

## Case Study

FreshBake Pvt. Ltd., established in 2012 in Pune, Maharashtra, is a mid-sized bakery manufacturer specializing in high-quality, preservative-free baked goods such as sandwich breads, artisan loaves, muffins, and cakes. The company operates a fully automated plant with a capacity of 50,000 units per week and distributes its products to over 250 retail chains across West and South India.

In recent years, the company has expanded into premium and health-focused product lines, such as multigrain breads and gluten-free muffins, targeting urban customers. With rising competition from national brands and app-based grocery platforms (e.g., BigBasket, Blinkit), FreshBake is focusing on demand-driven production planning to reduce overproduction, spoilage, and stock-outs. Their flagship product, Whole Wheat Sandwich Bread, accounts for nearly 30% of total revenue.

### **Business Challenge:**

The operations team at FreshBake has noticed fluctuations in weekly demand, especially during seasonal events (New Year, school openings, festivals). The current production planning uses simple heuristics (e.g., past 4-week average), but this leads to both stockouts during peak weeks and waste during low-demand weeks. The company wants to use statistical forecasting methods to better predict future demand using historical data.

Historical Demand Data (Week 1 to Week 20)

Week	Demand	Week	Demand
1	28	11	37
2	30	12	39
3	27	13	43
4	31	14	40
5	33	15	41
6	32	16	42
7	35	17	44
8	36	18	43
9	38	19	45
10	36	20	47

Forecast demand for Week 21 using:

1. Simple Moving Average (SMA) using 3-period and 5-period
2. Weighted Moving Average (WMA) using 3-period with weights (0.5, 0.3, 0.2)
3. Exponential Smoothing using  $\alpha = 0.3$  and  $\alpha = 0.5$
4. Compare and interpret forecast errors using MAD (Mean Absolute Deviation) and MAPE (Mean Absolute Percentage Error)

**Managerial Questions:**

1. Which method gives the most accurate forecast for this product?
2. What insights can be drawn about demand trend and seasonality?
3. Should FreshBake use a rolling forecast window, and how would that impact safety stock decisions?
4. How can FreshBake integrate these forecasts with its ERP for dynamic inventory control?

**Additional Business Notes:**

Core Competencies: High-quality ingredients, preservative-free production, quick distribution to urban outlets.

**Constraints**

Shelf life = 5 days

Plant changeover time = 6 hours per product variant

Fixed daily labor allocation; overproduction leads to wastage

**Seasonal Peaks**

Week 13 (Post-holiday health trends)

Week 20 (School reopening across Maharashtra and Karnataka)