H&M Group

Sales Analysis Report

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Part 1: Organization Information

1.1 Overview

H&M Group is a leading multinational clothing retailer known for offering fashion-forward apparel at affordable prices. With a presence in **53 online markets** and **4,850 stores worldwide**, the company integrates data-driven insights to enhance customer experience, inventory management, and marketing strategies.

H&M's mission revolves around **sustainability, affordability, and innovation**. The company emphasizes environmentally friendly production, reducing waste through supply chain optimization, and improving customer retention through personalized recommendations.

1.2 Employees

H&M employs over **120,000 people worldwide**, including professionals in retail operations, logistics, IT, data analytics, digital marketing, and supply chain management.

1.3 Industry & Business Type

- **Industry:** Fashion & Retail
- **Business Type:** Publicly Traded Company (NASDAQ Stockholm - HMB)

1.4 Specialties

- Fast Fashion & Sustainable Clothing
- Omnichannel Retail (Online & In-Store Sales)
- AI-Based Customer Insights & Analytics
- Global Supply Chain & Inventory Optimization
- Loyalty & Membership Programs

Part 2: Use Case/Scenario

2.1 Business Challenge

H&M faces major challenges in optimizing customer engagement, revenue growth, and inventory efficiency. The extensive product catalog often leads to customer indecision, resulting in lower conversion rates and increased return rates.

Additionally, online sales are outpacing in-store sales, requiring a digital-first approach to product recommendations and sales strategies.

Key challenges include the followings:

1. Customer Decision Overload
    - Shoppers often feel overwhelmed by too many choices, leading to abandoned carts and lower conversion rates.
    - Without tailored product suggestions, customers may struggle to find items that fit their style and needs.
2. High Return Rates
    - Many purchases result in returns due to incorrect sizing, impulse buying, or unmet expectations.
    - Processing returns increases logistics costs and impacts sustainability due to extra transportation emissions.

3. Inventory Mismanagement
    - Stock shortages and overstocking occur due to unpredictable demand trends.
    - Unsold inventory often leads to markdowns, reducing profit margins.
4. Increasing Digital trends
    - Online sales continue to grow faster than in-store purchases, requiring H&M to adopt a stronger digital-first strategy.
    - Competitors are using AI-powered analytics to personalize recommendations, optimize pricing, and improve customer engagement.

2.2 Proposed Solution

This project leverages **advanced analytics and machine learning** to:

1. Identify top-performing products based on customer purchase behavior.
    - Analyze transactional data to determine which products drive sales and why.
    - Understand how seasonal trends, pricing, and marketing campaigns influence purchasing patterns.
    - Business Value: Prioritize stocking high-demand items and improve marketing focus
2. Analyze customer demographics to create targeted marketing campaigns.
    - Segment customers based on age, location, shopping preferences, and past purchases.
    - Develop personalized email campaigns, push notifications, and promotions tailored to customer preferences.
    - Business Value: Improve customer retention and lifetime value through highly relevant marketing efforts.
3. Improve recommendation algorithms for online and in-store experiences.

- Using AI-powered algorithms to suggest products based on browsing behavior and past purchases.
- Displaying “You may also like” and “Frequently Bought Together” sections to boost cross-selling.
- Business Value: Helps customers find suitable products faster, increasing sales.

4. Enhance inventory forecasting using demand prediction models.
    - Utilizing past sales data and trend analysis to anticipate demand more accurately.
    - Avoiding overstocking or running out of popular products.
    - Business Value: Reduced waste, better supply chain management, and improved profitability.
5. Optimize pricing strategies through competitive analysis.
    - Adjusting prices dynamically based on customer demand, competitor pricing, and historical trends.
    - Implementing discount strategies that maximize revenue without cutting too deep into profits.
    - Business Value: Attracts more buyers while keeping profit margins stable.

2.3 Business Impact and Expected Results

- Higher Conversion Rates – Customers can easily find and purchase relevant products.
- Lower Return Rates – More personalized recommendations mean better buying decisions.
- Stronger Inventory Control – Smart forecasting helps prevent stockouts and excess inventory.
- Higher Customer Engagement – Customized promotions keep customers returning.
- Higher Profit Margins – Optimized pricing strategies maximize revenue.

- Competitive Advantage – AI-powered analytics keep H&M ahead in the retail industry.

