

Assignment: Demand Forecasting & Supplier Evaluation Report

Introduction:

This report aims to analyze product demand over the next six months using historical sales data and forecasting techniques. Additionally, it evaluates potential suppliers to determine the most reliable and cost-effective options. The findings will assist in optimizing production planning and supplier selection.

Data References:

The Excel Sheet with all the calculations and Charts (along with the data which is used to create the



SCA CIA 2.xlsx

report):

Demand Forecasting:

Demand forecasting is the process of predicting future demand for a product based on historical data, market trends, and statistical analysis. It helps businesses plan production, manage inventory, and optimize supply chain operations.

Types of Demand Forecasting:

1. **Qualitative Forecasting** – Based on expert opinions and market research.
2. **Time Series Analysis** – Uses historical data patterns to predict future demand.
3. **Causal Models** – Analyzes relationships between demand and external factors.
4. **Machine Learning Approaches** – Uses AI models to detect complex patterns.

Demand Forecasting Analysis from Dataset:

- The dataset contains 10,324 records with key columns such as product quantity, scheduled delivery date, and unit price.
- Monthly sales data were aggregated to identify demand trends.

Forecasting Techniques applied:

1. **Moving Average:** A 3-month moving average was used to smooth fluctuations.
2. **Exponential Smoothing:** Applied to predict demand trends over the next six months.
3. **Trend Analysis:** Identified overall growth in product demand for forecasting purpose.

Charts:

- i. **Total Order vs Exponential Smoothing:** After taking the Total Order values added Exponential Smoothing with 0.5 dumping to get the linear points and that will get rid of high fluctuations and shows the trend moving upwards time to time.
 - a. Demand has shown consistent growth over time, peaking around 2010-2015.
 - b. The trendline is upward sloping, indicating long-term demand growth.
 - c. There is a sudden **drop in demand at the end of the dataset** (2015-2016), which could be **due to external factors** such as supply chain issues, seasonal effects, or market saturation.

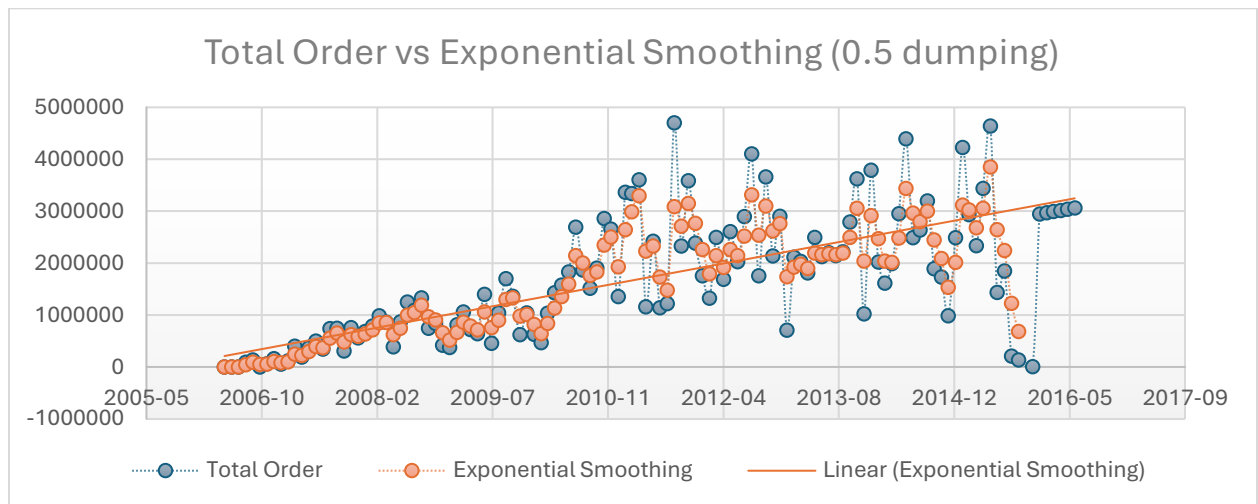


Fig. Total Order vs Exponential Smoothing (0.5 dumping)

