FABRIDOCE®

# BUSINESS INTELLIGENCE II


GROUP 11

JOÃO CHANG 20201620

RORY O’DWYER 20231467

RÚBEN MACHADO 20230367

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# 1. Introduction

This semester's report describing the work done in Business Intelligence 2 builds on the foundational work completed in the first semester, which focused on the creation of a robust data warehouse. In BI 1, the primary tasks involved designing and implementing a data warehouse that consolidates and organizes Fabridoce's extensive sales data from 2013 to 2018. This foundational structure enabled the storage and easy retrieval of data, facilitating comprehensive analysis and reporting.

This semester the focus shifted to creating a semantic model, as well as reporting and dashboarding capabilities. The semantic model serves as a bridge between the raw data stored in the warehouse and the end-user reports and dashboards, providing a user-friendly layer that simplifies data interpretation and utilization. By developing this semantic model and new measures using dax, we enabled more intuitive and efficient access to key business metrics and insights.

The reporting and dashboarding phase involved designing and implementing interactive and visually appealing paginated reports and dashboards. These tools allow stakeholders to explore the data in depth, uncover trends, and make data-driven decisions. The use of Power BI analytical features allowed the creation of dynamic visualizations, addressing specific business questions and providing actionable insights to support Fabridoce's strategic goals.

# 2. Business Presentation

## 2.1 Introduction to the Company

Fabridoce, established in 1989 in Aveiro, Portugal has been a staple in the Portuguese confectionery landscape, the company has cultivated a reputation for producing high-quality, authentic Portuguese sweets. Over the years, the company has expanded its product line beyond classic sweets to include items like biscuits and ice creams, catering to evolving consumer tastes while maintaining its core values. The expansion of these new product lines has led to impressive recent sales growth, as seen in Figure 1.

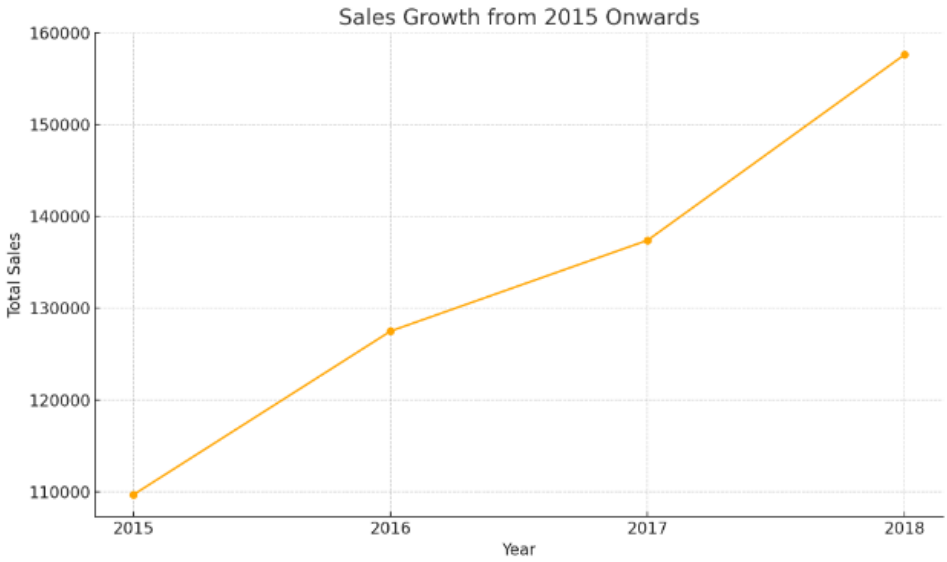
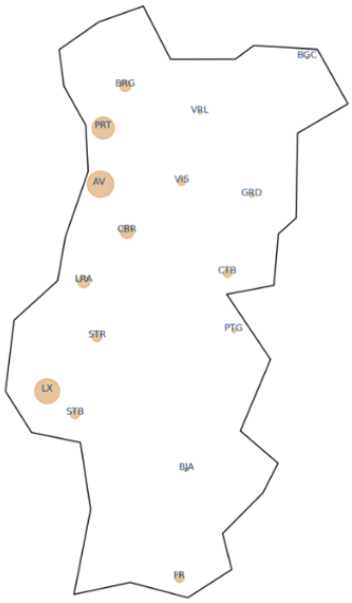



*Figure 1 - Growth of Sales Amount in euros from 2015*

Fabridoce has had great success in penetrating local markets and becoming a household name across many Portuguese cities. The data from 2013 to 2018 indicates a steady increase in the number of clients and the geographical spread of Fabridoce's market. This growth mirrors the company's strategic expansion efforts and its ability to adapt to different market needs, as proven in Figure 2 and 3.



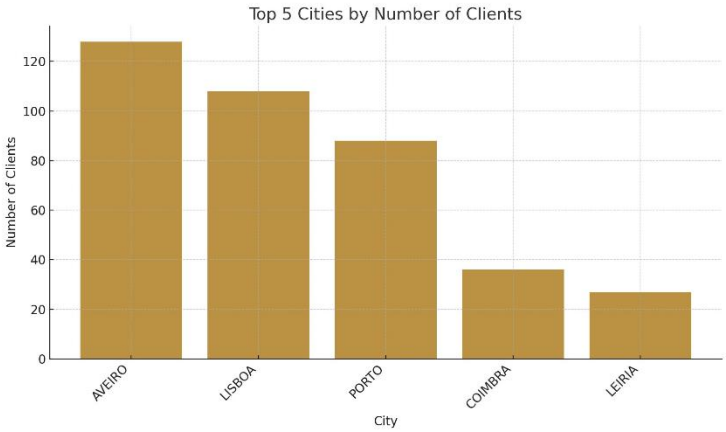




*Figure 2 - Top 5 cities by Number of Clients (Left Figure)*

*Figure 3 - Sales by Cities (Right Figure)*

Fabridoce's client base is not only growing but also diversifying. The data reveals an increasing variety in client types and sizes, demanding a more nuanced approach to sales and marketing strategies.

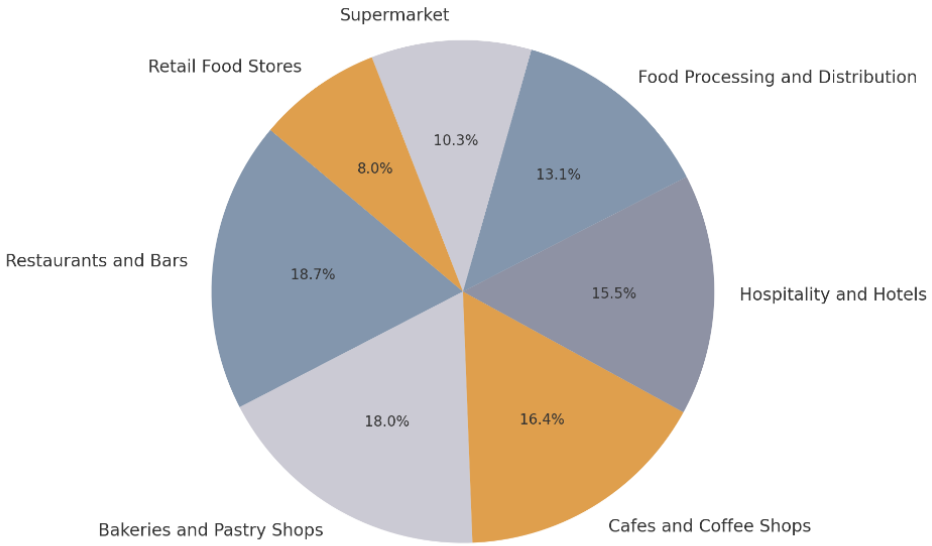



*Figure 4 - Client Industry Distribution by Client*

Central to Fabridoce's expansion of clients has been it is relatively small but growing in numbers dynamic team of sellers. This skilled workforce varied in experience is the engine driving the company's growth, traveling country wide showcasing Fabridoc's sweets and building relationships with an expanding client base across Portugal. Some of these sellers who have been working with Fabridoce for many years boast very impressive sales records as shown in Figure 5.

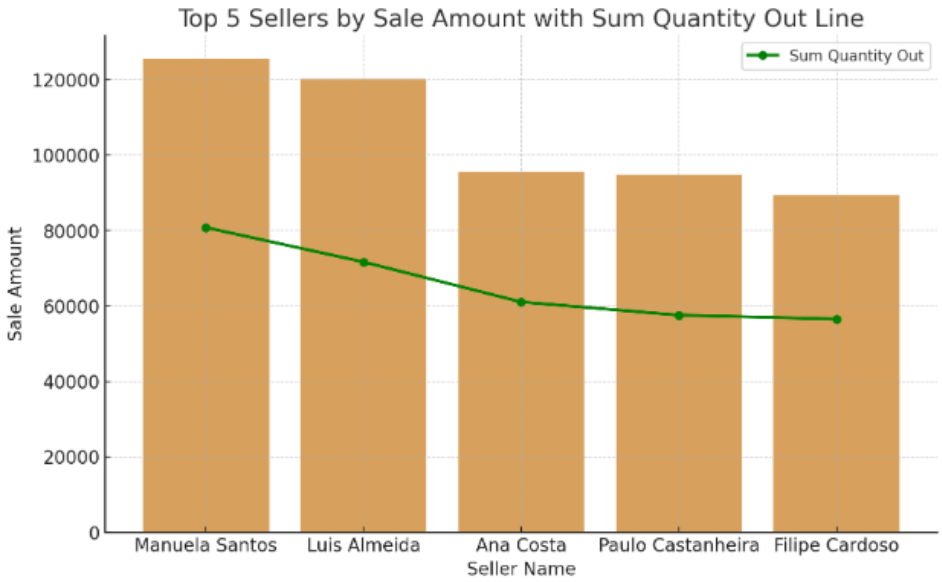



*Figure 5 - Fabridoce's Top 5 Sellers by Sale Amount*

## 2.2 Business Problem

Fabridoce operates in a competitive market where the ability to effectively manage and utilize a vast array of sales data is paramount. The company faces multifaceted challenges that stem from its diverse product range, the fluctuating nature of sales, and the complexities inherent in managing a geographically dispersed and varied client base. These challenges require a strategic approach, incorporating consolidated sales insights, in-depth seller performance analysis, nuanced client behavior understanding, predictive seasonal demand forecasting, adaptive pricing strategies, targeted market expansion efforts, and a focus on optimizing seller performance.

- **Sales Data by Product and Region:** Fabridoce lacks clarity on their sales data distribution by product and region, hindering their ability to compare sales on a monthly or quarterly basis to uncover patterns and anomalies.

- **Fluctuating Sales Patterns:** The company is challenged by fluctuating sales patterns across different products and regions, compounded by seasonal variations and regional product preferences, without a clear method to analyse and interpret these fluctuations.
- **Seller Performance Analysis:** Fabridoce faces difficulty in understanding why certain sellers perform better than others, especially considering regional and client segment differences, and lacks a systematic approach to evaluate and enhance seller performance.
- **Diverse Client Preferences Analysis:** The company struggles with tailoring their product offerings and marketing strategies to the diverse preferences of clients across various industries, sizes, and regions, due to a lack of detailed insight into client purchasing behaviours and preferences.
- **Seasonal Product Demand Forecasting:** Fabridoce is unable to accurately predict demand patterns for products with varying life cycles, particularly for conventual sweets, which poses challenges for effective product management and marketing strategy development.
- **Pricing Strategy Development:** The company has not established effective pricing strategies, finding it challenging to determine optimal pricing for different products in relation to factors like client responsiveness and product profitability, and lacks a clear understanding of the market to make informed pricing decisions.

Addressing these interconnected challenges is critical for Fabridoce to effectively harness its sales data for strategic decision-making, optimize its operations, and secure sustained growth in a highly competitive marketplace.

## 2.3 Business Questions

**Sales Performance**

1. What is the total recorded revenue generated?
2. What is the total recorded revenue generated yearly?
3. What is the total recorded gross profit generated, and what is the gross profit margin?
4. What is the total recorded amount of expenses?
5. How has the sales revenue changed year over year?
6. Are there any noticeable peaks or lows in sales revenue over the years?
7. How do the current year's gross sales compare to the previous year's gross sales, and are they meeting or exceeding the target?

8. How does sales variate overtime and how it affects the generated revenue?

**Products Analysis**

9. Which are the top 5 products by quantity sold, and how do their sales quantities compare to each other?
10. What is the quantity sold and revenue for each product type and individual product?
11. What are the total expenses associated with each product type and individual product?
12. What is the most sold product based on the quantity sold?
13. How does the sales quantity of the most sold product type compared to other product types?
14. Are there any seasonality trends for the best performing products in 2018?
15. What is the revenue for each of the products from 2013 to 2018?
16. What is the quantity sold by product from 2013 to 2018?
17. What is the average sale amount by product from 2013 to 2018?
18. How many products does Fabridoce sell?
19. Was any new product introduced during 2013 to 2018?
20. What is the revenue for each of the five most sold products in 2018?
21. What is the quantity sold for each of the five most sold products in 2018?
22. What is the average sale amount for each of the five most sold products in 2018?
23. What is the market share for each of the most sold products in 2018?
24. What is the difference of sales revenue compared with the previous year (2017) for each of the five most sold products in 2018?
25. What's the relationship between revenue and quantity sold by each product from 2013 to 2018?
26. What are the types of products that generate more revenue from 2013 to 2018?

**Sellers Analysis**

27. What are the main characteristics of each seller (age, experience, and training level)?
28. What is the yearly total sales amount per seller?

