Market Mix Modelling
For
ElecKart

Prepared by
  Praneeth, Sriharsha, Raju & Sravan

Background

ElecKart is an e-commerce firm based out of Ontario, Canada specialising in electronic products. Over the last one year, they had spent a significant amount of money on marketing. Occasionally, they had also offered big-ticket promotions (similar to the Big Billion Day). They are about to create a marketing budget for the next year, which includes spending on commercials, online campaigns, and pricing & promotion strategies. The CFO feels that the money spent over the last 12 months on marketing was not sufficiently impactful, and, that they can either cut on the budget or reallocate it optimally across marketing levers to improve the revenue response.

Problem Statement

How to optimise spending on commercials, online campaigns and pricing & special promotions?

Analytical Solution:

To develop a market mix model to observe the actual impact of different marketing variables over the last year and built model with potential market driver to generate maximum impact in sales so the ElecKart can optimise the marketing budget in future.

Data Description

Order level data

- FSN ID: The unique identification of each SKU

- Order Date: Date on which the order was placed

- Order ID: The unique identification number of each order

- GMV: Gross Merchandise Value or Revenue

- Units: Number of units of the specific product sold

- Order payment type: How the order was paid – prepaid or cash on delivery

- SLA: Number of days it typically takes to deliver the product

- Product MRP: Maximum retail price of the product

- Product procurement SLA: Time typically taken to procure the product

Other data

- Monthly spend on various advertising channels

- Days when there was any special sale

- Monthly NPS score – this may work as a proxy to 'voice of the customer'

- Stock Index of the company on a monthly basis

Solution Approach

1. Understanding Client Requirement
   - Understanding client business
   - Problem statement

2. Data Understanding
   - Describe data
   - Data quality check
   - Data cleaning

3. Data Preparation
   - Select relevant data
   - Integrate data
   - Format data

4. Model Building
   - Linear model (for mid submission)
   - Multiplicative Model
   - Distributive lag model
   - KOYCK Model

Data Cleaning

- Data type of columns looked at and modified as per the need.

- Presence of missing values were looked at and were ignored.

- Dropped rows of column 'gmv' or column 'product_mrp' value as '0'.

- Relevant columns were picked up ignoring the outliers.

- After the basic cleaning process of sales, media, NPS score data, their missing values assessment was done.

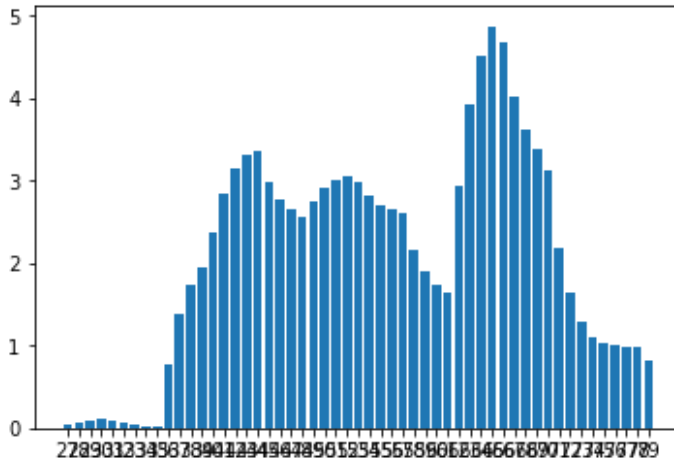- The entire data was looked at from weekly perspective.

Data Preparation

- Identified 'gmv' column with null values and replaced with '0'.
- Created new column 'discount' by subtracting 'gmv' from 'product_mrp'.
- Created new column 'discount_percentage' using existing columns 'product_mrp' and 'discount'.
- Filtered out dates which are not in July 2015 and June 2016.
- Converted order id and order item id to integer.
- Dropped columns 'customer ID' and 'PIN' as these columns are not used in analysis.
- Converted monthly data in to weekly.
- Created new column 'special_day_flag' based on provided 'Special Sale Calendar'.
- Created new column 'pay_flag' based on Payment Dates of every month.
- Converted 'Marketing Spends' to rupees which is provided in Crs.
- Prepared final data frame by merging 'Media Investment', 'Monthly NPS Score', 'Product List' and 'ConsumerElectronics'.
- GMV, Product_MRP are in terms of INR, while marketing spend is in INR Cr. For better model explanation converted the marketing spend to INR.
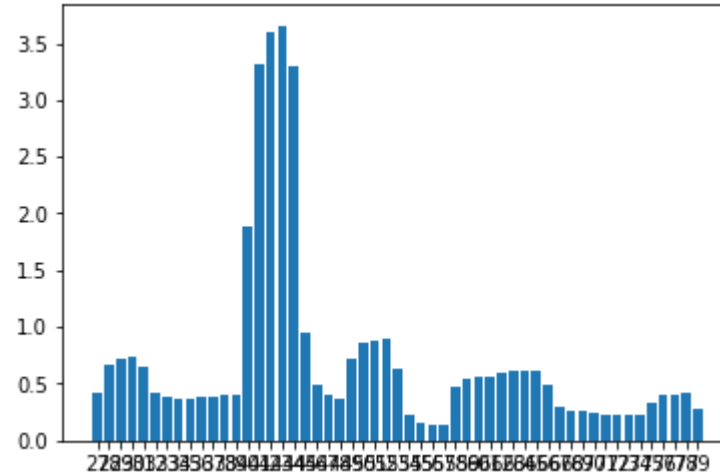
KPIs

