1 Introduction

This report presents the findings and insights derived from the FreshMart synthetic dataset. FreshMart is a fictional Australian retail grocery chain, and this project aims to simulate data-driven decision-making by generating realistic data and designing BI dashboards for three key internal stakeholders: senior management, the marketing team, and the inventory management team. The dashboard provides each audience with a tailored view of performance metrics, consumer trends, and operational efficiency indicators to support strategic planning and decision-making. The purpose of this dashboard is to bridge the gap between raw data and strategic planning by enabling interactive exploration and real-time monitoring of business activities.

Target Audience

(i) Senior Management Team – Focused on overall business performance, revenue, and customer loyalty.

(ii) Marketing Team – Focused on understanding customer demographics, purchasing behavior, and campaign performance.

(iii) Inventory Management Team – Focused on product stock levels, restocking frequency, and warehouse logistics.

1.1 Objectives

Following are the objectives of this report:

Objective 1 (Senior Management Team): Provide insights into business performance, profitability, and product popularity by tracking sales volume, product returns, and store-level performance using interactive visuals and slicers for time-based comparisons.

Objective 2 (Marketing Team): Understand customer demographics, preferences, and referral sources to drive more personalized and effective marketing campaigns.

Objective 3 (Inventory Management Team): Analyze purchase behavior by product category and repurchase frequency, etc. to manage inventory in most efficient way.

1.2 Benefits/Advantages

Following are the benefits of creating dashboards:

Benefit 1: Helps identify high-performing products and stores, uncover issues behind high returns, and enable data-driven forecasting and benchmarking.

Benefit 2: Enables precise campaign targeting, improves customer retention strategies, and helps allocate budget effectively by focusing on high-impact channels and cate-

gories.

Benefit 3: Reduces waste, avoids stockouts, and enhances inventory flow by aligning procurement and storage strategies with demand and product sensitivity.

1.3 Assumptions

The datasets used in this project are derived synthetically with the help of Chat GPT [7] and later modified suitably to generate Power BI dashboards. The following are the assumptions made:

Assumption	**Details**
Assumption 1	Transaction data covers a 24-month period.
Assumption 2	Premium customer tier is assigned based on spending amount; customers spending more than $500 are Premium.
Assumption 3	Each customer is uniquely identified by Customer_Id, each product by Product_Id, and each inventory by Inventory_Id.
Assumption 4	Each customer is uniquely identified and only belongs to one tier.
Assumption 5	Product categories are standardized across store Ids.

Table 1: Assumptions

1.4 Business Rules and Variables

Attribute	Data Type	Description	Business Rule
Sale_ID	String	Unique identifier for each sale	Unique value, not nullable
Sale_Date	Date	Date the sale occurred	Format: YYYY-MM-DD
Store_ID	String	Store where the sale was made	Must match existing store list
Quantity	Integer	Number of items sold	Quantity ≥ 0
Total_Amount	Float	Total transaction amount	Total_Amount = (Quantity $\times$ Price) $-$ Discount
Discount	Float	Discount applied on the transaction	Discount ≥ 0
Payment_Method	String	Method of payment used	Value $\in$ {Cash, Card, E-wallet}
Customer_ID	String	Unique customer identifier	Nullable, unless Loyalty_Score $\neq 0$
Loyalty_Score	Float	Loyalty points of customer	Score between 0 to 100
Is_Premium	Boolean	Whether customer is premium	Value $\in$ {True, False}
Product_ID	String	Unique product identifier	Unique for each product
Category	String	Product category	Category $\in$ pre-defined list
Price	Float	Price per unit	Price ≥ 0
Return_Flag	Boolean	If item was returned	Value $\in$ {True, False}

Table 2: Business rules and variables: Sales Dataset for Senior Management

Attribute	**Data Type**	**Description**	**Business Rule**
Inventory_ID	String	Unique inventory entry ID	Unique, not nullable
Store_ID	String	Identifier of the store	Must match store master table
Product_ID	String	Product identifier	Must exist in product table
Product_Name	String	Name of the product	Cannot be null
Category	String	Product category	Category $\in$ predefined list
Stock_Level	Integer	Quantity available in stock	Stock_Level ≥ 0
Reorder_Required	Boolean	Indicates restock need	If Stock_Level $\leq$ Threshold then True
Last_Restock_Date	Date	Date of last restocking	Format: YYYY-MM-DD
Shelf_Location	String	Shelf location in store	Format Aisle-Shelf (e.g., A2-B3)
Restock_Frequency_Days	Integer	Typical days between restocks	Frequency $\sim$ Category demand
Damaged_Items	Integer	Number of damaged units	Damaged_Items ≥ 0
In_Transit	Integer	Items currently being delivered	In_Transit ≥ 0
Expected_Delivery	Date	Next delivery date	Expected_Delivery $\geq$ today
Stock_Value	Float	Value of current stock	Stock_Value = Price $\times$ Stock_Level
Expiry_Date	Date	Product expiration date	Applicable only for perishable goods
Price	Float	Unit selling price	Price ≥ 0