**Client Analysis**

29. How many clients does Fabridoce have?
30. Who are the top 5 clients by client size?

31. How many clients does Fabridoce have in each size category (small, medium, big)?
32. What is the yearly total sales amount for the top clients in each client size category?
33. What is the average sales amount per client size?
34. What is the total quantity of products sold for the top clients?
35. What is the quantity of sold, average sale amount and total sales amount per client?

**Location Analysis**

36. What is the quantity sold, average sale amount and total sales amount per Zone?
37. What is the quantity sold, average sale amount and total sales amount per District?
38. How do sales quantities vary by district?
39. Who is the top client in each district?
40. What is the total revenue generated and amount of products sold in each Zone?
41. What is the total revenue generated in each district and which district has the highest quantity of products sold?
42. Who is the best performing seller by zone and district?

# 3. Data Source

The starting point of this project is to ensure the quality, reliability, and relevance of the data to be used. By providing an overview of the data source, we aim to establish the necessary context for enhanced data interpretation and greater clarity in our analysis.

Our team was granted direct access to structured data in an Excel .xlsx file format by Fabridoce, the company in question. We received a spreadsheet containing a comprehensive record of a Business-to-Business (B2B) sales data from 2013 to 2018. This comprehensive dataset presents purchases across different districts, including detailed information on postal codes, and it delineates sales in the northern, central, and southern regions of Portugal.

This dataset enabled us to conduct in-depth analysis in different areas including the type of billing and payment method, identified hierarchical product structures—including broader categorizations, pastry families, types, flavours, and packaging specifications. In examining products, the information concerning the production costs, retail prices, the base prices, and the discount applied are also presented.

The precise identification of clients is crucial for segmenting and discerning the significance they contribute to the company. Within this dataset, we can individually identify and categorize clients based on the industry they operate in, including sectors such as supermarkets, restaurants, hotels, and others. Additionally, we differentiate them by their respective company sizes, distinguishing between small, medium, and large businesses.

To identify revenue trends, the attribute “quantity_out” determines the number of units sold, and the “sale_amount” attribute indicates the revenue generated by each transaction. To analyse seasonality and sales fluctuations, we can conduct a comprehensive analysis at multiple levels of granularity, including yearly, monthly and daily.

Internally, we gain valuable insights into the involvement of the company's employees/sellers in the sales process. This includes assessing whether they are current or former employees, understanding their birth date, commission structures for each sale, their professional background in terms of industry and company experience, and their current training level within the company.

Using this data, we constructed a Fact table and various Dimension tables, each designed with distinct hierarchies and levels of granularity, which will be elaborated upon in greater detail in subsequent sections.

# 4. Data Warehouse Design

## 4.1 Dimensions tables


In data warehousing, dimensions refer to descriptive attributes that give context and categorization to facts (quantitative data) stored in a data warehouse. The attributes serve as basis for organizing and analysing business data. Per Kimball Group, “Dimension tables are sometimes called the “soul” of the data warehouse because they contain the entry points and descriptive labels that enable the DW/BI system to be leveraged for business analysis. A disproportionate amount of effort is put into the data governance and development of dimension tables because they are the drivers of the user’s BI experience.”

Upon analysing the dataset “fabridoce_dataset,” we decided to create 6 dimensions. Most of the attribute's names are a direct match with the column’s names in the dataset. We will have to create surrogate keys in Fabric since they do not exist in the dataset.

- dim_date

The "dim_date" table plays an important role in our data warehousing system, providing a representation of transaction dates since January 2013 until December 2018 and their associated attributes.

The creation of this dimension is a response to Fabridoce’s need to monitor sales performance, while also facilitating analyses through aggregated time frames, such as daily, weekly, monthly, semestral and yearly. With the date dimension, we have the possibility to track and assess transaction data across multiple time granularities.

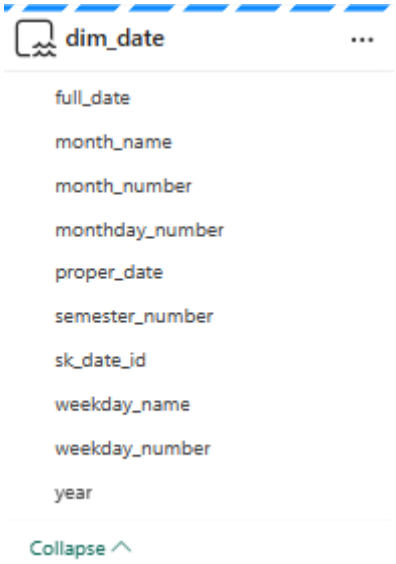



*Figure 6 - dim_date*

- **dim_invoice**

The Invoice Dimension within our data warehouse has relevant information related to invoices generated within Fabridoce's sales. It provides details about invoices, aiding in financial analysis and transactional insights. We will be able to obtain insights about payment methods and invoice categorization. Below are the attributes in our Invoice Dimension:

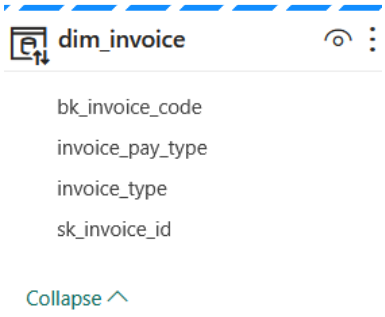



*Figure 7 - dim_invoice*

- **dim_client**

The Client Dimension organizes client data, enabling segmentation by industry and size. It supports decision-making by offering insights into client profiles and facilitating uniform reporting across Fabridoce. It drives informed business strategies and enhances customer relationships for improved outcomes.

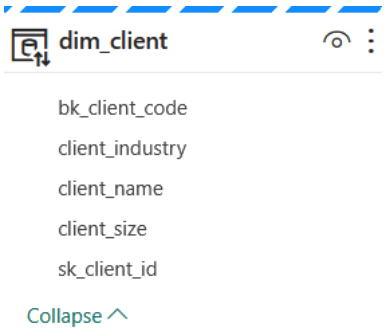



*Figure 8 - dim_client*

- **dim_product**

The Product table in our data warehousing system stores product-related data, attributes like product name, class, group, unit type, unit production cost and other characteristics. This dimension is important for product performance analysis and the facilitation of comprehensive product-related insights and decision-making.


*Figure 9 - dim_product*

- **dim_seller**

The seller dimension in our data warehouse stores information about employees responsible for executing Fabridoce's sales. This dimension is important to understand and analyse the performance of each seller by experience, training level and age. Since the dataset has the seller's birth date, we will be able to create a query regarding the current age during the ETL process. Below are the attributes for the seller dimension:

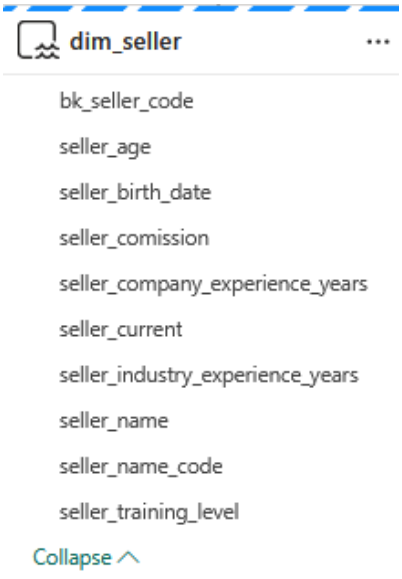



*Figure 10 - dim_seller*

- **dim_location**

The location dimension serves as an important component for contextualize and analyse data related to geographical aspects of Fabridoce' sales. It was designed to capture information about the countries, zones, districts, and post codes where transactions happened. These are the attributes in the location dimension:

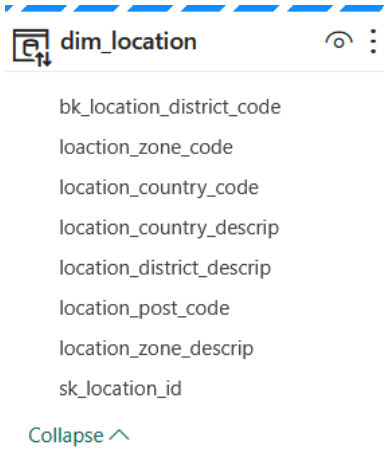



*Figure 11 - dim_location*

## 4.2 Hierarchies

Hierarchies are organizational structures that represent the relationships and levels of granularity within dimensional data. These hierarchies provide a way to organize and navigate through data in a more structured and meaningful manner enabling specificity when drawing conclusions. For the data provided by Fabridoce, we identified the following hierarchies:

- Client Hierarchy
- Date Hierarchy
- Product Hierarchy
- Seller Hierarchy
- Location Hierarchy

- **Client Hierarchy**

In this three-level depth hierarchy, from the Client dimension the top attribute identifies the type of industry in which the company operates. Subsequently, it delineates the company's size, distinguishing between small and local businesses or international enterprises. At the third tier, the client's name is specified. These hierarchical levels are fundamental for conducting an analysis of clients' purchasing behaviour, offering valuable insights into the buyer's identity, and the associated industries.

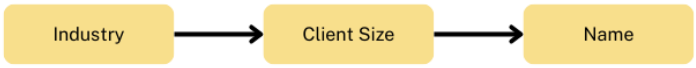



*Figure 12 - Client Dimension Hierarchy*

- **Date Hierarchy**

The Date Dimension employs a hierarchical structure with six levels of depth. Beginning at the top with the year, it descends through the semester, month, weekday, and concludes at the bottom with monthday. This granular level will be advantageous to compare performance and trends across different time periods. This facilitates identifying seasonality, spotting trends, and understanding how specific events or changes impact the data over time.

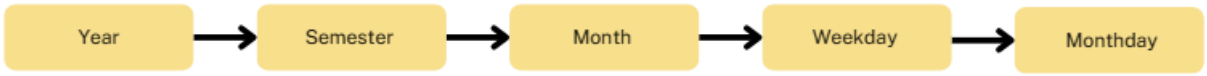



*Figure 13 - Date Dimension Hierarchy*

- **Product Hierarchy**

In the hierarchy of product dimensions, there are four levels of depth. This begins with a broad description of the product group, then narrows down to the pastry family, followed by the specific pastry in question. The final level delves into the pastry's specifications, detailing factors such as flavour (if applicable), the quantity of units, and the measurement in grams or litres. The different levels within this hierarchy offers a valuable framework for comprehending preferences across different regions and clients, either by product or the type of products being consumed. This data, when integrated with a seasonal analysis, will facilitate the prediction of annual demand.


*Figure 14 - Product Dimension Hierarchy*

- **Seller Hierarchy**

The seller hierarchy composed of a two-depth level within the seller dimension describes the employees' years of experience in the industry and then as a Fabridoce employee. These attributes play a crucial role to differentiate and pinpointing the most valuable employees, considering their experience. This information is pivotal in offering rewards or incentives to high-performing individuals and aiding those facing challenges reaching sales targets.

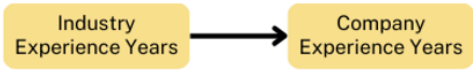



*Figure 15 - Seller Dimension Hierarchy*

- **Location Hierarchy**

In this dimension, the location hierarchy is structured across four levels of depth, starting with the country analysis, and descending through the country zone, district, and concluding with the post code. This stratified depth is essential for gaining valuable insights that can guide strategic decisions related to identifying the districts that are most valuable and anticipate restocking demands in the nearest warehouse. On the other hand, in regions characterized by lower demand, the company can enhance its presence by creating marketing segment strategies to promote the company's vision and products in these specific areas.


*Figure 16 - Location Dimension Hierarchy*

## 4.3 Slow-Changing-Dimensions

In a data warehouse dimensions data is constantly changing and eventually some of those changes will affect the dimensions' attributes. Since we are using a fixed dataset, slow changing dimensions (SCD) are not a significant concern because the data used is static. However, we decided to mention the types that we would use if the data was not static. Upon analysing each dimension and the respective attributes, we reach the conclusion that for some dimensions the best approach is to use a hybrid SCD strategy.

| Dimension | SCD Type |
|---|---|
| **Date** | **Type 0**<br>Attributes are constant |
| **Location** | **Type 2**<br>Historical tracking of changes is needed |
| **Product** | **Type 2**<br>Historical tracking of changes is needed |
| **Invoice** | **Type 1 & Type 2 (hybrid)**<br>Overwriting is possible for attributes such as invoice type and invoice pay type. However, for invoice number is necessary to maintain an audit trail for legal and compliance reasons |
| **Client** | **Type 1 & Type 2 (hybrid)**<br>Overwriting is possible for attributes such as client industry and client size. However, for client name is necessary to maintain an audit trail for legal and compliance reasons |
| **Seller** | **Type 1 & Type 2 (hybrid)**<br>Overwriting is possible for all attributes except seller commission. It is important to maintain an historical record about previous commissions |

*Table 1 - Slow-Changing-Dimension types*

## 4.4 Fact Table

The fact table, “sales_fact_table,” was established to play a crucial role in organising and storing quantitative data about business processes. Comprising six foreign keys, each corresponding to the surrogate key of one of the six defined dimensions of the data warehouse, it integrates essential measures such as “quantity_out”, “sale_amount” and “unit_sale_amount” to provide a comprehensive foundation for analytical processing and reporting."

