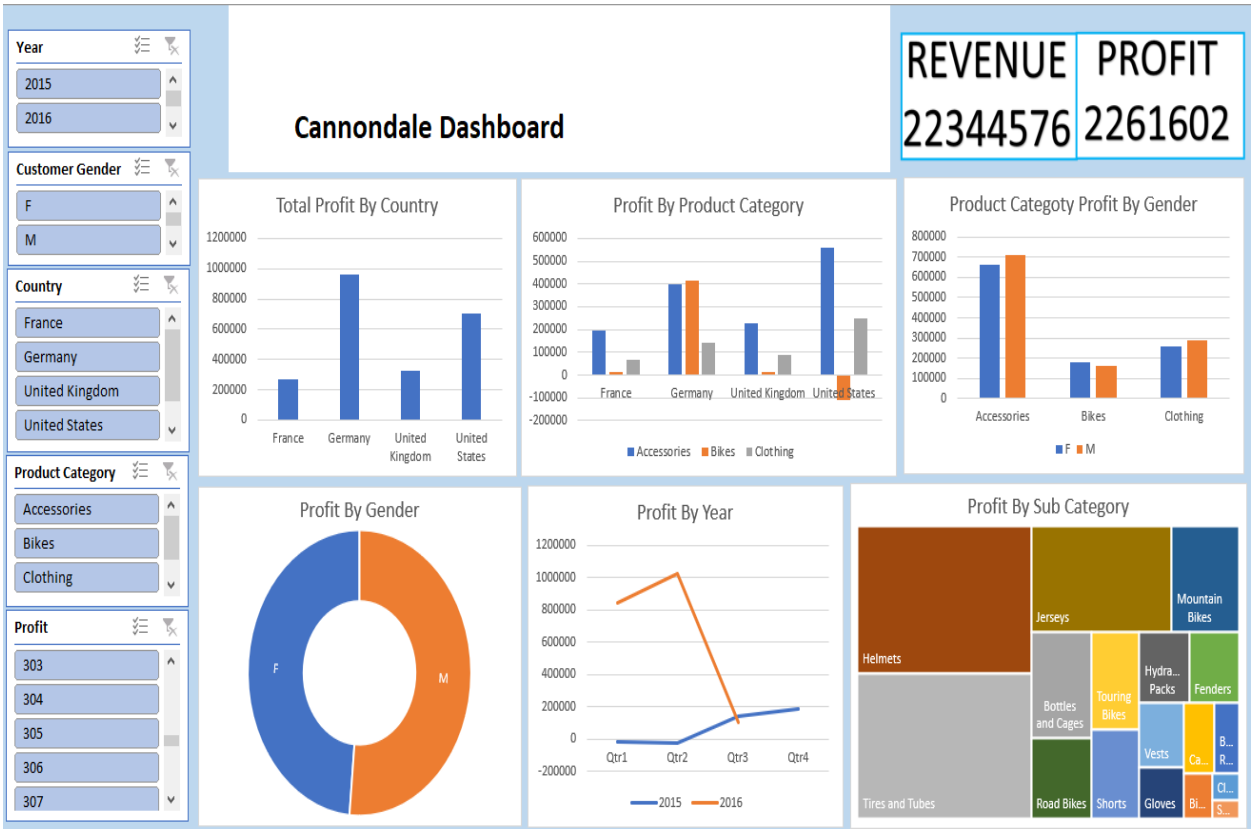

Figure 2 Dashboard

4.0 DASHBOARD JUSTIFICATION

The chart in figure 3 below shows the total profits for Cannondale Bicycle Corporation across different countries. Germany emerges as the leading contributor, with a profit of $958,825. The United States follows closely with a profit sum of $701,165. France and the United Kingdom contribute $272,657 and $328,955, respectively. The distribution of profits among these countries underscores the importance of conducting a deeper analysis to discern underlying trends and potential areas for optimization. It prompts questions about market dynamics, consumer behaviors, and the effectiveness of current strategies. By delving into the specific factors influencing profit margins in each region, Cannondale can tailor its approach, capitalize on successful strategies, and further address challenges to enhance global profitability.

