

EleckKart

Market Mix Model

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Agenda

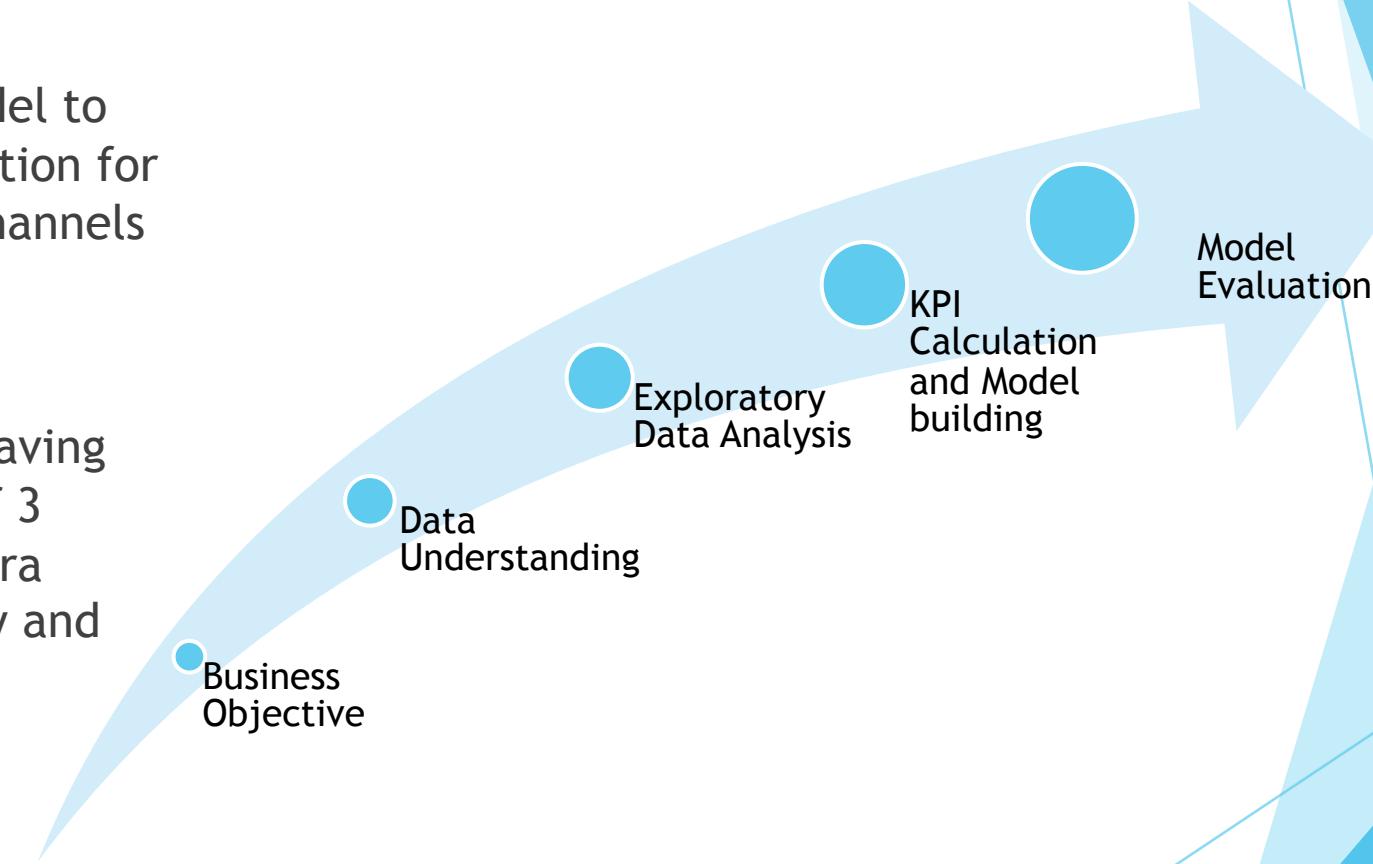
- ▶ Problem statement
- ▶ Business Objective and Flow chart of solution Approach
- ▶ Data understanding
- ▶ New variables and KPIs
- ▶ EDA
- ▶ Model and solution
- ▶ Recommendation
- ▶ Appendix

Problem Statement

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

Business Objective and Solution Approach

- ▶ Develop a market mix model to get optimal budget allocation for advertising in effective channels to increase revenue
- ▶ To identify other factors having positive impact on sales of 3 product categories - Camera Accessory, Game Accessory and Home Audio



Data Understanding

- ▶ 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
- ▶ Order item ID: Suppose you order 2 different products under the same order, it generates 2 different order Item IDs under the same order ID; orders are tracked by the Order Item ID.
- ▶ 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
- ▶ Cust id: Unique identification of a customer
- ▶ Product MRP: Maximum retail price of the product
- ▶ Product procurement SLA: Time typically taken to procure the product

Apart from this, the following information is also available:

- ▶ Monthly spends on various advertising channels
- ▶ Special sale calendar
- ▶ Monthly NPS score - this may work as a proxy to ‘voice of customer’
- ▶ Data to be considered:
 - ▶ Period of 1 year from July 2015 to June 2016
 - ▶ Three sub category of products “Camera Accessories”, “Home Audio”, “Gaming Accessories”

