Power BI Report Documentation

for

Case Study: Green Mobility Solutions

Prepared by Nilusche Liyanaarachchi (3272466)

FH Aachen University of Applied Sciences
Power BI

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Chapter 1

About this document

1.1 Purpose

The purpose of this documentation is to analyse the sales performance of the Case Study over the past year and identify key trends and insights that could inform the company's business strategy and decision making. The purpose of this report is to demonstrate my ability to analyze and interpret data using Power BI and to create visualizations that effectively communicate my findings.
This report is based on a fictional sales dataset and is intended for my classmates and instructors as part of a university class assignment.

1.2 Intended Audience

The intended audience for this report is the management team and sales team of the fictional company. The report is intended to provide insights and recommendations that will inform budgeting, forecasting, and resource allocation decisions, and to identify areas of business that may require further analysis or action.

1.3 Definitions, Acronyms and Abbreviations

Term/ Acronym / Abbreviation	Expansion / Description
Green Mobility Solutions	GMBS
Key Performance Indicators	KPI

Chapter 2

Introduction

2.1 Case Study and Context

Green Mobility Solutions (GMBS) is a fictional company that manufactures bicycles and scooters with innovative drive and propulsion methods and sells them through its own stores.
The core products are:

- Hydrogen powered bicycles (touring and sport)
- Cargo bicycles powered by hydrogen
- E-scooters with solar cells
- Accessories

GMBS emerged from a start up and grew rapidly. A structured analysis of business data does not currently exist and is now to be established.
The data originates from the GMBS' own ERP system and is available as an Excel file which consists of different tables.

2.2 Problem definition and Requirements

The management has the following requirements:

- Business key figures, such as sales, costs and profit are to be considered
- The key figures should be analyzed along different dimensions (e.g. date, customer, business)
- Forecasts of future developments are also to be made.
- The data shall be examined for possible correlations.
- A graphical representation of the data is expected

2.3 Limitations and Assumptions

There are a few limitations and assumptions that should be considered when interpreting the results of this report. First, the data used in this report is based on a fictional sales dataset and is not intended to represent actual sales performance.
Second, the analysis in this report is based on a limited set of data and may not capture all relevant factors that could impact sales performance.
Finally, the recommendations and insights presented in this report are based on the assumptions and interpretations made by the author and should be considered in the context of the specific business context and objectives.

Chapter 3

Report Structure

3.1 Navigation

The report consists of seven distinct pages that can be navigated through a navigation bar on the left. The pages "Store Analysis" and "Single Product Analysis" can be navigated to by drill-throughs as well.

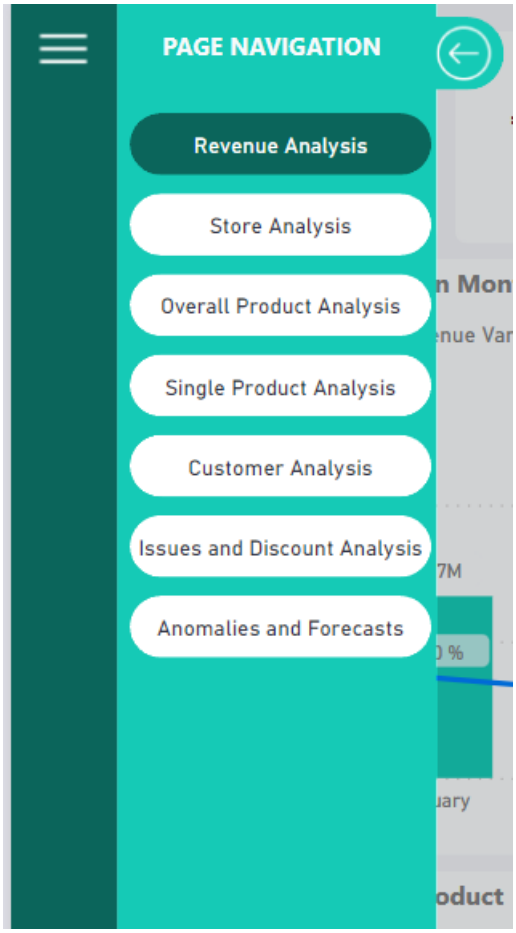

Figure 3.1: Navigation bar in the report

3.2 Pages, noteworthy visualizations and their purposes

This next chapter will explain why noteworthy visualizations were used on pages and what their purpose is for analysis.

3.2.1 Page "Revenue Analysis"

The first page "Revenue Analysis" consists of a broad overview of sales metrics like revenue, profit etc.
The Top row consists of a sequence of cards depicting the key sales-metrics "Total Revenue", "Total Profit", "Total Cost" "Profit Margin in percent", "Total Return Rate in percent".
The purpose of this card visualizations is to provide quick and easy-to-understand summary of a key metric or value.
This can be useful for quickly communicating KPI's or other key metrics to stakeholders, and can be used to track progress towards specific goals or targets.

Figure 3.2: Key sales metrics as cards

The line chart "Revenue Comparison Month to Month" shows changes in the total revenue by months with their respective variance to the previous month in percent.
It is intended to highlight trends and detect seasonality in sales performance over time

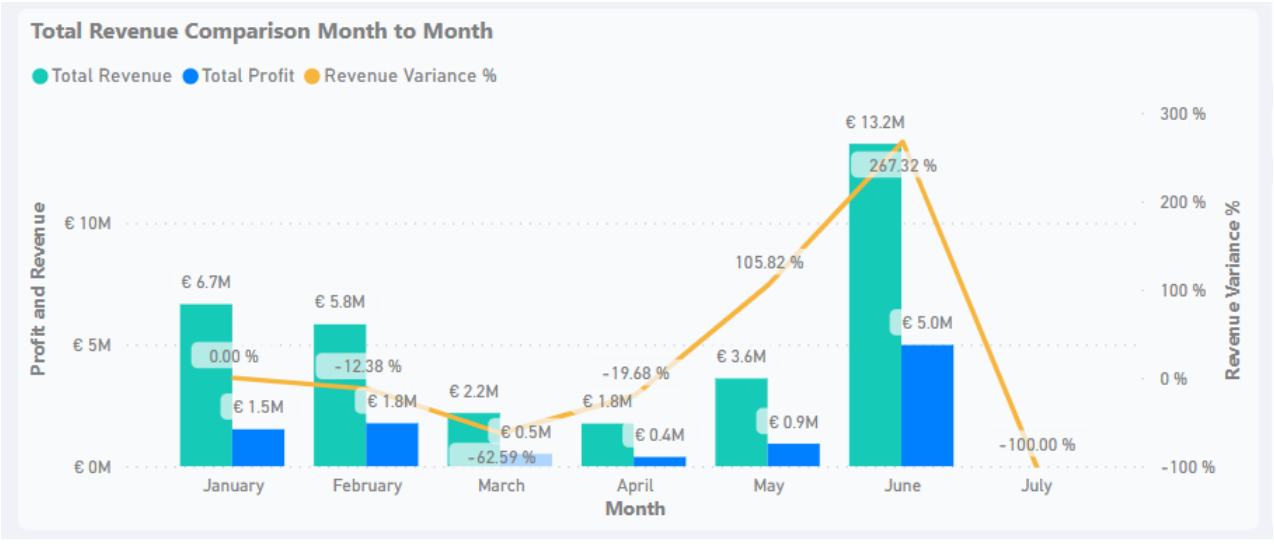

Figure 3.3: Total Revenue from Month to Month with Variance

The bar and pie chart show the breakdown of revenue by product and type of store. The bar chart showing total revenue by product might be used to identify the most and least successful products, or to identify any changes in revenue performance over time. This type of visualization can be useful for identifying opportunities for growth or for identifying areas that may need additional attention or resources.
A pie chart showing revenue by type of store is a type of visualization that is used to compare the revenue generated by different types of stores or store locations. They might be used to identify the most and least successful store types.

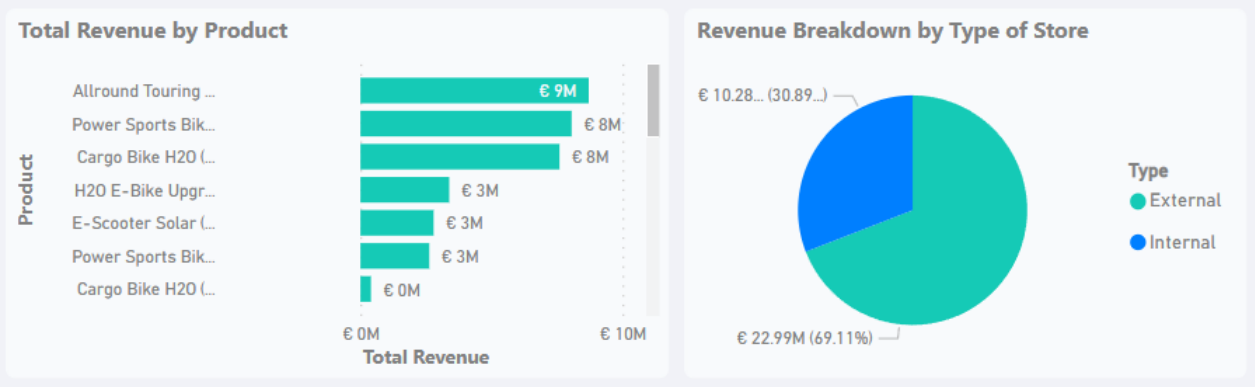

Figure 3.4: Revenue Breakdown by Product and Store

The column chart provides a visual representation of the total revenue for each store. Users can quickly and easily compare the revenue performance of different stores and identify areas of strength or weakness.
They can also be useful for identifying any changes in revenue performance that may be influenced by external factors, such as changes in market conditions or competition.