- week
- gmv
- sla
- units
- product_mrp
- product_procureme nt_sla
- discount_percentage
- special_day_flag

- pay_flag
- TV
- Digital
- Sponsorship
- Content Marketing
- Online marketing
- Affiliates
- SEM
- Radio

- Others
- NPS
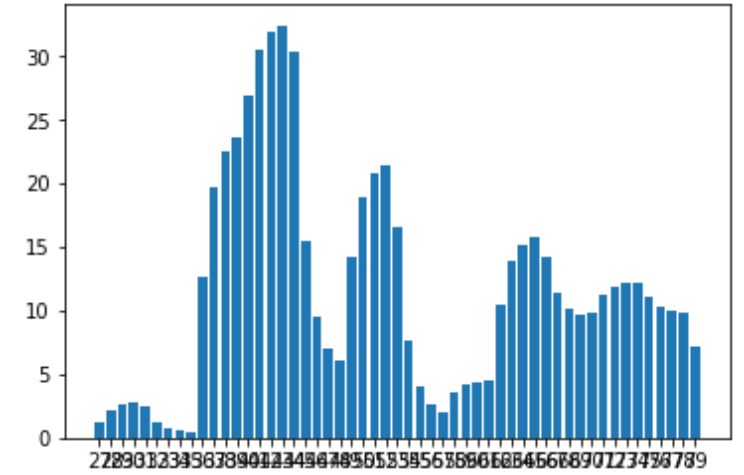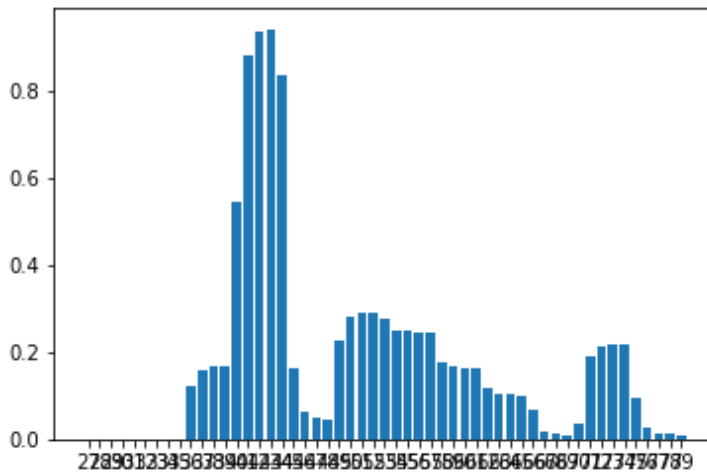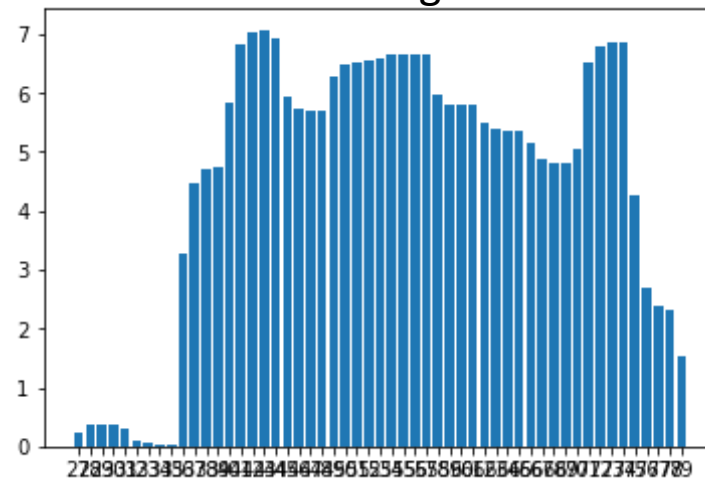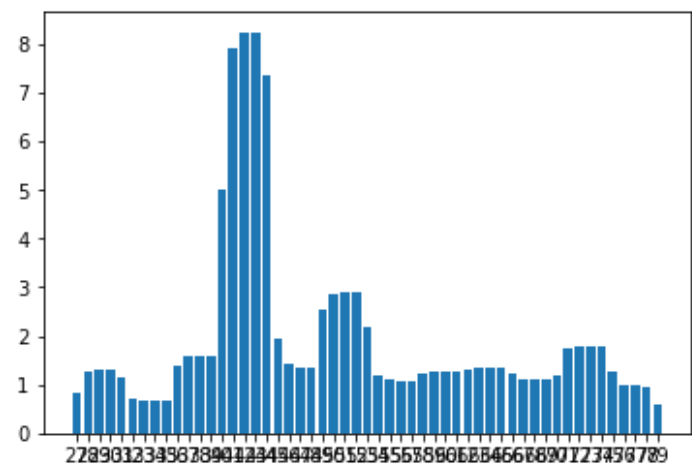- Stock Index

