

# REPORT: STRATEGIC ANALYSIS OF REGIONAL PROFIT MARGINS

**Title:** Strategic Analysis of Regional Profit Margins

**Author:** Alberto Gell

## EXECUTIVE SUMMARY

This report provides a comprehensive analysis of regional sales performance, focusing on identifying underperforming regions and categories, and determining actionable steps to optimize profitability. The analysis involves increasing the sales of high-margin products and strategically reducing or eliminating low-margin products. The overall goal is to propose data-driven strategies to achieve significant improvements in profitability across all regions.

## 1. Introduction

The primary objective of this analysis is to enhance the company's profitability by understanding and addressing key performance gaps across different regions and product categories. This includes:

- Analyzing the current profit margins and identifying areas for improvement.
- Determining the necessary actions to achieve a 10% increase in total profit.
- Examining the impact of increasing high-margin product sales in underperforming regions.

## DATA PREPARATION

To ensure accurate and effective analysis, the initial step involved cleaning and preparing the data using SQL. This process included:

**Selecting Necessary Columns:** The dataset initially contained multiple columns, many of which were not relevant to the analysis. Only the essential columns were retained, including Region, Category, Product Name, Quantity, Sales, Profit, and Shipping Cost.

### **SQL Script:**

```
SELECT Region, Category, ProductName, Quantity, Sales, Profit, ShippingCost  
FROM Sales-Profit_portfolio_project
```

New columns were created to provide a deeper understanding of profitability and for Calculating Additional Metrics

- **Profit Margin:** Calculated as the ratio of profit to sales, expressed as a percentage.
- **Profit Per Unit:** Determined by dividing the total profit by the quantity of products sold.

```
ALTER TABLE Sales-Profit_portfolio_project  
ADD COLUMN ProfitMargin AS (Profit / Sales) * 100;  
ALTER TABLE Sales-Profit_portfolio_project  
ADD COLUMN ProfitPerUnit AS Profit / Quantity;
```

### **DATA ANALYSIS IN R**

Following the data preparation in SQL, the cleaned dataset was imported into R for detailed analysis. The R scripts were used to perform three key analyses:

- determining the number of high-margin products needed to achieve a profit increase
- identifying low-margin products to reduce
- assessing the impact of increasing high-margin product sales in underperforming regions.

### **NUMBER OF PRODUCTS ABOVE 38% PROFIT MARGIN NEEDED TO ACHIEVE A 10% INCREASE IN TOTAL PROFIT**

This analysis focused on calculating the number of products with a profit margin above 38% that need to be sold in each category and region to achieve a 10% increase in total profit.

#### **Filter High-Margin Products:**

The first step was filtering the dataset to include only products with a profit margin greater than 38%.

#### **Aggregate Profit by Region and Category:**

The total profit for each region and category was calculated.

#### **Determine Additional Products Needed:**

Based on the target profit increase, the additional number of products needed to be sold was calculated.

### R Script:

```
6 high_margin_products <- Profits[Profits$profit.margin > 38, ]
7 current_profit <- aggregate(high_margin_products$profit.per.unit * high_margin_products$Quantity,
8                             by = list(Category = high_margin_products$Category, Region = high_margin_products$Region),
9                             FUN = sum)
10 colnames(current_profit)[3] <- "Total_Profit"
11 total_current_profit <- sum(current_profit$Total_Profit)
12 target_profit <- total_current_profit * 1.10
13 additional_profit_needed <- target_profit - total_current_profit
14 current_profit$Additional_Profit_Needed <- current_profit$Total_Profit / total_current_profit * additional_profit_needed
15 current_profit$Additional_Products_Needed <- current_profit$Additional_Profit_Needed / mean(high_margin_products$profit.per.unit)
16 print(current_profit)
17 kable(current_profit, caption = "Current Profit by Region and Category")
18
```