It is also possible to navigate to the "Store Analysis"-Page by selecting a store in the column chart and pressing the Button to drill-through.

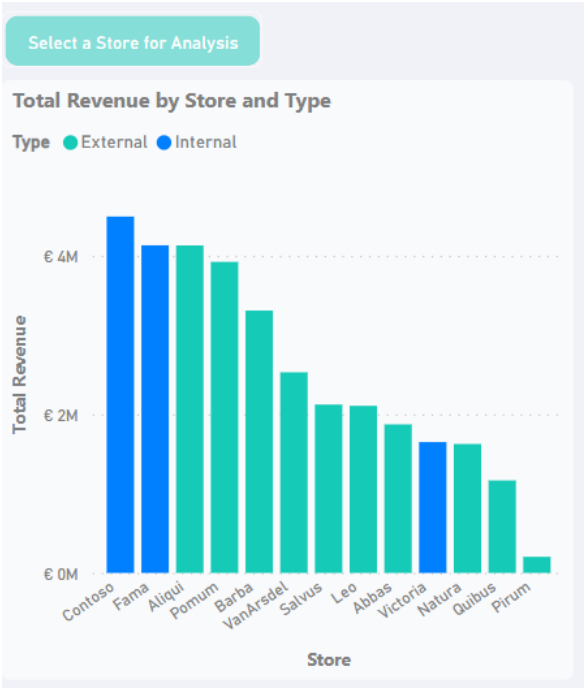

Figure 3.5: Umsatz Aufschlüsselung nach Filiale

The last visualizations which is probably the most important one is a waterfall chart that shows the breakdown of total revenue by the products the have been discounted and the products that have been returned and not sold.
This visualization can be used to help identify opportunities to optimize the use of discounts and returns. By understanding the impact of these factors on revenue, users can identify strategies for maximizing the benefits of discounts and minimizing the impact of returns.
For example, a waterfall chart might reveal that a particular store has a high rate of returns, which is impacting overall revenue performance. By understanding this trend, the store manager may be able to take steps to reduce the rate of returns, such as by offering better product training or by improving customer service. Similarly, if the chart reveals that a particular product has a high rate of discounts, the product manager may be able to identify opportunities to optimize the pricing of the product or to improve its market positioning.

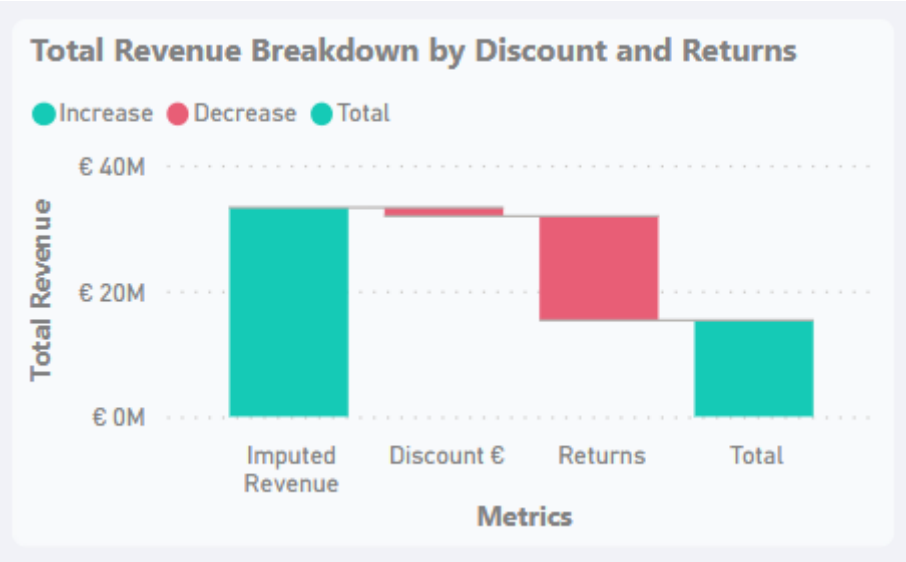

Figure 3.6: Revenue Waterfall-chart

3.2.2 Page "Store Analysis"

The metrics included in the first row of the store analysis page (store name, store type, total units sold, total units returned, total return rate, and total profit) provide a high-level summary of the performance of a particular store. The purpose of these metrics is to provide a quick and easy-to-understand overview of the store's performance and to identify any trends or patterns in that performance.

For example, the store name and store type metrics provide context for the performance data, while the total units sold, total units returned, and total return rate metrics provide information about the store's sales and customer satisfaction. The total profit metric provides an overall measure of the store's financial performance.

Additionally some metrics are conditionally highlighted in respect to the min and max values to induce immediate visual feedback.

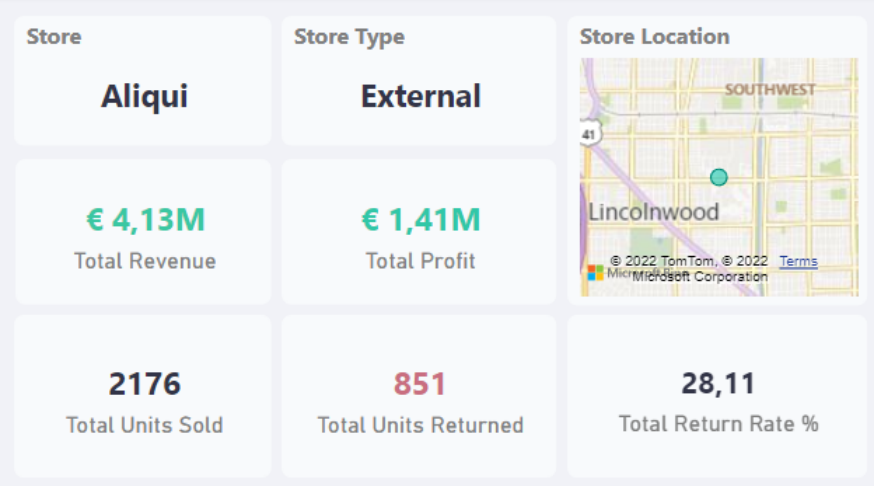

Figure 3.7: Store Key Metrics

For the same reasons as in the "Revenue Analysis"-Page the row below shows a the changes of total revenue by month for that particular store.

By using a line chart to display the number of issues by month and category, users can quickly and easily see how the frequency of different types of issues has changed over time. This can be particularly useful for identifying trends or patterns that may not be immediately apparent when looking at a single metric, such as the overall number of issues.

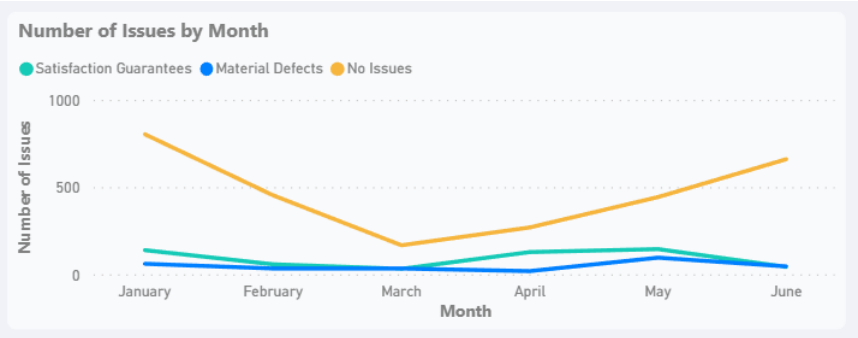

Figure 3.8: Number of Issues by Month and type of Issue

The radar chart might be perhaps the most important visual of this page.
It shows the total units that have been sold and compares them with the total units returned by product.
Here we can identify if their distributions differ from each other which would infer that a particular product is targeted by this loss.