Table 3: Business rules and variables: Inventory Management Dataset

Attribute	**Data Type**	**Description**	**Business Rule**
Sale_ID	String	Unique identifier for sale	Must match with sales dataset
Sale_Date	Date	Date of the sale	Format: YYYY-MM-DD
Customer_ID	String	Unique identifier of customer	Foreign key to customer table
Age	Integer	Customer age	Age ≥ 13
Gender	String	Gender of customer	Value $\in$ {Male, Female, Other}
Preferred_Category	String	Most bought category	Based on purchase history
Referral_Source	String	How customer heard about store	Value $\in$ {Social Media, Email, Friend, Ad}
Product_ID	String	ID of purchased product	Cross-check with product table
Category	String	Product category	Category $\in$ marketing list
Quantity	Integer	Units bought	Quantity ≥ 1
Total_Amount	Float	Total price after discount	Amount $\sim$ Quantity $\times$ Price
Discount	Float	Discount on this sale	Discount ≥ 0
Payment_Method	String	Method of payment used	Must match valid options
Transaction_Channel	String	Online or In-store	Value $\in$ {Online, In-store}

Table 4: Business rules and variables: Marketing Dataset

2 Sales Dashboard: for Senior Management

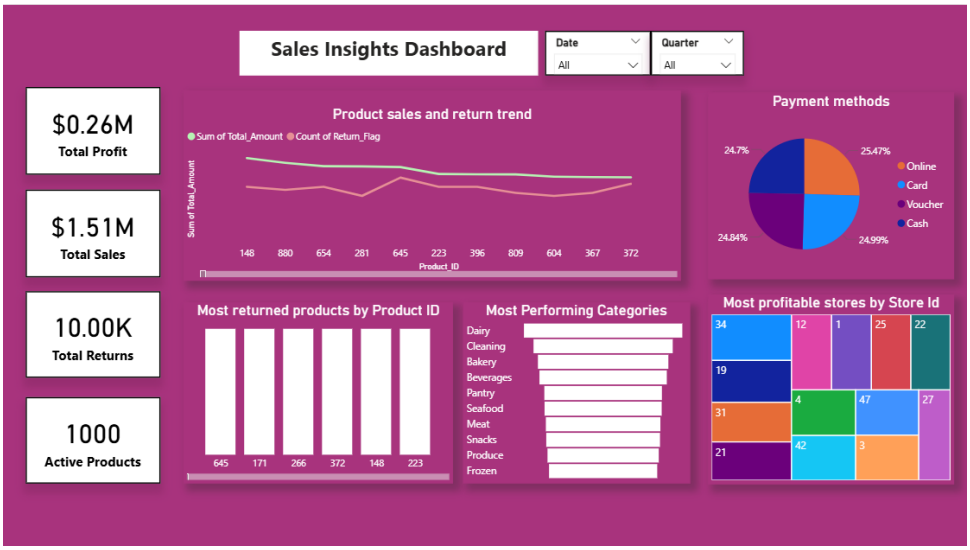


Figure 1: Sales Dashboard: for senior management

The sales dashboard is designed for senior management to evaluate ongoing business performance. It provides summary statistics including total profit, total sales, total revenue, and the count of active products currently being sold.

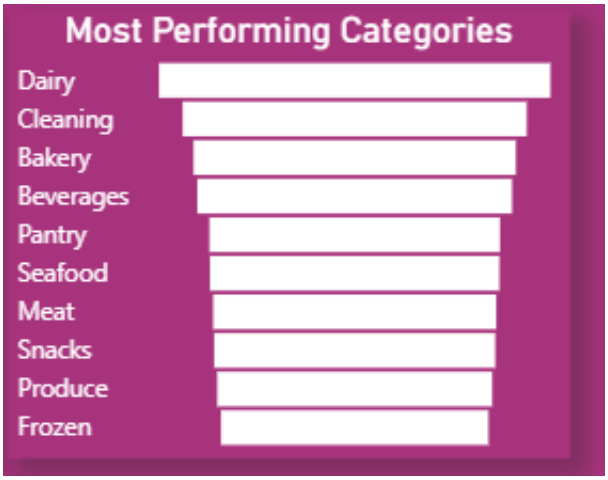


Figure 2: Most performing categories

The funnel chart highlights dairy as the top-selling product category, followed by cleaning items and bakery. Businesses can prioritize these categories to maximize sales revenue.

Figure 3: Most returned products

The bar chart indicates that Product 645 has the highest return rate, followed by Products 171 and 266. A detailed analysis is recommended to identify root causes and implement strategies to reduce returns.

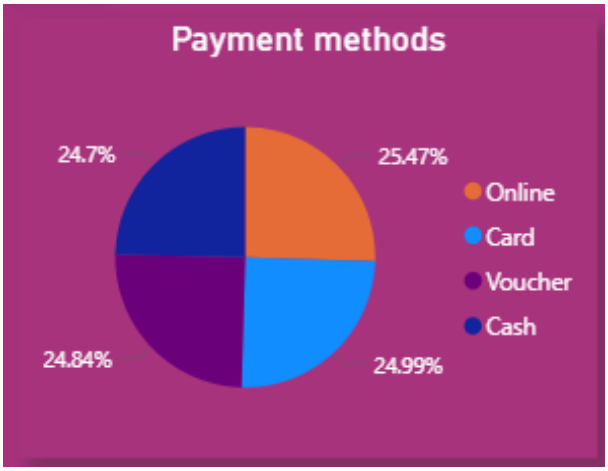


Figure 4: Most popular payment methods

The pie chart shows that all four methods of payment, i.e., online, card, voucher, and cash, are nearly equally popular. However, online payment is slightly in demand. In fact, the use of electronic transaction platforms and digital payment methods is increasing in retail and other industries [6]. This information can be leveraged to run a targeted ad campaign to encourage people to do more online transactions.