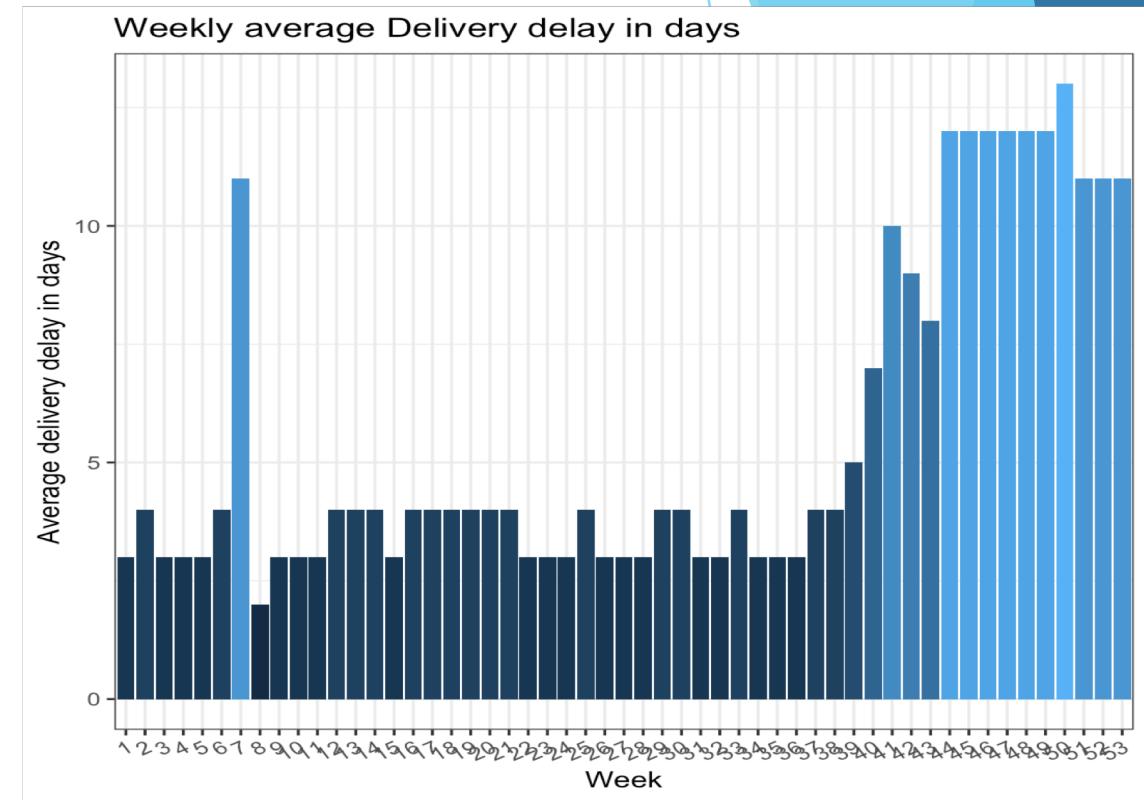
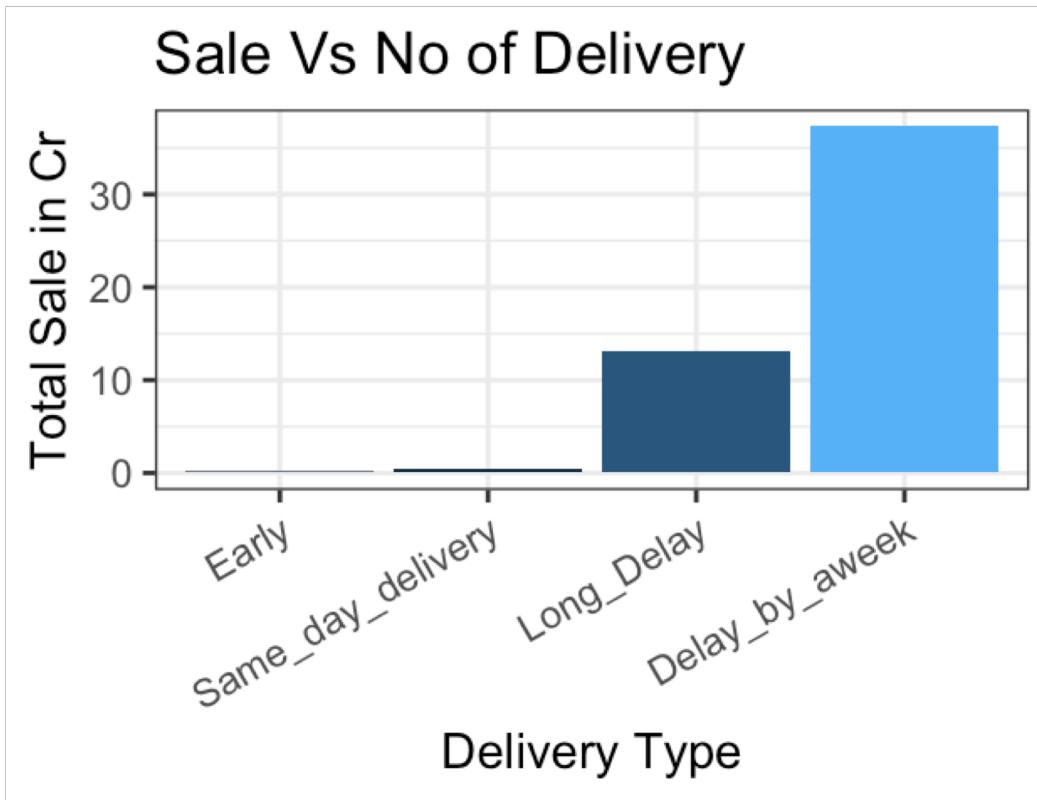
Data Cleaning and Preparation

- ▶ There were total of 4904 missing values in gvm, customer id and pin code
- ▶ -ve values present for ‘customer id’ and ‘pin code’
- ▶ Delivery days and SLA has a value ‘\N’ and some -ve value
- ▶ ‘gmv’ and ‘mrp’ are 0 or -ve for some records
- ▶ Clean up and bring all consumer data to weekly granular level
- ▶ Merge media investment, nps, and Special sale calendar with consumer data.
- ▶ Outliers handling
- ▶ Detailed graphs available in appendix

Derived variables and KPIs

- ▶ Delay days: Difference between estimated delivery days and actual delivery days (sum of time taken to procure, dispatch and deliver the product) Created buckets based on delay days.
- ▶ Units per order : No of total units consumer has bought together
- ▶ List price: gmv/units;
- ▶ Promotion/Discount: MRP - List price/MRP
- ▶ Product type: Based on units sold and its mrp created three classes “Mass Market”, “Aspiring” and “Premium”
- ▶ List price inflation with respect to last week
- ▶ List price inflation with respect to last month
- ▶ Sale, list price and discount lag values
- ▶ Adstock of all media investment type
 - ▶ TV, Digital, Sponsorship, Content Marketing, Online marketing, Affiliates, SEM, Radio, Other

