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BUSINESS INTELLIGENCE II COURSE REPORT

REPORT ON DELIVERY 2

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INTRODUCTION AND WORK METHODOLOGY

This report will cover the process of the implementation of a BI solution for *Killer Glute Bikes* (KGB). This whole development of action started in the *Business Intelligence I* course taken on the 1st semester of the 2022/2023 academic year. In that course the group tried to properly design both the Data Warehouse and the ETL process (Extract, Transform and Load) that would accommodate the data of the "*Killer Glute Bikes"* company.

Firstly, we had to revisit the motives that made us approach the Data Warehouse design the way we did (**1st step**). Then, although we found that our Data Warehouse design would properly fit the needs to support KGB's Business Case questions resolution, we later found that our assembled schema wouldn't be able to support the best analysis for the company's needs. Also, it did not match the required criteria for this course's project. This led us to our **2nd step** within our line of work: we would have to resketch and properly frame our Data Warehouse. Not only because of this, but also because we failed to load our Fact Table in the past, the following priority would be to redesign our ETL Process (**3rd step**) to ensure that we would fully understand the whole process (this step will not be presented within the report as to properly explain it, the other steps would be misplaced). For the **4th** and final step in the advent of intermediate delivery, we would finally be landing on new ground, as we would be developing our OLAP Tabular Model. This process is critical on developing the future BI solutions as it is in this step where we polish the multitude of relations within KGB's diverse data elements and fix some details within the nomenclature.

Overall, the development of the Data Warehouse and OLAP Tabular Model was a critical undertaking for KGB. It allowed the company to make more informed business decisions based on their vast amounts of data. By undertaking the necessary steps to ensure that the Data Warehouse and OLAP Tabular Model were properly designed, KGB was able to position itself for continued success in the future BI Solution assembly.

REVISITING THE BUSINESS: *KILLER GLUTE BIKES*

Introduction to *Killer Glute Bikes* (*KGB*) and Business Model

Killer Glute Bikes is a worldwide bike and bike apparel seller that operates in three different continents (Europe, Oceania, and North America), five different countries. For that reason, to grant the same quality service globally and therefore maintaining its position as a leading company within its line of business, Killer Glute Bikes structure follows some specific guidelines that ease this mission.

Each product that is available at the KGB stores comes from the same exact supplier. Allying this principle with a meticulous choice in their providers guarantees that Killer Glutes Bikes can deliver the same top tier quality products in all its stores. Even though this model might increase the freight in some products supply chain, with this business plan the company does not have to spend any resources on external warehouses fees.

Figure1 SUPPLY CHAIN MODEL

Killer Glute Bikes company organization found that the best way to keep its promise of delivering a specialized advice on selling their products to their clients was to fill all its stores with at least one expert in bikes' related subjects.

PROBLEM SCENARIO AND BUSINESS NEEDS

KGB is currently undergoing a restructuring of its organizational management process after the purchase of most of its shares by a new owner. As such, the new CEO needs to understand the current situation of the company. Having a Data Warehouse with all the information compiled will allow a more stoic approach to solve the company's problems and get a better understanding of the business itself. For the new board, the primary focus is to optimize the company's spendings in the multiple markets they are committed to. They hope that with the practice of more sustainable procedures, the organization will be more improve their logistical systems to decrease turnover time and increase the understanding of sales to make better decisions for future strategies pertaining to products.

To properly understand the company's reality and figuring out its next move, we identified the following questions and explain the needs that they would fulfill:

1. What is the type of products most sold by market and date?

This is a potential disruptive question for the company: achieving an overall understanding of the type of products, KGB can track the performance of their sales over time and identify trends and patterns. Further, this information can provide valuable insights for a better supported decision on inventory management, production planning and sales forecasting.

2. What is the average transportation cost, per type of transport, per product, per Market?

Answering this question can possibly Diminish KGB logistic costs and efficiency, which can help the company optimize their spending. Per example, with this analysis, KGB could consider negotiating better rates with their transportation providers or exploring alternative shipping routes to reduce costs.

3. What is the client segment with the biggest sales by market and date?

By achieving a proper analysis of the topics related to this question, KGB could, for example, develop marketing campaigns with a more accurate target on their sight and potentially expand their product offerings.

4. What is our customer profile by product, product category, and product subcategory?

While trying to answer this question , KGB will be more ready to properly identify niches and, therefore, identify gaps in their product offerings. Additionally, understanding the customer profile would help KGB develop a more nuanced perception of their customer base and tailor their marketing strategies accordingly.

5. How do product sales vary during the year?

This question would be an ignition point for KGB answering the needs already addressed on topic no **1.** .

6. What is our average revenue per sale per product type?

A discussion on this topic could be a focal point on developing the topics referred to in topic no **4.** .

7. Which region has the highest profits? What is the best investment resolution?

By going through the evaluation of this question, KGB can identify which regions are the most profitable for the company and adjust its business operations and investment strategies accordingly to a more refined allocation of its resources and a more focused effort on the regions that are likely to generate the highest returns. In addition, the company could get a better notion on the markets whose sales are underperforming and decide on a change of strategy paradigm to help those regions grow and generate higher profits in the future.

PRESENTING AND RESKETCHING THE DATAWAREHOUSE

We began by looking at our already built Data Warehouse.

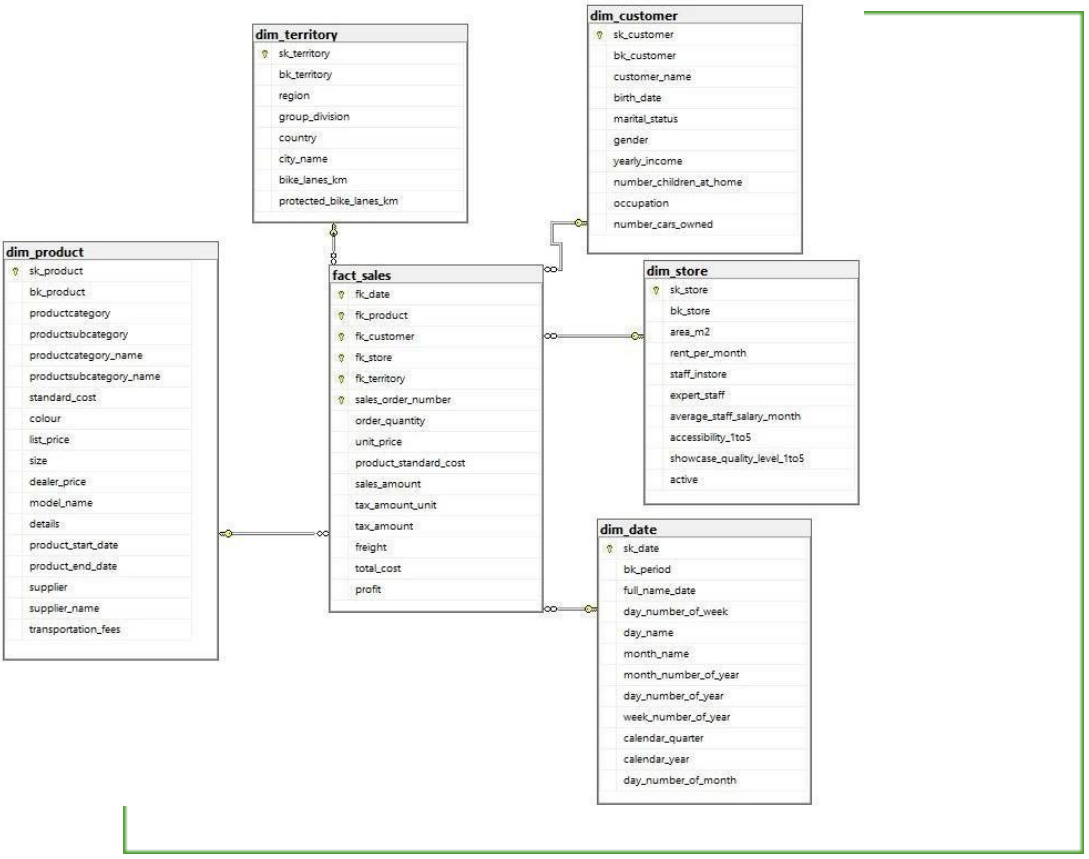


Figure 1 PREVIOUS DATA WAREHOUSE SCHEMA

As was formerly mentioned, we noticed that our hierarchical schema wasn't complying with the introduced requirements. We proceeded to make the appropriate changes within the Store Dimension, Dim_store , and the Customer Dimension, customer_Dim , as these ones were constituted without any appropriate hierarchy and weren't completely developed as we initially imagined. We had to introduce the Territory Dimension, Dim_territory , within these two Dimensions' hierarchical structure because not doing so could potentially create some problems within the records management itself and be a future adversity on getting a complete background for the business analysis.

We also noticed problems within the data structure itself as some of the surrogate keys, namely the ones for the Store Dimension (sk_store) and the Territory Dimension (sk_territory). Previously, in the Fact Sales, the

FK for Store and Territory was the BK from the respective dimensions, so to have a properly implemented Data Warehouse, we created the connection to the Fact Sales with the SK keys.

As we finished resketching our model of KGS's Data Warehouse, we ended up with this design.

Figure 2 NEW DATA WAREHOUSE SCHEMA

Note: The difference between the first and the second image is that we have the correct implementation of the Hierarchies.

OLAP TABULAR MODEL DEVELOPMENT AND COMPOSITION

Connecting SQL Management Studio to Analysis Services

To start developing, we had to import the tables from SQL Management Studio to Analysis Services. We also made sure that all deploy errors were properly fixed.

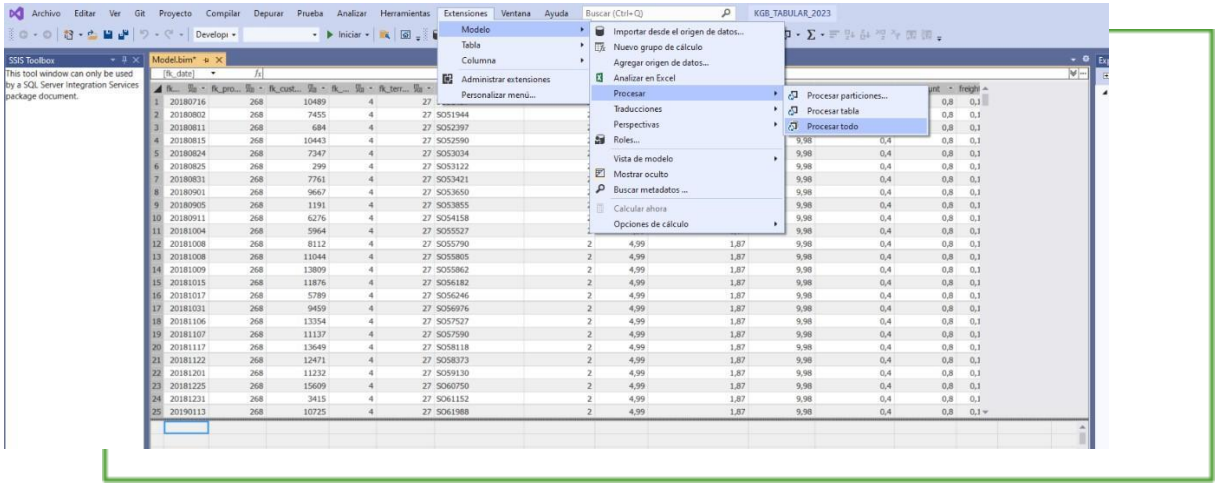


Figure 3 PROCESS OF FIX DEPLOY ERROS in Analysis Services (SSAS TABULAR)

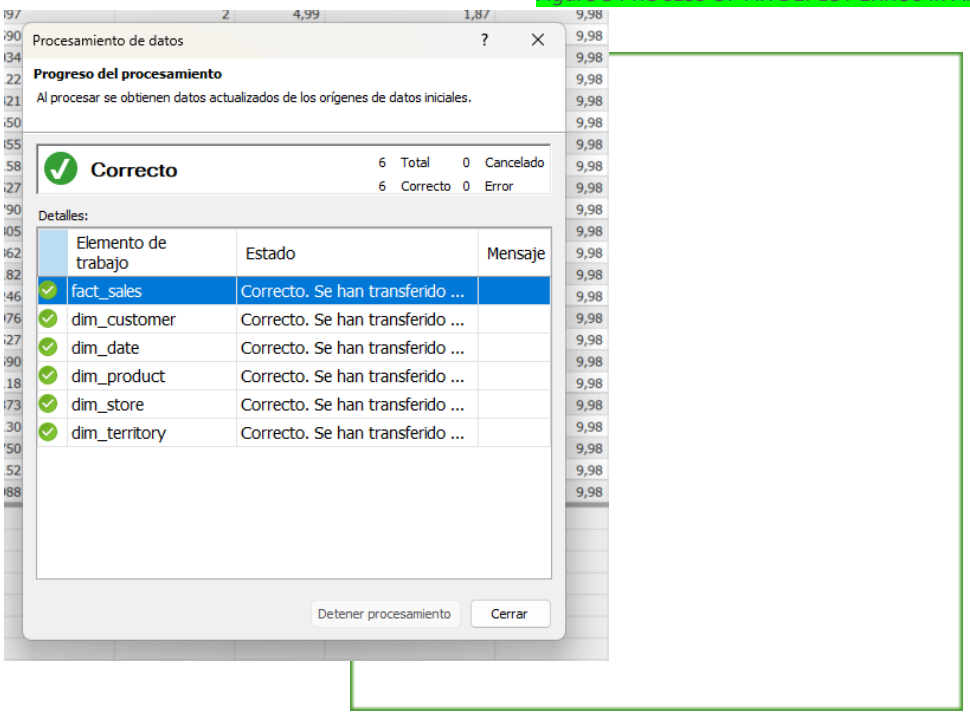


Figure 4 FIXING DEPLOY ERROS (COMPLETE)

Tables Reconfiguration within Analysis Services

Then we went ahead to change the nomenclature for both columns and tables. We changed all the names for all tables' names and relevant columns (the ones that would later figure in the reports) to uppercase for future presentation reasons. For the same reason, we also remove the underscores.

Figure 5 PREVIOUS TABLE NAMES

Figure 6 NEW TABLE NAMES

We also had to address some questions related to the format of some variables.

For example, we changed the format of column bk_period (Dim Date) to short date format. This is important as it is within this table that the timeline is defined for all the analysis within KGB operations universe. We also had to change all the columns related to currency like Total Cost (Fact Sales).

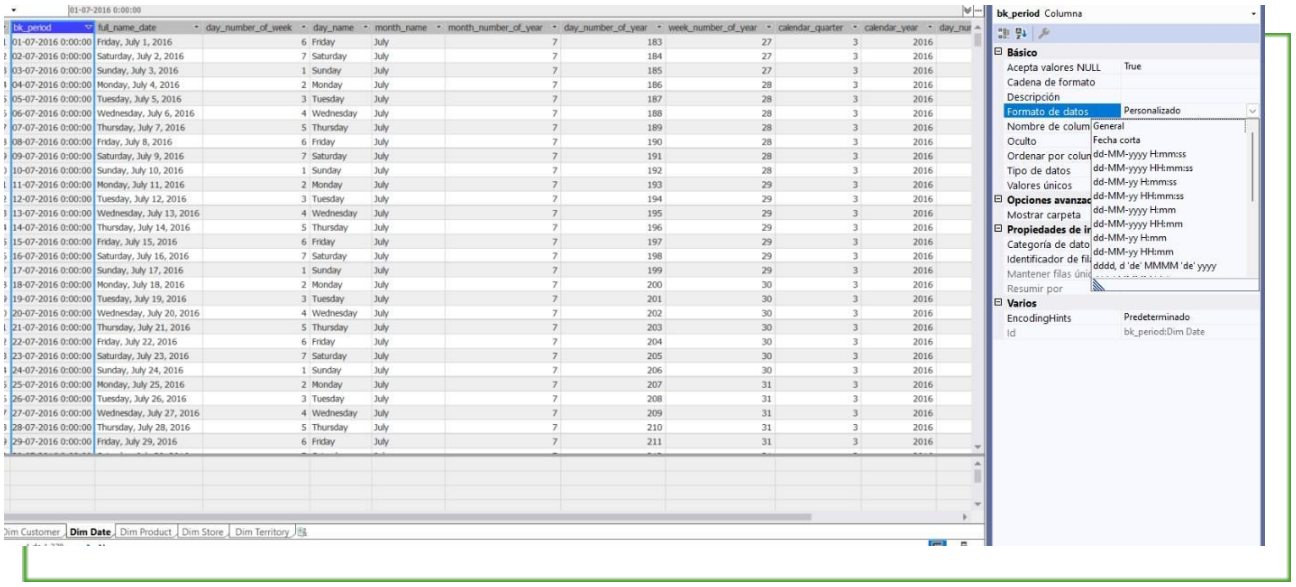


Figure 7 CHANGING FORMAT OF BK_PERIOD

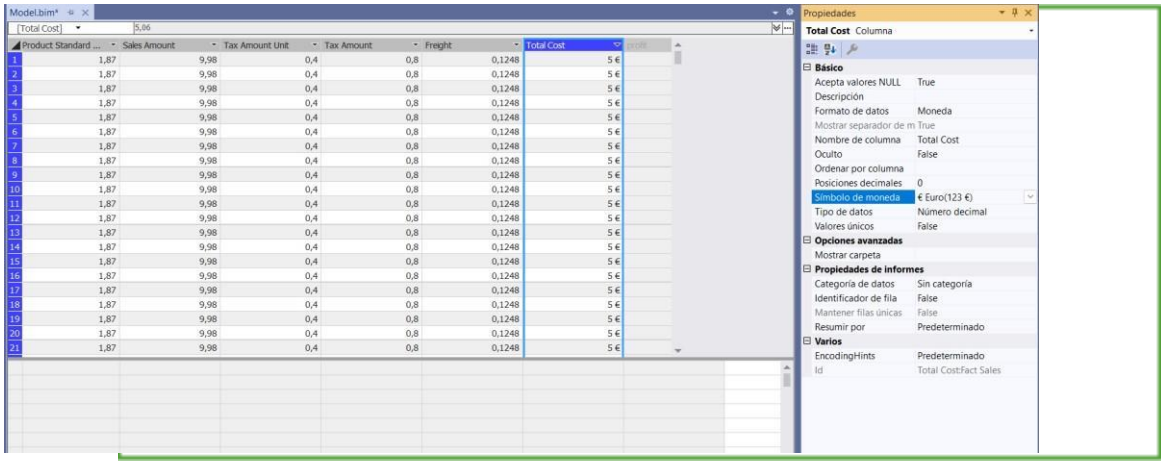


Figure 8 CHANGING ALL FORMATS RELATED TO CURRENCY

In order to be able to properly read the information that is displayed within the tables, we advance to order the order fields within the Date Table (Dim Date). As the data contained within this table is the heart of the breakdown of the other tables, it is crucial that their order is based on this timeline. We sort this table by changing the order of the non-numeric columns based on their numeric alias. We update the “Day Name” based on the “Day Number of the Week” and we follow the same logic for month with “Month Name” (based on “Month Number of Year”) . The auxiliary columns created are just used to order the Names, they have no relevancy to the project besides that, so they will be hidden.

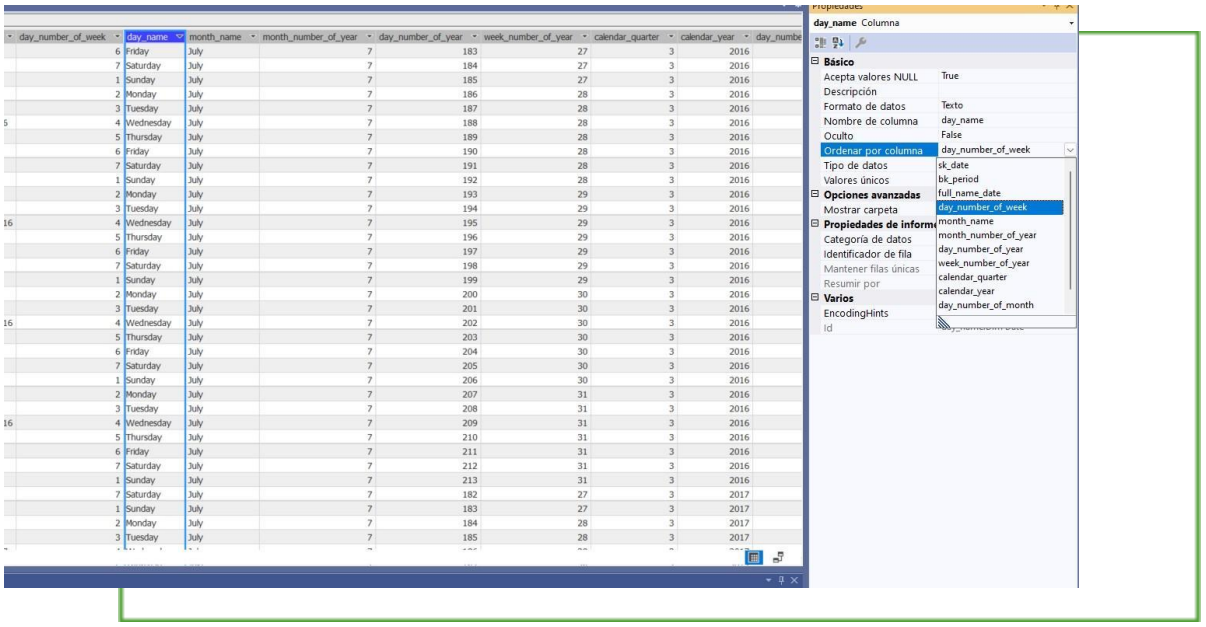


Figure 9 SORTING TABLE VIA "DAY NAME"

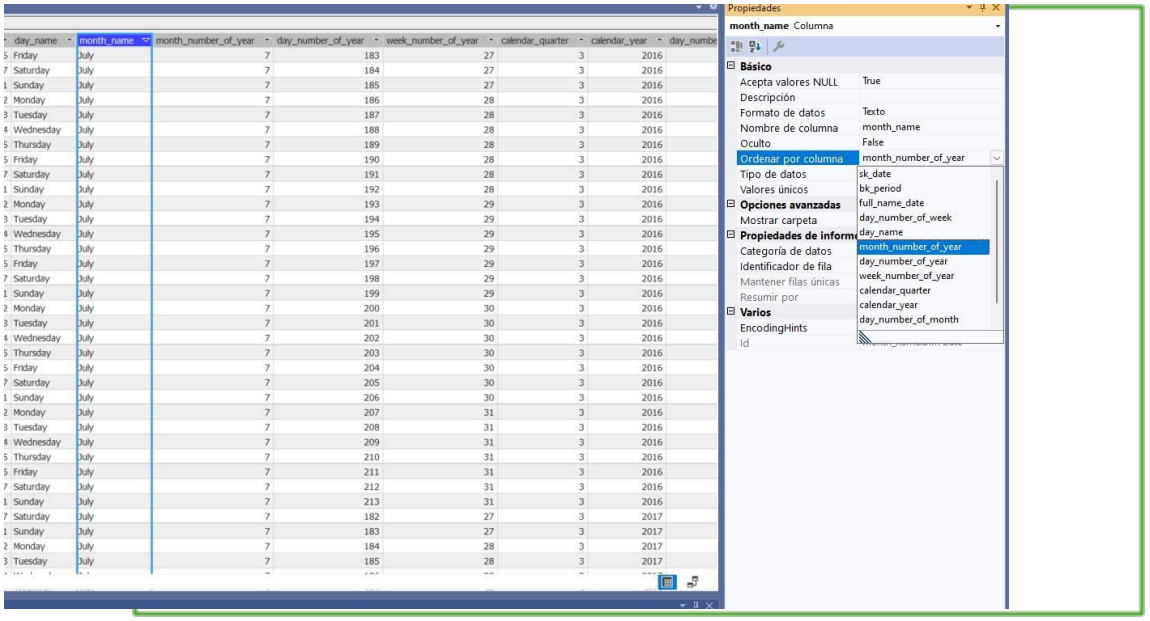


Figure 10 SORTING TABLE VIA "MONTH NAME"

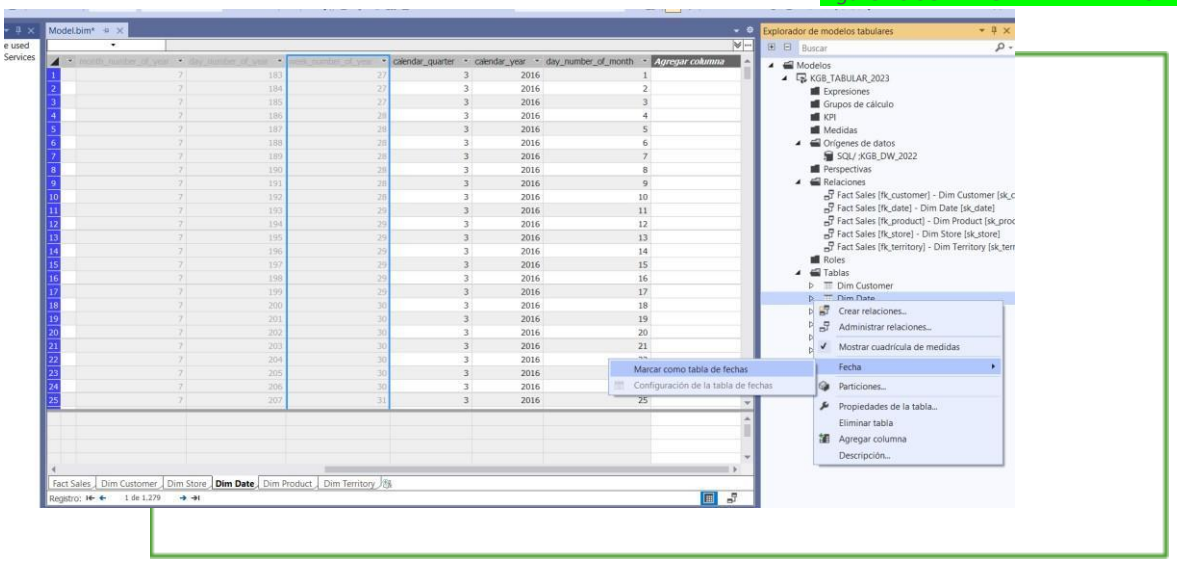


Figure 11 MARKING DIM DATE AS THE DATE TABLE

Creating Auxiliary Columns for Slowly Changing Dimensions

We proceeded to create some auxiliary columns that will help the future users of the analysis platform on dissecting the information about the *Killer Glute Bikes* company.

Within Dim Product we create an auxiliary column to help filter the available products (the ones with blank entries for the column *Product End Date*). Within this new column, *Product Status*, the available products will

feature the value *Available* and the ones that are discontinued (that have a value for *Product End Date*) will display *Discontinued*.

Model.bim*

=IF(CONVERT('Dim Product'[product_end_date], STRING)="", "Available","Discontinued")

	ce	Product Name	Details	product_start_date	product_end_date	Supplier	Supplier Name	Transportation Fees	Product ...	Agregar columna
1	1865 €	Sport-100	Universal fit ...	01-07-2016	30-06-2017	SP5	Be A Bike	1	Discontinued	
2	1865 €	Sport-100	Universal fit ...	01-07-2017	30-06-2018	SP6	Alicia Bike Keys	1	Discontinued	
3	9940 €	Sport-100	Universal fit ...	01-07-2018		SP3	Life on Wheels	1	Available	
4	1865 €	Sport-100	Universal fit ...	01-07-2016	30-06-2017	SP2	Trackish Life	0	Discontinued	
5	1865 €	Sport-100	Universal fit ...	01-07-2017	30-06-2018	SP8	Mike Bikes	0	Discontinued	
6	9940 €	Sport-100	Universal fit ...	01-07-2018		SP2	Trackish Life	0	Available	
7	7000 €	Mountain Bike Socks	Combinatio...	01-07-2016	30-06-2017	SP8	Mike Bikes	0	Discontinued	
8	7000 €	Mountain Bike Socks	Combinatio...	01-07-2016	30-06-2017	SP2	Trackish Life	0	Discontinued	
9	1865 €	Sport-100	Universal fit ...	01-07-2016	30-06-2017	SP4	Next Bike	0	Discontinued	
10	1865 €	Sport-100	Universal fit ...	01-07-2017	30-06-2018	SP7	Biker Boys Inc	0	Discontinued	
11	9940 €	Sport-100	Universal fit ...	01-07-2018		SP8	Mike Bikes	0	Available	
12	1865 €	Cycling Cap	Traditional s...	01-07-2016	30-06-2017	SP8	Mike Bikes	0	Discontinued	
13	1865 €	Cycling Cap	Traditional s...	01-07-2017	30-06-2018	SP3	Life on Wheels	1	Discontinued	
14	3940 €	Cycling Cap	Traditional s...	01-07-2018		SP3	Life on Wheels	1	Available	
15	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2016	30-06-2017	SP5	Be A Bike	1	Discontinued	
16	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2017	30-06-2018	SP5	Be A Bike	1	Discontinued	
17	9940 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2018		SP7	Biker Boys Inc	0	Available	
18	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2016	30-06-2017	SP8	Mike Bikes	0	Discontinued	
19	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2017	30-06-2018	SP6	Alicia Bike Keys	1	Discontinued	
20	9940 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2018		SP4	Next Bike	0	Available	
21	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2016	30-06-2017	SP3	Life on Wheels	1	Discontinued	
22	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2017	30-06-2018	SP4	Next Bike	0	Discontinued	
23	9940 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2018		SP4	Next Bike	0	Available	
24	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2016	30-06-2017	SP5	Be A Bike	1	Discontinued	
25	3404 €	Long-Sleeve Logo Jer...	Unisex long...	01-07-2017	30-06-2018	SP7	Biker Boys Inc	0	Discontinued	

Figure 12 NEW COLUMN PRODUCT STATUS

For the same table we also create the column *Transportation Included* that, based on the Boolean values from the column *Transportation Fees*, displays either *Included* or *Not Included*.

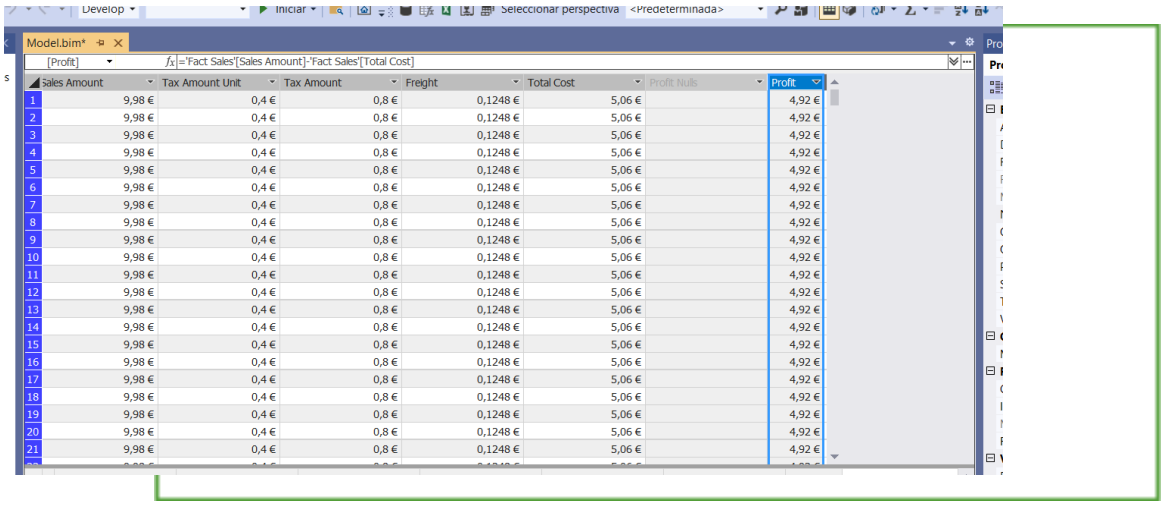
Model.bim*

=IF('Dim Product'[Transportation Fees]==1, "Included","Not Included")

	Product Name	Details	product_start_date	product_end_date	Supplier	Supplier Name	Transportation Fees	Product ...	Transportation Included
1	Sport-100	Universal fit ...	01-07-2016	30-06-2017	SP5	Be A Bike	1	Discontinued	Included
2	Sport-100	Universal fit ...	01-07-2017	30-06-2018	SP6	Alicia Bike Keys	1	Discontinued	Included
3	Sport-100	Universal fit ...	01-07-2018		SP3	Life on Wheels	1	Available	Included
4	Sport-100	Universal fit ...	01-07-2016	30-06-2017	SP2	Trackish Life	0	Discontinued	Not Included
5	Sport-100	Universal fit ...	01-07-2017	30-06-2018	SP8	Mike Bikes	0	Discontinued	Not Included
6	Sport-100	Universal fit ...	01-07-2018		SP2	Trackish Life	0	Available	Not Included
7	Mountain Bike Socks	Combinatio...	01-07-2016	30-06-2017	SP8	Mike Bikes	0	Discontinued	Not Included
8	Mountain Bike Socks	Combinatio...	01-07-2016	30-06-2017	SP2	Trackish Life	0	Discontinued	Not Included
9	Sport-100	Universal fit ...	01-07-2016	30-06-2017	SP4	Next Bike	0	Discontinued	Not Included
10	Sport-100	Universal fit ...	01-07-2017	30-06-2018	SP7	Biker Boys Inc	0	Discontinued	Not Included
11	Sport-100	Universal fit ...	01-07-2018		SP8	Mike Bikes	0	Available	Not Included
12	Cycling Cap	Traditional s...	01-07-2016	30-06-2017	SP8	Mike Bikes	0	Discontinued	Not Included

Figure 13 NEW COLUMN TRANSPORTATION INCLUDED

Concerning the Fact Table, we designed a column *Profit* that indicates the profit that a specific sale gave to KGB.