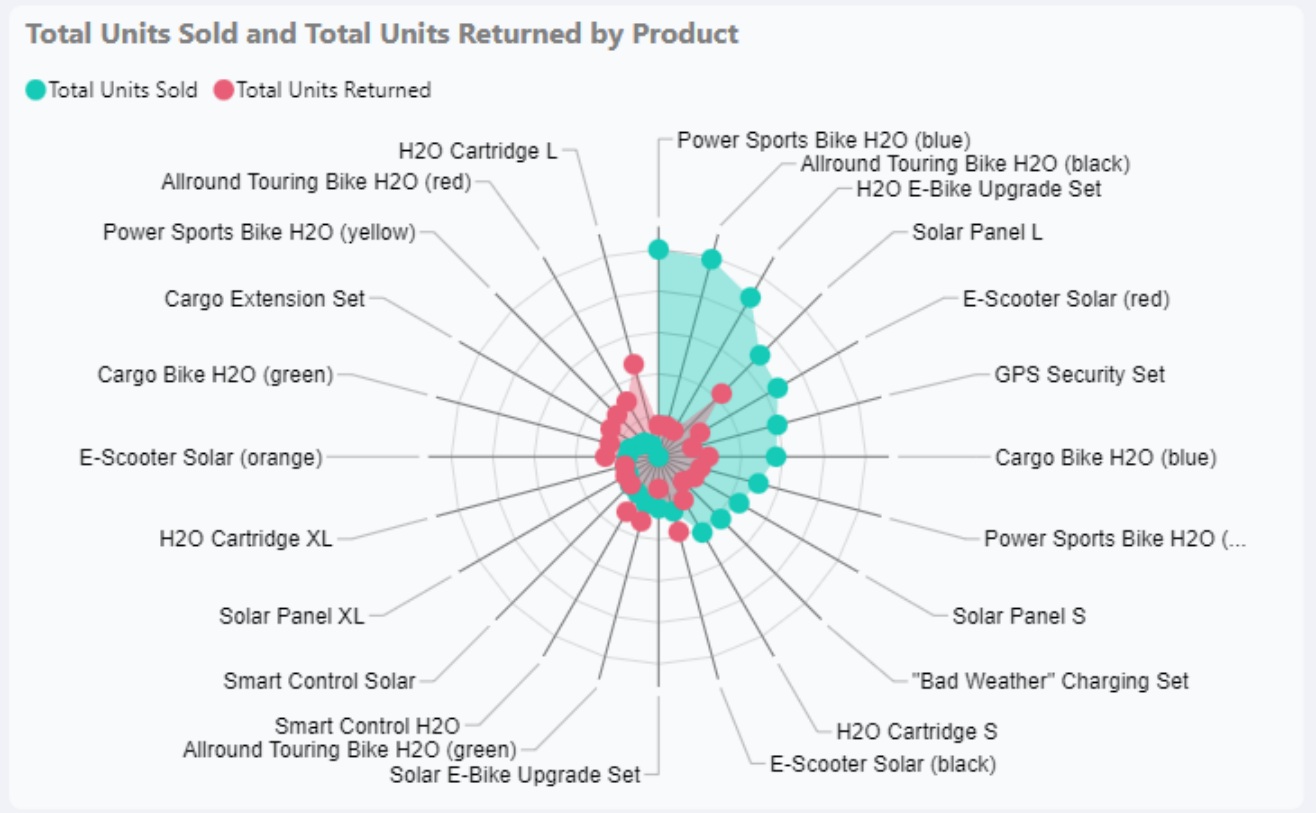

Figure 3.9: Total Units Sold and Returned by Product in a Radar Chart

3.2.3 Page "Overall Product Analysis"

A line chart depicting the changes in profit margin by month can reveal that a particular product or a service has a consistently low profit margin, which is impacting overall profitability. By understanding this trend, the business owner or manager may be able to take steps to improve the performance or the service.

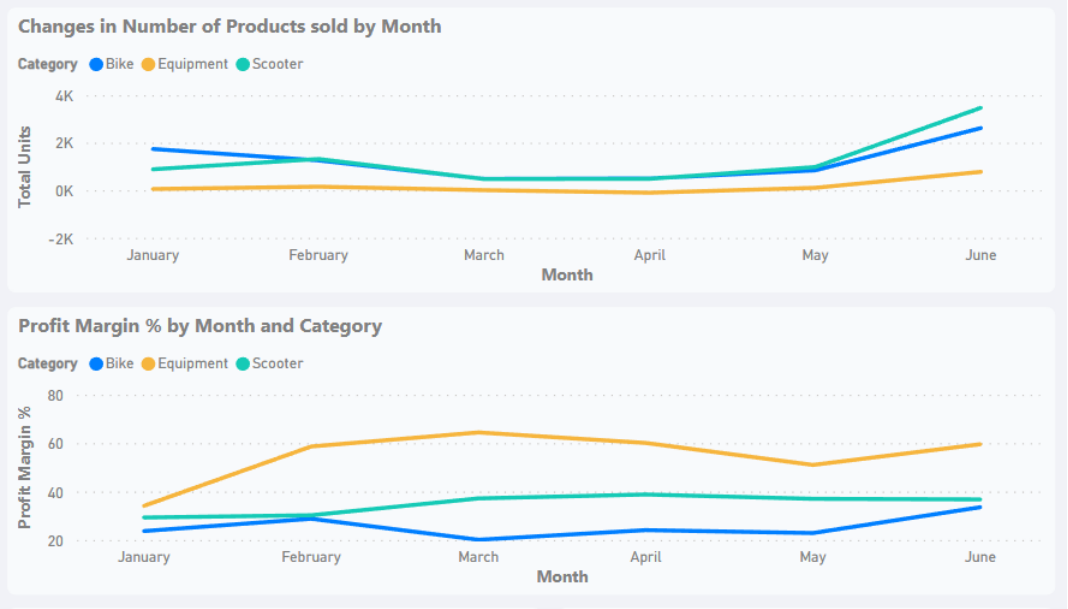

Figure 3.10: Line charts for Number of Products and Profit Margin by Month and Category

By using a scatter plot to display the relationship between the number of products sold and the average revenue by category, users can quickly and easily see how the number of products sold and the average revenue vary across different categories.
This can be particularly useful for identifying trends or patterns in the relationship between these variables, and for understanding how changes in one variable (such as the number of products sold) may impact the other variable (such as the average revenue per product).

For example a scatter plot might reveal that particular category has high average revenue per product, but relatively low sales volume. By understanding this trend the GMBS may be ablte to take steps to increase the sales of this category such as by adjusting pricing or by improving marketing efforts.

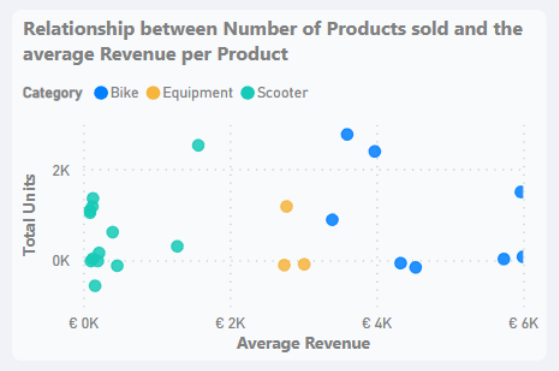

Figure 3.11: Relationship between Number of Products and average Revenue

Similarly to the drill-through in the "Revenue Analysis"-Page, click on one of the rows in the table and pressing the Button "Select a Product for Analysis" to land in the "Single product Analysis"-Page.

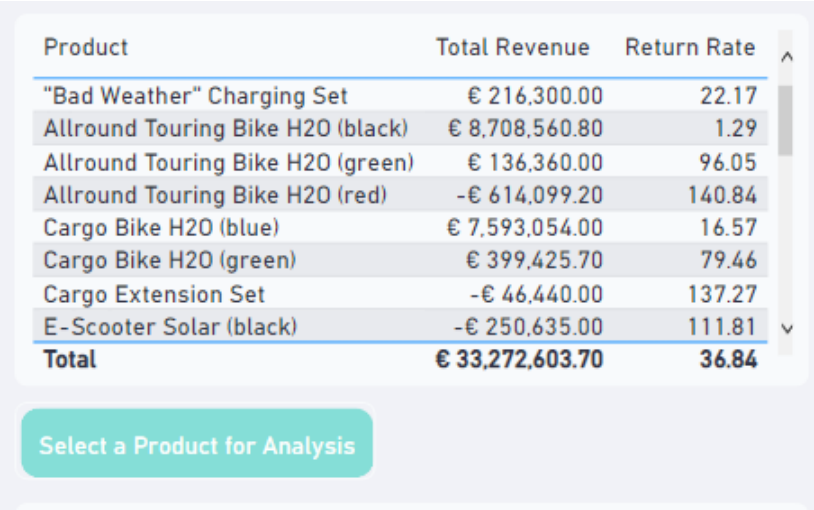

Figure 3.12: Drill-through to the Single product analysis page

To visualize the total Profit by Category I have used a donut chart to represent proportions.
The bar chart visualizing the number of products sold by category has been chosen to contrast revenue and total units sold to see if there is a general linear correlation between those two.

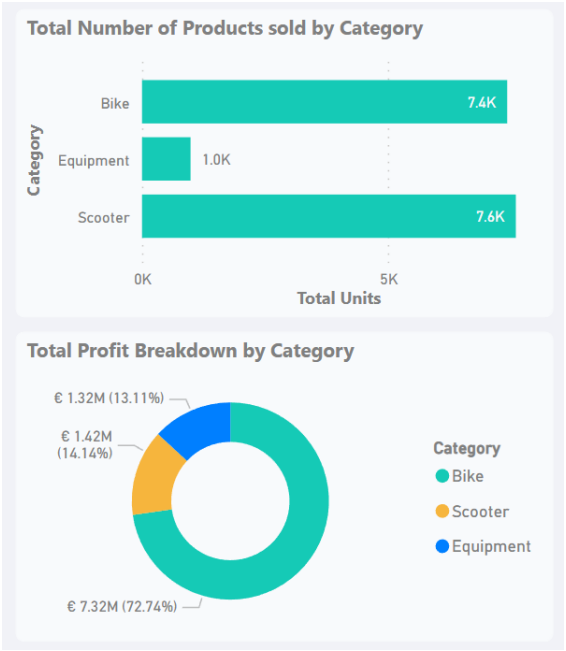

Figure 3.13: Revenue and Total Units Breakdown

3.2.4 Page "Single Product Analysis"

In this page the profitability of a product can be examined. An additional key-metric that is introduced here is the average purchase value.
It is a metrics that measures the average amount of money that a customer spends per purchase and it helps understand the value of each customer and the overall value of the business's customer base.
There are number of reasons that I included this metric:

- Identifying opportunities to increase revenue: By understanding the average purchase value, GMBS can identify opportunities to increase the value of each customer's purchase. This may involve adjusting pricing, promoting higher product or offering bundle deals.
- Tracking the success of promotions or discounts: By tracking changes in average purchase value over time, business can measure the success of promotions or discounts in terms of their impact on customer spending.