Exploratory Data Analysis

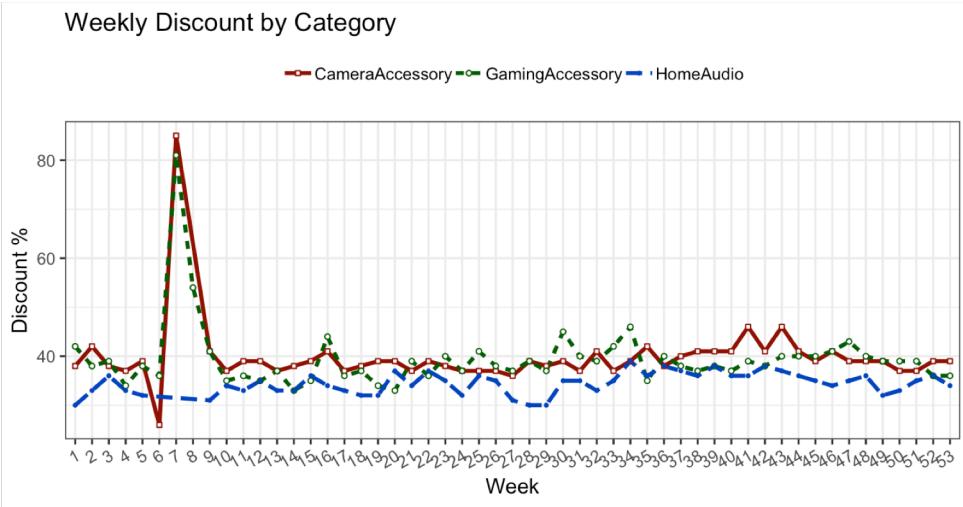


Insight:

- ▶ Sale decreases if delay in delivery of the goods take more than one week
- ▶ In week 7 and towards the end of the year delay in goods delivery increased significantly

Revenue and Discount

Weekly Discount by Category



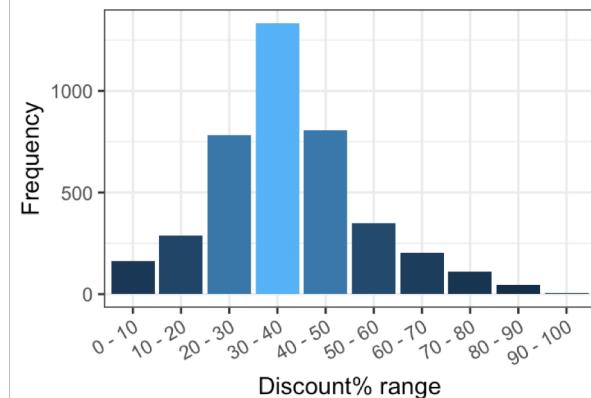
Average sale by Discount



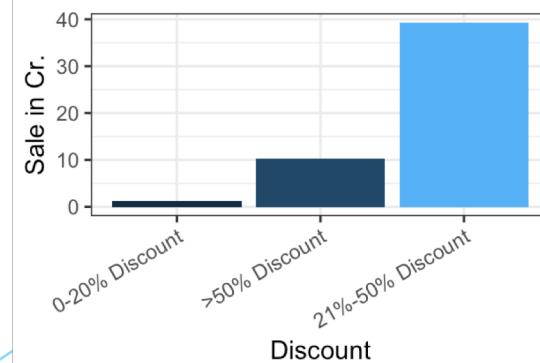
Insight:

- ▶ From frequency plot we can see from 20 to 50 percentage discount are given more frequently and it also yields more revenue than very low or very high discounts.
- ▶ Line plots are showing discounts given per week and per product category
- ▶ Camera accessory and Gaming Accessory are given more discounts than Home audio through out the year except week 6.
- ▶ We can see high discounts given to Camera accessory and gaming accessory in week 7.

Frquency of the discount given



Discount and Sale



List Price Inflation, Units per order and Product Type

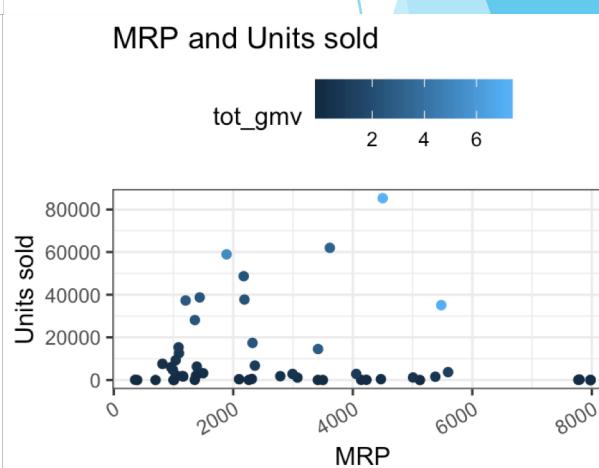
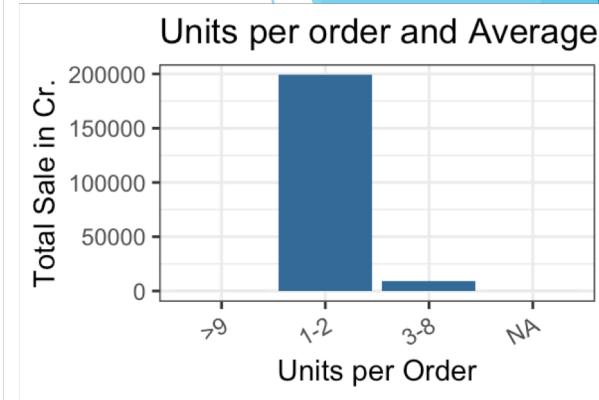
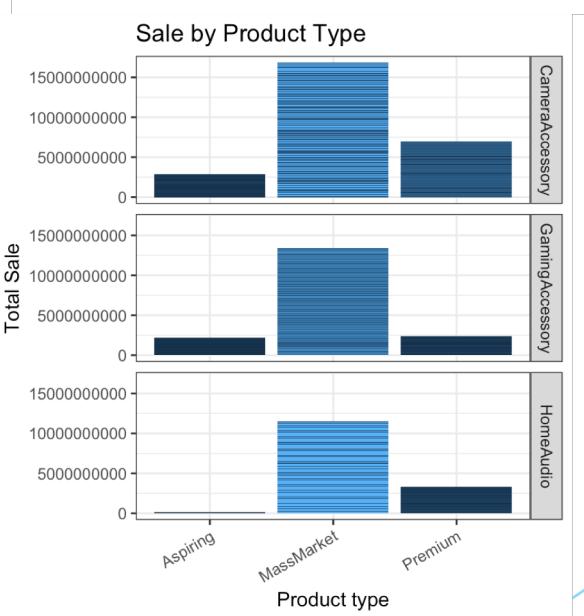
Units per order and total sale