Part 3: Problem Statement and Background

3.1 Problem Statement

H&M confronts the problem of effectively assisting customers in navigating its huge inventory, which includes a wide range of items available both online and in around 4850 shops. Customers may become overwhelmed by the sheer number of options, making it challenging for them to locate desired things fast. This puts H&M's business and environmental initiatives as risk in addition to perhaps creating a disaggreable shopping experience for cutomers.

Customers may completely give up on purchases if they are unable to find things of interest, which woul mean missed sales chances and lower income. On top of that, ineffective product discovery may result in more returns as buyer could unknowingly buy things that don't live up to their expectations. This return adds to H&M's expenses for processing, shipping, restocking, which hurts their economy.

In addition to all this problem's, H&M's key problems are:
- High Return rate: the number if returns are increasing due to wrong sizing, expectations not met, impulse buying, etc. These returns not only cause damage to profitability but also leave increase carbon footprint.

- Inventory mismanagement: Demand forecasting inaccuracies lead to either overstocking or stock shortage. Overstocking leads to items going on sale, reducing margin, and stockouts lead to lost of sale and customer dissatisfaction.

- Limited customized customer engagement: H&M lack personalized ways to interact with their customers. Customers of the brand were given overload amout of choices without any targeted marketing or any guidance.

- Shifting consumer preferences and Digital Growth: Online shopping is outpacing in-store shopping. While H&M lack optimized digital strategies, its competitors are incorporating AI to provide personalized experiences, improve customer retention, and enhance pricing models.

3.2 Key Analytical Questions

The following crucial analytical issues will be addressed to give H&M useful information and suggestions:

1. **Product Performance Analysis:**
    1. What is the top-selling products, and what factors contribute to their success?
    2. How do seasonal trends, pricing, and marketing campaigns influence product sales?
    3. How does color contribute to the sales of the product?
2. **Customer Behavior Insights:**
    1. How do customer demographics (age, gender, location, and membership status) impact purchase decisions?
    2. What are the buying patterns of repeat customers versus new customers?
3. **Personalized Recommendation Systems:**
    1. How can personalized product recommendations increase conversion rates?
    2. What AI-based strategies can be implemented to enhance cross-selling and upselling?
4. **Pricing and Revenue Optimization:**
    1. What pricing strategies can maximize revenue while maintaining profitability?
    2. How do competitor pricing models influence H&M's pricing adjustments?
5. **Inventory and Supply Chain Efficiency:**
    1. How can demand prediction models help optimize inventory management?
    2. What strategies can reduce overstocking and stockouts?

Part 4: Data Sources

4.1 Datasets Used

- **Articles Dataset:** Metadata on product types, pricing, and brand.

This dataset contains 105,452 rows of data including various heading, Like;

Metadata	Summary	Data Type
article_id	Unique identifier given to each article of clothing	Integer
prod_name	This is the product name of the article	String
Product_type_no	This is the unique identifier given to each product type.	Integer
product_type_name	This is the name of the type/category of the product it belongs to.	String
colour_group_no	This is the unique identifier given to each color.	Integer
colour_group_name	This is the color of the product	String
graphical_appearance_no	This is the unique identifier given to each graphical design on the article	Integer
graphical_appearance_name	This is the name given to the graphical design of the article	String
Perceived_colour_value_id	This is the unique identifier given to the perceived colour of the article	Integer
Perceived_colour_value_name	This is the perceived color of the article	String
Perceived_colour_master_id	This is the unique identifier given to perceived master colour of the article	Integer
Perceived_colour_master_name	This is the perceived master color of the article	String
Department_no	This is the unique identifier given to all the department	Integer
Department_name	This is the name of the department	String
Index_code	This is the code given to the index of clothing	Alphanumeric
Index_name	This is the name of the index given to the article	String
Index_group_no	This is the unique identifier given to the index group of cothing	Integer
Index_group_name	This is the name of the index group that article belongs to	String
Section_no	This is the unique identifier given to each section	Integer
Section_name	This is the name of the section this article belongs to	String

Garment_group_no	This is the unique identifier given to the garment group of the article	Integer
Garment_group_name	This is the name of the garment that article belongs to.	String
Detail_desc	This is the detailed description of the article	String

- **Customers Dataset:** Demographic details, membership status, and shopping preferences.