Table: Current Profit by Region and Category

Category	Region	Total_Profit	Additional_Profit_Needed	Additional_Products_Needed
Furniture	Central	3516.556	351.6556	28.64979
Office Supplies	Central	11297.419	1129.7419	92.04139
Technology	Central	3662.405	366.2405	29.83804
Furniture	East	4756.322	475.6322	38.75031
Office Supplies	East	13111.728	1311.1728	106.82278
Technology	East	4952.950	495.2950	40.35226
Furniture	South	2550.542	255.0542	20.77956
Office Supplies	South	7232.893	723.2893	58.92722
Technology	South	1884.681	188.4681	15.35472
Furniture	West	6180.778	618.0778	50.35552
Office Supplies	West	15103.384	1510.3384	123.04903
Technology	West	4426.946	442.6946	36.06685

### Summary of the Table: Current Profit by Region and Category

The table displays the current profit, additional profit needed to achieve a 10% increase in total profit, and the corresponding number of additional products that need to be sold across different categories and regions. Here's a breakdown of the key insights:

#### Furniture Category:

**Central Region:** The current profit is \$3,516.56. To achieve a 10% increase in total profit, an additional \$351.66 in profit is required, which corresponds to selling approximately 29 additional units.

**East Region:** The current profit is \$4,756.32. An additional profit of \$475.63 is needed, requiring about 39 additional units.

**South Region:** The current profit is \$2,550.54, with an additional \$255.05 in profit needed, corresponding to selling around 21 additional units.

**West Region:** The current profit is \$6,180.78. To increase profit by 10%, an additional \$618.08 is needed, requiring about 50 additional units.

**Office Supplies Category:**

**Central Region:** The current profit is \$11,297.42. An additional \$1,129.74 in profit is needed, corresponding to selling approximately 92 additional units.

**East Region:** The current profit is \$13,111.73, with an additional \$1,311.17 in profit needed, requiring about 107 additional units.

**South Region:** The current profit is \$7,232.89. To achieve a 10% increase, an additional \$723.29 in profit is required, corresponding to 59 additional units.

**West Region:** The current profit is \$15,103.38. An additional \$1,510.34 in profit is needed, requiring about 123 additional units.

**Technology Category:**

**Central Region:** The current profit is \$3,662.41. An additional \$366.24 in profit is required, corresponding to selling approximately 30 additional units.

**East Region:** The current profit is \$4,952.95, with an additional \$495.30 in profit needed, requiring about 40 additional units.

**South Region:** The current profit is \$1,884.69. An additional \$188.47 in profit is needed, corresponding to selling around 15 additional units.

**West Region:** The current profit is \$4,426.95. To achieve a 10% increase, an additional \$442.69 in profit is required, corresponding to 36 additional units.

**Key Takeaways:**

- The **West Region** consistently shows the highest profit across all categories but also requires the highest number of additional products to be sold to achieve a 10% profit increase.
- The **Office Supplies** category, particularly in the West and East regions, contributes significantly to the total profit and requires a substantial increase in the number of units sold to achieve the desired profit growth.

- **Furniture** and **Technology** categories in the South and Central regions show lower profits and, therefore, require fewer additional units to meet the profit increase target.

#### ***NUMBER OF PRODUCTS BELOW 38% PROFIT MARGIN TO BE REDUCED OR ELIMINATED***

This analysis aimed to identify products with a profit margin below 38% that should be reduced or eliminated to optimize profitability.

##### **Filter Low-Margin Products:**

The dataset was filtered to include only products with a profit margin of 38% or less.

##### **Aggregate Losses by Region and Category:**

The total loss associated with selling low-margin products was calculated.

##### **Determine Products to Reduce:**

The quantity of products that should be reduced or eliminated was determined.

### ***R-scripts:***

```
3
4 low_margin_products <- Profits[Profits$profit.margin <= 38, ]
5 current_loss <- aggregate(low_margin_products$profit.per.unit * low_margin_products$Quantity,
6 | | | | | by = list(Category = low_margin_products$Category, Region = low_margin_products$Region),
7 | | | | | FUN = sum)
8 colnames(current_loss)[3] <- "Total_Loss"
9 current_loss$Products_to_Reduce <- current_loss$Total_Loss / mean(low_margin_products$profit.per.unit)
10 print(current_loss)
11 kable(current_loss, caption = "Number of Products Below 38% Profit Margin to be Reduced or Eliminated by Region and Category")
12
```

