CASE STUDY-FORECASTING

FORECASTING TRACTOR SALES (DEMAND FORECASTING)

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Business Context:

PowerHorse, a tractor and farm equipment manufacturing company, was established a few years after World War II. The company has shown a consistent growth in its revenue from tractor sales since its inception. However, over the years the company has struggled to keep it's inventory and production cost down because of variability in sales and tractor demand. The management at PowerHorse is under enormous pressure from the shareholders and board to reduce the production cost. Additionally, they are also interested in understanding the impact of their marketing and farmer connect efforts towards overall sales. In the same effort, they have hired us as a data science and predictive analytics consultant.

We will develop an ARIMA model to forecast sale / demand of tractor for next 3 years. Additionally, we will also investigate the impact of marketing program on sales by using an exogenous variable ARIMA model.

As a part of this project, one of the production units we are analysing is based in South East Asia. This unit is completely independent and caters to neighbouring geographies. This unit is just a decade and a half old. In 2014, they captured 11% of the market share, a 14% increase from the previous year. However, being a new unit they have very little bargaining power with their suppliers to implement Just-in-Time (JiT) manufacturing principles that have worked really well in PowerHorse's base location. Hence, they want to be on top of their production planning to maintain healthy business margins. Monthly sales forecast is the first step we have suggested to this unit towards effective inventory management.

The MIS team shared the month on month (MoM) sales figures (number of tractors sold) for the last 12 years in the tractor-sales.csv file.

Data file to be used:

Tractor-Sales.csv: Number of tractors sold by month for 12 years.

Sales-and-Marketing.csv: Number of tractors sold and marketing spend by month for last four years.

Data file to be used:

• Time Series Analysis

• Seasonal Decomposition and forecast for next four quarters using decomposition

• Build Time Series Model (ARIMA, SARIMA, ARIMAX, SARIMAX, Regression) and forecast for next four quarters

• Calculating forecast accuracy by using RMSE and MAPE etc.