ElecKart Market Mix Modeling

FINAL SUBMISSION

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Business Problem and Objective

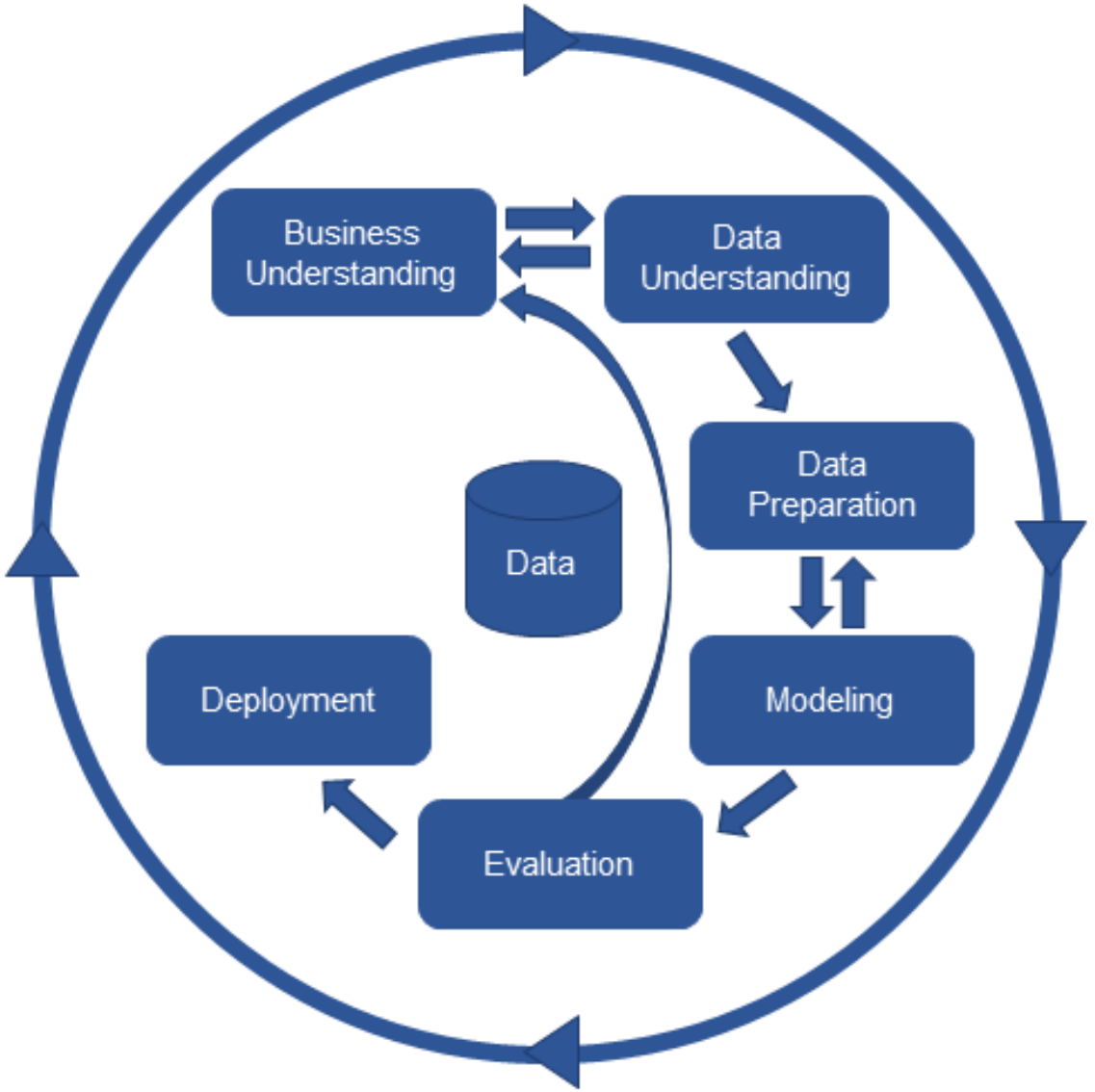
Business Problem:

- ElecKart is an e-commerce firm specializing in electronic products.
- In the last one year, they had offered big-ticket promotions (similar to the Big Billion Day) occasionally.
- It was observed that the money spent over the last 12 months on marketing was not sufficiently impactful, and they can either cut on the budget or reallocate it optimally across marketing levers to improve the revenue response.
- ElecKart is planning a marketing budget for the next year which includes spending on commercials, online campaigns, pricing, and promotion strategies.

Business Objective:

- To develop a market mix model to observe the actual impact of different marketing variables over the last one year.
- To recommend the optimal budget allocation for different marketing levers for the next year.

