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# 1. Executive Summary

Analysing the superstore’s dataset that contained data from the years 2019 to 2022 revealed that the EU market makes approximately 30% more profit than the US despite the two markets only having a difference of only 3 orders. Further analysis uncovered 3 key insights which can help the superstore take the relevant steps in making the US market more profitable.

The 3 key insights are as follows:

1. EU and US markets generated approximately the same amount of profit from the Technology category. The largest difference in profit between categories came from the Furniture category, where EU earned 273% more than US. EU earned approximately 30% more than the US in the Office Supplies category.
2. In general, profit margins of the Sub-Categories under the Furniture and Office Supplies categories were larger for EU compared to US.
3. There is evidence to suggest that external pressure from the superstore’s competitors in the US market along with high shipping costs and discounts is hampering the US’ profitability in these categories.

Following these discoveries, it is recommended that the superstore take 3 key actions to allow the US market to be as profitable as the EU market.

The 3 key actions are:

1. Look for alternative suppliers for raw materials of Bookcases to lower cost. This will increase profit margins for Bookcases while keeping prices competitive among competitors.
2. Pass some of the high shipping for Binders to customers. There is evidence to suggest that the slight increase in price will not reduce the superstore’s competitiveness. This will increase profit margins for Binders, which is the US’ second largest Sub-Category under the Office Supplies category.
3. Cater more discounts to repeating customers. This ensures that most discounts provided by the superstore are rewarded to repeating customers, improving customer loyalty, which will contribute to the superstore’s profitability in the long run.

# 2. Introduction

## 2.1 Description of Dataset

This report is based on a dataset collected by a superstore over the course of four years, from 2019 to 2022. The dataset contains detailed information on the orders received by the superstore over this period, which allows us to gather valuable insights for the superstore by analysing the data.

## 2.2 Overview of Orders and Profits by Market

We begin our analysis with a high-level perspective by looking at the number of orders made by each market over this period.

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*Figure 1: Pareto Chart of Orders by Market*

From Figure 1, we can see that the markets APAC, LATAM, EU and US, account for over 80% of the number of orders received by the superstore. EU and US are particularly interesting since they have almost the same number of orders. Intuitively, we would think that the profits for these countries would follow a similar pattern. However, this is not the case when we examine the data.

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*Figure 2: Pareto Chart of Profits by Market*

We can observe from Figure 2 that APAC leads in profits just as it did with orders. Despite having near identical number of orders, EU generated a lot more profits than US. We will be looking into the factors that contribute to this difference.

# 3. Analysis of EU and US Data

## 3.1 Overview of Profits by Category and Sub-Category

### 3.1.1 Overview of Profits by Category

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*Figure 3: Breakdown of Profits by Category*

Figure 3 shows us that while EU and US generated similar profits from the Technology category, US falls behind EU significantly in the other two categories, Furniture and Office Supplies. This may be due to two factors, EU selling more items in these categories and/or the profit margins for items in these categories being more profitable for EU compared to US.

### 3.1.2 Overview of Profits by Sub-Categories of Furniture

A graph with multiple colored bars

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*Figure 4: Breakdown of Profits by Sub-Categories of Furniture*

Figure 4 illustrates that both EU and US are making losses for Tables and earn similar profits for Furnishings. However, Bookcases are EU’s largest profit generating Sub-Category while it is causing US a slight loss.

### 3.1.3 Overview of Profits by Sub-Categories of Office Supplies

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*Figure 5: Breakdown of Profits by Sub-Categories of Office Supplies*

Notable observations from Figure 5 include Appliances for EU generating the most profits across both markets and how the top 3 most profitable Sub-Categories for Office Supplies are different for both markets. EU’s top 3 are Appliances, Art, and Binders while US’ top 3 are Paper, Binders and Storage.

## 3.2 Flow of Orders by Market

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*Figure 6: Sankey Diagram depicting flow of orders from Market to Category to Sub-Category*

We can see from Figure 6 that there were more orders for Office Supplies for EU than US. While this may be a factor in the difference in profits for Office Supplies, it does not apply for the Furniture category. Interestingly, despite having similar profits for Furnishings in the previous section, Figure 6 reveals that US sold a lot more than EU in this Sub-Category.

## 3.3 Overview of Profit Margins Across Categories

### 3.3.1 Profit Margins of Sub-Categories of Furniture

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*Figure 7: Box Plot of Profit for all Sub-Categories under Furniture*

It can be seen from Figure 7 that EU has a much higher median profit for orders on Bookcases, Chairs and Furnishings compared to US. This explains the similar profits for Furnishings despite US having sold a lot more orders. Both markets also have negative median profits for Tables. Despite EU having a much lower median profit than US for Tables, this does not seem to have affected their overall profits as they still outperformed US.