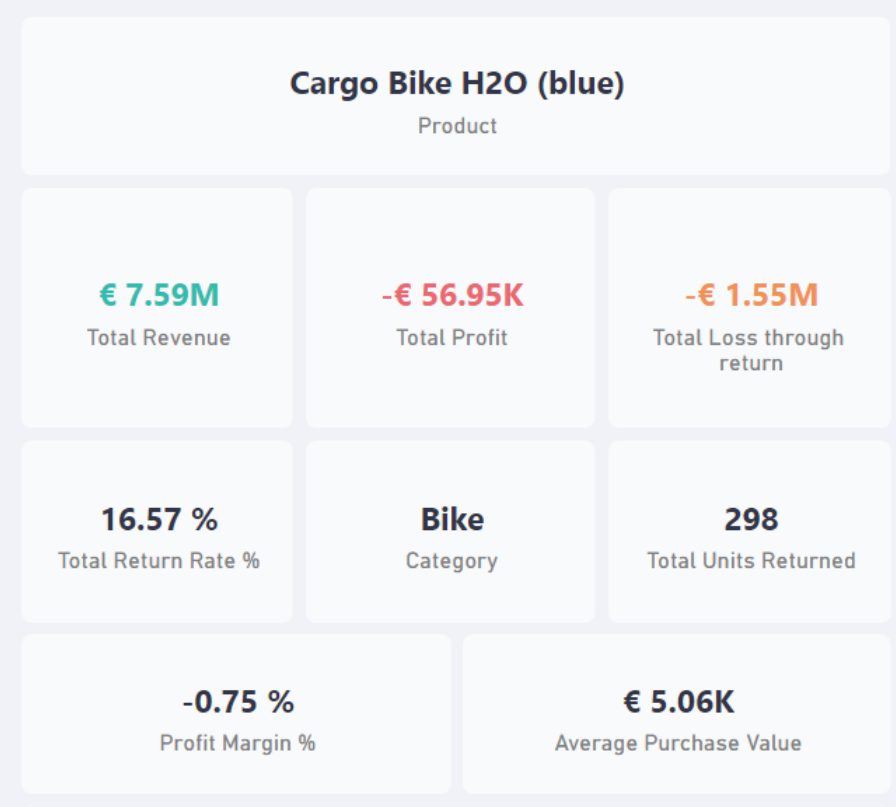

Figure 3.14: Single Product Page Cards

The next metrics shows Total Revenue, Total Profit and Revenue Variance by Month.
This metric might be the most important one for this page since it explains a resulting profit margin very well.

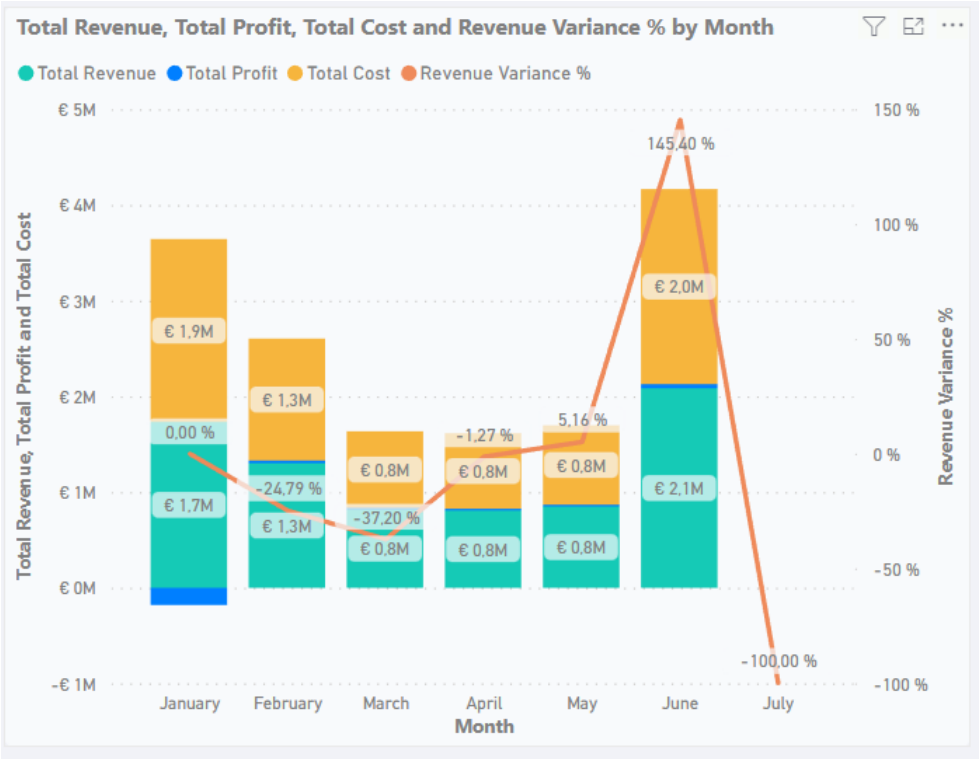

Figure 3.15: Stacked column line chart to track revenue, cost and profit

3.2.5 Page "Customer Analysis"

The bar chart showing the total number of customers by gender is a useful visualization for understanding the distribution of customers by gender. This can be useful for identifying any imbalances or trends in the gender distribution of your customer base and for targeting specific customer segments in marketing efforts.

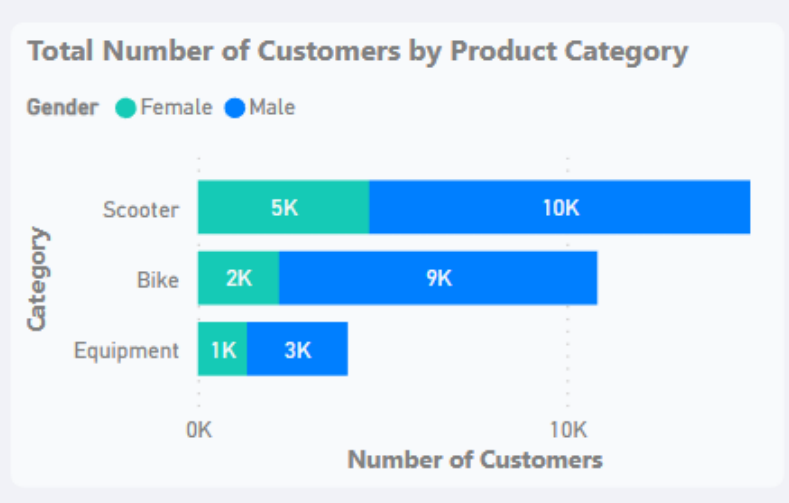

Figure 3.16: Distribution of customers by gender

The funnel chart showing the total revenue by range of age is important to understand the age distribution of GMBS' customers and how this relates to revenue. It can be useful identifying trends in customer spending by age and for targeting specific age groups in marketing efforts.

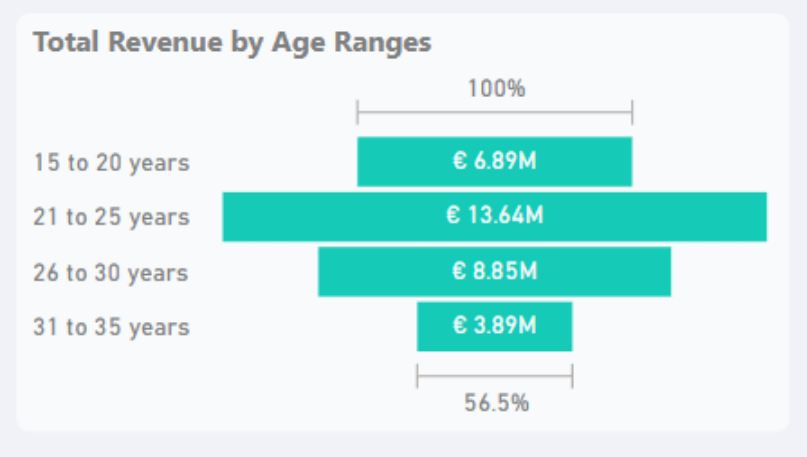

Figure 3.17: Distribution of Revenue by Age ranges

The Key influencer visual gives you a quick way to understand the correlation between target and input variables, it could be useful to understand the relationship between different variables which in turn will guide you to the next steps in your analysis. The following Key influencer-chart shows influences of age by number of units sold and gender is a useful to understand the changes of the age distribution of a customer and how this relates to changes in the overall size of GMBS' customer base.