This dataset contains 1,048,576+ rows of data including various heading, Like;

Metadata	Summary	Data Type
customer_id	Unique identifier given to each customer	String
FN	This is the flag that indicates whether the customer is a first-time customer.	Boolean
Active	This is the flag that indicates whether the record is active in the system.	Boolean
club_member_status	This is the member status of the customer	String
Fashion_news_frequency	This is the newsletter subscription mode of the customer	String
age	This is the age of the customer	Integer
postal_code	This is the postal code of the customer	String

- **Transactions Dataset:** Historical sales data including timestamps, product IDs, and customer purchase history.

This dataset contains 1,048,576+ rows of data including various heading, Like;

Metadata	Summary	Data Type
t_date	This is the date of the transaction	Date
customer_id	Unique identifier given to each customer	String

article_id	Unique identifier given to each article of clothing	Integer
price	This is the price of the article of clothing	Decimal
sales_channel_id	Unique identifier given to source channel through which a sale is generated	Integer

4.2 Data Quality Assessment

✓ **Handling Missing Values:** Missing customer attributes imputed using ML-based approaches.

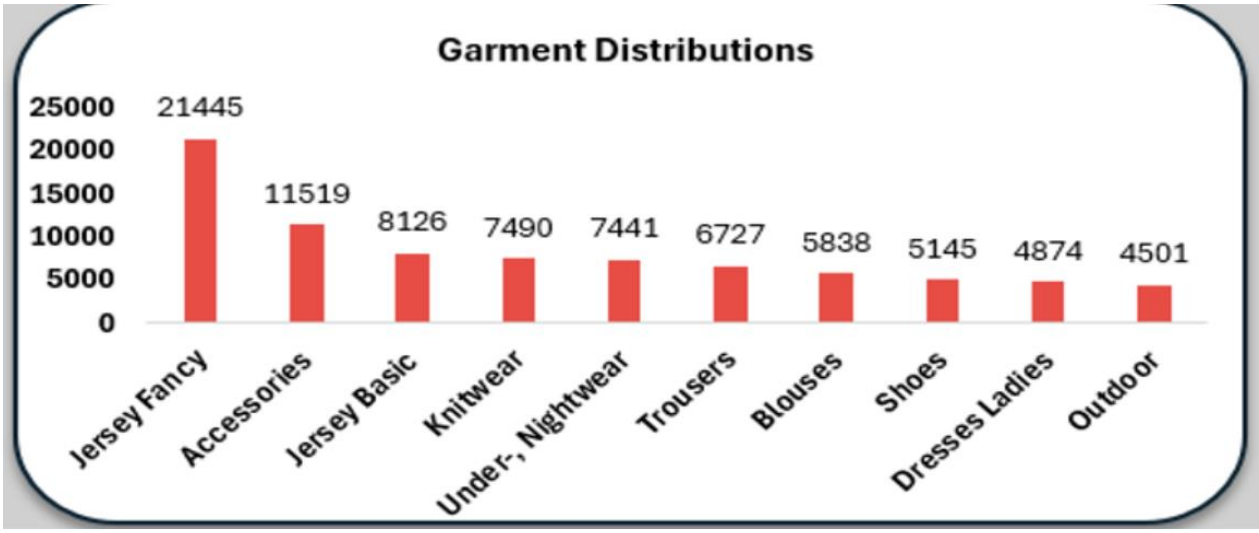
✓ **Data Cleaning:** Standardized pricing, categorical values, and removed inconsistencies.

✓ **Duplicate Transactions Removed:** Ensured unique sales data for accurate trend analysis.

