Business Intelligence: Final Project Report

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H&M Final Report

Section 1: Executive Summary

In this project, we studied a H&M dataset including transaction, customer and product data from Sept. 2018 - Sept. 2020. The available meta data spans from simple data, such as garment type and customer age, to text data such as product descriptions. Our project goal is to provide data analyses based on the above-mentioned dataset and help H&M better understand customers' preferences, improve manufacture and design strategies so as to increase revenue.

Some of the problems that we addressed include, but not limited to:

- How does the annual sales/transactions change from 2019 to 2020?
- How does each sales channel contribute to the total revenue?
- What are the most popular products in 2019 and 2020?
- Overall speaking, what are the most popular seasonal products?
- What are the quantities sold per product group for the most recent 12 months?
- What are the fluctuations for quantity sold per product group for the most recent 12 months?
- What are the top selling product groups for the past 12 months?
- What are the specific types/designs/colors of the top selling products?
- Who is the best/most loyal customers and what are their preferences?

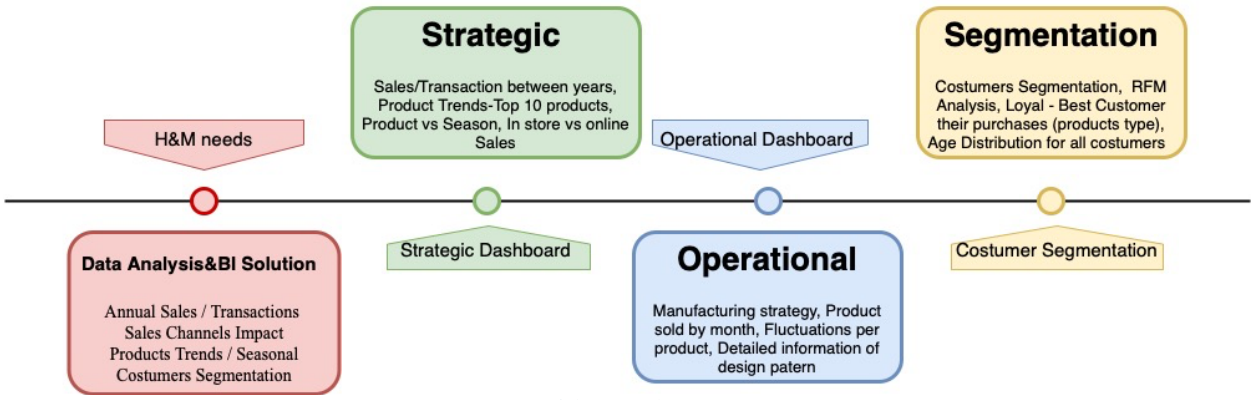

Figure 1: Overview of the BI Solutions

To answer the above questions, we conducted three different types of analyses, which are illustrated in the flow chart in Figure 1 above:

1. We developed a strategic dashboard to understand the general sales trend in terms of total revenue, number of transactions and sales channel distribution from 2019 to 2020. In the same dashboard, we also analyzed the top 10 product and top seasonal products by product type as well as the most popular colors. This information is intended for the management

team of the company to understand general customer preferences, and how the company was doing from 2019 to 2020, and how the pandemic lockdown affected the sales in 2020.

2. We developed an operational dashboard to help streamline the manufacturing strategies on an operational level for the company. In particular, we looked at the detailed breakdown of monthly quantities sold per product category for the most recent 12 months. We also analyzed the fluctuations of quantities sold for each product type from month to month to help the company plan for the production orders. Next, we also looked at the top revenue generators from the past 12 months and what design patterns or product types were trending. This information could guide the company to produce clothes that could generate more sales, thus increasing revenue.

3. We performed a customer segmentation analysis using the established RFM analysis framework. The RFM analysis is one of the most extensively utilized approaches, as it enables us to make customized special offers in order to increase sales and client retention. We intend to use the RFM analysis to identify the most loyal and best customers of H&M, who contributed to the majority of the annual revenue, and dive into their shopping preferences to help craft strategies to increase sales.

We will provide insights upon our analyses of the above three areas. In addition, we will also provide processes and recommendations for implementing our suggestions based on our data analytics insights.

Section 2: Introduction

Company Background

Figure 2: H&M Group

H&M Hennes & Mauritz AB (H&M) is a Swedish multinational clothing company headquartered in Stockholm. It focuses on fast-fashion clothing for men, women, teenagers, and children. As of November 2019, H&M operates in 74 countries with over 5,000 stores under the various company brands, with 126,000 full-time equivalent positions.

It is the second-largest global clothing retailer, behind Spain-based Inditex (parent company of Zara). The H&M group has a multi-brand matrix organization with well-defined brands: H&M, H&M HOME, COS, & Other Stories, Monki, Weekday, ARKET and Afound. Each brand is headed by a responsible individual and has local sales organizations. Centrally, there are a number of group functions that support each brand in order to enjoy the advantages of these common areas, so that each brand and country works purposefully according to central policies and guidelines.

The chief executive officer, who is appointed by the board of directors, is responsible for day-to-day management of the H&M group and appoints the members of the executive management team, which is fifteen persons including the CEO. The executive management team is made up of seven women and eight men, and comprises the CEO, CFO, the person with responsibility for the H&M brand, the person with responsibility for Portfolio Brands (which include COS, & Other Stories, Monki, Weekday and ARKET), the person with responsibility for Business Ventures (which include Afound and Treadler), the head of Business Tech and the CTO reporting to that role, and the heads of the following group functions: Expansion, Strategy & Transformation, Human Resources, Sustainability, Supply Chain, Communications, The Laboratory and the Group Strategy Council. Those responsible for other group functions are appointed by the CFO. [1]

H&M Group is about making fashion and design accessible to everyone in a sustainable way. The vision is to make fashion and design accessible to everyone, in a way that's good for people, the planet, our industry and the business. In the H&M Group 2020 Report they report 187 billion SEK net sales, they have around 153 000 employees and around 5000 stores in 74 markets and e-commerce in 52markets. [2]

Scope of the Project

The project we have implemented is about Business Intelligence solutions which improve the operational, strategic, and customer-based decision of one of the H&M Groups brands which is H&M. H&M as a big company and has a dedicated Business Intelligence Group which gathers information and together with other department experts identify and set priorities based on the business short- and long-term goals and needs. Based on the departments and the section, the Business Intelligence Group reports early and gives the necessary overview status of the company. The data we are using in this project is based on the H&M sales in the USA from previous transactions, as well as from customer and product meta data. We are going to give our contribution in using data analytics models and BI solutions to manipulate the data and get insights from the dataset based on their products trends, sales, and transactions. All these analyses will help H&M to focus on specific target customers that will help in improving their role on the market.

Current Status of BI and Analytics Tools

As a global company, finding specific BI tools which H&M is using is not very easy due to the company's privacy and their strategic role on the market. What is very easy to understand is that they have invested a lot in the Business Intelligence Group. One of the tools was from Microsoft that the company found particularly useful was the Center of Excellence (CoE) Starter Kit. Included in the kit is a Power BI dashboard template that provides a holistic view of a company's Power Platform activity and infrastructure. "The Power BI dashboard included with Microsoft's Center of Excellence Starter Kit gave us all the telemetry we needed to identify potential risks in our Power Platform," says Forsberg. That initial telemetry provided the company with three key insights as shown below. [3]

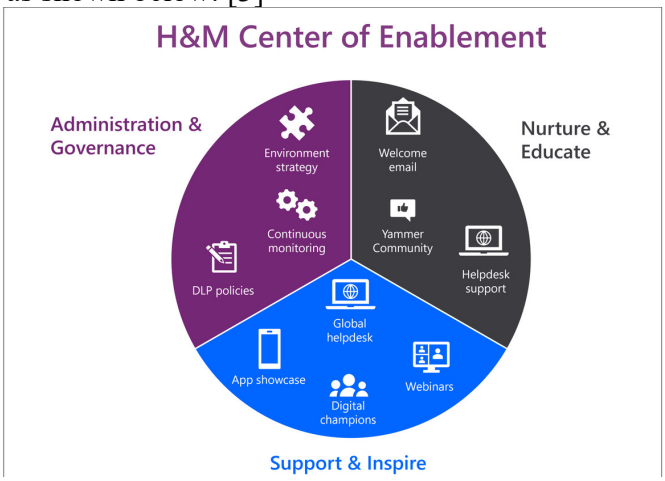

Figure 3: H&M Group leveraged the Power Platform Center of Excellence Starter Kit

Two Power Platform solutions for the employees used by H&M are:

PO Key Activities & Goals App: This app enables employees to set and track the progress of global and regional activities against a goal set annually. The solution not only collects and consolidates reports but automatically displays activities in Power BI developed by Marie Nordstroem, a citizen developer at H&M Group who created the app. The second one

FLEXI app solution: When flexible working hours were introduced in many offices at H&M Group, employees found it increasingly difficult to track down colleagues. A mobile app created in Power Apps makes it easy for employees to quickly update their location and view similar updates from colleagues.