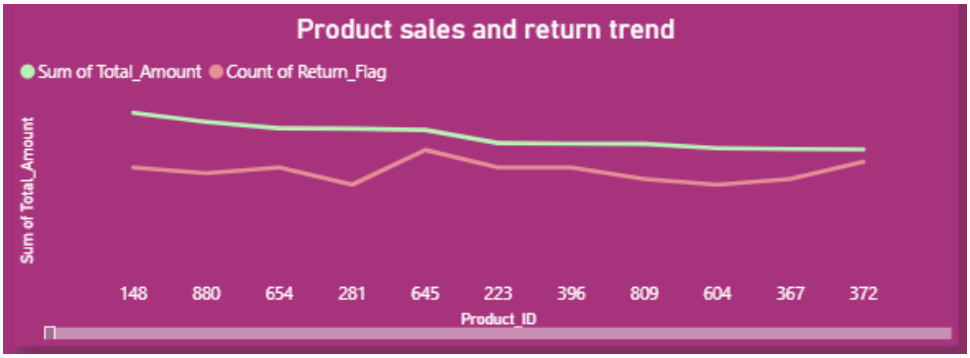


Figure 5: Product sales and return trend

The line shows a comparison between product sales and return trends among products. Product 645, although it has higher sales, is facing higher returns. This might indicate poor quality as the product, after being received, is being returned. However, there might be other underlying reasons that can be dug further. Retailers, like Freshmart, can increase profits by optimizing their product return policy, despite the negative impact of fraudulent returns [8].

Figure 6: Most profitable stores

The heatmap indicated store 34 as the highest revenue driver, followed by stores 19 and 31. Managers can leverage strategies being used in these stores to improve the underperforming stores.

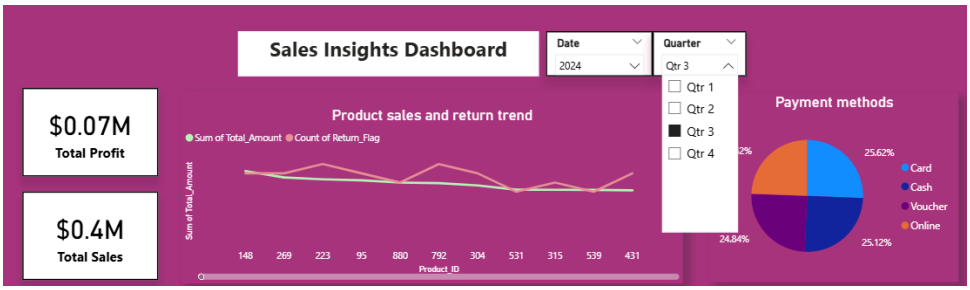


Figure 7: Use of slicer in Sales insights dashboard

Slicers in Power BI Desktop allow for powerful and insightful interactive dashboards [2]. The slicer in our dashboard can be used to filter the entire dataset in the dashboard based on date (year, month, days) and the sales quarter. This gives leverage to the managers to make necessary comparisons from past sales records as well.

3 Customer Insights Dashboard: for marketing team

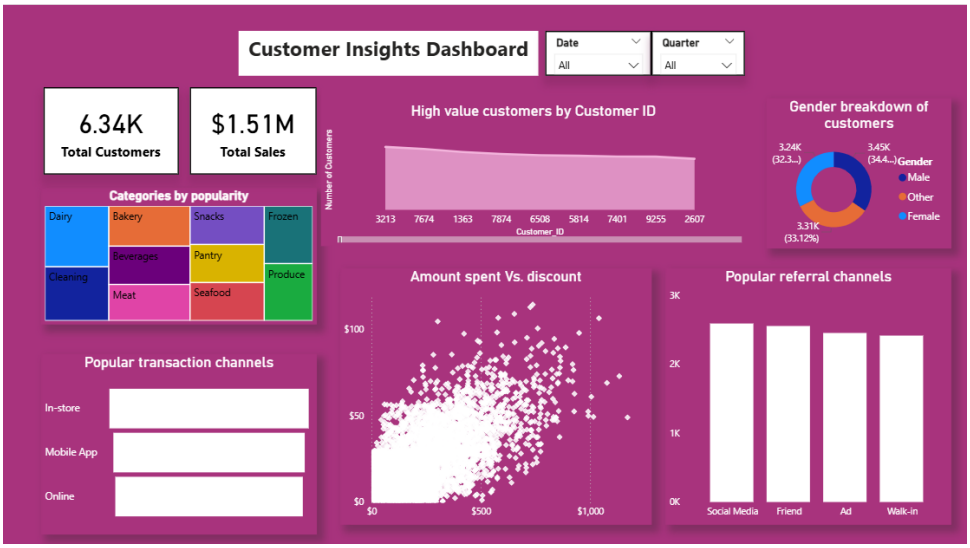


Figure 8: Sales Dashboard: for marketing team

The customer insights dashboard is developed for marketing to analyse on the existing customer demographics and run the targeted campaigns accordingly. The dashboard has a summary of total customers and total sales generated by them. Further information extracted from various charts as below:

Figure 9: Amount spent vs. discount

The scatter plot between the amount spent and the discount provided reveals that the discount might have an underlying effect on the sales amount. Correlation does not imply causation, as other unmeasured factors may be affecting the variables [5], for the actual causation, managers can do further analysis.