Problem Solving Methodology – MMM ElecKart



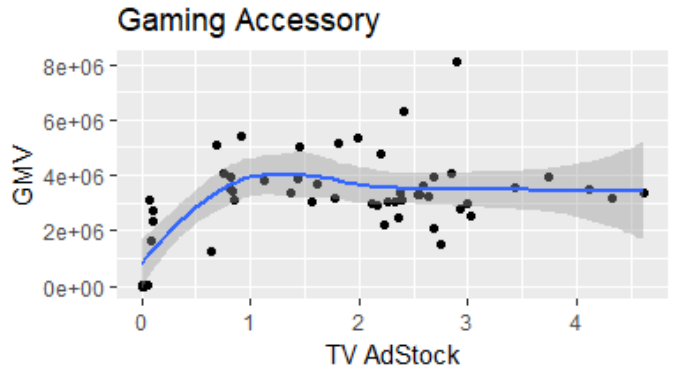
MMM ElecKart – Data Understanding

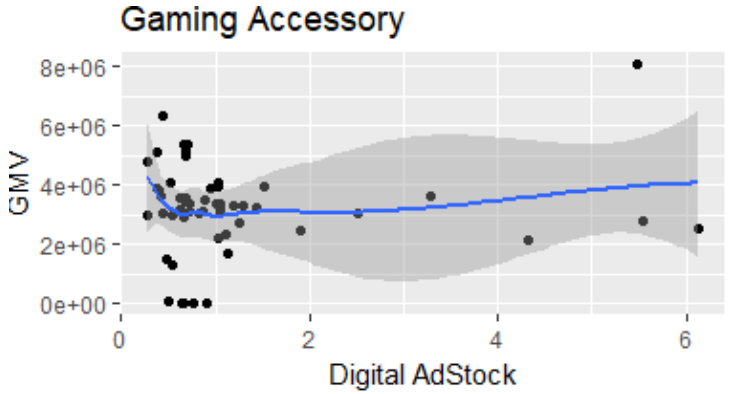
- **Eleckart sales data**
  - Data to be used for analysis are from July 2015 to June 2016
  - Number of Instances in Complete Order Dataset : 16,48,824
  - Number of Attributes in Order Dataset: 20
- **Marketing Investment into different media by Eleckart**
  - Monthly spends on various advertising channels such as TV, Digital, Sponsorship, Content Marketing, Online Marketing, Affiliates, SEM, Radio, Others
- **Customer Rating – Also called Net Promotion Score (NPS)**
  - Ratings given by customers for different product over the one year period
- **Holiday List**
  - Days when there was any special sale
- **Product Catalog**
  - Catalog consist of categorization in to Super Category, Category, Sub- Category & Vertical
  - For the current project sub-categories - camera accessory, home audio and gaming accessory – are considered only.

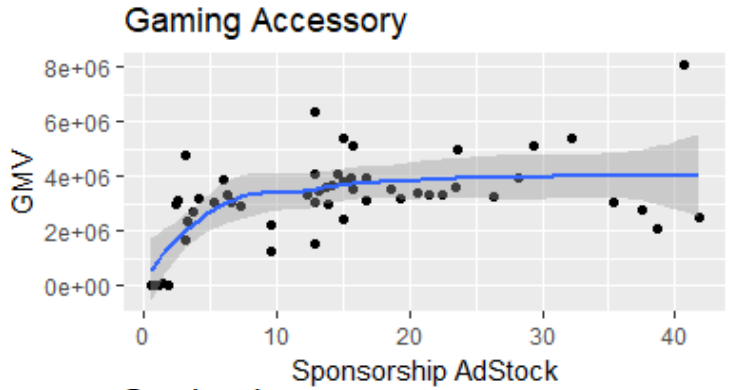
MMM ElecKart – Data Preparation

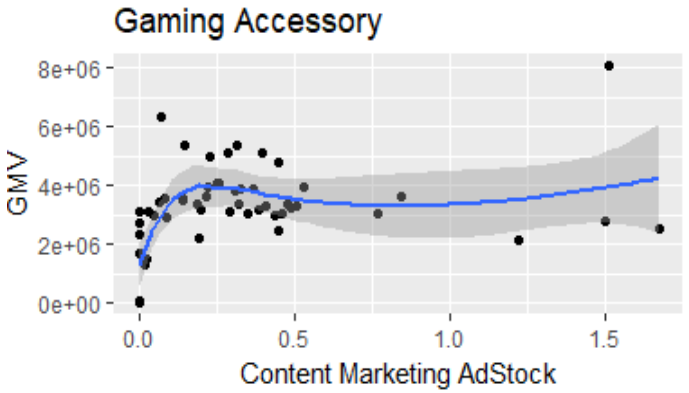
- Extracted data pertaining to three sub-categories: GamingAccessory, CameraAccessory, and HomeAudio from Consumer Electronics Dataset
- Removed columns from dataset which were on no significance for this analysis such as deliverybdays, deliverycdays, cust_id, pincode
- Performed Data Sanity as per business understanding such as removing data outside the duration given, replaced missing gmv with MRP multiplied by units, removed records that had GMV more than cost
- Grouped data on weekly basis
- Loaded Spend on Media, NPS and Holidays and merged them with sales data to further analysis
- Derived Fields (KPI's) created for Modelling
    - Sales Price – gmv/units
    - Promotional Decount - (MRP - Sales price) / MRP
    - Clustered sales data into middle mass, premium based on sell price, MRP, and units for each of the vertical.
    - Categorized Payment Mode – Prepaid / Postpaid
    - Sales Data with 0 GMV is considered as a kpi (refers to products sold free)
    - Holidays in each week
    - AdStock for each media for 3 subsequent weeks with multiplier of 0.6, 0.4 and 0.2
    - Moving Average

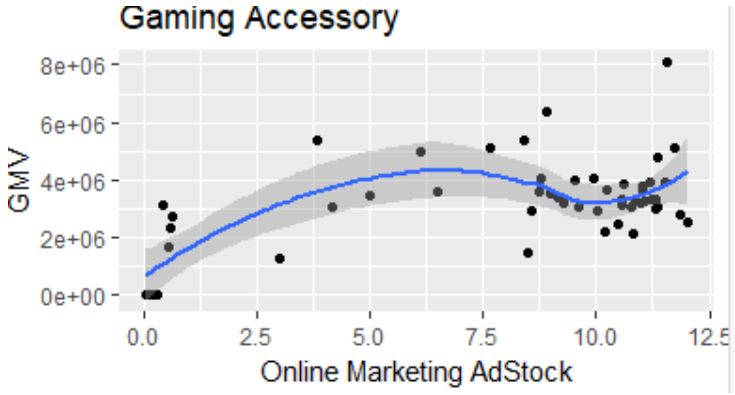
MMM ElecKart – Data Exploration for Gaming Accessory