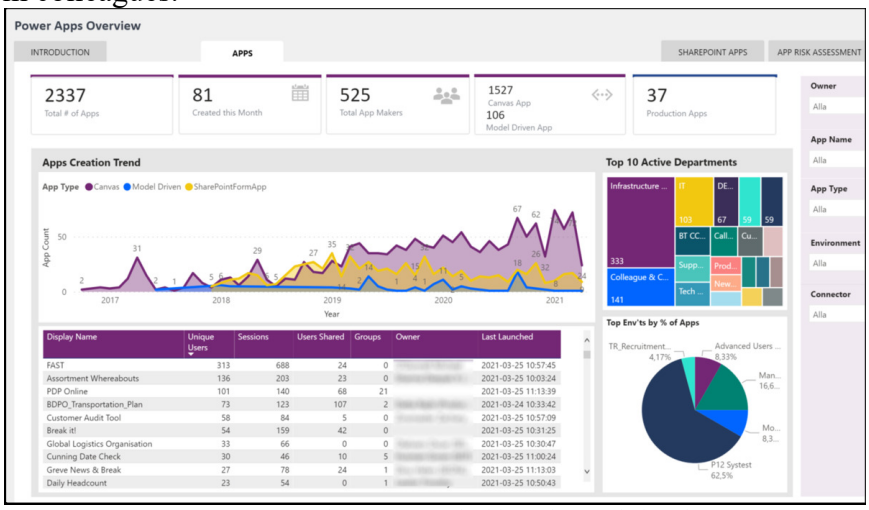

Figure 4: H&M GROUP uses the Power BI dashboard provided in the CoE Starter kit to monitor Power Platform activity

From the sales department the H&M Group uses various technologies which have been improved through years. The Excel reporting is no longer available and more developed and sophisticated tools are used. H&M is using TIBCO Spotfire. The TIBCO solutions empower the analysts of the companies to integrate all data sources, such as Hadoop databases and data warehouses, without an information technology (IT) specialist. Executives and employees can also analyze complicated data without IT expertise. [14].

H&M has always invested in its digital transformations initiatives which has helped it to be on the top of the market and to have a significant role in society. From our research the below tools have been used throughout the year.

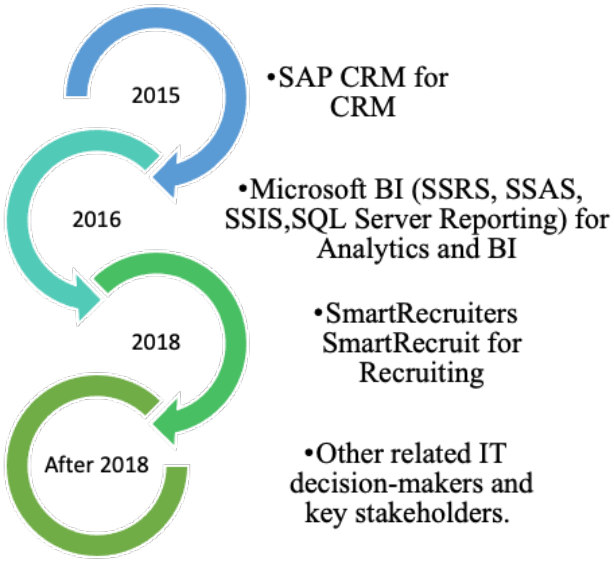

Figure 5: H&M Digital Transformation

The position of the H&M in the BI maturity has shown that it has been invested and it continues progressing. H&M is now part of the AI-driven retail approach. Which has increasingly turned to artificial intelligence (AI) for help in the guest to give customers what they want. H&M AI-driven retail has enabled brands to compete in the economy of the 21st century and meet modern customer demands by personalizing the shopping experience. Errol Koolmeister, H&M Group's Product Area Lead Engineer AI Foundation at H&M Group during his talk at the Data Innovation Summit 2019, explained that they first started adopting AI into their business in 2016. The impact of digitalization was clearly visible, and H&M Group knew they had to do something to stay relevant. Here are some tangible examples thanks to implementing AI solutions [4].

1. **Keeping popular items stocked** — H&M relies on staying on top of trends in order to be successful. With the help of algorithms, they analyze store receipts and returns to evaluate purchases in each store. This way, the fashion brand knows which items to promote and stock more of in certain locations.

2. **Predicting market demand** — Fashion retailers like H&M rely on fresh products at competitive prices. Data insights help H&M to predict what the market wants so they don't have to discount their inventory to sell it out.

3. **Automated warehouses** — Today customers expect fast, hassle-free deliveries anytime and everywhere. Therefore, H&M Group has invested in automated warehouses that will ultimately offer next-day deliveries for the majority of the European markets. The warehouses and their free shipping, exclusive for loyal customers, are driven by algorithms and data.

4. **Personalized offline customer experience** — H&M has introduced its personalized online recommendations also in their physical stores, with the help of RFID technology. Customers get in-store merchandise suggestions selected by algorithms. They can also see if an item they have seen online is available in a physical store, and scan labels to see if an item is available in another store or online.

5. **Tailor-made clothing** — Partnering with an AI-technology platform, the Swedish fashion brand has tested on-demand production, which shows great potential to react more specifically to customer's wishes, and to align product quantity to local demand.

Summary of Two Cases

1. Zara Case Study

The fashion industry is growing its dependency on data analytics to keep up with customers' growing demands and latest trends. The fashion industry is at the early stage of applying data analytics to increase sales, meet demands and solve problems. With time, it will be more interesting to see how fast fashion utilizes data analytics potential to the fullest.

Zara uses in-depth data analytics to manage the supply chain and deliver customers what they want. Zara has disrupted the fashion market with the use of data analytics to keep up with the customer's demand in real-time. Zara does not believe in spending on advertisements. The funds saved are diverted to hiring fresh talent. This helps generate new designs and improve their sales pipeline. Technology plays an important role in this process. Data gets collected from stores, surveys, and customer opinions. This is used to fuel the requirements for new designs. The collected data is sent directly to the headquarters. It is analyzed to understand the needed changes. The rectifications are made to the supply chain and inventory systems. Strong data analytics has led to Zara being one of the most successful brands in the world. Let's look at the top reasons for its growth over the years.

1. Zara is tracking **sales data analytics** (such as: product name, counts, profits). They track how long it stays on shelves and the remaining items from this item and if they need to refill the shelves and their location. All that enabling them to serve its customers with:
    - Trends that they actually want,
    - And eliminate designs that don't have customer pull.

2. Every morning, they dive through the sales data from stores across the world to determine what items are selling and accordingly tailor their designs that day. Zara has so-called **fashion data analytics** which analyze data about the previous sales, popular products, customers feedback and preferences. And up to this data, they design their products which helps Zara to avoid being left with excess inventory that they then must discount heavily at season-end.

3. Using analytics, they realize the **peak hours** of their stores and based on that they have improved the availability of store staff during that time to serve customers.

4.
5. Zara uses **demographic analytics** to design its collections based on the exact zip code and demographic that a given location serves

Benefits:

- Zara sells over 11,000 distinct items per year versus its competitors that carry 2,000 to 4,000.
- Zara also boasts the lowest year-end inventory levels in the fashion industry.
- Zara has been able to bring out as many as 30000 designs annually. Their competitors could just manage about 3000.
- The designs are prepared and delivered within 15 days and made Zara the most sought-after brand.
- At Zara, only 15% to 25% of a line is designed ahead of the season, and over 50% of items are designed and manufactured in the middle of a season based on what becomes popular. This is in direct contrast to a close competitor like H&M where 80% of designs are made ahead of the season, and 20% is done in real-time during the season.

The adaptation of technology has been the strength of Zara. Success has been through their fast response to change. Data analytics and Business Intelligence have been the key to the success of Zara.

How can we benefit from Zara's expertise in using business intelligence?

- **Sales data analytics and fashion data analytics**
  As it is mentioned that H&M makes 80% of the designs before the season which leaves with excess inventory that they then have to discount hard at the end of the season. We can take advantage of what Zara does (sales data analytics and fashion data analytics) to get rid of designs that are not attractive to the customer. This can be done by checking out the most popular products and sales.

- **Peak hour -> Peak days**
  Since we don't have time in the H&M data, we do have dates. We can identify dates that have a lot of customers, and this helps H&M know when to crawl to offer more offers or services.

- **Demographic analytics**
  We can take advantage of that to do customer segmentation and learn more about customers and their needs.

2. Macy's Case Study

To put companies back in the driver's seat, business leaders must think differently and learn how to leverage the Web to deliver the kind of value that builds and nurtures customer trust and loyalty. It's a shift which can strengthen companies and give them the foresight to generate the streams of revenue which enable them to profitably sustain their operations over the long term. It's a shift better realized by running advanced analytics to glean from Big Data the real-time insights that help decision-makers spot those previously untraceable opportunities so their companies can more strategically navigate their markets.

With advanced analytics, companies can get the functionality to see better and create strategies that help them better engage their core customer segments. The use of data has been critical for understanding customers' behaviors to increase customer spending and loyalty, and for analyzing operations to reduce costs.

Macy's is a mid-range to upscale department store chain in America. It was founded in 1858 in New York and has since expanded to 840 locations across 45 states in the USA. Macy's has implemented new technology into its e-commerce website that will help the company better understand customer buying behavior and optimize email and website marketing campaigns.

Macy's has partnered with SAP Infinite Insight to design a new system that provides predictive analytics for its online business. The technology will help Macy's understand the likelihood of customers spending on the Web in a certain product category.

Here we look at how Macy's is using data and analytics to positively impact its business.

1. Macy's gathers, and of course analyses, a vast amount of **customer data** ranging from visit frequencies and sales to style preferences and online & offline personal motivations. They use this data to create a personalized customer experience including customized incentives at checkouts.

2. They use Big Data among others to create customer-centric assortments. They **analyze** a large amount of **different data points**, such as out-of-stock rates, price promotions, sell-through rates etc.
3. Use of **AI for enhancing customer service**: Macy's developed a website virtual agent based on the Microsoft Dynamics 365 AI solution for customer service. The virtual agent answers more than one quarter of customer queries, reducing the company's costs.
4. **Inventory Allocation**: the retailer is acutely focused on improving its inventory allocation, while using data and analytics to better place inventory at stores and distribution centers, as well as across its markets. Macy's expects to become more efficient as its allocation work continues.