Figure 10: Popular categories by customer preference

The heatmap shows category popularity among different customers. The most liked category is dairy, followed by cleaning products bakery. This gives an idea of allocating marketing budgets and planning for targeted campaigns for managers.

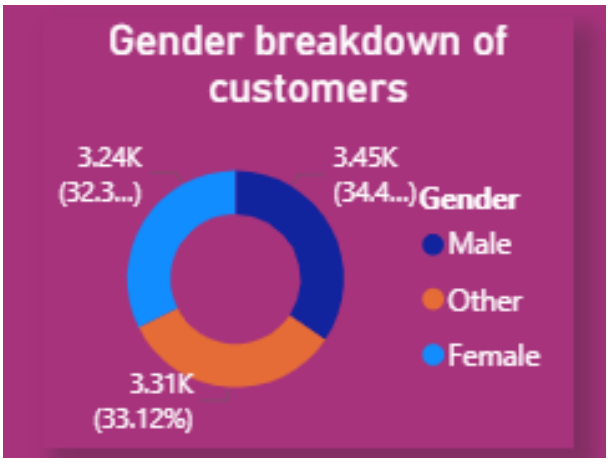


Figure 11: Customer breakdown by gender

The donut chart reveals that most of the shoppers in their store are females. This information gives leverage to the marketing team to strategize for their female audiences accordingly.

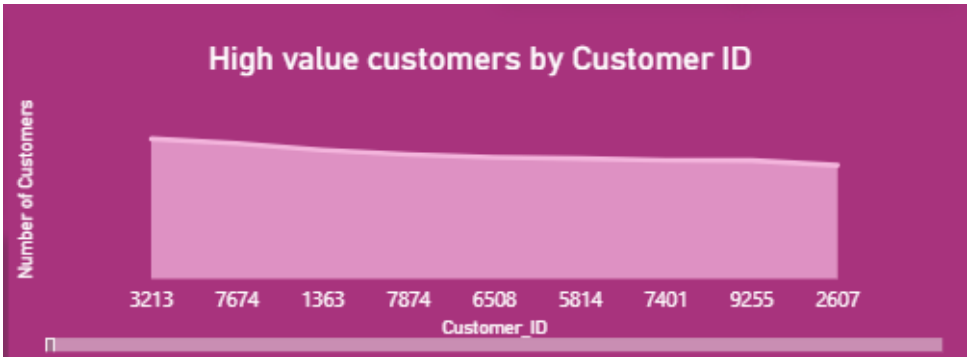


Figure 12: High value customer

The area chart reveals information about the high-value customers who have been

driving high revenue into the business. Further individual study can be done to develop the customer persona and do segmented targeting in the future.

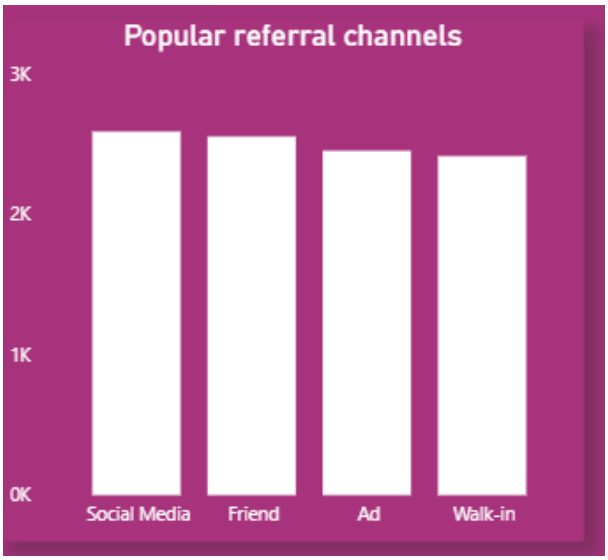


Figure 13: Popular referral channel

The bar chart shows that most of the customers come from social media, followed by referral from friends, and then paid ads. The marketing team can accordingly maintain their focus on social media and channels for further promotions.

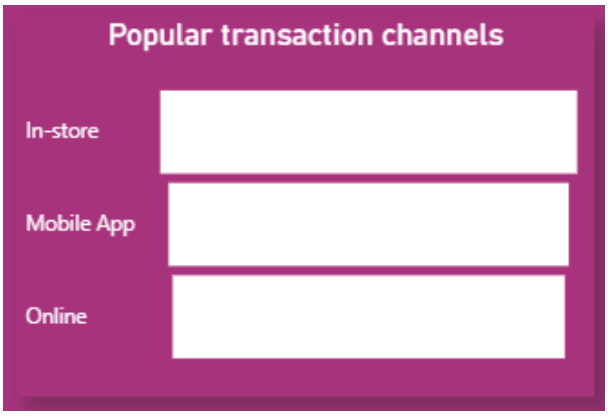


Figure 14: Popular transaction channel

The funnel chart shows that most customers love visiting the store rather than buying online. In-store promotions can be a suitable strategy to target these customers.