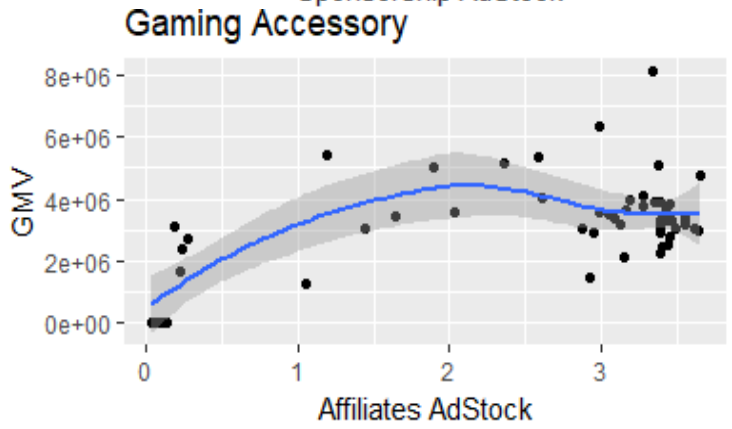


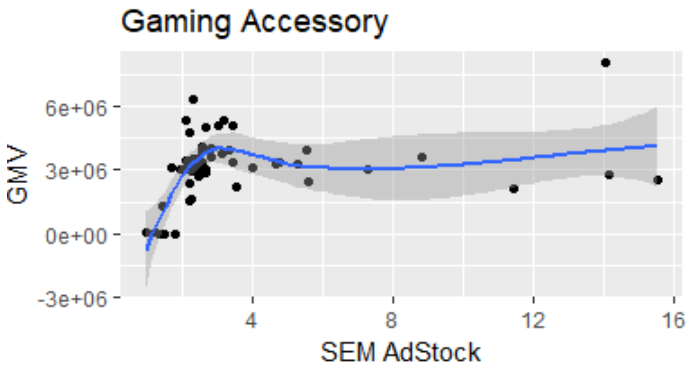






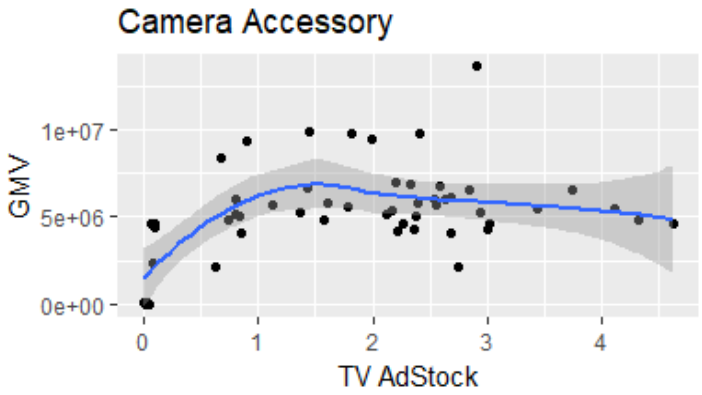


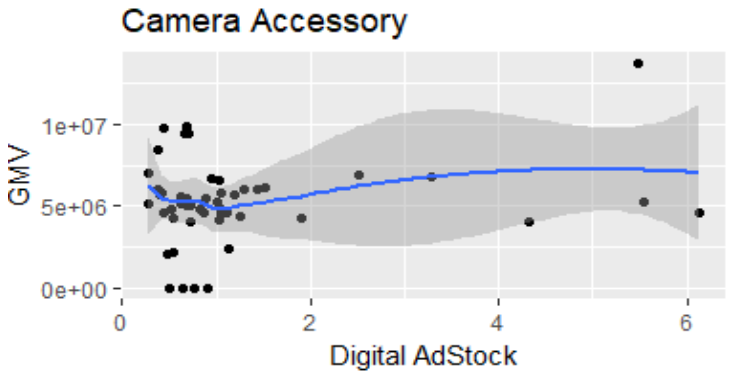


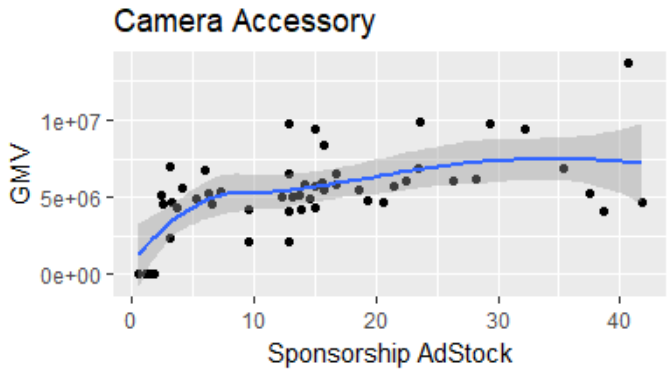


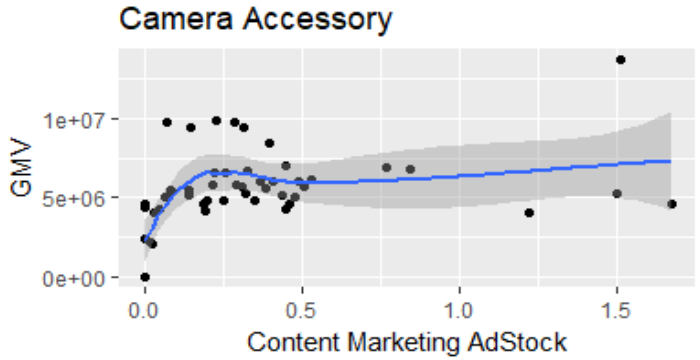
- **The different graphs show the revenue trend for different media investments for Gaming Accessories**