Benefits:

- Macy's serves 20 million customers in their biggest retail store.
- 70% of all Americans visit Macy's throughout the year.
- Using Big Data, they increased store sales by 10 percent over the past years.
- Macy's reported a profit of $103 million in Q1 2021, compared with a loss of $3.6 billion in the year-ago period.
- Digital sales grew 34% over Q1 2020 and 32% over Q1 2019.
- Digital sales were $1.7 billion accounting for 37% of total sales, up from 24% in 2019.

How can we benefit from Macy's expertise in using business intelligence?

We see that Macy's uses data analytics to increase its business performance and is clearly focused on customers and providing them with the offers and level of services they desire. According to Julie Bernard, Senior Vice President of Customer Strategy at Macy's, the customer must be at the center of all decisions that are made whenever that customer contacts through any of the channels offered by Macy's.

Therefore, we can take advantage of Macy's ability to better **understand customer buying behavior**, and then be able to actually use that knowledge to create optimized marketing campaigns.

We will design the customer segmentation dashboard to understand and know H&M customers. This dashboard displays the customer's last purchase, the frequency the customer made

the purchase, the money the customer spent, Age distribution of loyal customers and the most products that were purchased by loyal customers.

Section 3: The Proposed BI Solution

The H&M dataset contains three different data sets (products [Articles], customers, and transaction_train). The size of the data set is quite large, so we took a sample of data from the entire data set for analysis. To enhance the shopping experience and increase H&M revenue, we will analyze data from past transactions, as well as from customer and product metadata.

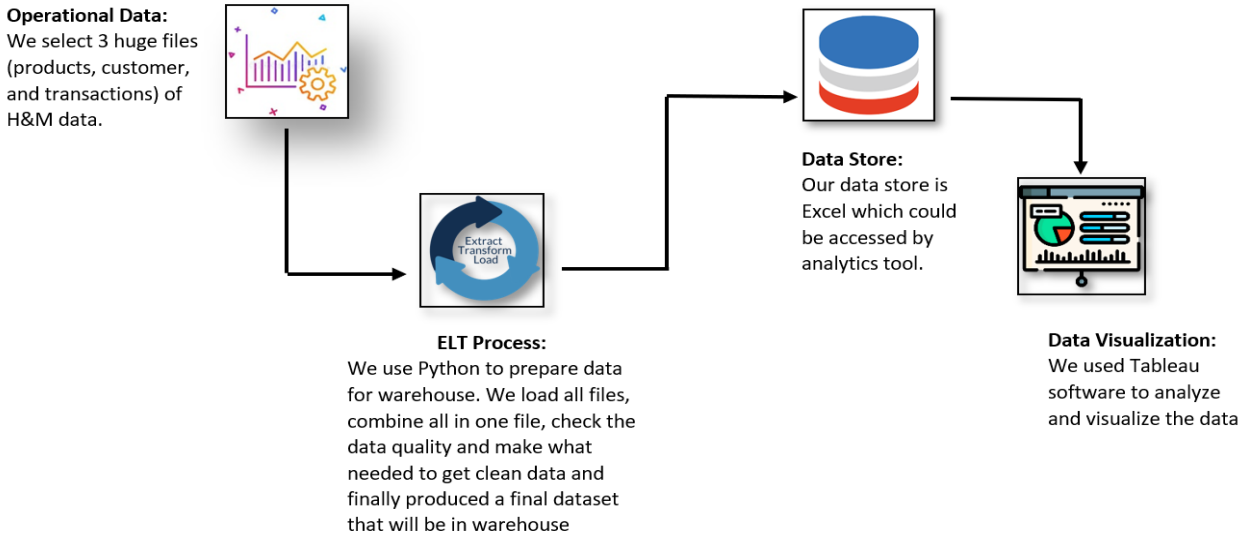

Figure 6: Proposed BI Solution

Here we create the database of our dataset and the relationship between tables. As it is clear that every table has its own primary key. Also, notice that Transaction_train table relate between the tables using their primary keys as foreign keys. At the same time, Transaction_train table uses the Product table's primary key as its primary key since it is the only column that has a unique value. Also, we add the data type of variables.