Part 5: Preliminary Analysis

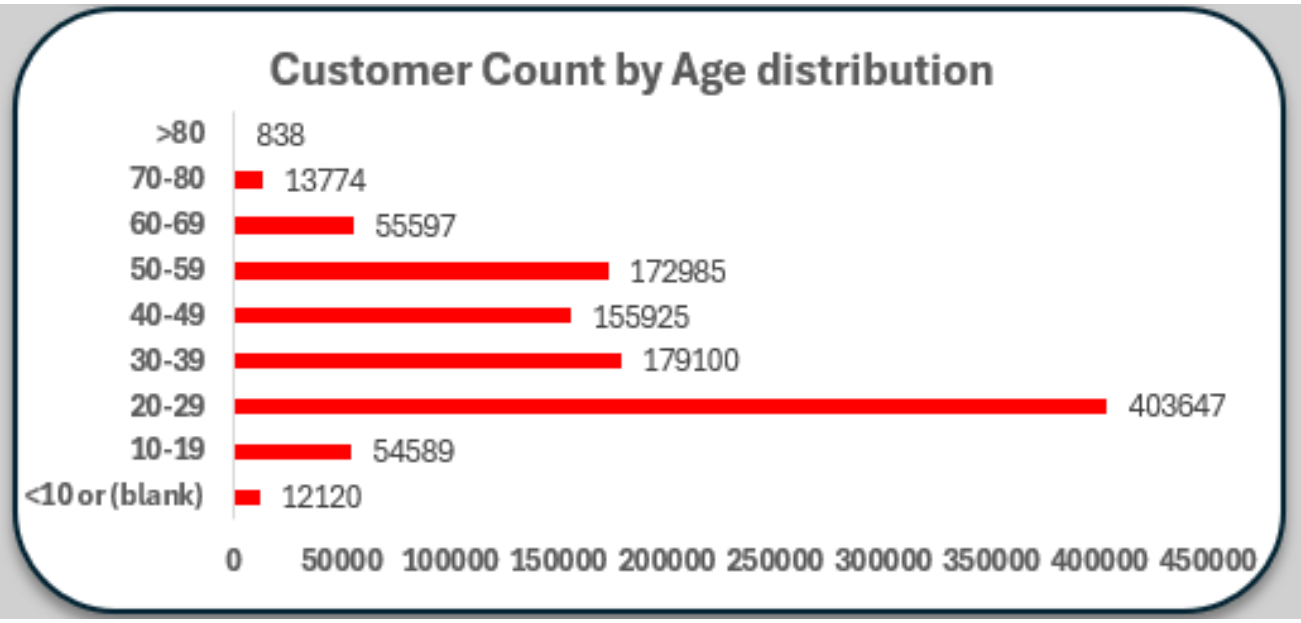
1. Best-Selling Products Analysis

- **Jersey Fancy** is the best-selling product category with **21,445 units sold**, significantly surpassing other categories.
- **Accessories (11,519 units sold) and Jersey Basic (8,126 units sold)** also contribute significantly to overall revenue.
- **Other notable categories include Knitwear, Nightwear, and Trousers**, all showing strong customer demand.
- **Blouses, Shoes, Dresses, and Outdoor wear have lower sales**, suggesting an opportunity for marketing and promotions in these areas.