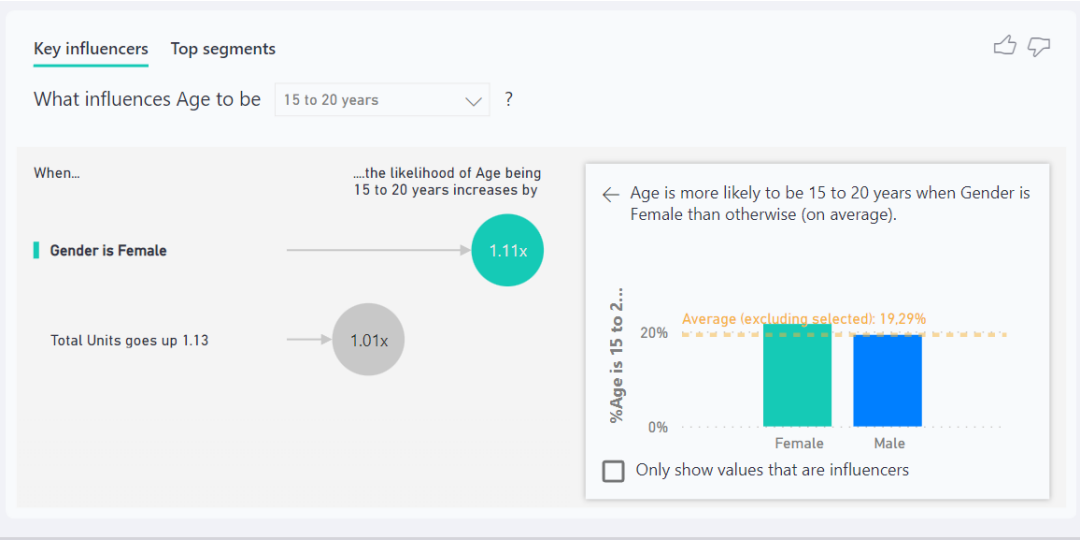

Figure 3.18: Age Influences

3.2.6 Page "Issues and Discount Analysis"

I have used a decomposition tree to decompose the number of issues by type of issue, status and discount. There are a number of reasons why I chose to use this particular visual on this Some of the main reasons include:

- Identifying trends or patterns in the data: By breaking down the data by multiple dimensions, the decomposition tree visual can help you to identify trends or patterns in the data that may not be immediately apparent when looking at the data in aggregate. For example, you might be able to identify patterns in the types of issues that are most commonly associated with certain discounts or with certain statuses (sold or returned).
- Understanding the relative importance of different factors: By visualizing the data in this way, you can also get a sense of the relative importance of different factors in driving the number of issues. For example, you might be able to see that certain discounts or issue types are more strongly correlated with the number of issues than others.
- Facilitating analysis and decision-making: By breaking down the data in this way, you can also make it easier to analyze the data and make informed decisions about how to optimize your discount and issue management strategies. For example, you might be able to identify specific areas where you can focus your efforts to reduce the number of issues, or you might be able to identify opportunities to adjust your discounting strategy to drive higher sales.

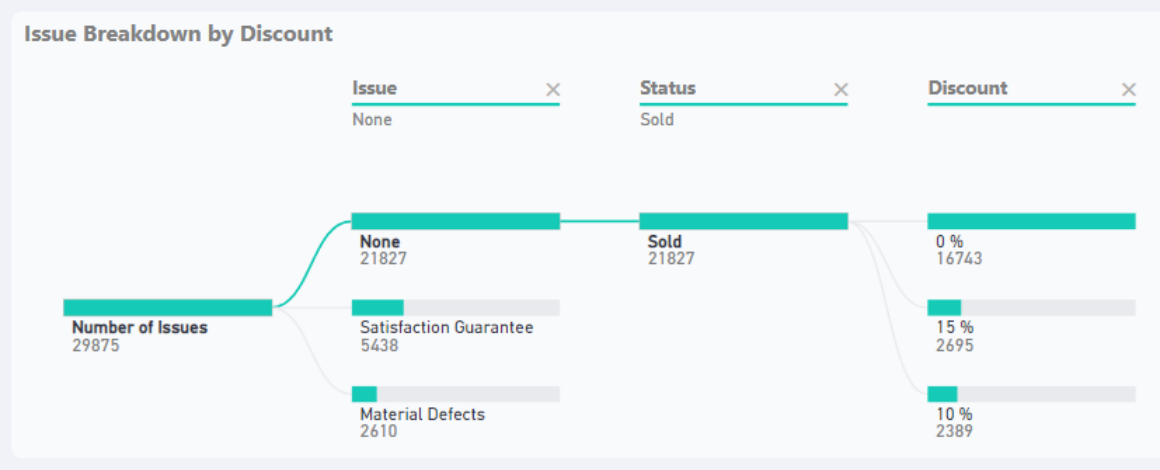

Figure 3.19: Decomposition of Number of Issues

For the same reason as in the product analysis page, there are two line charts that show the changes in the number of issues by type and the total units by type of discount over a course the months.

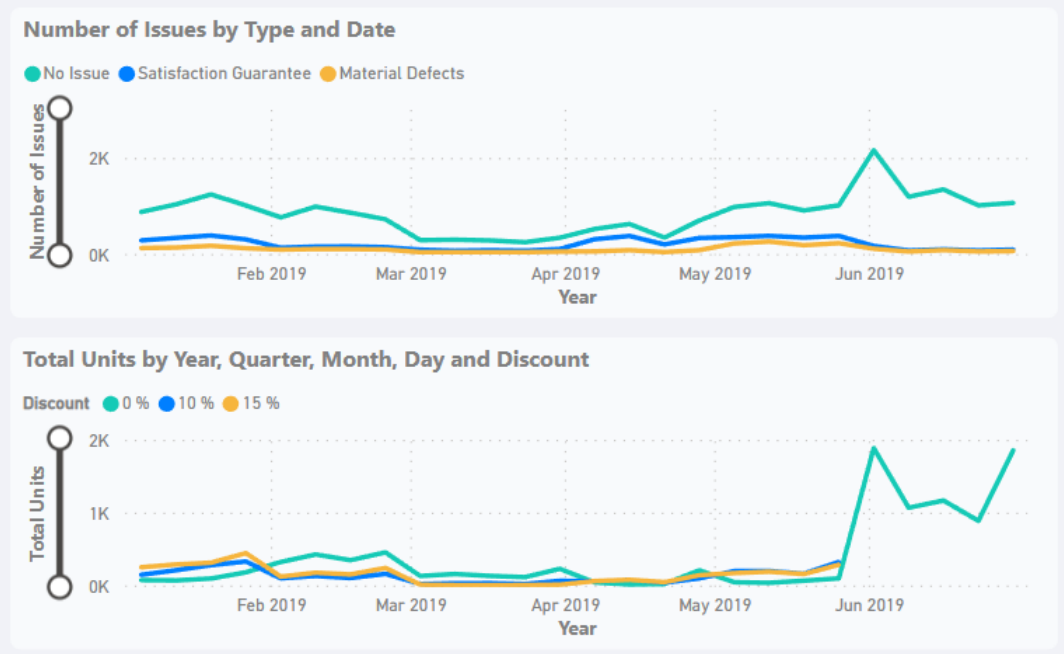

Figure 3.20: Line Chart Issue and Discount Analysis

A radar chart compares the occurrences of Material Defects and Satisfaction Guarantees by store so that any anomalies regarding defects can be detected.

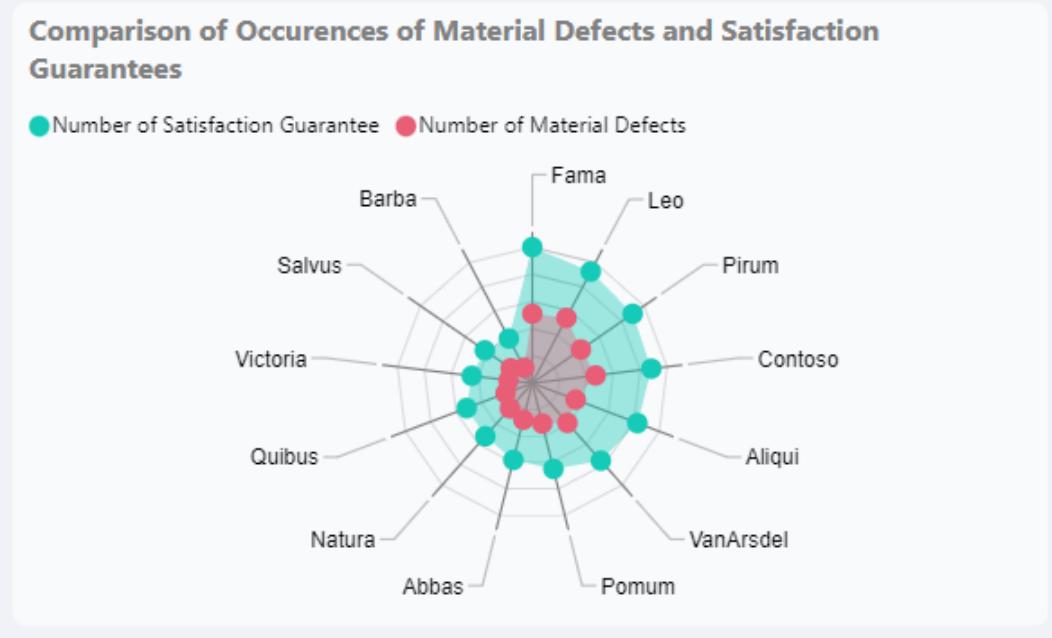

Figure 3.21: Radar chart with type of issue

3.2.7 Page "Forecasts and Anomalies"

The reason for selecting these forecasts will be determined by the unique goals and objectives of GMBS. Planning for future growth, seeing trends or patterns in your data, and making wise resource allocation and budgeting decisions are just a few of the many uses for forecasts.

In this case, forecasting total revenue, number of forecasts, and material defects may be helpful for understanding how these metrics are anticipated to perform going forward and for seeing any prospective possibilities or difficulties that may materialize.
Identifying trends in consumer demand or market conditions that may have an impact on your sales, for instance, may be aided by projecting total revenue, whereas planning for modifications to your product or service offerings may be aided by forecasting the number of forecasts.

Regarding the dependability of Power BI forecasts, it's critical to remember that all projections are based on assumptions and estimates and cannot be relied upon to be accurate. The accuracy of a forecast will depend on a variety of factors, such as the quality of the data used to create the forecast, the appropriateness of the forecasting method used, and the stability of the underlying trend or pattern in the data.