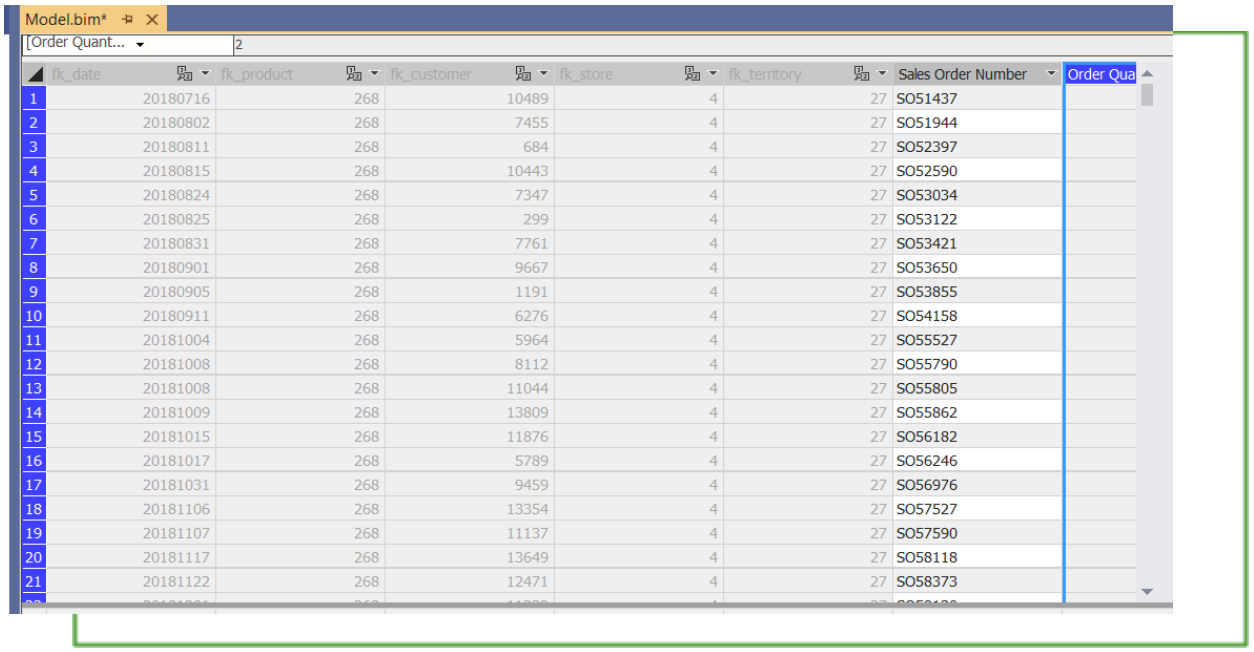
	Sales Amount	Tax Amount Unit	Tax Amount	Freight	Total Cost	Profit Nulls	Profit
1	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
2	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
3	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
4	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
5	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
6	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
7	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
8	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
9	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
10	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
11	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
12	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
13	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
14	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
15	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
16	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
17	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
18	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
19	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
20	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €
21	9,98 €	0,4 €	0,8 €	0,1248 €	5,06 €		4,92 €

Figure 14 NEW COLUMN PROFIT

Hiding Columns

In the process of ensuring that the model is concise and relevant to the KGB decision makers, we need to filter out (hide) columns that do not have a palpable sense of interest to KGB and its stakeholders. This includes columns that serve only for the data warehouse's proper functionality, such as the surrogate keys (*sk*), foreign keys (*fk*) and business keys (*bk*). Although they are essential to maintain the integrity of the data warehouse, they don't provide any meaningful insights to approach the already referred KGB Business Needs.

With this in mind, we hid *sk_date*, *sk_territory*, *sk_customer*, *sk_product* and *sk_store* for Dim Date, Dim Territory, Dim Customer, Dim Product and Dim Store, respectively. We also hid the business keys for all the five Dimension tables apart from the ones for Dim Date (changed the name for *Proper Date*) and Dim Store. We hid all the foreign keys for the Fact Sales table.



	fk_date	fk_product	fk_customer	fk_store	fk_territory	Sales Order Number	Order Qua
1	20180716	268	10489	4	27	SO51437	
2	20180802	268	7455	4	27	SO51944	
3	20180811	268	684	4	27	SO52397	
4	20180815	268	10443	4	27	SO52590	
5	20180824	268	7347	4	27	SO53034	
6	20180825	268	299	4	27	SO53122	
7	20180831	268	7761	4	27	SO53421	
8	20180901	268	9667	4	27	SO53650	
9	20180905	268	1191	4	27	SO53855	
10	20180911	268	6276	4	27	SO54158	
11	20181004	268	5964	4	27	SO55527	
12	20181008	268	8112	4	27	SO55790	
13	20181008	268	11044	4	27	SO55805	
14	20181009	268	13809	4	27	SO55862	
15	20181015	268	11876	4	27	SO56182	
16	20181017	268	5789	4	27	SO56246	
17	20181031	268	9459	4	27	SO56976	
18	20181106	268	13354	4	27	SO57527	
19	20181107	268	11137	4	27	SO57590	
20	20181117	268	13649	4	27	SO58118	
21	20181122	268	12471	4	27	SO58373	

Figure 15 HIDING FOREIGN KEYS WITHIN FACT SALES TABLE

Moreover, we need to hide non-relevant, obsolete, and irrelevant information that does not add any value to the model. For example, as previously explained, we hide "*Day Number of the Week*" column as this info is

already specified on the column "*Day Name*" and the "*Day Number of the Week*" was just created to order "*Day Name*". The columns that belong to a hierarchy are also hidden, because they will show up in the hierarchy that they belong to. We filter out the columns as describe in the following table:

Table	Hidden Columns
Dim Date	*sk_date*, *day_number_of_week*, *month_numbe_of_year*, *Proper Date*, day_number of_year, week_number_of_year, *calendar_year*
Dim Territory	*sk_territory*, *bk_territory*, *Country Region*, *Region*, *Country*, *City Name*
Dim Customer	*sk_customer*, *bk_customer*, *Number Children at Home*, *number_cars_owned*, *Region*, *Country*, *City*
Dim Product	*sk_product*, *bk_product*, *product_start_date*, *product_end_date*, *transportation_fees*, *Product Name*, *Product Category Name*, *Product Subcategory Name*
Dim Store	*sk_store*, *active*
Fact Sales	*fk_date*, *fk_product*, *fk_customer*, *fk_store*, *fk_territory*, *Profit Nulls*

Table 1 HIDED COLUMNS PER TABLE

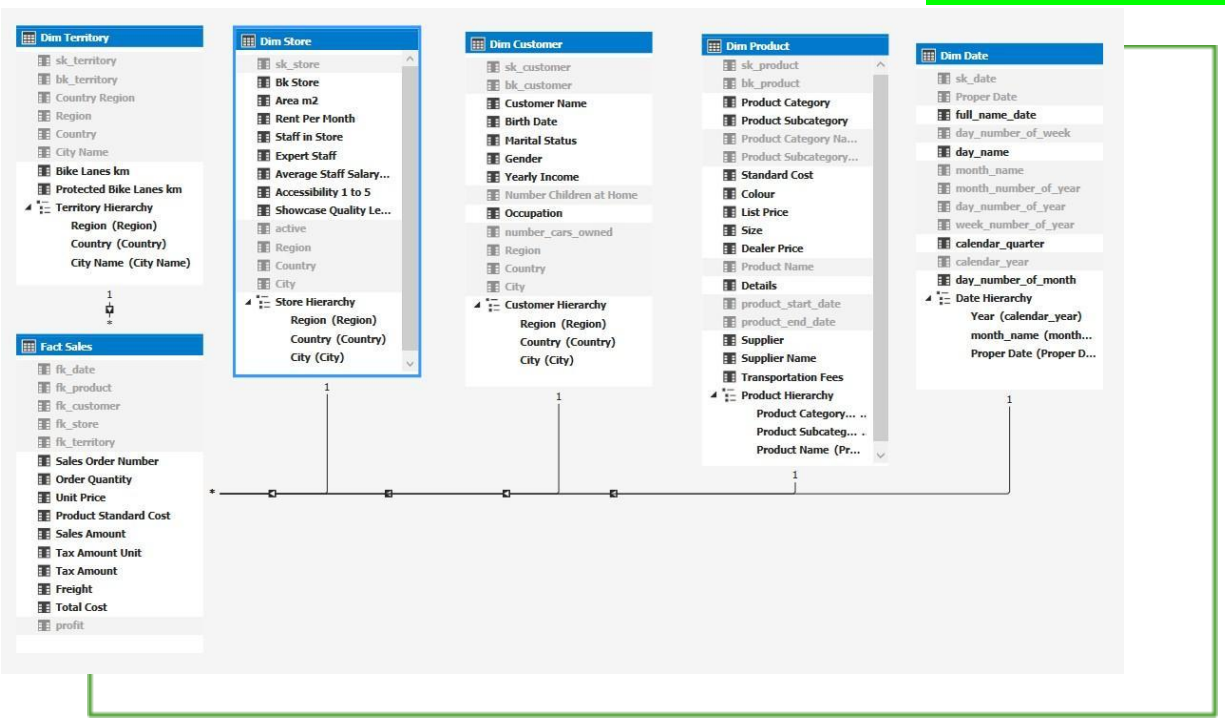


Figure 16 GENERAL OVERVIEW OF HIERARCHIES

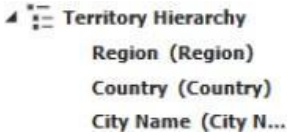
Hierarchy Definition

Alongside the process of hiding columns, we also started to define the chain of hierarchies for all the five Dimensions. As we know, the levels of hierarchies let us go from the more general term to the more specific one.

D

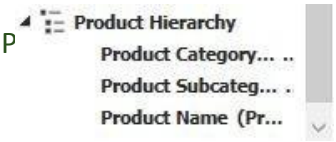
This hierarchy is self-explanatory. The three levels are the usual components of a date (day, month, year).

Territory Hierarchy



The territory hierarchy was done so we can locate where the bike lanes and protected bike lanes are. The 3 levels are the name of the city, the country and the region, more specifically the continent.

P



The 3 product hierarchy levels, from more specific to the more general, are product name or product model, product subcategory and product category.

St

Customer Hierarchy

The structure of the two previous hierarchies is the same as the Territory hierarchy. In the Store hierarchy it helps us locate the store and in the Customer hierarchy it helps us understand from where our clients are from.

Measures and KPIS Establishment

Defining and establishing the relevant measures in the OLAP Tabular Model is an essential step for fulfilling KGB's data analysis of their sales and, subsequently, of their theatre of operations. Given the new CEO's emphasis on cost optimization and logistics improvement, having accurate and pertinent measures will yield valuable insights for the decision-making process. This enables the company to gain a comprehensive understanding of its current state. We establish the measures that we think will be essential to answer the earlier questioned Business Needs.

Question	Measures	Variables Used
How many products did we sell?	Total Order Quantity Average Order Quantity	Order Quantity
What is the average and total cost for our business?	Average Standard Product Cost Grand Total Cost (Sum)	Order Quantity Product Standard Cost Freight Tax Amount Total Cost
What is the client segment with the biggest sales by market and date?	*1	---
What is our customer profile by product, product category, and product subcategory?	*1	---
How much does a unit cost on average to our customer?	Average Unit Price	Unit Price
How much did the business sell throughout the period in question? How much was our gross profit and net profit margin?	Total Sales Amount Gross Profit Margin Net Profit Margin	Sales Amount Total Cost Product Standard Cost Order Quantity Profit

Table 2 MEASURES AND KPIs INSTAURATION

Below we can see the implemented measures within the Fact Sales table.

Model.bim*

[Total Cost] 5,06

	ber	Order Quantity	Unit Price	Product Standard Cost	Sales Amount	Tax Amount Unit	Tax Amount
1		2	4,99 €	1,87 €	9,98 €	0,4 €	
2		2	4,99 €	1,87 €	9,98 €	0,4 €	
3		2	4,99 €	1,87 €	9,98 €	0,4 €	
4		2	4,99 €	1,87 €	9,98 €	0,4 €	
5		2	4,99 €	1,87 €	9,98 €	0,4 €	
6		2	4,99 €	1,87 €	9,98 €	0,4 €	
7		2	4,99 €	1,87 €	9,98 €	0,4 €	
8		2	4,99 €	1,87 €	9,98 €	0,4 €	
9		2	4,99 €	1,87 €	9,98 €	0,4 €	
10		2	4,99 €	1,87 €	9,98 €	0,4 €	
11		2	4,99 €	1,87 €	9,98 €	0,4 €	
12		2	4,99 €	1,87 €	9,98 €	0,4 €	
13		2	4,99 €	1,87 €	9,98 €	0,4 €	
14		2	4,99 €	1,87 €	9,98 €	0,4 €	
15		2	4,99 €	1,87 €	9,98 €	0,4 €	
16		2	4,99 €	1,87 €	9,98 €	0,4 €	
17		2	4,99 €	1,87 €	9,98 €	0,4 €	
18		2	4,99 €	1,87 €	9,98 €	0,4 €	
19		2	4,99 €	1,87 €	9,98 €	0,4 €	
20		2	4,99 €	1,87 €	9,98 €	0,4 €	
21		2	4,99 €	1,87 €	9,98 €	0,4 €	

Suma de Order Quantity: 192705 | Promedio de Unit Price: 486,09 € | Promedio de Product Standard Cost: 286,07 € | Suma de Sales Amount: 59.965.237,25 €

Promedio de Order Quantity: 3,19058578098613

Figure 17 SUM ORDER QUANTITY, AVERAGE ORDER QUANTITY...

	Freight	Total Cost	Profit Nulls	Profit
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
0,8 €	0,1248 €	5,06 €		4,92
		Suma de Total Cost: 42.873.087,44 €		Suma de Profit: 17.092.149 €

Figure 18 SUM TOTAL COST AND SUM OF PROFIT

***1 Note 1:** Although we didn't create any specific measures to answer the specific business questions related to Client Profile and Segmentation, we made sure we would globally leave the proper foundations to address questions built. We can visualize the answers to these questions on the pivot tables.

Note 2: As we concluded in PROBLEM SCENARIO AND BUSINESS NEEDS section, questions no **5.** and **6.** displayed needs already satisfied through the processes devised to answer the other questions. For that reason, they do not figure within Table 2 composition.

The implementation of Key Performance Indicators (KPIs) within the OLAP Tabular Model is an essential component to fulfill KGB's data analysis requirements. Through a regular monitorization of KPIs over time, KGB will be able to track its performance towards fulfilling the CEO's desires.

KPIs have proper objectives defined but we can also define a range where it is below the objective, but it is still not dangerous for the survival of the business (Yellow Alert).

Question	KPI	Yellow range	KPI Objective
Are we fulfilling our unit sales objective for the period in question?	Total Quantity Sold	150 000 – 250 000	250 000
Are we fulfilling our gross profit margin objective?	Gross Profit Margin	0,05 – 0,105	10,5 %
Are we fulfilling our net profit margin objective?	Net Profit Margin	0,25-0,35	35 %

Table 3 KPIs AND THEIR PARAMETERS

KPI Total Order Quantity gives us an idea of our selling pace and if we are keeping up with the objective we defined for the period in question.

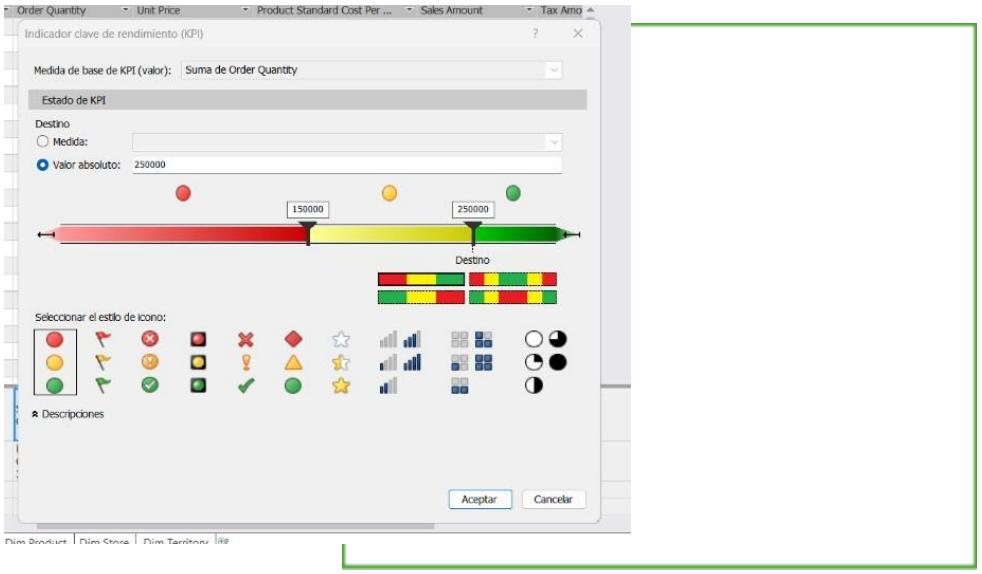


Figure 19 KPI TOTAL ORDER QUANTITY (SUM)

KPI Gross Profit Margin measures the difference between columns Sales Amount and Product Standard Cost multiplied by Order Quantity, contrary to Net Profit Margin that considers every cost associated that we have with the product.

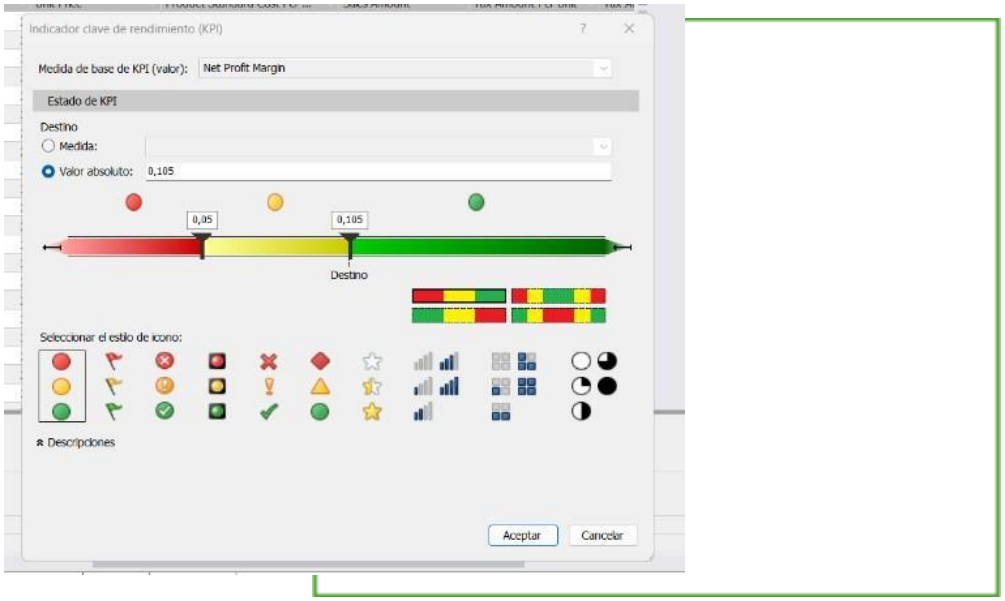


Figure 20 KPI NET PROFIT MARGIN

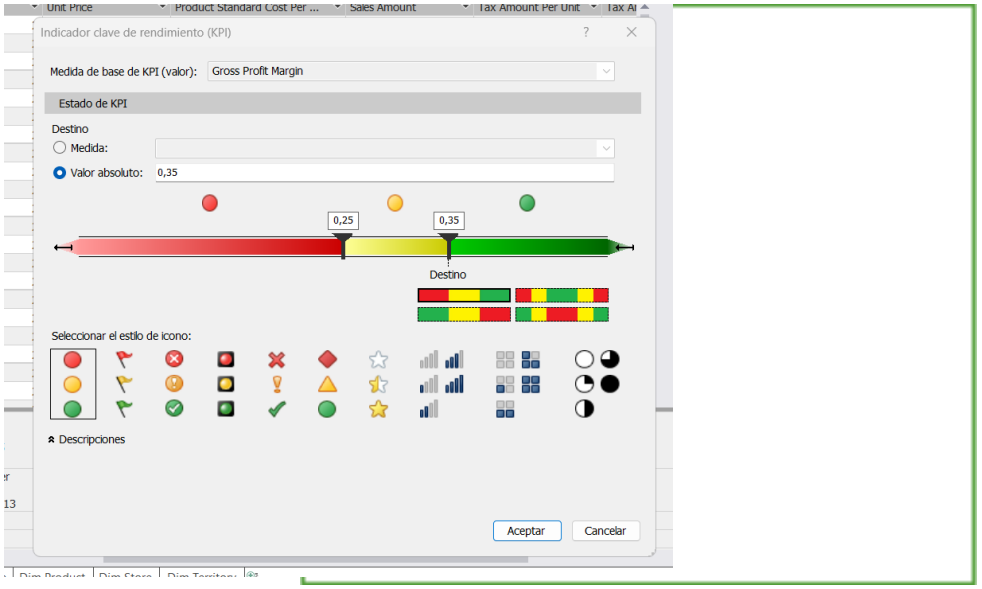


Figure 21 KPI GROSS PROFIT MARGIN

Analysis Services and Database Engine in SQL

After establishing the KPIs and measures, we had to connect analysis services with sql management studio in order to have all our sources available.

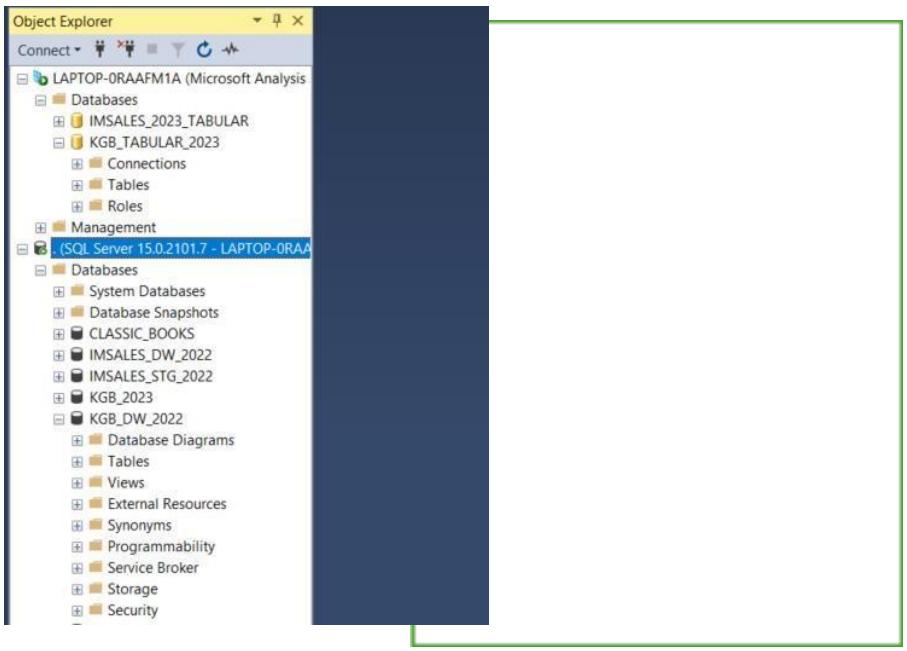


Figure 22 CONNECTING ANALYSIS SERVICES TO SQL

Report Creation

With the required key performance indicators in place and readily connect the Visual Studio with the SQL Management Studio, we could now start to focus on creating comprehensive reports on top of SRSS that would be able to provide a clear and concise overview of the data we collected from our SQL Data Warehouse.

1st Report (TABULAR Report)

Our report will be designed to provide KGB decision takers with actionable insights into the performance of our business, mainly by addressing the previously introduced business questions. With this first report we will be able to perceive the **Profit per Product by Year**.

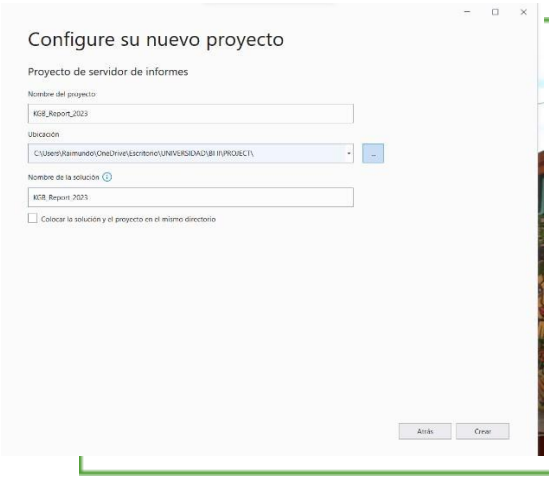


Figure 23 CREATING KGB's 1ST REPORT PART 1 AND 2

To shape our report, we wrote a query.

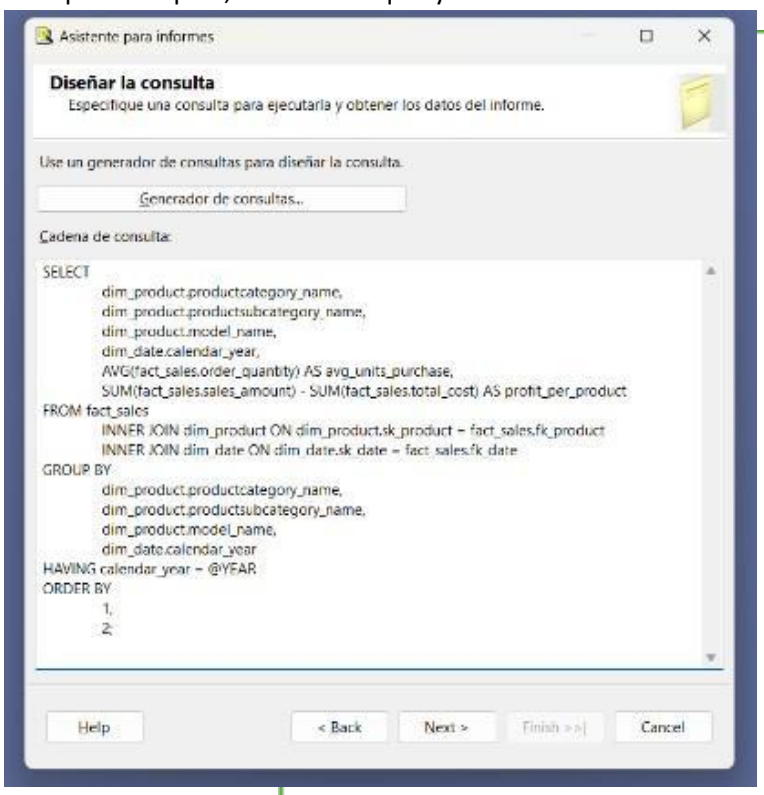


Figure 24 QUERY FOR REPORT 1

The SELECT statement in this SQL code specifies the columns that will be included in the report. In this case, as we intended to see KGB's Profit per Product by Year, the report, we selected the columns for the product category, product subcategory, model, calendar year, average units purchased, and profit per product. By selecting these columns, KGB decision makers would be able to get a detailed view of their profitability.

The INNER JOIN statements are used to combine information from the Fact Sales table and the dimension tables. In this case, the Fact Sales table is joined with the Product and Date dimension tables using their foreign keys.

The GROUP BY clause groups the results by specific columns, which can be useful for summarizing data. In this SQL code, the report is grouped by product category, product subcategory, model, and calendar year. By grouping the data in this way, KGB can see a breakdown of their sales and profitability by different product categories, subcategories, and models over time.

The HAVING clause is used to filter the results based on a specific condition. In this SQL code, the condition is that the calendar year must be equal to a specified parameter @YEAR. This means that the report will only include data from the year specified by the @YEAR parameter. By using the HAVING clause in this way, KGB can easily compare their sales and profitability across different years.

Finally, the ORDER BY clause is used to sort the results in a specific order. In this SQL code, the report is sorted first by product category and then by product subcategory. This ensures that the data is presented in a logical order that makes it easy for KGB personnel to understand and analyze.

We drew the path that connects our Warehouse to the Report execution.

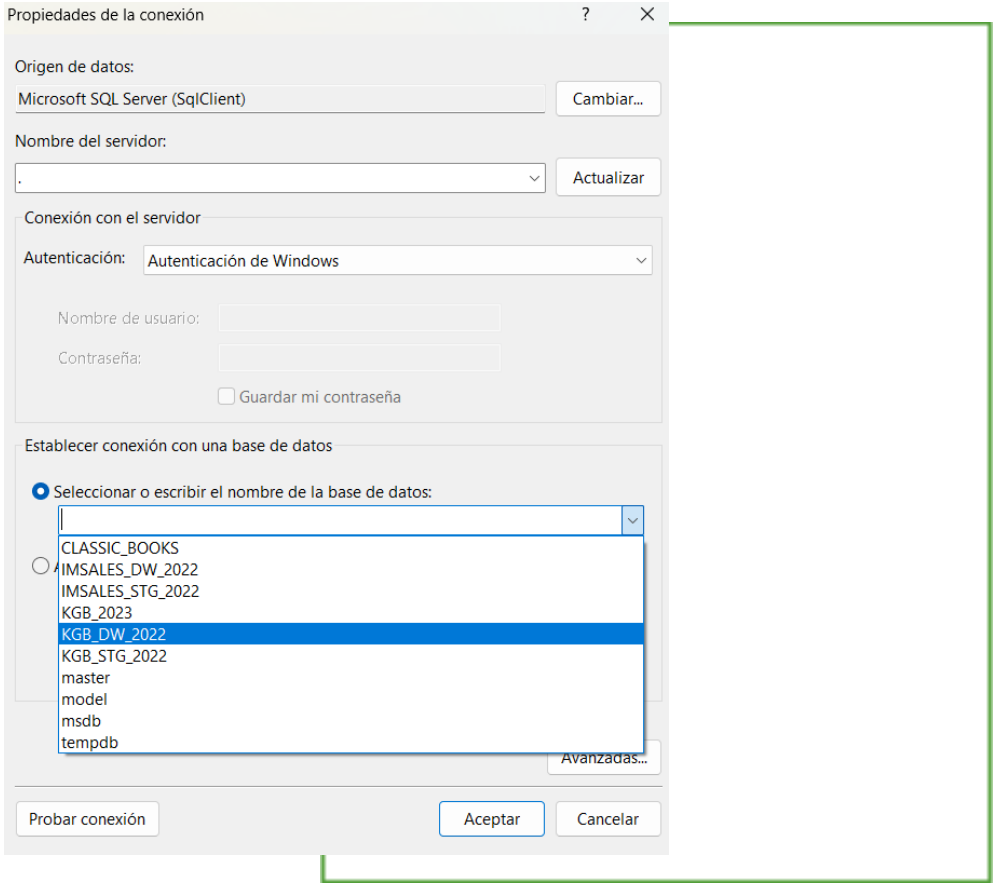


Figure 25 PATH MANAGER FOR REPORT 1

We then finally achieved the desired result for our First Report.