- ▶ People don't need electronic items in bulk, we can see unit products bought in each order is mostly 1 or 2

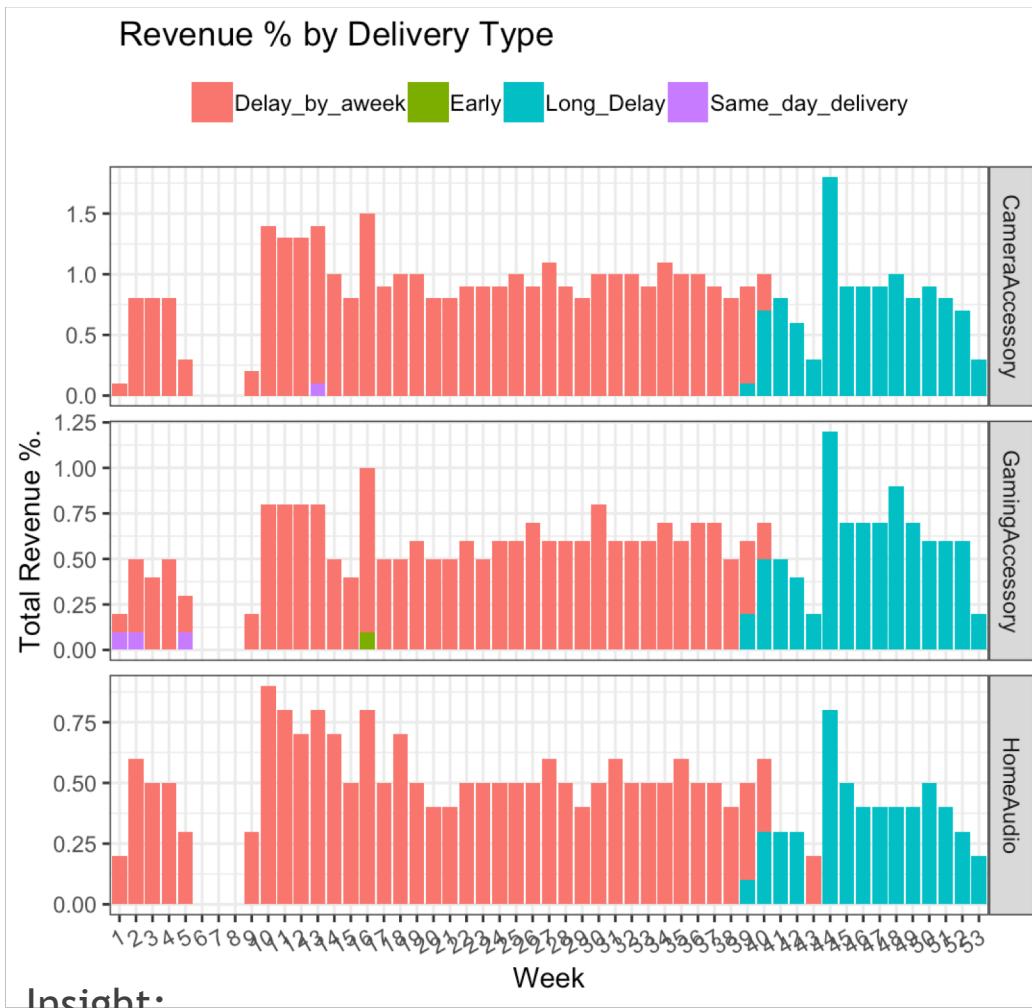


Group sub category products using MRP and Units sold

- ▶ Mass Market : Unit sold > 20000
- ▶ Premium: Unit sold < 20000 and MRP > 2000
- ▶ Aspiring: Unit sold < 20000 and MRP < 2000
- ▶ Mass Market type products gives high revenue