Referring to Figure 6, we can see that most of the Tables sold between the two markets come from the US. Furthermore, the width of the bands for the other Sub-Categories for EU are relatively similar to one another, while the two thickest bands for the US are Furnishings and Chairs. EU sold large quantities of their profitable Sub-Categories and minimised sales on Tables. While the US also sold large quantities of their most profitable Sub-Categories, the large quantity of Tables sold, and their lower profit margins in other Sub-Categories pulled down their overall profit for the Furniture category.

### 3.3.2 Profit Margins of Sub-Categories of Office Supplies

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*Figure 8.1: Box Plot of Profit for all Sub-Categories under Office Supplies (EU)*

*A screenshot of a graph

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*Figure 8.2: Box Plot of Profit for all Sub-Categories under Office Supplies (US)*

A similar pattern can also be observed for Office Supplies. Most of the Sub-Categories for EU have a higher median profit than their US counterparts. Referring to Figure 6, the two largest bands for EU Office Supplies are Art and Binders which have a median profit of 18 and 10 respectively, while the two largest bands for US Office Supplies are Binders and Papers which have a median profit of 4 and 13 respectively.

## 3.4 Trends Across Sub-Categories

### 3.4.1 Trends in Bookcases

We will be analysing trends in Bookcases to further understand the large difference in profits generated between the two markets.

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*Figure 9.1: Time Series of different variables for EU Bookcases*

*A graph of different colored lines

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*Figure 9.2: Time Series of different variables for US Bookcases*

Figures 9.1 and 9.2 show us monthly Average Sales and Average Profits for EU and US Bookcases respectively to account for the different number of orders. We can see that the Average Sales and Average Profits for both markets have remained relatively flat for both markets, which means profit is changed by number of orders for this period. However, EU has a much higher median value of 697 and 116.3 for Average Sales and Average Profits respectively compared to US’ median values of 438 and -18.1. EU has managed to achieve higher values despite having a higher median monthly Average Shipping Cost of 80.5 compared to US’ 47.59 and a higher median monthly total Discount of 0.95 compared to the US’ 0.87. Furthermore, EU also raised their Discounts at a faster rate than the US. Therefore, it is unlikely that Shipping Costs and Discounts can account for the difference in profitability. The low monthly Average Sales for US and the low profit margins discovered in the previous section suggests that they are unable to sell at a higher price due to the superstore’s competitors. Raising discounts, possibly to attract more customers, further reduces the profitability of Bookcases.

### 3.4.2 Trends in Binders

We will be analysing the trends in Binders since the number of orders of Binders are closest between the two markets among the other Sub-Categories as shown in Figure 6.

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*Figure 10.1: Time Series of different variables for EU Binders*

*A graph of different colored lines

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*Figure 10.2: Time Series of different variables for US Binders*

We can see from Figures 10.1 and 10.2 that the trend for monthly Average Sales and Average Profit for both markets is also relatively flat. US has a higher median monthly Average Sales of 91 compared to EU’s 69.64. Despite this, their median monthly Average Profits are very similar. This is likely caused by US’ higher median monthly Average Shipping Cost of 10.23 and median monthly total Discounts of 10.35 compared to EU’s median values of 7.71 and 1.5 respectively. This causes explains US’ lower profit margin for Binders compared to EU’s as shown in Figure 8.1 and 8.2. The differences for their profits in Figure 5 can thus be attributed to US’ higher number of orders as shown in Figure 6.

# 4. Concluding Recommendations

From our analysis, we found two key reasons for the difference in total profit between EU and US despite similar number of orders received. In the case of Bookcases, it is likely that low prices from the superstore’s competitors pressures sale prices to be low. Since Bookcases also received the least number of orders for US’ Furniture category, it is also likely that the supplier for raw materials of Bookcases is the same as one of the other categories, which may not be the cheapest option. It may be worth for the superstore to consider alternative suppliers that may be able to offer raw materials at a cheaper cost. This allows for sale prices to still be low while increasing profitability of Bookcases.

In the case of Binders, the high Shipping Costs and Discounts are the causes for low profit margins. The superstore may want to consider passing part of the Shipping Costs to the customers by raising the sale price. While a reduction in demand is a valid concern for this course of action, there is evidence to suggest that this may not happen. As Binders make up the most orders for US’ Office Supplies category, this suggests that the superstore’s prices for Binders are very appealing compared to their competitors and compared to other products under this category. As such, there may be positive returns from an increase in price. Lastly, providing discounts to repeat customers only also ensures that the superstore is able to retain customer loyalty while reducing the number of unnecessary discounts to other customers.