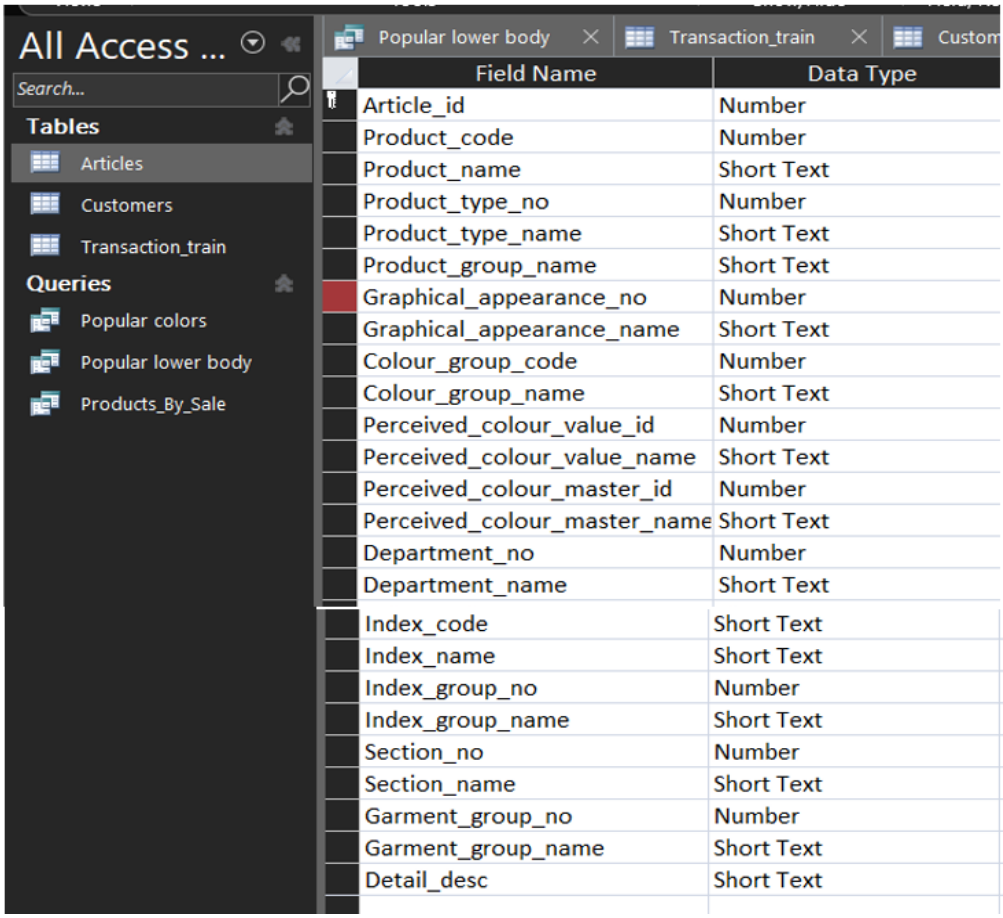

Figure 7: Articles table: products

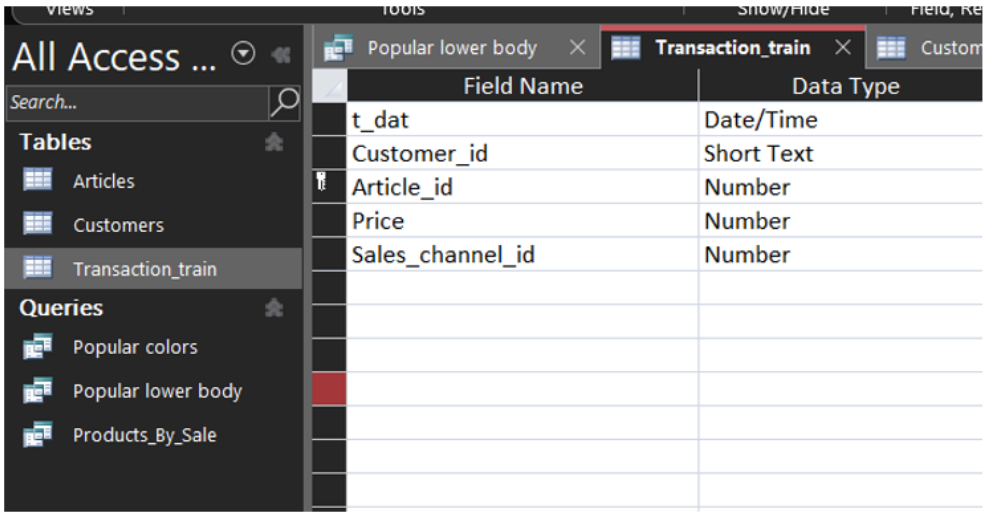

Figure 8: Transaction_train table

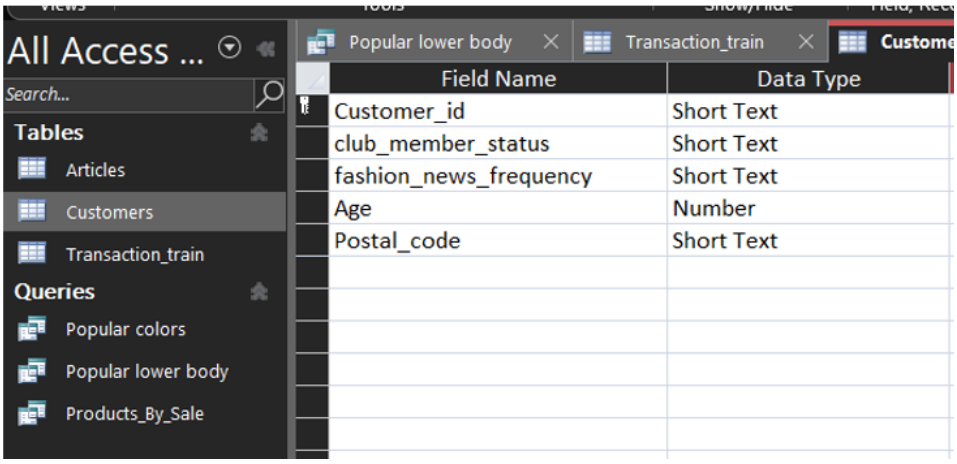

Figure 9: Customers table

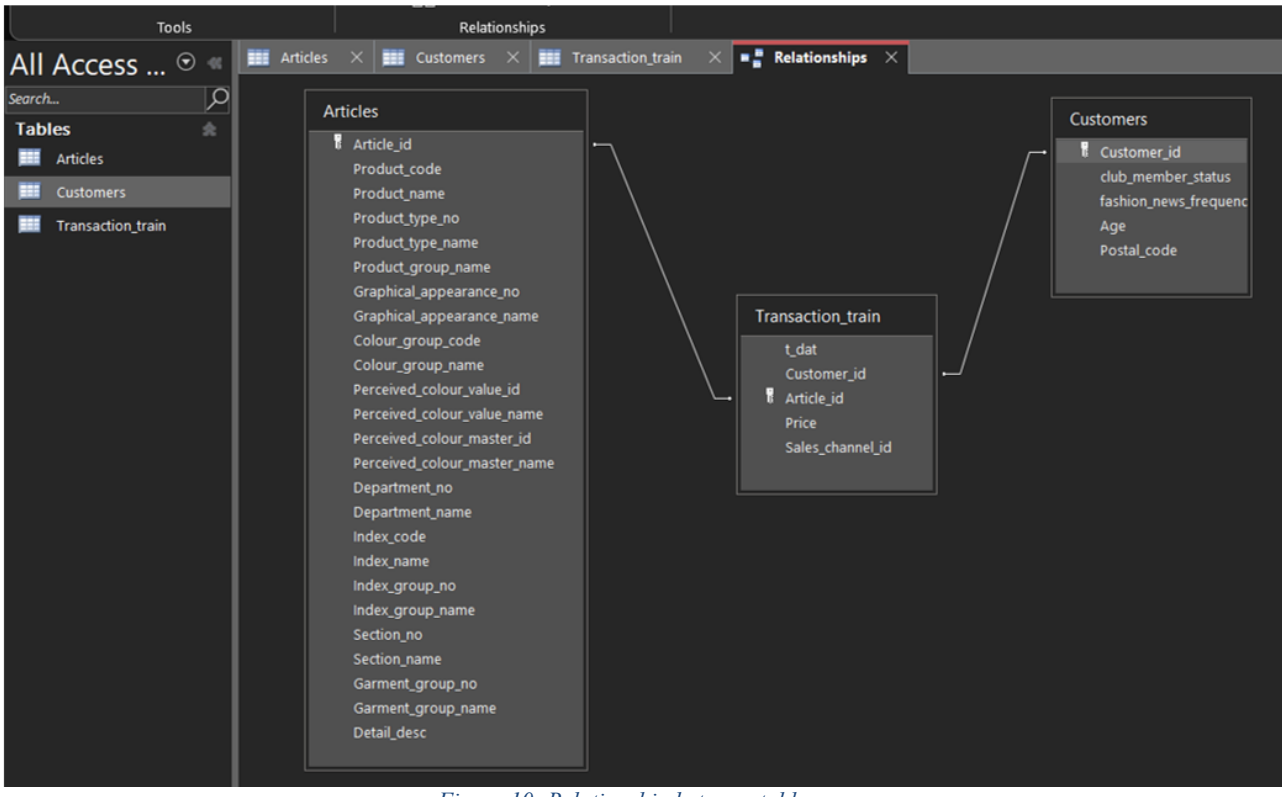

Figure 10: Relationship between tables

Below are some queries that answer questions that may be asked, and we also provide them in dashboards:

What are the most popular colors?

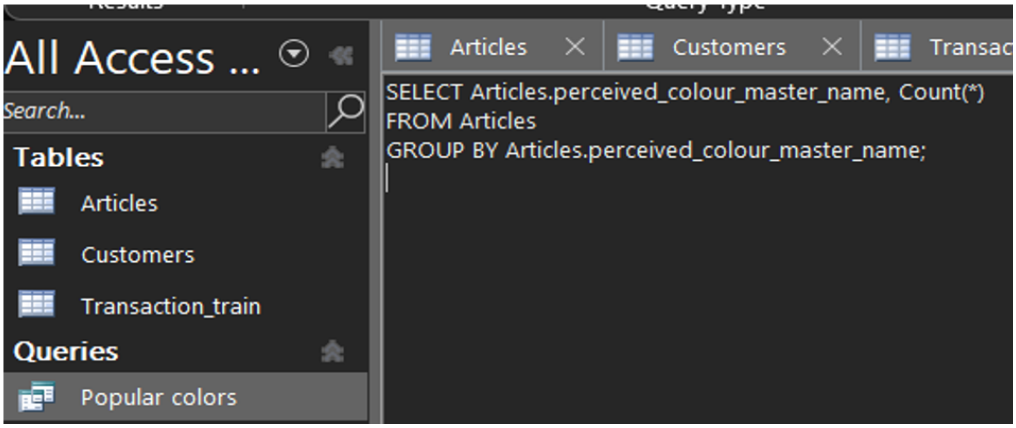

Figure 11: Most popular colors

What are the most popular products by sale?

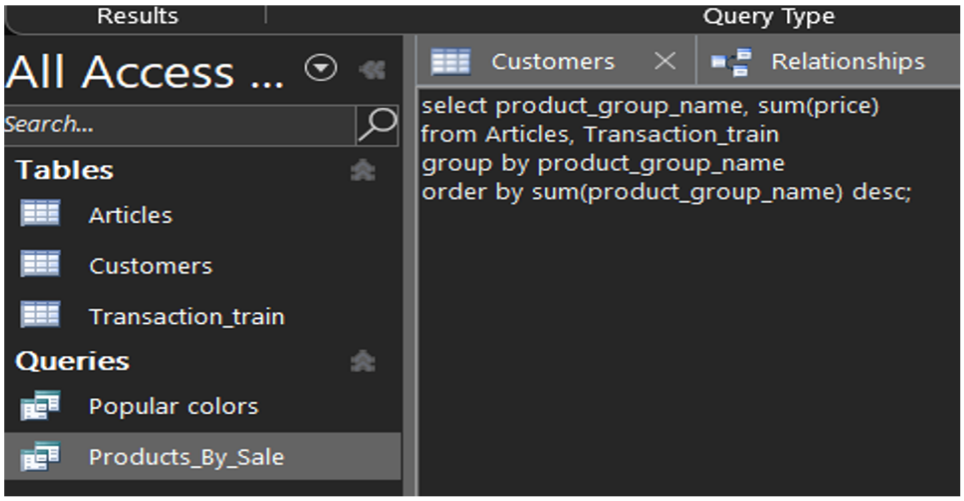

Figure 12: Most popular products by sale

What are the most popular (Garment lower body) products by sale?

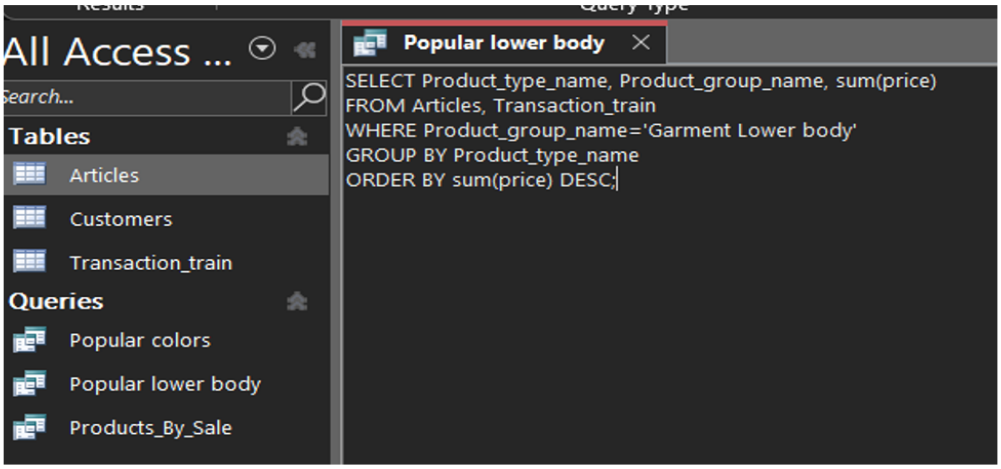

Figure 13: Most popular (Garment lower body) products by sale

Schema of H&M dataset

We will use star schema which is one of the types of multidimensional models that are used for data warehouses. In star schema, we have a fact table which will be in our case the (Transaction_train) table and dimension tables which will be (Articles) and (Customers) tables. Also, foreign keys will combine these tables with the fact table.