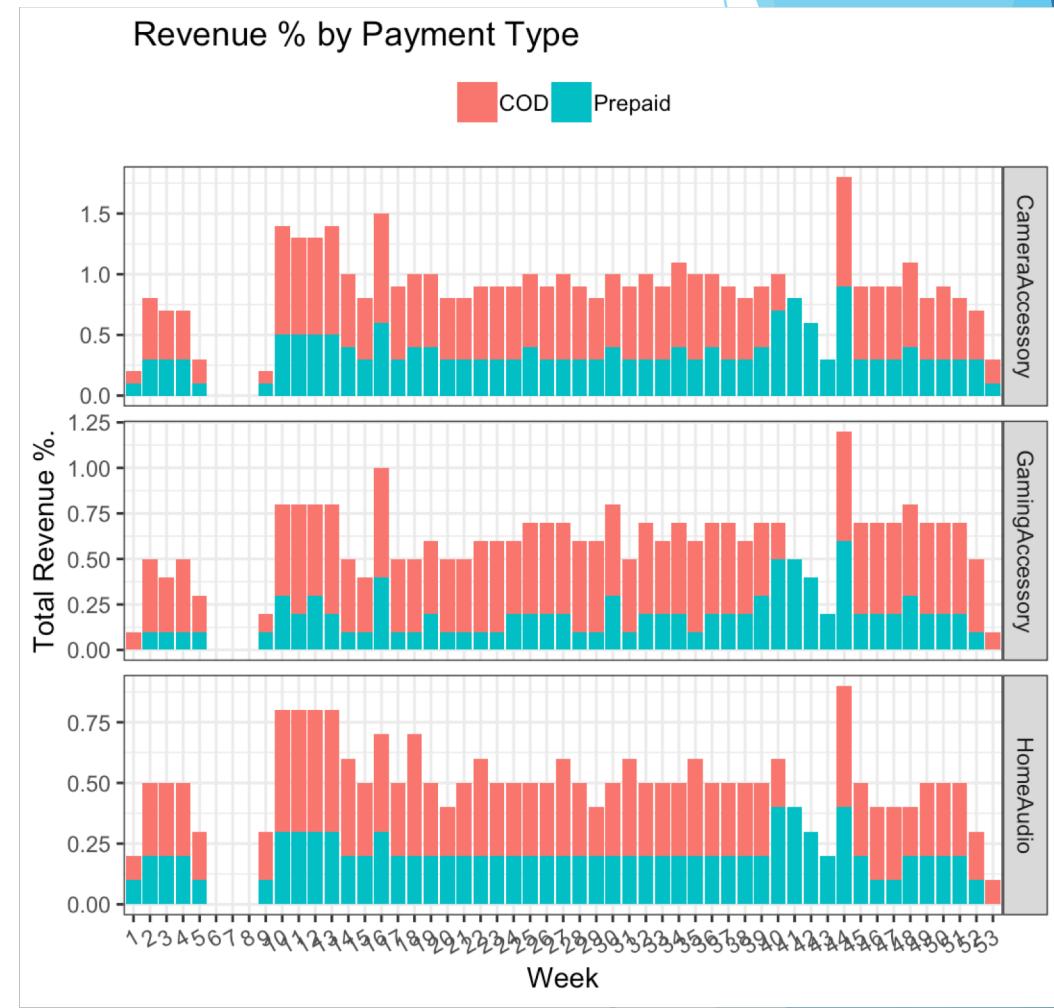


Revenue and Delivery delay, Payment Type



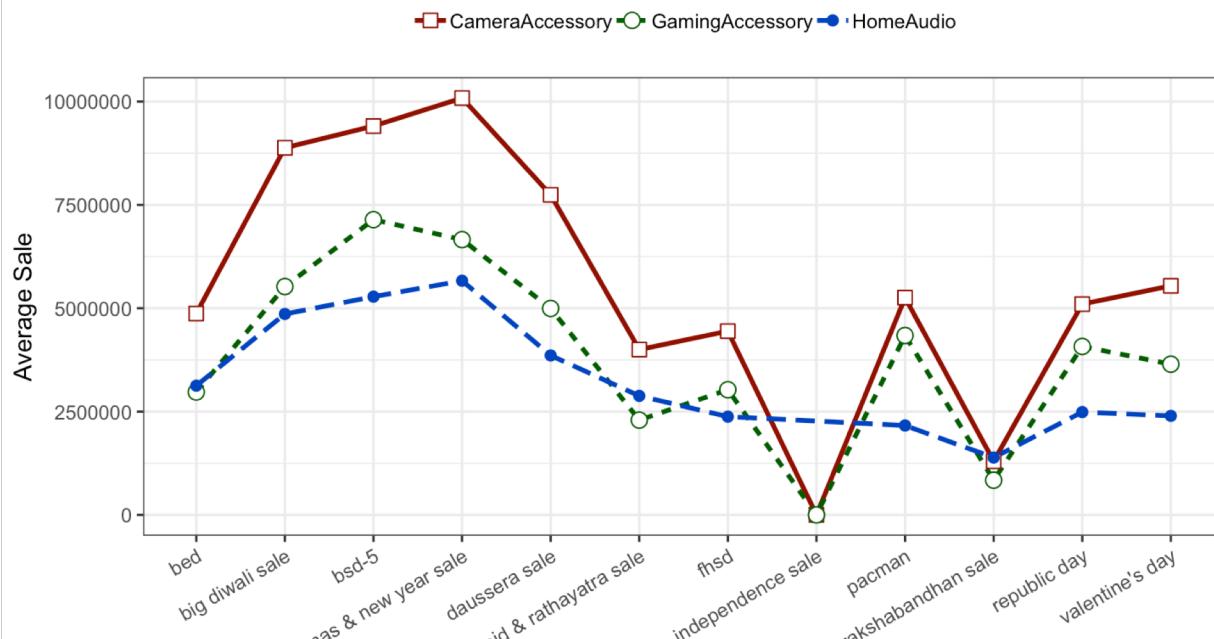
Insight:

- Delivery delay longer than a week introduced later part of the year. We can see jump in revenue % in 44 week because of Christmas sale, but we can see decline in Revenue% at year end, can be due to bad delivery service
 - In Payment Type plot Customers prefer COD over prepaid in general