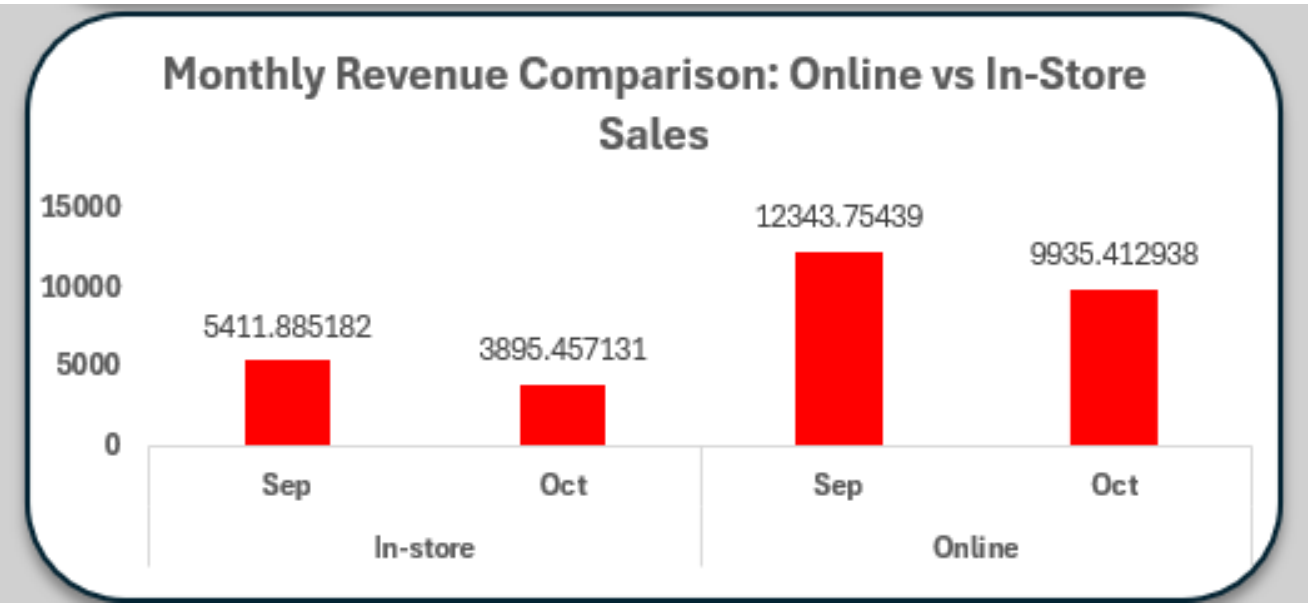
2. Customer Demographics Analysis

- The **20-29 age group** dominates the customer base with **403,647 customers**, making it the most engaged demographic.
- **Other high-volume age groups include 20-29 (179,100), 40-49 (155,925), and 50-59 (172,985).**
- **Teen customers (10-19 years) also show strong participation (54,589 customers), indicating engagement from younger audiences.**
- **Customers aged 60+ represent a smaller portion of the market, requiring targeted strategies for engagement.**



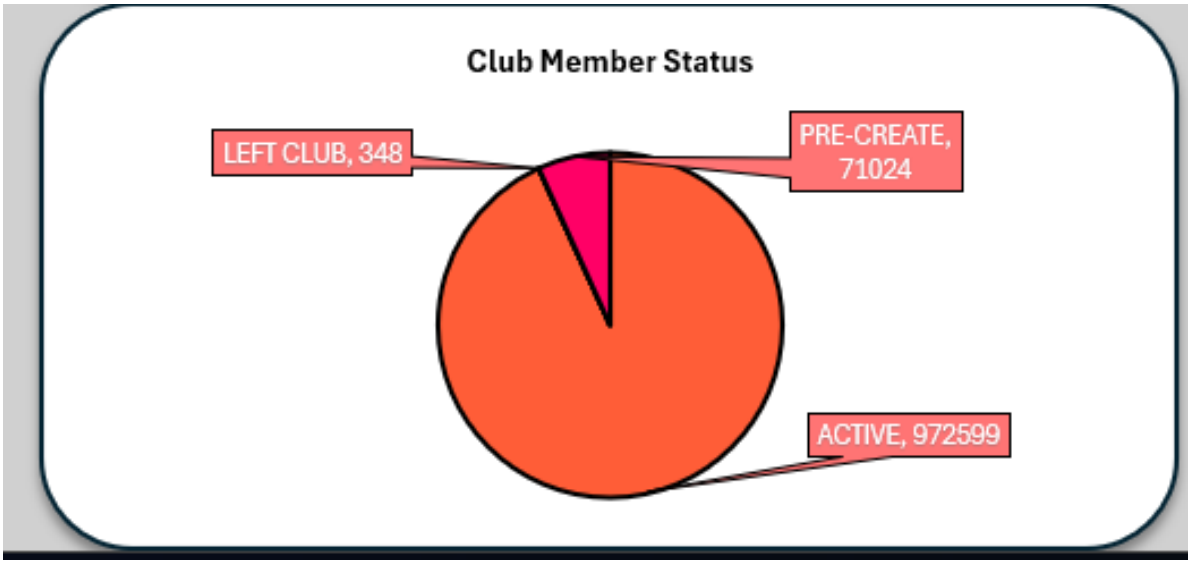
3. Online vs. In-Store Sales Trends

- **Online sales generated significantly higher revenue than in-store sales**, confirming the shift towards digital shopping.
- **For September, online revenue was $12,343.75 while in-store revenue was $5,411.88.**
- **For October, online revenue was $9,935.41 compared to in-store revenue of $3,895.45.**
- **This trend highlights the importance of further strengthening e-commerce efforts while maintaining a competitive in-store shopping experience.**