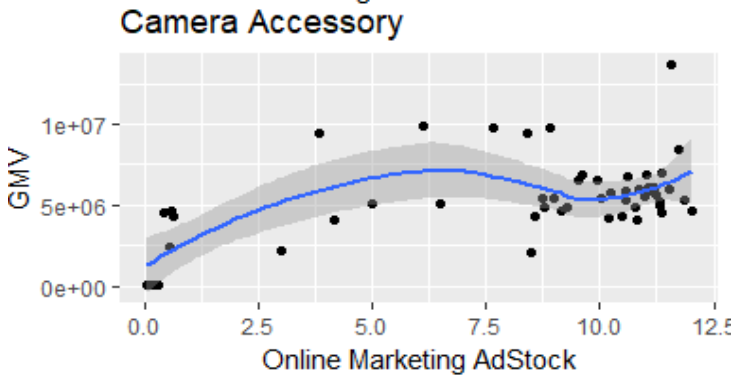
MMM ElecKart – Data Exploration for Camera Accessory

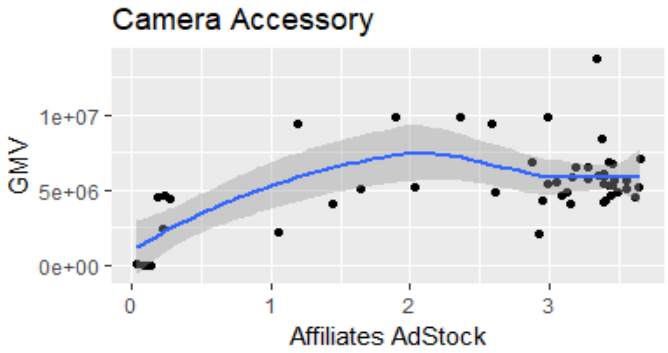


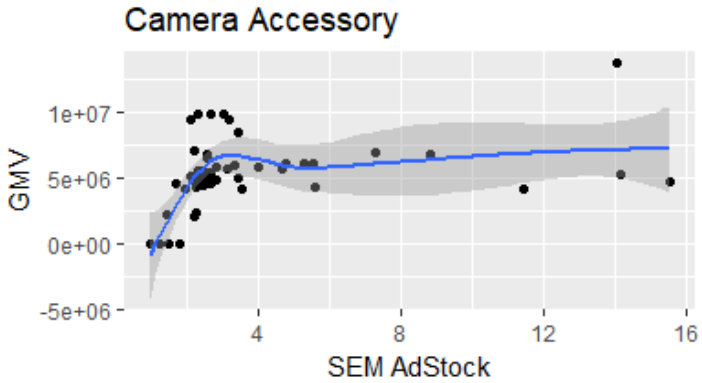






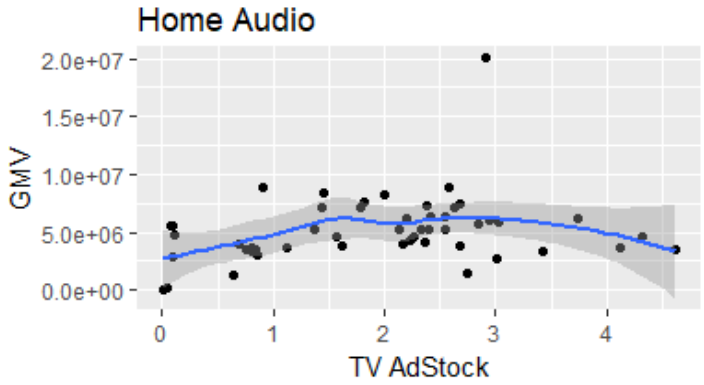


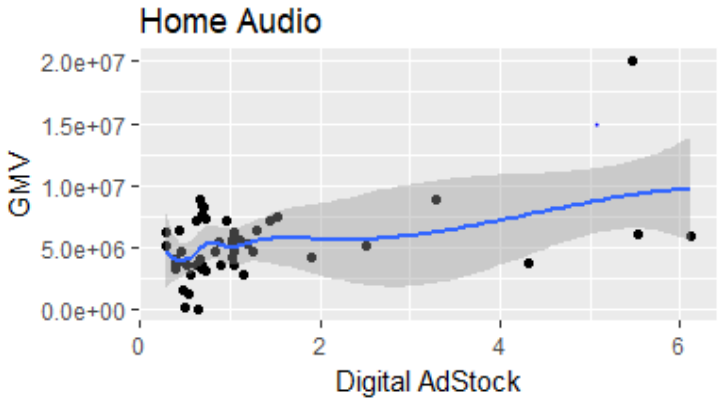


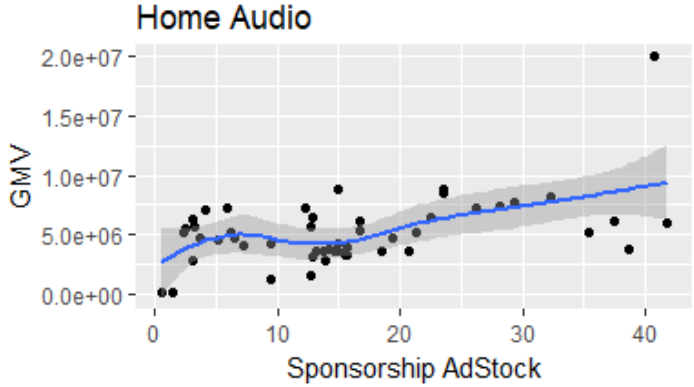


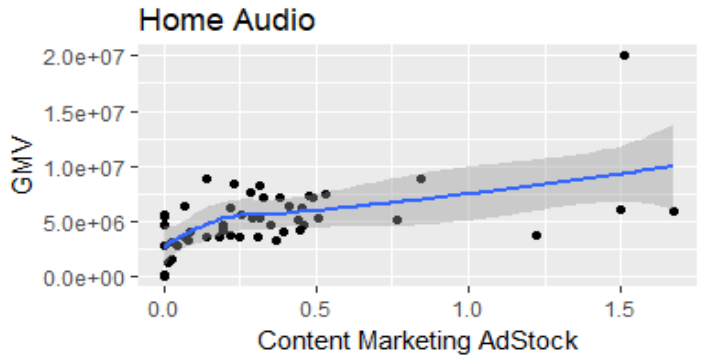
- **The different graphs show the revenue trend for different media investments for Camera Accessories.**