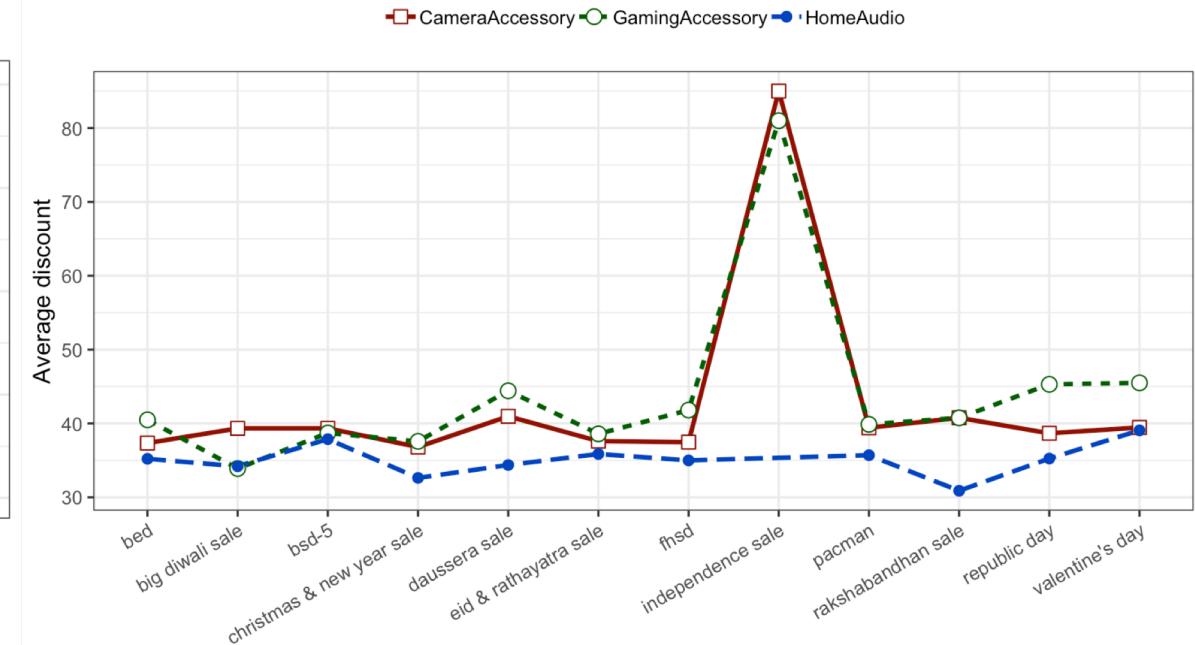


Special Sale days and Revenue

Average sale by Special sale



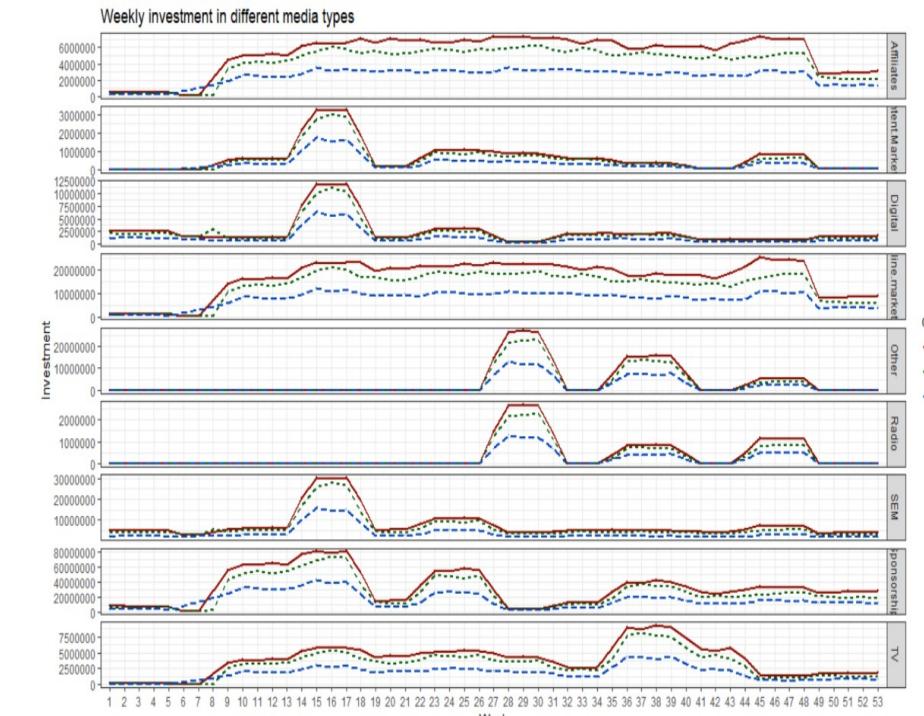
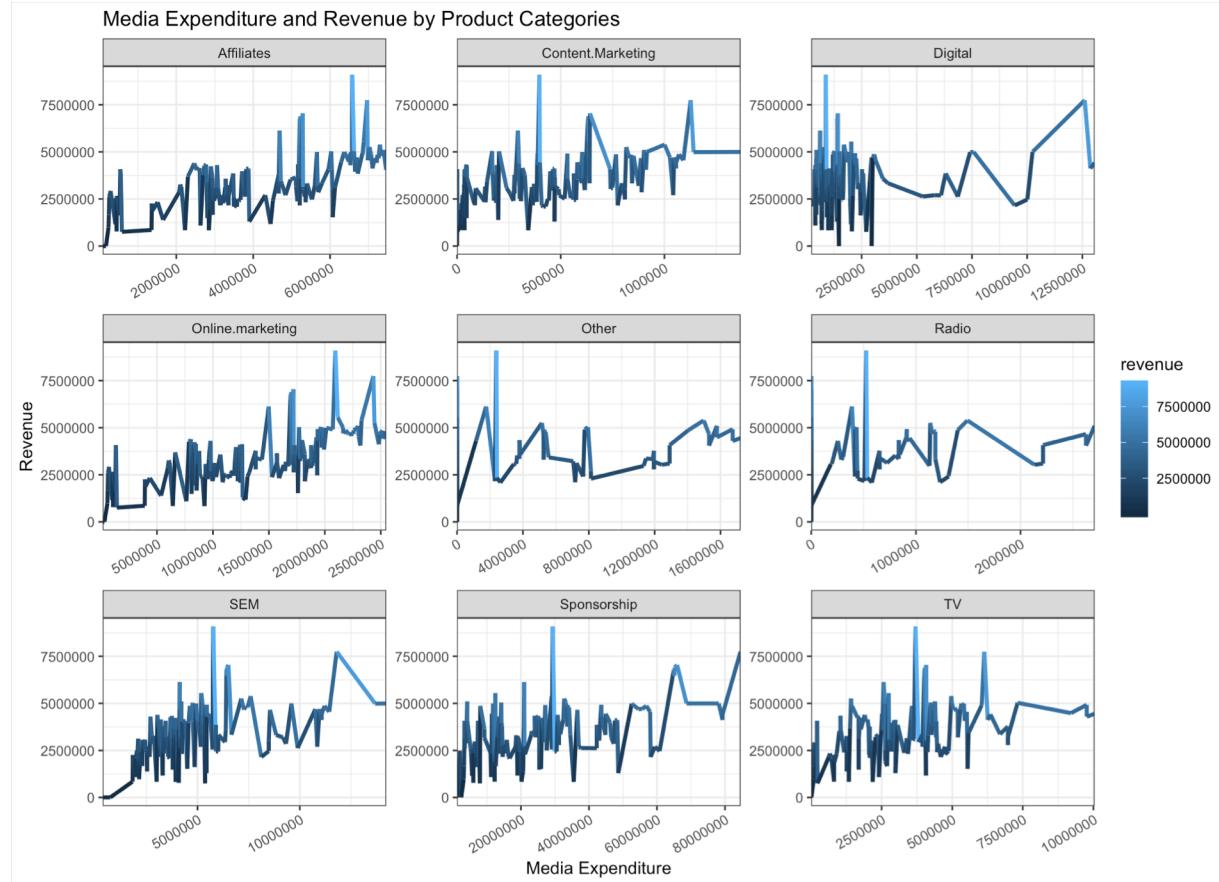
Average discount by Special sale



Insight:

- Diwali, Christmas and new year, daussera, eid and rathyatra sales brings good revenue, discount percentage during this festivals stays between 30-50%
- Even though independence sale highest discount sale given the total revenue actually less then other special day sales.

