Global Mart Online Store

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Objectives & Goals of Global Mart Presentation

Business Objectives:

Forecast the sales and the quantity for the two most profitable and consistent segments for the next 6 months

Strategy: The forecasting results of sales and demand will help to manage the revenue and inventory.

Overall Structure of the presentation:

- **Problem Statement** – Do Time Series modelling for sales and quantity measures.
- **Results of Modelling**– Explain results from model in business terms and the techniques used (eg. Auto ARIMA & Decomposition).
- **Evaluation-** Evaluate the models that have been created.
- **Visualization**– Support the data analysis using visualization charts.

Guidelines & Assumptions

Guidelines:

- Dataset File name need not be changed.
- All code to be written in R

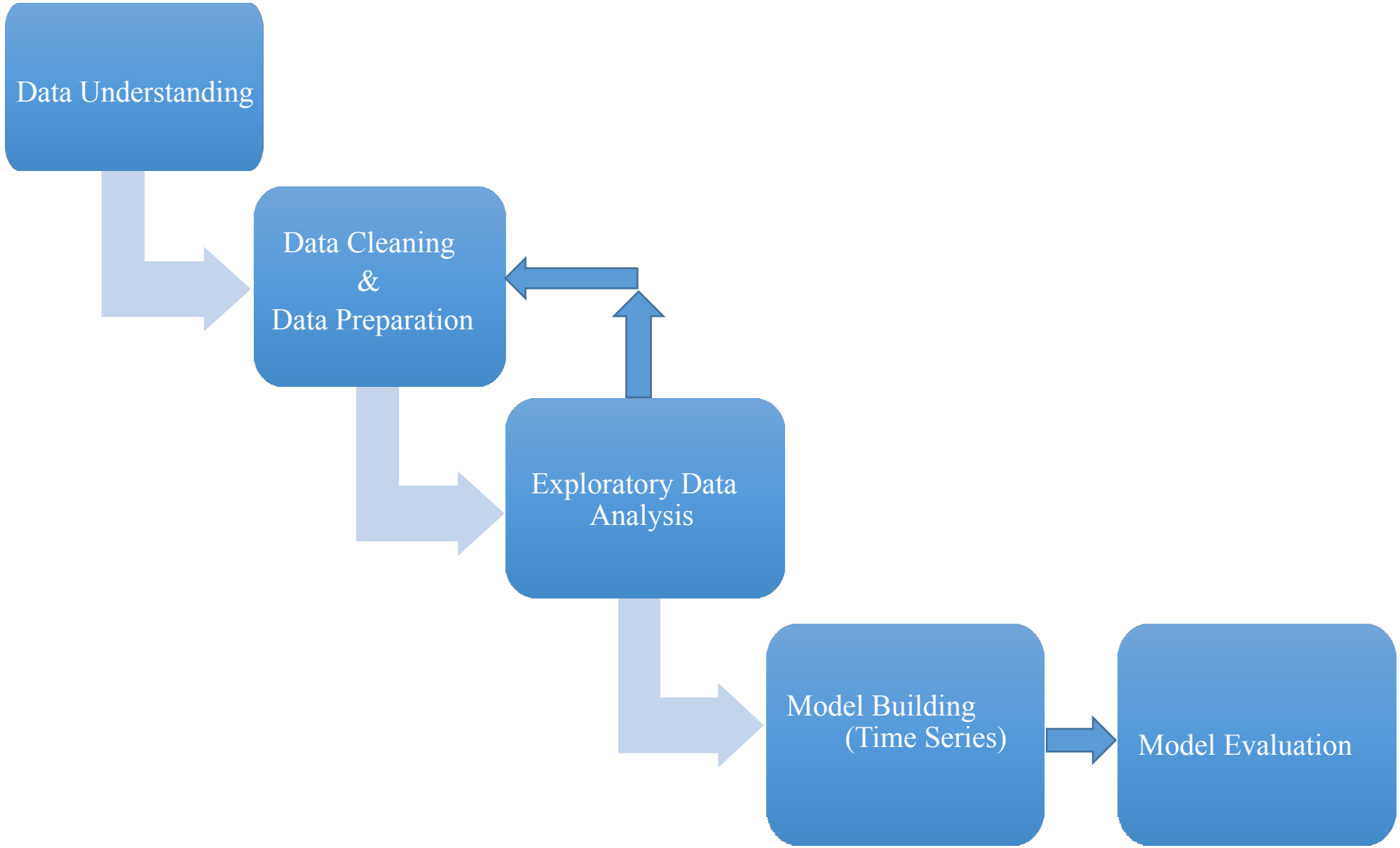
Data Management Framework & Technology:

- CRISP Data Management Framework
- R & R Visualizations.

Assumptions:

- **Baseline Code–** The code used for analysis is to be baselined and it can be used in future if follow-up questions are there from Chief Data Scientist.
- **Visualization-** More charts/visualization options can be made available for exploration subject to level of details asked during presentation.
- **Data** - All blank values are considered as NA while importing. NA values are subsequently ignored on case to case basis.
- **R Code-** Chief Data Scientist can ask to demonstrate additional charts and show-case the model using the R Code.

Approach – High Level



Data Understanding & Preparation

Data Understanding:

1. Create a master data frame ‘gsData’
2. Total no of observations in the dataset: 51290
3. Duplicate Ids are not there

Data Cleaning & Preparation:

1. Remove variables where there is a unique value in the column (None).
2. Convert dates from character to date format.
3. First segment the whole dataset into the 21 subsets based on the market and the customer segment level.
4. Handle outliers
5. Convert categorical columns into factors
6. Aggregate 3 attributes i.e. Sales, Quantity & Profit by Date to arrive at Monthly figures.

Top-2 Segments

Market-Segment	Net Profit	Average Profit	Coff of Variation
APAC-Consumer	222818	4642	0.632
EU-Consumer	188688	3931	0.624

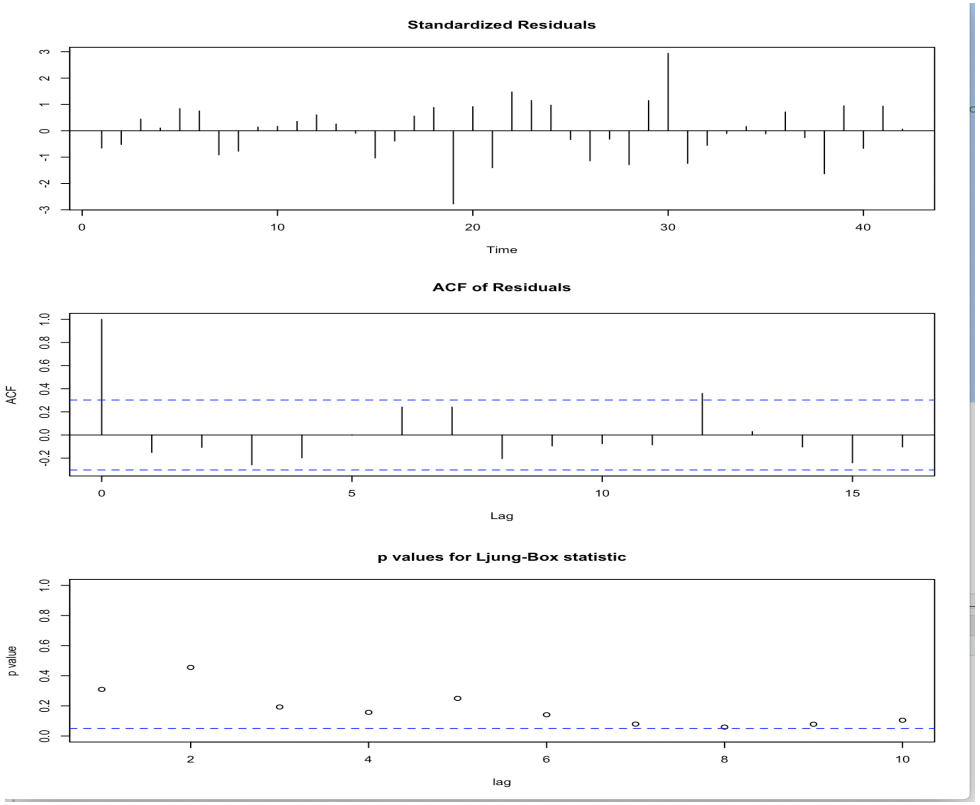
- Time series models to be created as

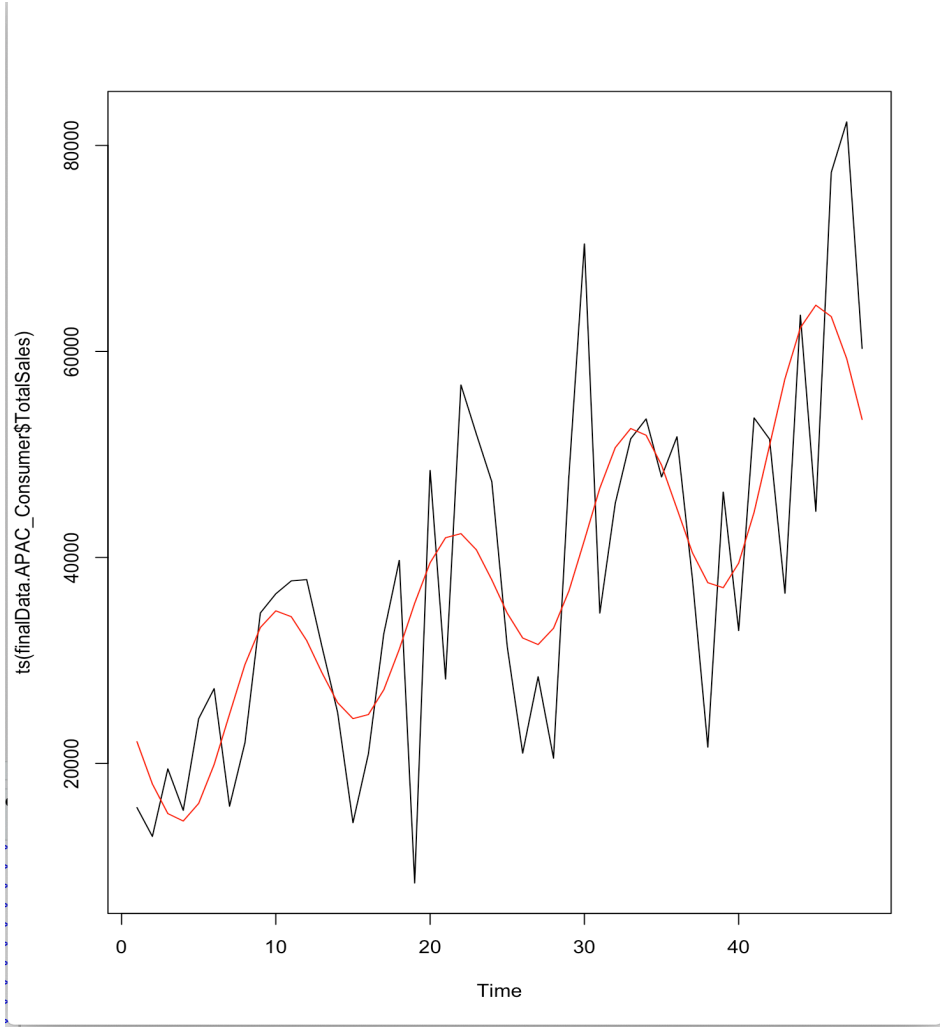
Market-Segment	Measure
APAC-Consumer	Sales
EU-Consumer	Sales
APAC-Consumer	Quantity
EU-Consumer	Quantity

