

## JAGSoM

### Term 3

## BUSINESS FORECASTING (JSPD 318)

### GROUP 3

#### Case 3 : A-CAT CORP FORECASTING

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**Background:** The company A-CAT corporation is leading producer of electrical appliances in India catering to household use for rural segments. It has its manufacturing units in Gonda town Vidarbha region in Maharashtra. The company offers various electrical appliances such as voltage regulators (flagship product), TV signal boosters, electronic ballasts, battery chargers and FM radio kits.

**Basic Issue:** A-CAT's voltage regulator sales are dropping despite consistent orders. The issue is two-fold: supply chain problems and limited resources. They rely on a single supplier with long lead times (1 week), and erratic ordering strains that supplier. Supplier complains about the haphazard manner of placing orders. Bulk ordering ties up cash, limiting purchases of parts for other products. These challenges, combined with market conditions and economic uncertainties, threaten A-CAT's ability to address multiple operational and financial issues effectively.

**Problem Statement:** Develop a strategic plan to optimize transformer procurement by implementing accurate forecasting techniques. This plan aims to ensure timely and appropriately sized orders, preventing both understocking and overstocking scenarios for A-CAT Corporation's transformers which are major part of electrical appliances such as voltage regulators and refrigerators.

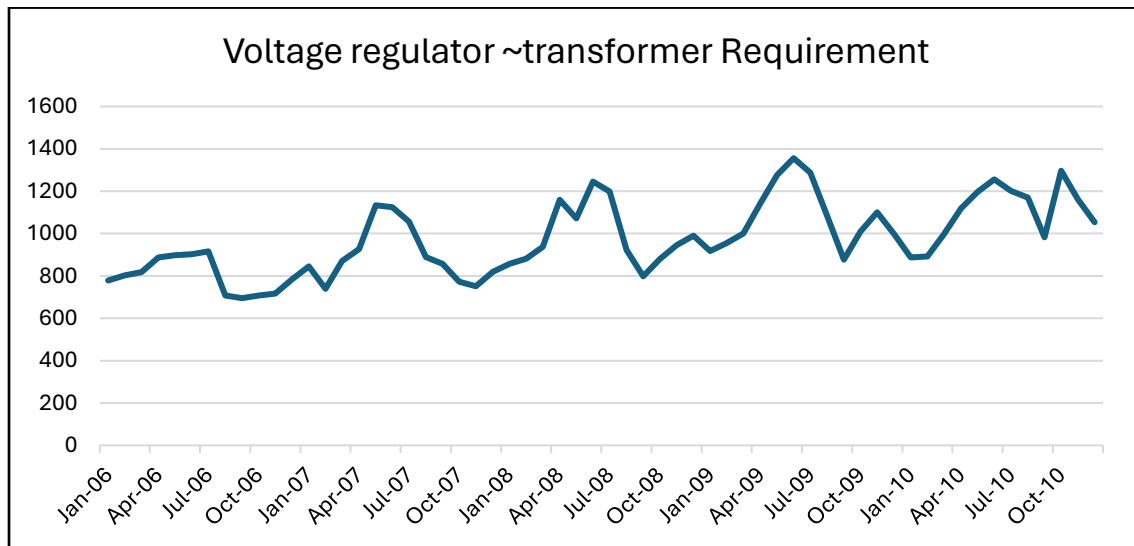
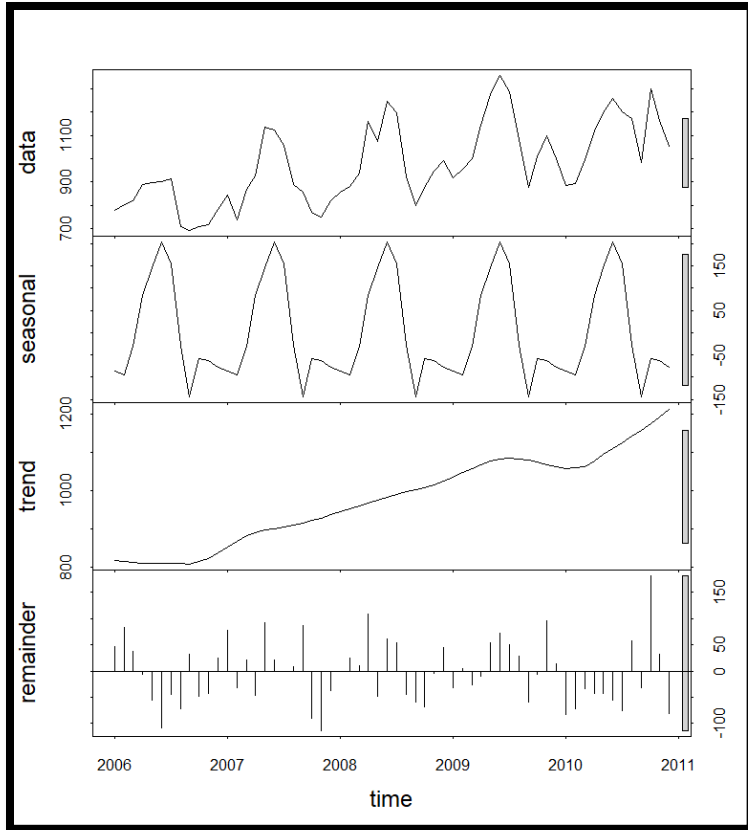
**Techniques to be adopted:** Various forecasting techniques can be used to address this issue: simple exponential smoothing, weighted moving average, linear trend, simple moving average.