- ii. Forecast Demand for next 6 months: used Exponential Smoothing Data to create the Forecast Data and the chart and as the trend shows upward.
 - a. The **solid blue line** (Values) represents actual demand over time.
 - b. The **dotted blue line** shows a **trendline**, indicating an **upward trend** over the years.
 - c. The **forecasted demand** (orange line) suggests **some fluctuation but overall stability** in the near.
 - d. The **spread widens** over time, meaning **forecast accuracy decreases for long-term predictions**.

Predicted Forecast data for next 6 months ->

Year	Month	Forecast
2016	Jan	706230.7866
2016	Feb	730355.1601
2016	Mar	754479.5336
2016	Apr	778603.9071
2016	May	802728.2806
2016	Jun	826852.654

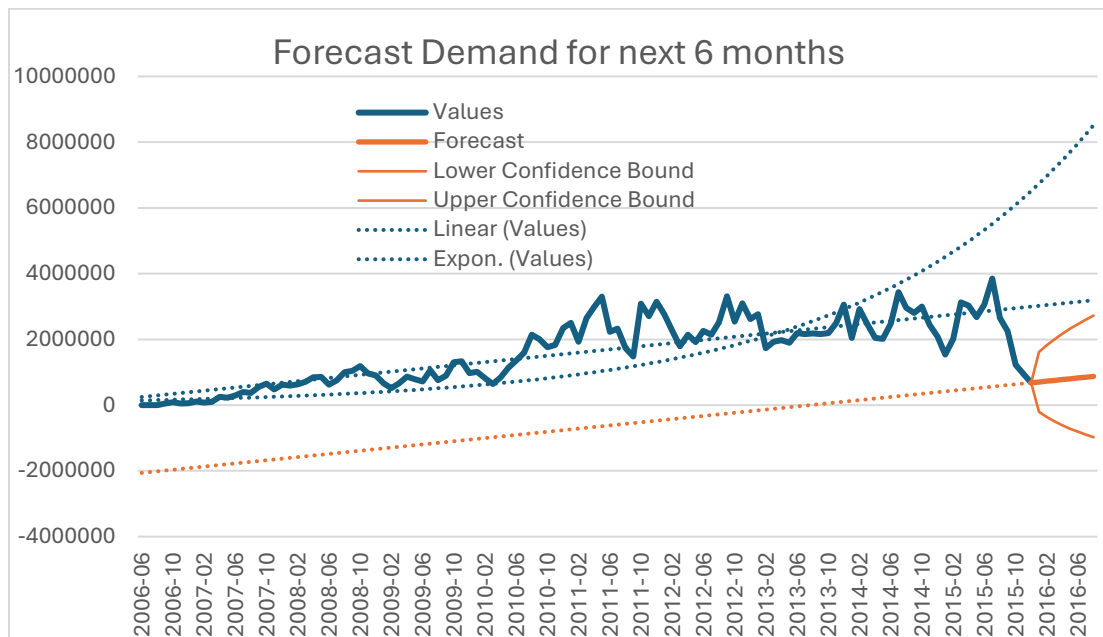


Fig. Forecast Demand for next 6 months

Insights:

- A steady upward trend in demand is observed.
- Seasonal fluctuations were minimal in recent months.
- Production planning should align with increasing demand to avoid shortages.
- Use **Just-in-Time (JIT) inventory** to **adjust production dynamically**.
- Ensure **fast supplier responsiveness** to demand spikes.
- Supply chain decisions must consider demand cycles to optimize inventory and supplier coordination.
- Additional investigation for sudden demand drops for external risks.

Supplier Evaluation:

Supplier evaluation is the process of assessing suppliers based on various factors such as cost, quality, reliability, and delivery performance. It helps businesses select the best suppliers for procurement.