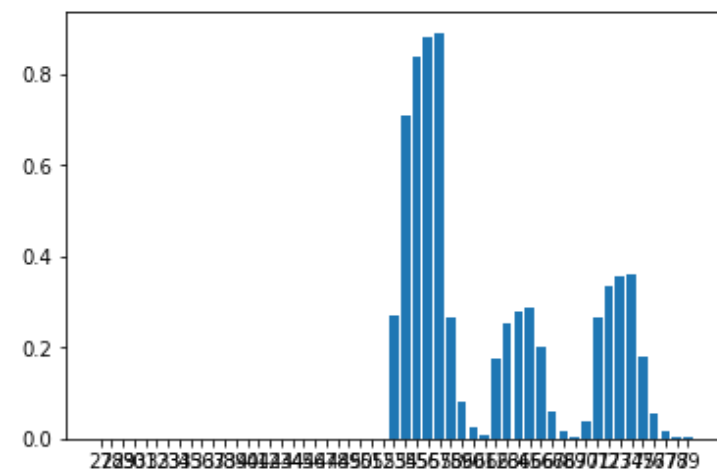# Adstocks by week

Adstocks by week contd .....
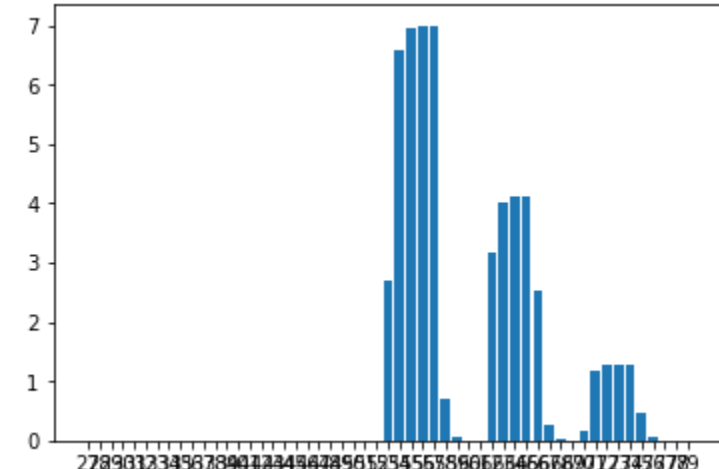

SEM Adstock   Radio Adstock   Other Adstock

Different Models and Significant variables (for Product Type 'Camera Accessory')

- Linear Model
  - R2 score – 62%
  - KPI's –
    - discount_percentage
    - payment_type_COD
    - NPS

- Multiplicative Model
  - R2 Score – 87%
  - MSE – 51%
  - KPI's –
    - discount_percentage
    - pay_flag
    - Sponsorship_adstock

- Distributive lag model
  - R2 score – 87%
  - MSE – 52%
  - KPI's –
    - discount_percentage
    - pay_flag
    - Sponsorship_adstock

- KOYCK Model
  - R2 Score – 90%
  - MSE – 66%
  - KPI's –
    - discount_percentage
    - pay_flag
    - Digital_adstock
    - Sponsorship_adstock

Different Models and Significant variables (for Product Type 'Gaming Accessory')

- Multiplicative Model
  - R2 Score – 92%
  - MSE – 16%
  - KPI's –
    - discount_percentage
    - NPS
    - Onlinemarketing_adstock
    - Digital_adstock
    - Sponsorship_adstock

- KOYCK Model
  - R2 Score – 80%
  - MSE – 6%
  - KPI's – payment_type_COD, Digital_adstock & Sponsorship_adstock

- Distributive lag model
  - R2 score – 86%
  - MSE – 11%
  - KPI's –
    - payment_type_COD
    - Digital_adstock
    - Sponsorship_adstock

Different Models and Significant variables
(for Product Type 'Home Audio')

- Multiplicative Model
  - R2 Score – 43%
  - MSE – 32%
  - KPI's –
    - sla

- Distributive lag model
  - R2 score – 65%
  - MSE – 55%
  - KPI's –
    - sla
    - payment_type_COD

- KOYCK Model
  - R2 Score – 59%
  - MSE – 27%
  - KPI's – sla, payment_type_COD

Results to the Business

1. For 'Camera Accessory' products: 'Discount percentage', 'Pay Days' and 'Sponsorship adstock' are the significant KPI's.

    So more 'Discount's should be planned on pay days and more investment in 'Sponsorship adstock' is required to improve more revenue on 'Camera Accessory' products.

2. For 'Gaming Accessory' products, 'Cash on Delivery', 'Digital Adstock' & 'Sponsorship_adstock' are the main KPI's.

    So to increase revenue on these products, funds should be reallocated on these two adstocks and Cash on delivery should be given.

3. For Product Type 'Home Audio', 'SLA' and 'Cash on Delivery' are the significant KPI's which are impacting business negatively.

    For increasing the revenue on these products, SLA should be decreased for these products and Cash on Delivery option should be given.

Thank you..