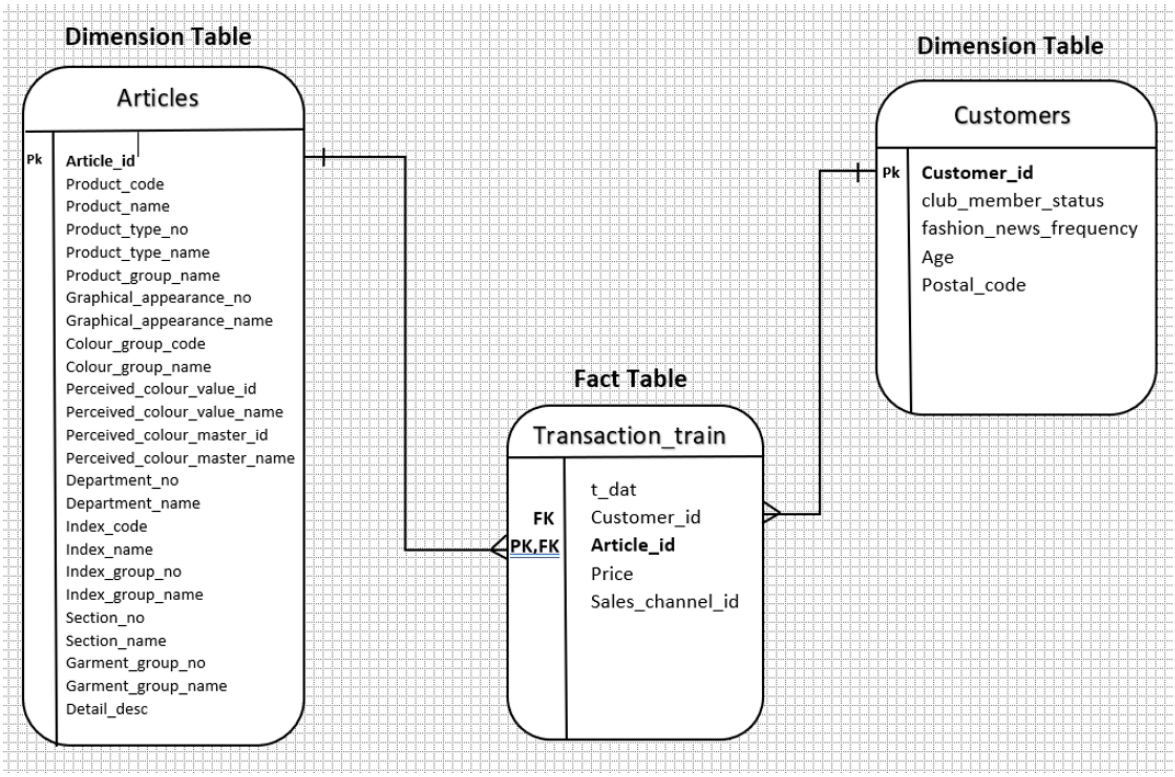

Figure 14: Star Schema of the Data Set

BI Functionalities

Strategic Dashboard:

It is a reporting tool for monitoring the long-term company strategy with the help of critical success factors. It provides an enterprise-wide impact to a business and it tracks the required information to compare the trends over time.

In the strategic dashboard, we use different charts that easily represent and view the information for the users. We have used an area chart, bar chart, circles chart and line chart.

The strategic dashboard can provide H&M with:

The trend of total sales during the months helps them to know the status of sales.

The trend of total transactions over the months helps them in the number of transactions and customers.

Online and in-store sales over the years help them see which resets the most revenue.

The most popular colors that help them offer popular color products.

The best products in terms of revenue help them focus on offering these products all the time.

Operational Dashboard:

It is a reporting tool for monitoring and managing operations that have a shorter time horizon. It is designed to provide, at a glance, a comprehensive snapshot of the performance of the day.

In the operational dashboard, we use appropriate graphs that display information in a clear manner. We depend on tables and bar graphs that we see are the better way to present information.

The operational dashboard can provide H&M with:

Quantities of products sold during months help manage inventory products.

Most of the categories by revenue help them focus on offering these products all the time.

Higher design patterns help them offer these design patterns and reduce the lower patterns desire.

Customer segmentation dashboard:

This dashboard focuses specifically on customers and tries to track and understand their behaviors. This dashboard analyzes customers from different angles to extract useful information that can help H&M retain current customers and grow customers in the future.

In the customer segmentation dashboard, we use different charts that serve our results. We use a circle chart, a pie chart, a table, and a bar chart.

The dashboard can provide H&M with:

The types and percentage of customers help check if we are losing customers or getting more customers.

The revenue for each type helps to focus on the genre and gives them more attention and offers.

Knowing the age of the best customers helps them offer more products for that age.

Knowing the best products for the best customers helps to better deliver the products they want.

Section 4: Three Use Cases/Prototypes

1. Prototype of the Strategic dashboard

H&M is a well-established company with a high rank in the market, to keep its role on the market, the company needs to consider a long-term goal of which detailed analysis is required. For this purpose, we have created a Strategic dashboard based on the dataset through all years and focusing on long term strategies and high-level metrics.

The strategic dashboard will help the managers and executives of the company to have an overview of the business progress towards reaching strategic goals. This dashboard is intended to guide H&M future strategic decisions based on the experience. It will show the total sales, transactions, which products are increasing most, which are less. How is the season impacting the products trend and in which areas H&M need to focus and invest more?

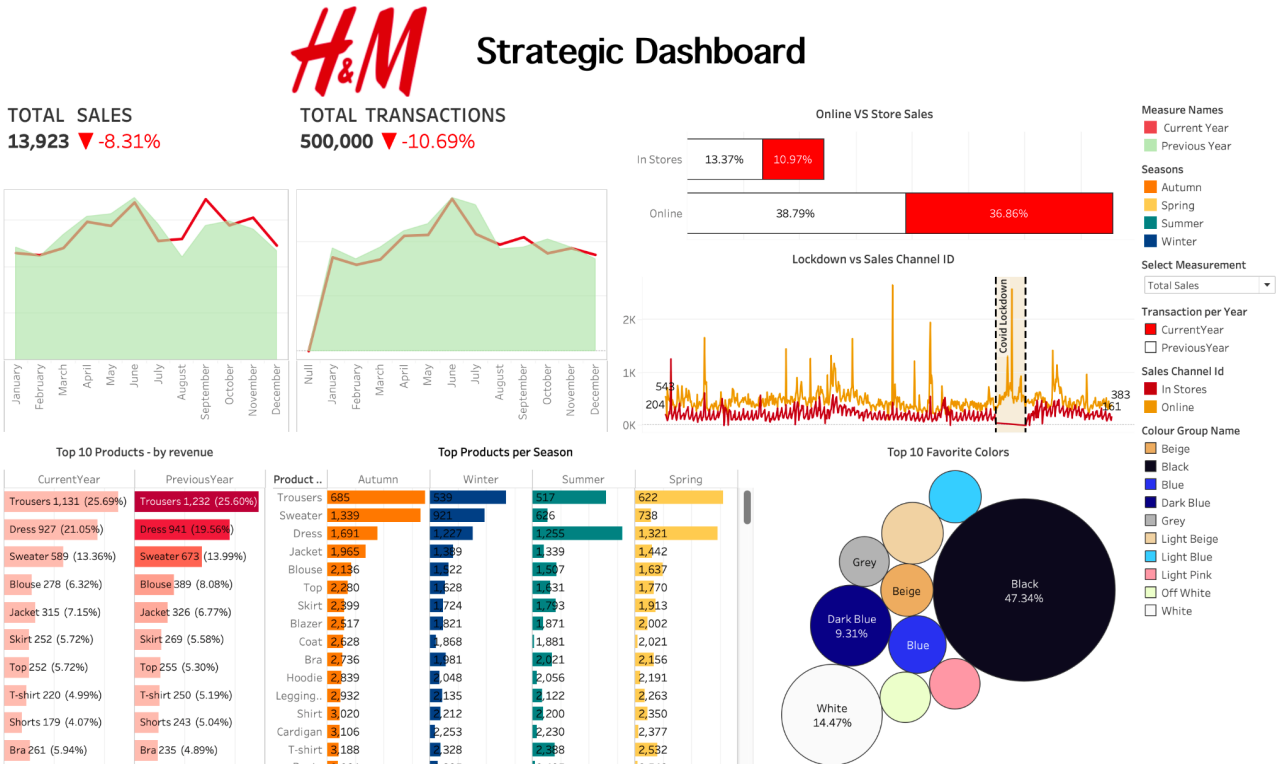

Figure 15: Strategic Dashboard

At the top-level part of this dashboard, we had an overview of the total sales and total transaction based on the entire dataset. So, we gave a general update where H&M has arrived. To better analyze the sales and transaction we decided to take into consideration 2 years and break them by month. For each year we saw the trend of the sales and transactions month by month and compared the 2 consecutive years. The red line shows the current year while the green area shows the previous year. In this way it is very easy to understand the performance for each month. The

above information should be able to help the managerial department to know the performance by total revenue and by total number of transactions for each month for 2 years (previous and current).

We also focused on the way these transactions and sales were made by giving an overview of the transaction made online or in store. We based this information in the whole dataset by comparing the 2 consecutive years for both online and in store. This will give the managerial team an overview of which channel id is used more by the customer and where to invest. The importance of the digital transformation and online purchases is shown with the Covid Lockdown chart which shows a maximization of the online transaction in that period compared with the whole data information that we have.