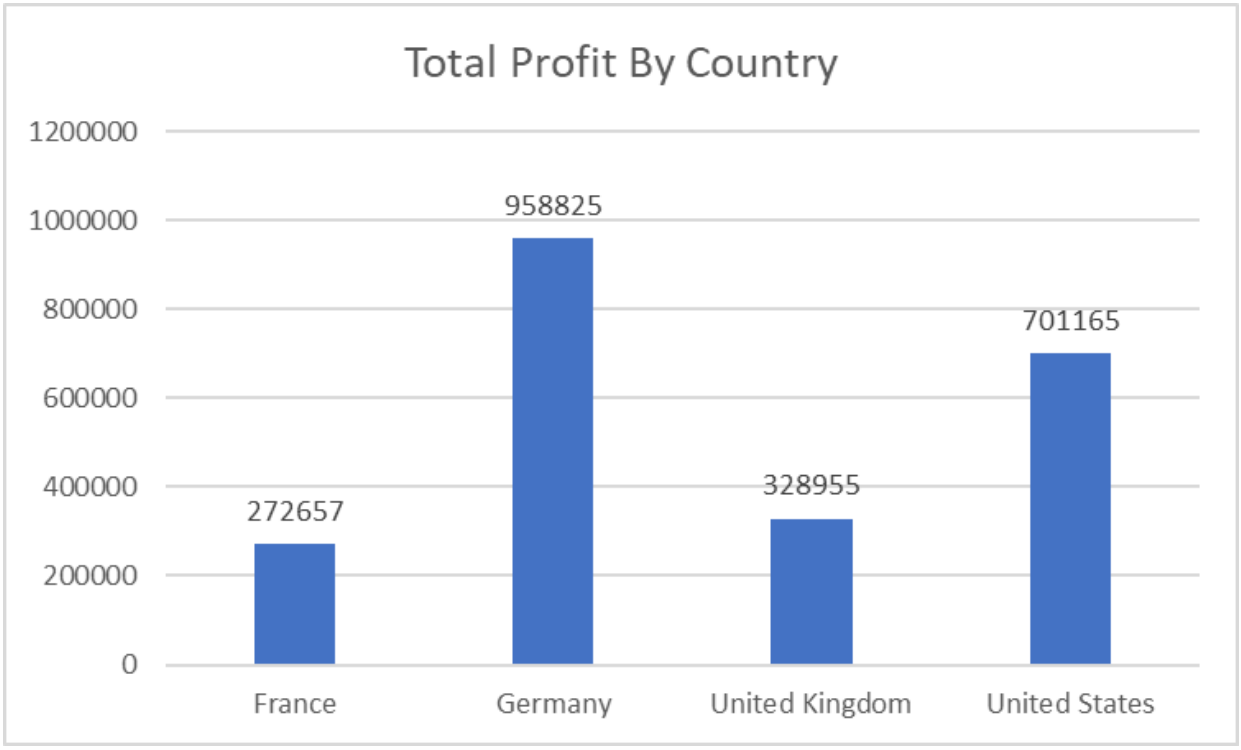

Figure 3 Total Profit by Country

The figure 4 below illustrates the profit distribution of Cannondale Bicycle Corporation across different product categories (Accessories, Bikes, and Clothing) in various countries. Germany emerges as a significant market for Cannondale, demonstrating robust sales in all types, particularly in Bikes, with a profit of $416,069. Despite reporting a negative value in Bikes, the United States showcases substantial gains in Accessories and Clothing, indicating a diversified product portfolio. France prefers Accessories, while the United Kingdom demonstrates a balanced distribution across all categories. The negative value for Bikes in the United States warrants further investigation, probing potential anomalies or specific market challenges. This data underscores the importance of tailoring marketing and product strategies to the preferences and demands of each region. Cannondale can optimize its product offerings and marketing initiatives by delving into the drivers behind these profit patterns, fostering sustained growth and profitability in diverse global markets.

