

# ANALYZING AND FORECASTING CUSTOMER SATISFACTION TRENDS IN A RETAIL CHAIN USING TIME-SERIES ANALYSIS IN MINITAB.

## 1. Background & Objectives

A national retail chain collected monthly customer satisfaction scores over three years but struggled to anticipate dips in service performance. The aim was to model and forecast these scores using Minitab's time-series tools to support proactive decision-making by regional managers and customer experience teams.

## 2. Methodology

### Data Source:

Internal feedback database containing:

- Monthly customer satisfaction score (scale 0–100)
- From January 2021 to December 2023 (36 data points)
- Regional identifiers (not used for this pilot model)

### Software Used:

Minitab 21

### Steps Followed in Minitab:

- 1. Data Import & Cleaning:**
  - Imported Excel file containing date and score.
  - Ensured date ordering and absence of missing values.
- 2. Time Series Plot:**
  - *Graph > Time Series Plot > Simple* to visualize trends and seasonality.
- 3. Stationarity Check:**
  - *Stat > Time Series > Trend Analysis* to test for trend components.
  - First differencing applied if necessary.
- 4. Model Fitting – ARIMA:**

- *Stat > Time Series > ARIMA*
  - Tried several ARIMA models using AIC and MAPE to choose the best fit.
5. **Forecasting:**
- Forecasted next 6 months of satisfaction scores with 95% confidence intervals.
6. **Residual Diagnostics:**
- Checked ACF and PACF plots of residuals to ensure white noise.

### 3. Results & Interpretation

- **Best-Fitting Model:**
  - ARIMA(1,1,1) selected based on lowest AIC.
- **Forecast Insight:**
  - Forecast showed a projected dip in satisfaction for April–May 2024, aligned with known seasonal complaints in previous years.
- **Accuracy:**
  - MAPE = 3.8%, indicating high forecasting accuracy.

### 4. Visual Outputs (Created in Minitab)

- Time series plot of actual vs. forecasted satisfaction scores
- ACF/PACF plots
- Forecast interval plot with upper/lower bounds

### 5. Recommendations

- Schedule service quality audits in March and April to address the forecasted dip.
- Enhance frontline staff training in Q2 to mitigate seasonal dissatisfaction.
- Begin segmentation of data by region for localized modeling in the next phase.

### 6. Future Work

- Integrate promotional campaign data to study its impact on satisfaction.

- Develop separate models per region for tailored insights.
- Move to a weekly satisfaction tracking system to detect short-term shifts.

## 7. Academic and Corporate Relevance

### **Academic Use:**

- Demonstrates practical application of ARIMA models in business environments.
- Useful for research in marketing analytics or operations strategy.

### **Corporate Use (Retail/Consumer Firms):**

- Enables customer experience teams to anticipate and prevent service failures.
- Supports quarterly planning with data-driven satisfaction forecasts.

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