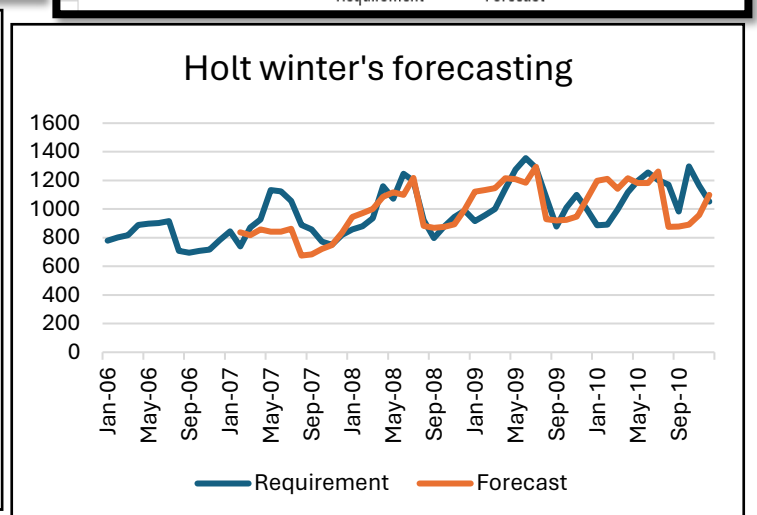
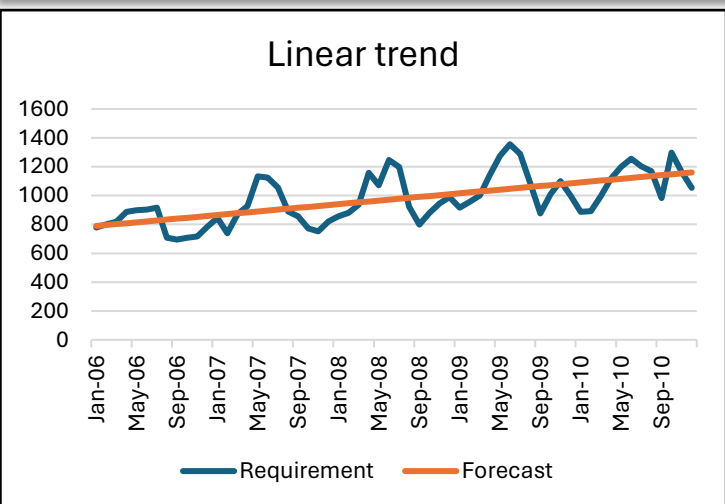
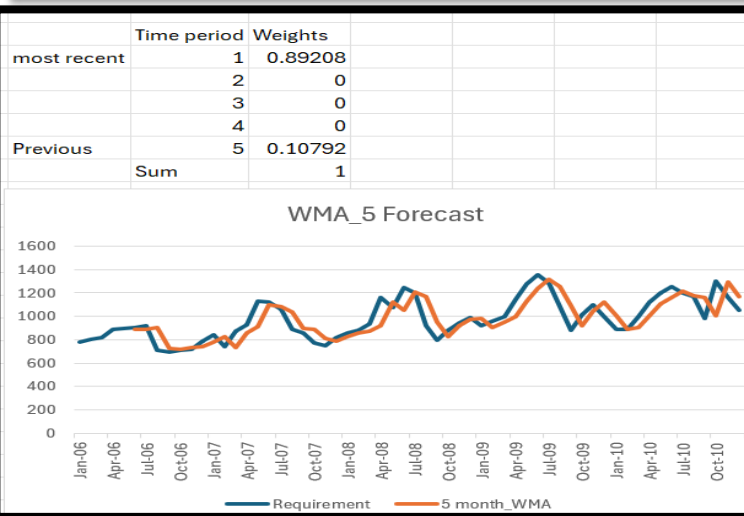
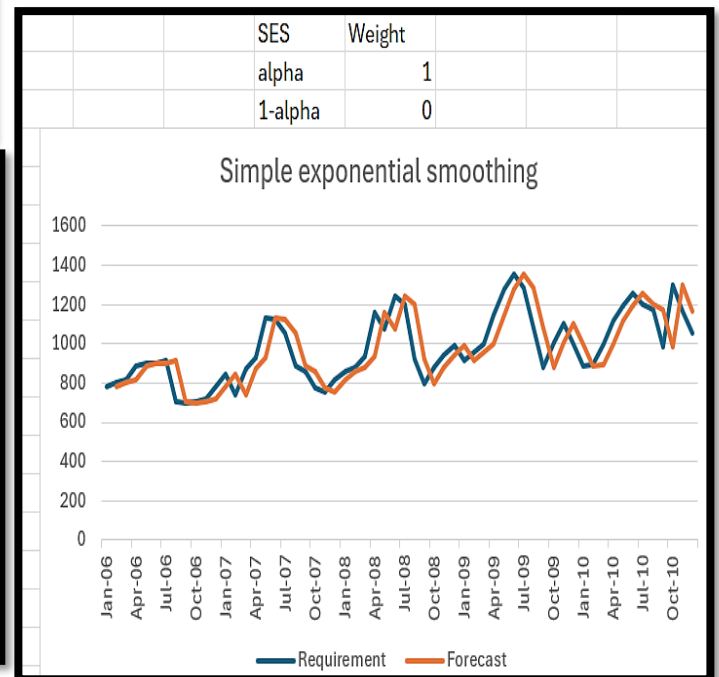
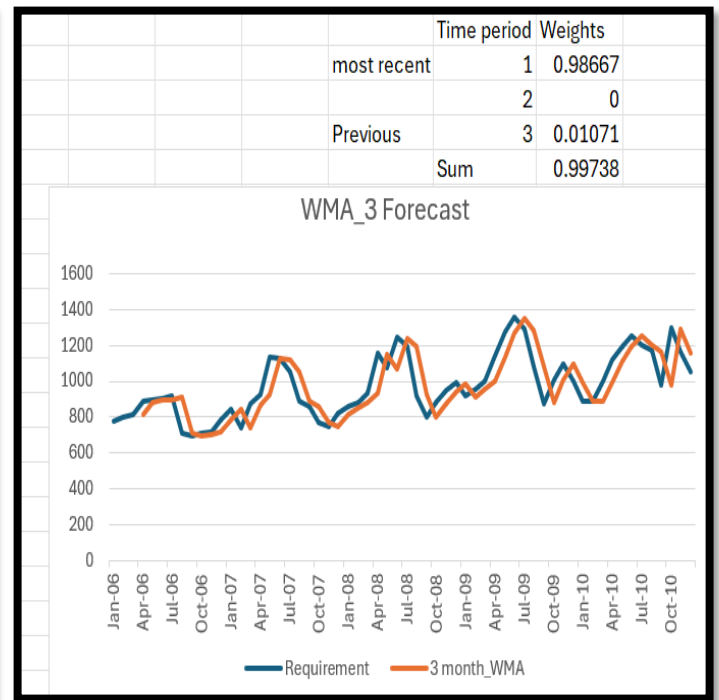
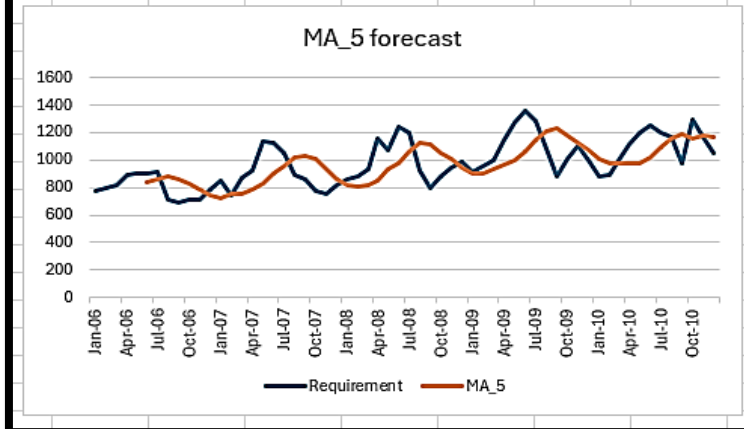
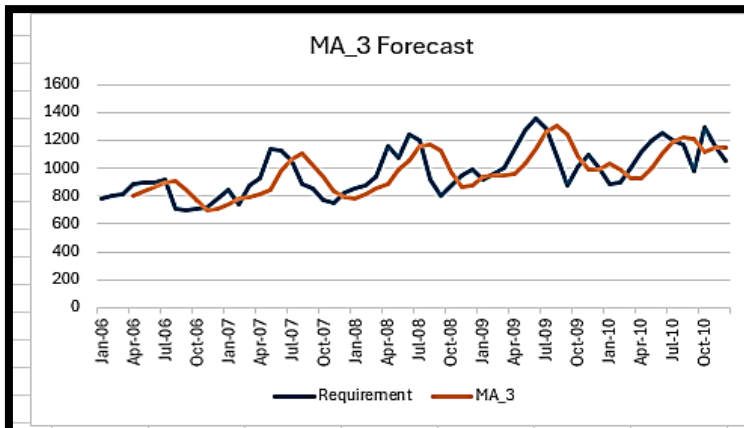
Then we study the forecasting errors found through above methods: mean absolute error, mean square error, Root mean square error, mean absolute percentage error. Least error value obtained in any method will be a suitable forecasting technique.

