

MONTHLY RETAIL SALES FORECASTING FOR AN URBAN CONVENIENCE STORE USING EXCEL

1. Background and Problem Statement:

A mid-sized urban convenience store in central Mumbai experienced unpredictable fluctuations in monthly sales. Although the store had three years of historical sales data, it lacked a structured forecasting model to plan for inventory, staff scheduling, and marketing. The management wanted a practical solution using Excel to forecast upcoming sales with high interpretability and minimal software dependency.

2. Objectives:

- Forecast the next six months of sales using past 36 months of data
- Apply **moving average** and **exponential smoothing** models in Excel
- Build a dynamic forecasting dashboard for ongoing use
- Provide forecast accuracy metrics to validate performance

3. Methodology:

3.1 Dataset

- **Period:** January 2021 – December 2023 (36 months)
- **Variable:** Total monthly sales revenue (in INR)
- **File Format:** .xlsx, organized with columns: Date, Sales

3.2 Data Preprocessing in Excel

- Checked for missing months and corrected one missing entry using `=AVERAGE()` of previous and next values
- Created a helper column for **3-month centered moving average** using:
 - `=AVERAGE(B2:B4)`
- Applied **exponential smoothing** ($\alpha = 0.3$) using recursive formula:
 - $=\alpha * \text{Actual} + (1-\alpha) * \text{Previous Forecast}$
- Calculated seasonal indices by averaging monthly deviations from centered moving averages

4. Forecasting Models in Excel

4.1 Model 1: 3-Month Moving Average

- Used AVERAGE() function to create smoothed trend
- Projected next 6 months based on rolling average logic
- Manual seasonal adjustment applied using monthly index table

4.2 Model 2: Exponential Smoothing ($\alpha = 0.3$)

- Created a recursive formula-based forecast column
- Compared against actuals to calculate forecast error using
- $=\text{ABS}(\text{Actual} - \text{Forecast})/\text{Actual}$
- Computed **Mean Absolute Percentage Error (MAPE)** for evaluation

4.3 Visualization

- Dual-axis chart of Actual vs Forecast (Line + Marker)
- MAPE chart per month
- Dynamic drop-down filter to switch between models

5. Key Findings

- **MAPE for Moving Average:** 8.4%
- **MAPE for Exponential Smoothing:** 6.1%
- Best fit during festival seasons using seasonal index model
- Model underperformed slightly in months with unplanned promotions

6. Excel Deliverables

- Clean **Sales Forecast Master Sheet**
- Separate tabs for Moving Average, Exponential Smoothing, and Seasonal Index
- **Forecast Dashboard Sheet** with slicers for model comparison
- KPI summary table and forecast charts auto-updated with new entries

7. Recommendations

- Use exponential smoothing model with seasonal adjustments for monthly planning
- Automate monthly forecast updates using Excel's formula logic
- Allocate higher inventory budgets in months flagged by seasonal uplift
- Consider switching to weekly forecasting model for short-term promotion tracking

8. Stakeholder Relevance

Academic Use:

- Demonstrates forecasting using non-programmatic tools
- Showcases Excel's power in statistical modeling with minimal add-ins

Corporate Use:

- Enables **non-technical staff to maintain forecasting logic** in Excel
- Supports **inventory, marketing, and staffing** with structured foresight