Table: Number of Products Below 38% Profit Margin to be Reduced or Eliminated by Region and Category

Category	Region	Total_Loss	Products_to_Reduce
:-----	:-----	:-----	:-----
Furniture	Central	1388.8480	200.91795
Office Supplies	Central	4018.1625	581.28823
Technology	Central	981.5775	142.00009
Furniture	East	2002.9975	289.76401
Office Supplies	East	6401.6195	926.09148
Technology	East	1749.0630	253.02852
Furniture	South	987.4105	142.84392
Office Supplies	South	2546.2080	368.34765
Technology	South	689.8600	99.79873
Furniture	West	2011.2295	290.95489
Office Supplies	West	6577.0330	951.46770
Technology	West	1779.0800	257.37094

### **Summary of the Table: Number of Products Below 38% Profit Margin to be Reduced or Eliminated by Region and Category**

This table provides an overview of the total losses associated with selling products below a 38% profit margin across various regions and categories. It also shows the number of product units that should be reduced or eliminated to optimize profitability.

#### **Furniture Category:**

**Central Region:** The total loss incurred is \$1,388.85. To reduce these losses, approximately 201 units should be eliminated or reduced.

**East Region:** The total loss is \$2,002.99, with around 290 units suggested for reduction.

**South Region:** The loss is \$987.41, requiring a reduction of approximately 143 units.

**West Region:** The loss is \$2,011.23, with about 291 units to be reduced or eliminated.

**Office Supplies Category:**

**Central Region:** The total loss is \$4,018.16, the highest in this category, requiring the reduction of approximately 581 units.

**East Region:** The loss is \$6,401.62, suggesting that around 926 units should be reduced.

**South Region:** The loss is \$2,546.21, with approximately 368 units needing to be reduced.

**West Region:** The loss is \$6,577.04, the highest in the West region, requiring around 951 units to be reduced.

**Technology Category:**

**Central Region:** The total loss is \$981.58, with approximately 142 units recommended for reduction.

**East Region:** The loss is \$1,749.06, with around 253 units needing to be reduced.

**South Region:** The loss is \$689.86, with approximately 100 units to be reduced.

**West Region:** The loss is \$1,779.08, requiring a reduction of about 257 units.

**Key Takeaways:**

- **Office Supplies** consistently shows the highest losses across all regions, particularly in the East and West regions, indicating a strong need to reduce or eliminate low-margin products in this category.
- The **Furniture** and **Technology** categories also show significant losses, especially in the East and Central regions, suggesting a strategic focus on reducing low-margin products in these areas.
- The **West Region** has the highest total losses overall, particularly in the Office Supplies category, indicating that this region should be a priority for reducing low-margin products to improve overall profitability.

## IMPACT ON OVERALL REVENUE AFTER A 20% INCREASE IN HIGH-MARGIN PRODUCT SALES

The final analysis assessed the impact on overall revenue if sales of high-margin products (above 38%) were increased by 20% in the most underperforming region.

### Identify Underperforming Region:

The region with the lowest total profit was identified.

### Calculate Projected Profit:

The impact of a 20% increase in sales of high-margin products was calculated.

### Compare Original and Projected Profits:

The original and projected profits were compared to assess the overall impact.

### *R-Scripts:*

```
4 colnames(projected_profit)[2] <- "New_Total_Profit"
5 original_profit <- aggregate(high_margin_products$profit.per.unit * high_margin_products$Quantity,
6                               by = list(Category = high_margin_products$Category, Region = high_margin_products$Region),
7                               FUN = sum)
8 original_profit <- original_profit[original_profit$Region == underperforming_region, ]
9 original_profit$Region <- NULL
10 colnames(original_profit)[2] <- "Original_Total_Profit"
11 final_comparison <- merge(original_profit, projected_profit, by = "Category")
12 final_comparison$Profit_Increase <- final_comparison$New_Total_Profit - final_comparison$Original_Total_Profit
13 print(final_comparison)
14 kable(final_comparison, caption = "Comparison of Original vs. Projected Profit After 20% Increase in High-Margin Product Sales")
15
16
;
; underperforming_region <- underperforming_region[which.min(underperforming_region$Total_Profit), "Region"]
; impact_high_margin <- high_margin_products[high_margin_products$Region == underperforming_region, ]
; impact_high_margin$Impact_on_Profit <- impact_high_margin$profit.per.unit * impact_high_margin$Quantity * 1.20
; projected_profit <- aggregate(impact_high_margin$Impact_on_Profit,
;                               by = list(Category = impact_high_margin$Category),
;                               FUN = sum)
;
;
```