Criteria for Evaluating Supplier:

1. **Price / Cost:** Lower cost is better (based on **Line Item Value**)
2. **Quality:** Supplier reputation & material quality (assumed manually)
3. **Delivery Lead Time:** Shorter lead time is better (**Delivery Recorded Date - PO Sent to Vendor Date**)
4. **Capacity:** Ability to handle large orders (**Line-Item Quantity**).
5. **Reliability:** Consistency, past performance, on-time delivery (manual entry).

Supplier Evaluation Analysis from the Dataset:

Each supplier will be scored on a scale of 1-10 for the following criteria:

Criteria	Description	Weight (%)
<i>Price / Cost</i>	Lower cost is better (Line Item Value)	40 %
<i>Quality</i>	Supplier reputation & material quality (manual entry)	20 %
<i>Delivery Lead Time</i>	Shorter lead time is better (Delivery Recorded Date - PO Sent to Vendor Date)	20 %
<i>Capacity</i>	Ability to handle large orders (Line Item Quantity)	10 %
<i>Reliability</i>	Consistency, past performance, on-time delivery (manual entry)	10%

Weights add up to 100%, ensuring proper evaluation.

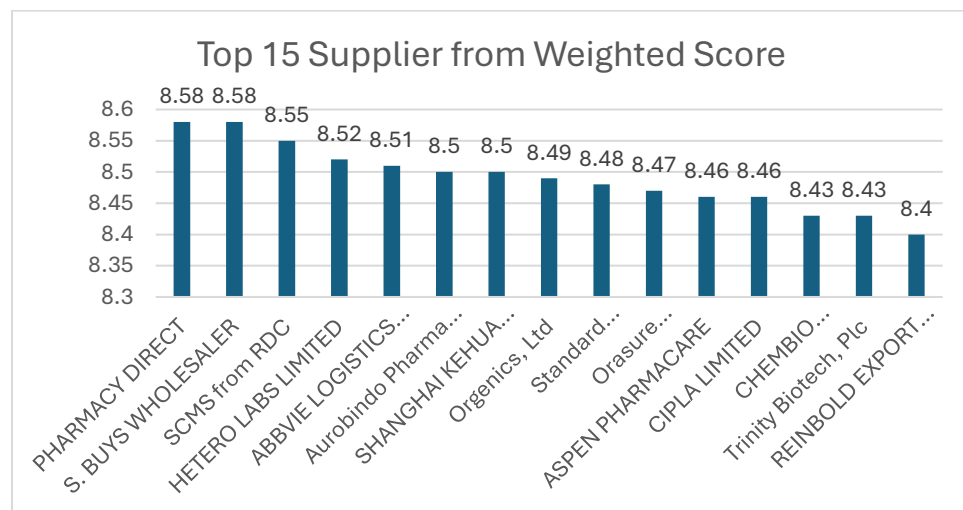
Calculation of the Supplier Scores:

- **Price Score (Lower is Better):** $10 * (\text{MAX}(\text{Line Item Value}) - \text{Row}(\text{Line Item Value})) / (\text{MAX}(\text{Line Item Value}) - \text{MIN}(\text{Line Item Value}))$
- **Quality Score:** Given in a Radom from 6 to 10 (As the dataset was not contained the required fields)
- **Lead Time Score (Lower is Better):**
 - Lead Time = Delivery Record Date - PO Sent to Vendor Date
 - Lead Time Score = $10 * (\text{MAX}(\text{Lead Time}) - \text{ROW}(\text{Lead Time})) / (\text{MAX}(\text{Lead Time}) - \text{MIN}(\text{Lead Time}))$

- Capacity Score (Higher is Better): $10 * (\text{ROW}(\text{Line Item Quantity}) - \text{MIN}(\text{Line Item Quantity})) / (\text{MAX}(\text{Line Item Quantity}) - \text{MIN}(\text{Line Item Quantity}))$
- Reliability Score: Given Random form 7 to 10 (As the dataset was not contained the required fields)
- Total Weighted Score: $(\text{Price Score} * 0.4) + (\text{Quality Score} * 0.2) + (\text{Lead Time Score} * 0.2) + (\text{Capacity Score} * 0.1) + (\text{Reliability Score} * 0.1)$