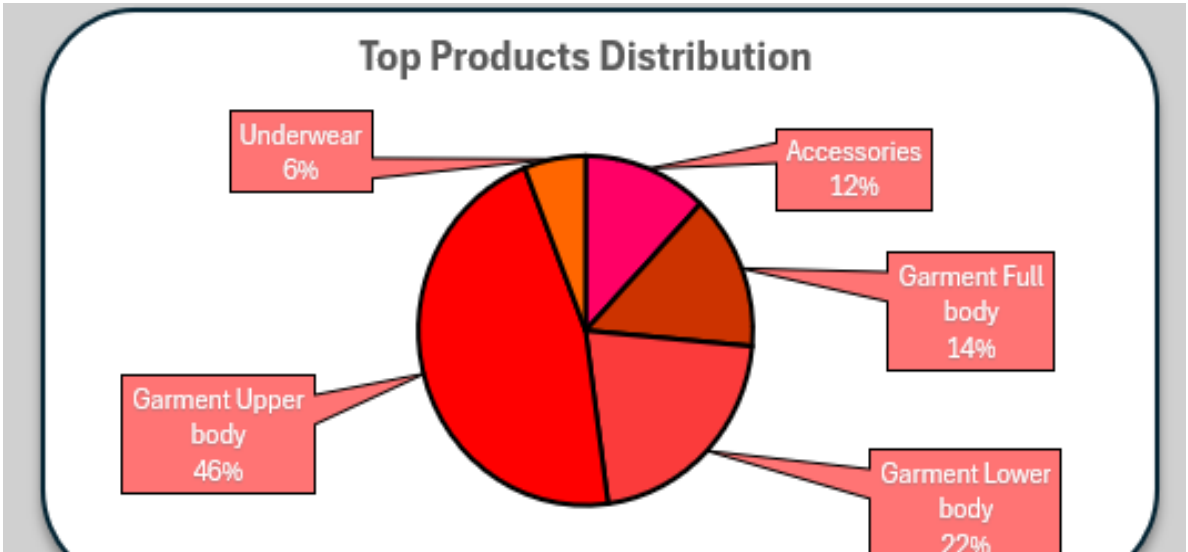
4. Membership & Loyalty Insights

- **Active club members (972,599) contribute to the majority of repeat purchases**, highlighting the importance of the loyalty program.
- **Pre-create members (71,024) represent potential customers**, requiring engagement strategies to encourage their first purchase.
- **Customers who have left the club (348) account for a very small fraction**, but understanding their reasons for leaving could improve customer retention.
- **Loyalty program members tend to have higher basket values**, reinforcing the effectiveness of discounts, early sale access, and exclusive offers.