Table: Comparison of Original vs. Projected Profit After 20% Increase in High-Margin Product Sales

Category	Original_Total_Profit	New_Total_Profit	Profit_Increase
Furniture	2550.542	3060.650	510.1084
Office Supplies	7232.893	8679.472	1446.5786
Technology	1884.681	2261.617	376.9362

**Summary of the Table: Comparison of Original vs. Projected Profit After 20% Increase in High-Margin Product Sales**

This table compares the original total profit with the projected total profit after implementing a 20% increase in high-margin product sales. The profit increase for each category is also highlighted.

**Furniture Category:**

**Original Total Profit:** \$2,550.54

**New Total Profit:** \$3,060.65

**Profit Increase:** \$510.11

The Furniture category sees a projected profit increase of \$510.11 after increasing high-margin product sales by 20%.

**Office Supplies Category:**

**Original Total Profit:** \$7,232.89

**New Total Profit:** \$8,679.47

**Profit Increase:** \$1,446.58

The Office Supplies category demonstrates the most substantial profit increase of \$1,446.58, indicating a significant impact from the increased focus on high-margin product sales.

**Technology Category:**

**Original Total Profit:** \$1,884.68

**New Total Profit:** \$2,261.62

**Profit Increase:** \$376.94

The Technology category shows a profit increase of \$376.94, reflecting a positive but smaller impact compared to the other categories.

### **Key Takeaways:**

- **Office Supplies** sees the largest profit increase after a 20% boost in high-margin product sales, suggesting that this category offers the most significant opportunity for profit growth.
- **Furniture** and **Technology** categories also show positive profit increases, though the impact is less pronounced than in Office Supplies.
- This analysis confirms that focusing on increasing sales of high-margin products, particularly in the Office Supplies category, can lead to substantial improvements in overall profitability.

### **CONCLUSION**

This comprehensive analysis demonstrates the potential for significant profitability improvements across different regions and product categories by strategically focusing on high-margin products and reducing or eliminating low-margin products. The key findings can be summarized as follows:

1. **Profit Optimization through High-Margin Products:** The analysis shows that by increasing the sales of products with a profit margin above 38%, particularly in the Office Supplies category, the company can achieve substantial profit growth. The most significant profit increase was observed in the Office Supplies category, where a 20% boost in sales of high-margin products resulted in an additional \$1,446.58 in profit.
2. **Strategic Reduction of Low-Margin Products:** Reducing or eliminating low-margin products, especially in regions where these products are contributing to significant losses, can further optimize profitability. For instance, the Office Supplies category in the West region alone accounted for a loss of \$6,577.04, suggesting a strong need to reassess the product mix in this region.
3. **Targeted Regional Strategies:** The West region consistently shows the highest profit across all categories but also has the greatest need for product optimization. Focusing on high-margin products in this region while reducing low-margin products could maximize profitability.
4. **Category-Specific Insights:** The Office Supplies category offers the most significant opportunity for profit growth across all regions. Conversely, the Technology and

Furniture categories, while still showing positive gains, require more tailored strategies to achieve similar levels of profit optimization.

### **Final Recommendations**

Based on these findings, the company should implement the following strategic actions:

**Increase Focus on High-Margin Products:** Prioritize marketing and sales efforts on high-margin products, particularly in the Office Supplies category, to capitalize on the potential for significant profit growth.

**Reduce Low-Margin Product Offerings:** Reevaluate the product mix, especially in the West region, to reduce or eliminate low-margin products that are contributing to losses.

**Tailored Regional Strategies:** Develop region-specific strategies that consider the unique profit dynamics of each region, ensuring that resources are allocated where they can have the most substantial impact.