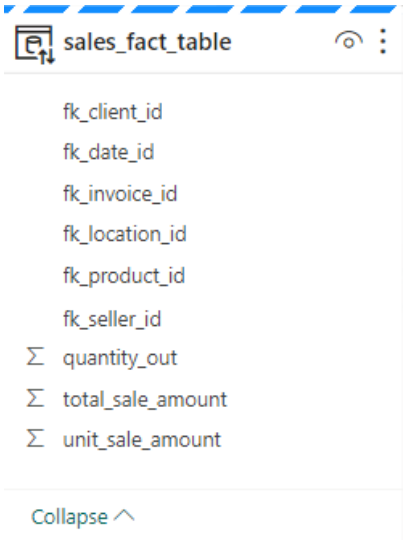



*Figure 17 - sales_fact_table*

## 4.5 Measures

To address our business needs effectively, we examined the source data and identified the main measures that will robustly support our analysis of the business problem. The chosen measures are identified in the table below as follows:

| Measures | Formula |
|---|---|
| **sale_amount** | unit_price * quantity_out |
| **quantity_out** | quantity_out |

*Table 2 - Measures*

The "sale_amount" measure in the facts table represents the monetary value from the sales transactions, without commissions and discounts. It quantifies the gross revenue generated from each sale, includes the total value of products sold by Fabridoce. This measure will allow evaluation of the sales performance, revenue, and financial analysis within the data warehouse.

The "quantity_out" measure in the facts table represents the total quantity of items sold during specific transactions. It measures the physical units of goods dispensed, providing insights into demand trends and operational efficiency. This measure is essential for understanding product movement within the business operations. In this context we cannot used this measure to analyse inventory management because Fabridoce did not provide information about inventory.

It is crucial to emphasize that addressing our business requirements requires a strategic combination of these measures across the various dimensions. This integrated approach will significantly enhance our ability to analyze and address the business needs and tackle the business problem.

## 4.6 Data Warehouse Star Schema

After establishing the dimensions and the fact table, we established interconnections by linking the surrogate keys of the dimensions with the foreign keys of the fact table in a one-to-many relationship, which was structured in as the star schema presented below.

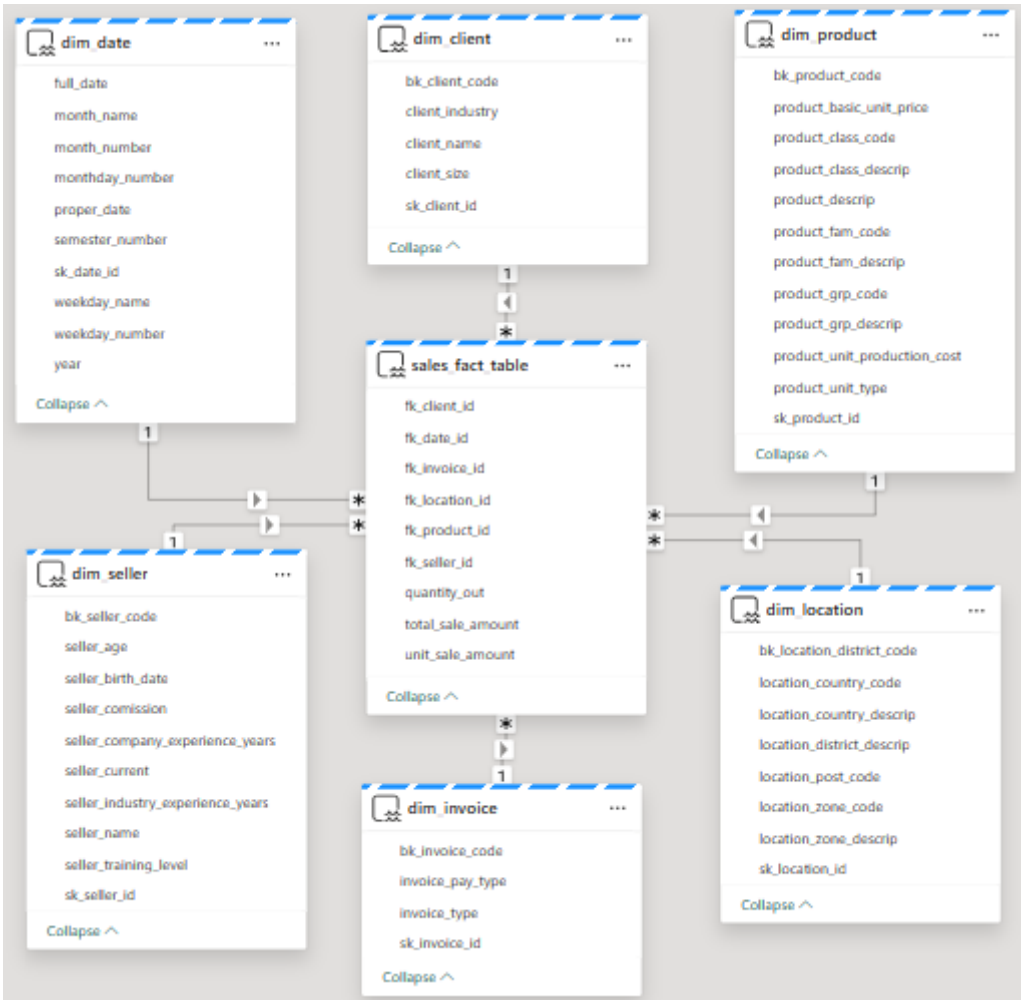



*Figure 18 - Data Warehouse Star Schema*

# 5. Semantic Model

Semantic model

Following the data warehouse previously developed, we created a new semantic model named “SM Fabridoce Sales”. This framework will facilitate the creation of comprehensive reports and dynamic dashboards empowering us to carefully answer our business questions.

Upon its establishment, it became crucial to map the foreign keys (FK) in the fact table to their corresponding surrogate keys (SK) within the dimension tables, ensuring the integrity and coherence of the relational structure in the semantic model.

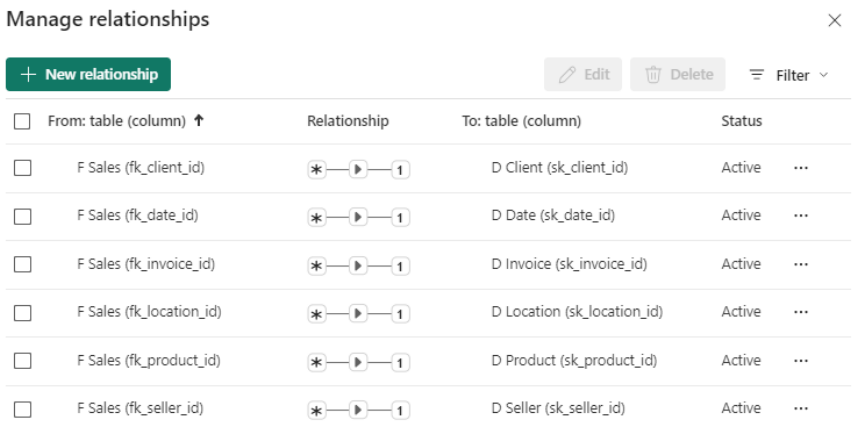



*Figure 19 – Semantic Model Relationships*

Subsequently, we renamed the dimension tables and variables for enhanced clarity and comprehension. We constructed the previously outlined hierarchies and hided the variables that were not necessary to develop the visuals. The image below shows an example of the renamed attributes and hierarchies created for the Facts and Client dimension tables.

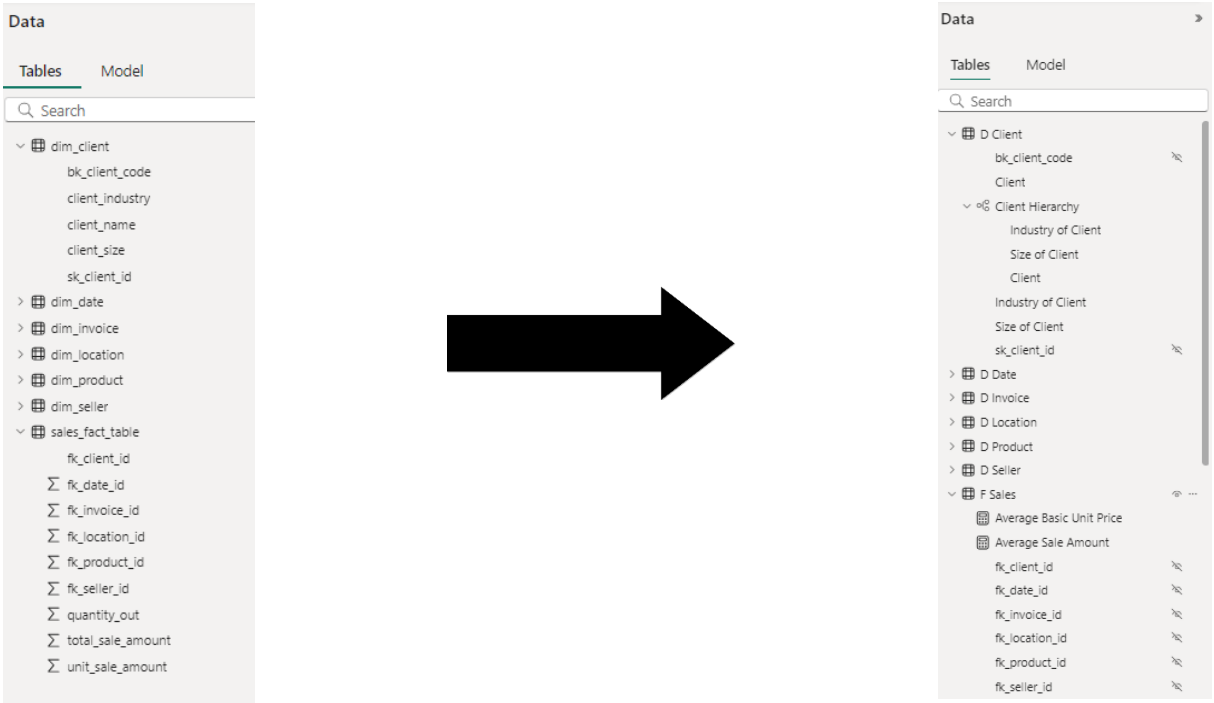



*Figure 20– Semantic Model Before Renaming Dimensions and Variables (Left Image)*

*Figure 21– Semantic Model After Renaming Dimensions and Variables (Right Image)*

In the final phase, we focused on developing measures and Key Performance Indicators (KPIs) that would address our business objectives. Utilizing the analytical features of Fabric, we constructed both calculated and quick measures, complemented by the functionalities available in Power BI Desktop that were found to be very flexible.

| Measures Created in Fabric | Description |
|---|---|
| Average Basic Unit Price | The average of the each product's standard selling price. |
| Average Sale Amount | The average price that the products were sold at. |
| Average Sales Per Client Per Year | The average revenue by client by year. |
| Gross Profit | The sum of the total sale amount not subtracting expenses |
| Gross Quantity Sold | The sum of the quantity of products sold |
| KPI Gross Profit Margin | The percentage difference of total revenue and total expenses |
| KPI Previous Year Gross Sales | The sum of the total sales revenue for the previous year |
| KPI Previous Year Quantity Sold | The sum of the total amount of products for the previous year |

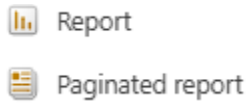
| | |
|---|---|
| MoM Revenue Change | The percentage increase or decrease in revenue one month compared to the previous |
| Net Profit | The sum of the total revenue minus the total expenses |
| The Quantity of Products Sold | This was a recreation of our native measure so that it can be used in other measure creations. It is the sum of the quantity of products sold from the quantity_out column |
| The Unit Sale Amount | Another recreation of our native measure. Products are sold at different prices due to discounts, the dax sum the total of this column |
| Total Expenses | Sum of the expenses |
| Total Sales Amount | Another recreation of our native measure. It is the sum of the sale amount from the sale_amount column |
| Total Unit Production Costs | Sum of the unit production cost |
| Unique Products Sold | Count of the different product IDs |

*Table 3 - Measures Created in Fabric*

| **Measure Created in Power BI Desktop** | **Description** |
|---|---|
| Market share % | The percentage of total sales generated by product |
| Sales growth 2017-2018% | The percentage of sales difference between 2017 and 2018 |

*Table 4 - Measures Created in Power BI Desktop*

# 6. Reporting and Dashboarding




After successfully establishing the semantic model, the next critical step was to create reports and dashboards that would effectively address the business problem. Leveraging the capabilities of Microsoft Fabric, we developed two table-based reports as we also did, using Microsoft Report Builder.

Furthermore, we delved into the powerful tools offered by Microsoft Power BI Desktop, where we crafted two interactive reports. These reports featured various analytical features, enabling us to dive deeper into the Fabridoce case.

## 6.1 Presentation and explanation of the report

## Power BI – Products Report

### Sales and Products Overview

The objective of the dashboard is to provide a comprehensive overview of the company's revenue and product performance. It aims to address key business questions by presenting crucial metrics such as revenue, profit, gross profit margin, and expenses in a clear and easily interpretable manner. The dashboard is designed to help stakeholders quickly assess the company's performance, identify trends, and make data-driven decisions. The dark blue and gold color theme for the dashboard complements the colors of the company logo.