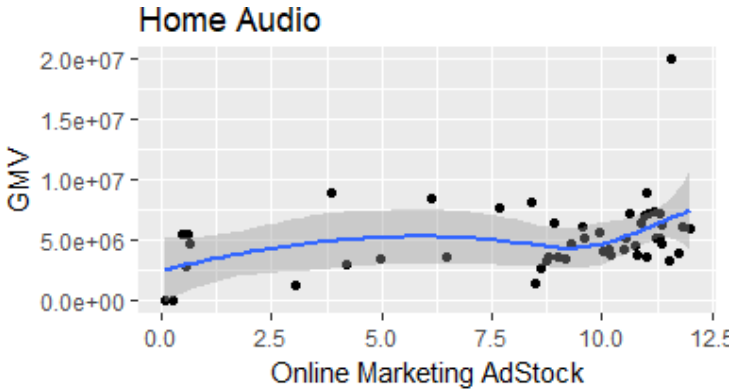
MMM ElecKart – Data Exploration for Home Audio

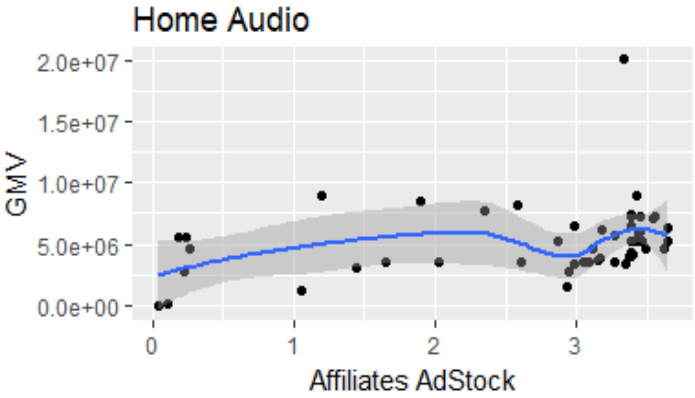


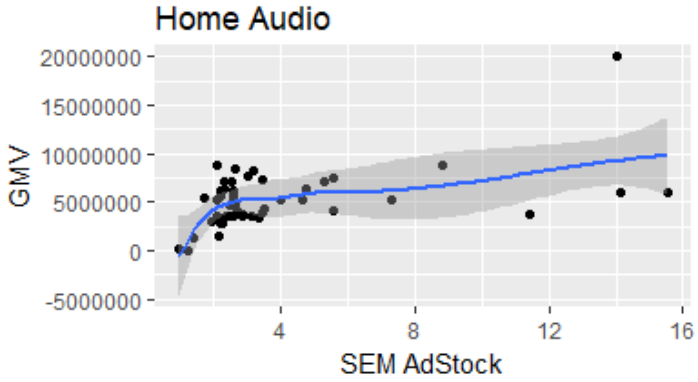






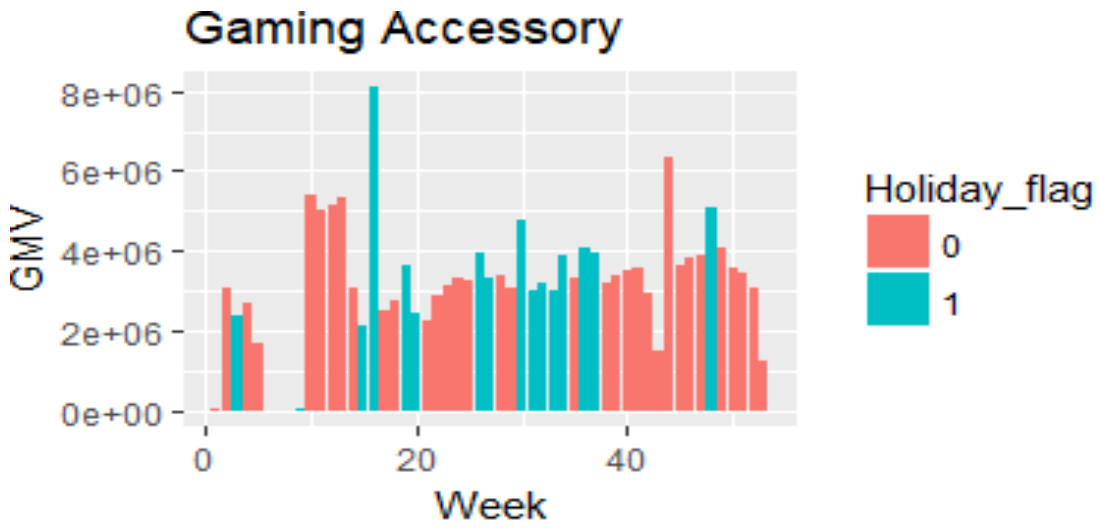


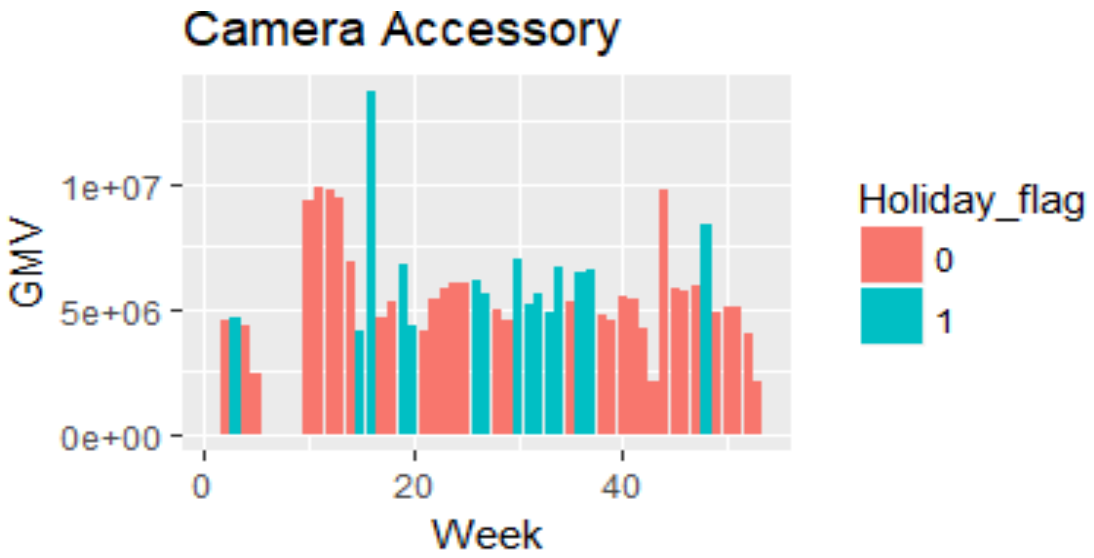


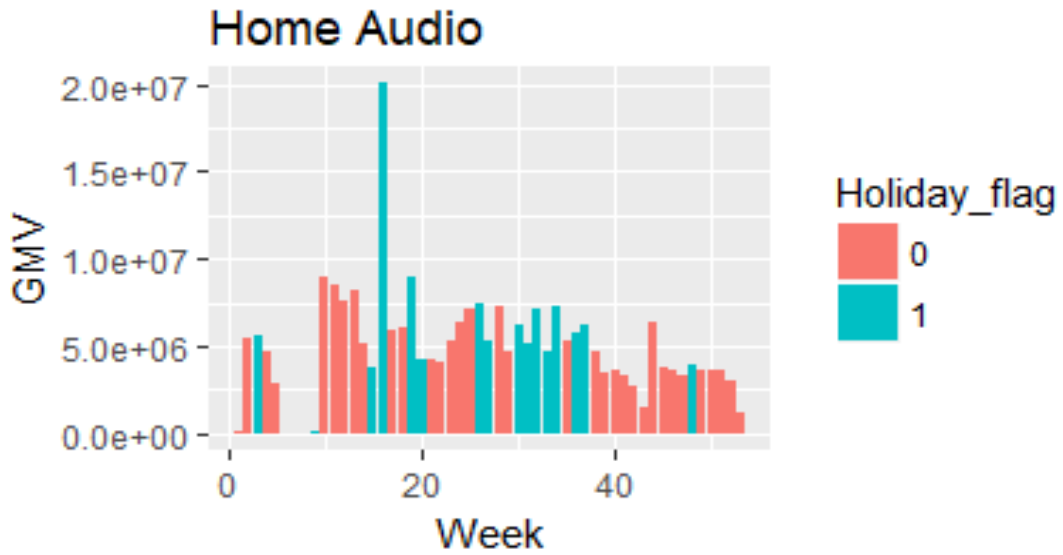


- **The different graphs show the revenue trend for different media investments for Home Audio.**

MMM ElecKart – Data Exploration







- These three graphs show the revenue trend spread over 53 weeks for different categories
- As we can observe from EDA, revenue in weeks with holidays or festivals within them have higher value compared to neighboring weeks without holidays or festivals.

Modeling - Gaming Accessories

Model Name	No. of Significant Variables	Significant Variable Names	Adjusted R-squared
Basic Linear Model	3	Premium_p, Mass_p, inc_PO_MA1	0.967
Multiplicative Model	4	Mass_p, Middle_p, Premium_p, promotional_discount	0.996
Koyck Model	3	SLA, inc_LP_MA1, inc_PO_MA2	0.375
Distributed lag Model	7	SLA, promotional_discount, NPS, Premium_p, Mass_p, Middle_p, gmv.1	0.985
Multiplicative + Distributed lag Model	5	promotional_discount, percentage_of_prepaid_order, Middle_p, Digital, Sponsorship	0.968