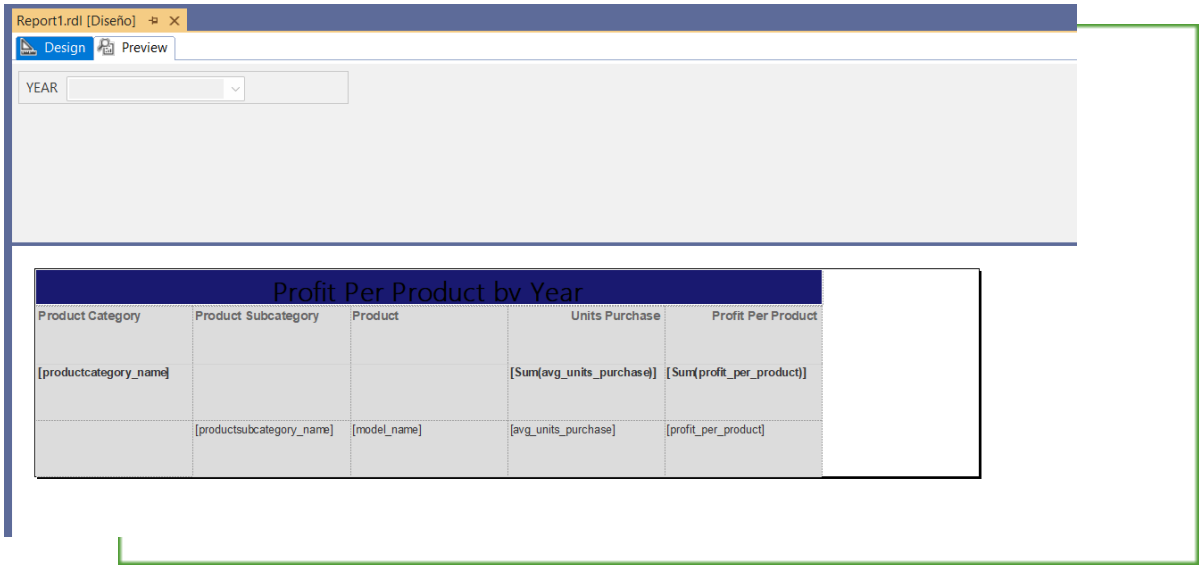


Figure 26 REPORT 1 (1)

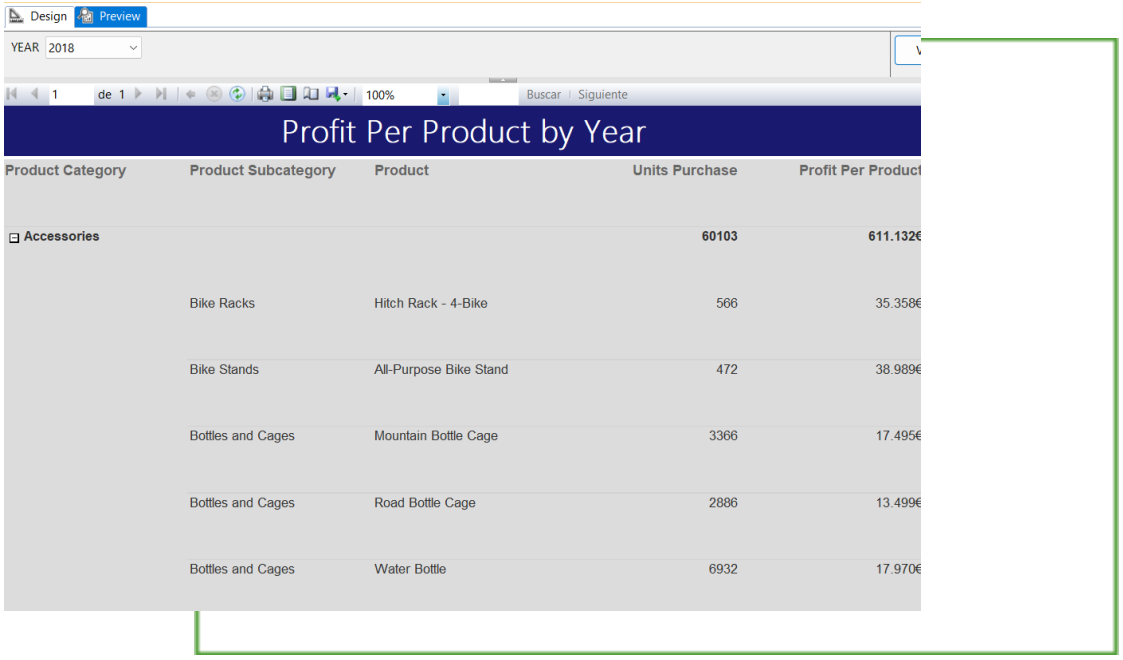


Figure 27 REPORT 1 (2)

2nd Report (TABULAR Report)

With the second report that was assembled, KGB can verify the **Quantities of Product Per Customer Region**. The query orders the purchases by an order such that the first product for a specific customer displayed is the one which was bought the most by the client.

For this report we followed the same logical steps as the ones used to create the first report. We only had to make changes to the query that is used to create the report.

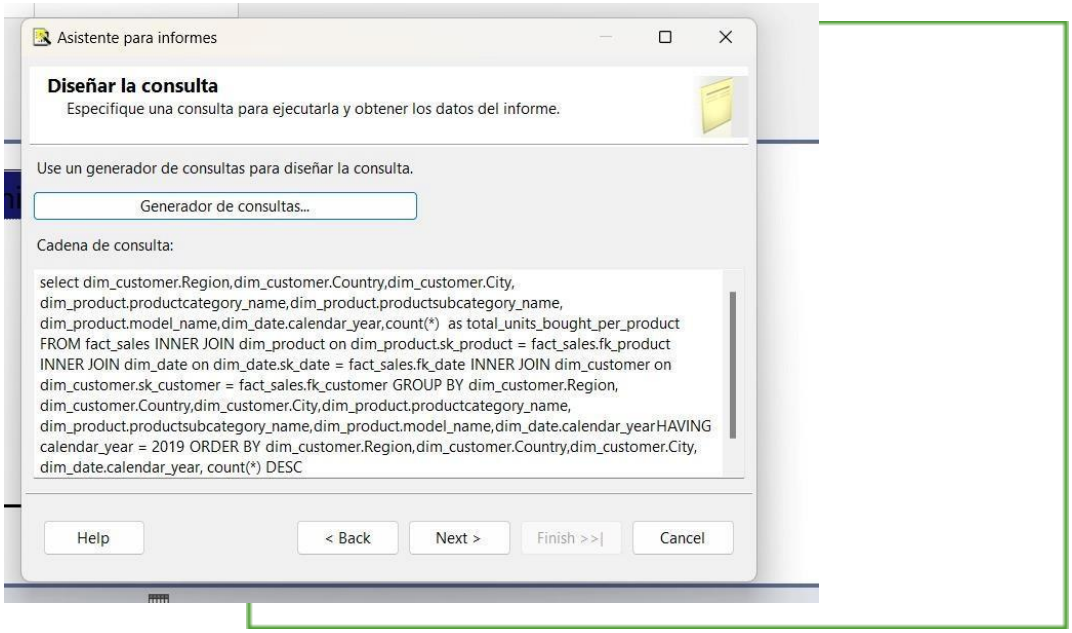


Figure 28 QUERY FOR REPORT 2

While designing the table, we made sure to use the highest attribute in hierarchy as the group, which in this case is the productcategory_name and the subsequent lower hierarchies impacting productcategory_name are added in the details tab.

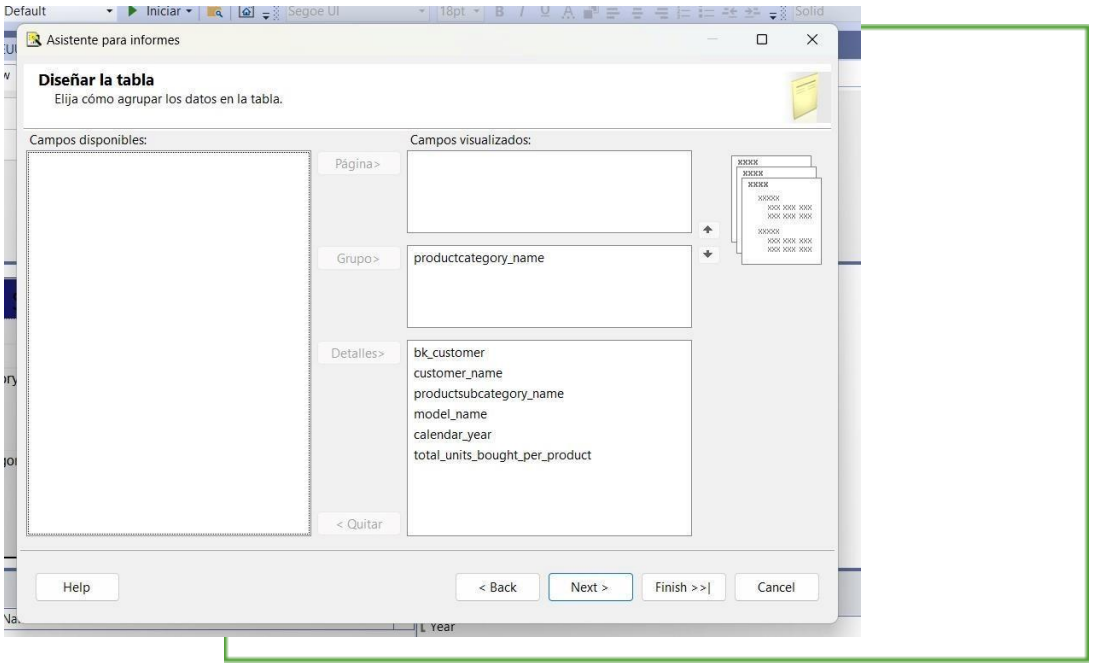


Figure 29 TABLE DESIGN FOR EASIER VISUAL PRESENTATION

We then finally achieved the desired result for our Second Report.

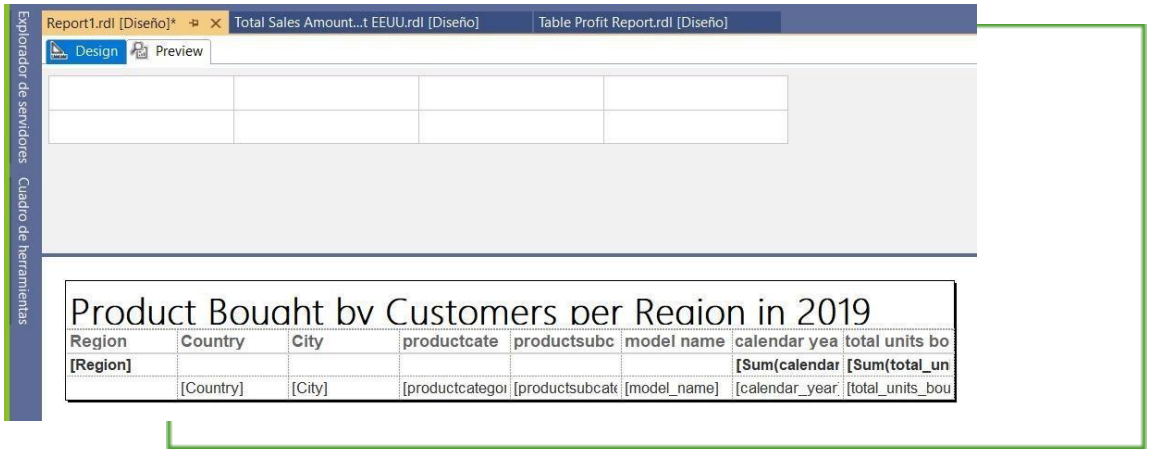


Figure 30 REPORT 2 (1)

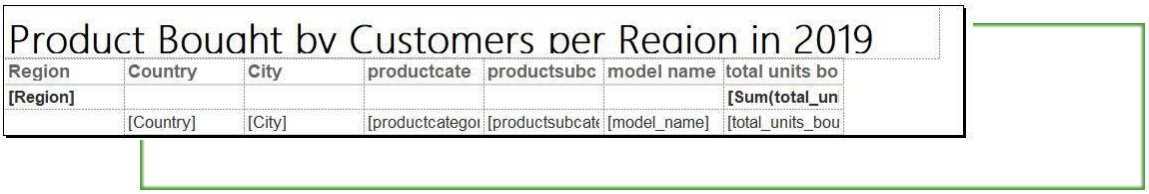


Figure 31 REPORT (2)

3rd Report (MATRIX Report)

For our third and final report we analyze **Profits by Year in the United States**.

We use the data source created during the tabular phase, as it can be seen notated by it's name KGB_Tabular_2023.

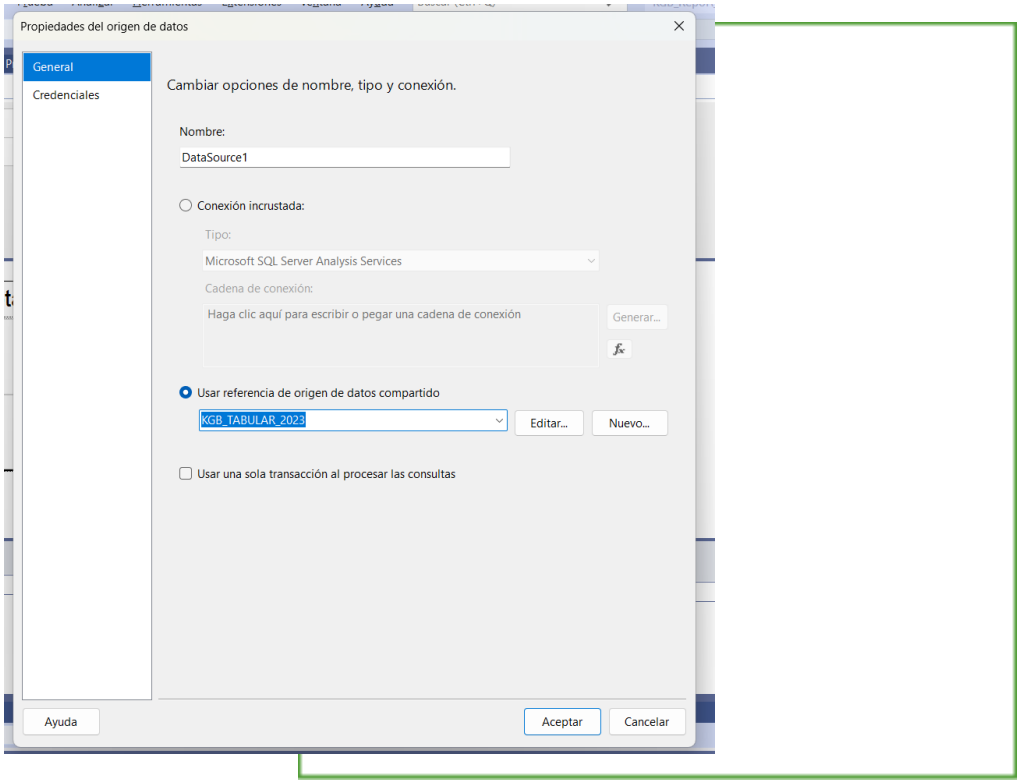


Figure 32 IMPORTING DATASOURCE

While designing the table, we made sure to use the highest attribute in hierarchy as the group, which in this case is the productcategory_name and the subsequent lower hierarchies impacting productcategory_name are added in the details tab.

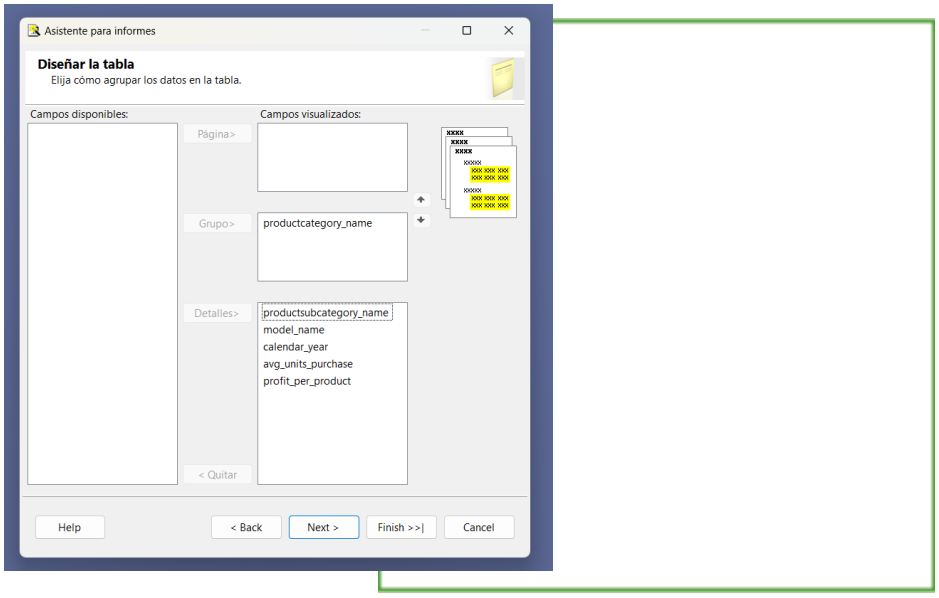


Figure 33 TABLE DESIGNING SECTION

We deleted the date column because it was not needed, as all the sales are shown on a yearly basis.

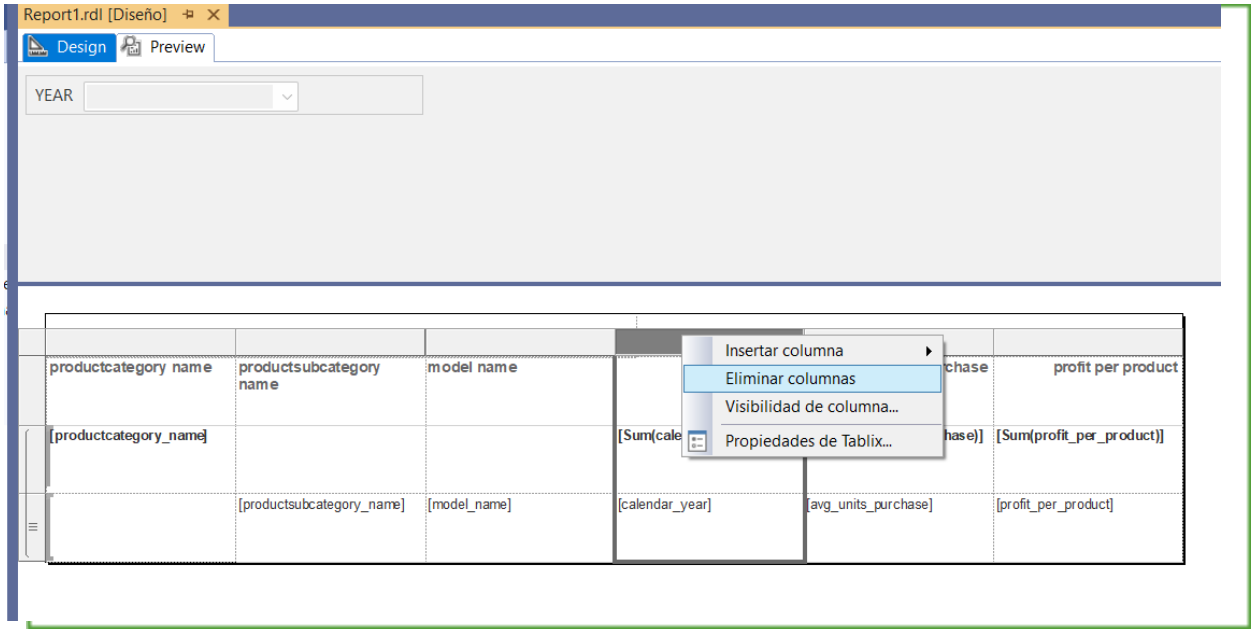


Figure 34 TABLE DESIGN

These were the parameters set for visual reasons, to make it more intuitive for the user.

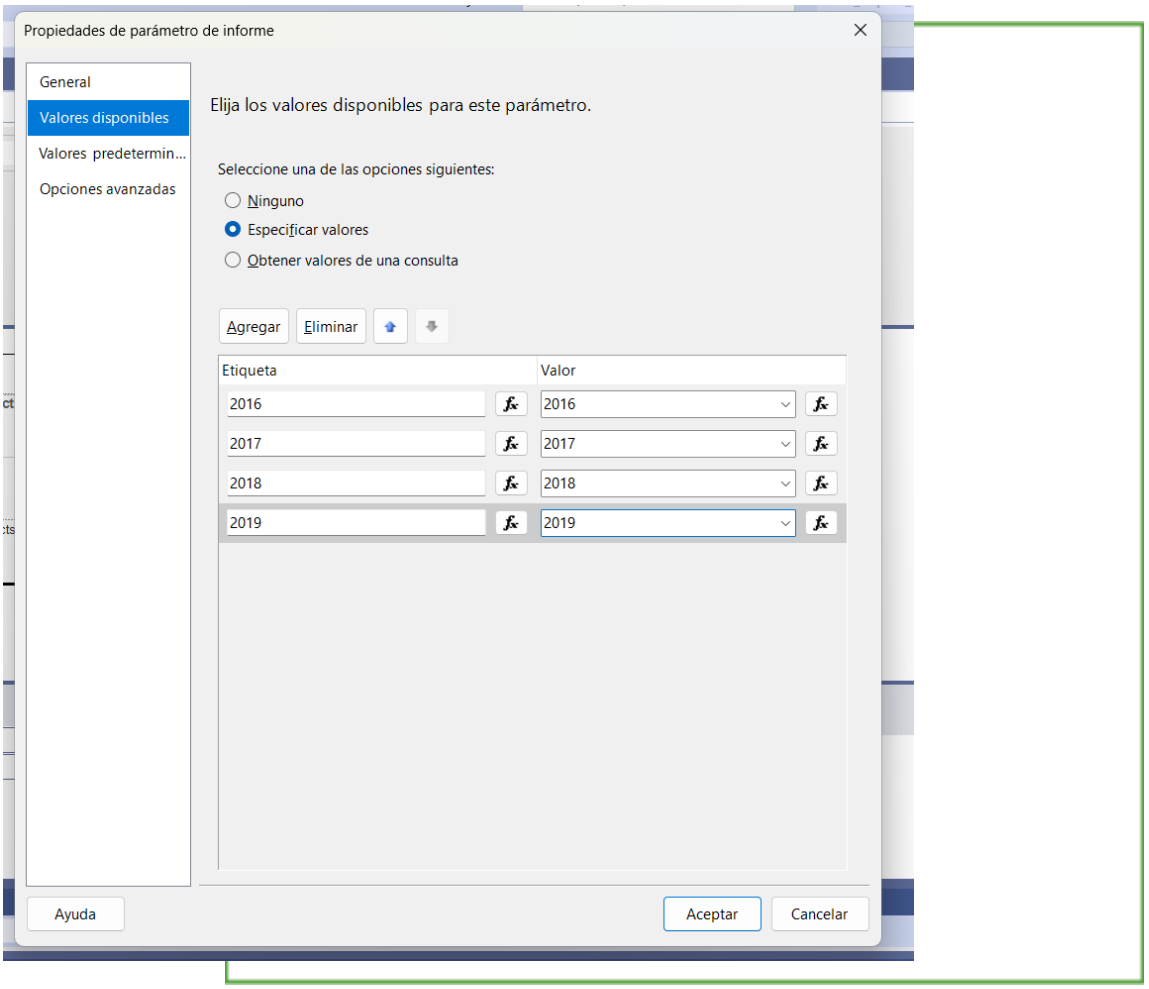


Figure 35 YEAR SPECIFICATION

This was the formatting used for displaying monetary values in the reports.

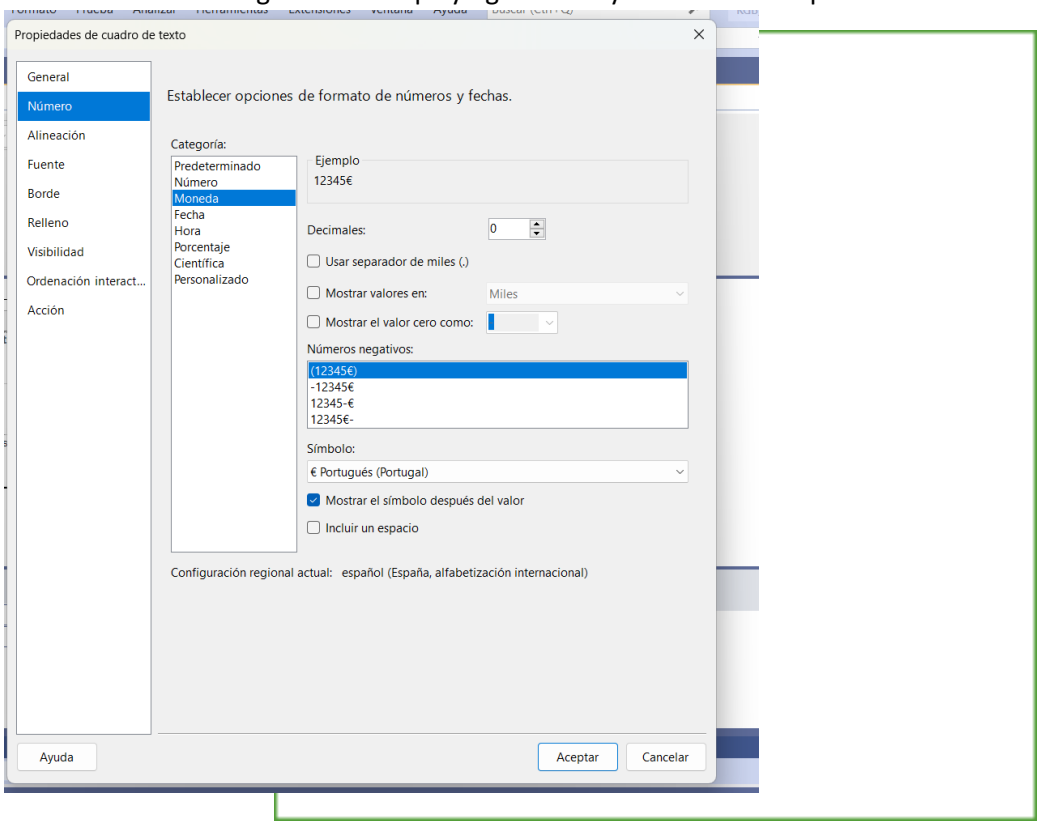


Figure 36 FORMATING CURRENCY

This was the expression used to calculate yearly sales over all sales to observe the percentage of yearly sales.

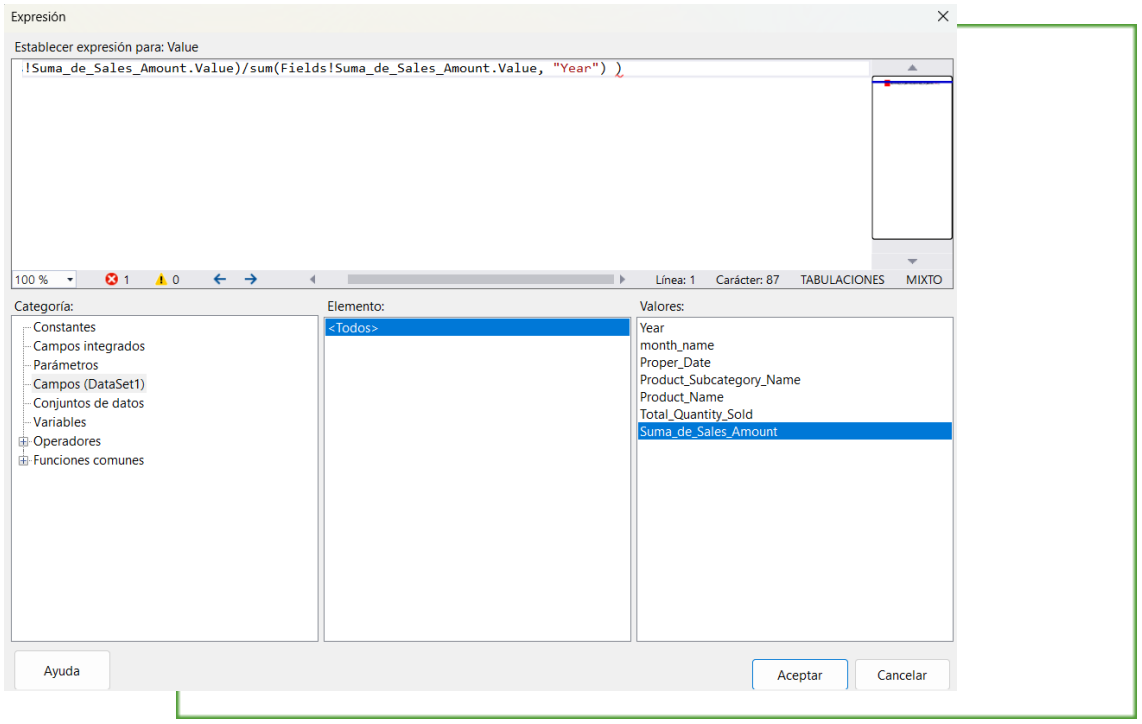


Figure 37 SETTING YEARLY SALES % EXPRESSION

Here we select the United States as a filter to showcase country specific details for making informed decisions based on the information that is relayed back.

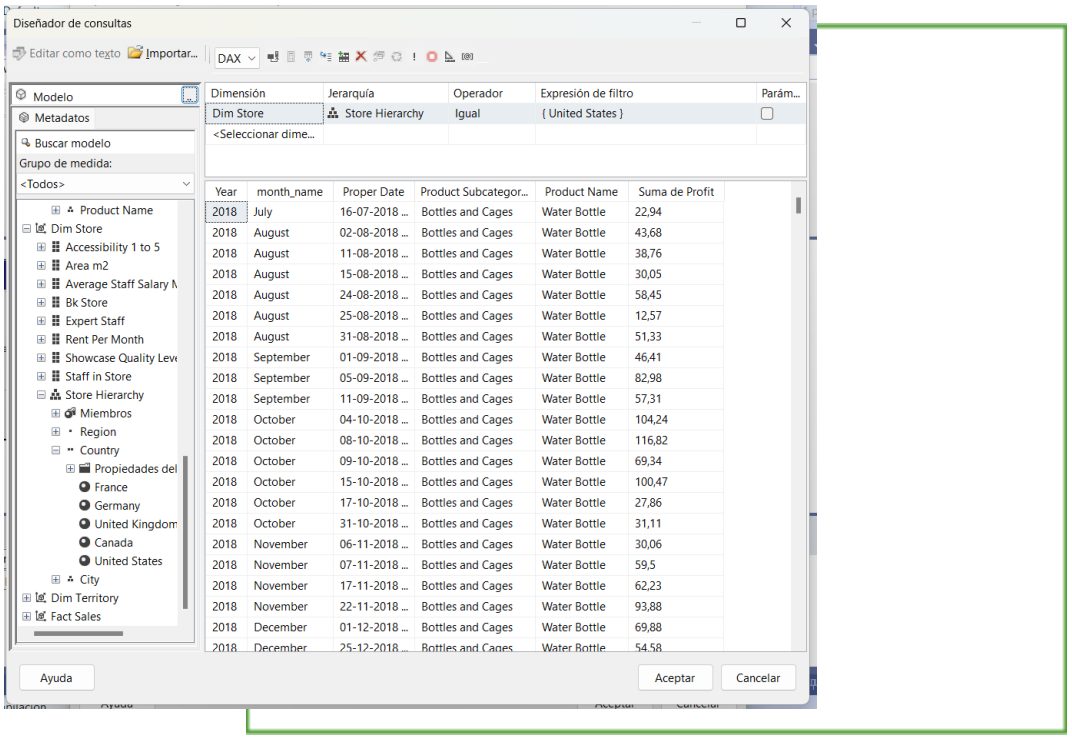


Figure 38 FILTERING THROUGH COUNTRY

We achieved the last designed for our MATRIX Report.