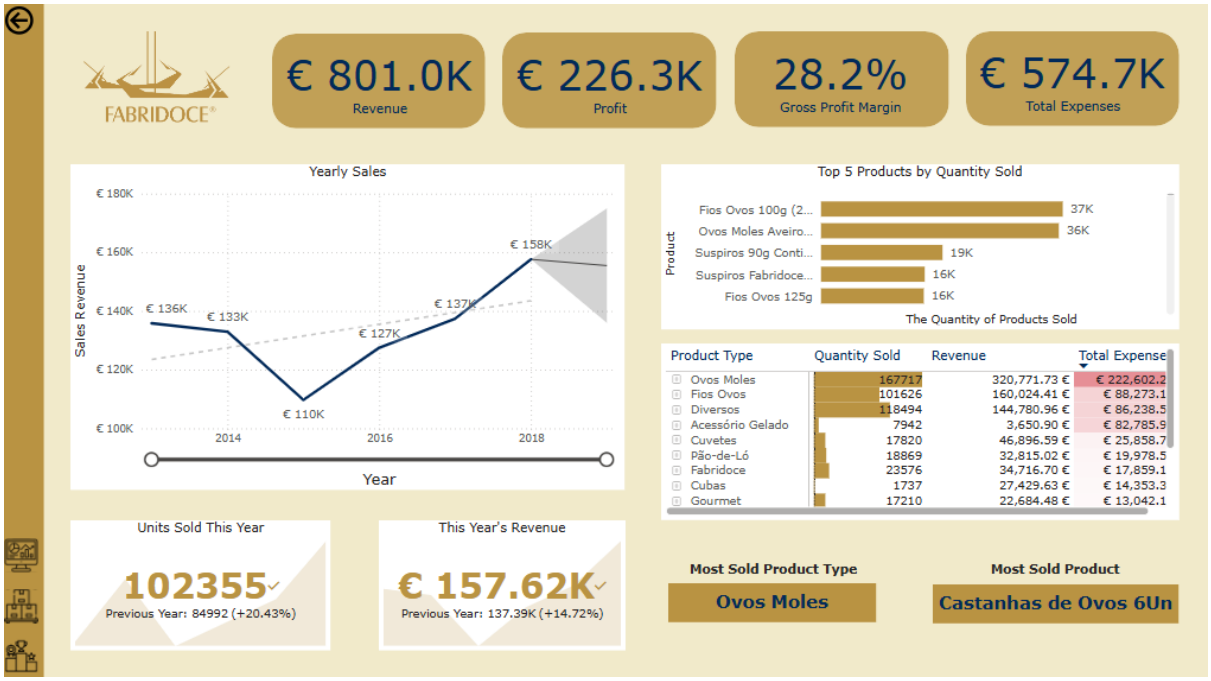



*Figure 22- Sales and Products Overview Page Report*

## Components and Business Questions Addressed

### 1. Total Revenue Card (Top Left)

**Objective:** Displays the total revenue generated by the company.

**Business Questions Addressed:**

- What is the total recorded revenue generated?

| **Total Revenue** | €3,200,000 |
|---|---|

*Table 5 – Total Revenue Recorded*

The total revenue of €3,200,000 indicates a strong overall performance but doesnt give deep insights on yearly performance or trajectory of growth.

### 2. Total Profit Card (Top Center Left)

**Objective:** Shows the total profit generated.

**Business Questions Addressed:**

- What is the total recorded gross profit generated?

| Total Gross Profit | €905,100 |
|---|---|

*Table 6 – Total Gross Profit Recorded*

The total gross profit of €905,100 demonstrates solid profitability, suggesting efficient cost management.

### 3. Profit Margin Card (Top Center Right)

**Objective:** Displays the gross profit margin percentage.

**Technical approach:** Applied the dark blue and gold color theme, maintaining a consistent and professional appearance across the dashboard.

**Business Questions Addressed:**

- What is the gross profit margin?

| Profit Margin | 28.2% |
|---|---|

*Table 7 – Gross Profit Margin Recorded*

A profit margin of 28.2% is healthy, indicating a significant portion of revenue is retained as profit

### 4. Total Expenses Card (Top Right)

**Objective:** Shows the total expenses incurred.

**Business Questions Addressed:**

- What is the total recorded amount of expenses?

| Total Expenses | €2,300,000 |
|---|---|

*Table 8 – Total Expenses Recorded*

Total expenses amounting to €2,300,000 suggest a possibility to increase efficiencies.

### 5. Yearly Sales Line Chart (Middle Left)

**Objective:** Illustrates sales revenue trends over the years.

**Technical approach:**

- Added a one-year forecast to project future sales trends.

- Included a trend line to visualize the overall direction of sales.
- Utilized dark blue for the line and data labels, with gold highlighting for hover data labels, ensuring clear visibility.
- Added a zoom slider for the year to allow users to focus on specific time periods.

**Business Questions Addressed:**

- What is the total sales revenue for each year?

| Year | Revenue |
|---|---|
| 2013 | €543,000 |
| 2014 | €531,900 |
| 2015 | €438,800 |
| 2016 | €510,000 |
| 2017 | €549,600 |
| 2018 | €630,000 |

*Table 9 – Total Revenue by Year*

Peak: The year 2018 is the noticeable peak with the highest sales revenue of €630,000.

Low: The year 2015 is the noticeable low with the lowest sales revenue of €438,800.

### 6. Yearly Products Sold KPI Card (Bottom Left)

**Objective:** Shows the current year products sold comparison with the previous year quatity if products sold.

**Technical approach:**

- Applied trend axis colors with gold indicating good performance and pink for bad performance to accommodate color blindness.
- Ensured these KPIs are not filtered by other visualizations to maintain accurate month-to-month comparisons.

**Business Questions Addressed:**

- How do the current quantity of products sold compare to the previous years quantity of products sold and are they meeting or exceeding the target?

| | |
|---|---|
| **Current Year Quantity Sold:** | 409,420 units |
| **Previous Year Quantity Sold:** | 339,968 units |
| **Change:** | +20.43% |

*Table 10 – Quantity Sold Compared to the Previous Year*

The current year's quantity sold has increased by 20.43%, rising from 339,968 units to 409,420 units.

### 7. Yearly Revenue KPI Card (Bottom Center)

**Objective:** Displays the current year's revenue and comparison with the previous year.

**Technical approach:**

- Used gold for good performance and pink for bad performance to enhance readability for colourblind users.
- Ensured these KPIs remain unfiltered by other visualizations for accurate year-to-year comparisons.

**Business Questions Addressed:**

- How do the current year's gross sales compare to the previous year's gross sales, and are they meeting or exceeding the target?

| | |
|---|---|
| **Current Year Revenue:** | €630,470 |
| **Previous Year Revenue:** | €549,570 |
| **Change:** | +14.72% |

*Table 11 - Gross Sales Comparison*

The current year's revenue has increased by 14.72%, rising from €549,570 to €630,470. This growth in revenue demonstrates a successful year

### 8. Top 5 Products by Quantity Sold (Middle Right)

**Objective:** Lists the top 5 products based on the quantity sold.

**Technical approach:**

- Utilized gold bars for a visually appealing representation.

- Incorporated gold and dark blue data labels and values to maintain consistency with the dashboard's colour theme.

**Business Questions Addressed:**

- Which are the top 5 products by quantity sold, and how do their sales quantities compare to each other?

| Top 5 Products by Quantity Sold: |
|---|
| 1. Ovos Moles Aveiro 150g FabriDoce: **191K** units |
| 2. Fios Ovos 100g (2x50) Mercadona: **148K** units |
| 3. Ovos Moles Aveiro 250g FabriDoce: **146K** units |
| 4. Suspiros 90g Continente: **74K** units |
| 5. Suspiros FabriDoce 90g: **64K** units |

*Table 12 – Top 5 Products by Quantity*

"Ovos Moles Aveiro 150g Fabridoce" leads with 191K units sold, significantly ahead of the next best-seller "Fios Ovos 100g (2x50) Mercadona" at 148K units. This data provides valuable insights into consumer preferences, indicating which products should be prioritized in inventory and marketing strategies to maximize sales and customer satisfaction.

### 9. Product Analysis Matrix (Bottom Center Right)

**Objective:** Provides detailed analysis of quantity sold, revenue, and total expenses by product type.

**Technical approach:**

- Applied gold for high values on quantity sold and pink for high values on total expenses to highlight key metrics.
- Enabled drill-down functionality from product type to individual product for detailed analysis.

**Business Questions Addressed:**

- What is the quantity sold for each product type and individual product?

- Option to drill down to individual Product also available
- What is the revenue generated for each product type and individual product?
- What are the total expenses associated with each product type and individual product?

| Product Type | Quantity Sold | Revenue (€) | Total Expenses (€) |
|---|---|---|---|
| Ovos Moles | 670,868 | 1,283,086.92 | 890,409.16 |
| Fios Ovos | 406,504 | 640,097.64 | 353,092.72 |
| Diversos | 473,976 | 579,123.84 | 344,954.16 |
| Acessório Gelado | 31,768 | 14,603.60 | 331,143.68 |
| Cuvetes | 71,280 | 187,586.36 | 151,206.41 |
| Pão-de-Ló | 75,476 | 131,260.08 | 99,296.49 |
| FabriDoce | 94,034 | 138,866.80 | 71,436.72 |
| Cubas | 6,948 | 109,718.52 | 57,413.52 |

*Table 13- First 8 Products - Quantity, Revenue and Expenses Analysis*

With the ability to drill down to individual products, this analysis highlights the key products and product types with high sales and revenue but also significant expenses, which need to be managed to maximize profitability.

- How do the quantity sold, revenue, and total expenses compare across different product types and products?

Quantity Sold: "Ovos Moles Aveiro 150g FabriDoce" leads with 191,160 units, followed by "Fios Ovos 100g (2x50) Mercadona" at 148,000 units.

Revenue: "Ovos Moles Aveiro 250g FabriDoce" generates the highest revenue (€366,065.88), despite a lower quantity sold compared to the 150g variant.

Production Cost: Significant variation exists, with "Fios Ovos 1Kg" having the highest cost per unit (€7.04), indicating potential areas for cost optimization.

Product Comparison: "Ovos Moles" products show high sales and revenue, justifying higher production costs. "Fios Ovos" and "Diversos" products, while also performing well, highlight the need to balance cost and pricing strategies.

### 10. Most Sold Product Type Card (Bottom Right)

**Objective:** Displays the most sold product type.

**Business Questions Addressed:**

- What is the most sold product type based on the quantity sold?

Most Sold Product Type: Ovos Moles. This suggests a strong consumer preference for "Ovos Moles" products. Recognizing "Ovos Moles" as the leading product type can guide inventory management, marketing strategies, and product development to further capitalize on its popularity.

### 11. Most Sold Product Card (Bottom Right)

**Objective:** Shows the most sold product.

**Business Questions Addressed:**

- What is the most sold product based on the quantity sold?

Most Sold Product: Castanhas de Ovos 6Un. This highlights the significant popularity and demand for "Castanhas de Ovos 6Un" among consumers. Identifying this product as the top seller can help in prioritizing production, optimizing stock levels, and directing marketing efforts towards promoting this popular item.

## Products Performance

The report below aims to provide a deepen analysis with interactable buttons and slicers focused on the products performance from 2013 to 2018.

Metrics like revenue and quantity are plotted in various ways to extract different insights and statistics like the average and count of products are also available to help answering the business questions. It is important to note that before choosing a product, the default values account for the total of every product.

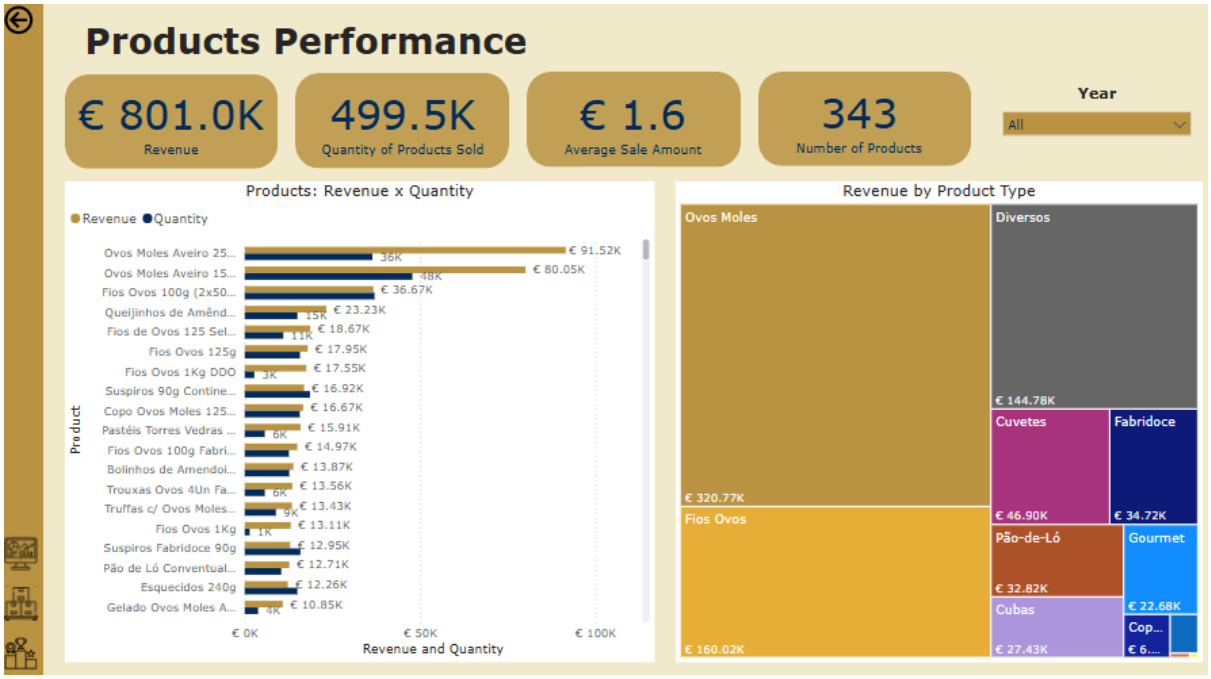



*Figure 23 - Products Performance Page Report*

## Components and Business Questions Addressed

### 1. Year Slicer (Top Right)

**Objective:** Display all recorded years.

**Technical approach:**

- We used the style “Dropdown” for a cleared overall look.
- The options “select all” and “Multi Selection” were set active.