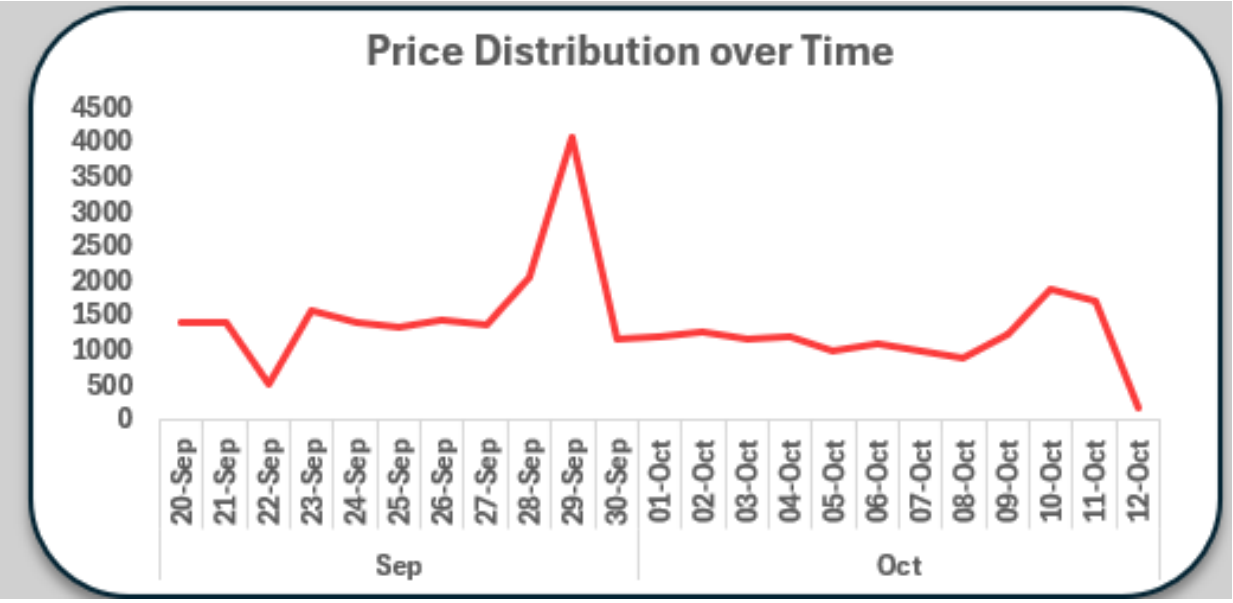
5. Top Products Distribution

- **Garment Upper Body (46%) dominates product sales**, showing strong demand for jerseys, t-shirts, and similar items.
- **Garment Lower Body (22%) follows closely, indicating steady sales for trousers, jeans, and related apparel.**
- **Garment Full Body (14%) includes dresses, jumpsuits, and other one-piece outfits, contributing to total sales but at a lower percentage.**
- **Accessories (12%) show strong customer interest, often purchased alongside apparel items.**
- **Underwear (6%) represents a niche category with consistent demand.**



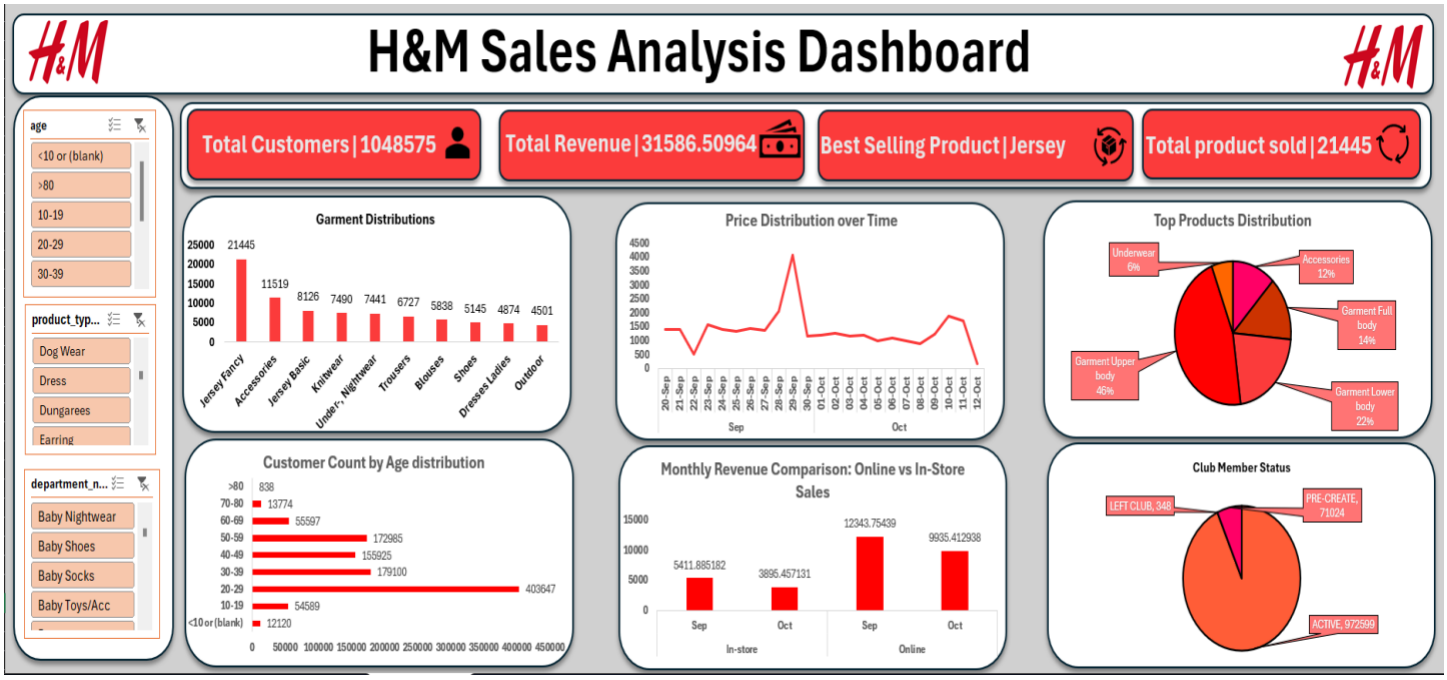
6. Price Distribution Over Time

- **Price trends indicate fluctuations influenced by sales events, seasonal discounts, and promotions.**
- **A significant price spike occurred in late September, possibly due to an increase in demand or promotional campaign effects.**
- **Prices remain stable for most of October with minor fluctuations, indicating controlled pricing strategies.**
- **Tracking these price trends can help optimize future pricing strategies to align with consumer purchasing behavior.**



Part 6: Conclusion

The insights gained from our analysis highlight the critical role of data-driven decision-making in optimizing H&M's retail strategy. By examining key sales patterns, customer engagement trends, and digital purchasing behaviors, we have identified several actionable strategies that will enable H&M to enhance its competitive edge, maximize revenue, and improve customer satisfaction.



