

Executive Summary

Problem Statement - Find patterns in the spending patterns of the clients

The team analyzed the wholesale data of the XYZ company to identify spending patterns and provide them with actionable insights. This will facilitate XYZ company to make data driven business decisions. Our findings are as follows:

- Spending Patterns across Channels:
 - The spending on Fresh and Frozen products by Horeca clients is ~3 and ~4.75 times the spending of retail clients, respectively.
 - Within Retail, the greatest spend is observed for Grocery: ~2 times greater compared to Horeca
- Spending Patterns across Regions:
 - The spending in other regions is **2.2-3.2x** of the spend in Lisbon and Oporto combined across all product categories
- Correlation among different spends:
 - There is a strong correlation between Detergents&Paper and Grocery spending, as shown by the Pearson coefficient below (**0.92**). The correlation between Grocery and Milk is also strong (**0.73**) as is Detergents&Paper and Milk (**0.66**).

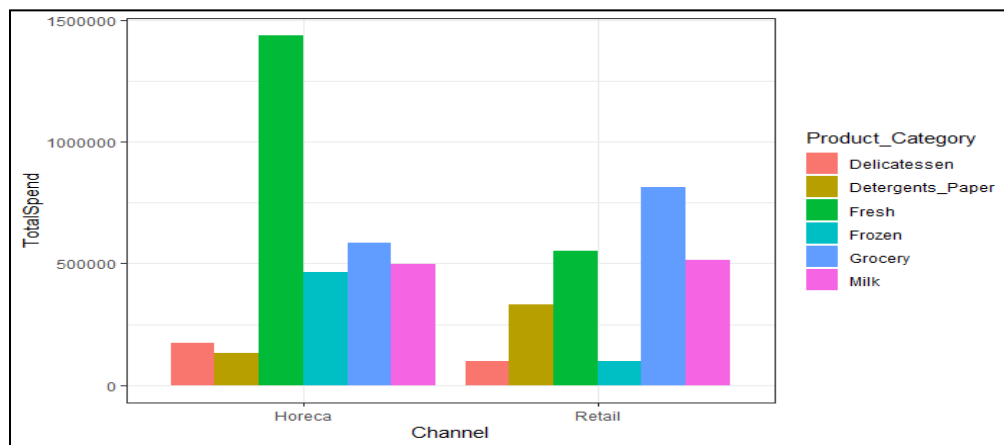
	Fresh	Milk	Grocery	Frozen	Detergents_Paper	Delicatessen
Fresh	1.00	0.10	-0.01	0.35	-0.10	0.24
Milk	0.10	1.00	0.73	0.12	0.66	0.41
Grocery	-0.01	0.73	1.00	-0.04	0.92	0.21
Frozen	0.35	0.12	-0.04	1.00	-0.13	0.39
Detergents_Paper	-0.10	0.66	0.92	-0.13	1.00	0.07
Delicatessen	0.24	0.41	0.21	0.39	0.07	1.00

We performed k-means and Hierarchical Clustering to better understand the data. After a few iterations of analysis, we found that by sorting the data into 3 Clusters through k-means gave us better insight into client spending patterns.

Cluster Summary:

Total annual spending (Dollars) in %	Cluster 1 n=338	Cluster 2 n=41	Cluster 3 n=61
Product Categories			
Delicatessen	4.80%	5.50%	3.10%
Detergents/Paper	7.90%	1.80%	18.60%
Fresh	35.20%	59.50%	11.20%
Frozen	10.50%	12.20%	2.60%
Grocery	24.10%	10.90%	38.60%
Milk	17.50%	10.10%	25.90%
Channels			
Hotel/Rest/Cafe	72.50%	0.00%	86.90%
Retail	27.50%	100.00%	13.10%
Regions			
Libson	17.80%	17.10%	16.40%
Oporto	10.30%	19.50%	6.60%
Other Regions	71.90%	63.40%	77.00%

CLUSTER 1 - Low spending clients. This cluster constitutes of the clients majorly from Horeca sector (i.e. Hotels/Restaurants/Cafes) approx. **72%**.



These clients demonstrate high spending in the Fresh category, while the remaining **28%** of the clients from Retail channel spend more on Grocery. Clients from both channels tend to spend the most on **Fresh, Grocery and Milk** as shown above.

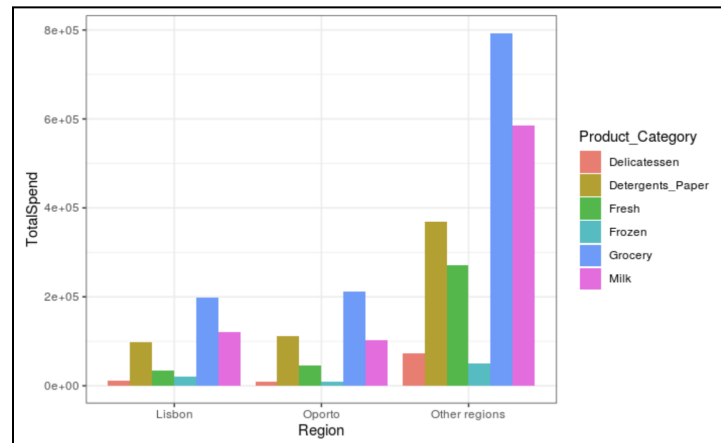
CLUSTER 2 - High spending clients who prefer Milk, Grocery and Detergents&Paper. This cluster consists of the clients only from the Retail channel, majorly from the Other regions (63%). Their spending pattern shows huge spends in the **Grocery, followed by Milk and Detergents&Paper** as shown above.

CLUSTER 3 - Middle spending clients who prefer Fresh and Frozen. This cluster consists of clients from both Horeca and Retail, majorly from Other regions (66%). These clients spend mostly in the **Fresh** category. The spend across other categories is minimal as shown above.

Recommendations:

- **Cross-sell based on the association between spends across different product categories**
 - Within the Retail channel (and within Cluster 2), the clients from Other Regions purchasing Grocery are more likely to buy Detergents&Paper and Milk products, due to the correlation observed between these categories of spends.
 - Hence, to encourage the clients to buy products across all 3 categories, the company can **bundle these products** together and **offer a discount** on bundled bulk orders. This will help both the company and the clients: spending would increase, and clients will find it more convenient to order products as they wouldn't have to individually locate the products from the entire product line.

- If given more data regarding the different products and brands, their pricing and profit margins, and existing marketing campaigns, the team will be able to determine the optimal packages and discounts for these clients.



- **Optimize inventory and delivery for low and high spending segments**

- The XYZ company can reduce costs for serving low spending clients (belonging to Cluster 1), by optimizing inventory management - eliminating excess inventory to match demand and reduce waste of fresh products with a short shelf life.
- Due to the high volume and low price of products moving through Cluster 1, any efforts to reduce inventory and delivery costs will greatly increase profitability. This should be investigated further internally to identify cost-saving measures in this area. Some potential strategies could include utilizing cross-docking techniques and/or optimization of delivery routes.
- Supply chain optimization can also be beneficial for clients in Cluster 3, who spend more on **Fresh** products. The quality of these products is directly dependent on how quickly they get from the shelf to the client. Eliminating excess inventory will assist in ensuring product freshness and customer satisfaction.

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