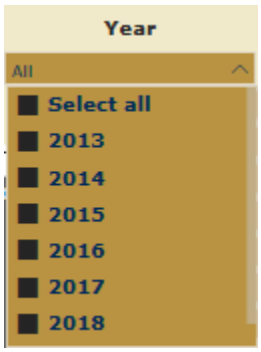



*Figure 24 - Year Slicer*

### 2. Total Revenue Card (Top left)

**Objective:** Displays the total revenue generated by each product.

**Business Questions Answered:**

- What is the revenue generated for each of the products from 2013 to 2018?

When clicking on the chosen product, for example 'Ovos Molde Aveiro 250g Fabridoce' we can retrieve and answer the value 366,1k euros generated for the selected 6 years, and if we choose to study only the year 2013 or 2018, by adjusting the slicer we obtain the values 95k and 40k euros generates for this product. Following this approach, we can analyse and compared other products.

### 3. Quantity of Products Sold Card (Top Center Left)

**Objective:** Displays the quantity of products sold for each product.

**Business Questions Answered:**

- What is the quantity sold by product from 2013 to 2018?

From 2013 to 2018, if we choose the product 'Pastéis Torres Vedras 6Un' the total units sold is 22,8k. On the other hand, by looking at the bottom of the table, the product 'Queijada Regional – RD – Revenda' had a total of four sales over the years, all of which occurred exclusively in 2016.

### 4. Average Sale Amount Card (Top Center Right)

**Objective:** This card shows the average sale amount for each product.

**Business Questions Answered:**

- What is the average sale amount by product from 2013 to 2018.

The average sale amount for the product 'Queijinhos de Amêndoa c/Ovos Moles 120g 6Un' for the six years is 1.5 euros, but if we select only for 2013 its average price is 2.0 euros and in 2018 is 1.5 euros, concluding that the price decreased on average overtime.

### 5. Number of Products Card (Top Right)

**Objective:** Present the number of products on the market and analyse the occurrence of a new product implemented.

**Business Questions Answered:**

- How many products does Fabridoce sell?
- Was any new product introduced during 2013 to 2018?

Using this card, we can see that Fabridoce sells 343 different products and during the recorded six years there was no new product implemented on the market.

### 6. Products: Revenue x Quantity Clustered Bar Chart (Bottom left)

**Objective:** Illustrates revenue and quantity comparison between products.

**Technical approach:**

- Applied gold for revenue and dark blue for quantity for an easy distinction.
- Data labels are present to easily compare with other products.
- Scroll bar is available to analyse every product on the market.

**Business Questions Addressed:**

- What's the relationship between revenue and quantity sold by each product from 2013 to 2018?

The bar chart suggests a generally positive correlation between revenue and quantity sold for each product from 2013 to 2018. Products with higher quantities sold typically generate higher revenues, indicating that volume sales are a significant driver of revenue. However, there are instances where products with lower quantities sold still achieve substantial revenue for example, 'Fios Ovos 1Kg DDO' and 'Pastéis Torres Vedras 6Un' implying a higher price point per unit for these items, leading to a higher profitability.

### 7. Revenue by Product Type Treemap (Bottom Right)

**Objective:** Showcases the most representative product type by revenue generated.

**Technical approach:**

- Distinct colours used for a clear interpretation.
- Data and category labels are present for revenue comparison between product types.

**Business Questions Addressed:**

- What are the types of products that generate more revenue from 2013 to 2018?

The treemap indicates the product type 'Ovos Moles' as the dominant one throughout the years. Interestingly, 'Fios Ovos' declined its revenue over the years and the 'Cubas' significantly increased representing the ice cream market segment.

## Best Products

On a different objective of analysis, the following report focuses on the five best products in the most recent year recorder that is 2018.

It is displayed a slicer that allows the user to choose the desired product to be analysed and five different metrics were used to better answer the business questions. It is essential to bear in mind that when opening the page, the report will account for the five products together.

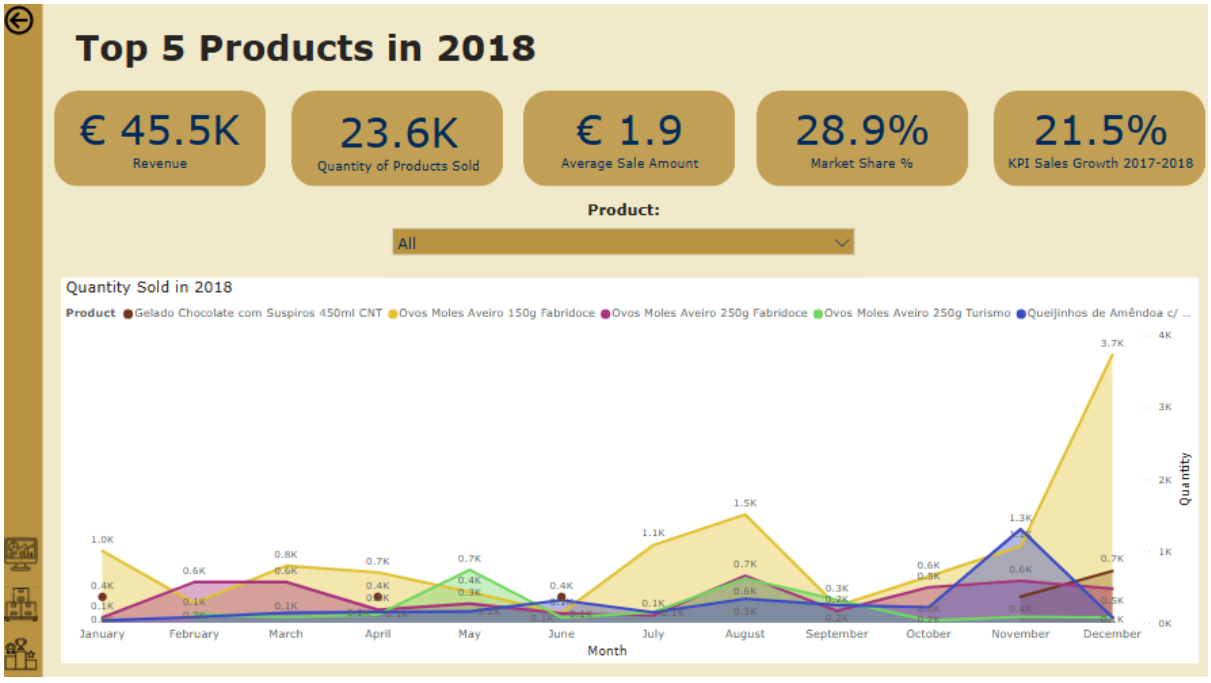



*Figure 25 - Best Products Page Report*

## Components and Business Questions Addressed

For every visual feature on the report, we applied a filter for the variable "product" using the Filter Type, Top N, choosing "5" as the number of top values by the variable "Total Sales Amount". It was also set a basic filtering to only show records from 2018. In this way we can do the desired analysis.

1. **Product Slicer (Middle)**

**Objective:** Display the top 5 products by revenue.

**Technical approach:**

- We used the style “Dropdown” for a cleared overall look.
- The options “select all” and “Multi Selection” were set active.


*Figure 26 - Top 5 Products Slicer*

### 2. Total Revenue Card (Top Left)

**Objective:** Displays the total revenue generated by each of the best products.

**Business Questions Answered:**

- What is the revenue for each of the five most sold products in 2018?

| Products | Revenue |
|---|---|
| Gelado Chocolate com Suspiros 450ml CNT | €4,600.00 |
| Ovos Moles Aveiro 150g Fabridoce | €19,100.00 |
| Ovos Moles Aveiro 250g Fabridoce | €10,100.00 |
| Ovos Moles Aveiro 250g Turismo | €6,900.00 |
| Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un | €4,700.00 |

*Table 14- Top 5 Products Revenue in 2018*

The product ‘Ovos Moles Aveiro 150g Fabridoce’ generates the highest revenue (€19,100.00) whereas ‘Gelado Chocolate com Suspiros 450ml CNT’ has the lowest revenue (€4,600.00). The other products fall in between these two values.

### 3. Quantity of Products Sold Card (Top Center Left)

**Objective:** To show the quantity of units sold by each of the best products.

**Business Questions Answered:**

- What is the quantity sold for each of the five most sold products in 2018?

| Products | Quantity |
|---|---|
| Gelado Chocolate com Suspiros 450ml CNT | 2,160 |
| Ovos Moles Aveiro 150g Fabridoce | 11,600 |
| Ovos Moles Aveiro 250g Fabridoce | 4,247 |
| Ovos Moles Aveiro 250g Turismo | 2,388 |
| Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un | 3,179 |

*Table 15 - Top 5 Products Quantity in 2018*

Similarly to the previous analysis 'Ovos Moles Aveiro 150g Fabridoce' is the product that sold the most units (11,600) and 'Gelado Chocolate com Suspiros 450ml CNT' sold the lowest (2,160) among the five variants.

### 4. Average Sale Amount Card (Top Center)

**Objective:** Indicates the average price each product unit is sold at for each of the best products.

**Business Questions Answered:**

- What is the average sale amount for each of the five most sold products in 2018?

| Products | Average Sale Amount |
|---|---|
| Gelado Chocolate com Suspiros 450ml CNT | €2.2 |
| Ovos Moles Aveiro 150g Fabridoce | €1.6 |
| Ovos Moles Aveiro 250g Fabridoce | €2.4 |
| Ovos Moles Aveiro 250g Turismo | €2.9 |
| Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un | €1.5 |

*Table 16 - Top 5 Products Average Sale Amount in 2018*

When analysing the average sale amount, the product 'Ovos Moles Aveiro 250g Turismo' is sold at the highest unit price (€2.9) which may be an indicator of lower quantities sold. 'Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un' is sold at the lowest (€1.5) and the other three product have similar price ranges in between these two products.

### 5. Market Share % Card (Top Center Right)

**Objective:** To showcase the impact and importance of each of the best products on the annual sales.

**Business Questions Answered:**

- What is the market share for each of the most sold products in 2018?

| Products | Market Share |
|---|---|
| Gelado Chocolate com Suspiros 450ml CNT | 2.9% |
| Ovos Moles Aveiro 150g Fabridoce | 12.1% |
| Ovos Moles Aveiro 250g Fabridoce | 6.4% |
| Ovos Moles Aveiro 250g Turismo | 4.4% |
| Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un | 3.0% |

*Table 17 - Top 5 Products Market Share in 2018*

The product with the highest market share is 'Ovos Moles Aveiro 150g Fabridoce' with an imposing 12.1% from all products. Following its performance on the revenue and quantity analysis we can indicate that this is the most influential product of Fabridoce.

The second highest market share is 'Ovos Moles Aveiro 250g Fabridoce' with 6.4% which is a significant difference compared with the previous one, and the remaining three come shortly after.

### 6. KPI Sales Growth 2017-2018 Card (Top Right)

**Objective:** To determine whether there has been an escalation or decline in the product's demand and sales compared to the previous year.

**Business Questions Answered:**

- What is the difference of sales revenue compared with the previous year (2017) for each of the five most sold products in 2018?

| Products | Sales Growth 2017-2018 |
|---|---|
| Gelado Chocolate com Suspiros 450ml CNT | 167.8% |
| Ovos Moles Aveiro 150g Fabridoce | 5.2% |
| Ovos Moles Aveiro 250g Fabridoce | -21.4% |
| Ovos Moles Aveiro 250g Turismo | 0.0% |

| | |
|---|---|
| Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un | -0.3% |

*Table 18 - Top 5 Products Sales Growth 2017 to 2018*

When comparing sales growth from 2017 to 2018 the most impressive performance is the product 'Gelado Chocolate com Suspiros 450ml CNT' with 167.8% growth, despite only having sales in 2017 and 2018, it has made it to the top five products in 2018.

The other product that had a significat growth was 'Ovos Moles Aveiro 150g Fabridoce' with 5.2% while 'Ovos Moles Aveiro 250g Turismo' had the same impact as the year before with 0.0%.

On the other hand, 'Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un' demonstrated a slight fall with -0.3% in sales and 'Ovos Moles Aveiro 250g Fabridoce' with –21.4%, which indicates a possible loss of interest for the 250g packages and prefer the 150g ones.

### 7. Quantity Sold in 2018 Area Chart (Bottom)

**Objective:** Presents a visual representation of quantity sold by product on a monthly granularity basis.

**Technical approach:**

- Distinct colours have been used for each product to ease interpretability such as the shaded area option.
- Data labels are active to numerically understand the monthly change overtime.
- The legend is presented to augment interpretability, thereby linking each product with its corresponding area chart.

**Business Questions Addressed:**

- Are there any seasonality trends for the best performing products in 2018?

On a combined analysis we can observe three different periods of peak sales, from March to May, in July and August, and from October to December where the close is to the end of the year, the more units are sold. These periods may be associated with Easter, summer, and Christmas.
The product 'Gelado Chocolate com Suspiros 450ml CNT' showcases an odd distribution where it doesnt sell in all months, instead on January, April, June, and November sells exaclty the same 1440 units and in December duplicates its sells to 2880, this may suggest some errors or incoherences in the data.

