

Introduction to Demand Planning and Forecasting

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Key concepts, steps, tools, and best practices

1. What Is Demand Planning?

Aspect	Description
Definition	A systematic process of estimating future customer demand for products or services over a specific time horizon.
Goal	Align supply chain activities (production, inventory, purchasing, distribution) with expected demand to minimize stockouts and excess inventory.
Scope	Covers all sales channels, product families, and geographic regions; integrates market intelligence, promotions, and seasonality.
Stakeholders	Sales, marketing, finance, operations, supply chain, product management, senior leadership.

2. Forecasting vs. Demand Planning

Forecasting	Demand Planning
Quantitative prediction of future sales using statistical or machine learning models.	End-to-end process that incorporates forecasts, business insights, and collaborative adjustments.
Focuses on the “what” (numbers).	Focuses on the “how” (using numbers to drive decisions).
Usually a single step in the workflow.	Includes data collection, model selection, forecast generation, review, consensus, and execution.

3. Types of Forecasting Methods

Category	Techniques	When to Use
Qualitative	- Expert opinion (Delphi) - Market research - Sales force consensus	New product launches, limited historical data, major market shifts.

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Category	Techniques	When to Use
Time Series Quantitative	• Moving Average • Exponential Smoothing (SES, Holt, Holt-Winters) • ARIMA / SARIMA	Suitable for stable demand patterns, clear seasonality, sufficient historical data.
Causal / Regression	• Linear regression • Multiple regression • Econometric models	When demand is driven by identifiable factors (price, advertising spend, GDP).
Machine Learning	• Random Forest • Gradient Boosting • Neural Networks (LSTM, Prophet)	Large, complex data sets, non-linear relationships, need for higher accuracy.
Hybrid	• Combination of statistical + ML • Ensemble models	To capture both short-term patterns and long-term trends.

4. The Demand Planning Process (Step-by-Step)

1. Data Collection & Cleansing

- Gather sales history, promotions, pricing, stock-outs, returns, macro-economic indicators.
- Cleanse: remove duplicates, correct errors, handle missing values, align time-grains.

2. Segmentation & Hierarchy Building

- Group SKUs by product family, lifecycle stage, geography, or channel.
- Build a hierarchical structure (e.g., SKU → Item → Category → Division) for roll-up/roll-down.

3. Model Selection & Development

- Choose baseline method (e.g., Holt-Winters for seasonal items).
- Train alternative models for comparison; keep a “model zoo”.

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4. Forecast Generation

- Run selected models on the cleaned data set.
- Produce point forecasts and prediction intervals (e.g., 80%/95% confidence bands).

5. Statistical Validation

- Metrics: MAE, MAPE, RMSE, Bias, Theil's U.
- Perform back-testing (rolling-origin) to verify stability.

6. Business Review & Consensus

- Present results to cross-functional team.
- Adjust for