

# Northwind Traders – Advanced Sales & Inventory Analysis Report

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**Database:** Northwind-like Sales Dataset (2012–2023)

**Tools Used:** SQL, DB Browser for SQLite, Data Analysis, Business Intelligence

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## Executive Summary

This comprehensive analysis leverages 11+ years of sales and inventory data to deliver actionable business insights and demonstrate advanced SQL and analytical skills. The project uncovers:

- **Severe inventory risks** threatening \$50M+ in annual revenue
- **Seasonal sales patterns** for optimized marketing and inventory planning
- **High-value, premium products** driving disproportionate revenue
- **Employee performance trends** to inform staffing and incentive strategies

Key outcomes include identifying superstar products like **Côte de Blaye** (\$53.3M revenue), exposing critical stockouts across top revenue-generating items, and providing short- and long-term recommendations for operational and financial improvement. This report showcases **technical proficiency, business acumen, and strategic decision-making**, making it ideal for recruitment portfolios for **data analyst, business analyst, or operations-focused roles**.

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# 1. Dataset Overview

The analysis is based on a structured relational database integrating transactional and master data:

Table	Key Attributes	Size / Notes
Orders	OrderID, OrderDate, EmployeeID, CustomerID	~10,000 records spanning 2012–2023
Order Details	OrderID, ProductID, UnitPrice, Quantity, Discount	~100,000 rows; used to calculate revenue and sales volumes
Products	ProductID, ProductName, CategoryID, UnitsInStock, UnitsOnOrder, ReorderLevel	77 products across 8 categories
Categories	CategoryID, CategoryName	Supports category-level analysis
Employees	EmployeeID, FirstName, LastName	Enables tracking of individual sales performance

This dataset supports **time-series, inventory, and product-level analysis**, facilitating comprehensive business intelligence reporting.

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# 2. Analysis Objectives & SQL Techniques

## Primary Goals:

1. Identify seasonal trends and peak sales periods
2. Determine top product categories and superstar products
3. Detect inventory gaps and critical stockouts
4. Track monthly product performance and growth
5. Evaluate employee contributions to revenue

## SQL Techniques Applied:

- Aggregations: `SUM()`, `COUNT()`

- Date functions: `strftime('%Y-%m')` and `'%Y'`
  - Joins: `INNER JOIN` across all relevant tables
  - Window functions: `SUM() OVER(PARTITION BY ...)` for running totals
  - Filtering and conditional logic: `WHERE`, `HAVING`, stock threshold calculations
  - Optimization: indexing on `OrderDate`, `ProductID`, `CategoryID`; partitioned window functions for efficiency
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## 3. Key Findings

### 3.1 Sales Performance & Seasonal Trends

- **Total Revenue Analyzed:** \$500M+ over 11 years
  - **Peak Revenue Months:**
    - December 2021: \$4.38M
    - August 2015: \$4.37M
    - May 2017: \$4.37M
  - **Weak Revenue Months:**
    - July 2012: \$2.07M
    - February 2017: \$2.60M
  - **Seasonal Insights:** Sales peak during **August, December, May, and January**, suggesting alignment with holidays and promotions; February and April consistently underperform.
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## 3.2 Product & Category Performance

Year	Top Category	Revenue	Units Sold
2012	Beverages	\$3,832,061	101,836
2015	Beverages	\$8,421,088	223,697
2021	Beverages	\$8,703,968	226,089
2023	Beverages	\$6,758,278	173,979

- **Top Categories:** Beverages, Confections, Meat/Poultry
- **Observation:** Beverages consistently lead revenue despite varying unit sales, indicating a **premium product focus**.

### Top Products (Revenue vs Volume):

Product	Category	Units Sold	Revenue	Avg Unit Price
Côte de Blaye	Beverages	202,234	\$53,274,483	\$263
Thüringer Rostbratwurst	Meat/Poultry	199,010	\$24,630,837	\$124
Mishi Kobe Niku	Meat/Poultry	200,258	\$19,424,638	\$97

- **Insight:** Premium pricing drives disproportionate revenue. Côte de Blaye alone accounts for >\$50M in revenue.

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## 3.3 Critical Inventory Risks

- **Products at Immediate Risk:**

- Côte de Blaye: 17 units vs. 202,234 historical demand
- Alice Mutton: 0 units vs. 202,304 demand
- Thüringer Rostbratwurst: 0 units vs. 199,010 demand
- Sir Rodney's Marmalade: 40 units vs. 205,637 demand

- **Root Causes:** Low reorder thresholds, missing automated reorder system, insufficient prioritization of high-revenue products
  - **Business Impact:** Revenue loss, customer dissatisfaction, potential competitor advantage
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### 3.4 Product Growth & Seasonal Analysis – Côte de Blaye

- **Milestones:**
    - 100,000 units sold: March 2018
    - 200,000 units sold: September 2023
  - **Seasonal Patterns:** Peaks in August, December, January, May; lows in February and April
  - **Use Case:** Supports inventory forecasting and promotion scheduling
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### 3.5 Employee Performance

Employee	Revenue Generated
Margaret Peacock	\$51,505,691
Steven Buchanan	\$51,393,235
Janet Leverling	\$50,455,812

- **Top Performer:** Margaret Peacock
  - **Team Performance:** Balanced sales across 9 employees with only 0.2% difference between #1 and #2
  - **Insight:** Data supports resource allocation, commission planning, and incentive structuring
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## 4. Recommendations & Action Plan

### Immediate Actions (Next 48 Hours)

- Emergency replenishment of top products (Côte de Blaye, Thüringer Rostbratwurst, Alice Mutton)
- Priority restocking to maintain minimum 2,000 units for high-demand items
- Temporary inventory freeze on products <50 units

### Short-term Solutions (30 Days)

- Revise reorder levels for top 20 products (+300% safety stock)
- Implement automated stock alert system
- Prioritize supplier fulfillment for critical products

### Long-term Strategy (90 Days)

- Inventory management overhaul with modern ERP implementation
  - Predictive sales forecasting using historical data
  - Product portfolio optimization: focus on premium, high-margin products
  - Seasonal marketing campaigns targeting weak months
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## 5. Business Impact

### Revenue Protection

- \$24.6M at risk due to stockouts of Thüringer Rostbratwurst
- \$53.3M growth opportunity with proper Côte de Blaye inventory

- Mitigate customer attrition and competitor gains

## Operational Efficiency

- Optimize slow-moving product inventory
  - Reduce capital tied in excess stock
  - Enhance sales team performance through guaranteed product availability
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## 6. Technical Approach & Skills Highlighted

- **Advanced SQL:** Multi-table joins, window functions, running totals, complex aggregations
  - **Analytical Techniques:** Descriptive, diagnostic, predictive, and prescriptive analytics
  - **Data Visualization:** Heatmaps, line charts, scatter plots, bar charts for actionable insights
  - **Portfolio Showcase:** Screenshots of queries, visualizations, and key tables demonstrate end-to-end BI proficiency
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## 8. Conclusion

This integrated analysis demonstrates the **power of data-driven decision-making** in retail operations:

- Identified critical inventory gaps threatening multi-million-dollar revenue
- Uncovered seasonal patterns to optimize sales and marketing strategies
- Highlighted high-value products for portfolio management
- Provided actionable recommendations across operations, inventory, and employee performance

**Outcome:** Combines **technical excellence** (SQL and BI) with **strategic business insights**, making it a compelling showcase for recruitment in **data analysis, business intelligence, or operations-focused roles**.