**Factors to be considered:** Data available, Time horizon, Accuracy (expected), Model complexity, Scope for interpretation, consequences of bad forecast.

**Analyzing the data:** This is a time series forecasting.

From the voltage regulator sales data we found that it had both trend and seasonality. **There is upward trend and seasonality (increased sales) is seen during May- June of the year.**





Comparison of Errors						
	MA_3	MA_5	WMA	Trend	SES	Holt Winter's
MAE	118.82	136.84	90.92	107.96	90.3	118.52
RMSE	147.1571	162.76	115.6	131.87	114.381	152.59
MAPE	12.25	13.97	9.2	11.11	9.135	11.57

### Techniques considered

- 3 month moving average, 5 month moving average,
- In 3 month weighted moving average , 5 month weighted moving average exponential smoothing. In all these three methods we ***used solver on RMSE*** to minimize the error.
- Linear trend
- Holt's winter method- here too Solver was used on RMSE to minimize the error.

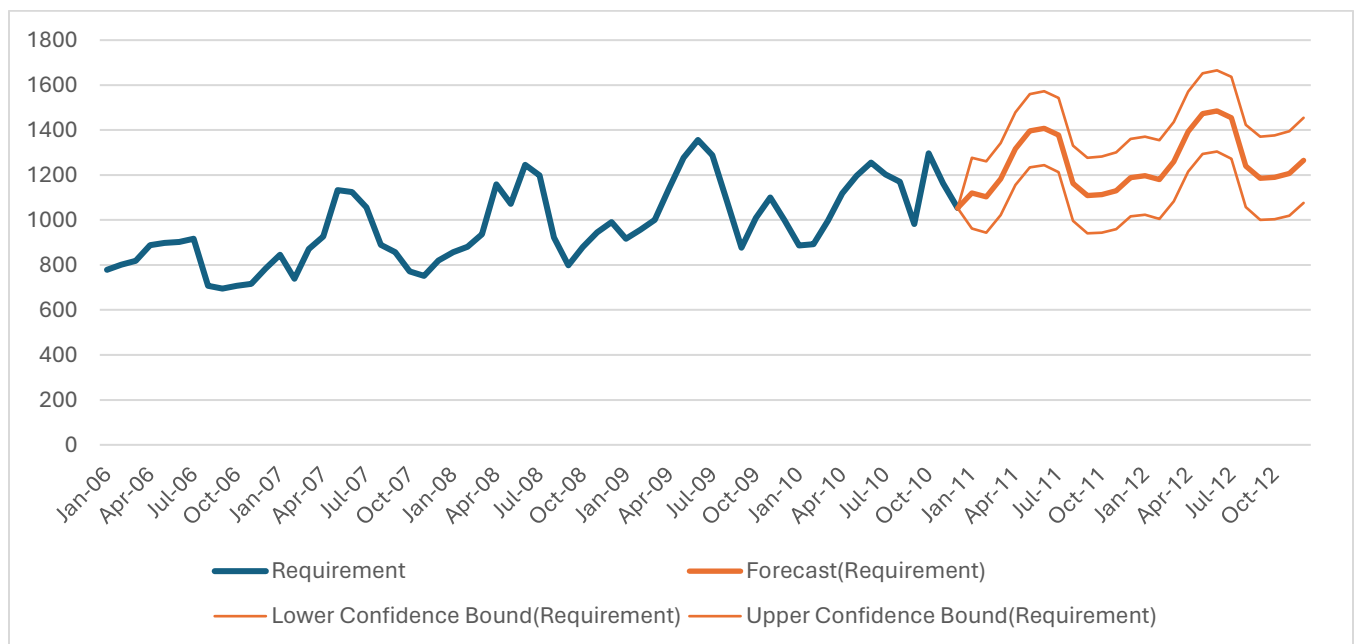
Errors computed: mean absolute error (MAE), mean square error (MSE), mean absolute percentage error (MAPE).

**Note- Weights in different models are shown in graphs. Please refer to that.**

**Conclusion:** We found that, Simple exponential smoothing gave the least error 114.381 (Here we consider only RMSE as we did solver on it). Thus simple exponential smoothing ( $\alpha = 1$ , best explains the forecast values for transformer from sales data of Voltage regulators.

