

# Financial Performance Analysis Using Python

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## Executive Summary

This comprehensive financial analysis project demonstrates the application of Python-based data analytics to streamline business financial decision-making. By automating the processing of a large financial dataset containing 700 records across 16 attributes, this project successfully computed critical business metrics including total sales, cost of goods sold (COGS), and profitability across multiple dimensions such as country, product, and customer segment.

### Key Findings:

- Total Sales: \$118,726,350.26
  - Total Cost: \$101,832,648.00
  - Total Profit: \$16,893,702.26
  - Dataset Size: 700 records × 16 columns
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## 1. Introduction

### Problem Statement

Traditional manual financial analysis presents significant challenges to modern businesses:

- **Time Inefficiency:** Manual calculations are slow and resource-intensive
- **Error Susceptibility:** Human error in data processing leads to inaccurate insights
- **Limited Scalability:** Difficult to identify profitable countries, products, and segments across large datasets
- **Decision Delays:** Lack of automated systems prevents timely strategic decision-making

### Proposed Solution

Implement an automated Python-based data analytics solution that provides:

- Automated Excel data processing and extraction
- Comprehensive data cleaning and preparation
- Real-time profit calculations across multiple dimensions
- Granular analysis at country, product, and segment levels
- Professional data visualization for stakeholder communication

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## 2. Tools & Technologies

The following technology stack was employed for this analysis:

Technology	Purpose	Functionality
<b>Python</b>	Primary Programming Language	Core data processing and computation
<b>Pandas</b>	Data Manipulation Library	DataFrame operations, grouping, and aggregations
<b>Matplotlib</b>	Visualization Library	Generation of charts and graphical insights
<b>OpenPyXL</b>	Excel Integration	Reading and writing Excel workbook data
<b>Excel</b>	Data Source & Repository	Financial dataset storage and export
<b>VS Code / PowerShell</b>	Development Environment	Code writing, execution, and testing

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## 3. Methodology

### Data Processing Workflow

The analysis followed a systematic approach to ensure data quality and accuracy:

#### 3.1 Data Loading and Preparation

```
import pandas as pd  
import matplotlib.pyplot as plt
```

### Load financial dataset

```
df = pd.read_excel("financial_data.xlsx")
```

### Clean and standardize column names

```
df.columns = df.columns.str.strip()
```

# Initial data inspection

```
print(df.head())
print(df.shape) # Output: (700, 16)
```

## 3.2 Data Quality Assessment

- Removal of leading/trailing whitespace in column names
- Identification and handling of missing values
- Validation of data types and consistency

## 3.3 Financial Calculations

The following key metrics were computed from the raw financial data:

# Calculate aggregated financial metrics

```
total_sales = df['Sales'].sum()
total_cost = df['COGS'].sum()
total_profit = df['Profit'].sum()

print("Total Sales:", total_sales)
print("Total Cost:", total_cost)
print("Total Profit:", total_profit)
```

## 3.4 Dimensional Analysis

Profitability analysis was conducted across three critical business dimensions:

# Profit analysis by dimension

```
profit_by_country = df.groupby('Country')['Profit'].sum()
profit_by_product = df.groupby('Product')['Profit'].sum()
profit_by_segment = df.groupby('Segment')['Profit'].sum()

print(profit_by_country)
print(profit_by_product)
print(profit_by_segment)
```

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# 4. Key Results and Findings

## 4.1 Overall Financial Performance

Metric	Amount (USD)
Total Sales	\$118,726,350.26
Total Cost (COGS)	\$101,832,648.00
Total Profit	\$16,893,702.26
Profit Margin	14.23%

Table 1: Overall Financial Summary

## 4.2 Geographic Performance Analysis

The profit analysis across five key markets reveals significant variation in regional performance:

Country	Profit (USD)	Market Share
France	\$3,781,020	22.39%
Germany	\$3,680,388	21.79%
Canada	\$3,529,228	20.89%
USA	\$2,995,540	17.74%
Mexico	\$2,907,523	17.19%

Table 2: Profit by Geographic Market

**Key Insights:** France and Germany lead in profitability, collectively accounting for over 44% of total profits. These markets demonstrate strong performance and represent strategic priorities.

## 4.3 Product Performance Analysis

Products demonstrate varying levels of profitability and market contribution:

**Top Performer:** Paseo product line generates the highest profit contribution, establishing itself as a core revenue driver for the organization.

**Underperformer:** Enterprise segment products show negative profitability, indicating cost structure issues or pricing misalignment that require immediate strategic review.

## 4.4 Customer Segment Analysis

Analysis across customer segments reveals a clear divergence in profitability:

- **Government Segment:** Demonstrates the highest profitability, reflecting strong contract values and stable revenue streams
- **Commercial Segment:** Moderate profitability with steady demand
- **Enterprise Segment:** Shows loss performance, suggesting the need for revised pricing strategies, cost optimization, or segment repositioning

## 5. Strategic Implications

### 5.1 Recommendations

- 1. Geographic Expansion:** Replicate success factors from high-performing markets (France, Germany) to underperforming regions (Mexico, USA).
- 2. Product Portfolio Optimization:** Investigate Enterprise segment losses to determine whether market repositioning, pricing adjustment, or product redesign is warranted.
- 3. Segment Strategy:** Leverage Government segment profitability for contract expansion while addressing Enterprise segment viability concerns.
- 4. Operational Efficiency:** Analyze cost drivers to identify opportunities for COGS reduction and margin improvement.

### 5.2 Competitive Advantage

This automated analysis framework provides several strategic advantages:

- **Real-Time Insights:** Rapid decision support enables faster strategic pivots
- **Reduced Overhead:** Automation eliminates manual calculation burden and associated errors
- **Scalability:** Framework easily adapts to larger datasets or additional analysis dimensions
- **Data-Driven Culture:** Objective metrics replace subjective assessments in decision-making

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## 6. Conclusion

This financial performance analysis project successfully demonstrates the transformative power of Python-based data analytics in business intelligence. By automating the processing of complex financial datasets, the organization can:

1. Achieve comprehensive visibility into profitability across geographic, product, and segment dimensions
2. Reduce manual analytical effort and associated error rates
3. Make rapid, data-driven strategic decisions
4. Support better resource allocation and investment prioritization
5. Establish a scalable foundation for ongoing financial analysis

The integration of Python, Pandas, and Excel provides a practical, cost-effective solution for financial analytics that can be expanded to additional datasets, geographies, and analytical dimensions as business needs evolve.

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## References

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