## Power BI - Sellers, Clients and Locations Report

### Sellers' Info Page

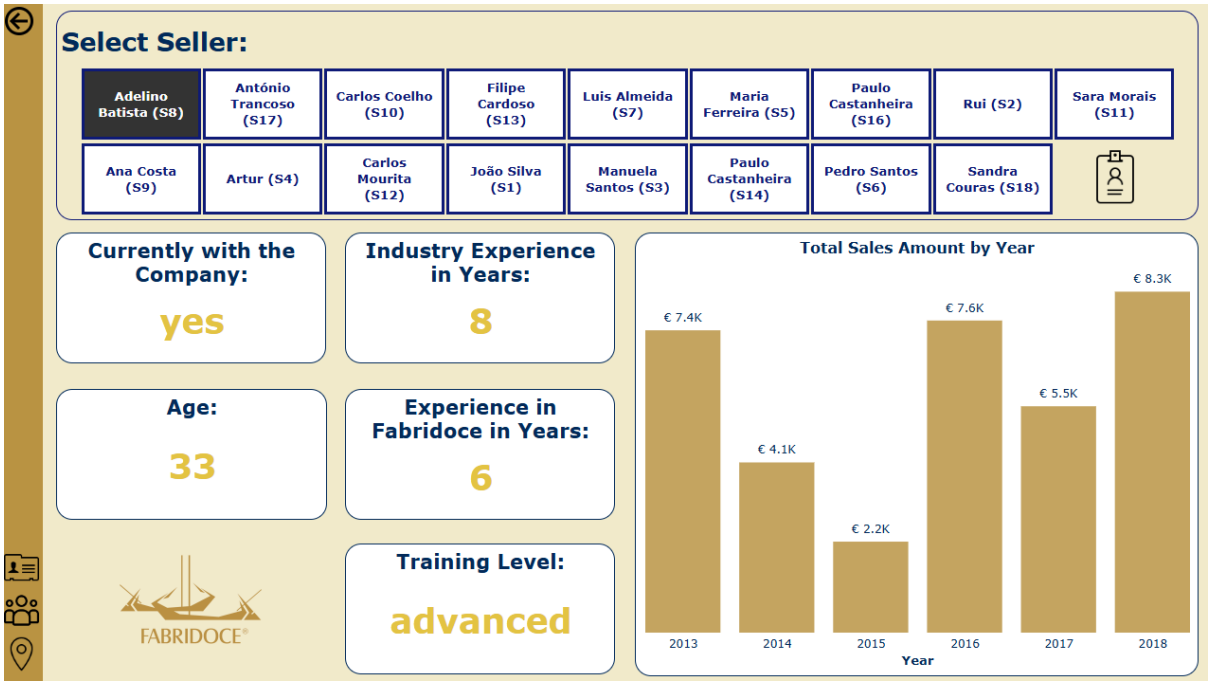



*Figure 27 - Sellers' Info Page*

In this page we used the following visuals: 1 slicer to select the Seller name and code, 5 cards for the sellers' characteristics and 1 Bar chart to show the Total Sales Amount by Year of each seller. We also added Fabridoce's logo with an URL link to the company's website.

### Components and Business Questions Addressed

1. **Select the Seller Name and Code slicer**

**Objective:** Being able to filter the information from the other visuals by seller's name and code.

**Technical approach:** While creating this slicer, we noticed that Fabridoce has two sellers with the same name, Paulo Castanheira. Therefore, using the attribute "Seller Name" was not sufficient. For this reason, the column "Seller Name Code" for the dimension Seller was created in the Data Warehouse to have an understandable unique and visually appealing key. In this visual we also added an image for aesthetic reasons. The title "Select Seller:" invokes a call to action for the user/viewer. The slicer has a tile style, allowing only single selection.

## 2. Sellers' Characteristics Cards

**Objective:** The objective of the cards is to provide an overview of each seller's characteristics, including whether they are currently working at Fabridoce, total industry experience, tenure at Fabridoce, age, and training level. These insights help in evaluating and managing the sales team effectively.

**Technical approach:** All attributes used in the cards belong to the "D Seller" table from the semantic model "SM Fabridoce Sales." They are "Seller Years in the Company," "Seller Years in the Industry," "Seller Training Level," "Age of Seller," "Seller Training Level," and "Currently with Company." For the visual these attributes were renamed for clarity.

**Business Question Addressed:**

- What are the main characteristics of each seller (age, experience, and training level)?

This question is easily answered by the cards; the viewer only needs to select the desired seller. Using the previous image, it is possible to see that Adelino Batista (S8) is a seller with 8 years of experience in the industry, 6 years of experience at Fabridoce, is 33 years old, has an advanced training level, and is currently with the company.

## 3. Total Sales Amount by Year Bar Chart

**Objective:** The objective of Total Sales Amount by Year bar chart is to provide a clear visualization of sales performance for each seller over time. By using the slicer functionality to select the seller, users can assess individual sales contributions over the years.

**Technical approach:** The visual used was a bar chart. We utilized "Year" from "D Date" for the X-axis and the measure "Total Sales Amount" from "F Sales" for the Y-axis. The Y-axis label was removed to minimize visual noise. All formatting adhered to the colour palette while ensuring message clarity

**Business Question Addressed:**

- What is the yearly total sales amount per seller?

Using Adelino Batista (S8) as an example again, we can observe that sales amounted to €7.4k in 2013, €4.1k in 2014, €2.2k in 2015 (the lowest), €7.6k in 2016, €5.5k in 2017, and reached €8.3k in 2018 (the best year). The same analysis can be done for other sellers by selecting their names in the slicer.

## Clients' Page


*Figure 28 - Clients' Page*

In this page we used the following visuals: 1 slicer to select size of the client, 2 cards for Count of Clients and Average Sales Amount, 1 table for the top 5 clients, 1 pie chart to visualize the number of clients by size, and 1 line chart to check the total sales amount for top clients per year.

## Components and Business Questions Addressed

### 1. Select Size of the Client Slicer

**Objective:** Being able to filter the client by size large, medium or small.

**Technical approach:** A slicer with a vertical list and multi-selection functionality was implemented, the field being used is "Size of client" from "D Client". Blank values are not allowed. An image, the rounded corners and the border were added for aesthetic reasons, the background colour of the header icons was changed to match the colour scheme. This slicer will interact with all visuals except the pie chart. The title "Select Size of the Client:" invokes a call to action for the user/viewer.

## 2. Top 5 clients' table

**Objective:** Being able to visualize the top 5 clients' total sales amount and quantity sold. In combination with the slicer, it's possible to see the top 5 client for each size type.

**Technical approach:** The columns used are "Client" from "D Client", and the calculated measures "The Quantity of Products Sold" and "Total Sales Amount" from "F Sales". For this visual "The Quantity of Products Sold" was renamed to "Quantity Sold" to be clearer to the viewer and to be more concise. We disactivated the interactions of this visual with the others because it was causing blanks.

**Business Question Addressed:**

- Who are the top 5 clients by client size?

By using the slicer it's possible to quickly find the top clients by client size, check the figures below to see.

| Client |
| --- |
| BRISA DE LETRAS, LDA |
| COOPLERCNORTE, CRL |
| SABORES PACIFICOS, LDA. |
| PADARIA PASTELARIA SNACK - BAR VILLA, LD |
| RECORTES DA VILA EXP. REST.E BARES, LDA. |

*Figure 29 - Top 5 Clients (All/Large Size)*

| Client |
| --- |
| FRUTAS MONTE CRISTO, SA |
| QUARTETO DOCE, LDA |
| RICARDO FILIPE RIBEIRO PEREIRA |
| FERNANDA MARIA DOS SANTOS COSTA CANEDO |
| MALAQUIAS-DISTRIBUIÇÃO ALIMENTAR, LDA. |

*Figure 30 - Top 5 Client (Size Medium)*

| Client |
| --- |
| JOSÉ FILIPE VILELA MALHEIRO |
| APFC - ASSOC. PAIS FREGUESIA CEDRIM |
| INGREDIENTE FUNCIONAL, LDA. |
| MARIA CLAUDINA MACHADO COSTA |
| SABER INTEMPORAL- COMERCIO DE PRODUTOS |

*Figure 31 - Top 5 Clients (Size Small)*

### 3. Number of clients and average sales amount cards

**Objective:** Being able to visualize the number of clients and the average sales amount per client size.

**Technical approach:** For the number of clients card, we used the distinct count of the attribute "Client" from "D Client" and renamed it to Number of clients. For the Average Sales Amount card, the measure Average Sales per Client per Year was used and renamed. The cards can only be affected by the slicer of the client size selection.

**Business Questions Addressed:**

- How many clients does Fabridoce have?

As the dashboard show the total number of Fabridoce distinct clients is 268.

- What is the average sales amount per client size?

The average sales amount is €2.99K for all clients, €5.99K for large clients, €2.67K for medium clients and €1.43K for the small clients.

### 4. Client size pie chart

**Objective:** Visualize the distribution of Fabridoce's clients by client size.

**Technical approach:** We used as value the count of distinct "Size of Client" from "D Client" and the legend is also the size of the client. We changed the default colours to match the theme while maintaining a clear distinction between them.

**Business Question Addressed:**

- How many clients does Fabridoce have in each size category (small, medium, big)?

The pie chart shows that Fabridoce has 67 large clients (25%), 134 medium clients (50%) and 67 small clients (25%).

### 5. Total Sales Amount for Top Clients line chart

**Objective:** Visualize the sales amount trend over the years for the small, medium and large size top clients.

**Technical approach:** The 'Total Sales Amount' measure was used for the Y-axis and the 'Year' from 'D Date' for the X-axis. We used the 'Client' attribute from 'D Client' as the legend. To filter the top 5 clients, we used the top N filter type by Total Sales Amount. This visual will not affect other visuals and is only affected by the size of the client filter. We tried to add month to the filtering however the inconsistent sales patterns did not allow a clear visualization when the drilling was performed.

**Business Question Addressed:**

- What is the yearly total sales amount for the top clients in each client size category?

By hovering the mouse over each year is possible to see the yearly total sales amount for the top clients of each size. As an example, the image below shows the 2014 yearly values for the small size clients.

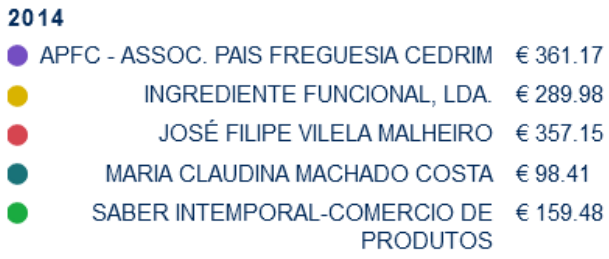



*Figure 32 - 2014 Total Sales Amount for Small Size Clients*

## Location Sales Overview

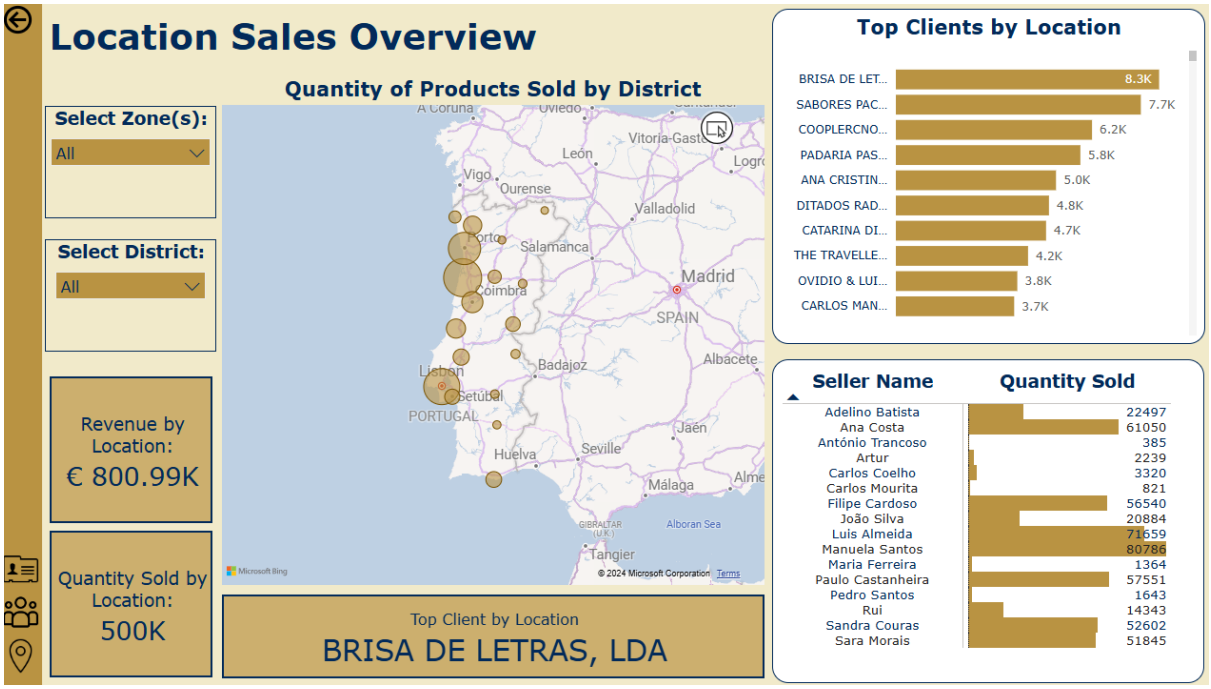



*Figure 33 - Location Sales Overview Page Report*

## Components and Business Questions Addressed

### 1. Map of Portugal by Quantity of Products Sold (Center)

**Objective:** Display the quantity of products sold by district using bubble sizes on the map of Portugal.

**Technical approach:** Applied gold bubbles for quantity representation and used gold and dark blue data labels for consistency. Slicers above the map for zone and to the left for districts, with dark blue buttons and gold selections.