Revenue and Media investment



Insight:

- Investment in TV, Affiliates, Content.Marketing, Online.Marketing, SEM, Sponsorship shows Positive trend with revenue
- Other plot shows weekly investment with respect

Model Evaluation

Camera Accessory Models

Model	Significant variables	Adjusted R square	R square on test	MAE on test	R square , 10 fold CV
Linear	Lens , dausserra.sale , payment_type , Softbox	0.73	0.65	0.35	0.72
Multiplicative	Mrp, TV, payment_type, valentine.s.day, independence.sale, CameraMicrophone, ReflectorUmbrella	0.82	0.77	0.66	0.80
Kyock	dausserra.sale , Lens, Softbox , CameraHousing	0.70	0.50	3.14	0.67
Lag distribution	Lens, gmv_lag1, payment_type, TV_adstock	0.72	0.70	0.32	0.71
Multiplicative Lag Distribution	Mrp, tot_gmv_lag1, Affiliates_adstock, tot_gmv_lag1_prc_change	0.92	0.92	0.36	0.92

Insight:

- Linear model revenue with stability based on cross validation results
- Multiplicative model gives good result with more MAE
- Lag distribution and multiplicative lag distribution models are stable , Multiplicative lag distribution is more accurate and stable

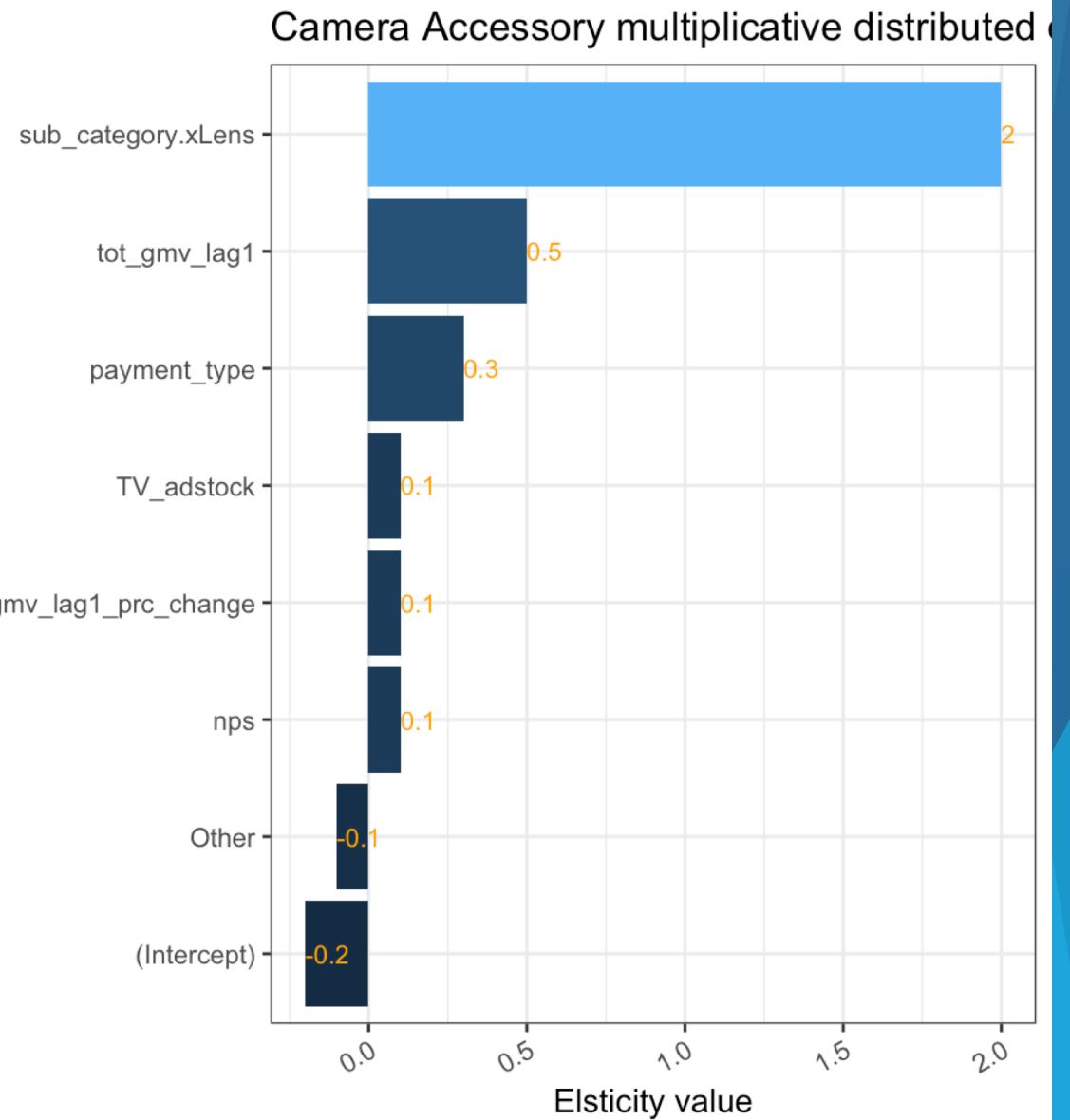
Significant variables: Lens, Affiliate adstock, Tv adstock, mrp, tot_gmv_lag1

Camera Accessory Models

Recommendation

Distributed lag model captures the carry over effect of all variables

- Investing more in ‘TV’ ad and less in ‘other’
- Lens -mass market product with relatively high mrp, focusing more on this product sale can improve revenue
- Payment type cash on delivery is popular, making it more available may make customer come back