So, Operations head, Ratnaparkhi can give simple exponential smoothing forecasting model to VP of A-CAT corporation, Arun Mitra. He can say that during May-June there is peak in sales of voltage regulators so the company should maintain optimum stock level of transformers to meet the demand.

This is the forecast of next year 2011.



**Limitations to forecasting done:**

- Change in trend
- Unanticipated cyclical factors
- Random variations not captured
- Unanticipated changes in the competitive landscape- price or marketing changes
- Other unanticipated changes- Political climate

**Qualitative factors that can be considered to improve the forecast experience**

- Monitor market trends and consumer preferences in voltage regulators, refrigerators, etc wherever A-CAT transformers are used. Systematic market research – data collection and hypothesis testing
- Analyze competitive strategies and market share
- Forecast can go faulty if there is vague or less data- this happen with new products or new technology.
- Track economic indicators like GDP growth and consumer spending on electrical appliances
- Account for seasonal variations and long-term trends
- Evaluate consumer behavior, brand perception, and emerging technologies
- Jury of “executive opinion”- internal expert opinion
- Delphi method : gathering inputs from a panel of experts in relevant fields, iterative rounds of data collection and feedback,
- Panel method: The panel method can enhance forecast accuracy by leveraging a combination of historical data, expert opinions, and statistical models.