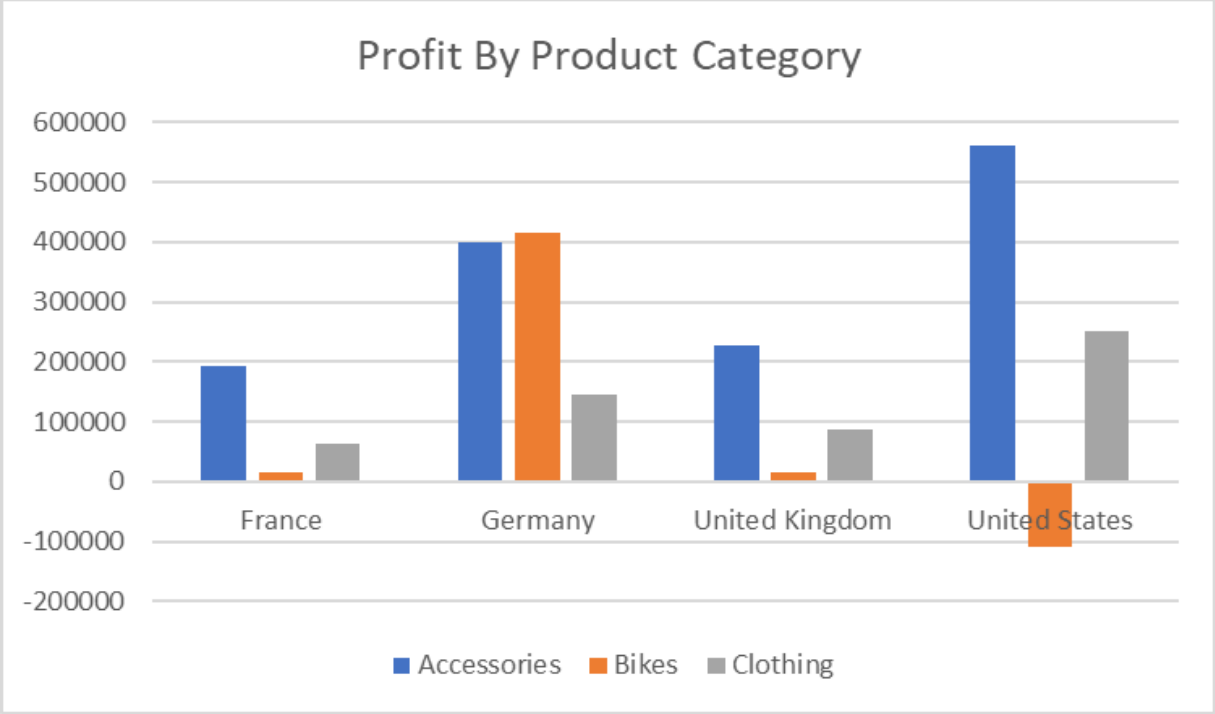

Figure 4 Profit by Product Category

Figure 5 below shows gender-based distribution analysis of Cannondale Bicycle Corporation's profits across three product categories. Both genders contribute significantly to the overall profit, with a slight preference variation. Females (F) demonstrate a higher inclination towards Accessories, with a figure of $664,993. Males (M) also lead in Accessories but show a relatively balanced interest across all types. Recognizing the distinct preferences between male and female customers allows the company to optimize inventory, refine marketing campaigns, and introduce product variations that resonate with each target demographic. This analysis underscores the importance of a customer-centric approach, ensuring that Cannondale caters effectively to diverse gender preferences within its consumer base, ultimately enhancing customer satisfaction and driving sustained profit growth.