**Business Questions Addressed:**

- How do sales quantities vary by district?

The map shows a clear distribution of product sales across various districts, with larger bubbles indicating higher quantities sold.

Top District: Aveiro has the highest quantity of products sold, with the largest bubble on the map.

## 2. Multi Card: Revenue and Quantity Sold by Location (Bottom Center)

**Objective:** Show the total revenue and quantity sold by location based on selected district or zone from the slicers.

**Technical approach:** Applied the dark blue and gold colour theme for visual consistency.

**Business Questions Addressed**:

- What is the total revenue generated in each district and which district has the highest quantity of products sold?

Aveiro is the district with the highest revenue (€830,400) and the highest quantity of products sold (506,000 units).

## 3. Card: Top Client by Location (Bottom Center)

**Objective:** Show the top client by location based on selected district or zone from the slicers.

**Technical approach:** Applied the dark blue and gold color theme for visual consistency.

**Business Questions Addressed:**

- Who is the top client in each district?

Brisa de Letras, LDA, is identified as the top client 33K units purchased, highlighting a key customer. Brisa de Letras, LDA, buys most of the products from Lisbon, Leiria, and Aveiro.

## 4. Stacked Bar Chart: Top Clients by Location (Top Right)

**Objective:** Display the top clients by quantity of products purchased based on the selected district or zone from the slicers.

**Technical approach:** Utilized gold bars for a visually appealing representation and included gold and dark blue data labels for consistency.

**Business Questions Addressed:**

- Who is the top client in each district?

In the top districts of Aveiro and Lisbon the chart shows significant purchases from clients, with Brisa de Letras, LDA, and Sabores Pac.

### 5. Table Matrix: Top Seller by Quantity Sold (Bottom Right)

**Objective:** Display the quantity sold by each seller based on the selected district or zone from the slicers.

**Technical approach:** Used gold bars for high values to highlight top performers by quantity sold.

**Business Questions Addressed:**

- Who is the best performing seller by zone and district?

The best performing seller sells mostly to companies in Aveiro and Lisbon, highlighting key areas of strong sales performance.

## Fabric Paginated Report – Sales Monthly Comparison

The following paginated report represented as a table view provides an analysis from 2013 to 2018 and is composed by five variables, Year, Semester and Month that will support the time analysis and MoM (Month over Month) Revenue Change and Revenue that presents the total revenue of each month.

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### Sales - Monthly Comparison

| Year | Semester | Month | MoM Revenue Change | Total Sales Amount |
|---|---|---|---|---|
| 2013 | 1 | January | | € 11,046.65 |
| 2013 | 1 | February | -45.29% | € 6,043.21 |
| 2013 | 1 | March | 118.10% | € 13,180.46 |
| 2013 | 1 | April | -36.03% | € 8,431.83 |
| 2013 | 1 | May | 0.50% | € 8,474.33 |
| 2013 | 1 | June | -6.37% | € 7,934.68 |
| 2013 | 2 | July | -27.07% | € 5,786.89 |
| 2013 | 2 | August | 73.35% | € 10,031.85 |
| 2013 | 2 | September | 27.59% | € 12,799.17 |
| 2013 | 2 | October | -32.88% | € 8,590.41 |
| 2013 | 2 | November | 109.40% | € 17,988.01 |
| 2013 | 2 | December | 41.88% | € 25,520.86 |
| 2014 | 1 | January | -68.07% | € 8,149.34 |
| 2014 | 1 | February | -25.96% | € 6,033.47 |
| 2014 | 1 | March | 42.43% | € 8,593.60 |
| 2014 | 1 | April | 22.23% | € 10,503.62 |
| 2014 | 1 | May | -12.40% | € 9,201.48 |
| 2014 | 1 | June | -25.80% | € 6,827.22 |
| 2014 | 2 | July | -9.80% | € 6,158.05 |
| 2014 | 2 | August | 53.62% | € 9,459.87 |
| 2014 | 2 | September | 51.33% | € 14,315.18 |
| 2014 | 2 | October | 66.56% | € 23,843.79 |
| 2014 | 2 | November | -35.78% | € 15,312.87 |
| 2014 | 2 | December | -4.89% | € 14,564.69 |
| 2015 | 1 | January | -56.23% | € 6,374.24 |
| 2015 | 1 | February | -16.76% | € 5,305.62 |
| 2015 | 1 | March | 41.01% | € 7,481.44 |
| 2015 | 1 | April | -22.46% | € 5,801.10 |
| 2015 | 1 | May | 26.25% | € 7,323.83 |
| 2015 | 1 | June | -1.51% | € 7,213.60 |
| Total | | | | € 800,986.79 |

*Figure 34 - Sales Monthly Comparison Report (Page 1)*

## Components and Business Questions Addressed

**Objective:** Compare monthly revenue fluctuations.

**Technical approach:** Table style is Bold header which allows a clear distinction between column names and values. The total revenue is available at the bottom of the table.

**Business Question Answered:**

- How does sales variate overtime and how it affects the generated revenue?

In the months of March and December, a notable upward trend in sales is observed, likely influenced by the Easter holidays and Christmas season, respectively. These periods traditionally see a rise in consumer spending, which is reflected in the increased revenue compared to the preceding months.

On the other hand, January often shows a decline in sales, possibly due to post holiday season. Similarly, June also presents a downturn in sales, potentially due to its position between two peak periods: Easter and the summer holidays.

## Fabric Paginated Report - Product Performance Report

The following paginated report, represented as a table view, provides a detailed analysis of product performance, including production cost, quantity sold, and revenue. This report covers the period from 2013 to 2018, offering insights into the sales and profitability of various products. The variables included in this report will support a comprehensive analysis, helping to identify key trends and areas for potential improvement.

FABRIDOCE

### Product Performance Report

| Product Type | Product | Production Cost | Quantity Sold | Revenue |
|---|---|---|---|---|
| Ovos Moles | Ovos Moles Aveiro 250g Fabridoce | 266,440.68 € | 145596 | 366,065.88 € |
| Ovos Moles | Ovos Moles Aveiro 150g Fabridoce | 219,834.00 € | 191160 | 320,193.40 € |
| Fios Ovos | Fios Ovos 100g (2x50) Mercadona | 74,000.00 € | 148000 | 146,699.84 € |
| Ovos Moles | Queijinhos de Amêndoa c/ Ovos Moles 120g 6Un | 76,296.52 € | 60076 | 92,903.00 € |
| Fios Ovos | Fios de Ovos 125 Selecção Continente | 47,872.80 € | 43920 | 74,687.48 € |
| Fios Ovos | Fios Ovos 125g | 32,093.28 € | 62928 | 71,798.40 € |
| Fios Ovos | Fios Ovos 1Kg DDO | 32,821.04 € | 10904 | 70,199.76 € |
| Diversos | Suspiros 90g Continente | 45,384.00 € | 74400 | 67,673.60 € |
| Ovos Moles | Copo Ovos Moles 125g Fabridoce | 40,760.20 € | 62708 | 66,678.60 € |
| Diversos | Pastéis Torres Vedras 6Un | 35,333.80 € | 22796 | 63,658.48 € |
| Fios Ovos | Fios Ovos 100g Fabridoce | 35,732.88 € | 50328 | 59,892.24 € |
| Diversos | Bolinhos de Amendoim 200g | 31,456.32 € | 50736 | 55,467.16 € |
| Ovos Moles | Trouxas Ovos 4Un Fabridoce | 37,248.76 € | 22852 | 54,242.12 € |
| Ovos Moles | Truffas c/ Ovos Moles e Laranja 120g 9Un | 44,684.64 € | 35464 | 53,714.16 € |
| Fios Ovos | Fios Ovos 1Kg | 39,086.08 € | 5552 | 52,420.92 € |
| Diversos | Suspiros Fabridoce 90g | 39,372.48 € | 63504 | 51,806.32 € |
| Pão-de-Ló | Pão de Ló Conventual 75g (2Un) | 33,702.48 € | 41608 | 50,831.08 € |
| Diversos | Esquecidos 240g | 30,002.00 € | 60004 | 49,034.52 € |
| Cuvetes | Gelado Ovos Moles Aveiro 450ml | 22,302.84 € | 15172 | 43,415.24 € |
| Ovos Moles | Creme Ovos Moles 300g | 27,662.40 € | 24480 | 42,333.92 € |
| **Total** | | **2,298,871.28 €** | **1998116** | **3,203,947.16 €** |

*Figure 35 - Product Performance Report (Page 1)*

## Components and Business Questions Addressed

**Objective:** Display detailed performance metrics for each product, including production cost, quantity sold, and revenue.

**Technical approach:** Applied the dark blue and gold color theme with bold headers

**Business Questions Addressed:**

- How do the quantity sold, revenue, and total expenses compare across different product types and individual products?

**Ovos Moles**: Highest performer with 167,717 units sold, €320,771.73 in revenue, and €222,602.29 in production costs.

**Fios Ovos**: Sold 101,626 units, generating €160,024.41 in revenue with €88,273.18 in production costs.

Diversos: Sold 118,494 units, bringing in €144,780.96 in revenue and incurring €86,238.54 in production costs.

**Cuvetes**: Moderate performance with 17,820 units sold, €46,896.59 in revenue, and €25,858.79 in production costs.

**Pão-de-Ló**: Sold 18,869 units, €32,815.02 in revenue, and €19,978.56 in production costs.

**Acessório Gelado**: Low revenue (€3,650.90) compared to high production costs (€82,785.92) with only 7,942 units sold.

Overall, Ovos Moles leads in sales and revenue despite high costs, while Acessório Gelado shows a need for cost optimization. Fios Ovos and Diversos also perform well, balancing sales volume and profitability effectively.

## Report Builder Paginated Report- Client Sales Breakdown

The Client Sales Breakdown paginated report provides an overview analysis of sales performance for individual clients. Each row represents a different client, with columns detailing the quantity of products sold, the average sale amount, and the total sales amount. This structured format allows Fabridoce to track and compare metrics across their clients. This 11-page report supports informed decision-making and strategic planning, helping the company identify top-performing clients and sales trends. For this report, the measure name “quantity of products sold” was changed to “quantity sold” to prevent the viewer from thinking that it referred to the quantity of distinct products.

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Client Sales Breakdown

| Client | Quantity Sold | Average Sale Amount | Total Sales Amount |
|---|---|---|---|
| A LOJA DO SR.ROCHA - CAFÉ & MERCEARIA | 597 | €2.26 | €1,348.78 |
| A.J.NOGUEIRA UNIPESSOAL LDA | 964 | €1.68 | €1,619.19 |
| AGRUPAMENTO DE ESCOLAS A LÃ E A NEVE | 1,591 | €1.07 | €1,697.21 |
| AGRUPAMENTO DE ESCOLAS JOSÉ ESTEVÃO | 1,800 | €1.57 | €2,817.92 |
| ÁGUA NA BOCA-REST.UNIPESSOAL LDA | 1,701 | €1.67 | €2,846.32 |
| ALBERTINA ROSA DA SILVA RIBEIRO | 1,148 | €1.79 | €2,050.10 |
| ALBERTO NUNO OLIVEIRA DA FONSECA | 837 | €1.77 | €1,484.25 |
| ALBISABORES, IMP. E EXP. DE PROD. ALIM. | 1,397 | €1.45 | €2,026.90 |
| ALDI SUPERMERCADOS, LDA | 1,469 | €1.83 | €2,692.18 |

*Figure 36 - Client Sales Breakdown Report (Fragment of the 1st Page)*

## Components and Business Questions Addressed

**Objective**: Display detailed performance metrics for each client such as quantity of products sold, the average sale amount, and the total sales amount.

**Technical approach:** Applied the dark blue and gold colour scheme with bold headers, following the structure of Fabric-based paginated reports for consistency. Fabridoce logo was included to turn the Power BI Report Builder paginated report more appealing. To enable Fabridoce to have a detailed view of the quantity sold, average sale amount and total sale amount of each client we implemented a filtering option that allows filtering by client.

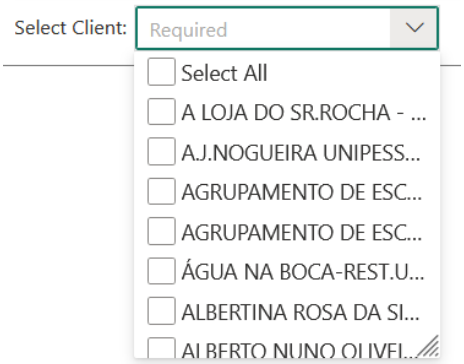



*Figure 37- Filtering Option per Client*

**Business Question Addressed:**

- What is the quantity of sold, average sale amount and total sales amount per client?

The Client Sales Breakdown easily answers this question. By selecting one specific client or selecting all, the user can check the quantity sold, average sale amount, and total sales amount per client. Using "A LOJA DO SR. ROCHA - CAFÉ & MERCEARIA" as an example, Fabridoce sold 597 units to this client, with an average sale amount of €2.26 and a total sales amount of €1,348.78. It's also possible to check the total for all clients combined: quantity sold 499,529, average sale amount €452.12, and total sales amount €800,986.79.