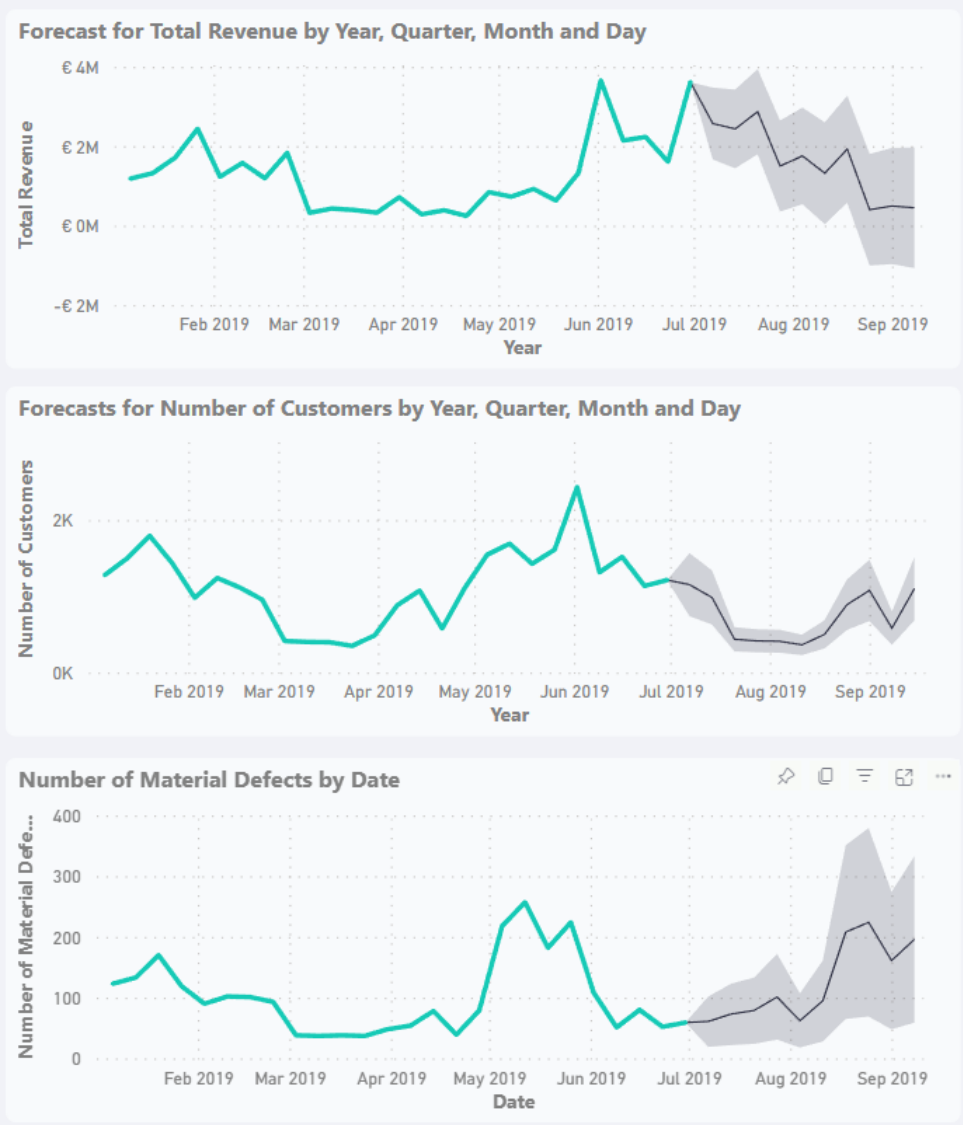

Figure 3.22: Forecasts and Actuals

A visualizations that has been used to highlight outliers is the next one that shows a the total units sold by the different stores over a course of months as a box plot.
There are a number of reasons I used a box plot for this:

- Understanding the distribution of sales: A box plot can help you to understand the distribution of sales across the different stores over time, including the range of values, the median, and the quartiles. This can give you a sense of how sales vary across stores and over time, and help you identify any outliers or anomalies that may be worth further investigation.
- Making comparisons: You can use box plots to compare the performance of different stores or time periods to each other, which can help you identify any differences or similarities in sales. This can be particularly useful if you are trying to identify the factors that are driving performance, or if you are trying to benchmark your sales against other stores or time periods.

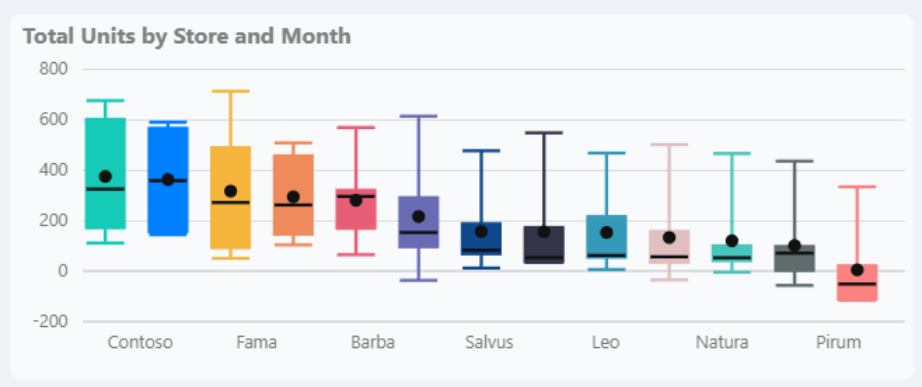

Figure 3.23: Box plot for Sales distribution

Chapter 4

Analysis

4.1 Key Findings

4.1.1 Revenue and Profit Trends

Summary

The analysis of revenue data revealed several key trends that are worth highlighting. First, overall revenue has been steadily increasing over the past year, with the largest growth occurring in Q2.
Second, Profit varies significantly by product category. The largest contributor to Profit is category "Bike" with about 72% of total revenue. This is significantly large as we compare the total units sold by category for Bikes (7.4K) and Scooters (7.6).
The analysis of profit showed a total profit margin of 30.26% most likely do to the amount of total returns of 36.74% returns.

Context

To understand these trends, we analyzed revenue data from the past year only, including data from all of GMBS' stores. We have also looked at data on product category, store location and units returned to see how these factors may be impacting revenue.

Implications

These trends have several implications for GMBS' business. The overall increase in revenue suggests that the efforts to grow the business are paying off and that there may be opportunities for further growth in the future.
The high amounts of returned units pose a threatening factor to the total profit overall.

Visual Aids

- Line and clustered column chart showing overall revenue over time (Fig.3.3)
- Line Chart showing profit margin over time (Fig. 3.10)
- Donut chart comparing revenue by product category (Fig. 3.13)
- Bar chart comparing number of products sold by category (Fig. 3.13)
- Cards showing Key Performance Indicators regarding Revenue (Fig. 3.2)

4.1.2 Customer Demographics

Summary

The analysis of the customer data revealed several key trends in terms of demographics. First, 75%of the revenue is generated by male customers. Second, the largest revenue is generated by customers aged 21-25. Finally the total number of customers increases over the course of the year and is the highest in Q2.

Context

To understand these trends, the customer data from the past year including data on gender, age and the number of customers by month was analyzed.

Implications

The high revenue generated by male customers suggests that GMBS' may need to focus more on marketing to this demographic, or consider ways to increase revenue from female customers. The concentration pf revenue in the 21-24 age range highlights the importance of targeting younger customers, while the high number of customers in Q2 suggests that there may be seasonal patterns in customer behaviour that should be considered.

Visual aids

- Bar chart showing number of customers by product category (Fig. 3.16)
- Funnel chart showing revenue by age range (Fig. 3.17)
- Key Influencer chart showing the influences on age (Fig. 3.18)

4.1.3 Product performance

Summary

The analysis of product data revealed several key trends in terms of performance.
First the total number of products sold is highest for scooters, followed by bikes and equipment. However the total Profit is highest for bikes, followed by scooters and equipment. The average revenue is the highest for bikes. The profit margin of all categories is rising.

Context

To understand these trends the product data from the past year, including the data on the total number of products sold, the total revenue, average revenue the profit margin and the number of products sold by month was analyzed.

Implications

The high total number of scooters sold suggests that is a popular product category that we should continue to focus on. However, the high profit for bikes indicates that this category may be more profitable, even though it has lower sales.
The seasonal pattern in sales highlights the importance of preparing for higher demand in summer months (Q2).

Visual aids

- Line charts showing profit margin and number of products sold over time (Fig. 3.10)
- Scatter chart showing relationship between number of products sold and the average revenue per product (Fig. 3.11)
- bar chart showing total number of products sold by category (Fig. 3.13)
- pie chart showing total revenue by category (Fig. 3.13)

4.1.4 Marketing performance (Issues and Discounts)

Summary

The analysis of discounts and issues data revealed several key trends. First, most of the issues occurred between June and August. Second, discounts of 10% and 15% stopped in June. Third, products that were labeled as satisfaction guarantee or material defects were returned. Finally, of the products that were sold, a majority were not discounted, while a smaller number were discounted with 15% or 10%.

Context

To understand these trends, the data on discounts and issues from the past year, including data on the type of issues, the number of issues by month, the availability of discounts, and the number of products sold with different levels of discount was analyzed.

Implications

The high number of issues in the summer months suggests that GMBS may need to pay more attention to customer satisfaction during this time. The discontinuation of certain discounts in June suggests that these discounts may not have been effective or profitable. The high rate of returns for products with satisfaction guarantee or material defects highlights the importance of addressing customer complaints and ensuring product quality. Finally, the distribution of discounts among products sold suggests that GMBS needs to consider adjusting their pricing strategies to better align with customer demand.