Model Creation

- Smoothen the time series using classical decomposition.
- Fit a multiplicative model with trend and seasonality to the data.
- Seasonality will be modeled using a sinusoid function
- Derive locally predictable series using lm function and model it as ARMA series
- Find residual series and white noise. Perform kpss test
- Evaluate the model using MAPE. Compare prediction and actuals
- Create visualizations to compare actual values vs predictions

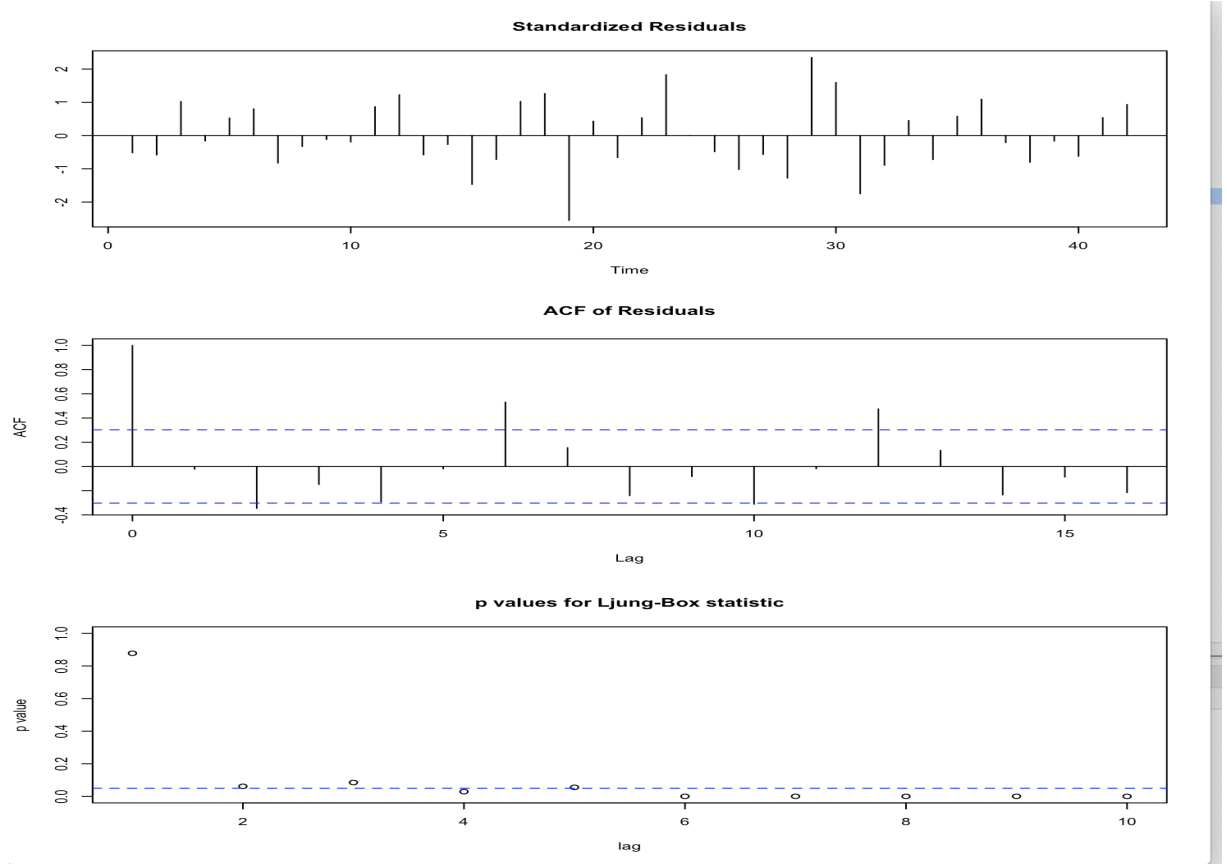
APAC-Consumer - Sales

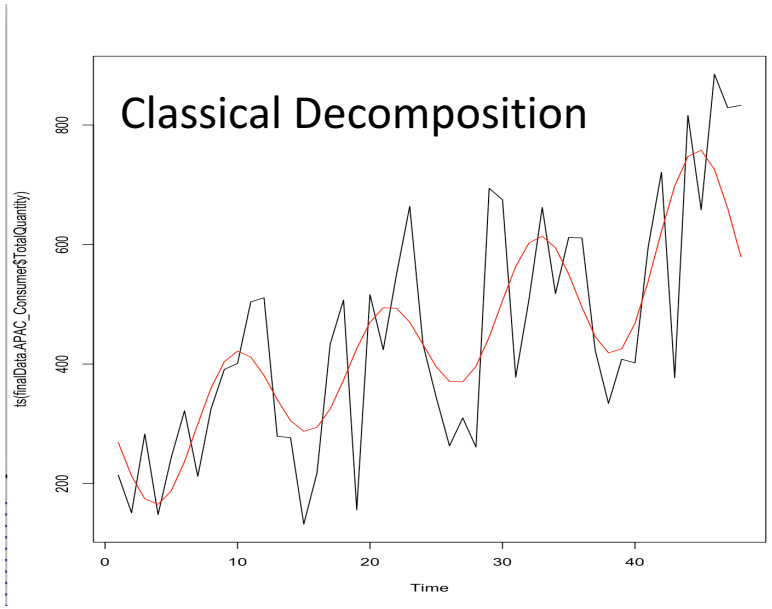


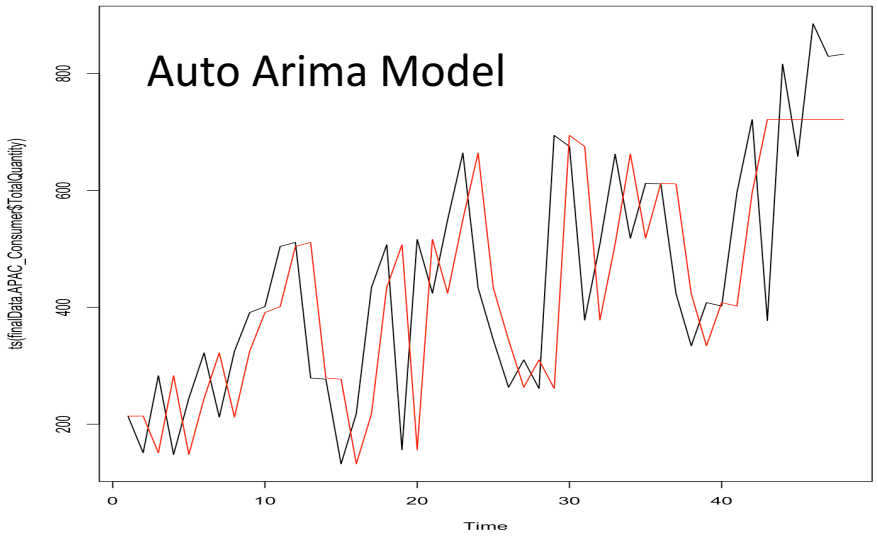


- ARIMA(0,0,0) with zero mean
- sigma^2 estimated as 95714751: log likelihood=-445.51
- AIC=893.02 AICc=893.12 BIC=894.76