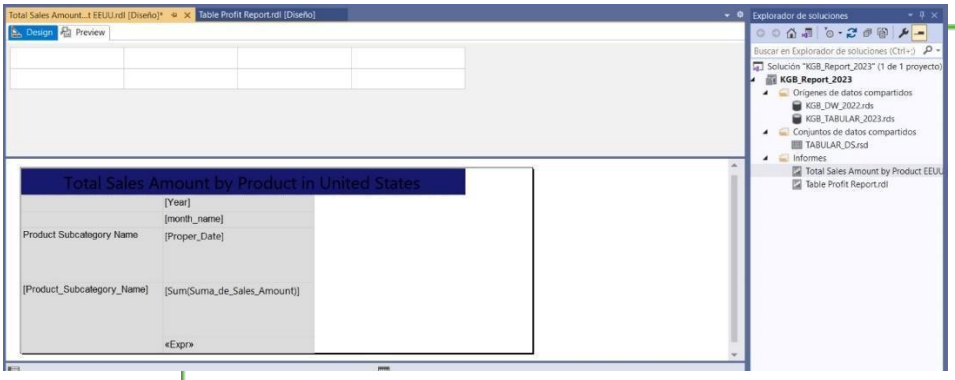


Figure 39 REPORT 3 (1)

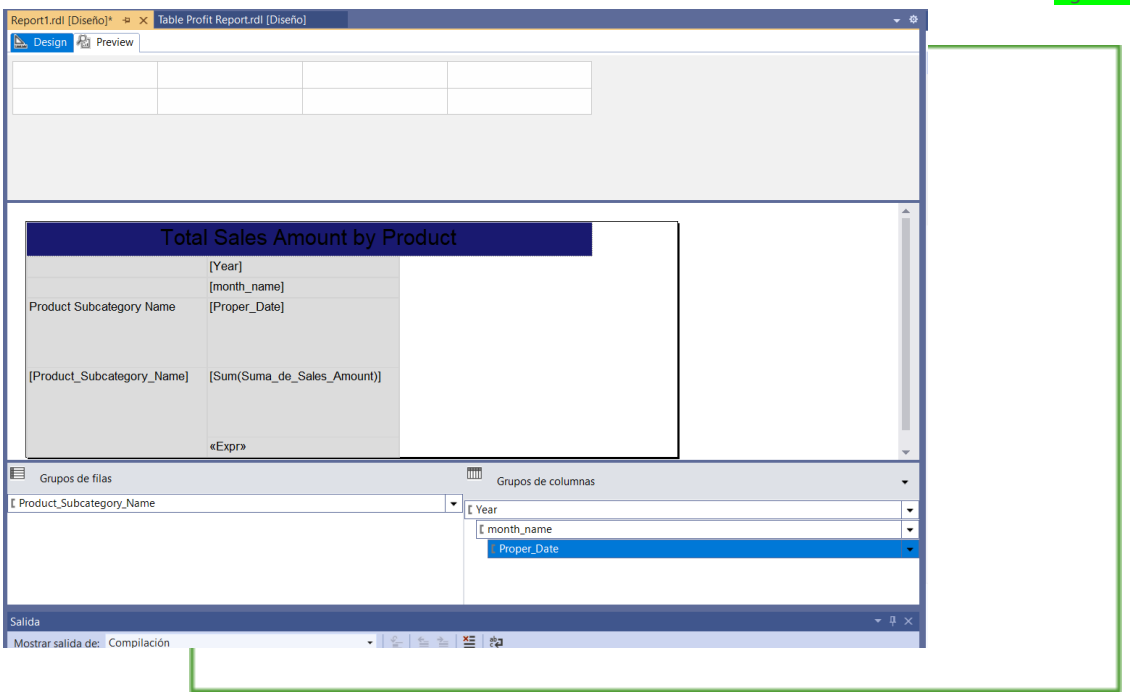


Figure 40 REPORT 3 (2)

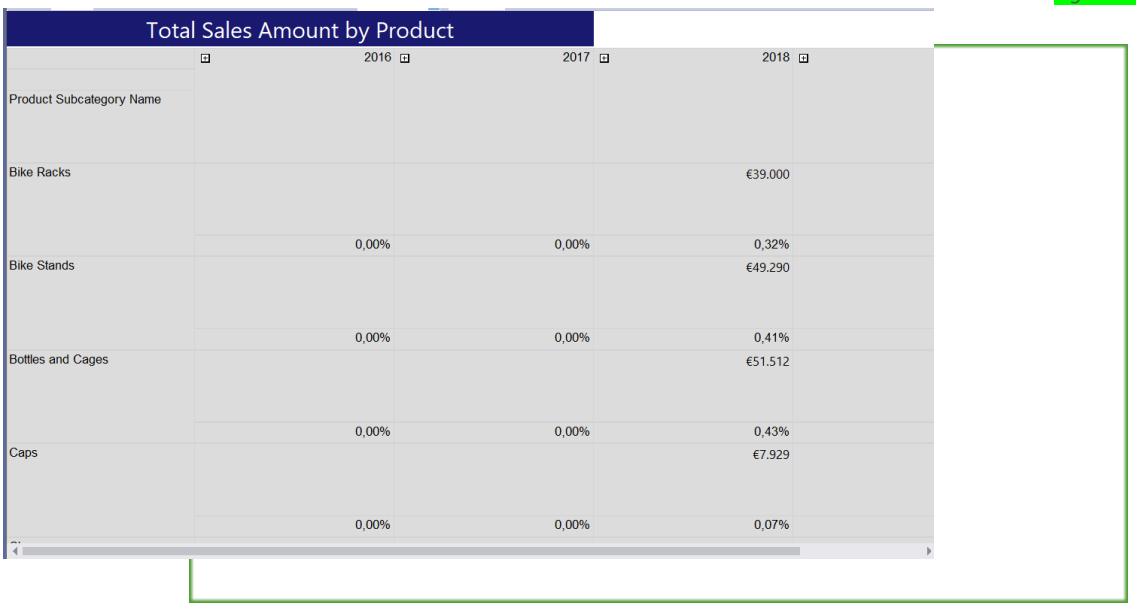
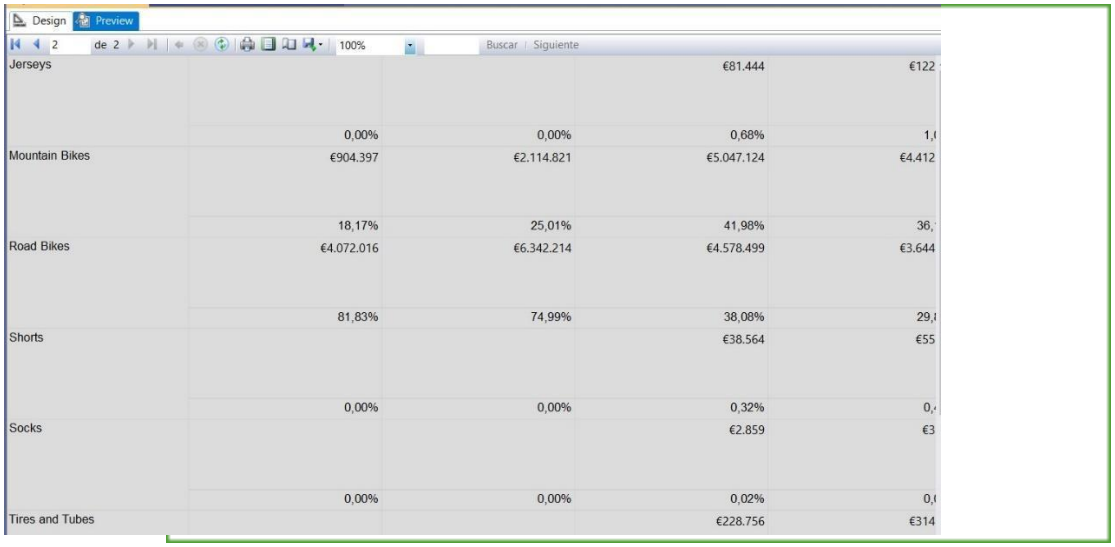


Figure 41 REPORT 3 (3)



Jerseys			€81.444	€122
	0,00%	0,00%	0,68%	1,
Mountain Bikes	€904.397	€2.114.821	€5.047.124	€4.412
	18,17%	25,01%	41,98%	36,
Road Bikes	€4.072.016	€6.342.214	€4.578.499	€3.644
	81,83%	74,99%	38,08%	29,
Shorts			€38.564	€55
	0,00%	0,00%	0,32%	0,
Socks			€2.859	€3
	0,00%	0,00%	0,02%	0,
Tires and Tubes			€228.756	€314

Figure 42 REPORT 3 (4)

Demonstration of Effective Interactive Capability

The part of the report showcases our report's ability to provide KGB with actionable details about a multitude of different aspects of the business. We went with an approach which details the sales pertaining to regional data, types of products/products across all the years that the dataset contained.

1 de 1 100% Buscar | Siguiente

Product Bought by Customers per Region in 2019

Region	Country	City	productcategory name	productsubcategory name	model name	total units bought per product
⊞ Europe						9.622,00
⊞ North America						22.643,00

Figure 43 REPORT I

Product Bought by Customers per Region in 2019

Region	Country	City	productcategory name	productsubcategory name	model name	total units bought per product
⊟ Europe						9.622,00
	France	Lyon	Accessories	Helmets	Sport-100	142
	France	Lyon	Accessories	Tires and Tubes	Road Tire Tube	68
	France	Lyon	Accessories	Bottles and Cages	Water Bottle	66
	France	Lyon	Accessories	Tires and Tubes	Patch kit	56
	France	Lyon	Bikes	Mountain Bikes	Mountain-200	50
	France	Lyon	Accessories	Tires and Tubes	Touring Tire Tube	46
	France	Lyon	Accessories	Bottles and Cages	Road Bottle Cage	41
	France	Lyon	Accessories	Tires and Tubes	Mountain Tire Tube	40
	France	Lyon	Clothing	Caps	Cycling Cap	39
	France	Lyon	Clothing	Jerseys	Long-Sleeve	38

Figure 44 REPORT II

These reports focus on the products sold per region in 2019.

Total Sales Amount by Product in United States

Product Subcategory Name	2016	2017	2018	2019
Bike Racks			€39.000	€57.000
	0,00%	0,00%	0,32%	0,47%
Bike Stands			€49.290	€45.633
	0,00%	0,00%	0,41%	0,37%
Bottles and Cages			€51.512	€76.801

Total Sales Amount by Product in United States

Product Subcategory Name	2016	January	February	March	April
Bike Racks					
	0,00%	0,00%	0,00%	0,00%	
Bike Stands					
	0,00%	0,00%	0,00%	0,00%	
Bottles and Cages					

Figure 45 REPORT III

Figure 46 REPORT VI

These reports on the other hand are related to the Total Sales amount by Product/Product Sub Category in a specific region (USA). Also providing a monthly breakdown whilst also showing the percentage that this sales amount over the total sales amount.

YEAR 2018

1 de 1 100% Buscar | Siguiente

Profit Per Product by Year

Product Category	Product Subcategory	Product	Units Purchase	Profit Per Product
⊞ Accessories			60.103,00	611.132€
⊞ Bikes			11.362,00	5.148.155€
⊞ Clothing			7.378,00	74.313€

YEAR 2018

1 de 1 100% Buscar | Siguiente

Profit Per Product by Year

Product Category	Product Subcategory	Product	Units Purchase	Profit Per Product
⊟ Accessories			60.103,00	611.132€
	Bike Racks	Hitch Rack - 4-Bike	566,00	35.358€
	Bike Stands	All-Purpose Bike Stand	472,00	38.989€
	Bottles and Cages	Mountain Bottle Cage	3.366,00	17.495€

Figure 47 REPORT V

Figure 48 REPORT VI

This report primarily focuses on Profit per Product across any specific year. This allows the business to analyze yearly profits of every product they've sold.

Creation and configuration of Excel Pivot Table

This part of the report relates to the creation of a pivot table in MS Excel. The figures x,x and x showcases some of the important steps we took during the customization of features and the selection of KPIs.

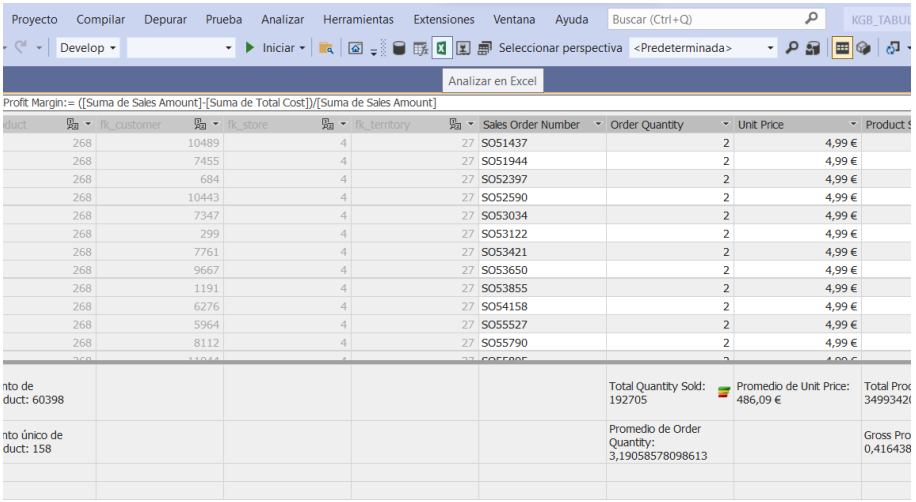


Figure 49 Pivot table setup I

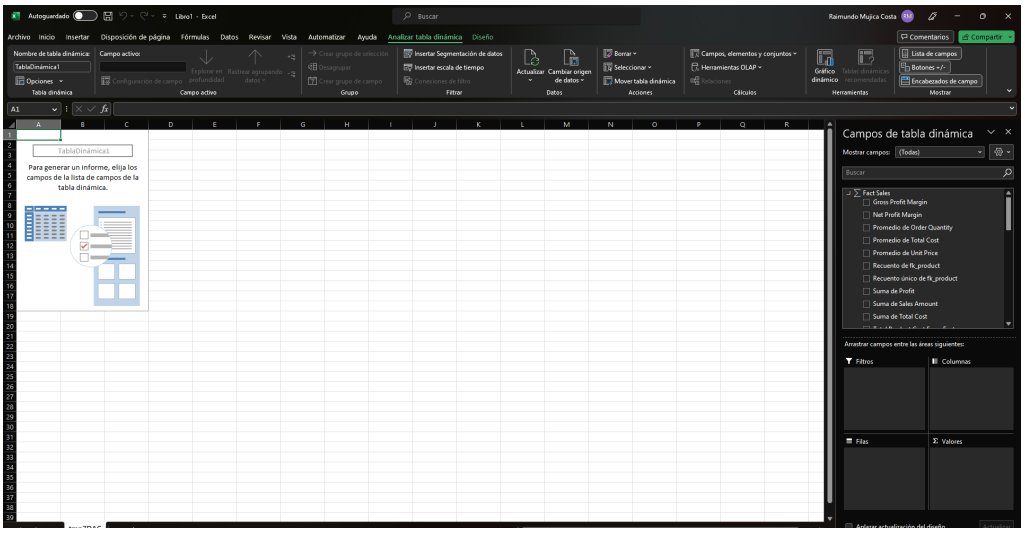


Figure 50 Pivot table setup II

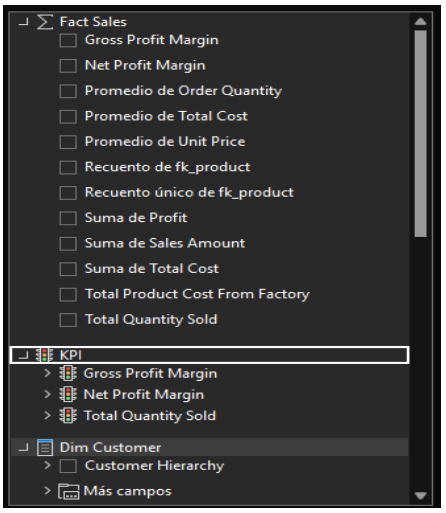
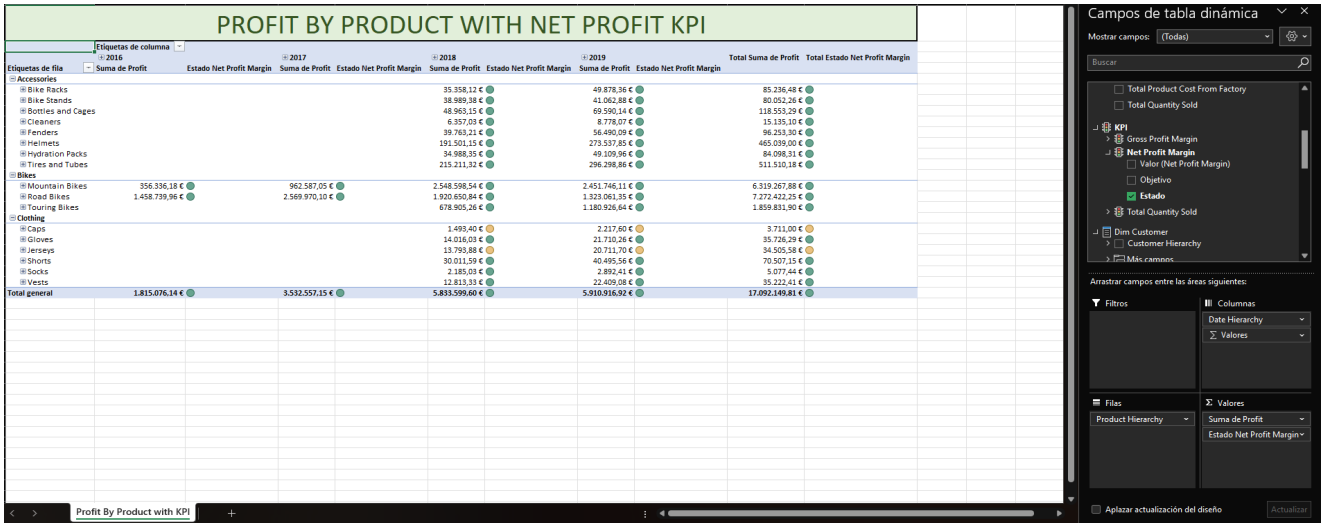


Figure 51 Pivot table setup III

We opted to make 3 pivot tables showing :

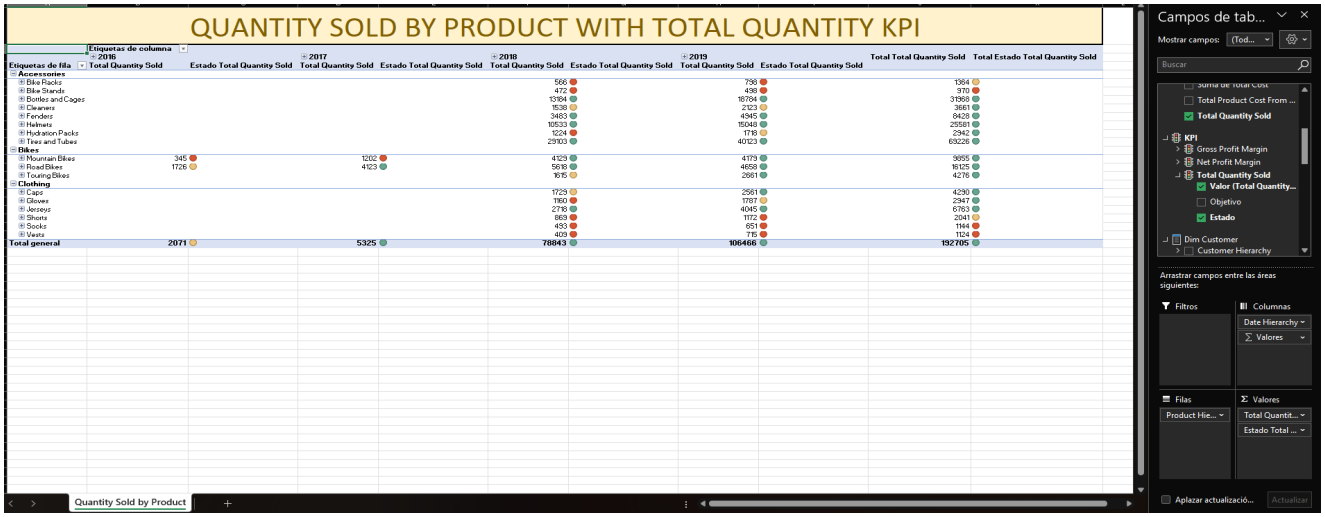
1. Profit by Product with Net Profit KPI
2. Second Pivot Table Quantity Sold by Product with Total Quantity KPI
3. Third Pivot Table Quantity Sold and Profit by Store Location with Total Quantity KPI



PROFIT BY PRODUCT WITH NET PROFIT KPI

Etiquetas de fila	2016 Suma de Profit	2016 Estado Net Profit Margin	2017 Suma de Profit	2017 Estado Net Profit Margin	2018 Suma de Profit	2018 Estado Net Profit Margin	2019 Suma de Profit	2019 Estado Net Profit Margin	Total Suma de Profit	Total Estado Net Profit Margin
Accessories										
Bike Racks					35.358,12 €		49.878,36 €		85.236,48 €	
Bike Stands					38.989,38 €		41.062,88 €		80.052,26 €	
Bottles and Cages					48.963,15 €		69.590,14 €		118.553,29 €	
Cleaners					6.357,03 €		8.778,07 €		15.135,10 €	
Fenders					39.763,21 €		56.490,09 €		96.253,30 €	
Helmets					191.501,15 €		273.537,85 €		465.039,00 €	
Hydration Packs					34.988,35 €		49.109,96 €		84.098,31 €	
Tires and Tubes					215.211,32 €		296.298,86 €		511.510,18 €	
Bikes										
Mountain Bikes	356.336,18 €		962.587,05 €		2.548.598,54 €		2.451.746,11 €		6.319.267,88 €	
Road Bikes	1.458.739,96 €		2.569.970,10 €		1.920.650,84 €		1.323.061,35 €		7.272.422,25 €	
Touring Bikes					678.905,26 €		1.180.926,64 €		1.859.831,90 €	
Clothing										
Caps					1.493,40 €		2.217,60 €		3.711,00 €	
Gloves					14.016,03 €		21.710,26 €		35.726,29 €	
Jerseys					13.793,88 €		20.711,70 €		34.505,58 €	
Shorts					30.011,59 €		40.495,56 €		70.507,15 €	
Socks					2.185,03 €		2.892,41 €		5.077,44 €	
Vests					12.813,33 €		22.409,08 €		35.222,41 €	
Total general	1.815.076,14 €		3.532.557,15 €		5.833.599,60 €		5.910.916,92 €		17.092.149,81 €	

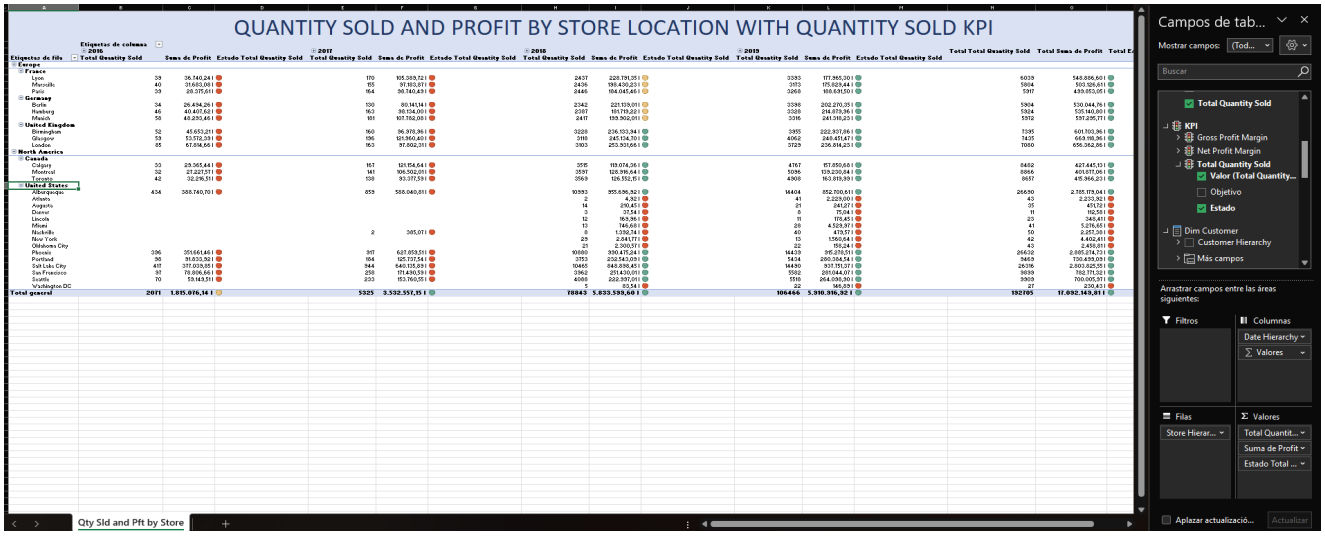
Figure 52 Pivot table I



QUANTITY SOLD BY PRODUCT WITH TOTAL QUANTITY KPI

Etiquetas de fila	2016 Total Quantity Sold	2016 Estado Total Quantity Sold	2017 Total Quantity Sold	2017 Estado Total Quantity Sold	2018 Total Quantity Sold	2018 Estado Total Quantity Sold	2019 Total Quantity Sold	2019 Estado Total Quantity Sold	Total Total Quantity Sold	Total Estado Total Quantity Sold
Accessories										
Bike Racks					566		798		1364	
Bike Stands					472		498		970	
Bottles and Cages					13184		18784		31968	
Cleaners					1538		2123		3661	
Fenders					3483		4945		8428	
Helmets					10533		15048		25581	
Hydration Packs					1224		1718		2942	
Tires and Tubes					29103		40123		69226	
Bikes										
Mountain Bikes	345		1202		4129		4179		9855	
Road Bikes	1726		4123		5616		4658		16125	
Touring Bikes					1675		2601		4276	
Clothing										
Caps					1729		2561		4290	
Gloves					1160		1787		2947	
Jerseys					2718		4045		6763	
Shorts					869		1172		2041	
Socks					493		651		1144	
Vests					409		715		1124	
Total general	2071		5325		78843		106466		192705	

Figure 53 Pivot table II



QUANTITY SOLD AND PROFIT BY STORE LOCATION WITH QUANTITY SOLD KPI

Etiquetas de filas	2016 Total Quantity Sold	2016 Suma de Profit	2016 Estado Total Quantity Sold	2017 Total Quantity Sold	2017 Suma de Profit	2017 Estado Total Quantity Sold	2018 Total Quantity Sold	2018 Suma de Profit	2018 Estado Total Quantity Sold	2019 Total Quantity Sold	2019 Suma de Profit	2019 Estado Total Quantity Sold	Total Total Quantity Sold	Total Suma de Profit	Total E
Europe															
France															
Lyon	39	36.740,24 €		170	105.389,72 €		2437	228.191,35 €		3383	171.365,30 €		6029	545.686,60 €	
Marseille	40	31.663,08 €		155	97.183,97 €		2436	198.430,23 €		3813	175.829,44 €		5804	503.106,61 €	
Paris	39	28.375,61 €		164	98.740,49 €		2445	194.045,46 €		3868	166.631,50 €		5917	489.653,06 €	
Germany															
Berlin	34	26.434,28 €		190	80.141,14 €		2342	221.135,01 €		3398	202.270,35 €		5904	530.044,76 €	
Hamburg	46	40.407,62 €		163	99.134,00 €		2387	191.719,22 €		3328	214.873,36 €		5924	535.140,80 €	
Munich	50	42.270,46 €		181	107.152,00 €		2417	159.302,01 €		3316	241.519,23 €		5912	591.235,71 €	
United Kingdom															
Birmingham	52	45.653,21 €		160	96.978,96 €		2228	236.133,34 €		3395	222.937,86 €		7335	601.703,36 €	
Glasgow	53	53.572,23 €		196	121.960,40 €		2118	245.134,70 €		4062	241.451,47 €		7435	663.118,96 €	
London	85	67.694,66 €		163	97.602,20 €		2303	253.503,66 €		3729	236.414,23 €		7080	655.352,86 €	
North America															
Canada															
Calgary	33	23.365,44 €		167	121.154,54 €		2575	119.074,26 €		4767	117.059,68 €		8542	421.445,51 €	
Montreal	32	27.221,71 €		141	106.502,09 €		2597	128.398,64 €		5096	139.230,84 €		8866	401.677,06 €	
Toronto	42	32.236,31 €		158	93.371,59 €		2569	126.552,15 €		4908	163.819,39 €		8657	416.366,23 €	
United States															
Albuquerque	434	308.740,10 €		855	555.040,01 €		10593	955.936,32 €		14404	852.209,61 €		26630	2.755.175,04 €	
Atlanta							2	4,32 €		41	2.229,00 €		43	2.233,32 €	
Augusta							14	210,42 €		21	241,27 €		35	451,72 €	
Denver							3	37,54 €		8	75,04 €		11	112,58 €	
Lincoln							12	163,36 €		11	115,43 €		23	278,79 €	
Miami							13	146,68 €		28	4.529,97 €		41	4.676,65 €	
Nashville				2	365,07 €		8	1.092,74 €		40	419,37 €		50	1.877,18 €	
New York							29	2.041,77 €		13	1.560,64 €		42	3.602,41 €	
Oklahoma City							21	2.300,97 €		22	155,24 €		43	2.456,21 €	
Phoenix	396	251.661,46 €		317	627.653,51 €		10660	930.475,24 €		14439	795.878,51 €		26812	2.605.668,72 €	
Portland	56	31.833,32 €		164	125.737,54 €		3153	232.743,05 €		5434	260.354,54 €		8803	650.641,45 €	
Salt Lake City	417	377.039,65 €		344	640.135,89 €		10465	848.898,45 €		14430	931.191,37 €		26656	2.797.365,36 €	
San Francisco	97	70.606,66 €		258	171.430,59 €		3962	251.420,06 €		5582	289.044,07 €		9899	782.501,38 €	
Seattle	70	59.143,51 €		233	153.760,55 €		4088	232.997,08 €		5516	264.030,30 €		9907	709.931,44 €	
Washington DC							5	83,54 €		22	146,69 €		27	230,23 €	
Total general	2071	1.815.076,14 €		5325	3.532.557,15 €		78843	5.833.599,60 €		106466	5.910.916,92 €		192705	17.092.149,81 €	

Figure 54 Pivot table III

Creation and configuration of Power BI reports

Using Direct Approach

The objective was to create identical reports from the SSRS phase. We were able to create visualizations for each report whilst adding a General Dashboard on the final page for streamlining navigation through the Data.

The 4 reports made using direct query, all of these reports allow for filtering through years, they are as follows:

1. Profit By Product
2. Products sold per Region
3. Total Sales Amount by Product
4. General Dashboard

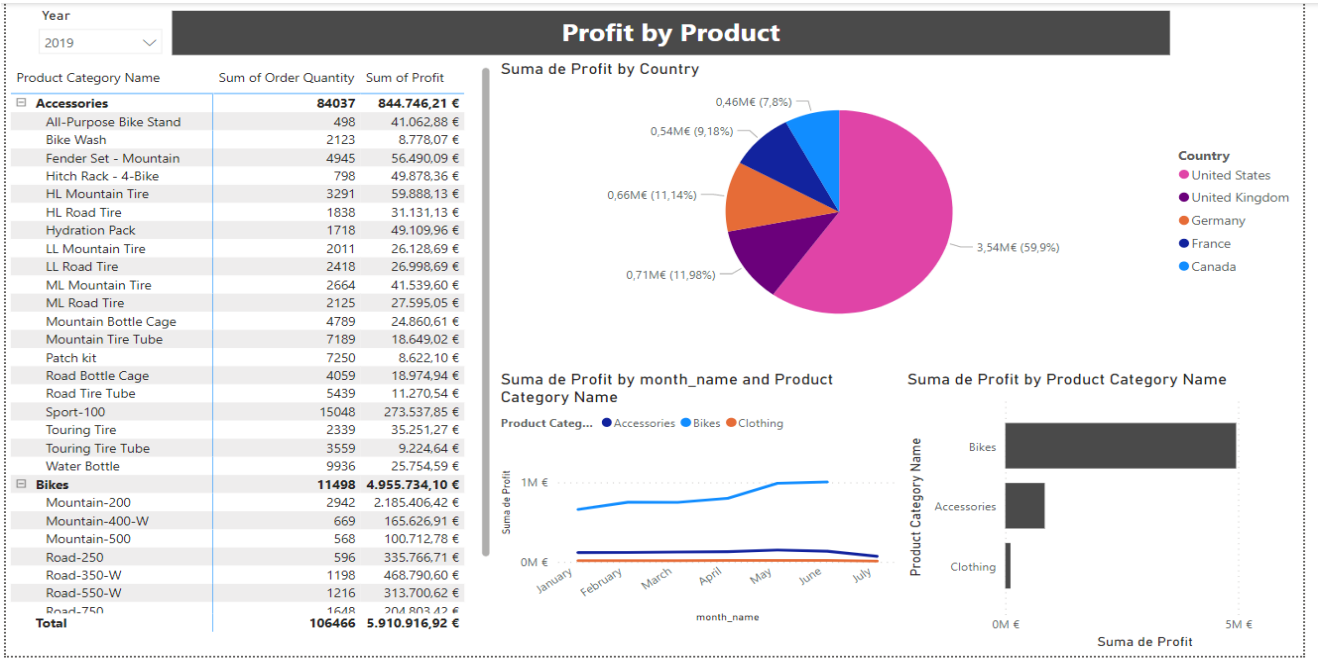


Figure 55 Dashboard I

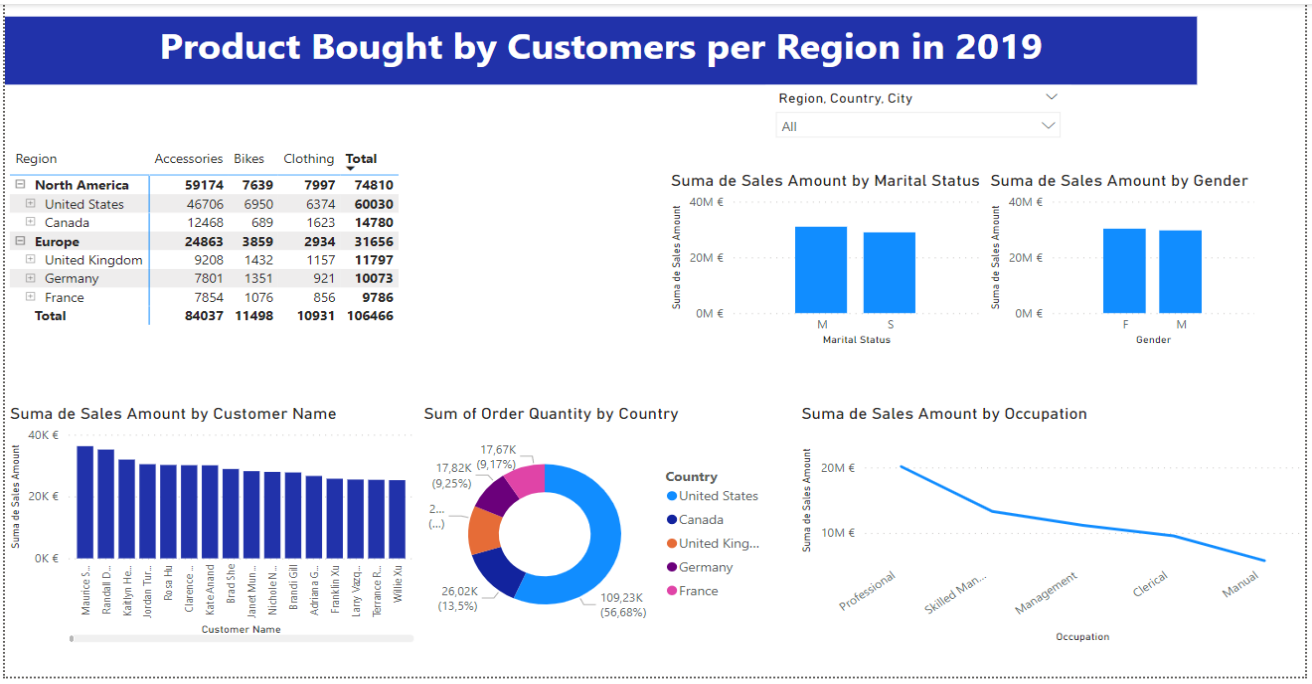


Figure 56 Dashboard II

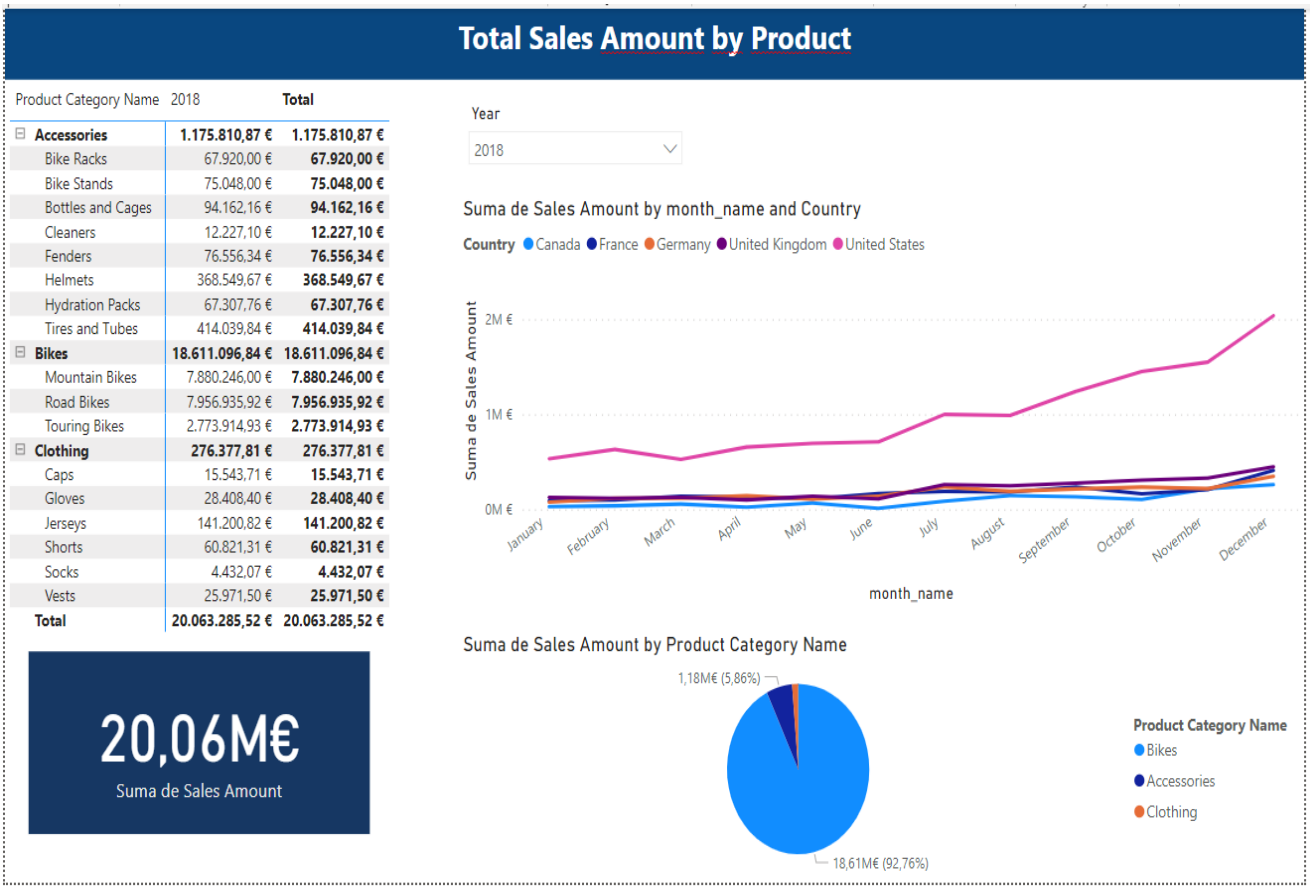


Figure 57 Dashboard III

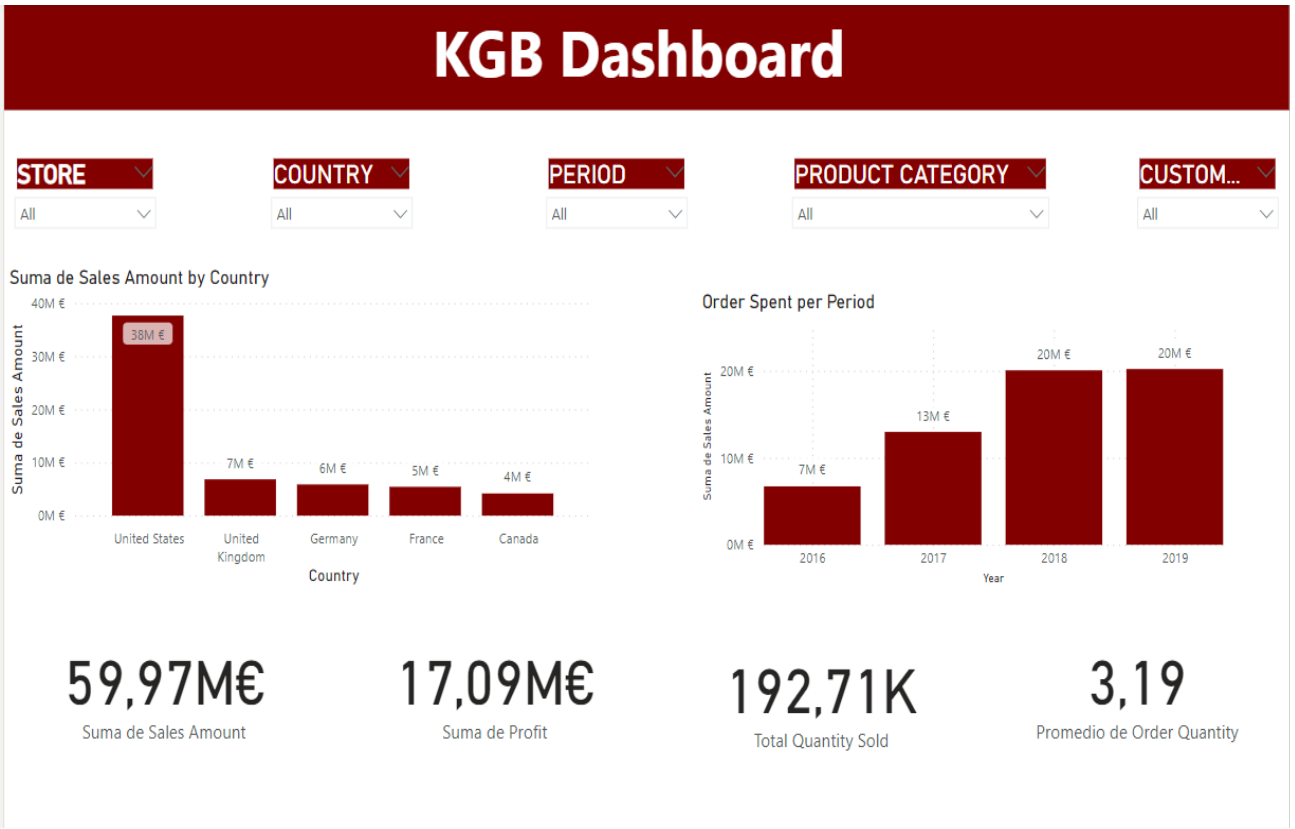
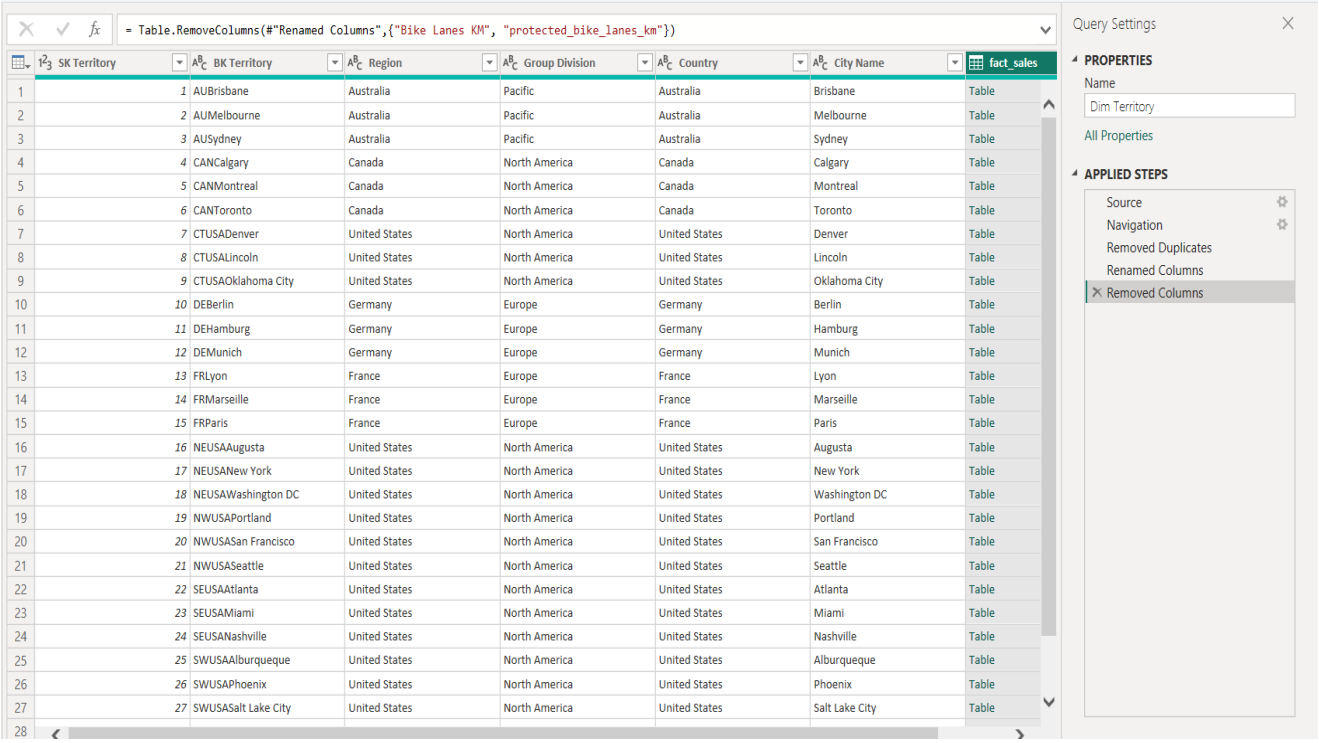


Figure 58 Dashboard VI

Using Import of DW data along with internal development



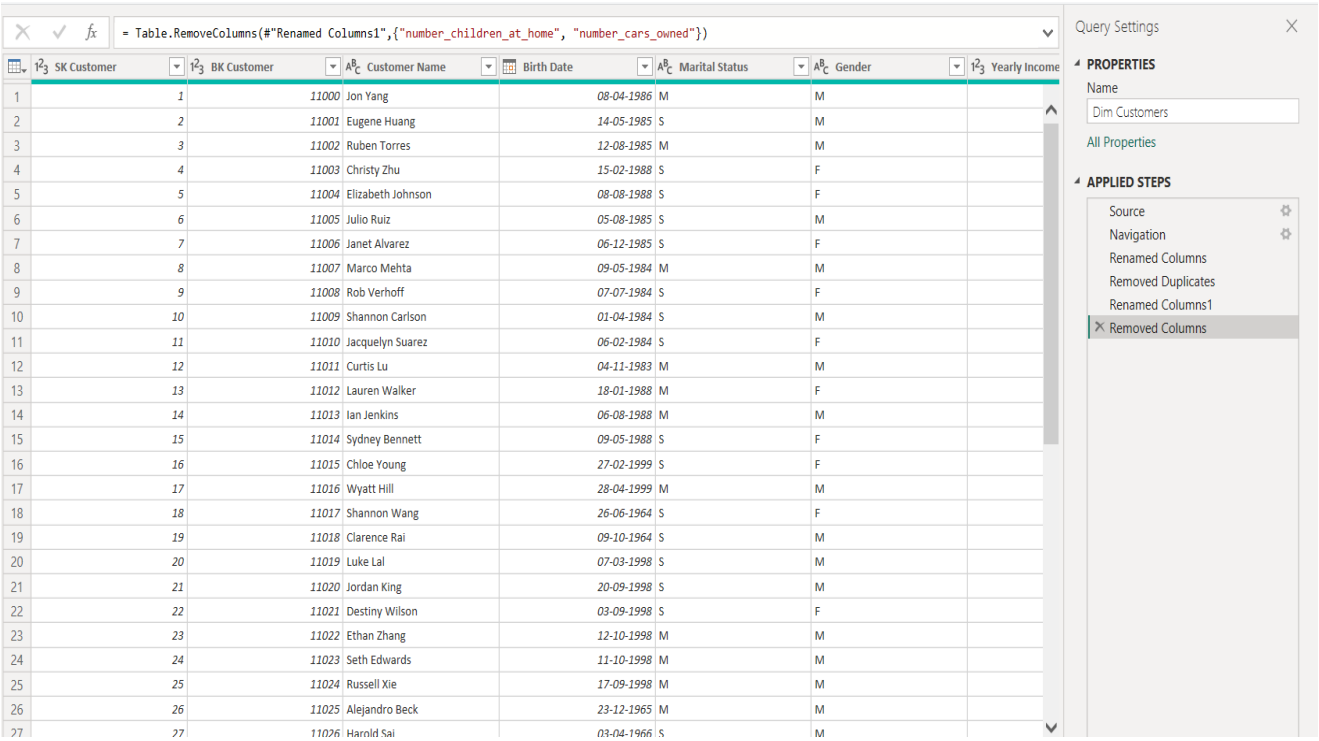
= Table.RemoveColumns(#"Renamed Columns",{"Bike Lanes KM", "protected_bike_lanes_km"})

	SK Territory	BK Territory	Region	Group Division	Country	City Name	fact_sales
1	1	AUBrisbane	Australia	Pacific	Australia	Brisbane	Table
2	2	AUMelbourne	Australia	Pacific	Australia	Melbourne	Table
3	3	AUSydney	Australia	Pacific	Australia	Sydney	Table
4	4	CANCalgary	Canada	North America	Canada	Calgary	Table
5	5	CANMontreal	Canada	North America	Canada	Montreal	Table
6	6	CANToronto	Canada	North America	Canada	Toronto	Table
7	7	CTUSADenver	United States	North America	United States	Denver	Table
8	8	CTUSALincoln	United States	North America	United States	Lincoln	Table
9	9	CTUSAOklahoma City	United States	North America	United States	Oklahoma City	Table
10	10	DEBerlin	Germany	Europe	Germany	Berlin	Table
11	11	DEHamburg	Germany	Europe	Germany	Hamburg	Table
12	12	DEMunich	Germany	Europe	Germany	Munich	Table
13	13	FRLyon	France	Europe	France	Lyon	Table
14	14	FRMarseille	France	Europe	France	Marseille	Table
15	15	FRParis	France	Europe	France	Paris	Table
16	16	NEUSAAugusta	United States	North America	United States	Augusta	Table
17	17	NEUSANew York	United States	North America	United States	New York	Table
18	18	NEUSAWashington DC	United States	North America	United States	Washington DC	Table
19	19	NWUSAPortland	United States	North America	United States	Portland	Table
20	20	NWUSASan Francisco	United States	North America	United States	San Francisco	Table
21	21	NWUSASeattle	United States	North America	United States	Seattle	Table
22	22	SEUSAAtlanta	United States	North America	United States	Atlanta	Table
23	23	SEUSAMiami	United States	North America	United States	Miami	Table
24	24	SEUSANashville	United States	North America	United States	Nashville	Table
25	25	SWUSAAlburqueque	United States	North America	United States	Alburqueque	Table
26	26	SWUSAPhoenix	United States	North America	United States	Phoenix	Table
27	27	SWUSASalt Lake City	United States	North America	United States	Salt Lake City	Table

Query Settings
PROPERTIES
Name
Dim Territory
All Properties
APPLIED STEPS
Source
Navigation
Removed Duplicates
Renamed Columns
Removed Columns

Figure 59 Transformations I

We made transformations in the DIM territory. The transformations we made are visible in the applied steps on the right. The changes we made are pertaining to removing duplicates, removing and renaming columns.



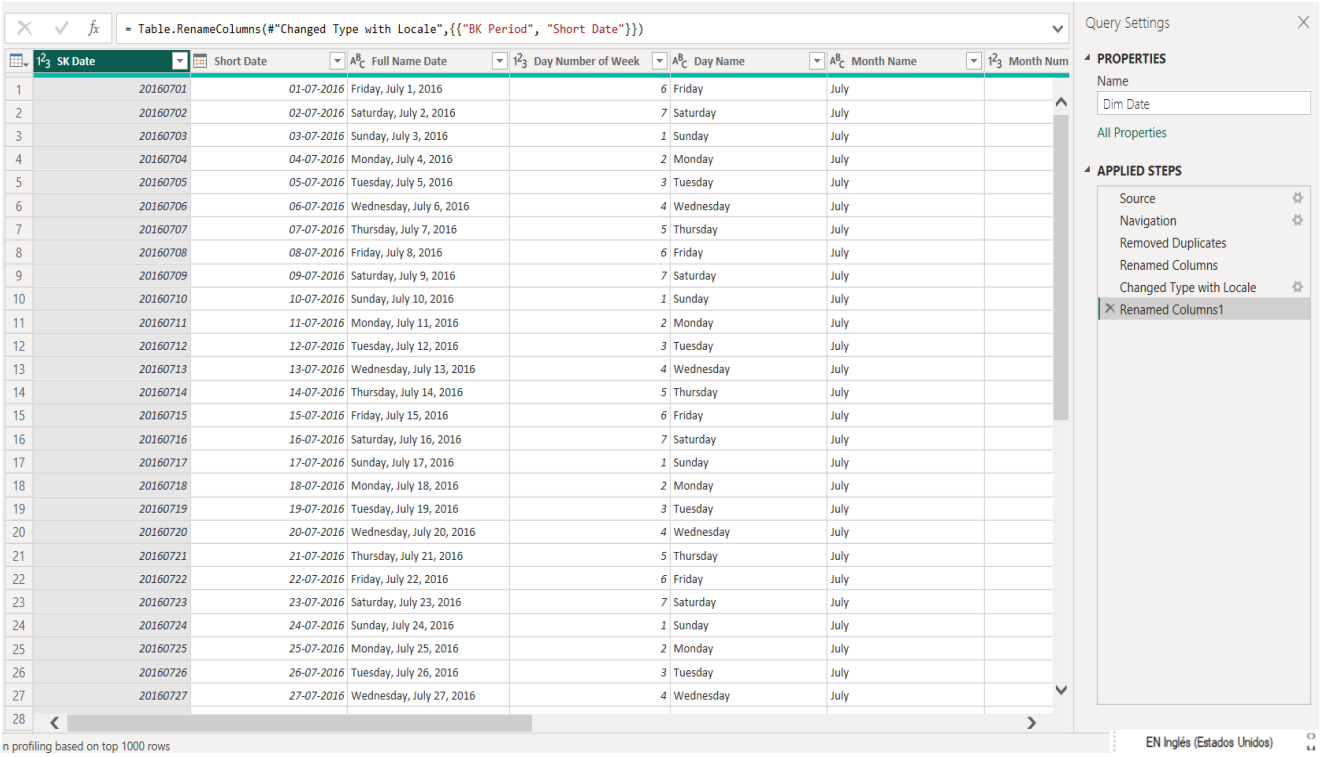
= Table.RemoveColumns(#"Renamed Columns1",{"number_children_at_home", "number_cars_owned"})

	SK Customer	BK Customer	Customer Name	Birth Date	Marital Status	Gender	Yearly Income
1	1	11000	Jon Yang	08-04-1986	M	M	
2	2	11001	Eugene Huang	14-05-1985	S	M	
3	3	11002	Ruben Torres	12-08-1985	M	M	
4	4	11003	Christy Zhu	15-02-1988	S	F	
5	5	11004	Elizabeth Johnson	08-08-1988	S	F	
6	6	11005	Julio Ruiz	05-08-1985	S	M	
7	7	11006	Janet Alvarez	06-12-1985	S	F	
8	8	11007	Marco Mehta	09-05-1984	M	M	
9	9	11008	Rob Verhoff	07-07-1984	S	F	
10	10	11009	Shannon Carlson	01-04-1984	S	M	
11	11	11010	Jacquelyn Suarez	06-02-1984	S	F	
12	12	11011	Curtis Lu	04-11-1983	M	M	
13	13	11012	Lauren Walker	18-01-1988	M	F	
14	14	11013	Ian Jenkins	06-08-1988	M	M	
15	15	11014	Sydney Bennett	09-05-1988	S	F	
16	16	11015	Chloe Young	27-02-1999	S	F	
17	17	11016	Wyatt Hill	28-04-1999	M	M	
18	18	11017	Shannon Wang	26-06-1964	S	F	
19	19	11018	Clarence Rai	09-10-1964	S	M	
20	20	11019	Luke Lal	07-03-1998	S	M	
21	21	11020	Jordan King	20-09-1998	S	M	
22	22	11021	Destiny Wilson	03-09-1998	S	F	
23	23	11022	Ethan Zhang	12-10-1998	M	M	
24	24	11023	Seth Edwards	11-10-1998	M	M	
25	25	11024	Russell Xie	17-09-1998	M	M	
26	26	11025	Alejandro Beck	23-12-1965	M	M	
27	27	11026	Harold Sai	03-04-1966	S	M	

Query Settings
PROPERTIES
Name
Dim Customers
All Properties
APPLIED STEPS
Source
Navigation
Renamed Columns
Removed Duplicates
Renamed Columns1
Removed Columns

Figure 60 Transformations II

We made transformations in the DIM Customers. The transformations we made are visible in the applied steps on the right. The changes we made are pertaining to removing duplicates, removing and renaming columns.

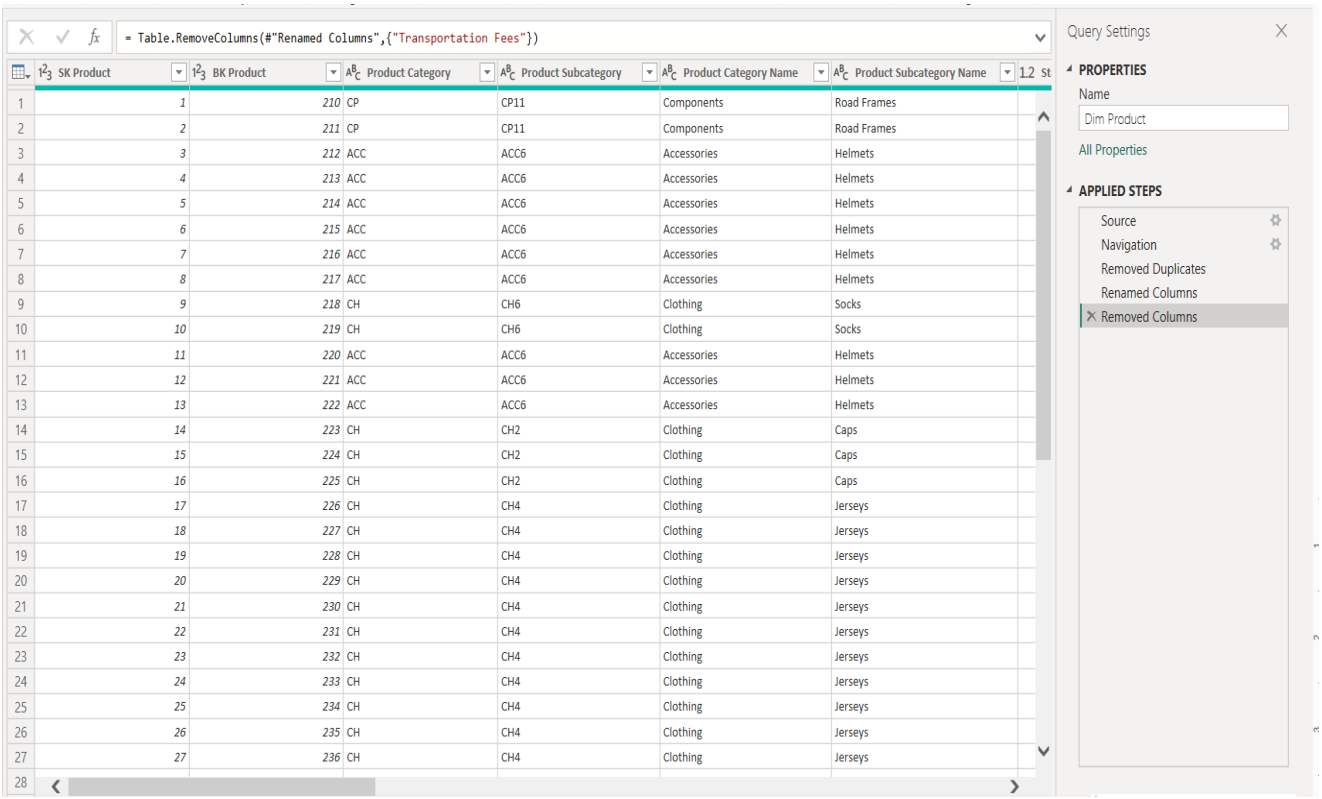


= Table.RenameColumns(#"Changed Type with Locale",{{"BK Period", "Short Date"}})

	SK Date	Short Date	Full Name Date	Day Number of Week	Day Name	Month Name	Month Num
1	20160701	01-07-2016	Friday, July 1, 2016	6	Friday	July	
2	20160702	02-07-2016	Saturday, July 2, 2016	7	Saturday	July	
3	20160703	03-07-2016	Sunday, July 3, 2016	1	Sunday	July	
4	20160704	04-07-2016	Monday, July 4, 2016	2	Monday	July	
5	20160705	05-07-2016	Tuesday, July 5, 2016	3	Tuesday	July	
6	20160706	06-07-2016	Wednesday, July 6, 2016	4	Wednesday	July	
7	20160707	07-07-2016	Thursday, July 7, 2016	5	Thursday	July	
8	20160708	08-07-2016	Friday, July 8, 2016	6	Friday	July	
9	20160709	09-07-2016	Saturday, July 9, 2016	7	Saturday	July	
10	20160710	10-07-2016	Sunday, July 10, 2016	1	Sunday	July	
11	20160711	11-07-2016	Monday, July 11, 2016	2	Monday	July	
12	20160712	12-07-2016	Tuesday, July 12, 2016	3	Tuesday	July	
13	20160713	13-07-2016	Wednesday, July 13, 2016	4	Wednesday	July	
14	20160714	14-07-2016	Thursday, July 14, 2016	5	Thursday	July	
15	20160715	15-07-2016	Friday, July 15, 2016	6	Friday	July	
16	20160716	16-07-2016	Saturday, July 16, 2016	7	Saturday	July	
17	20160717	17-07-2016	Sunday, July 17, 2016	1	Sunday	July	
18	20160718	18-07-2016	Monday, July 18, 2016	2	Monday	July	
19	20160719	19-07-2016	Tuesday, July 19, 2016	3	Tuesday	July	
20	20160720	20-07-2016	Wednesday, July 20, 2016	4	Wednesday	July	
21	20160721	21-07-2016	Thursday, July 21, 2016	5	Thursday	July	
22	20160722	22-07-2016	Friday, July 22, 2016	6	Friday	July	
23	20160723	23-07-2016	Saturday, July 23, 2016	7	Saturday	July	
24	20160724	24-07-2016	Sunday, July 24, 2016	1	Sunday	July	
25	20160725	25-07-2016	Monday, July 25, 2016	2	Monday	July	
26	20160726	26-07-2016	Tuesday, July 26, 2016	3	Tuesday	July	
27	20160727	27-07-2016	Wednesday, July 27, 2016	4	Wednesday	July	

Figure 61 Transformations III

We made transformations in the DIM Date. The transformations we made are visible in the applied steps on the right. The changes we made are pertaining to removing duplicates, renaming columns and also changing the data type for Locale.

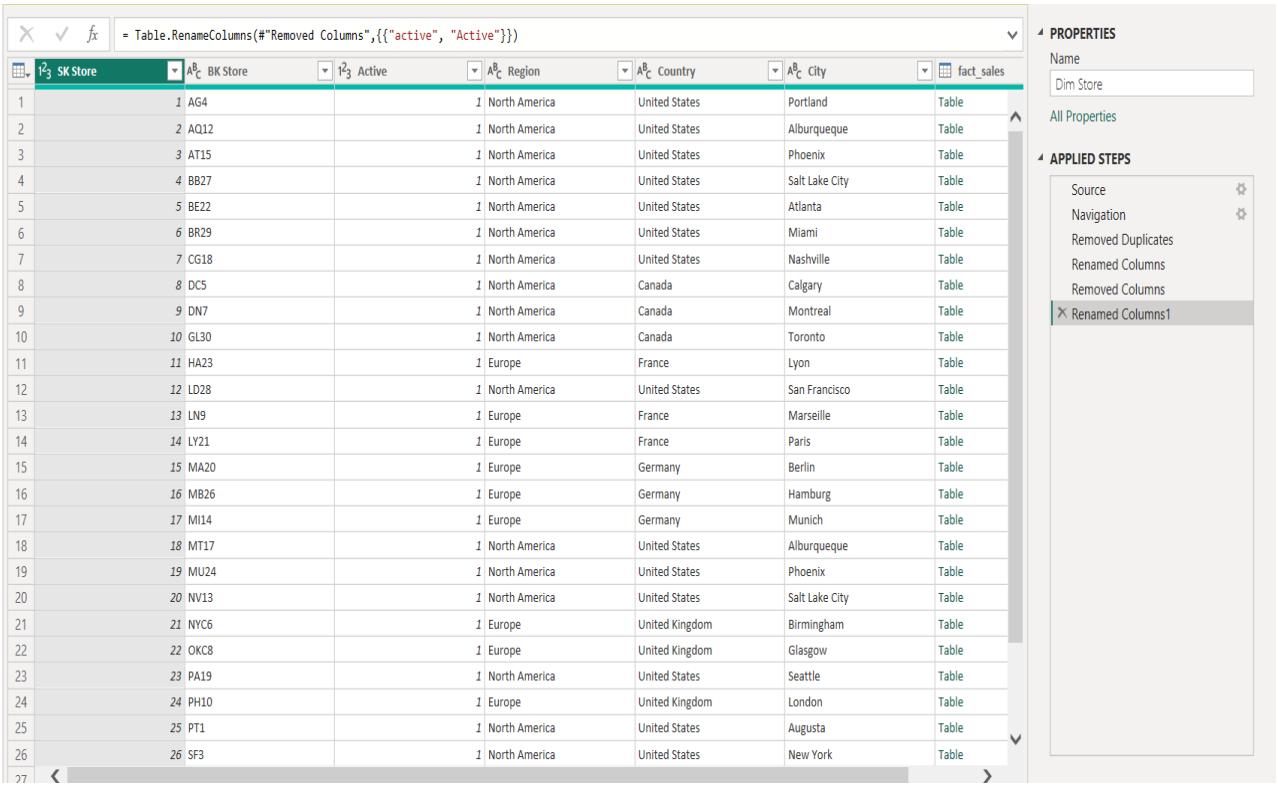


= Table.RemoveColumns(#"Renamed Columns",{"Transportation Fees"})

	SK Product	BK Product	Product Category	Product Subcategory	Product Category Name	Product Subcategory Name
1	1	210	CP	CP11	Components	Road Frames
2	2	211	CP	CP11	Components	Road Frames
3	3	212	ACC	ACC6	Accessories	Helmets
4	4	213	ACC	ACC6	Accessories	Helmets
5	5	214	ACC	ACC6	Accessories	Helmets
6	6	215	ACC	ACC6	Accessories	Helmets
7	7	216	ACC	ACC6	Accessories	Helmets
8	8	217	ACC	ACC6	Accessories	Helmets
9	9	218	CH	CH6	Clothing	Socks
10	10	219	CH	CH6	Clothing	Socks
11	11	220	ACC	ACC6	Accessories	Helmets
12	12	221	ACC	ACC6	Accessories	Helmets
13	13	222	ACC	ACC6	Accessories	Helmets
14	14	223	CH	CH2	Clothing	Caps
15	15	224	CH	CH2	Clothing	Caps
16	16	225	CH	CH2	Clothing	Caps
17	17	226	CH	CH4	Clothing	Jerseys
18	18	227	CH	CH4	Clothing	Jerseys
19	19	228	CH	CH4	Clothing	Jerseys
20	20	229	CH	CH4	Clothing	Jerseys
21	21	230	CH	CH4	Clothing	Jerseys
22	22	231	CH	CH4	Clothing	Jerseys
23	23	232	CH	CH4	Clothing	Jerseys
24	24	233	CH	CH4	Clothing	Jerseys
25	25	234	CH	CH4	Clothing	Jerseys
26	26	235	CH	CH4	Clothing	Jerseys
27	27	236	CH	CH4	Clothing	Jerseys

Figure 62 Transformations VI

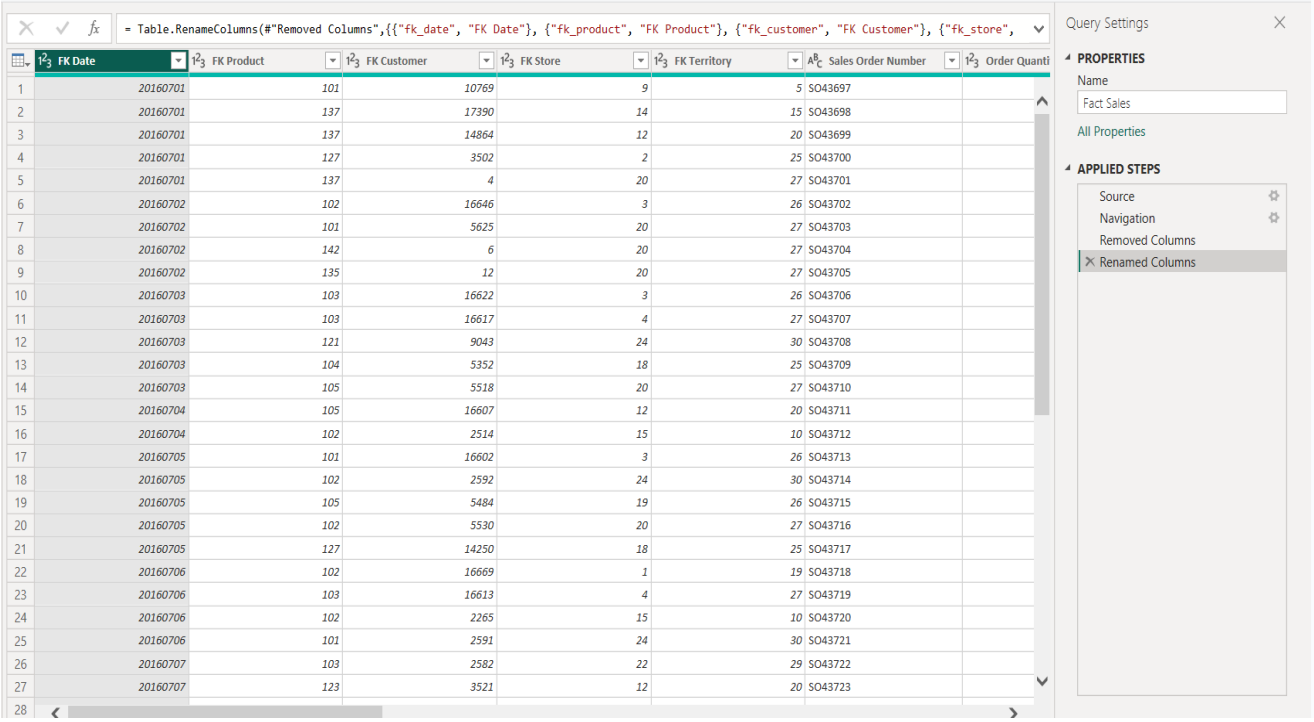
We made transformations in the DIM Product. The transformations we made are visible in the applied steps on the right. The changes we made are pertaining to removing duplicates, removing and renaming columns.