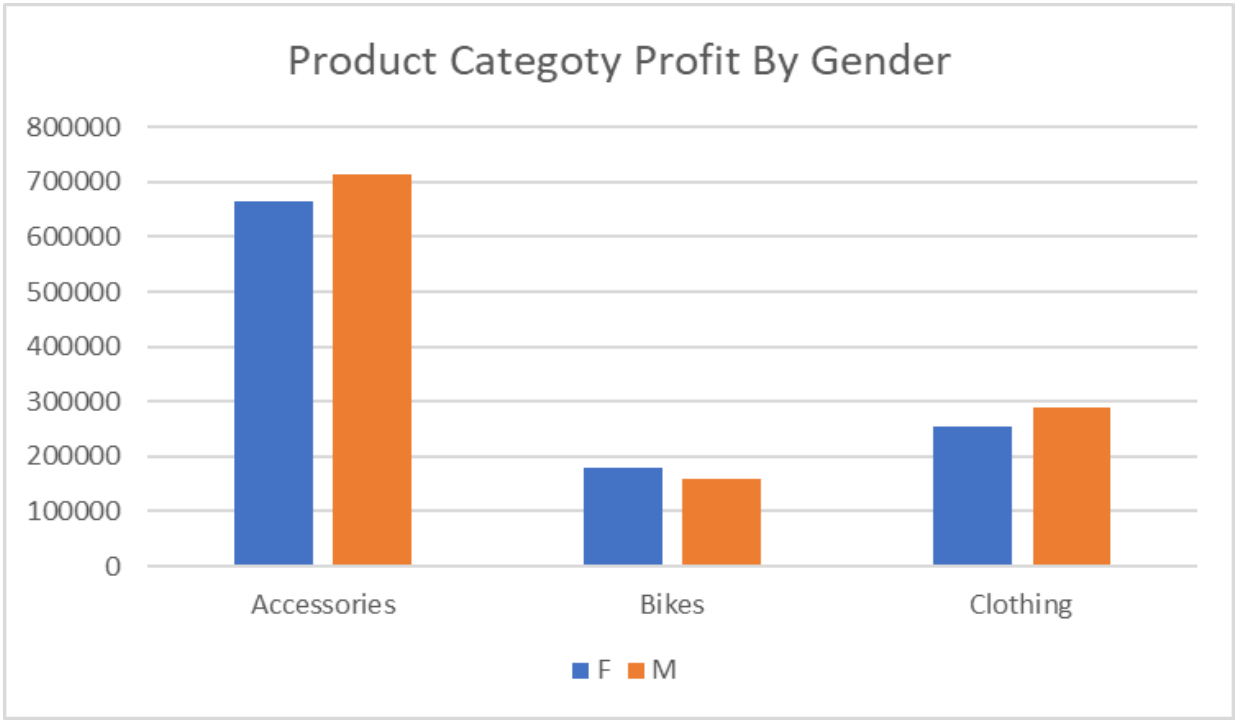

Figure 5 Product Category Profit by Gender

The sunburst chart in the figure below illustrates the total profits for Cannondale Bicycle Corporation, categorized by gender. Both genders segments contribute significantly to the

company's overall profitability, with males generating a total profit of $1,163,252 and females contributing $1,098,350. The comparable profit suggests a balanced financial impact from both genders. Analyzing profit distribution by gender is crucial for Cannondale to identify and capitalize on market trends and consumer behaviors unique to each demographic.