APAC-Consumer - Quantity

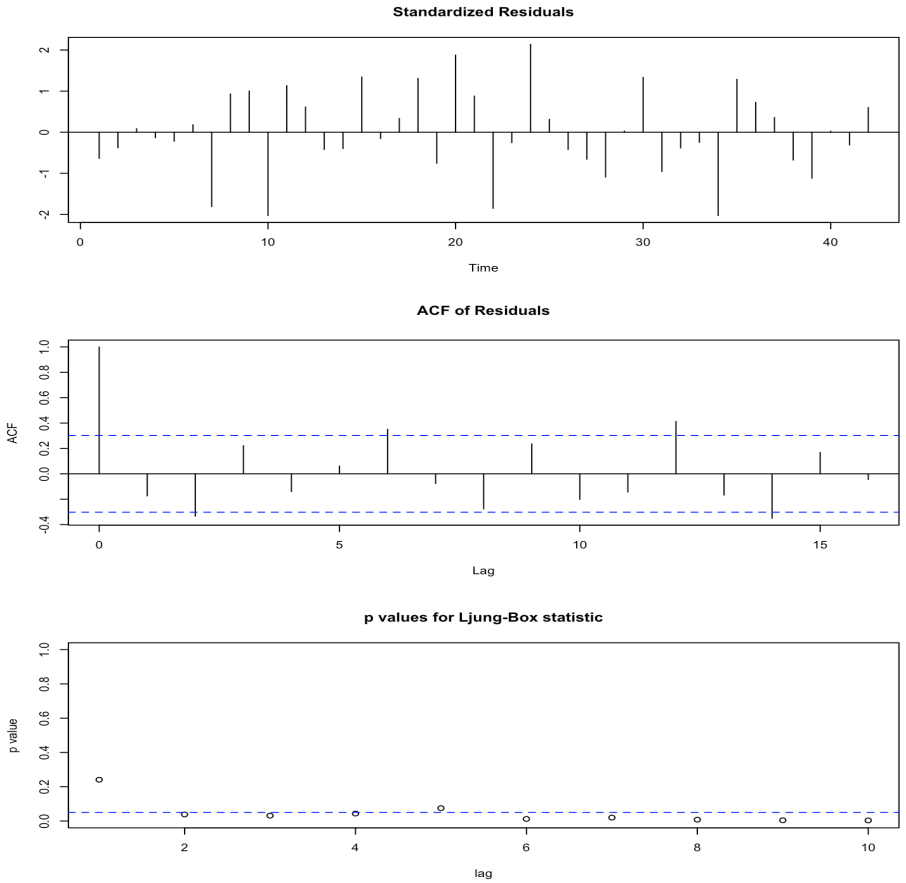


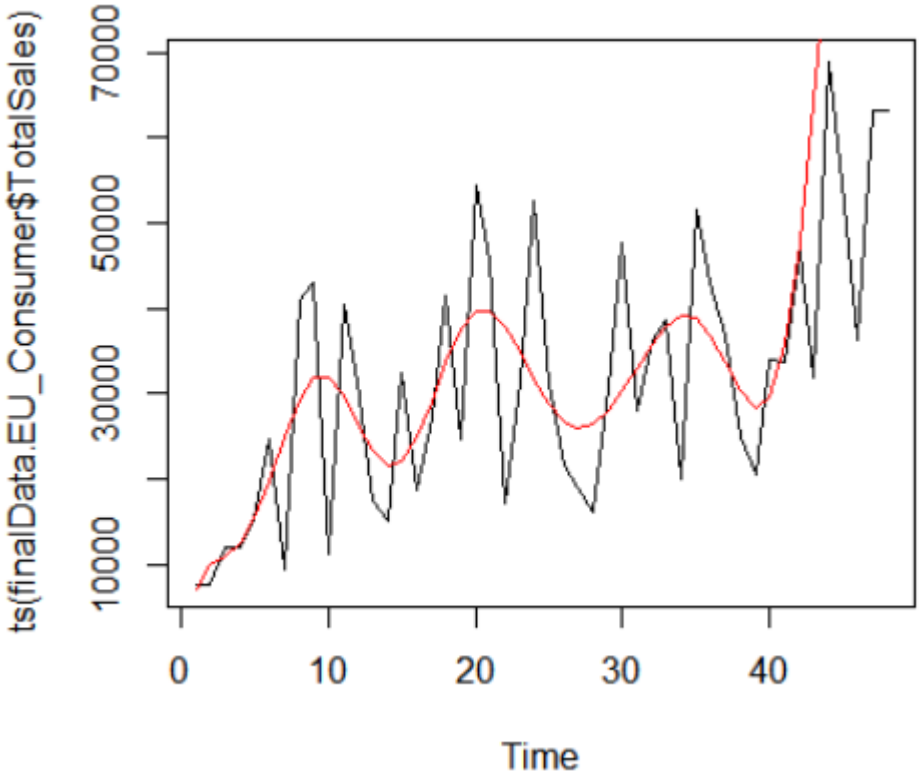




- ARIMA(0,1,0)
- sigma^2 estimated as 25366: log likelihood=-266.07
- AIC=534.14 AICc=534.24 BIC=535.85