	SK Store	BK Store	Active	Region	Country	City	fact_sales
1	1	AG4	1	North America	United States	Portland	Table
2	2	AQ12	1	North America	United States	Alburqueque	Table
3	3	AT15	1	North America	United States	Phoenix	Table
4	4	BB27	1	North America	United States	Salt Lake City	Table
5	5	BE22	1	North America	United States	Atlanta	Table
6	6	BR29	1	North America	United States	Miami	Table
7	7	CG18	1	North America	United States	Nashville	Table
8	8	DC5	1	North America	Canada	Calgary	Table
9	9	DN7	1	North America	Canada	Montreal	Table
10	10	GL30	1	North America	Canada	Toronto	Table
11	11	HA23	1	Europe	France	Lyon	Table
12	12	LD28	1	North America	United States	San Francisco	Table
13	13	LN9	1	Europe	France	Marseille	Table
14	14	LY21	1	Europe	France	Paris	Table
15	15	MA20	1	Europe	Germany	Berlin	Table
16	16	MB26	1	Europe	Germany	Hamburg	Table
17	17	MI14	1	Europe	Germany	Munich	Table
18	18	MT17	1	North America	United States	Alburqueque	Table
19	19	MU24	1	North America	United States	Phoenix	Table
20	20	NV13	1	North America	United States	Salt Lake City	Table
21	21	NYC6	1	Europe	United Kingdom	Birmingham	Table
22	22	OKC8	1	Europe	United Kingdom	Glasgow	Table
23	23	PA19	1	North America	United States	Seattle	Table
24	24	PH10	1	Europe	United Kingdom	London	Table
25	25	PT1	1	North America	United States	Augusta	Table
26	26	SF3	1	North America	United States	New York	Table

Figure 63 Transformations V

We made transformations in the DIM Store. The transformations we made are visible in the applied steps on the right. The changes we made are pertaining to removing duplicates, removing and renaming columns.



	FK Date	FK Product	FK Customer	FK Store	FK Territory	Sales Order Number	Order Quanti
1	20160701	101	10769	9	5	SO43697	
2	20160701	137	17390	14	15	SO43698	
3	20160701	137	14864	12	20	SO43699	
4	20160701	127	3502	2	25	SO43700	
5	20160701	137	4	20	27	SO43701	
6	20160702	102	16646	3	26	SO43702	
7	20160702	101	5625	20	27	SO43703	
8	20160702	142	6	20	27	SO43704	
9	20160702	135	12	20	27	SO43705	
10	20160703	103	16622	3	26	SO43706	
11	20160703	103	16617	4	27	SO43707	
12	20160703	121	9043	24	30	SO43708	
13	20160703	104	5352	18	25	SO43709	
14	20160703	105	5518	20	27	SO43710	
15	20160704	105	16607	12	20	SO43711	
16	20160704	102	2514	15	10	SO43712	
17	20160705	101	16602	3	26	SO43713	
18	20160705	102	2592	24	30	SO43714	
19	20160705	105	5484	19	26	SO43715	
20	20160705	102	5530	20	27	SO43716	
21	20160705	127	14250	18	25	SO43717	
22	20160706	102	16669	1	19	SO43718	
23	20160706	103	16613	4	27	SO43719	
24	20160706	102	2265	15	10	SO43720	
25	20160706	101	2591	24	30	SO43721	
26	20160707	103	2582	22	29	SO43722	
27	20160707	123	3521	12	20	SO43723	

Figure 64 Transformations VI

We made transformations in the Fact Sales. The transformations we made are visible in the applied steps on the right. The changes we made are pertaining to removing and renaming columns.

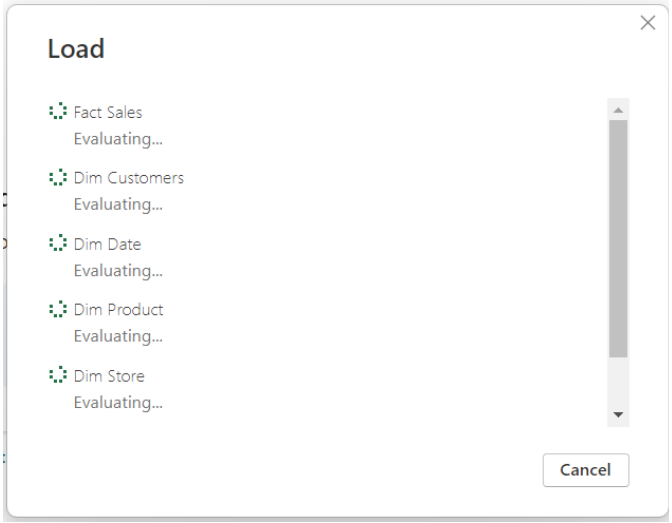


Figure 65 Loading tables in Power BI

This illustration shows the loading of the tables into Power BI.

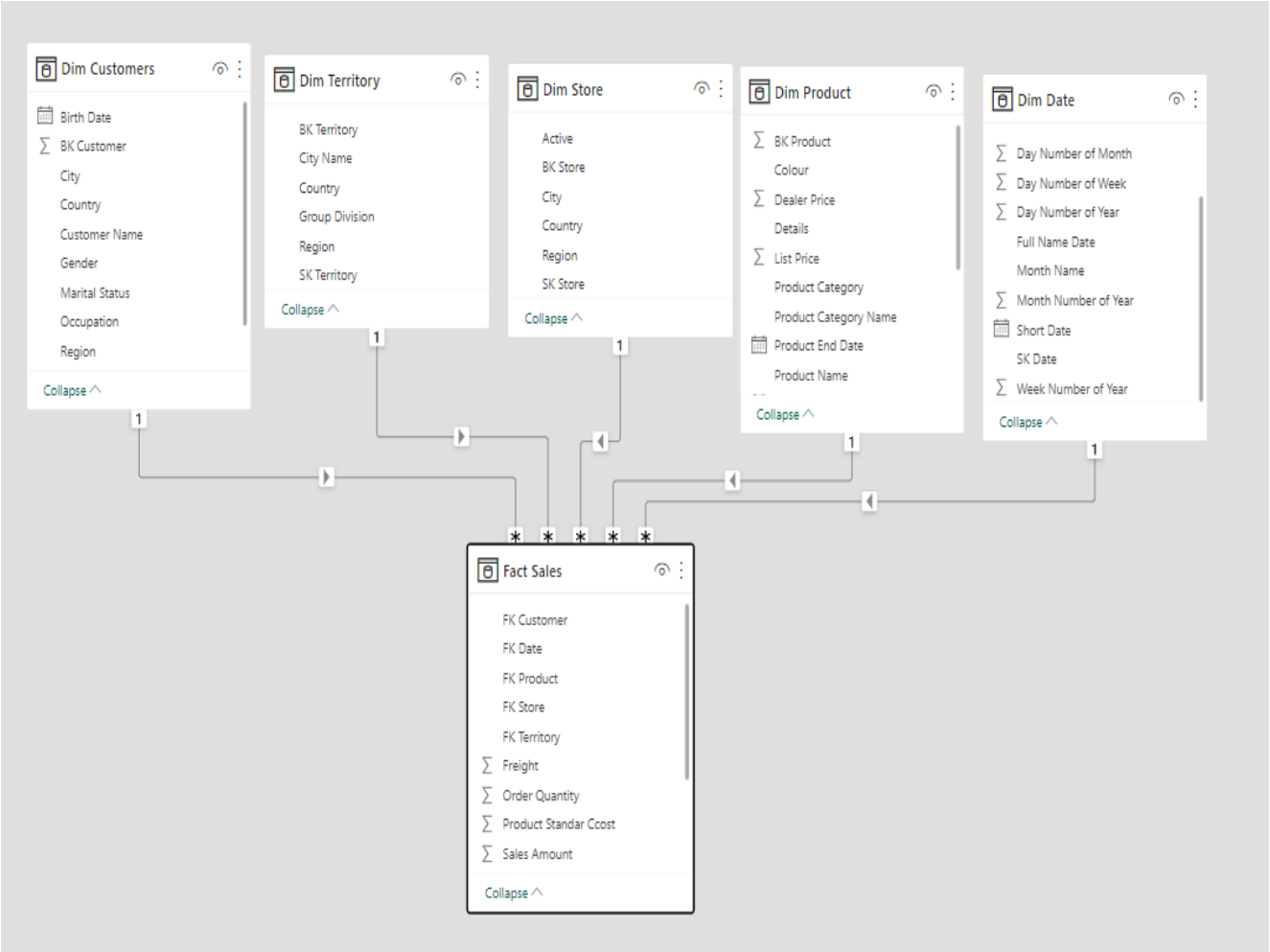


Figure 66 DW diagram in Power BI

DW diagram after the loading process in Power BI.

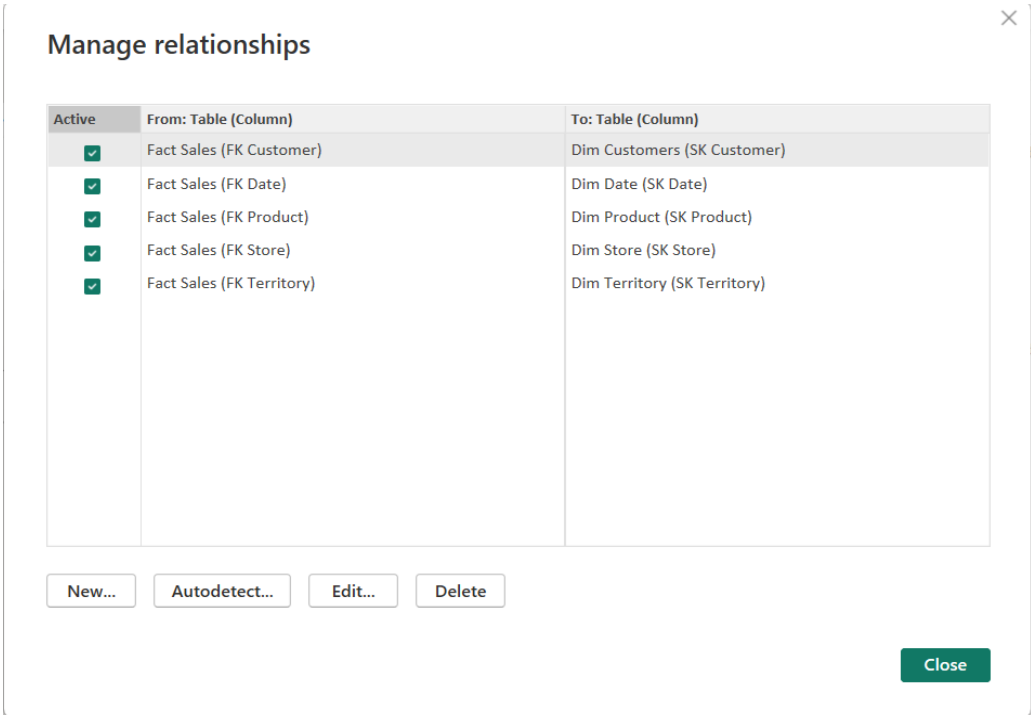


Figure 67 Relationships of tables in Power BI

This showcases the relationship of our tables in Power BI.

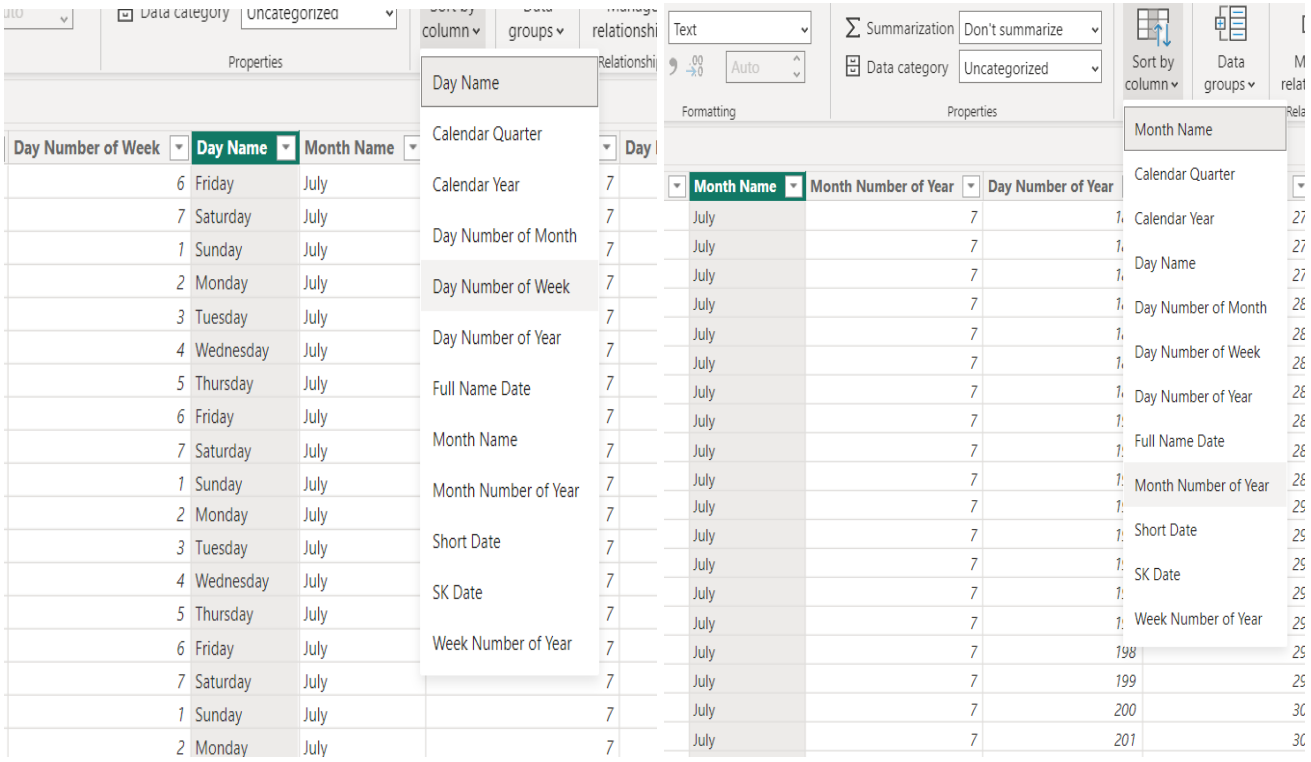


Figure 68 sorting in DIM Date

This is a showcase of the sorting process for Day Name and Month Name columns in DIM date.

eral | From Text | From Number | From Date & Time | AI Insights

```
= Table.AddColumn(#"Removed Columns", "Customer Age", each Date.Year(DateTime.LocalNow()) - Date.Year([Birth Date]))
```

	ne	Occupation	Region	Country	City	fact_sales	Customer Age
1	90000	Professional	North America	United States	Salt Lake City	Table	37
2	60000	Professional	North America	United States	Alburqueque	Table	38
3	60000	Professional	North America	United States	Alburqueque	Table	38
4	70000	Professional	North America	United States	Salt Lake City	Table	35
5	80000	Professional	North America	United States	Phoenix	Table	35
6	70000	Professional	North America	United States	Salt Lake City	Table	38
7	70000	Professional	North America	United States	Alburqueque	Table	38
8	60000	Professional	North America	United States	Phoenix	Table	39
9	60000	Professional	North America	United States	Phoenix	Table	39
10	70000	Professional	North America	United States	Alburqueque	Table	39
11	70000	Professional	North America	United States	Phoenix	Table	39
12	60000	Professional	North America	United States	Salt Lake City	Table	40
13	100000	Management	North America	United States	San Francisco	Table	35
14	100000	Management	North America	United States	Portland	Table	35
15	100000	Management	North America	United States	Portland	Table	35
16	30000	Skilled Manual	North America	United States	Alburqueque	Table	24
17	30000	Skilled Manual	North America	United States	Salt Lake City	Table	24

Figure 69 Adding a column in DIM customer

We added a column using the customer's birth date as a reference against the current date to obtain their age and populated a newly added column named age.

```
Age Group =
SWITCH(TRUE(),
    [Customer Age] >= 90 && [Customer Age] < 100, "90-99 years",
    [Customer Age] >= 80 && [Customer Age] < 90, "80-89 years",
    [Customer Age] >= 70 && [Customer Age] < 80, "70-79 years",
    [Customer Age] >= 60 && [Customer Age] < 70, "60-69 years",
    [Customer Age] >= 50 && [Customer Age]  < 60, "50-59 years",
    [Customer Age] >= 40 && [Customer Age]  < 50, "40-49 years",
    [Customer Age] >= 30 && [Customer Age]  < 40, "30-39 years",
    [Customer Age] >= 20 && [Customer Age]  < 30, "20-29 years",
    [Customer Age] >= 10 && [Customer Age]  < 20, "10-19 years",
    [Customer Age] >= 0 && [Customer Age]  < 10, "0-9years",
    "Other"
```

Figure 70 Adding Age Group Column

We added another column using age as a reference this time, but broke them down in groups of 10 years which we think will be beneficial in the visualization phase of the reports later in the project

```
Income Group =
SWITCH(TRUE(),
    [Yearly Income] >= 10000 && [Yearly Income] < 20000, "10k-20k",
    [Yearly Income] >= 20000 && [Yearly Income] < 30000, "20k-30k",
    [Yearly Income] >= 30000 && [Yearly Income] < 40000, "30k-40k",
    [Yearly Income] >= 40000 && [Yearly Income] < 50000, "40k-50k",
    [Yearly Income] >= 50000 && [Yearly Income] < 60000, "50k-60k",
    [Yearly Income] >= 60000 && [Yearly Income] < 70000, "60k-70k",
    [Yearly Income] >= 70000 && [Yearly Income] < 80000, "70k-80k",
    [Yearly Income] >= 80000 && [Yearly Income] < 90000, "80k-90k",
    [Yearly Income] >= 90000 && [Yearly Income] < 100000, "90k-100k",
    [Yearly Income] >= 100000 && [Yearly Income] < 150000, "100k-150k",
    [Yearly Income] >= 150000 && [Yearly Income] <= 170000, "150k-170k",
    "Other"
```

Figure 71 Adding Income Group Column

We applied a similar technique to Yearly Income and created different income brackets for the same reason as before.

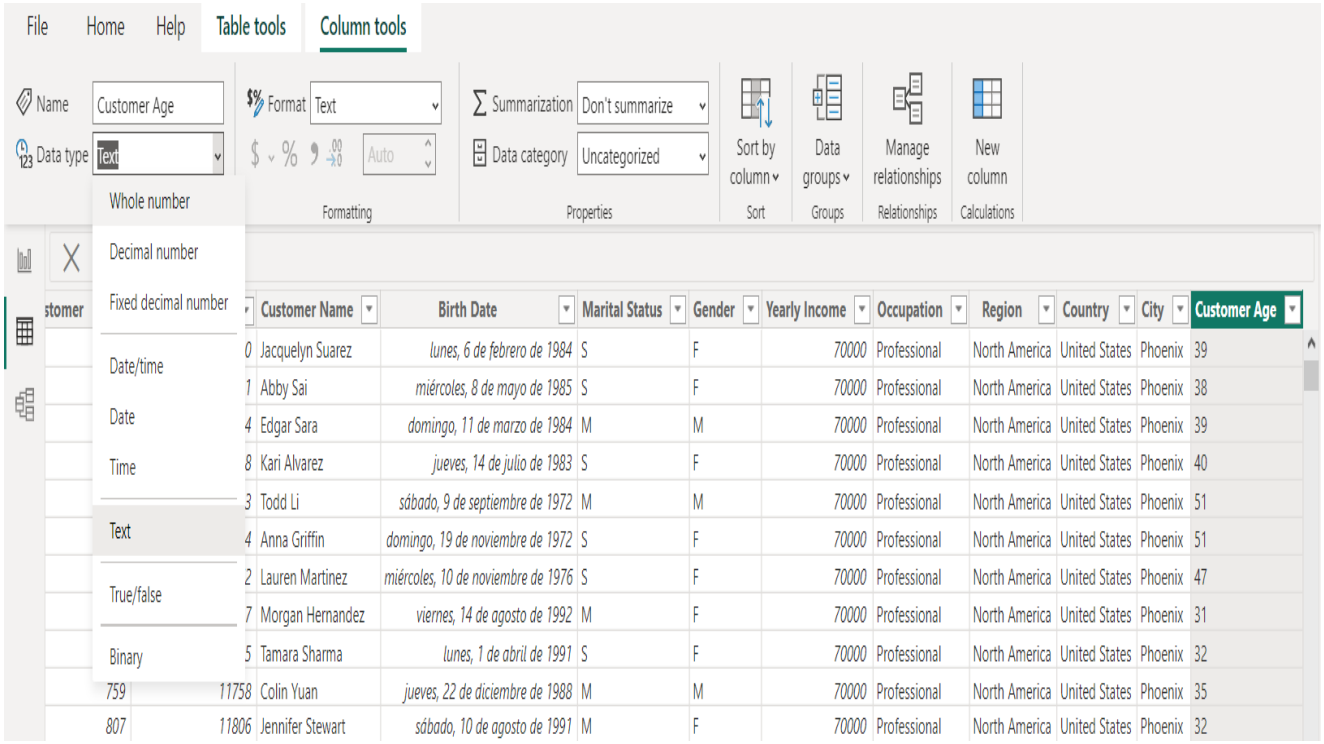


Figure 72 Formatting Columns (All tables)

This step involved changing the formats of columns in all the imported tables.

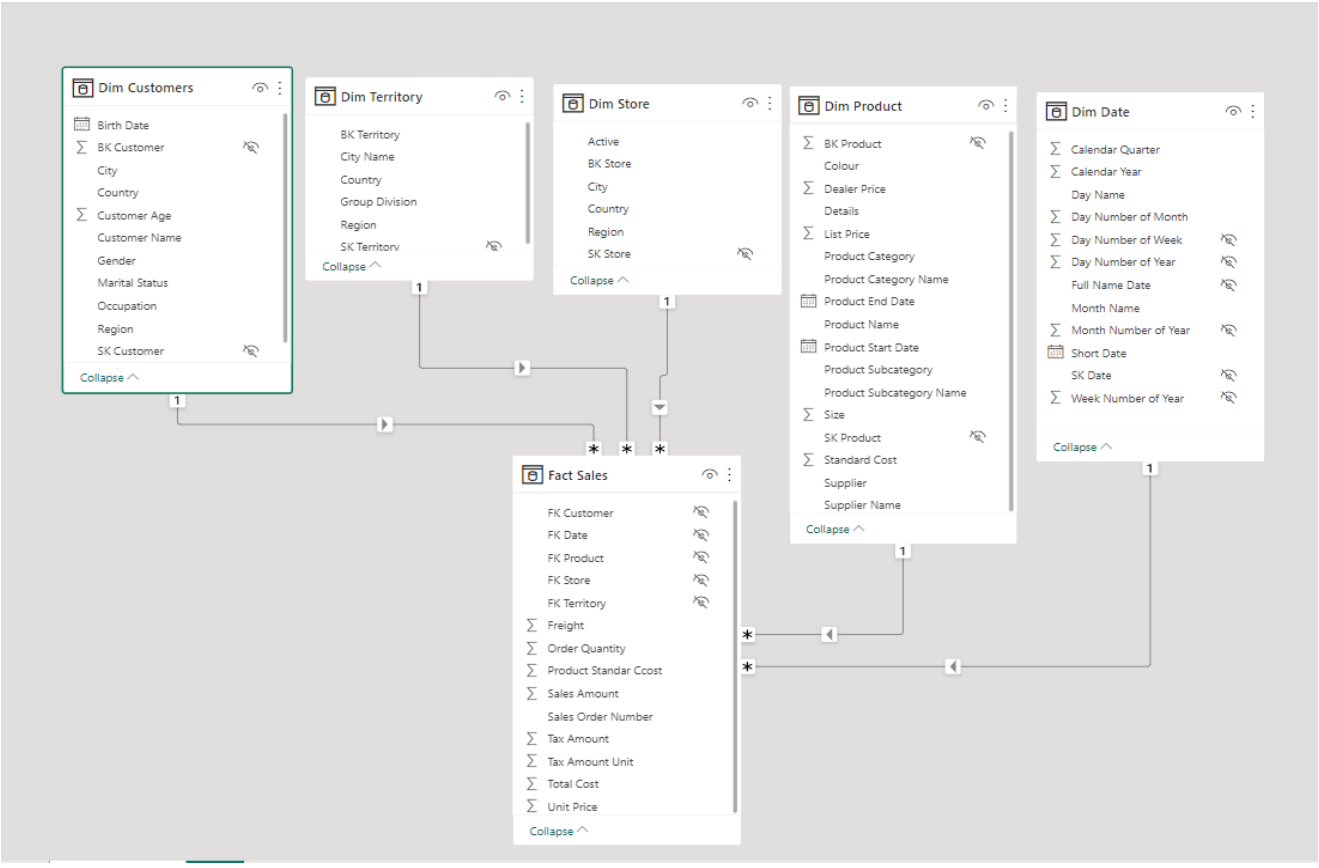


Figure 73 Updated Diagram

This updated diagram shows the changes we made in column formats and hiding the non-relevant columns but before the implementation of hierarchies and measures.

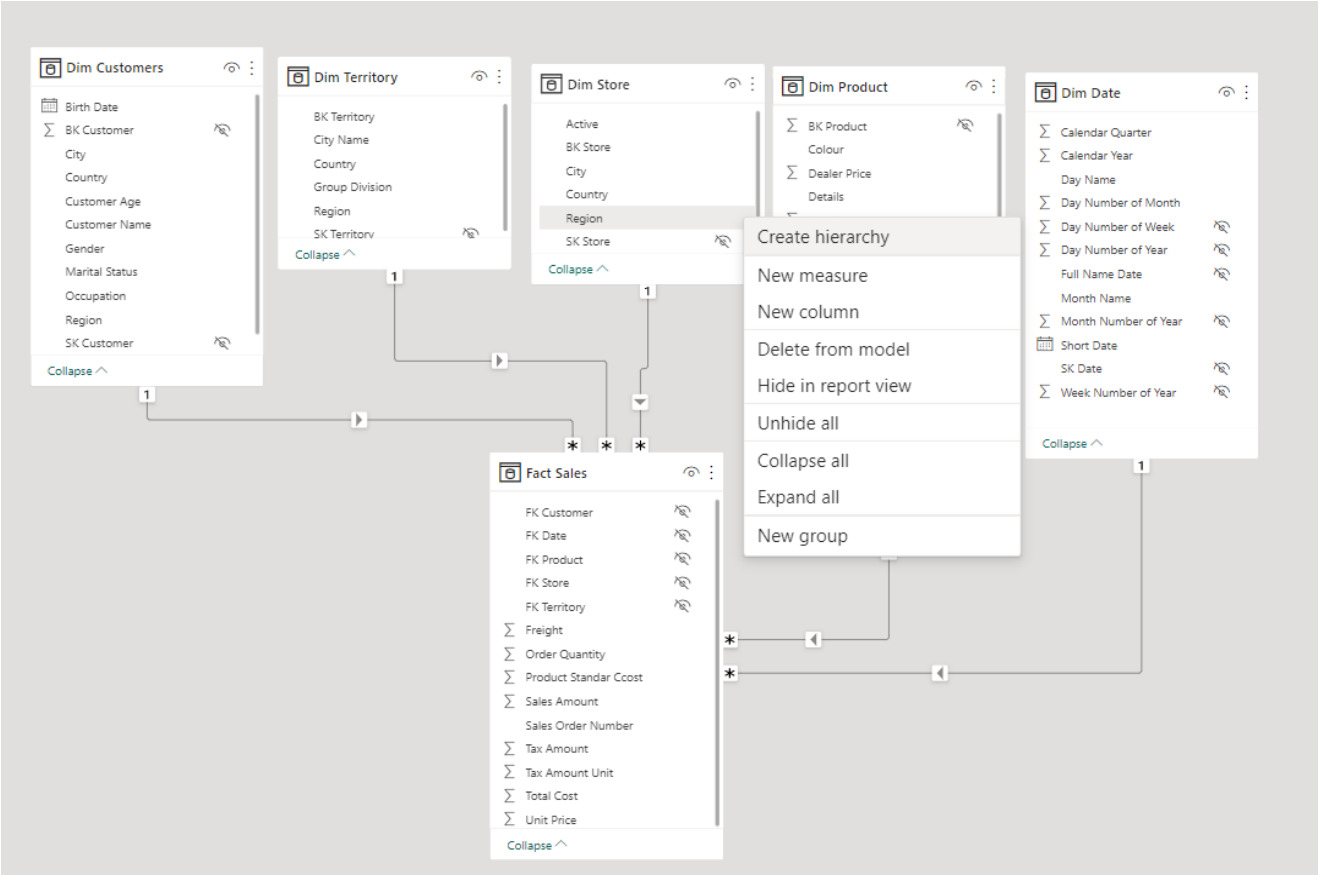


Figure 74 Creation of Hierarchies

This screenshot showcases the creation of hierarchies for all dimensions.

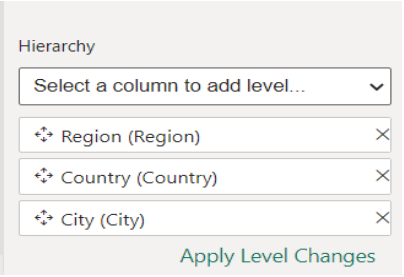
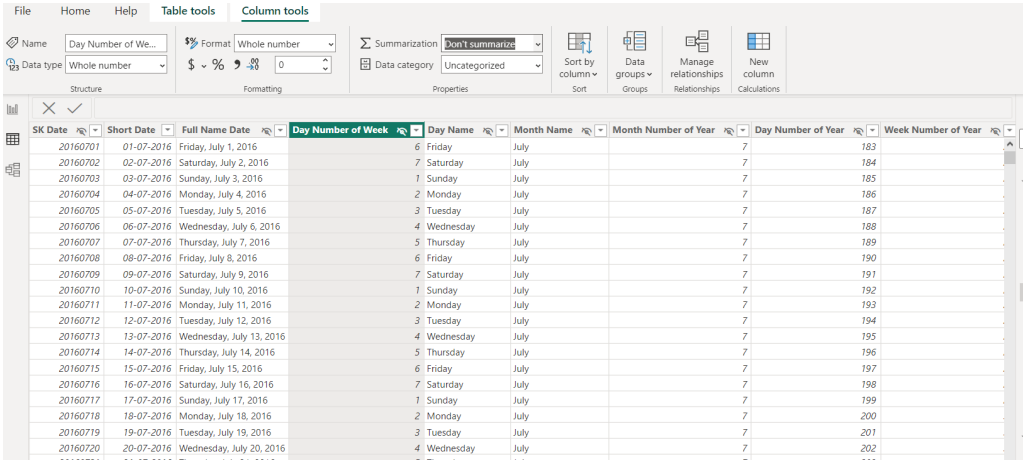


Figure 75 Defining Levels for Hierarchies

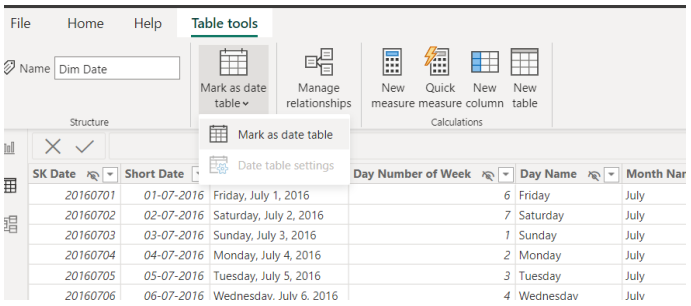
Implementation of the levels inside each hierarchy



SK Date	Short Date	Full Name Date	Day Number of Week	Day Name	Month Name	Month Number of Year	Day Number of Year	Week Number of Year
20160701	01-07-2016	Friday, July 1, 2016	6	Friday	July	7	183	
20160702	02-07-2016	Saturday, July 2, 2016	7	Saturday	July	7	184	
20160703	03-07-2016	Sunday, July 3, 2016	1	Sunday	July	7	185	
20160704	04-07-2016	Monday, July 4, 2016	2	Monday	July	7	186	
20160705	05-07-2016	Tuesday, July 5, 2016	3	Tuesday	July	7	187	
20160706	06-07-2016	Wednesday, July 6, 2016	4	Wednesday	July	7	188	
20160707	07-07-2016	Thursday, July 7, 2016	5	Thursday	July	7	189	
20160708	08-07-2016	Friday, July 8, 2016	6	Friday	July	7	190	
20160709	09-07-2016	Saturday, July 9, 2016	7	Saturday	July	7	191	
20160710	10-07-2016	Sunday, July 10, 2016	1	Sunday	July	7	192	
20160711	11-07-2016	Monday, July 11, 2016	2	Monday	July	7	193	
20160712	12-07-2016	Tuesday, July 12, 2016	3	Tuesday	July	7	194	
20160713	13-07-2016	Wednesday, July 13, 2016	4	Wednesday	July	7	195	
20160714	14-07-2016	Thursday, July 14, 2016	5	Thursday	July	7	196	
20160715	15-07-2016	Friday, July 15, 2016	6	Friday	July	7	197	
20160716	16-07-2016	Saturday, July 16, 2016	7	Saturday	July	7	198	
20160717	17-07-2016	Sunday, July 17, 2016	1	Sunday	July	7	199	
20160718	18-07-2016	Monday, July 18, 2016	2	Monday	July	7	200	
20160719	19-07-2016	Tuesday, July 19, 2016	3	Tuesday	July	7	201	
20160720	20-07-2016	Wednesday, July 20, 2016	4	Wednesday	July	7	202	

Figure 76 Changes in DIM Date

Change specifically in Dim Date that the columns with data type number, to Not Summarize



SK Date	Short Date		Day Number of Week	Day Name	Month Nar
20160701	01-07-2016	Friday, July 1, 2016	6	Friday	July
20160702	02-07-2016	Saturday, July 2, 2016	7	Saturday	July
20160703	03-07-2016	Sunday, July 3, 2016	1	Sunday	July
20160704	04-07-2016	Monday, July 4, 2016	2	Monday	July
20160705	05-07-2016	Tuesday, July 5, 2016	3	Tuesday	July
20160706	06-07-2016	Wednesday, July 6, 2016	4	Wednesday	July

Figure 77 Marking DIM Date as date table I

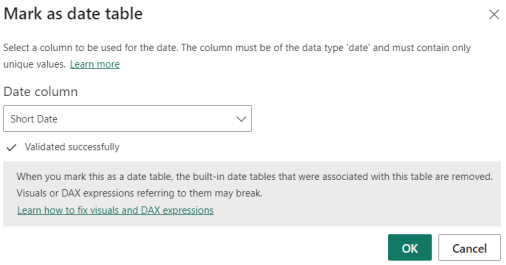


Figure 78 Marking DIM Date as date table II

This process was done to mark the DIM Date as a date table.