- **Key Takeaways and Business Impact**

Our study has uncovered several essential findings that will shape the company's future direction:

1. **Jersey Products Dominate Sales**
    - The Jersey category has consistently outperformed other product categories in sales, signifying a strong consumer preference for this segment.
    - Ensuring adequate stock levels and optimizing marketing campaigns around these high-performing items will be crucial for sustaining growth.
2. **Young Consumers Drive Engagement**

- The 20-29 age group represents the most engaged customer base, indicating that H&M's marketing efforts should be tailored to meet their preferences and shopping habits.
- Personalizing promotions, product recommendations, and loyalty rewards for this demographic can increase conversion rates and brand loyalty.

3. **Digital Sales Surpass In-Store Purchases**
    - Online transactions continue to outperform in-store purchases, reflecting the shift in consumer behavior toward e-commerce.
    - Investing in digital enhancements such as AI-driven recommendations, a seamless online shopping experience, and mobile-friendly interfaces will be key to further capitalizing on this trend.
4. **Loyalty Program Engagement Boosts Repeat Purchases**
    - Customers enrolled in H&M's club membership program demonstrate higher retention rates and repeat purchase behavior.
    - Strengthening the program through tier-based incentives, exclusive promotions, and personalized discounts can increase customer lifetime value and engagement.
5. **Personalized Recommendations Improve Conversions**
    - AI-powered recommendations provide a significant opportunity to streamline the shopping experience and reduce decision fatigue.
    - Leveraging machine learning models to analyze customer preferences and suggest relevant products will lead to higher conversion rates and increased revenue.

- **Strategic Recommendations for Sustainable Growth**

To address these insights and drive long-term success, we propose the following business strategies:

1. **AI-Powered Product Recommendations**
    - Implementing advanced machine learning algorithms will enable H&M to deliver personalized product suggestions based on customer behavior and past purchases.
    - Enhancing the "You May Also Like" and "Frequently Bought Together" sections will encourage cross-selling and increase the average transaction value.

2. **Targeted Digital Marketing Strategies**
    - Focusing on the 20-29 age group and online shoppers, H&M should refine its digital marketing campaigns to target high-value customers more effectively.
    - Leveraging data analytics for customized email promotions, social media advertisements, and personalized push notifications will drive customer engagement and brand loyalty.
3. **Inventory Optimization for High-Demand Products**
    - Expanding the inventory for best-selling categories like jerseys and trousers will help meet consumer demand while preventing stockouts.
    - Implementing predictive analytics for demand forecasting will ensure better stock management and reduce losses from unsold inventory.
4. **Enhancing Online Shopping Experience**
    - Improving website navigation and search filters will help customers find their desired products more efficiently, reducing bounce rates and increasing conversions.
    - Implementing real-time AI chatbots for customer assistance and integrating augmented reality (AR) try-on features can further enhance the e-commerce experience.
5. **Strengthening Customer Loyalty Programs**
    - Introducing tier-based rewards and exclusive membership perks will incentivize repeat purchases.
    - Personalizing discounts and early-access sales for high-value customers will increase brand engagement and customer retention.

Final Thoughts

The recommendations outlined above present a comprehensive approach for H&M to enhance its digital transformation, optimize inventory management, and deepen customer engagement. As online shopping continues to grow, investing in data-driven marketing, AI-powered personalization, and an optimized e-commerce experience will be essential to maintaining H&M's competitive advantage.

By leveraging advanced analytics and customer insights, H&M can not only address its current business challenges but also position itself for long-term success in the evolving fashion retail industry. With a strategic focus on digital innovation, personalized engagement, and efficient supply chain management, H&M is well-equipped to sustain profitability and market leadership in the years to come.