

# 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:

- Identify seasonal trends and peak sales periods
- Determine top product categories and superstar products
- Detect inventory gaps and critical stockouts
- Track monthly product performance and growth
- 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**.