At the bottom-level part of this dashboard we focused on product trends of H&M comparing two consecutive years. This will show if the trend has changed which are the top products by revenue but also which are the least one of this list. The managerial team can easily notice the trend and decide for the next strategic move based one the product. We know that the season is very important to H&M and being able to afford the customers the best clothes for that season means a high revenue coming up. That's why we break down the product types sold by season to see how that affects the revenue. And the findings are very helpful because for all the season the same product was the one who was bringing more revenue. The percentage of season changes do not differ a lot and are the manager who will be able to decide how their current product strategy is going and if how to improve that based on the season market.

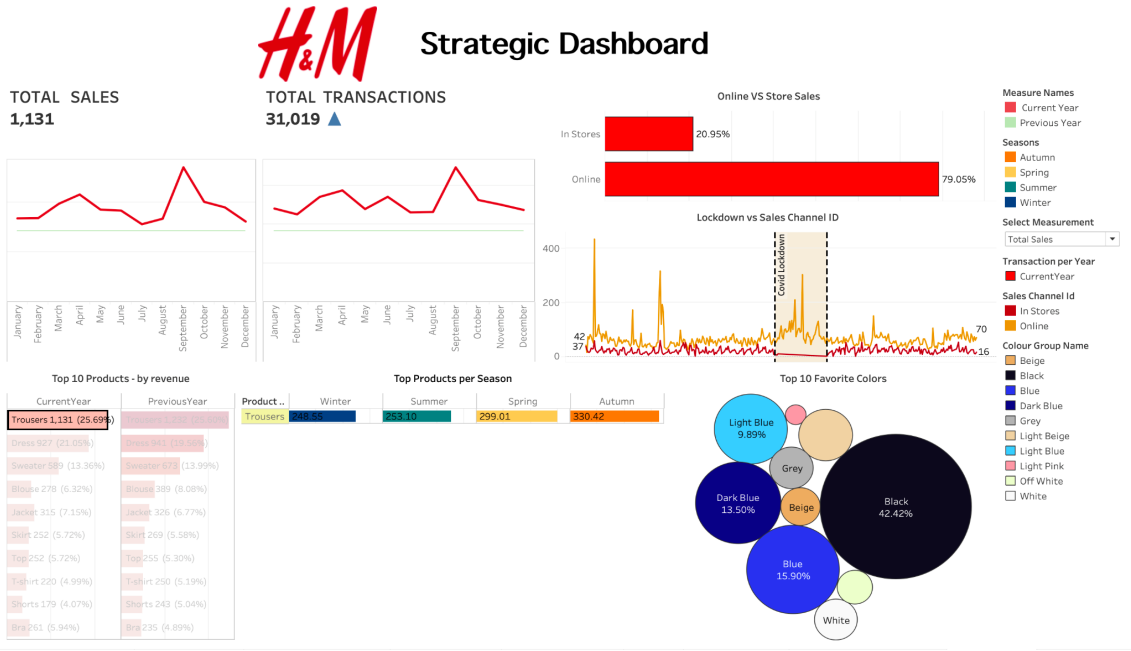

Figure 16: Strategic dashboard-interactive I

The colors are also not related with the season but also with the personal taste of the H&M customers. So, we decided to have an overview of the color trends of H&M, which resulted in black and white and the nude colors being on trend. Which will help the managerial team to decide in which color direction they will decide to keep the business to maximize their revenue based on this data.

Based on the dashboard we also added some interactive features to look up into each of the insights of each element. When selecting the product by revenue we can easily see what its total sales are, total transaction of it and a month breakdown overview. We can see what its impact has been depending on the season and from which channel id it was purchased.

From the other side we can also see what are the items that are mostly bought online or offline for each of the year. This information will provide the managers to understand also what customers prefer to buy in person and what online. In this way they can also see the total sales and transition for that channel id.

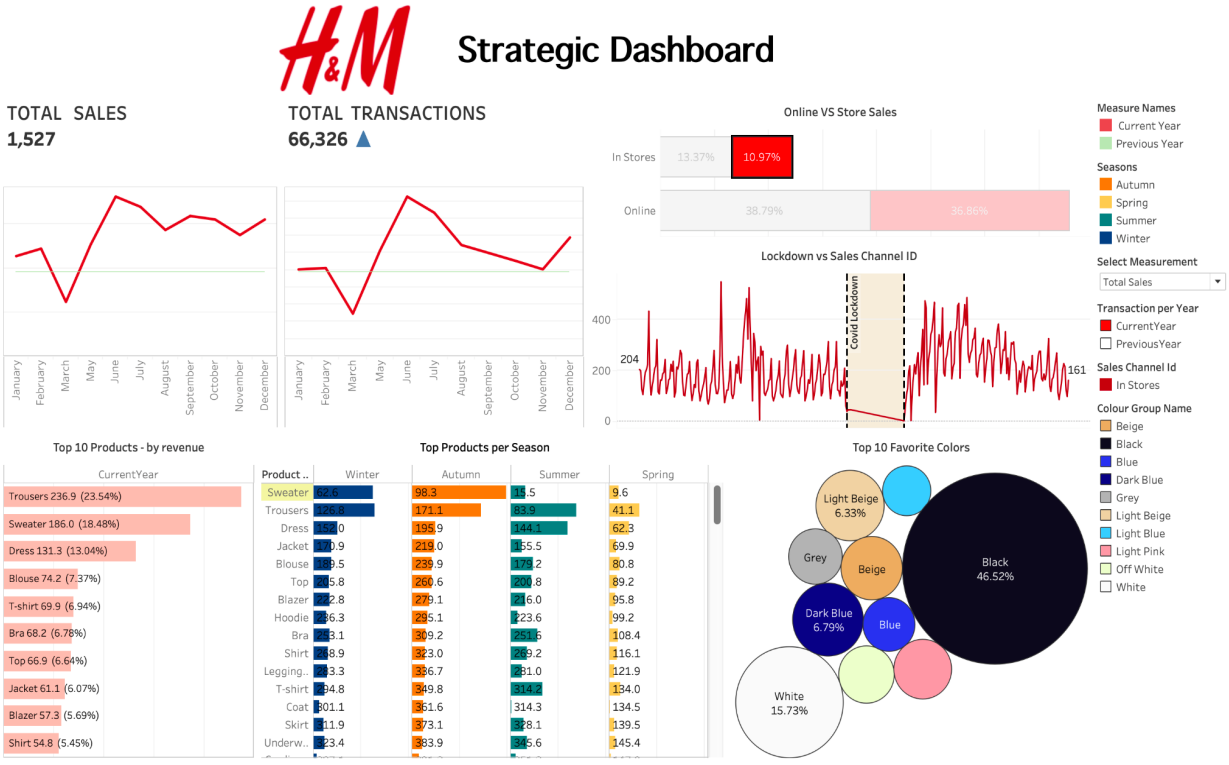

Figure 17: Strategic dashboard interactive II

Another useful interaction that we added is to show how a product in a specific season has impacted the sales, transaction, and the colors. By further analyzing its impact in the overall sales we can see the trend and the role of it in for that specific season. This information could help the managers to have a detailed overview if they want to focus on a specific part of the data.

2. Prototype of the operational dashboard

We developed an operational dashboard to help guide the production and design strategies on an operational level for the company. This dashboard is intended to guide the H&M factories on production quantity of each product based on previous sales. It will also help the designers of the company to understand what patterns/graphical appearances are popular so that the designers know what designs to continue and what design changes need to be made.

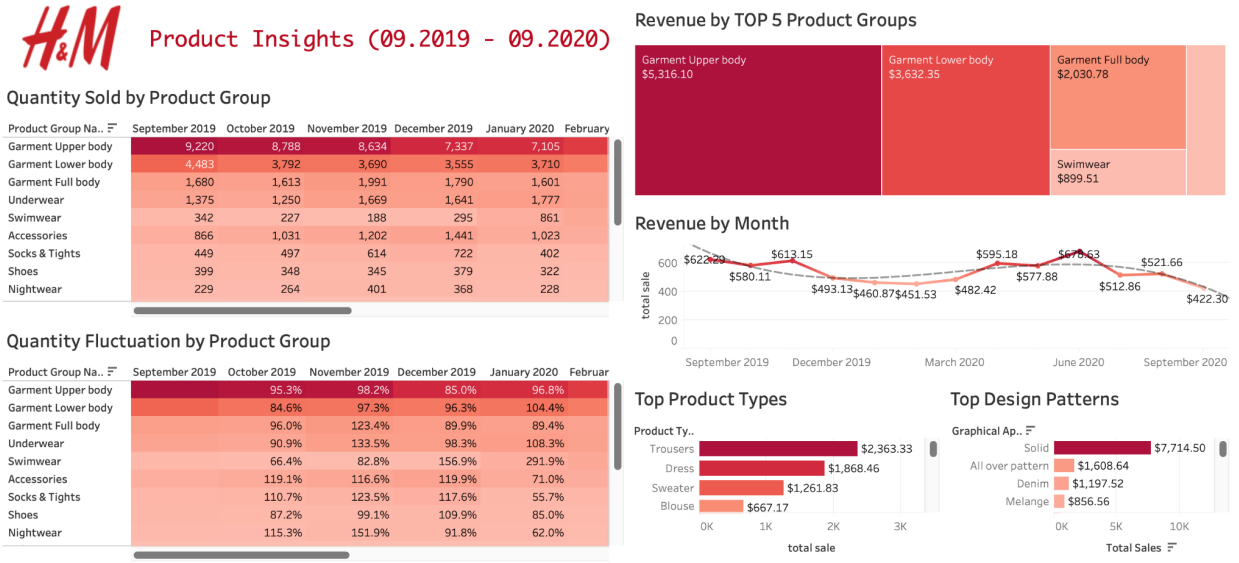

Figure 18: Operational Dashboard Overview

At the left-hand side of this dashboard, we looked at the detailed breakdown of monthly quantities sold per product category for the most recent 12 months. To better analyze the above data, we also showed in the table at the bottom left with fluctuations of quantities sold for each product type from month to month to help the company plan for the production orders. The above information should be able to help the production department to know the rough size of quantities of each product category to produce for each month.