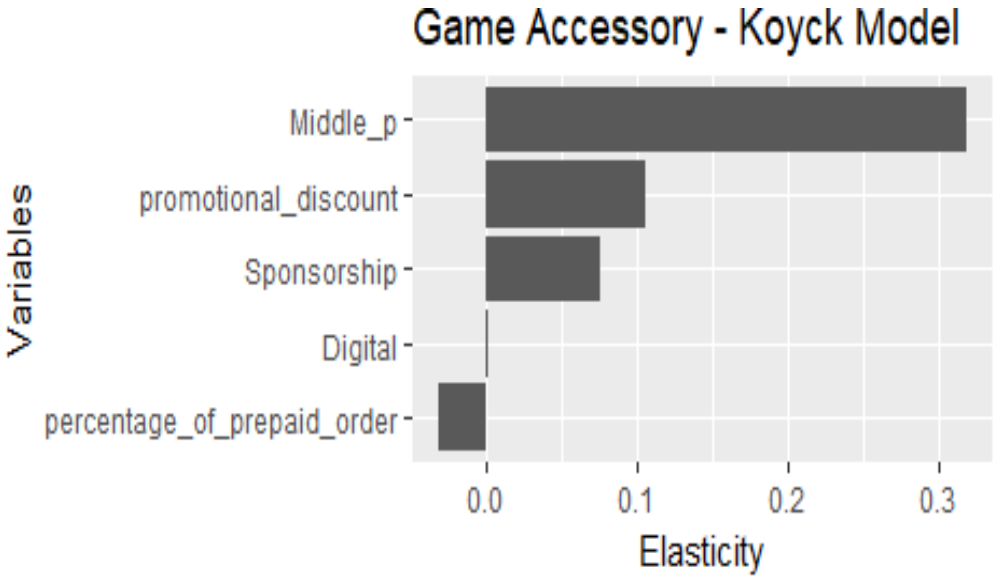
Modeling - Camera Accessories

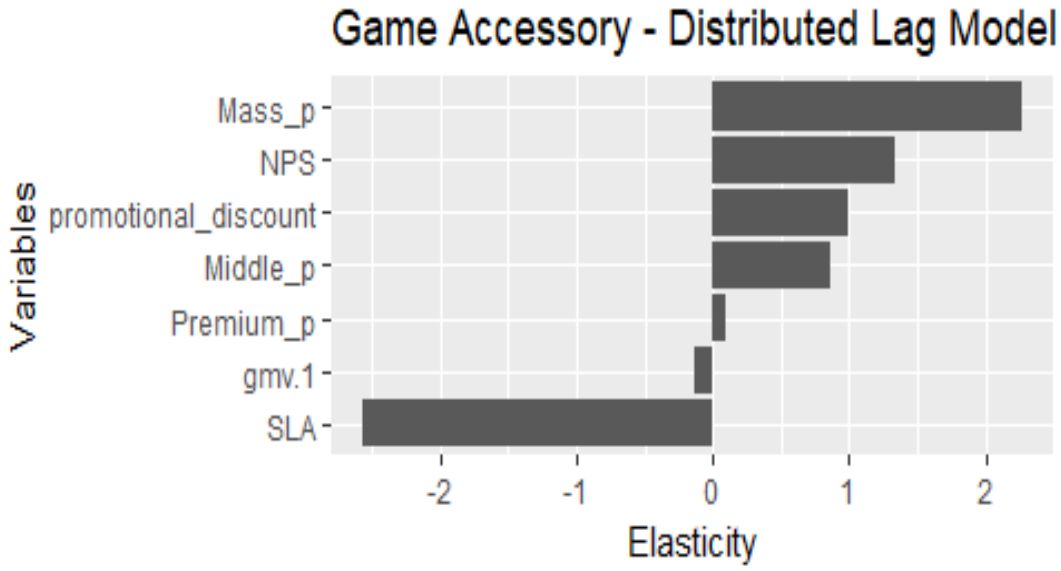
Model Name	No. of Significant Variables	Significant Variable Names	Adjusted R-squared
Basic Linear Model	4	Procurement_SLA, Mass_p, holiday_freq, inc_PO_MA3	0.895
Multiplicative Model	3	promotional_discount, NPS, Mass_p	0.997
Koyck Model	4	Sponsorship, inc_LP_MA1, inc_PO_MA3, NPS.3	0.496
Distributed lag Model	6	Mass_p, Middle_p, Digital, Sponsorship, inc_PO_MA3, percentage_of_prepaid_order	0.902
Multiplicative + Distributed lag Model	4	promotional_discount, NPS, Mass_p, inc_LP_MA2	0.996

Modeling - Home Audio

Model Name	No. of Significant Variables	Significant Variable Names	Adjusted R-squared
Basic Linear Model	5	Procurement_SLA, Mass_p, Sponsorship, inc_LP_MA2, inc_PO_MA3	0.994
Multiplicative Model	3	SLA, Mass_p, Digital	0.996
Koyck Model	6	Premium_p, TV, Digital, inc_LP_MA2, inc_LP_MA3, inc_PO_MA1	0.233
Distributed lag Model	3	Procurement_SLA, Mass_p, inc_PO_MA3	0.991
Multiplicative + Distributed lag Model	5	SLA + Mass_p, Sponsorship, Content.Marketing, inc_LP_MA2	0.992