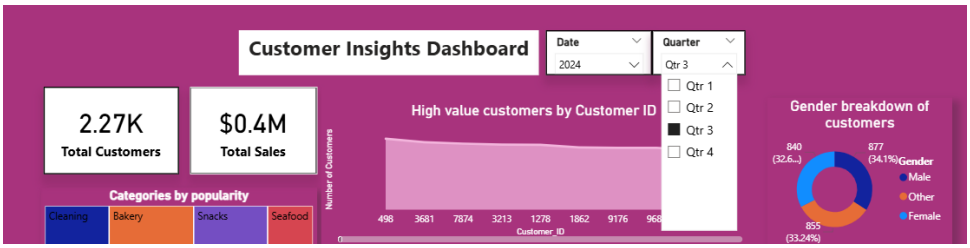


Figure 15: Use of slicer in customer insights dashboard

With the help of the slicer in the customer insights dashboard, the marketing manager can easily look up the values of total customers and identify churns in a given time period. They can have a look at how product popularity, category popularity, transaction channels, etc, evolved and prepare their marketing strategies accordingly.

4 Sales Dashboard: for inventory management team

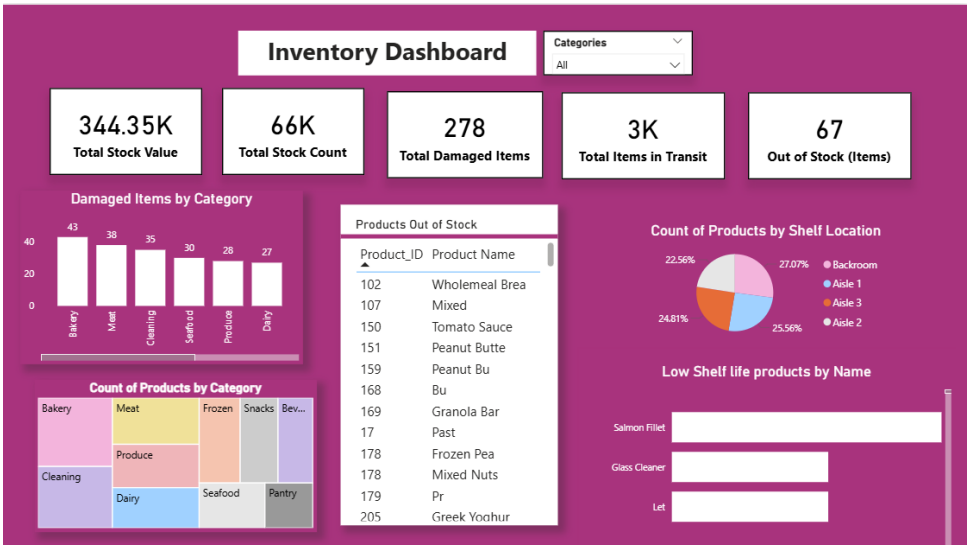


Figure 16: Sales Dashboard: for inventory management team

The inventory dashboard gives the inventory manager an idea of total stock values, total stock counts, total damaged items, total items that are in transit, items that are out of stock and need replacement, items that get sold very often, etc. This helps them plan better to optimise their inventory.

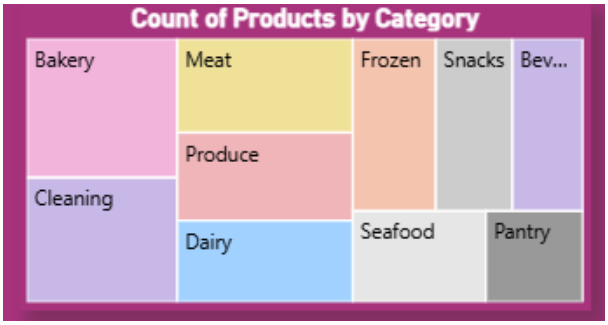


Figure 17: Popular categories by inventory stock

The heat map shows that bakery items are high on stock, which makes sense as they are the highest demanded categories as well. This heatmap gives an idea to the inventory manager about the products that might require frequent purchasing and storing appropriately.

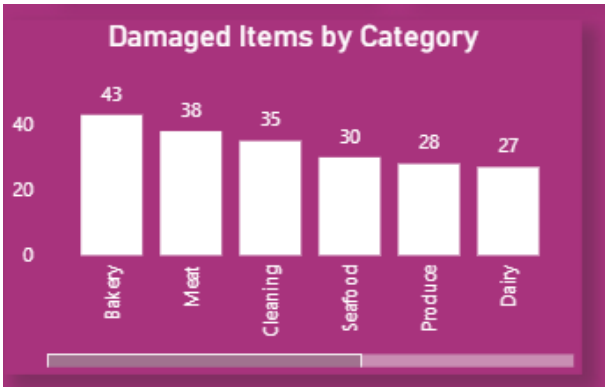


Figure 18: Damaged items by category

The bar chart shows items damaged per category. While the demand is very high. Bakery is the most sensitive category when it comes to getting damaged. Proper measures must be taken to store them properly to reduce possible loss.

Figure 19: Low shelf life products by name

The horizontal column chart shows Salmon fillet has the lowest shelf life. Hence, proper stock clearance strategies can be applied to the items with low shelf life, or a proper storing mechanism that can prolong their shelf life can be applied.