At the right-hand side of this dashboard, we first looked at the top 5 revenue generators from the past 12 months, which is shown in the upper right. Below this section, we looked at the revenue per month to uncover the trends of sales per month. At the bottom, we looked at what design patterns or product types were trending. This information could guide the company to produce clothes based on customers' preferences so as to increase sales.

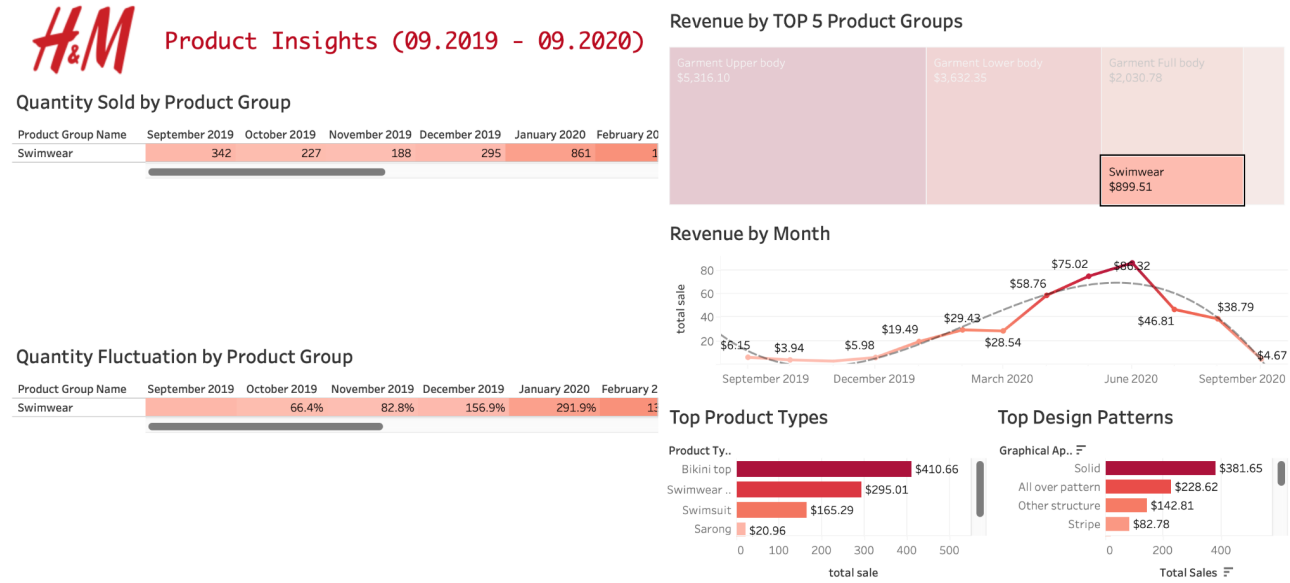

Figure 19: Operational Dashboard Interactions

We also added interactive features to look further into each of the product groups. For example, when we select swimwear from the top 5 product groups on the upper right graph, all the other graphs will show detailed information about this particular product group.

On the left-hand side, we will see the number of swimwear sold from month to month as well as the change of demand in percentage. This information should tell the swimwear production line to prepare a proper amount of materials for each month's supply.

On the right-hand side, we can see the trend of swimwear sales by month. It is not surprising that the peak season happens in early summer when the weather gets warmer. We further analyzed the top selling product types (bikini tops, etc.) and also the top selling design patterns (solid, etc.) to provide more insights into customers' preferences. This information could help designers to come up with popular designs on the market.

3. Customer Segmentation Analysis

Segmentation of Customers Customer segmentation is the process of dividing consumers into groups based on shared criteria. Companies may use these clusters to target clients with the right marketing message and personalize their offers to a certain demographic. This not only helps businesses increase revenue, but it also helps them create customer relationships and gain a deeper understanding of them. Customer segmentation is a useful tool that allows us to learn more about our customers and better respond to their diverse demands. Almost every business that offers goods or services keeps track of customer purchases. This sort of data may be utilized to carry out customer segmentation, and the study' findings can then be converted into marketing efforts to boost sales. RFM analysis is one of the most extensively utilized approaches, as it enables us to make customized special offers in order to increase sales and minimize client retention.

RFM stands for Recency, Frequency, Monetary Value and it is the technique of customer segmentation based on their transaction history. The RFM analysis is based on three criterias, which measure different customer characteristics:

- Recency: Days since last purchase/order of the client;
- Frequency: Total number of purchases the customer were made;
- Monetary Value: Total money the customer spent per order.

RFM is based on a basic concept: 1) Customers who have recently purchased from you are more likely to purchase from you again than customers who haven't purchased from you in a long time. 2) Customers who purchase from you on a regular basis are more inclined to purchase from you again than customers who purchase seldom. 3) Customers who spend more money are more likely to purchase again than those who spend less money.

Customers can be segmented using the traditional RFM approach, which assigns them scores from 1 to 4. The greatest / highest value is four, while the lowest / poorest value is one. To develop RFM value classes for our clients, the final RFM score is produced by merging the separate score numbers into one column.

- If RFM_Scores == '444', then "1-Best Customers"
- If RFM_Scores == 'X4X', then "2-Loyal Customers"
- If RFM_Scores == 'XX4', then "3-Big Spenders"
- If RFM_Scores == '244', then "4-Almost Lost"
- If RFM_Scores == '144', then "5-Lost Customers"
- If RFM_Scores == '111', then "6-Lost Thrifty Customers"

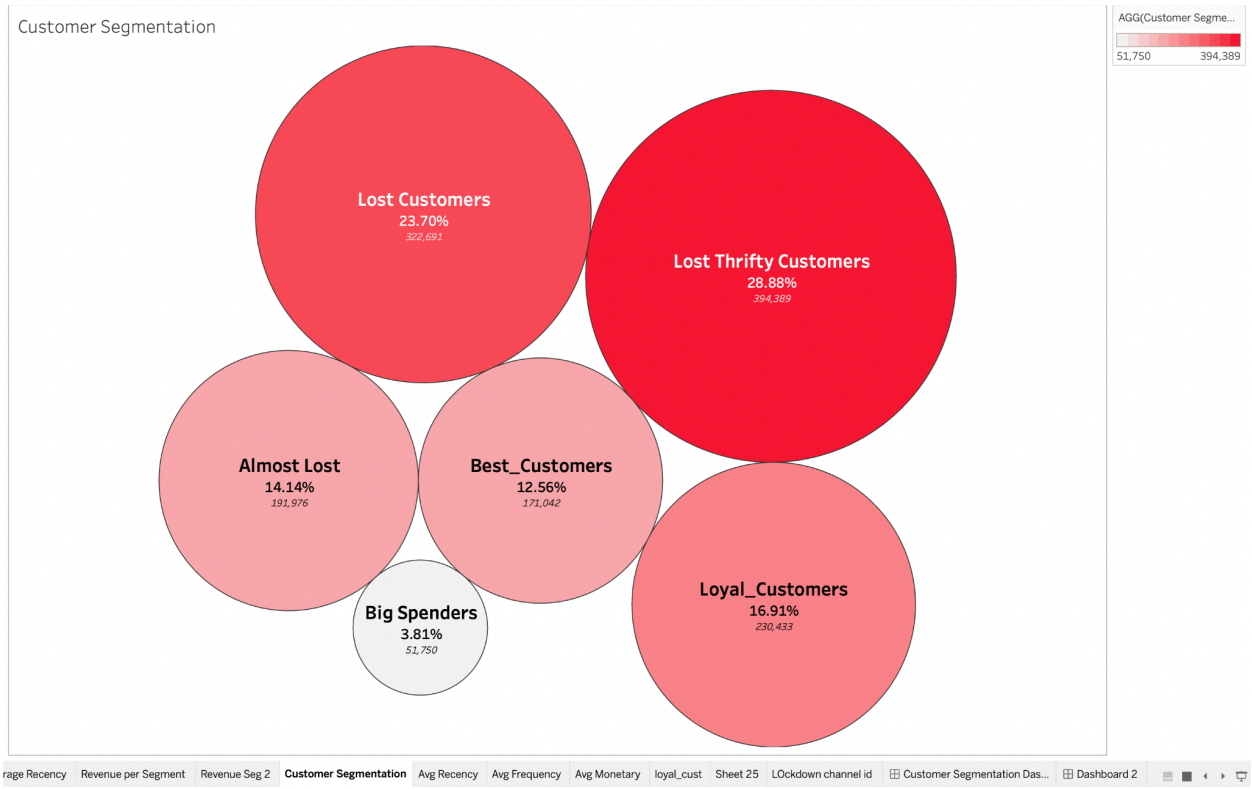

Figure 20: Customer Segmentation Results

1. Best Customers: - These are the customers who have lately shopped and tend to buy frequently and in significant amounts.

   Marketing Strategy - Special offers with discounts, customer cards entitling to perks (e.g. accumulating points used for incentives), or a present for the next order may be examples of activities for the best customers.

2. Loyal Customers: - Spend good money with us often. Responsive to promotions.

   Marketing Strategy - Can be early adopters for new products. Will promote our brand. Ask for reviews and engage them.