## Report Builder Paginated Report- Location Sales Breakdown

The Location Sales Breakdown paginated report provides an overview analysis of sales performance across different locations. This tabular presentation shows key metrics such as quantity of products sold, average sale amount, and total sales amount. By organizing data in a structured format, this report facilitates analysis of sales trends and enables informed decision-making. For this report, the measure name "quantity of products sold" was changed to "quantity sold" to prevent the viewer from thinking that it referred to the quantity of distinct products. In the image below we expanded the Zone "CENTRO" to highlight the main capability of this report, checking the metrics per zone(s) and district(s).

Location Sales Breakdown

| Zone | District | Quantity Sold | Average Sale Amount | Total Sales Amount |
|---|---|---|---|---|
| ⊟CENTRO | BEJA | 8,276 | €1.69 | €14,027.32 |
| | CASTELO BRANCO | 50,664 | €1.42 | €71,730.88 |
| | COIMBRA | 129,240 | €1.57 | €202,591.60 |
| | EVORA | 9,844 | €1.50 | €14,735.28 |
| | LEIRIA | 101,692 | €1.52 | €154,625.36 |
| | LISBOA | 449,676 | €1.51 | €678,623.40 |
| | PORTALEGRE | 12,324 | €1.85 | €22,822.16 |
| | SANTARÉM | 66,112 | €1.74 | €114,898.96 |
| | SETÚBAL | 55,892 | €1.79 | €99,974.16 |
| | Total | 883,720 | €1.62 | €1,374,029.12 |
| ⊞ILHA | Total | 14,856 | €1.47 | €22,605.72 |
| ⊞NORTE | Total | 1,037,768 | €1.63 | €1,695,801.60 |
| ⊞SUL | Total | 61,772 | €1.81 | €111,510.72 |
| **Total** | | **1,998,116** | **€1.62** | **€3,203,947.16** |

1

*Figure 38 - Location Sales Breakdown Report (1st Page)*

## Components and Business Questions Addressed

To enable Fabridoce to have a detailed view of each Zone and District we implemented a filtering option. By default, all Zones and Districts are pre-selected upon opening the report, this allows a better user-friendly experience.

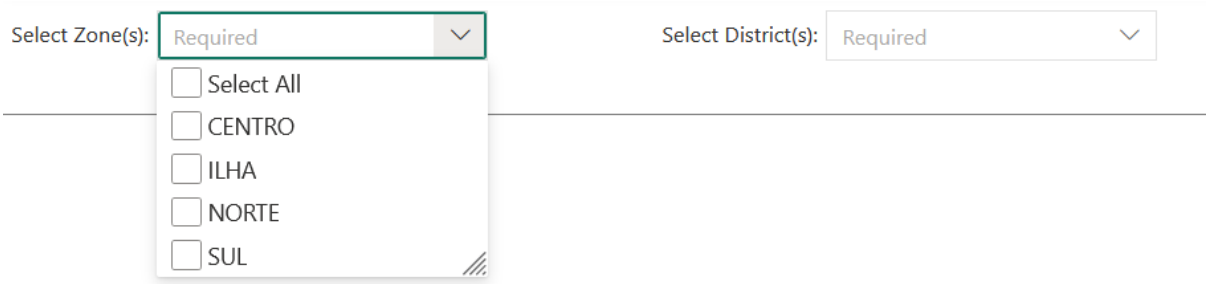



*Figure 39 - Filtering Option per Zone(s) and District(s)*

**Objective**: Display detailed performance metrics per Location such as quantity sold, the average sale amount, and the total sales amount.

**Technical approach:** Applied the dark blue and gold colour scheme with bold headers, following the structure of Fabric-based paginated reports for consistency. Fabridoce logo was included to turn the Power BI Report Builder paginated report more appealing. The pre-select Zones and Districts were defined in the Report Parameter Properties > Default Values.

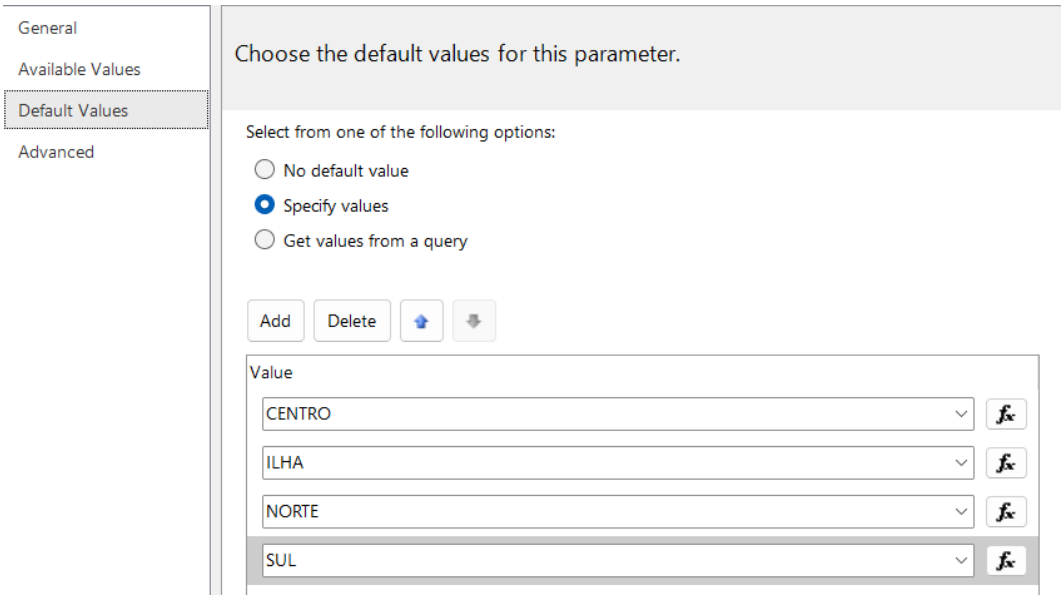



*Figure 40 - Zone Report Parameter Properties*

**Business Questions Addressed:**

- What is the quantity sold, average sale amount and total sales amount per Zone?
- What is the quantity sold, average sale amount and total sales amount per District?

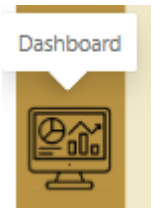
The Location Sales Breakdown report easily analyse the sales performance by Zone and District. As an example, for the "SUL" zone, the quantity sold was 15,443 units, with an average sale amount of €1.81, resulting in a total sales amount of €27,877.68. Likewise, we can analyse by District, considering the "BEJA" district, the quantity sold was 2,069 units, with an average sale amount of €1.69, resulting in a total sales amount of €3,506.83.

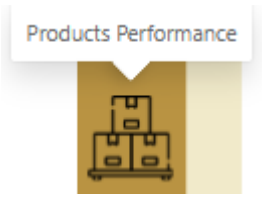
## 6.2 Extra Work

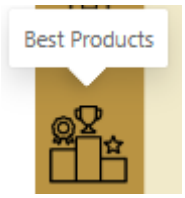
### Navigation Buttons

To facilitate the navigation process, on each Power Bi report we implemented on the left a ribbon with various buttons for different purposes. On the Products Report, we added page navigation buttons that automatically redirect to the referenced page with tooltip defined as: Dashboard; Products Performance; Best Products.

On the Dashboard and Sellers' Info pages we also added a Web URL linked to the Fabridoce logo that will redirect the user to the company's official website.



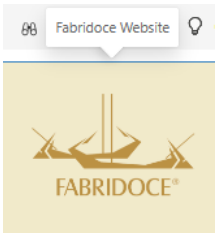



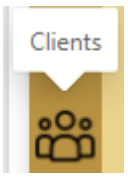

*Figure 41- Dashboard Navigation Button (First Figure)*

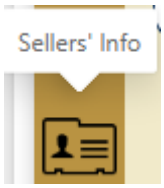
*Figure 42- Products Performance Navigation Button (Second Figure)*

*Figure 43- Best Products Navigation Button (Third Figure)*

*Figure 44- Fabridoce Website Navigation Button (Fourth Figure)*

Similarly, on the Sellers, Clients and Locations Report, navigation buttons were also used with a tooltip defined as: Seller's Info; Clients; Location. The URL link to the company's website was also added to the Sellers' Info page on the logo.



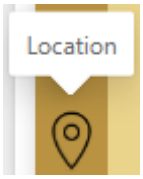





*Figure 45- Sellers' Info Navigation Button (First Figure)*

*Figure 46- Clients Navigation Button (Second Figure)*

*Figure 47- Location Navigation Button (Third Figure)*

*Figure 48- Fabridoce Website Navigation Button (Fourth Figure)*

## Bookmarks

We implemented bookmarks across all Power BI reports, assigning them to a reset button located at the top left of each page. When this button is selected, all filters on the page are cleared, returning the report to its default, unfiltered state. The reset buttons have a black icon colour for visibility with tooltip of description of button function when user hovers on button. This functionality enhances user experience by allowing users to easily explore data and reset filters to the original view with a single click.

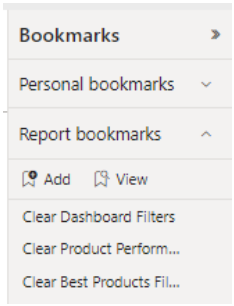



*Figure 50 - Bookmarks Actions*

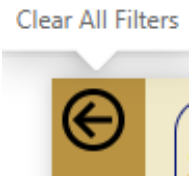



*Figure 49 - Clear All Filters Button*

# 7. Critical Assessment

The Business Intelligence II project primarily utilizing Power BI software provided a valuable learning experience. Through the utilization of Power BI's features, we discovered numerous benefits that improved our data analytics efforts. Additionally, we gained valuable insights into the importance of data visualization techniques. We found Power BI Desktop to be easy to use, with its user-friendly interface and intuitive design. However, our experience with Power BI Report Builder was less enjoyable. Its outdated layout and lack of intuitive design made it challenging to create the paginated reports efficiently. We would say the only positive takeaway from using the report builder is adding one more tool to our arsenal of BI students.

One of the main challenges was formatting the reports consistently. Each team member has their personal preferences and style when creating the reports. Initially, this led to discrepancies in formatting across reports in the different Power BI tools. Since all group member wanted to try the different tools, merging the individual work into something uniform and consistent was a challenging task. If we could start all over again, we would have defined a template with a colour palette and pre-defined style to use in all reports following the data visualization's recommendation of drawing an initial sketch of the final project. That's one of the lessons we take from the project.

Another challenge that caused significant concern occurred while creating the "Select the Seller:" slicer. As previously mentioned, Fabridoce has two sellers with the same name, therefore the use of the seller's name attribute is not viable because only one of them appears. After seeking assistance in the Moodle's forum, we received the recommendation to create a new attribute in the seller's dimension. This new attribute combines the seller's name with an "S" and the business key of each seller, e.g. John Smith (S14). However, we encountered difficulties running the pipelines and loading the data into our Data Warehouse. As expected, during this problem the information from our report disappeared because the data was not available. With the assistance of Professor Duarte Rodrigues, we identified the issue was related to the mapping of the attributes in Fabric's cache. After clearing the cache and resolving another minor issue with the date table, all data was properly loaded into our Data Warehouse. Through this experience, we learned the ramifications of an apparently simple slicer, the importance of creating distinctive features for the visuals and not only for the DW, and the value of collaboration by seeking assistance to overcome obstacles.

Our group faced challenges in creating and understanding DAX measures, due to our lack of prior experience with the language. We struggled not only with writing the measures but also with understanding what we wanted to calculate and how to interpret those results. This made the process of working with DAX particularly challenging for us.

Overall, this project felt more creative compared to the Business Intelligence I project. While BI I focused more on technical skills related to dimensions, facts, and general Data Warehousing design, BI II offered more opportunities for creativity particularly with Power BI software for visuals creation. This shift made data exploration and analysis more captivating and dynamic. We learned not only general principles about semantic model and data analytics but also how to present data in visually appealing ways. This provided us with a foundation to answer business questions and communicate insights effectively through data, skills that are very valuable academically and in a business context.

# 8. Conclusions

This project underscores the importance of creating and providing access to detailed reports and visuals in a business intelligence context. The comprehensive analysis and reporting we developed will enable Fabridoce to address their key business questions, facilitating informed decision-making and strategic planning.

The creation of interactive reports and dashboards through Power BI and Microsoft Fabric will provide management ability to explore data in depth, uncover trends, and derive actionable insights. This will be essential for optimizing operations, understanding markets and enhancing overall business performance. For example, detailed insights into product performance, sales trends, and client behaviour allow Fabridoce to tailor their strategies more effectively, driving growth and competitiveness.

The report answers crucial business questions such as identifying the top-performing products, understanding regional sales distribution, analysing sales trends over time, and assessing seller performance. Insights into client behaviour and preferences will enable targeted marketing and sales strategies and detailed seller performance analysis highlighted areas for employee management.

The semantic model and data warehouse structure have provided a foundation for data organization providing reliable and efficient data retrieval and analysis. This infrastructure supports the seamless integration and presentation of key business metrics, making complex data more accessible and interpretable for decision-makers.

Our project also highlighted several areas for improvement and learning. Establishing a standardized template for report creation from the outset would enhance consistency and efficiency. Overcoming challenges with DAX measures and data loading processes has deepened our understanding of the technical intricacies involved in business intelligence work.

The reports and visualizations developed in this project have provided Fabridoce with valuable tools to drive informed decision-making and strategic growth. By effectively harnessing the power of data, Fabridoce can better navigate the competitive landscape, optimize their operations and achieve sustained business success. This project has not only addressed the immediate business questions but has also established a solid foundation for continuous data-driven improvement.

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