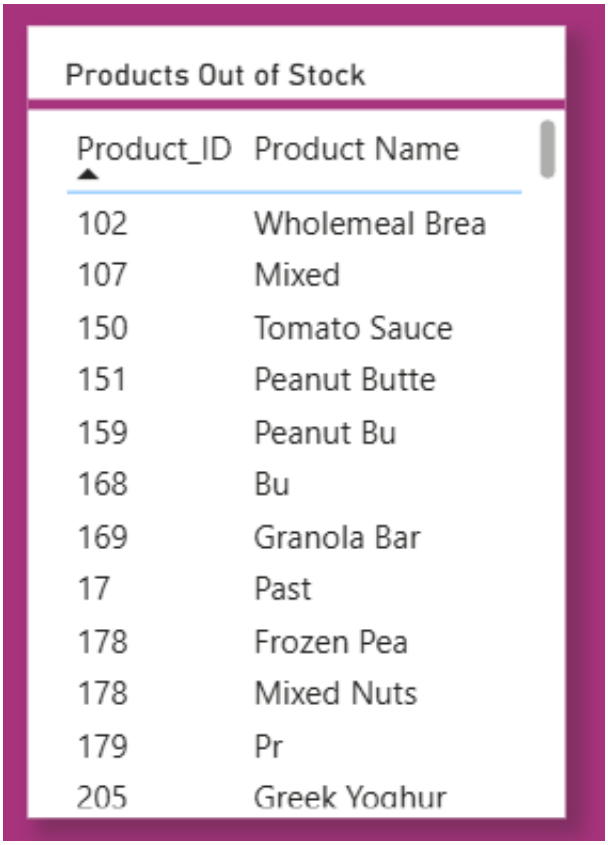


Figure 20: Out of stock products

The table shows the list of products that are out of stock on today's date. Appropriate planning can be done in time to maintain their demand and procurement.

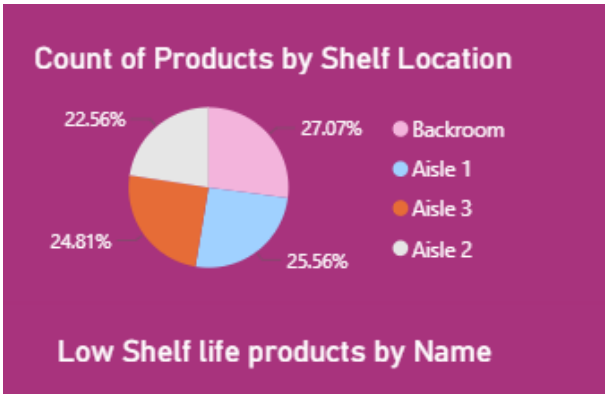


Figure 21: Product distribution by shelf location

The pie chart shows that most of the products are stored in the backroom, followed by aisles 1,2, and 3. Proper measures can be taken by managers to decide on the most effective ways to store the inventory.

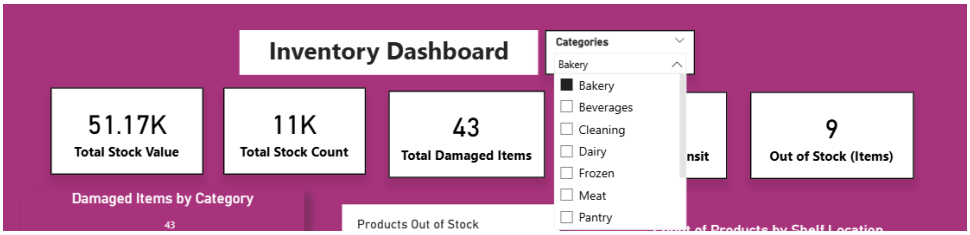


Figure 22: Use of slicer in inventory dashboard

The slicer in this dashboard helps the inventory team to visualise the status of various products based on categories. Multiple categories can be selected at the same time.

5 Recommendations

Recommendations for Senior management team:
Fresh Mart can investigate the underlying causes behind Product 645's high sales and high return rates to identify possible quality or fulfillment issues. Retailers should consider consumer returns when selecting their product assortment, as offering a mix of popular and eccentric products can be optimal under strict return policies[1]. The company should also replicate the successful strategies used by Store 34 to improve performance in underperforming locations. By utilizing quarterly slicers, Fresh Mart can track evolving sales trends and refine campaign planning with greater accuracy.

Recommendations for the marketing team:
Fresh Mart should refine its discount strategy to encourage greater customer spending. Infact, researches show that tiered discounts with smaller increments between spending thresholds encourage higher customer spending compared to larger increments [3]. The marketing team can focus efforts on top-performing categories like dairy and bakery to drive sales. Campaigns should be designed to appeal to the store's largely female customer base. Fresh Mart can strengthen its loyalty programs to retain high-value customers and enhance customer lifetime value. Additionally, the company should continue to prioritize social media and referral channels for promotional outreach.

Recommendations for inventory management team:
Fresh Mart should maintain a steady supply of fast-selling items like bakery products while implementing measures to reduce spoilage. The inventory team can address high damage rates in sensitive product categories to minimize losses. Fresh Mart should act promptly to restock frequently unavailable products to meet ongoing demand. Shelf placement strategies should be optimized to improve visibility and product access. Infact, Optimizing shelf-space allocation to grouped product categories can promote impulse buying by improving product visibility [4]. Finally, the team can use category filters in the dashboard to make more informed and efficient restocking decisions.