3. Big Spenders: - Made the biggest purchases and often. But haven't returned for a long time.

   Marketing Strategy - Market our most expensive products to them. They should be instantly informed about a new product launch.

4. Almost Lost: - Haven’t purchased for some time but purchased frequently and spent the most.
   Marketing Strategy - Create an email sequence or retargeting audience and provide an incentive like free shipping, a 2-for-1 deal, or a discount to keep them interested.

5. Lost Customers :- Haven't purchased for some time, but purchased frequently and spent the most.
   Marketing Strategy - Share valuable resources, recommend popular products / renewals at discount, reconnect with them.

6. Lost Thrifty Customers :- Last purchase was long ago, purchased few and spent little.
   Marketing Strategy - With a reach-out effort, you can reignite interest. Don't spend too much trying to re-acquire

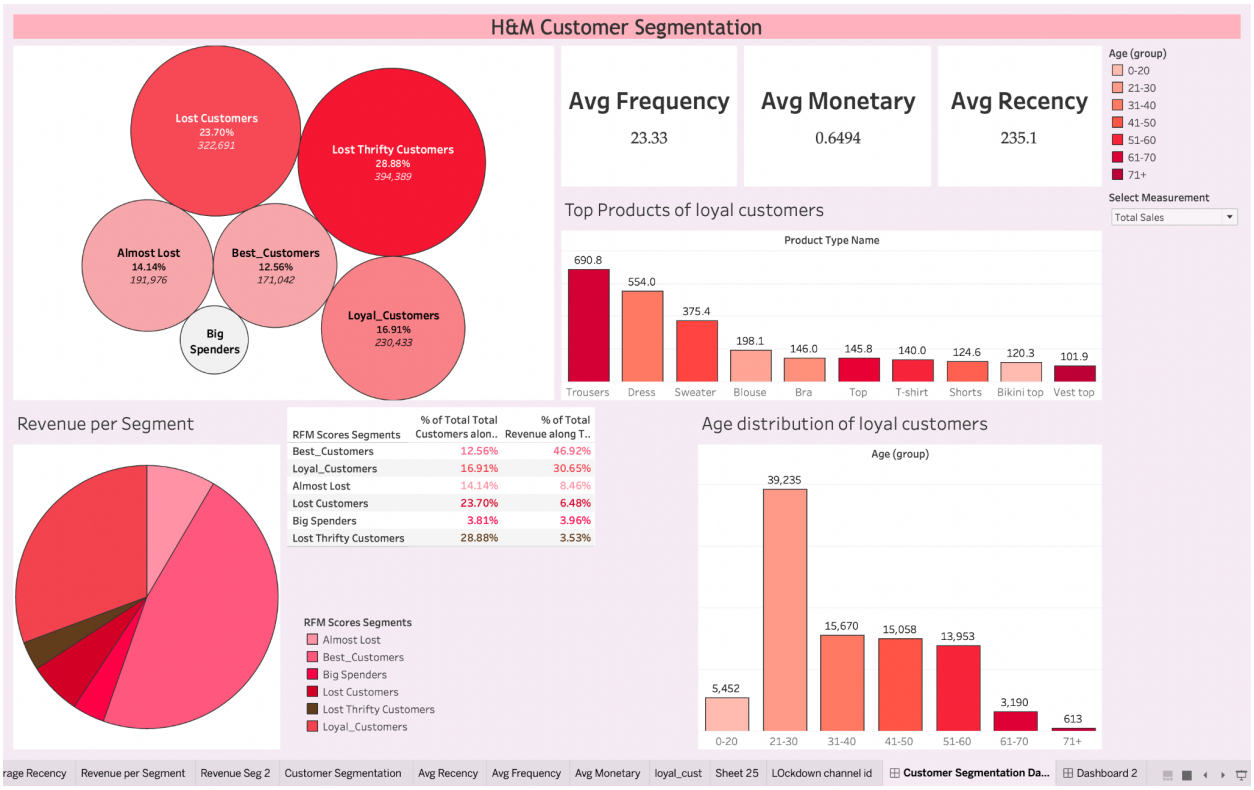

Figure 21: Customer Segmentation Insights

Section 5: Implementation

Kotter's eight-step model for organizational transformation and data warehousing

Using Kotter's eight-step model for organizational transformation and data warehousing, we have developed the following implementation suggestions for H&M.

1. Creating a Sense of Urgency

The management team can help create a forum with the H&M employees to talk about the potential threats that H&M are facing, such as other companies that are taking over H&M's market share, the pandemic that is affecting the company's revenue, or the low customer retention rate and other problems that the company is facing. Such forums can help establish a sense of urgency to help the employees look for ways to improve company performance.

2. Putting Together a Guiding Coalition

The company should bring together a competent team with the BI skills, reputation, connections and sufficient power to provide leadership to the change efforts and influence stakeholders.

3. Developing Vision and Strategies

The company should create a sensible vision to direct the initiative and to develop effective strategies to help the team achieve it. For example, the vision could be "to leverage the power of data analytics to stay ahead of customers' needs".

4. Communicating the Change Vision

The team leading the change should communicate the vision and strategies as frequently as they can and make the employees understand that changes will bring positive impact to the company, and the employees who adopt the changes will get rewards. The company should also provide training to help the employees to learn how to use BI tools so that the implementation will be smoother.

5. Remove Barriers to Action

The senior management should focus on removing obstacles that block the organization's path to achieving the change vision. They should openly communicate with employees to identify the barriers, and reward employees that actively work on implementing the BI tools. Also, the management team should empower employees to do their best and face challenges successfully by giving them the necessary training, coaching and mentoring.

6. Accomplish Short-Term Wins

The management team should Break down the change project into smaller parts with short-term goals and reward those who are responsible for these quick wins to encourage other employees as well. Such short-term goals could be quarterly increase in revenue, etc.

7. Build on the Change

To continue the momentum of change, the management team should identify what worked and what went wrong to decide what needs to be improved after each short-term win. They should also consolidate the gains from the short-term wins and continue to work on implementing larger change throughout the organization.

8. Make Change Stick

The change leaders should also work on nurturing a new culture where change can stick. This includes changing organizational norms and values, processes, reward systems, and other infrastructure elements to make sure that everything aligns with the new direction. For example, the management team can create new training and development programs to help employees develop data analytics skills and develop competencies in using BI tools.

Data quality Assurance

Since our transaction data comes from in-store as well as online venues, from computer platforms as well as mobile apps, the company needs to make sure that the data from all sources is consolidated without redundancy or missing values. We suggest that after consolidating the data, the company should perform data validation to review their data sets, find and mark errors or exceptions, and make corrections.

In addition, the company needs to monitor each step of the data warehousing process to identify whether data is acceptable to move to the next step. At the broader data operations level, the effectiveness of the data consolidation, validation and processing can be assessed and managed through tracking quality over time.

Finally, to prevent recurring issues, the company should track data for quality over time. Also, a daily focus as well as a big picture focus can make it easier for firms to see how mistakes are being caused.

Ethical challenges

H&M has scored highly in the Fashion Transparency Index in the past as it publishes information about its supplier policies, audit, and remediation processes on its website. Protecting personal data and customers' privacy is the greatest concern for the H&M and H&M Group. They have given a clear, concise, and transparent communication on the collection, use, processing, storing, etc. of personal data relating to customers of the H&M Group. Whenever H&M processes personal data, by automated means based on costumers’ consent or based on an agreement, you

have the right to get a copy of your data transferred to you or to another party. This only includes the personal data you have submitted to H&M[5].

The H&M policies are very strict when it comes to data privacy, and they make sure to minimize/eliminate the usage of very sensitive data .H&M since 2018 has set up an AI Team which has developed a practical checklist to be used by its IT Team. This policy aims to identify and mitigate untended harms that could arise from integrated AI techniques into its business operation. In the dataset that we are using for this project, we can see that all the sensitive data information is not in the dataset. The customer's ids are generic by any relation to the customer national ID so avoiding any leak of information.

As per our analysis H&M has set up a clear line and transparency in how data is collected and being secured. They only collect the data they need and avoiding and sensitive data. They have already invested and set up a Data Security system which process a clear data dealing process. They have a data detailed data privacy for its customer and respect their rights. What we suggest to the H&M group is maybe trying to make its customer to read and understood all the above steps so they can feel more informed and safer.

Section 6: Summary and Conclusion

We conclude with our aim which is to provide data analyses based on the mentioned dataset and help H&M to better understand its customers so as to increase revenue and streamline production and inventory strategies to reduce waste.

We have studied and understood the dataset and extracted the most important inquiries related to sales, products, and customers. We covered the most useful questions and clarified a lot for the department. We were eager to provide an outcome that could assist the H&M department in decision-making and problem-solving.

To analyze and present our work in an efficient way, we used Tableau which is the most powerful, secure, and flexible analytics platform. We used three dashboards that explained the results graphically. As we have seen in this paper, dashboards present all important points related to the provided H&M dataset.

We answer using dashboards all questions we addressed at the beginning such as the annual sales/transactions change, the most popular products, the specific types/designs/colors of the top-selling products, the best/most loyal customers, and what are their preferences and more.
Depending on the dashboard, we end our paper with some recommendations to the H&M department:

Since most of the sales are done online, they need to invest more in their online system purchases**.**

As we have given in the dashboard which products are generating the most revenue, they need to keep producing the most popular products and keep adjusting production quantities per product according to the monthly fluctuations

We have supplied H&M with customer segmentation. They can use the advantage of knowing what is the age of loyal customers and what products they prefer by targeting this segment by providing benefits and not only by giving discounts, coupons or free shipping

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