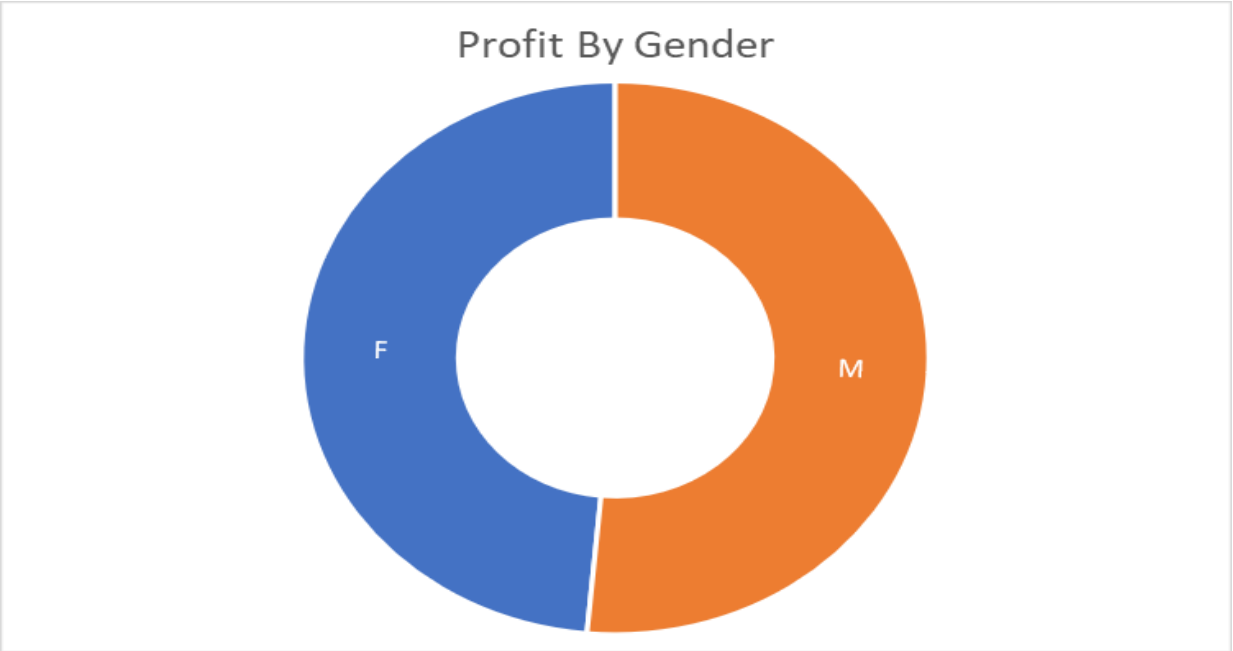

Figure 6 Profit by Gender

The line chart below depicts Cannondale Bicycle Corporation's total profits in 2015 and 2016, segmented by quarter. 2015, the company encountered difficulties in the first two quarters, with negative gains recorded in Q1 and Q2. A remarkable turnaround occurred in the third and fourth quarters, contributing to an overall positive profit value by the end of the year, implying a strategic shift or recovery in the latter part of 2015. Cannondale's profits were consistently positive in Q1 and Q2. This analysis emphasizes the importance of examining quarterly performance trends,

which allows Cannondale to identify periods of strength, address challenges, and develop strategies for long-term profitability.

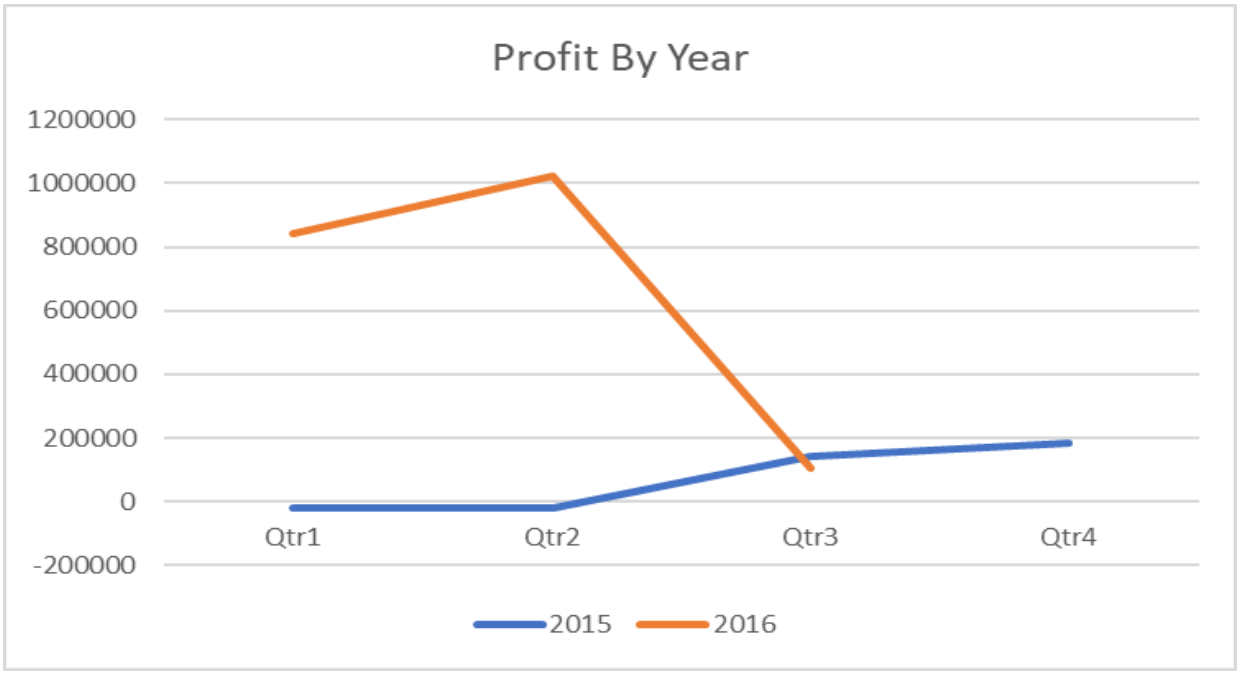

Figure 7 Profit by Year

The tree map below shows Cannondale Bicycle Corporation's product subcategory profits. An impressive $518,475 profit from helmets shows the importance of safety gear in the company's product assortment. Tires and Tubes earn $512,124, demonstrating their market importance. Jerseys and mountain bikes follow, each vital to Cannondale's profits. The research shows that accessories like Bike Racks and Hydration Packs help the company make money. Understanding the profitability of each subcategory helps Cannondale optimize its product offers, allocate resources, and capitalize on market trends to increase profitability in the competitive bicycle sector.