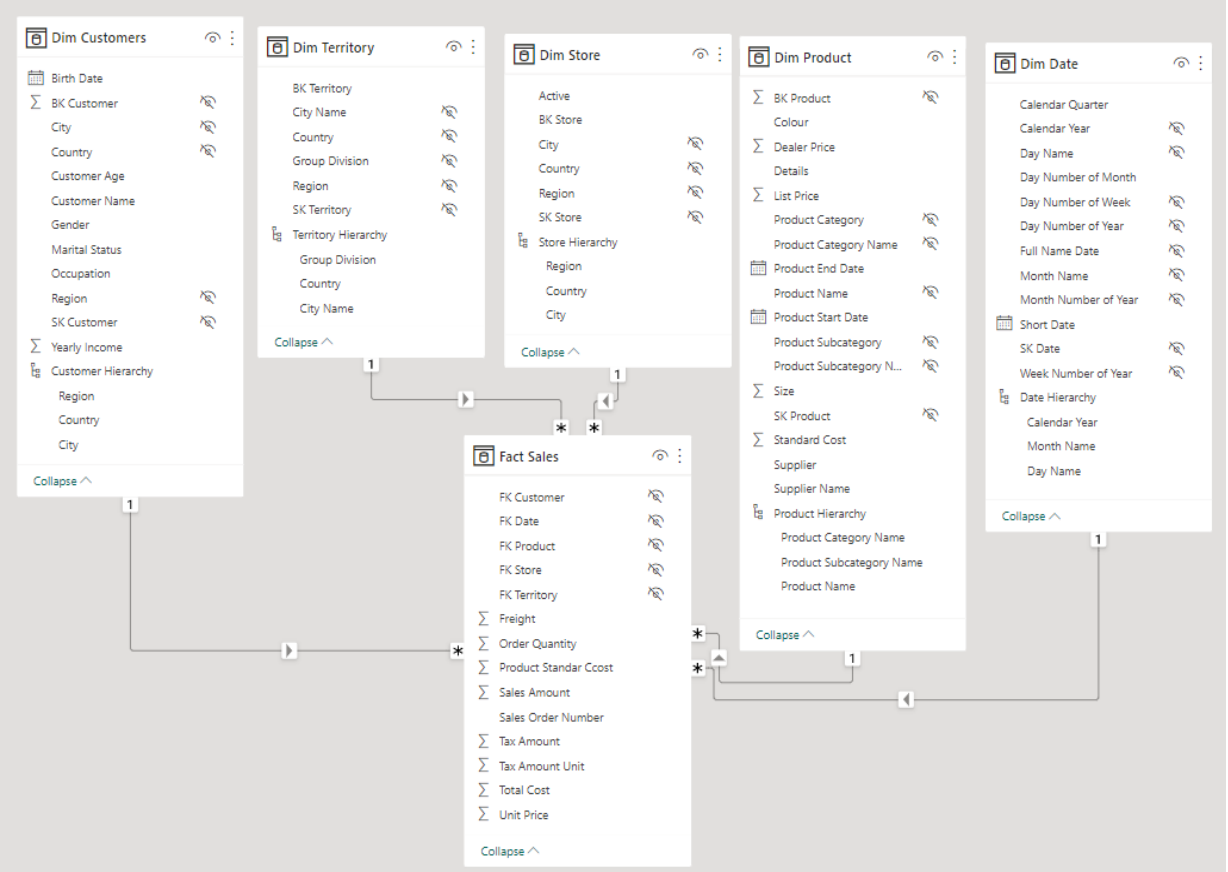
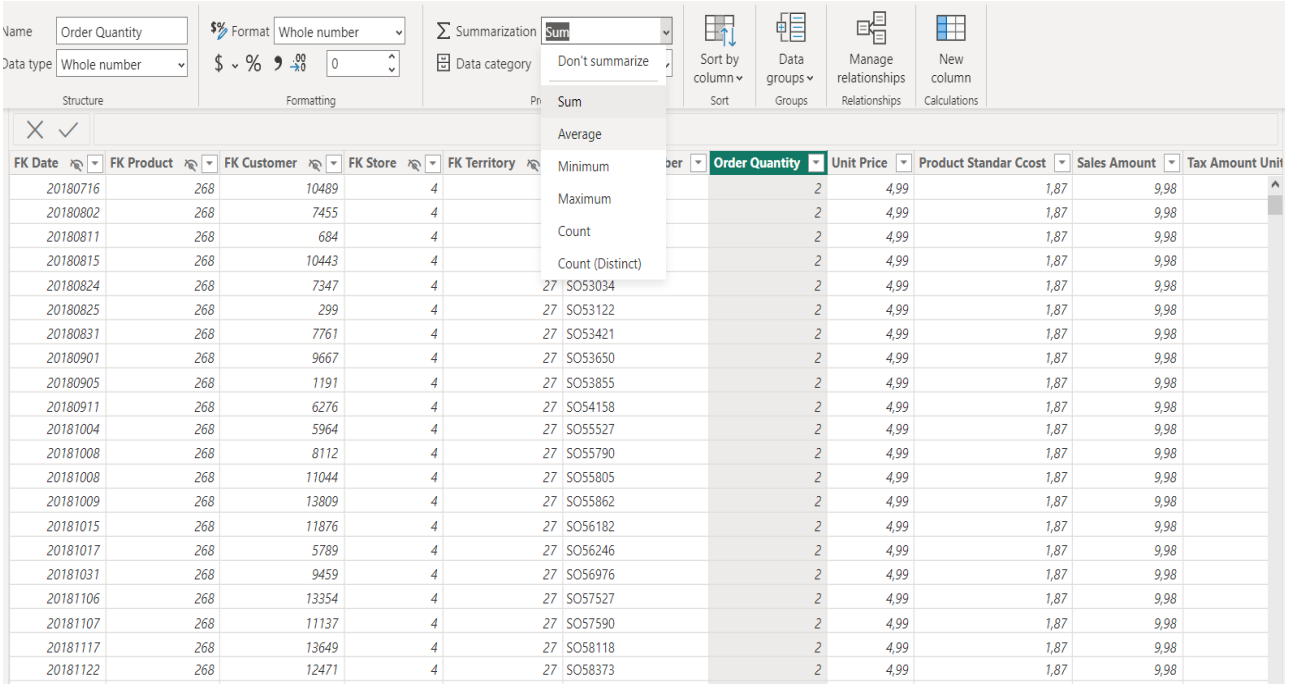


Figure 79 Diagram with Hierarchies

The final diagram after the creation of hierarchies but before the implementation of measures.



FK Date	FK Product	FK Customer	FK Store	FK Territory		Order Quantity	Unit Price	Product Standar Ccost	Sales Amount	Tax Amount Unit
20180716	268	10489	4			2	4,99	1,87	9,98	
20180802	268	7455	4			2	4,99	1,87	9,98	
20180811	268	684	4			2	4,99	1,87	9,98	
20180815	268	10443	4			2	4,99	1,87	9,98	
20180824	268	7347	4	27	SO53034	2	4,99	1,87	9,98	
20180825	268	299	4	27	SO53122	2	4,99	1,87	9,98	
20180831	268	7761	4	27	SO53421	2	4,99	1,87	9,98	
20180901	268	9667	4	27	SO53650	2	4,99	1,87	9,98	
20180905	268	1191	4	27	SO53855	2	4,99	1,87	9,98	
20180911	268	6276	4	27	SO54158	2	4,99	1,87	9,98	
20181004	268	5964	4	27	SO55527	2	4,99	1,87	9,98	
20181008	268	8112	4	27	SO55790	2	4,99	1,87	9,98	
20181008	268	11044	4	27	SO55805	2	4,99	1,87	9,98	
20181009	268	13809	4	27	SO55862	2	4,99	1,87	9,98	
20181015	268	11876	4	27	SO56182	2	4,99	1,87	9,98	
20181017	268	5789	4	27	SO56246	2	4,99	1,87	9,98	
20181031	268	9459	4	27	SO56976	2	4,99	1,87	9,98	
20181106	268	13354	4	27	SO57527	2	4,99	1,87	9,98	
20181107	268	11137	4	27	SO57590	2	4,99	1,87	9,98	
20181117	268	13649	4	27	SO58118	2	4,99	1,87	9,98	
20181122	268	12471	4	27	SO58373	2	4,99	1,87	9,98	

Figure 80 Changes to the Fact Sales

Here we changed some summarizations in the Fact Sales table to help with coherent visualizations later down the line.

Documentation of PBI reports and their explanation

After we were satisfied by our model, we proceeded to build our visualizations, we opted for 6 different variations :

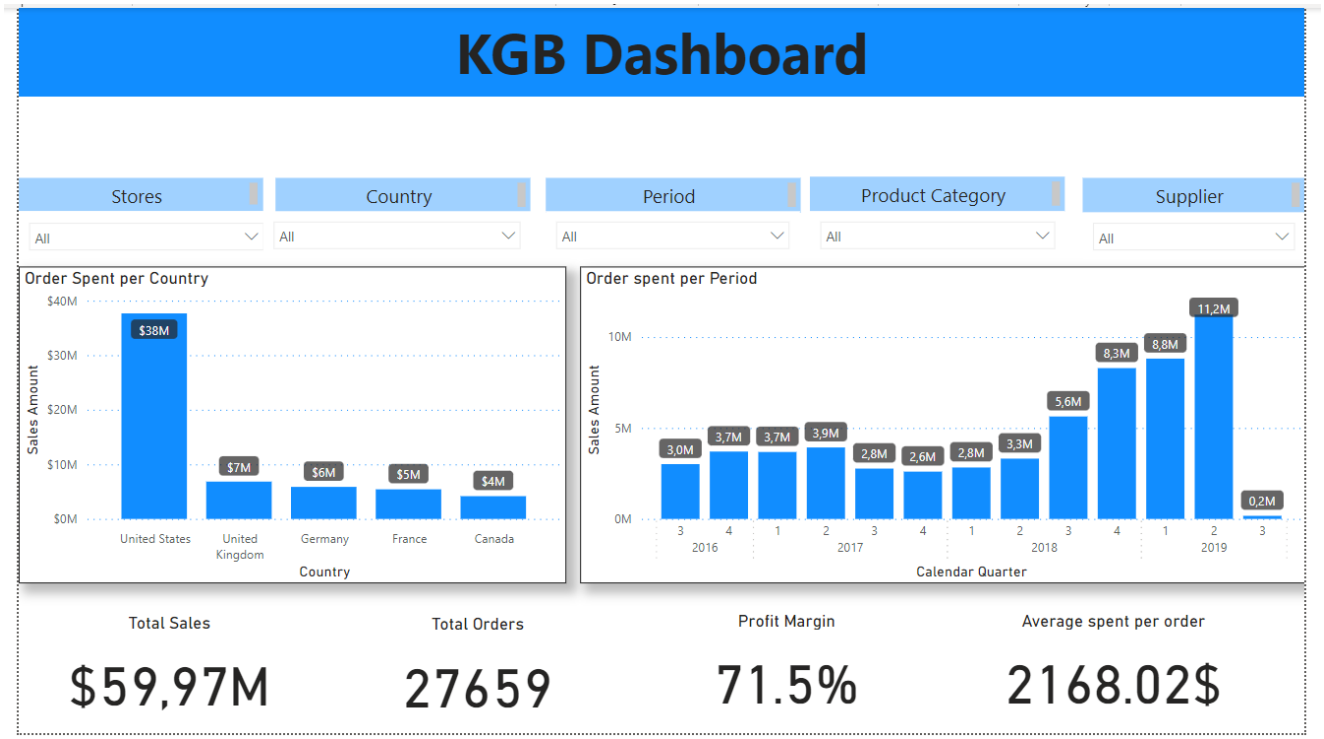


Figure 81 Dashboard I

This is a general over look of sales through multiple layers such as Stores, Country, Time Period, Product Category and Supplier.

Figure 82 Dashboard II

This visualization is more product focused and showcases the Top 10 products whilst also showcasing them across all Stores.

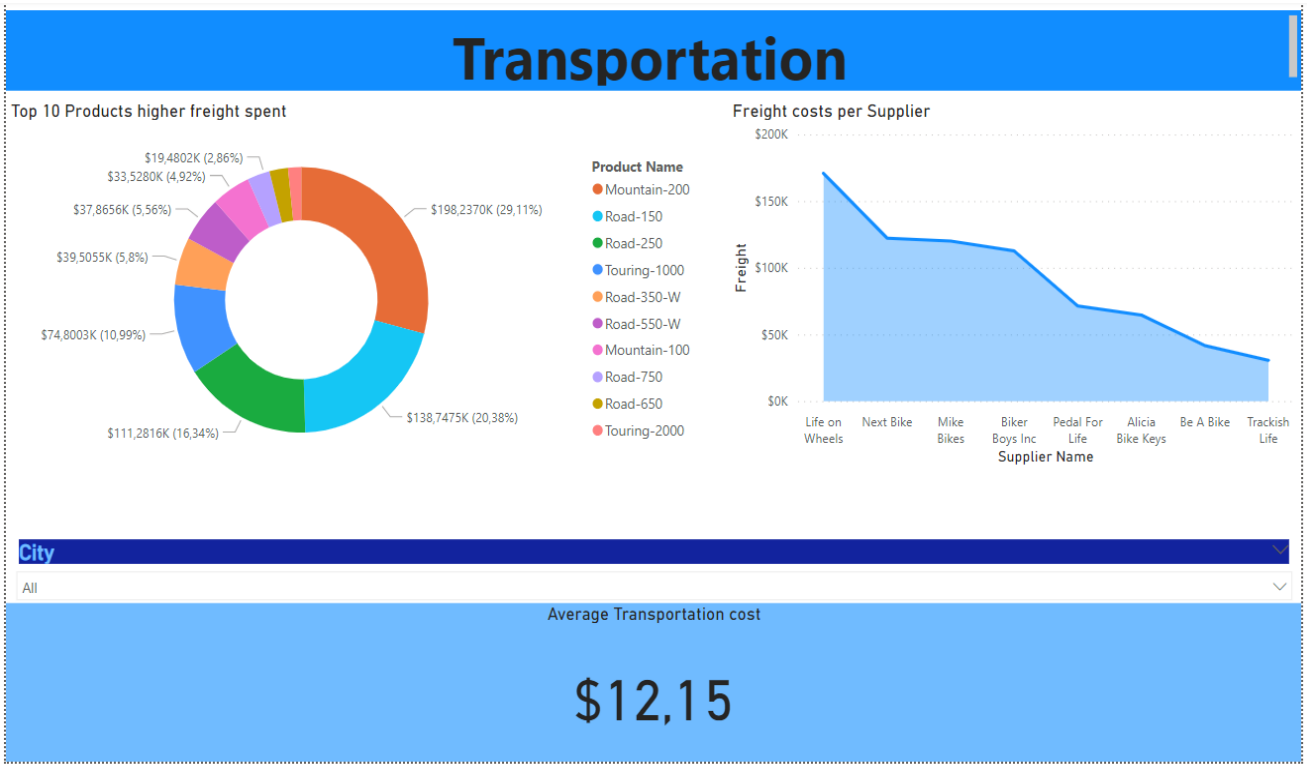


Figure 83 Dashboard III

This visualization deals with an integral part which pertains to the information regarding transportation costs.

Figure 84 Dashboard IV

This visualization helps with segmenting KGB's target market.

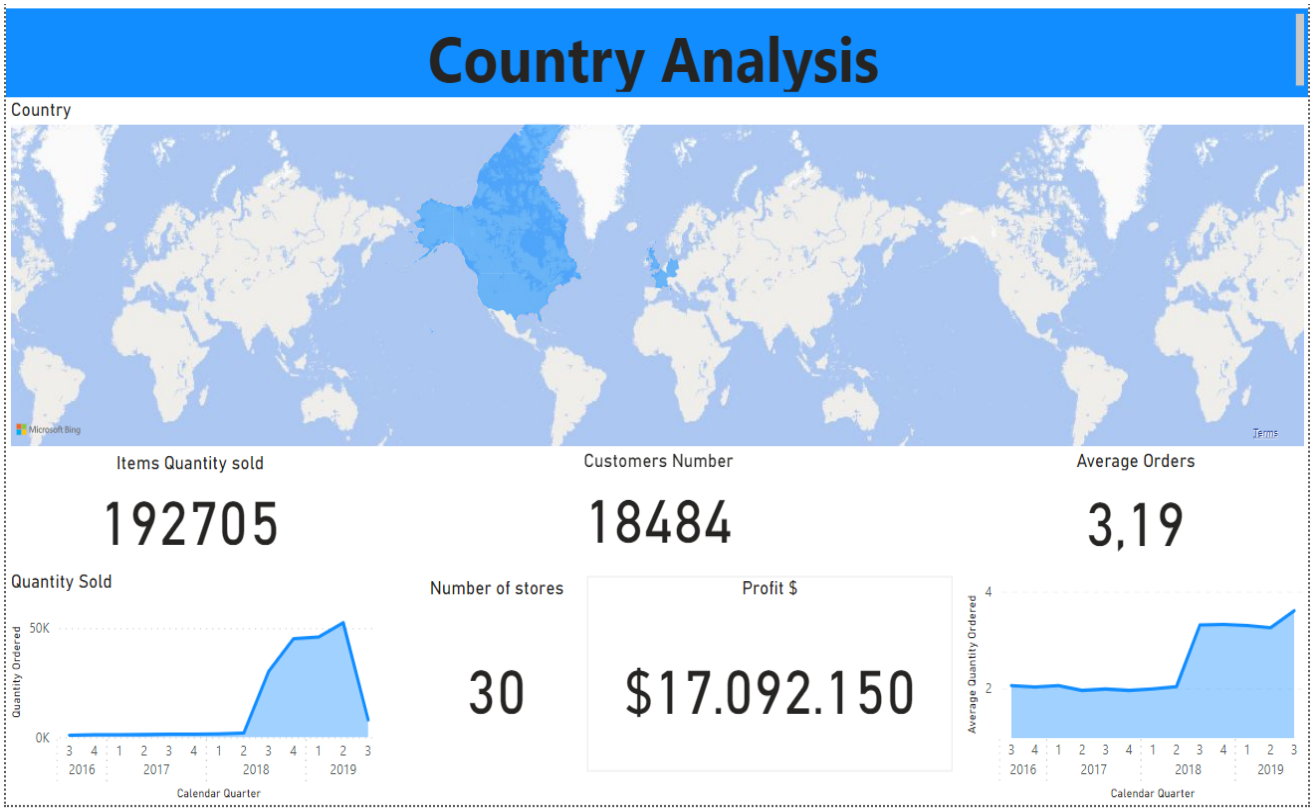


Figure 85 Dashboard V

This provides valuable regional information about Sales.

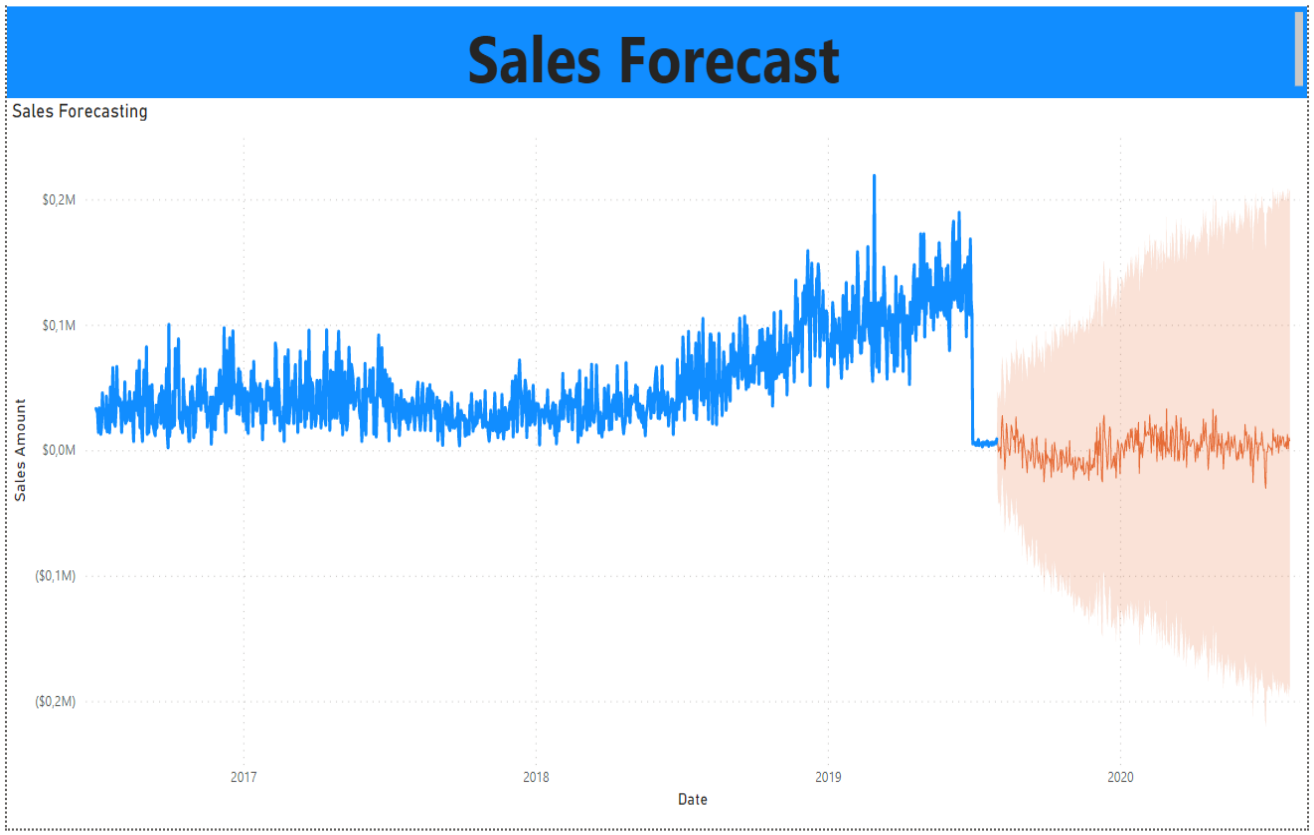
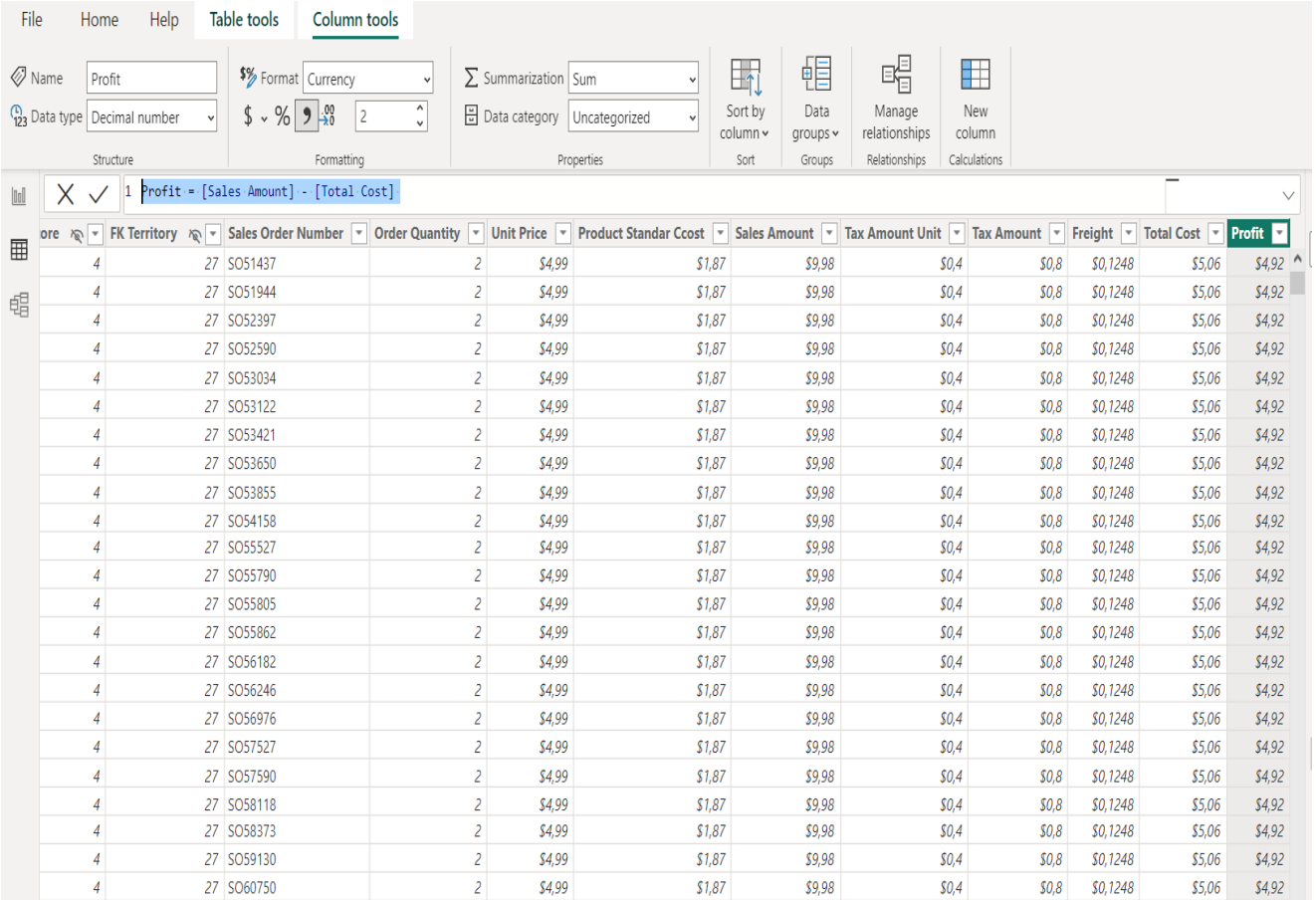


Figure 86 Dashboard VI

This visualization makes use of PBI forecasting analysis features for Sales.

Original Power BI Developments

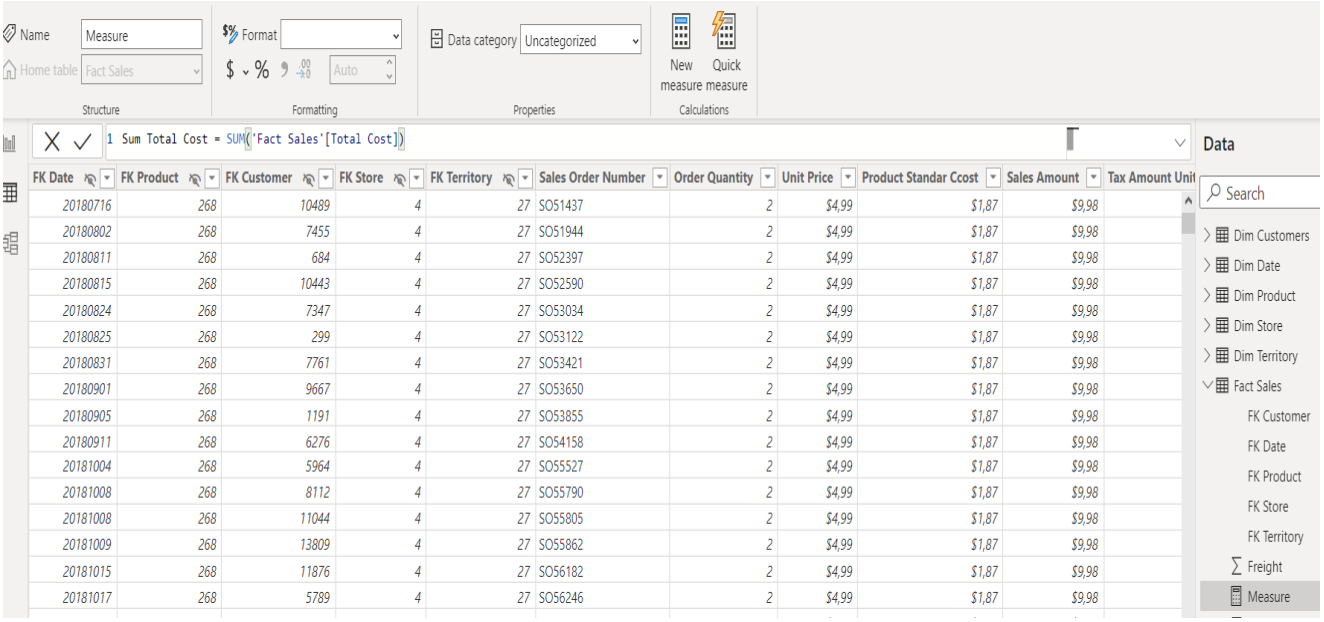


ore	FK Territory	Sales Order Number	Order Quantity	Unit Price	Product Standar Ccost	Sales Amount	Tax Amount Unit	Tax Amount	Freight	Total Cost	Profit
4	27	SO51437	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO51944	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO52397	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO52590	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO53034	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO53122	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO53421	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO53650	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO53855	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO54158	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO55527	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO55790	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO55805	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO55862	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO56182	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO56246	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO56976	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO57527	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO57590	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO58118	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO58373	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO59130	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92
4	27	SO60750	2	$4,99	$1,87	$9,98	$0,4	$0,8	$0,1248	$5,06	$4,92

Figure 87 Creation of a new column (Profit)

We created a new column called Profit using Data Analysis Expression DAX.