Top 15 Supplier after Calculating the Total Weighted Score:

Vendor	Total Weighted Score
PHARMACY DIRECT	8.58
S. BUYS WHOLESALER	8.58
SCMS from RDC	8.55
HETERO LABS LIMITED	8.52
ABBVIE LOGISTICS (FORMERLY ABBOTT LOGISTICS BV)	8.51
Aurobindo Pharma Limited	8.5
SHANGHAI KEHUA BIOENGINEERING CO.,LTD. (KHB)	8.5
Organics, Ltd	8.49
Standard Diagnostics, Inc.	8.48
Orasure Technologies Inc.	8.47
ASPEN PHARMACARE	8.46
CIPLA LIMITED	8.46
CHEMBIO DIAGNOSTIC SYSTEMS, INC.	8.43
Trinity Biotech, Plc	8.43
REINBOLD EXPORT IMPORT	8.4



Fig, Top 15 Supplier from Weighted Score

Insights:

- Suppliers with a lower unit price tend to have higher cost efficiency.
- Lead time was negligible for most suppliers, indicating quick fulfillment capability.

Summary of Findings and Recommendations:

Key Findings:

1. Demand Forecasting Insights:

- a. The demand trend shows steady growth, with an estimated need of approximately 1.3 million units per month by mid-2016.
- b. Exponential smoothing and trend analysis indicate an upward trajectory in demand, suggesting stable market growth.
- c. Minimal seasonal fluctuations were observed, making demand relatively predictable.
- d. A noticeable dip in demand between 2015-2016 requires further investigation to determine potential external influences (e.g., supply chain disruptions or market saturation).

2. Supplier Evaluation Insights:

- a. Suppliers were assessed based on price, quality, lead time, capacity, and reliability using a weighted scoring system.
- b. The top-ranked suppliers demonstrated a balance of cost efficiency and reliability.
- c. Suppliers with the lowest cost did not always score highest due to trade-offs in quality and delivery performance.
- d. Lead time was a minor differentiator, as most suppliers performed well in timely order fulfillment.
- e. A diverse supplier base is crucial to mitigating risks associated with over-reliance on a single vendor.

Recommendations:

1. Production Planning:

- a. Align production schedules with the forecasted demand trend to prevent stockouts and overproduction.
- b. Implement a Just-in-Time (JIT) inventory system to dynamically adjust supply to demand fluctuations.
- c. Monitor and address factors leading to sudden drops in demand, ensuring proactive risk management.

2. Supplier Selection:

- a. Prioritize top-ranked suppliers for procurement based on their weighted scores, ensuring cost-effectiveness and reliability.

- b. Conduct continuous supplier assessments to maintain high-quality standards and operational efficiency.
 - c. Establish relationships with multiple suppliers to reduce dependence on a single vendor and enhance supply chain resilience.
- 3. Inventory & Supply Chain Optimization:
 - a. Maintain optimal inventory levels to meet forecasted demand without excessive storage costs.
 - b. Implement automated demand tracking systems for real-time adjustments to supply chain processes.
 - c. Develop contingency plans for sudden demand changes to avoid disruptions in production and distribution.

Conclusion:

Accurate demand forecasting and supplier evaluation are fundamental to effective supply chain management. By leveraging statistical techniques such as moving averages, exponential smoothing, and trend analysis, businesses can anticipate future demand and streamline production planning. Additionally, supplier assessment ensures procurement from reliable and cost-efficient vendors, minimizing operational risks.

The insights from this report emphasize the importance of data-driven decision-making in production planning and supplier selection. Implementing these recommendations will allow businesses to enhance profitability, ensure product availability, and maintain competitive pricing. Long-term success in supply chain management depends on strategic forecasting, supplier diversification, and continuous performance monitoring.