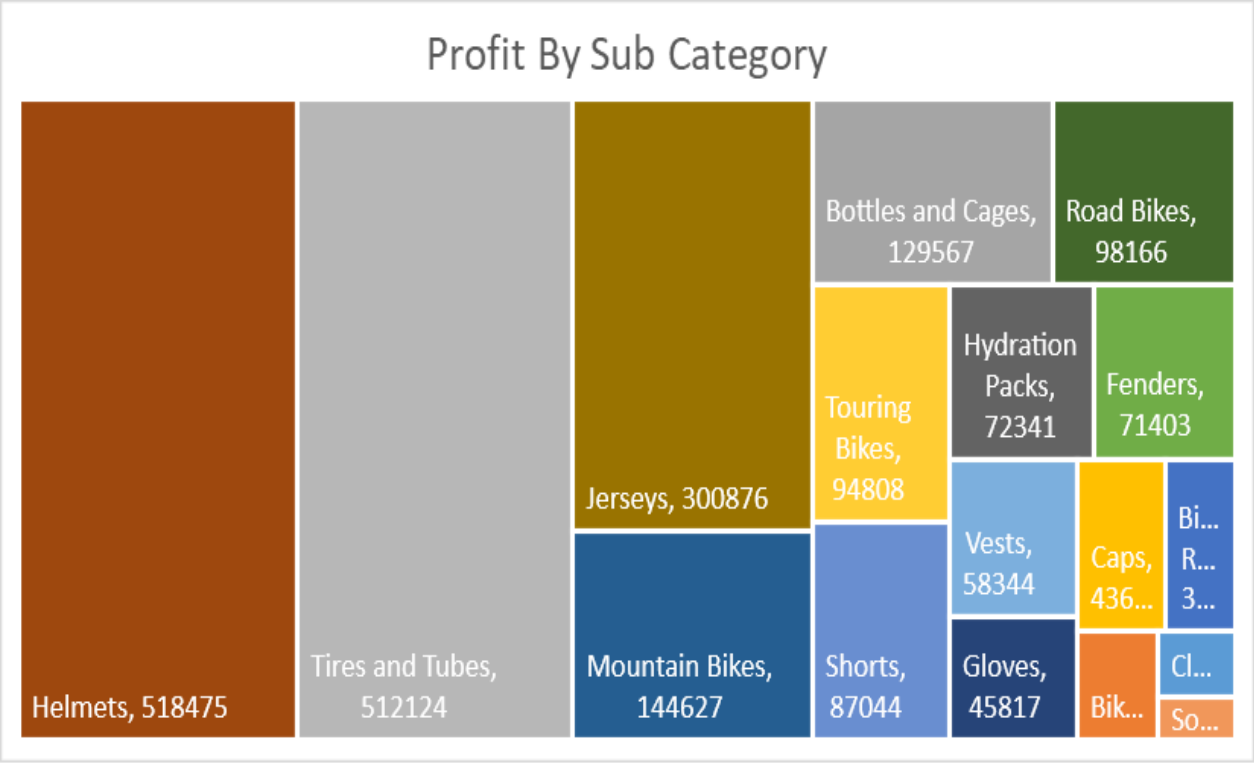

Figure 8 Profit by Sub Category

Figure 9 shows the dashboard slicer's customized interface improving system usability. Users can quickly dive into data subsets to acquire deeper insights without sophisticated queries or manual

data manipulation. This flexibility lets stakeholders analyze trends and anomalies in real-time, making decision-making more flexible.