Now we start with making new measures, they are as follows:



FK Date	FK Product	FK Customer	FK Store	FK Territory	Sales Order Number	Order Quantity	Unit Price	Product Standar Ccost	Sales Amount	Tax Amount Unit
20180716	268	10489	4	27	SO51437	2	$4,99	$1,87	$9,98	
20180802	268	7455	4	27	SO51944	2	$4,99	$1,87	$9,98	
20180811	268	684	4	27	SO52397	2	$4,99	$1,87	$9,98	
20180815	268	10443	4	27	SO52590	2	$4,99	$1,87	$9,98	
20180824	268	7347	4	27	SO53034	2	$4,99	$1,87	$9,98	
20180825	268	299	4	27	SO53122	2	$4,99	$1,87	$9,98	
20180831	268	7761	4	27	SO53421	2	$4,99	$1,87	$9,98	
20180901	268	9667	4	27	SO53650	2	$4,99	$1,87	$9,98	
20180905	268	1191	4	27	SO53855	2	$4,99	$1,87	$9,98	
20180911	268	6276	4	27	SO54158	2	$4,99	$1,87	$9,98	
20181004	268	5964	4	27	SO55527	2	$4,99	$1,87	$9,98	
20181008	268	8112	4	27	SO55790	2	$4,99	$1,87	$9,98	
20181008	268	11044	4	27	SO55805	2	$4,99	$1,87	$9,98	
20181009	268	13809	4	27	SO55862	2	$4,99	$1,87	$9,98	
20181015	268	11876	4	27	SO56182	2	$4,99	$1,87	$9,98	
20181017	268	5789	4	27	SO56246	2	$4,99	$1,87	$9,98	

Figure 88 Creation of a new measure I

Sum Total Cost

```
Avg Total Cost = AVERAGE('Fact Sales'[Total Cost])
```

Figure 89 Creation of a new measure II

Average Total Cost

```
Sum Sales Amount = SUM('Fact Sales'[Sales Amount])
```

Figure 90 Creation of a new measure III

Sum Sales Amount

```
Sum Profit = SUM('Fact Sales'[Profit])
```

Figure 91 Creation of a new measure IV

Sum Profit

```
Total Quantity Sold = SUM('Fact Sales'[Order Quantity])
```

Figure 92 Creation of a new measure V

Total Quantity Sold

```
Avg Order Quantity = AVERAGE('Fact Sales'[Order Quantity])
```

Figure 93 Creation of a new measure VI

Average Order Quantity

```
Avg Unit Price = AVERAGE('Fact Sales'[Unit Price])
```

Figure 94 Creation of a new measure VII

Average Unit Price

```
Net Profit Margin = DIVIDE(SUM('Fact Sales'[Sales Amount]) - SUM('Fact Sales'[Total Cost]), SUM('Fact Sales'[Sales Amount]))
```

Figure 95 Creation of a new measure VIII

Net Profit Margin

```
Total % Profit = CONCATENATE(ROUND((sum('Fact Sales'[Total Cost])*100)/SUM('Fact Sales'[Sales Amount]),2),"%")
```

Figure 96 Creation of a new measure XI

Total Profit Percentage

```
Total Orders = DISTINCTCOUNT('Fact Sales'[Sales Order Number])
```

Figure 97 Creation of a new measure X

Total Orders

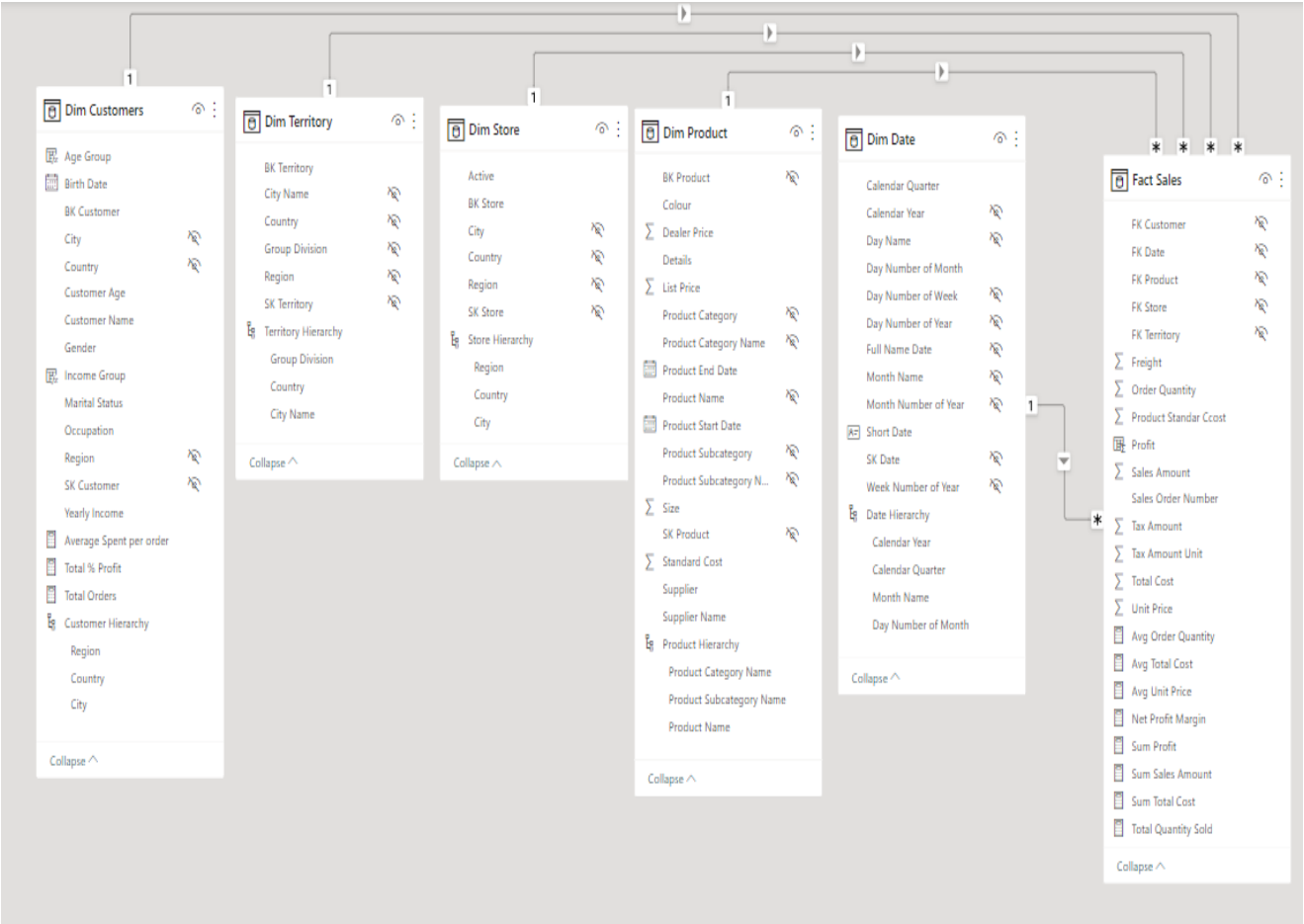


Figure 98 Final Diagram

Final Diagram with all Measures and hierarchies.

Business Needs

We wanted to maximize the amount of relevant information that can be accessed through these reports, particularly the ones that are the most beneficial for day to day needs of the business. Valuable information from here can be turned into actionable intel for the next steps that could be taken to boost efficiency.

1. Shows which products are being sold by cities and date whilst also showing the Sum Sales Amount by Product Category. Top 10 Products Sold is also added for an additional layer of complexity

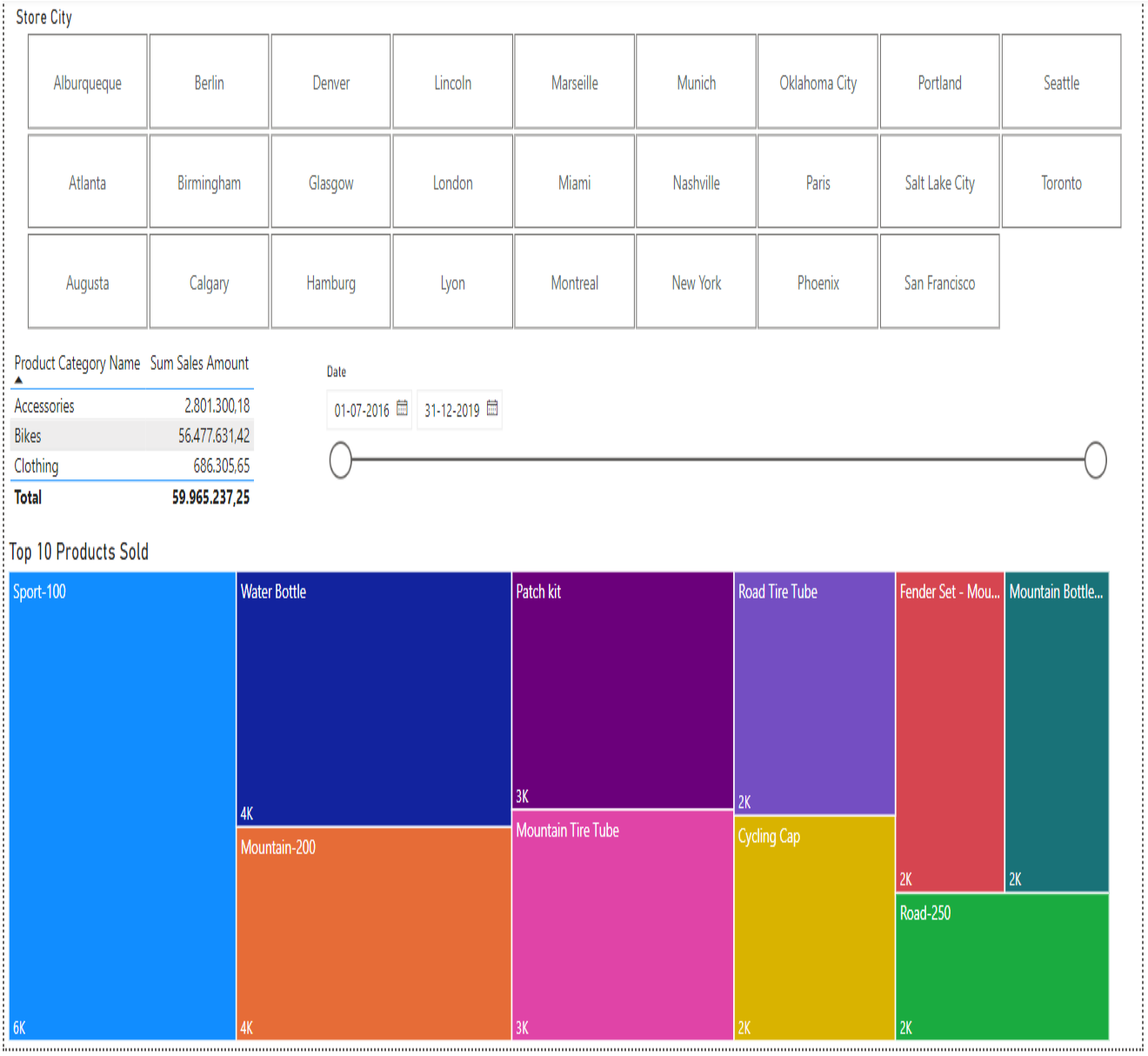


Figure 99 Dashboard I

2. Showcases the average transportation cost per type of transport which is broken down for each product

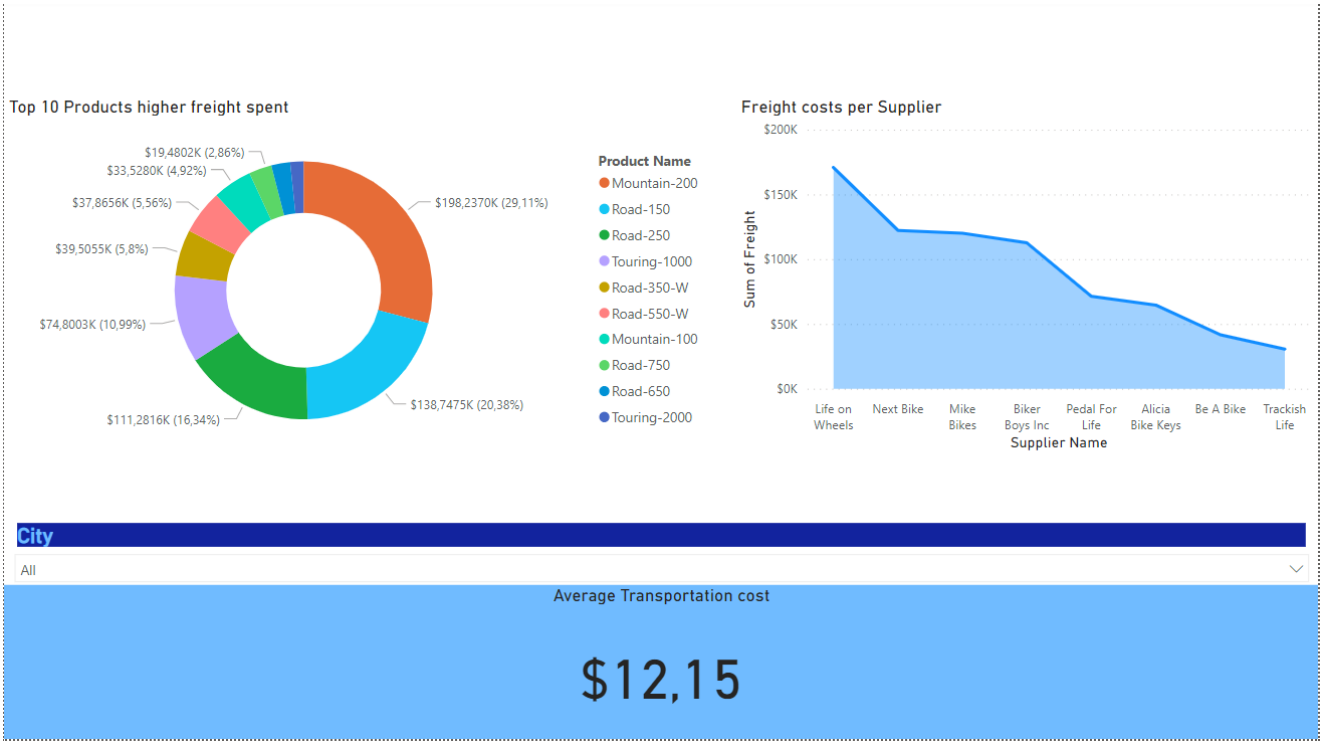


Figure 100 Dashboard II

This provides an overview of the transportation cost by product, which allows KGB to make educated decisions about cost of freight for individual products and intractability of the report lets the user click on any product and they are directed to Dashboard I (Figure 99).

3. Client segmentation with sales by market and date

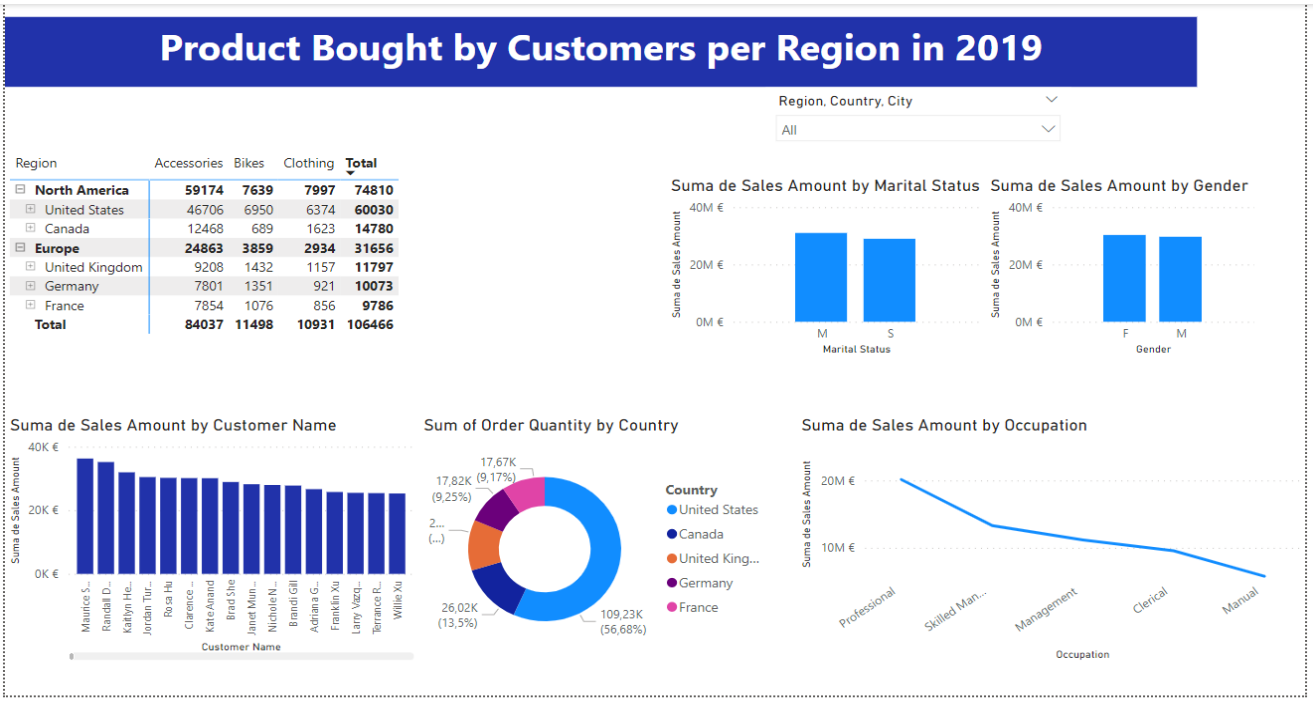


Figure 101 Dashboard III

This report breaks down client segments based on the categorical data of the customer, allowing KGB to narrow down the target market for different product types within any region.

4. How do product sales vary during the year?

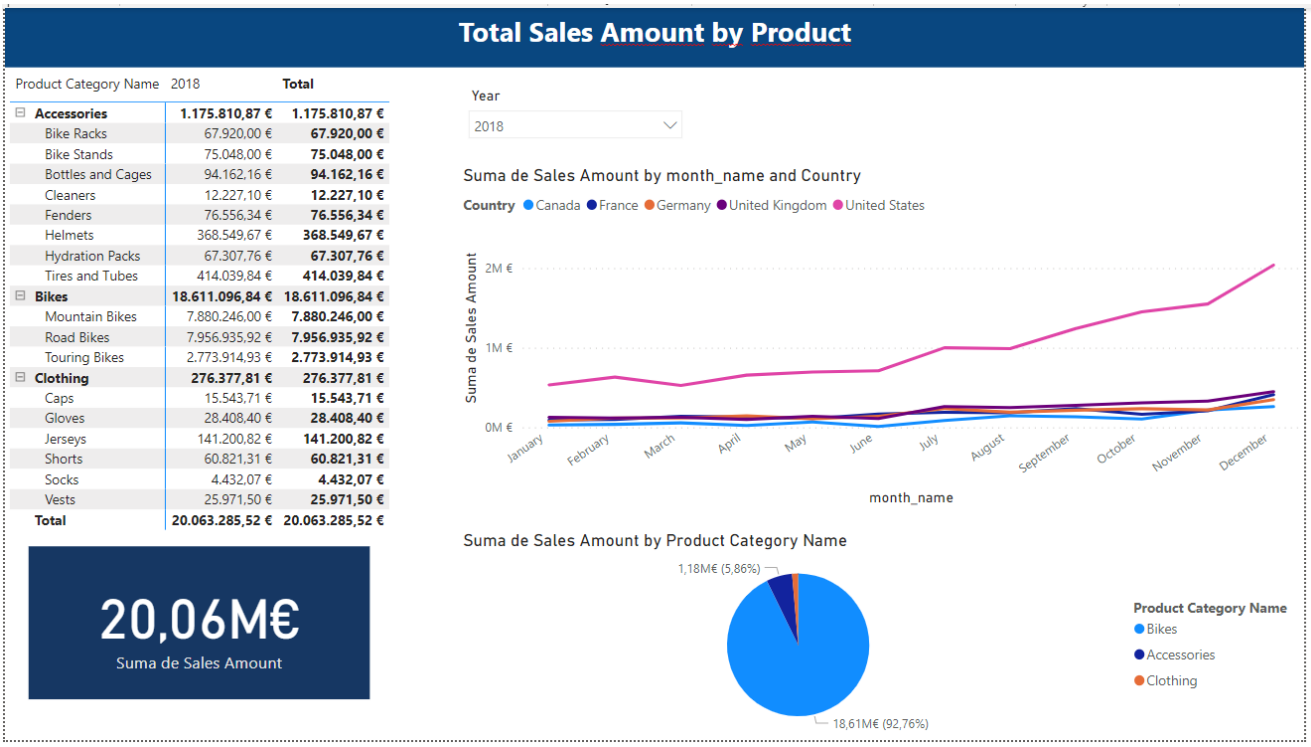


Figure 102 Dashboard VI

With this report we can analyze the sales amount by product and country.

5. What is our average revenue per sale per product type?

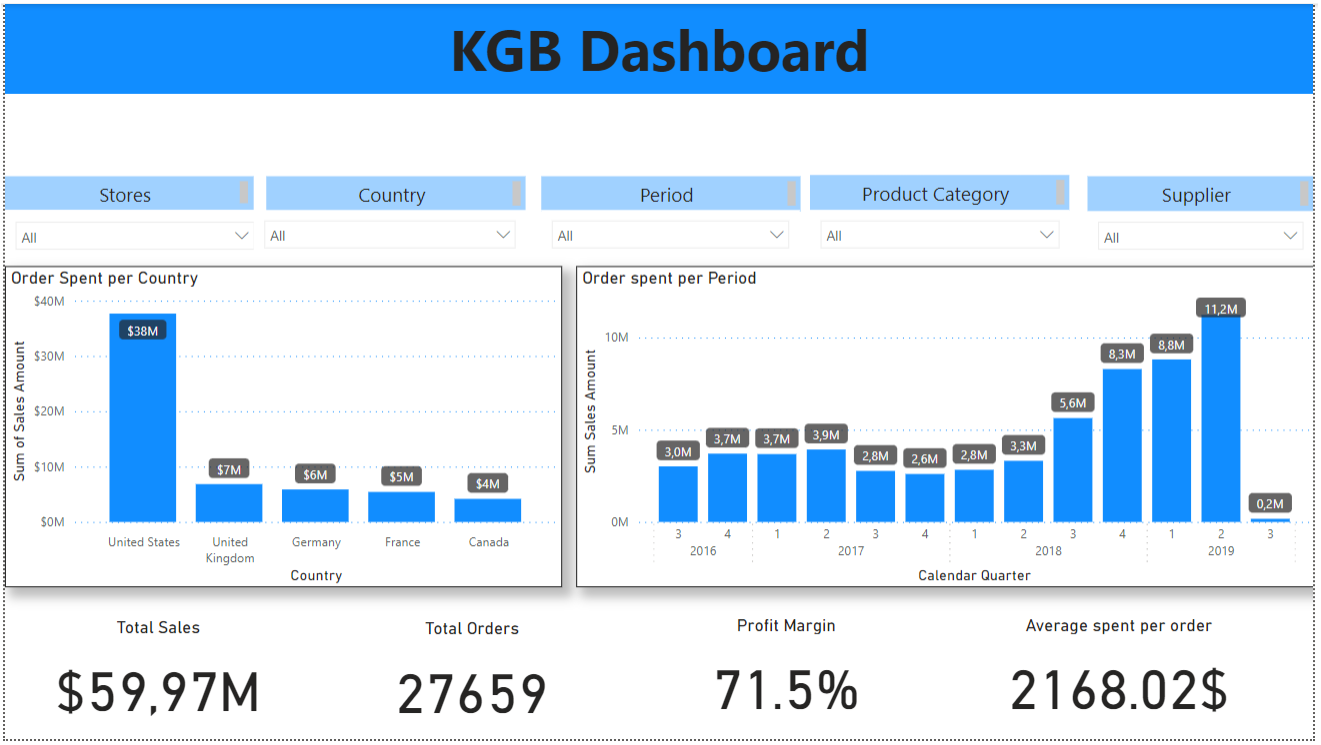


Figure 103 Dashboard V

This dashboard analyzes Store, Country, Time Period, Product and Supplier whilst also showcasing the profit margins.

6. Which region has the highest profits providing an insight on future investments

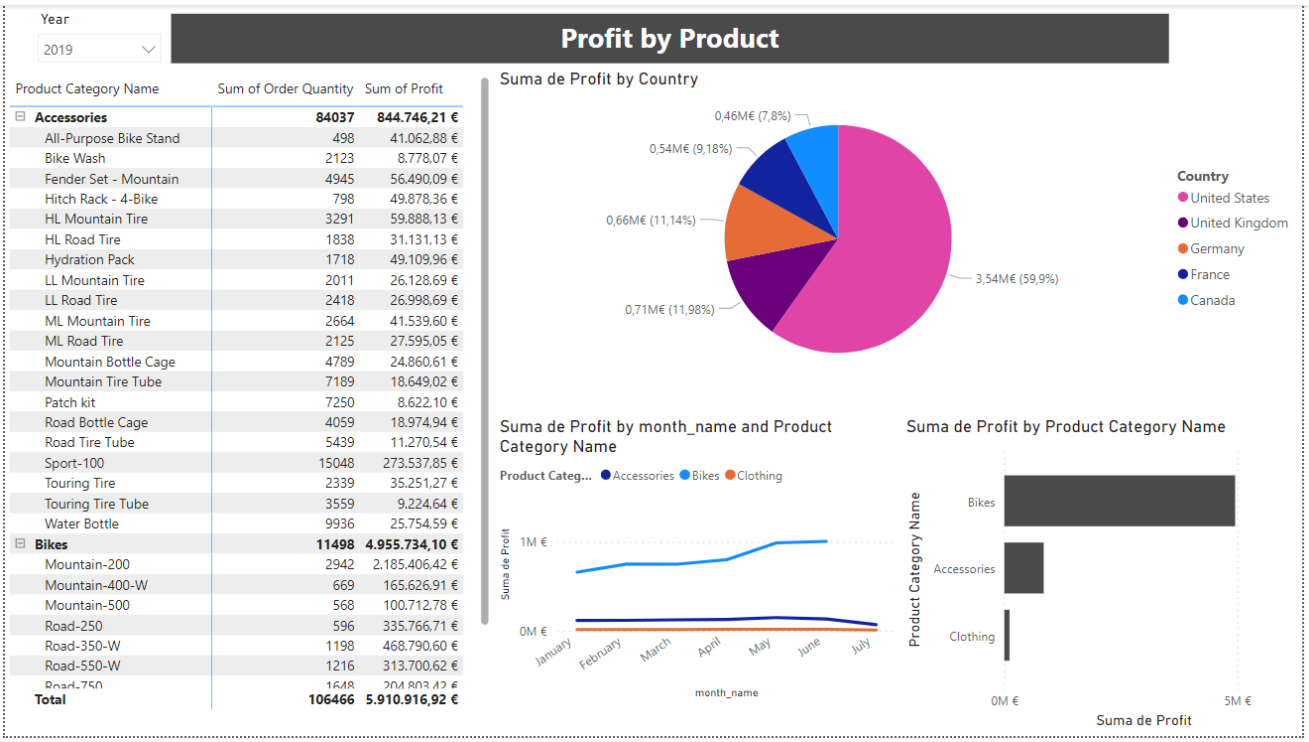


Figure 104 Dashboard VI

With this Report we can analyze the Country with the highest profit, and also provides a deeper analysis for searching the results by product and year.

7. This report showcases customer's profiles based on their categorical data like gender, age, marital status and also another data type such as income brackets. This can be further analyzed using store locations.

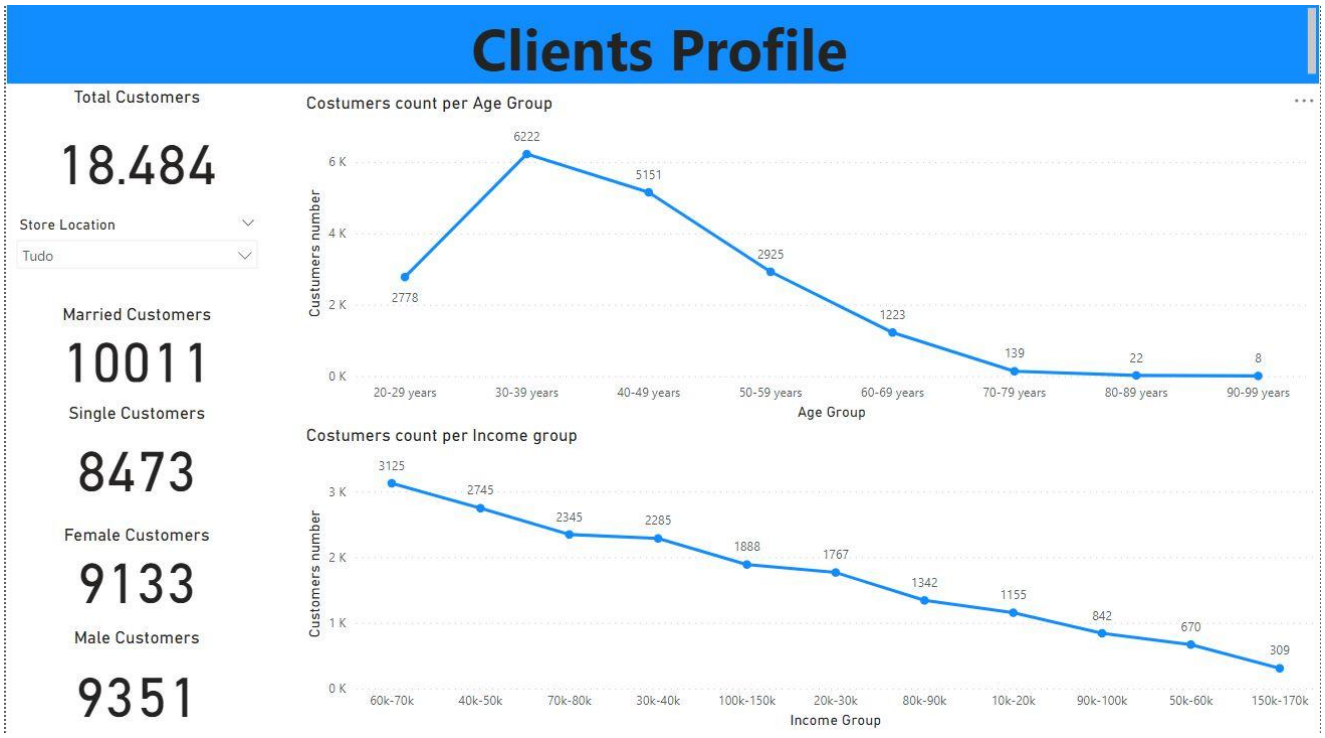


Figure 105 Dashboard VII

8. This report shows an analysis based on Country Data, specifically pertaining to the number of Customers, items sold, stores and average orders placed. This report also shows the profit by country.

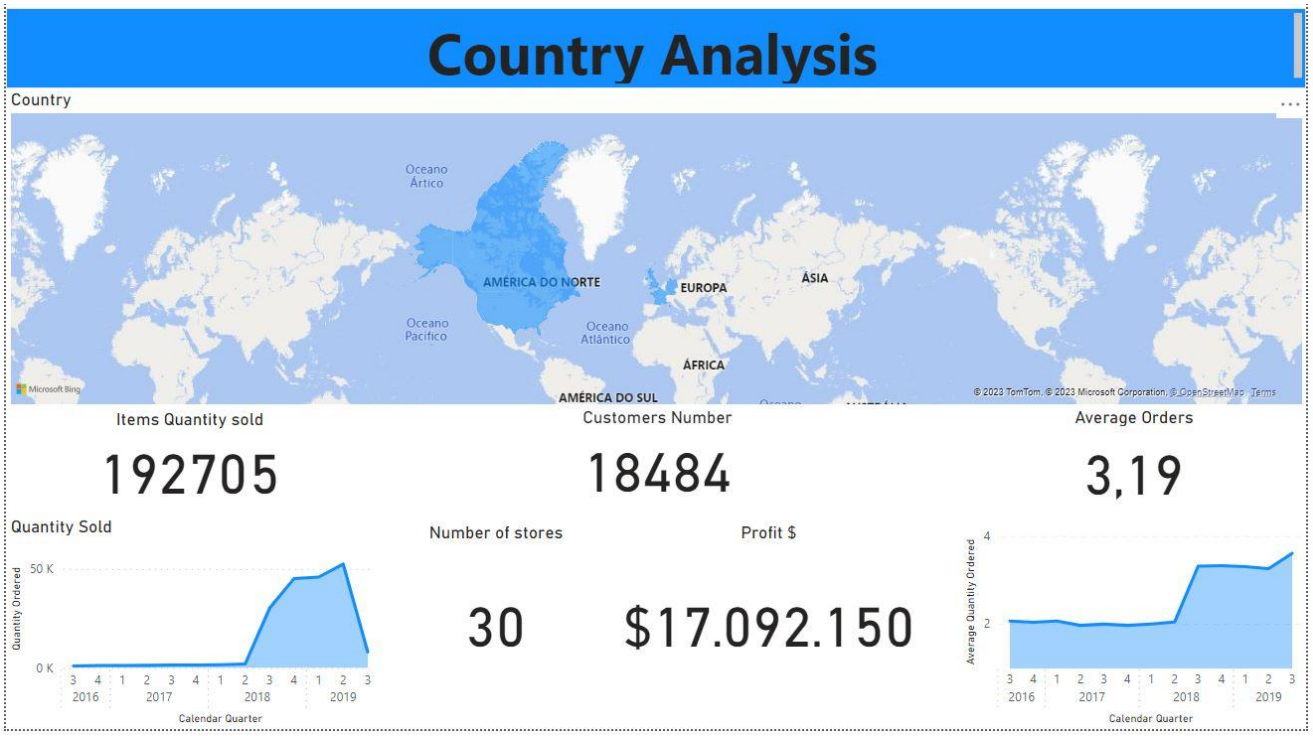


Figure 106 Dashboard VIII

9. This report uses PBI forecasting analysis features for future sales. The median is highlighted in orange and provides an upper and lower limit for the estimations.

Figure 107 Sales Forecast

Conclusion

We continued our work from last semester on this solution for KGB. We had to make some corrections in our DW design for better efficiency and clarity before the implementation in the Data Visualisation phase. We are pleased with the overall result as it provides KGB with a solid backend from the SQL and Visual studio for updating the data warehouse with new data and its seamless integration with the frontend in the form of dashboard/reports made during this phase.
This should prove to be a valuable asset for KGB moving forward as it not only showcases all the relevant information for day to day business tasks but also has the predictive ability to forecast future sales. Many pivotal decisions can be made for the growth of the business based on the infrastructure we have built.