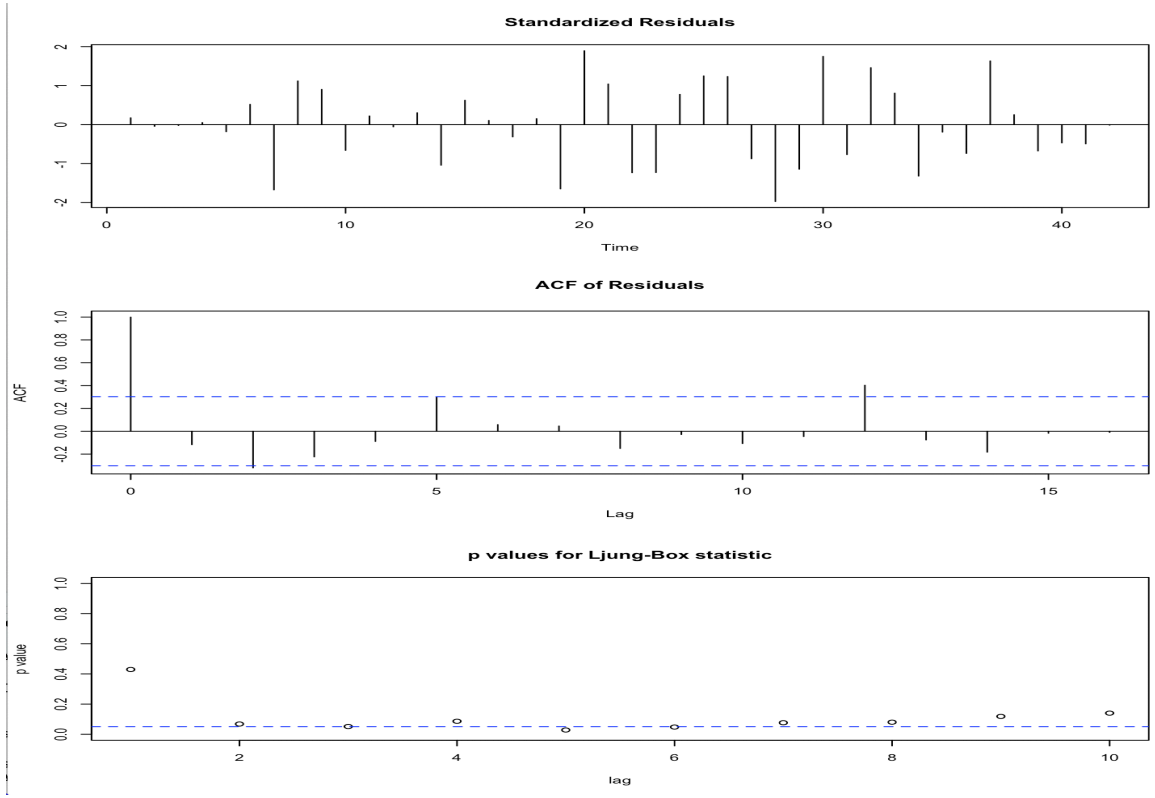
EU-Consumer - Sales

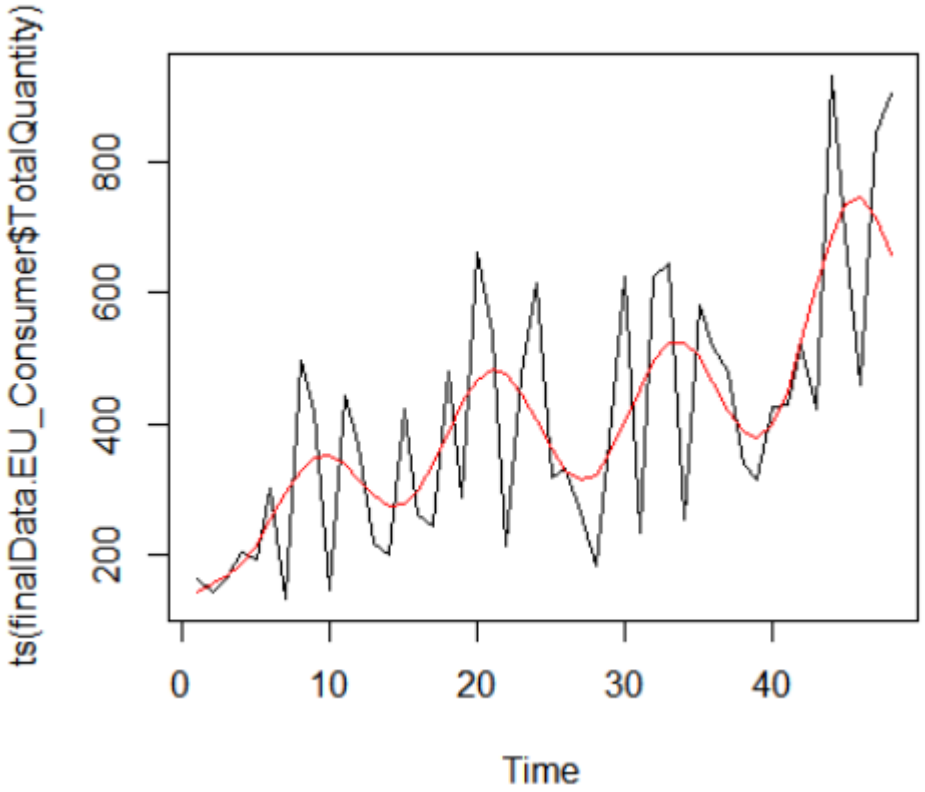




- ARIMA(0,0,0) with zero mean
- sigma^2 estimated as 1.03e+08: log likelihood=-447.05
- AIC=896.1 AICc=896.2 BIC=897.84

EU-Consumer - Quantity





- ARIMA(2,0,0) with zero mean
- sigma^2 estimated as 7284: log likelihood=-245.89
- AIC=497.79 AICc=498.42 BIC=503

Model Forecast for Top-2 Profitable Segments(6 months)

APAC-Consumer	Sales Forecast
Month1	47341.95
Month2	42923.43
Month3	41577.41
Month4	43983.86
Month5	49859.71
Month6	57995.43

APAC-Consumer	Quantity Forecast
Month1	505.6714
Month2	461.1905
Month3	461.4866
Month4	510.7856
Month5	600.5297
Month6	711.0826

EU-Consumer	Sales Forecast
Month1	37767.15
Month2	36501.97
Month3	37005.61
Month4	39310.69
Month5	42956.32
Month6	47103.55

EU-Consumer	Quantity Forecast
Month1	590.6191
Month2	540.0785
Month3	532.8207
Month4	587.1292
Month5	707.3636
Month6	880.7869

CONCLUSION & RECOMMENDATIONS

- APAC and EU Consumer segments are the maximum growing markets in terms of probability.
- It is recommended to invest more in APAC and EU Consumer segments for maximum profitability.
- For next 6 months, APAC Consumer sales, demand shows a sinusoidal behavior, where it decreases but picks up again.
- For next 6 months, EU Consumer demand & EU Consumer sales , shows a sinusoidal behavior, where it decreases but picks up again.
- It is advised to scale and plan the inventory management aligning to the predicted trend to derive maximum benefit.