References

[1] A. Alptekinoğlu and A. Grasas. When to carry eccentric products? optimal retail assortment under consumer returns. *Production and Operations Management*, 23(5):877–892, 2013.

[2] A. Aspin. Using slicers. In *Pro Power BI Desktop*, pages 779–820. 2020.

[3] A. Cheng and G. R. Ross. Tiered discounts as multiple reference points for spending. *Journal of Consumer Psychology*, 2022.

[4] T. Flamand, A. Ghoniem, and B. Maddah. Promoting impulse buying by allocating retail shelf space to grouped product categories. *Journal of the Operational Research Society*, 67(7):953–969, 2016.

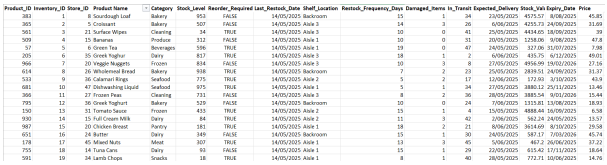
[5] D. E. Geer Jr. Correlation is not causation. *IEEE Security & Privacy Magazine*, 9(2):93–94, 2011.

[6] S. Kolyandov. The rising popularity of digital transaction platforms. *Trakia Journal of Sciences*, 19(Suppl.1):122–129, 2021.

[7] OpenAI. Chatgpt (mar 14 version). `https://chat.openai.com/`, 2023. Large language model.

[8] M. A. Ülkü, L. C. Dailey, and H. M. Yayla-Küllü. Serving fraudulent consumers? the impact of return policies on retailer's profitability. *Service Science*, 5(4):296–309, 2013.

A Appendix



Product_ID	Inventory_ID	Store_ID	Product Name	Category	Stock_Level	Reorder_Required	Last_Restock_Date	Shelf_Location	Restock_Frequency_Days	Damaged_Items	In_Transit	Expected_Delivery	Stock_Val	Expiry_Date	Price
383	1	8	Sourdough Loaf	Bakery	953	FALSE	14/05/2025	Backroom	15	1	24	22/05/2025	4575.57	8/08/2025	45.85
365	2	5	Croissant	Bakery	507	FALSE	14/05/2025	Aisle 3	14	3	26	6/08/2025	4255.73	24/09/2025	31.69
561	3	21	Surface Wipes	Cleaning	34	TRUE	14/05/2025	Aisle 3	10	0	41	25/05/2025	4434.05	18/08/2025	39
599	4	15	Bananas	Produce	312	FALSE	14/05/2025	Aisle 1	10	0	31	20/05/2025	1258.06	9/08/2025	47.8
57	5	6	Green Tea	Beverages	596	TRUE	14/05/2025	Aisle 1	19	0	47	24/05/2025	327.06	31/07/2025	7.98
205	6	35	Greek Yoghur	Dairy	817	TRUE	14/05/2025	Aisle 3	18	1	2	6/06/2025	435.75	6/12/2025	49.01
966	7	20	Veggie Nuggets	Frozen	834	FALSE	14/05/2025	Aisle 3	10	3	8	27/05/2025	4956.99	19/02/2026	27.16
614	8	26	Wholemeal Bread	Bakery	938	TRUE	14/05/2025	Backroom	7	2	23	25/05/2025	2839.51	24/08/2025	31.37
533	9	36	Calamari Rings	Seafood	775	TRUE	14/05/2025	Aisle 2	5	2	17	12/06/2025	172.93	3/10/2025	43.9
681	10	47	Dishwashing Liquid	Seafood	975	TRUE	14/05/2025	Aisle 1	5	1	34	27/05/2025	3880.12	25/11/2025	13.46
366	11	27	Frozen Peas	Cleaning	731	FALSE	14/05/2025	Aisle 3	8	2	36	28/05/2025	3885.54	9/01/2026	15.44
795	12	36	Greek Yoghurt	Bakery	529	FALSE	14/05/2025	Backroom	10	0	24	7/06/2025	1315.81	13/08/2025	18.93
150	13	31	Tomato Sauce	Frozen	415	TRUE	14/05/2025	Aisle 2	15	1	4	15/05/2025	4888.44	16/09/2025	6.58
930	14	15	Full Cream Milk	Dairy	84	TRUE	14/05/2025	Aisle 2	11	3	42	2/06/2025	562.24	24/05/2025	13.57
987	15	20	Chicken Breast	Pantry	181	TRUE	14/05/2025	Aisle 1	18	2	21	8/06/2025	3614.69	8/10/2025	29.58
651	16	24	Butter	Dairy	349	FALSE	14/05/2025	Backroom	15	1	30	24/05/2025	587.17	7/03/2026	45.74
178	17	45	Mixed Nuts	Meat	307	TRUE	14/05/2025	Aisle 1	13	3	45	5/06/2025	467.2	26/06/2025	17.22
755	18	14	Tuna Cans	Dairy	93	FALSE	14/05/2025	Aisle 1	15	1	29	22/05/2025	615.42	17/11/2025	18.64
591	19	34	Lamb Chops	Snacks	18	TRUE	14/05/2025	Aisle 1	8	1	40	28/05/2025	772.71	10/06/2025	14.76