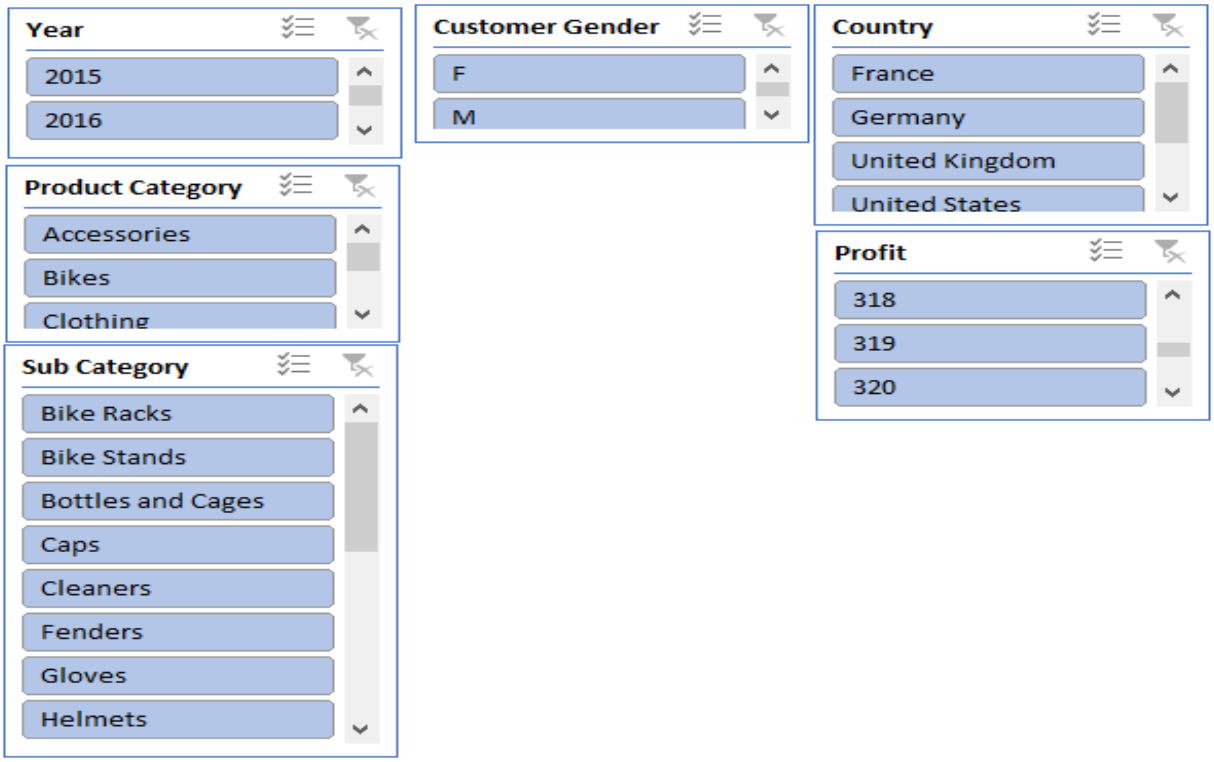

Figure 9 Slicer

5.0 CONCLUSION AND RECOMMENDATIONS

Using business intelligence and analytics to assess Cannondale Bicycle Corporation's sales profitability has revealed crucial insights into market dynamics, product performance, and consumer behaviors. Examining data sources such as gender-based and geographical sales distributions has provided a complete knowledge of the company's financial landscape. The profitability of key product categories, such as Helmets, Tires, and Tubes, has been discovered, stressing the importance of strategically leveraging these high-performing areas. The quarterly analysis highlighted historical tendencies, emphasizing the importance of adaptation in response to seasonal variations. Gender and regional studies have underscored the need to customize marketing and product strategies to distinct demographics and geographic markets. Recognizing

the diversity of consumer tastes and market dynamics, particularly in locations such as Germany and the United States, is critical for optimizing product offers and driving long-term profitability. Based on the study's findings regarding Cannondale Bicycle Corporation's sales profitability, several recommendations can be made. Cannondale should prioritize data integration by aggregating information from multiple sources, including historical sales data, market trends, and real-time data streams. Use advanced analytics, such as machine learning and predictive modelling, to uncover subtle patterns and connections within the dataset. Cannondale can improve its demand forecasting accuracy by studying variables such as product categories, regional differences, and customer habits and optimizing inventory management and production plans. Allow periodic inspections and updates to the analytics system to foster a culture of adaptation. This adaptability is critical in the continually changing cycling industry, allowing Cannondale to remain flexible and sensitive to changing market conditions and consumer preferences. Given the importance of data in the analytics process, adequate security measures are required to avoid data breaches, build confidence in the system's reliability, and preserve Cannondale's private information.

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