Visual aids

- Line chart showing Issue and Discount changes over time (Fig. 3.20)
- Decomposition Tree showing the decomposition of the number of issues by type of issue, status and discount (Fig. 3.19)

4.1.5 Forecasts and Anomalies

Summary

The analysis of forecast and anomalous data revealed several key trends. First, the box plot of total units sold for each store over the course of the months showed that the boxes were heavily right skewed, with the upper whisker being significantly larger than the lower one. This suggests that the distribution of total units sold among stores is uneven and that some stores are performing significantly better than others. Second, based on our forecasts, revenue and the total number of customers are projected to decrease in the coming months (from September to December).

Context

To understand these trends, the data on forecasts and anomalies from the past year, including data on total units sold by store and projections for revenue and total number of customers was analyzed.

Implications

The uneven distribution of total units sold among stores highlights the need to identify and address any factors that may be contributing to this imbalance. The projected decrease in revenue and total number of customers suggests that we GMBS' need to implement strategies to boost sales and attract new customers.

Visual aids

- Line chart showing forecasts for total revenue and number of customers (Fig. 3.22)
- Box plot showing total units sold by store and time (Fig. 3.23)

4.2 Conclusion and Recommendations

The analysis of the sales data of GMBS has revealed several key trends and patterns.
It is evident that the total units sold among stores is uneven, with some stores performing significantly better than others. Additionally we have discovered that the majority of revenue is generated by males aged 21-25 and that most of the products are sold between June and August (Q2, Summer). We have found that profit margin is generally increasing over time and finally that a large amount of revenue is reduced due to a 36% return rate which results in an overall smaller total profit.

Based on these insights, here are some recommended actions:

- Identify and address any factors contributing to the uneven distribution on total units sold among stores
- Consider implementing strategies to boost sales and attract new customers, particularly in light of the large amount of male customers and small amount of female customers.
- Continue to monitor and optimize product pricing to maximize profit margins
- Keep collecting additional or new type of data (For example Reviews)

It's worth noting that the analysis has some limitations, such as the fact that it is based on data from half a year. However, I believe that the insights and recommendations I have provided offer a strong foundation for improving GMBS' sales and profitability going forward.

Appendices

Appendix A

Data Preparation

A.1 Tables

GMBS provided the following unprocessed Data across 8 different tables:

- Sales (Product Number, Store Number, Order Number, Unit, Date)
- Calendar (Date, Month, MonthSort, Week)
- Customer(ID, Gender, Age)
- Issues and Promotions (ID, Issue, Promotion, Discount)
- Product (Product, ProductID, CategoryID, SegmentID, Price, Cost)
- Category (Category, ID)
- Segment (Segment, ID)
- Store (StoreID, Store, Type, Longitude, Latitude)

A.2 Transformations and computed Columns

This sections describes all the transformations the data of the different tables underwent.

A.2.1 Sales Table

- Changes in data type
- reorder of columns
- Addition of related column Discount of table Issues and Promotions Table
- computed columns Price per unit, cost per unit, cost per order, profit per order, price per order, discount amount

Product Number	Store Number	Status	Order Number	Unit	Date	Price per Unit	Cost per Unit	Discount	Cost per Order	Profit per Order	Price per Order	Discount Amount
12	5	Sold	36510074431	1	Sonntag, 13. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	35261794581	1	Sonntag, 13. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	23806384593	1	Sonntag, 6. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	333594642117	1	Sonntag, 13. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	360210029131	1	Sonntag, 13. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	407034971140	1	Sonntag, 20. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	324608468151	1	Sonntag, 13. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	496794428168	1	Sonntag, 20. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	243750127253	1	Sonntag, 6. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	466795008257	1	Sonntag, 20. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	340236122286	1	Sonntag, 13. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	456379396312	1	Sonntag, 20. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44
12	5	Sold	226336721380	1	Sonntag, 6. Januar 2019	3376	2100	15 %	2100	770	2869,6	430,44

Figure A.1: Final View of Sales Table

A.2.2 Calendar Table

- Changes in data type
- reorder of columns
- Derived columns Year and Day

Date	Week	Year	Month	Day
Dienstag, 1. Januar 2019	1	2019	1	1
Sonntag, 6. Januar 2019	2	2019	1	6
Sonntag, 13. Januar 2019	3	2019	1	13
Sonntag, 20. Januar 2019	4	2019	1	20
Sonntag, 27. Januar 2019	5	2019	1	27
Sonntag, 3. Februar 2019	6	2019	2	3
Sonntag, 10. Februar 2019	7	2019	2	10
Sonntag, 17. Februar 2019	8	2019	2	17

Figure A.2: Final View of Calendar Table

A.2.3 Customer Table

- Changes in data type
- Copy of column age which was a string showing the age range of customers.
  Subsequently the new columns Min Age and Max Age were derived by splitting the copy.
- computed column "Number of Purchases" per Customer

ID	Gender	Min Age	Max Age	Age	Number of Purchases
208044689883	Male	21	25	21 to 25 years	1
314798435888	Male	21	25	21 to 25 years	1
278979498943	Male	21	25	21 to 25 years	1
4342779911024	Male	21	25	21 to 25 years	1
4596435891096	Male	21	25	21 to 25 years	1
2792881731137	Male	21	25	21 to 25 years	1
5933112231146	Male	21	25	21 to 25 years	1
3331698251411	Male	21	25	21 to 25 years	1

Figure A.3: Final View of Customer Table

A.2.4 Issues and Promotions Table

- Changes in data type

ID	Issue	Promotion	Discount
5885927921	None	None	0 %
3098973982	None	None	0 %
5029132964	None	None	0 %
5326135078	None	None	0 %
5701775629	None	None	0 %
21246538910	None	None	0 %
25417292611	None	None	0 %
29749551115	None	None	0 %
42137857517	None	None	0 %
55163693819	None	None	0 %

Figure A.4: Final View of Issues and Promotions Table

A.2.5 Product Table

- Changes in data type
- Reorder of columns

Product	ProductID	CategoryID	SegmentID	Price	Cost
Power Sports Bike H2O (yellow)	1	1	3	€ 3.586,00	1800
Cargo Bike H2O (blue)	2	1	2	€ 5.210,00	5100
Cargo Extension Set	3	3	7	€ 387,00	350
E-Scooter Solar (black)	4	2	1	€ 2.387,00	1000
Cargo Bike H2O (green)	5	1	4	€ 5.394,00	5100
Power Sports Bike H2O (black)	6	1	1	€ 3.030,00	1800
Allround Touring Bike H2O (red)	7	1	6	€ 3.872,00	2100
E-Scooter Solar (orange)	8	2	5	€ 2.617,00	1000
GPS Security Set	9	3	7	€ 80,00	30

Figure A.5: Final View of Product Table

A.2.6 Category Table

- no changes

Category	ID
Bike	1
Scooter	3
Equipment	2

Figure A.6: Final View of Category Table

A.2.7 Segment Table

- no changes

Segment	ID
Black	1
Blue	2
Yellow	3
Green	4
Orange	5
Red	6
n.a.	7

Figure A.7: Final View of Segment Table

A.2.8 Store Table

- no changes

StoreID	Store	Type	Longitude	Latitude
1	Abbas	External	-87,774353	41,965639
2	Aliqui	External	-87,719251	42,012424
3	Barba	External	-87,695392	41,958968
4	Salvus	External	-87,742799	41,911624
5	Fama	Internal	-87,908907	41,904651
6	Leo	External	-87,747134	41,831725
7	VanArsdel	External	-87,745508	41,765605

Figure A.8: Final View of Store Table

A.3 Data Model

The Sales Table has been declared as Fact table which contains numeric fact and foreign keys to dimensional tables.
Here are some reasons why the sales table is chosen as fact table:

1. Data granularity: The granularity of the data in the table can influence which table is used as fact table. This table contains several columns that are used in measures later.
2. Data relationships: The sales table is likely to be closely related to the other tables in the data warehouse, such as the customers table and the products table. These relationships can be used to link the sales table to the other tables in the data warehouse through foreign keys.
3. Data volume: The sales table is likely to contain a significant volume of data, as it will contain records for every sale made by GMBS. This large volume of data makes the sales table a good candidate for the fact table.