Figure 23: Inventory dataset

Customer_ID	Sale_ID	Product_ID	Sale_Date	Age	Gender	Preferred_	Referral_S	Category	Quantity	Total_Amount	Discount	Payment_Method	Transaction_Channel
4055	1	203	26/08/2024	28	Male	Produce	Friend	Dairy	2	27.55	9.74	Online	Mobile App
248	2	231	24/09/2024	35	Male	Pantry	Friend	Beverages	5	148.22	16.45	Online	In-store
8370	3	249	14/06/2024	62	Female	Bakery	Ad	Frozen	5	197.66	18.1	Card	In-store
9604	4	327	31/01/2025	67	Other	Produce	Friend	Frozen	3	214.51	6.45	Voucher	Online
9291	5	316	3/12/2024	33	Other	Seafood	Walk-in	Pantry	6	108.6	29.27	Cash	In-store
8610	6	141	30/03/2025	31	Female	Bakery	Ad	Meat	4	72.15	28.02	Card	Mobile App
5197	7	373	28/03/2025	48	Male	Bakery	Friend	Seafood	4	199.67	18.51	Online	In-store
3653	8	745	20/07/2024	63	Other	Produce	Friend	Frozen	3	252.74	16.51	Online	Online
8971	9	644	19/07/2024	24	Other	Cleaning	Ad	Snacks	1	53.39	20.78	Online	In-store
3763	10	672	15/10/2024	25	Female	Bakery	Ad	Frozen	1	15.01	4.14	Online	Mobile App
1712	11	688	22/08/2024	61	Male	Seafood	Walk-in	Produce	8	35.05	29.32	Online	Online
1990	12	893	23/12/2024	29	Female	Dairy	Social Me	Bakery	7	245.76	11.67	Voucher	In-store
311	13	968	20/06/2024	21	Other	Snacks	Ad	Cleaning	9	127.61	4.2	Voucher	Online
2555	14	914	13/10/2024	43	Female	Beverages	Walk-in	Dairy	4	100.43	29.43	Voucher	Online
909	15	129	18/04/2025	28	Female	Meat	Walk-in	Meat	4	216.84	25.78	Online	In-store
9282	16	36	11/01/2025	20	Other	Seafood	Walk-in	Pantry	2	299.1	0.38	Card	Mobile App
35	17	822	18/03/2025	29	Other	Seafood	Walk-in	Bakery	6	38.4	20.98	Card	Online
2305	18	98	24/07/2024	26	Female	Dairy	Walk-in	Beverages	5	61.08	24.51	Online	Mobile App
5204	19	682	30/10/2024	50	Male	Cleaning	Walk-in	Beverages	5	153.84	12.02	Card	Online

Figure 24: Marketing dataset

Sale_ID	Customer_ID	Sale_Date	Store_ID	Quantity	Total_Amount	Discount	Payment_Method	Loyalty_Score	Is_Premium	Product_ID	Category	Price	Return_Flag
1	4055	26/08/2024	25	2	27.55	9.74	Online	49.2	FALSE	203	Dairy	34.26	FALSE
2	248	24/09/2024	29	5	148.22	16.45	Online	73	TRUE	231	Beverages	18.5	FALSE
3	8370	14/06/2024	32	5	197.66	18.1	Card	98.1	FALSE	249	Frozen	8.25	FALSE
4	9604	31/01/2025	21	3	214.51	6.45	Voucher	35.7	FALSE	327	Frozen	30.25	FALSE
5	9291	3/12/2024	3	6	108.6	29.27	Cash	71.6	FALSE	316	Pantry	28.15	FALSE
6	8610	30/03/2025	10	4	72.15	28.02	Card	53.5	FALSE	141	Meat	14.84	FALSE
7	5197	28/03/2025	12	4	199.67	18.51	Online	70.5	FALSE	373	Seafood	26.38	FALSE
8	3653	20/07/2024	28	3	252.74	16.51	Online	83.1	FALSE	745	Frozen	24.91	FALSE
9	8971	19/07/2024	11	1	53.39	20.78	Online	41.8	TRUE	644	Snacks	37.93	FALSE
10	3763	15/10/2024	14	1	15.01	4.14	Online	100	TRUE	672	Frozen	48.38	FALSE
11	1712	22/08/2024	19	8	35.05	29.32	Online	9.5	FALSE	688	Produce	47.25	FALSE
12	1990	23/12/2024	46	7	245.76	11.67	Voucher	99.3	FALSE	893	Bakery	36.16	FALSE
13	311	20/06/2024	50	9	127.61	4.2	Voucher	90.8	TRUE	968	Cleaning	48.8	TRUE
14	2555	13/10/2024	30	4	100.43	29.43	Voucher	76.1	TRUE	914	Dairy	30.62	FALSE
15	909	18/04/2025	2	4	216.84	25.78	Online	84.6	FALSE	129	Meat	38.97	FALSE
16	9282	11/01/2025	22	2	299.1	0.38	Card	67.5	FALSE	36	Pantry	4.71	FALSE
17	35	18/03/2025	42	6	38.4	20.98	Card	51.4	TRUE	822	Bakery	17.33	FALSE
18	2305	24/07/2024	47	5	61.08	24.51	Online	16.2	TRUE	98	Beverages	20.94	FALSE
19	5204	30/10/2024	27	5	153.84	12.02	Card	68.2	TRUE	682	Beverages	45.56	FALSE
20	8116	6/01/2025	33	3	14.07	29.71	Voucher	59.1	FALSE	594	Cleaning	29.35	FALSE

Figure 25: Sales dataset