Recommendations - Gaming Accessories

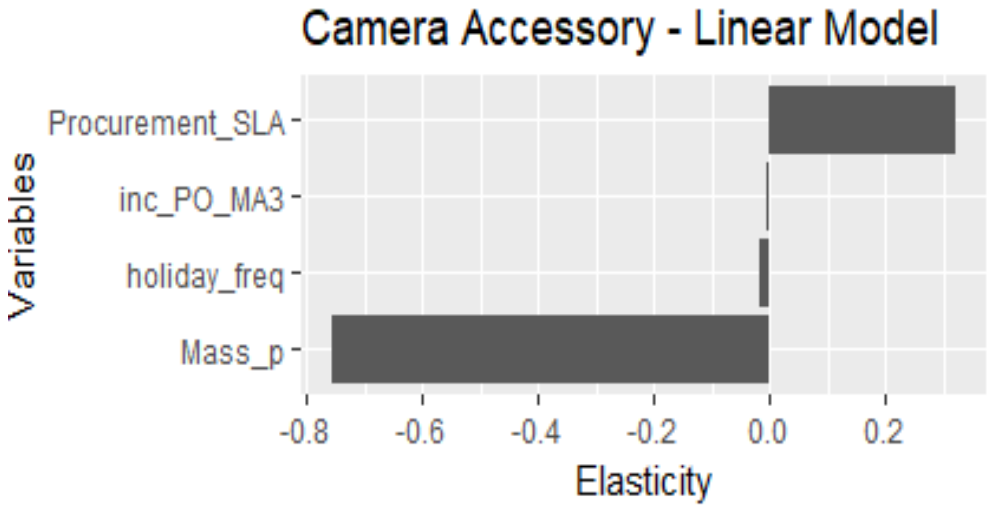


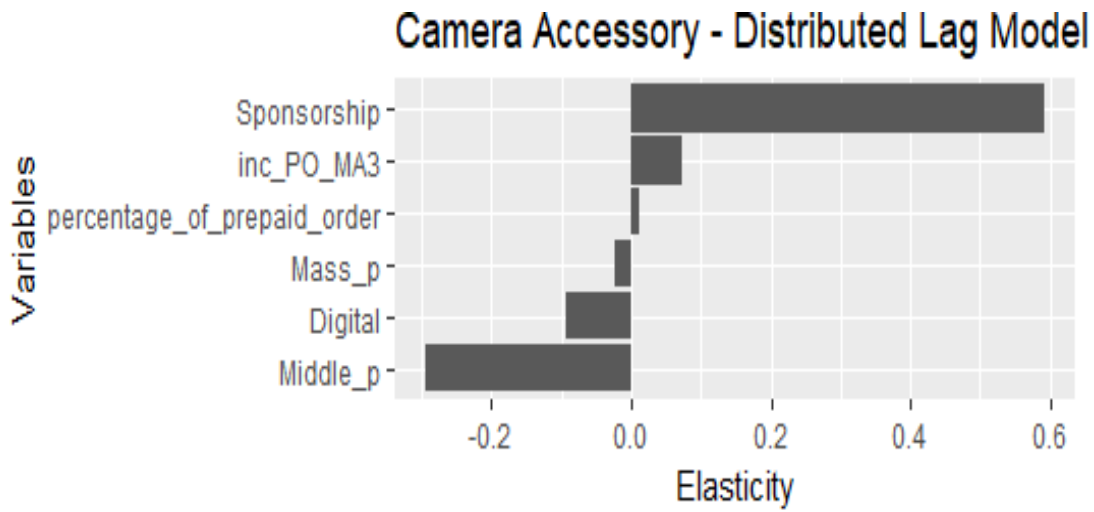


- For Gaming Accessories, Koyck Model suggest that the products belonging to mid-segment contribute more towards revenue and also promo-discount, Sponsorship should be increased and pre-paid orders should be reduced in order to increase revenue.

- As per Distubuted lag Model the products belonging to mass and mid-segment has more impact on revenue.
- ElecKart should stress upon good NPS and offer promotional-discounts.

Recommendations - Camera Accessories

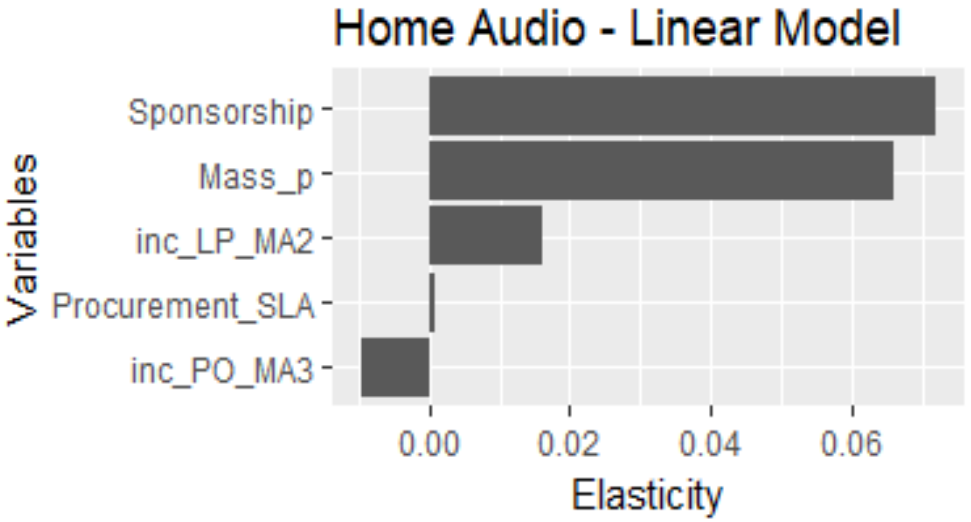


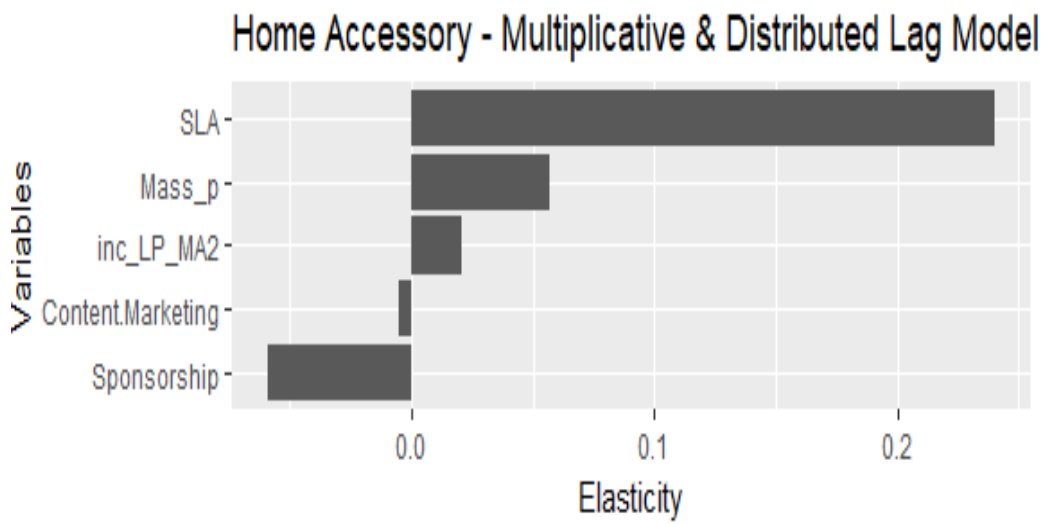


- The graphs show the elasticity for the different variables with respect to overall sales (gmv).
- Positive elasticity means that increase in the value of the KPI would lead to increase in the sales figure.
- The objective would be to allocate more spending on the KPIs that have positive elasticity w.r.to the sales.

- Thus going with the Linear Model model, ElecKart should focus more on Procurement SLA and decrease investment on Mass Products (frequently selling products).
- As per Distubuted lag model, ElecKart should focus more on Sponsorship and decrease investment on Medium selling products.

Recommendations - Home Audio





- For Home Audio, Linear Model suggest that Investment on Sponsorship and Mass Products should be increased.
- As per Multiplicative Distubuted lag Model, there should be more focus on SLA, Mass Products and should reduce investment in Sponsorship.

Thank You