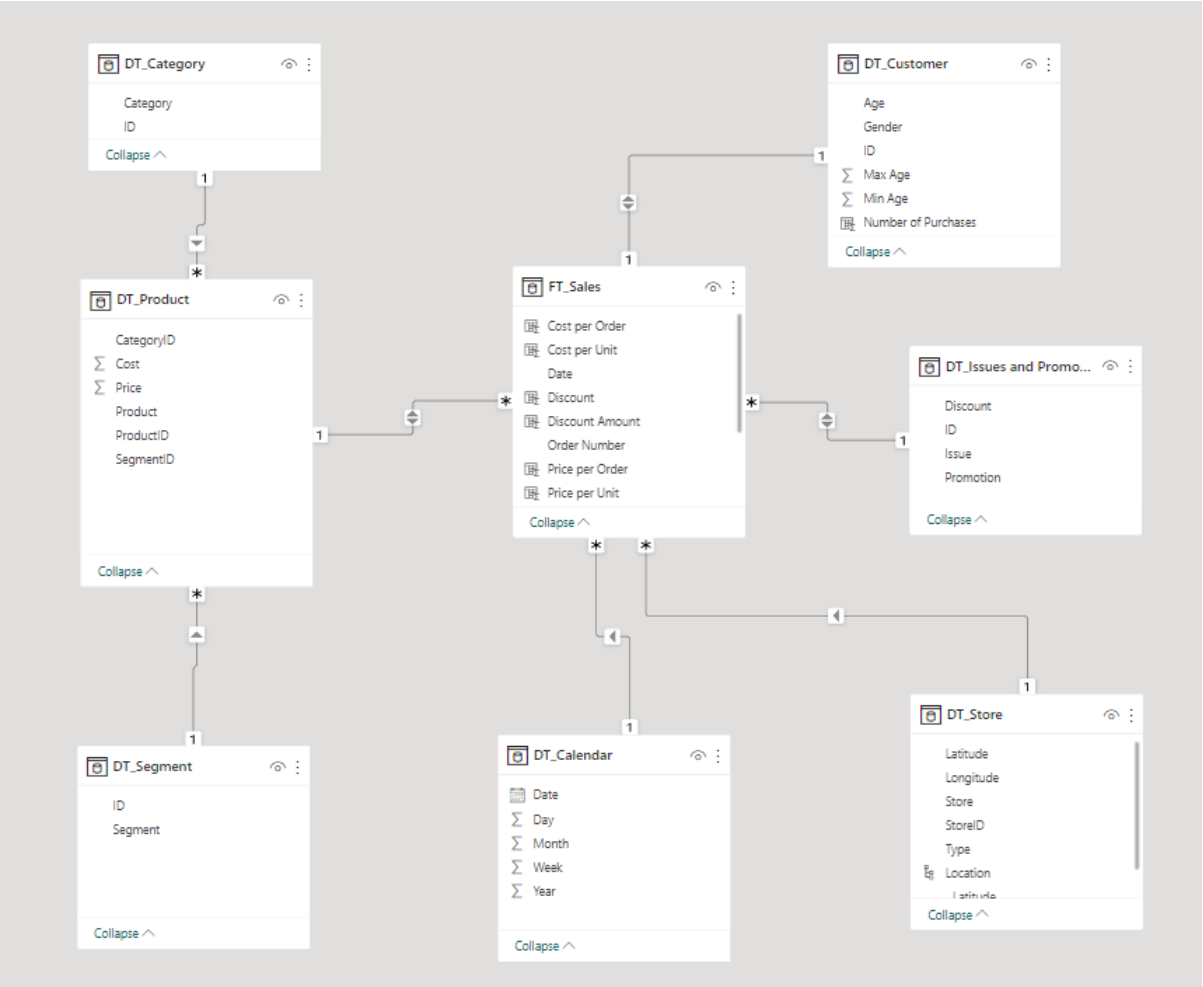

Figure A.9: Final Data Model

Since some of the dimensional tables are sub-dimension tables and not directly connected to the fact table (Category, Segment) but they are connected to another dimension table (Product) this Data model has a snowflake schema.

A.3.1 Relationships

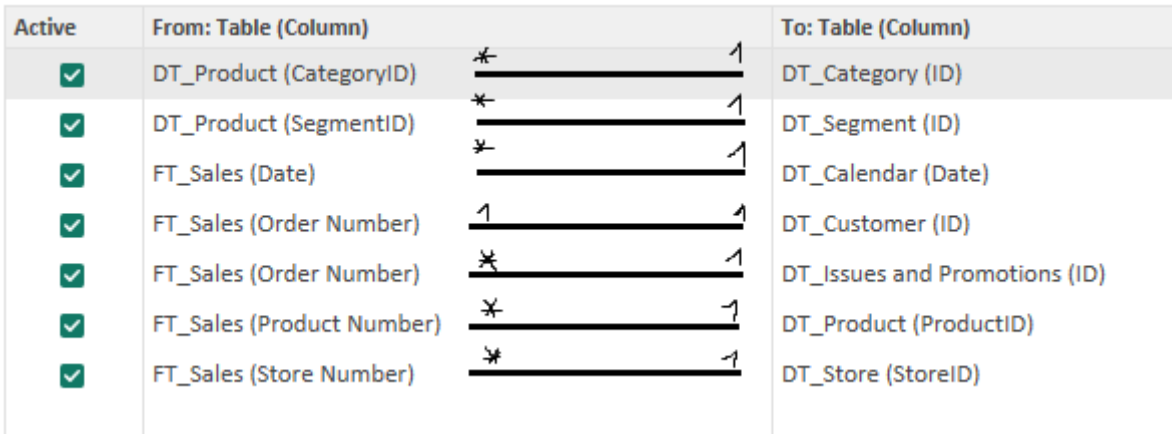

Figure A.10: Data Relationships between Tables

A.4 Computed Tables

This report contains a table called "Revenue Breakdown". It is used to display the breakdown of total revenue by the discounted amount and the returned amount in the waterfall chart in Fig. 3.6

Metrics	Revenue
Imputed Revenue	€ 33.272.603,70
Discount €	-€ 1.369.592,21
Returns	-€ 16.577.715,00

Figure A.11: Revenue Breakdown

A.5 Measures

A.5.1 Sales Measurements

To understand some of these measures one need to understand that one sales record contains a status "sold" or "returned" to its status.
A "returned" status means that there is also a record in the sales table with the same Order Number with the status "sold".
Following that premise many measures will have several different calculations for the same semantic measure.

Average Revenue Returned

```
Average Revenue Returned = CALCULATE(AVERAGE(FT_Sales[Price per Order]), FT_Sales[Status] ="Returned")
```

Average Revenue Sold + Returned

```
Average Revenue Sold + Returned = CALCULATE(AVERAGE(FT_Sales[Price per Order]), FT_Sales[Status]="Sold")
```

Number of Purchases

```
Number of Purchases = DISTINCTCOUNT(FT_Sales[Order Number])
```

Revenue Variance abs

```
Revenue Variance = [Total Revenue] - [Total Revenue Last Month]
```

Revenue Variance in percent

```
Revenue Variance % = DIVIDE([Revenue Variance], [Total Revenue Last Month], 0)
```

Profit margin

```
Profit Margin % = DIVIDE([Total Profit], [Total Revenue],0)
```

Total Cost

```
Total Cost = [Total Cost Sold + Returned] - [Total Cost Returned]
```

Total Cost Returned

```
Total Cost Returned = CALCULATE(SUM(FT_Sales[Cost per Order]), FT_Sales[Status] ="Returned")
```

Total Cost Sold + Returned

```
Total Cost Sold + Returned = CALCULATE(SUM(FT_Sales[Cost per Order]), FT_Sales[Status] ="Sold")
```

Total Profit

```
[Total Profit Sold + Returned] - [Total Profit Returned]
```

Total Profit Returned

```
Total Profit Returned = CALCULATE(SUM(FT_Sales[Profit per Order]), FT_Sales[Status] = "Returned")
```

Total Profit Sold + Returned

```
Total Profit Sold + Returned = CALCULATE(SUM(FT_Sales[Profit per Order]), FT_Sales[Status] = "Sold")
```

Total Return Rate percent

```
Total Return Rate % = DIVIDE([Total Units Returned], [Total Units Sold + Returned 2], 0)
```

Total Revenue last month

```
Total Revenue Last Month = CALCULATE([Total Revenue],
                               PARALLELPERIOD(DT_Calendar[Date].[Date], -1, MONTH))
```

Total Revenue

```
Total Revenue = [Total Revenue Sold + Returned] -[Total Revenue Returned]
```

Total Revenue Returned

```
Total Revenue Returned = CALCULATE(SUM(FT_Sales[Price per Order]), FT_Sales[Status] ="Returned")
```

Total Revenue Sold + Returned

```
Total Revenue Sold + Returned = CALCULATE(SUM(FT_Sales[Price per Order]), FT_Sales[Status]="Sold")
```

Total Units

```
Total Units = [Total Units Sold + Returned] - [Total Units Returned]
```

Total Units Returned

```
Total Units Returned = CALCULATE(SUM(FT_Sales[Unit]), FT_Sales[Status] ="Returned")
```

Total Units Sold + Returned

```
Total Units Sold + Returned = CALCULATE(SUM(FT_Sales[Unit]), FT_Sales[Status] ="Sold")
```

A.5.2 Customer Measurements

Customer Variance abs

```
Customer Variance = [Number of Customers] - [Number of Customers Last Month]
```

Customer Variance percent

```
Customer Variance % = DIVIDE([Customer Variance], [Number of Customers Last Month], 0)
```

Number of Customers

```
Number of Customers = COUNT(DT_Customer[ID])
```

Number of Customers last month

```
Number of Customers Last Month = CALCULATE([Number of Customers],
                                    PARALLELPERIOD(DT_Calendar[Date].[Date], -1, MONTH))
```

A.5.3 Issues Measurements

Average Discount

```
Average Discount = AVERAGE(FT_Sales[Discount])
```

Average Purchase Value

```
Average Purchase Value = DIVIDE([Total Revenue], [Total Units], 0)
```

Number of Issues

```
Number of Issues = COUNT('DT_Issues and Promotions'[Issue])
```

Number of Material Defects

```
Number of Material Defects = CALCULATE(COUNT('DT_Issues and Promotions'[Issue]), 'DT_Issues and Promotions'[Issue] = "Material Defects")
```

Number of Nones

```
Number of Nones = CALCULATE(COUNT('DT_Issues and Promotions'[Issue]), 'DT_Issues and Promotions'[Issue] = "None")
```

Number of Satisfaction Guarantees

```
Number of Satisfaction Guarantees = CALCULATE(COUNT('DT_Issues and Promotions'[Issue]), 'DT_Issues and Promotions'[Issue] = "Satisfaction Guarantee")
```

A.5.4 Miscellaneous Measurements

Number of external Stores

```
Number of External Stores = CALCULATE(COUNT(DT_Store[StoreID]), DT_Store[Type]="External")
```

Number of internal Stores

```
Number of Internal Stores = CALCULATE(COUNT(DT_Store[StoreID]), DT_Store[Type]="Internal")
```