Gaming Accessory

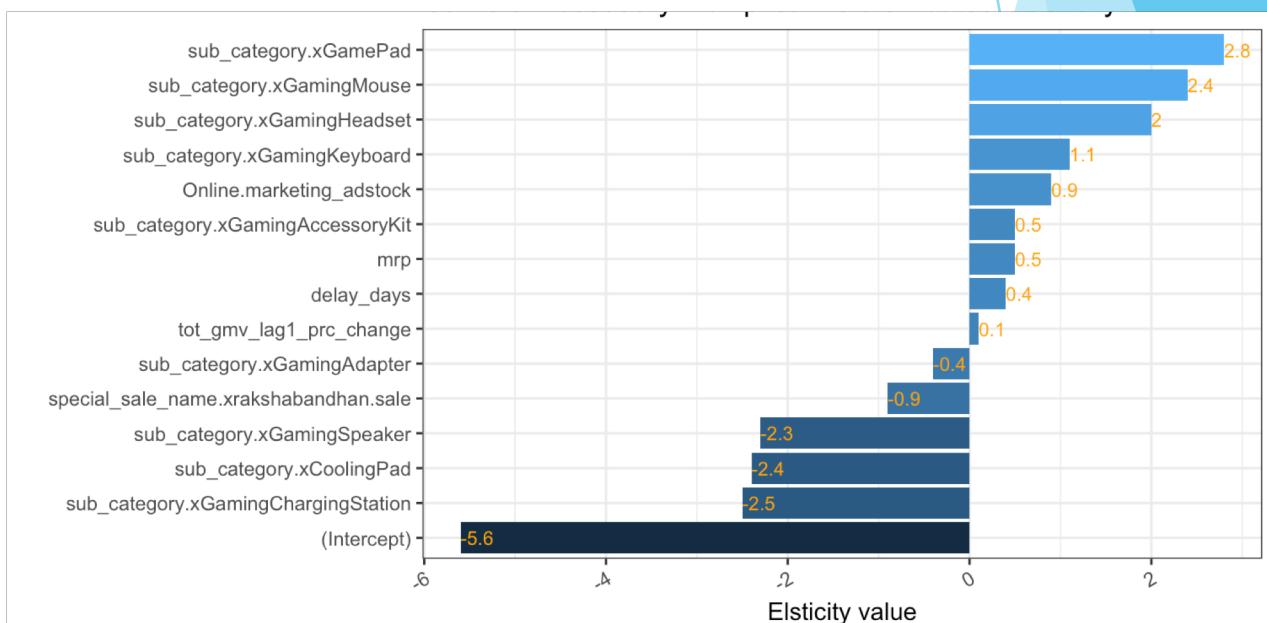
Recommendation

Game Pad, Gaming mouse, Gaming head set and gaming key board has high elasticity and promoting this products can improve revenue

Online marketing shows positive elasticity in multiplicative model indicated exponential revenue return from this investment

Gaming charging Station, Gaming speaker and adaptor are having negative elasticity and impacting revenue negatively

Model	Significant variables	Adjusted R square	R square , 10 fold CV
Linear	delay_days , Affiliates, GamePad , rakshabandhan.sale	0.69	0.62
Multiplicative	Listprice, units_per_order, nps, TV, SEM, valentine.s.day	0.77	0.74
Kyock	units_per_order, Affiliates, tot_gmv.lag, rakshabandhan.sale	0.62	0.64
Lag distribution	dausserra.sale, Affiliates, nps, GamePad , GamingHeadset	0.64	0.62
Multiplicative Lag Distribution	Mrp, TV, tot_gmv_lag1_prc_change, rakshabandhan.sale, CoolingPad, GamePad	0.80	0.79



Home Audio

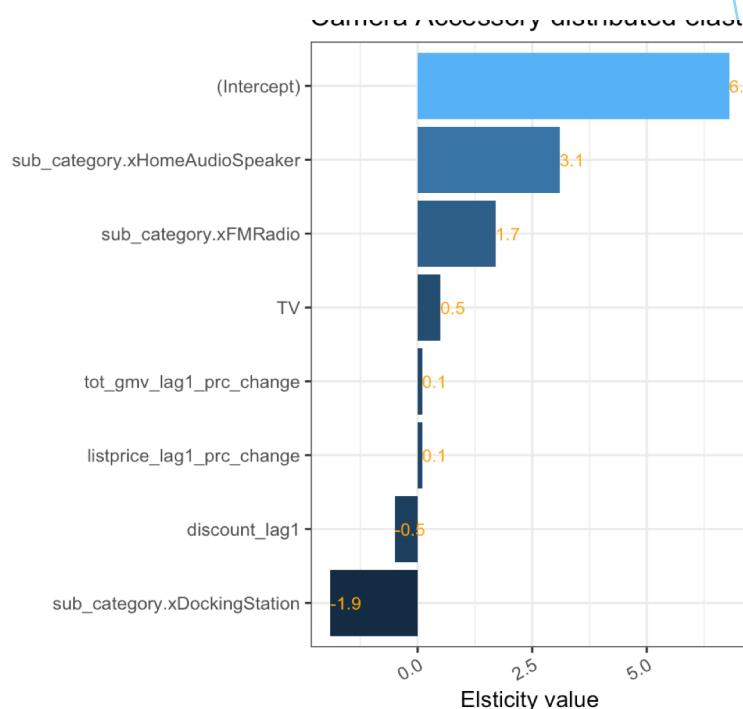
Recommendation

Home Audio Speaker and FM Radio both has positive elasticity, Sale and Tv media investment on these product can improve revenue

Discount is having negative carry over effect on home audio product types. Giving more frequent discounts may hurt the revenue

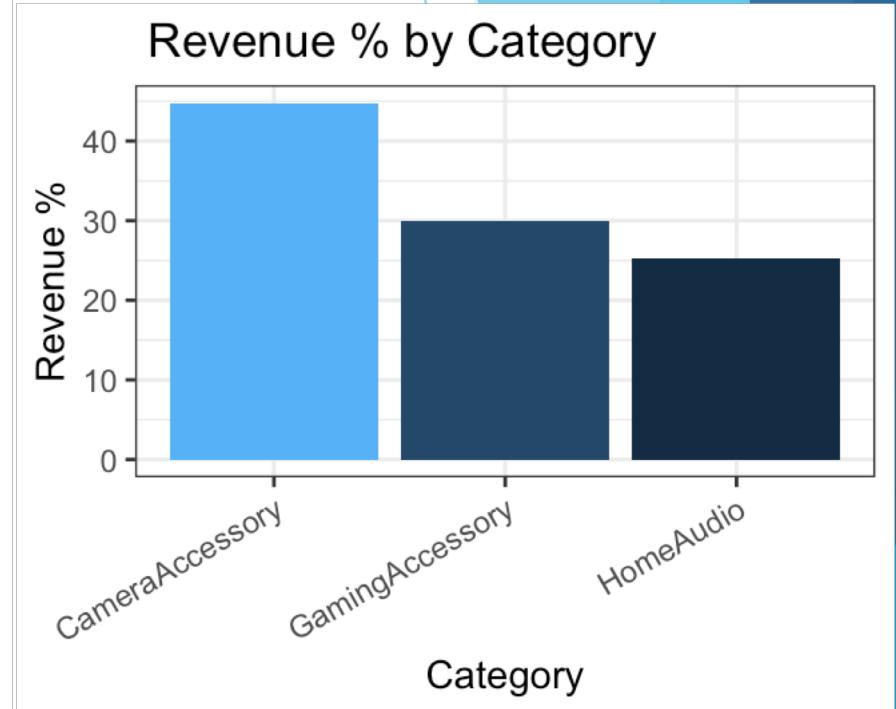
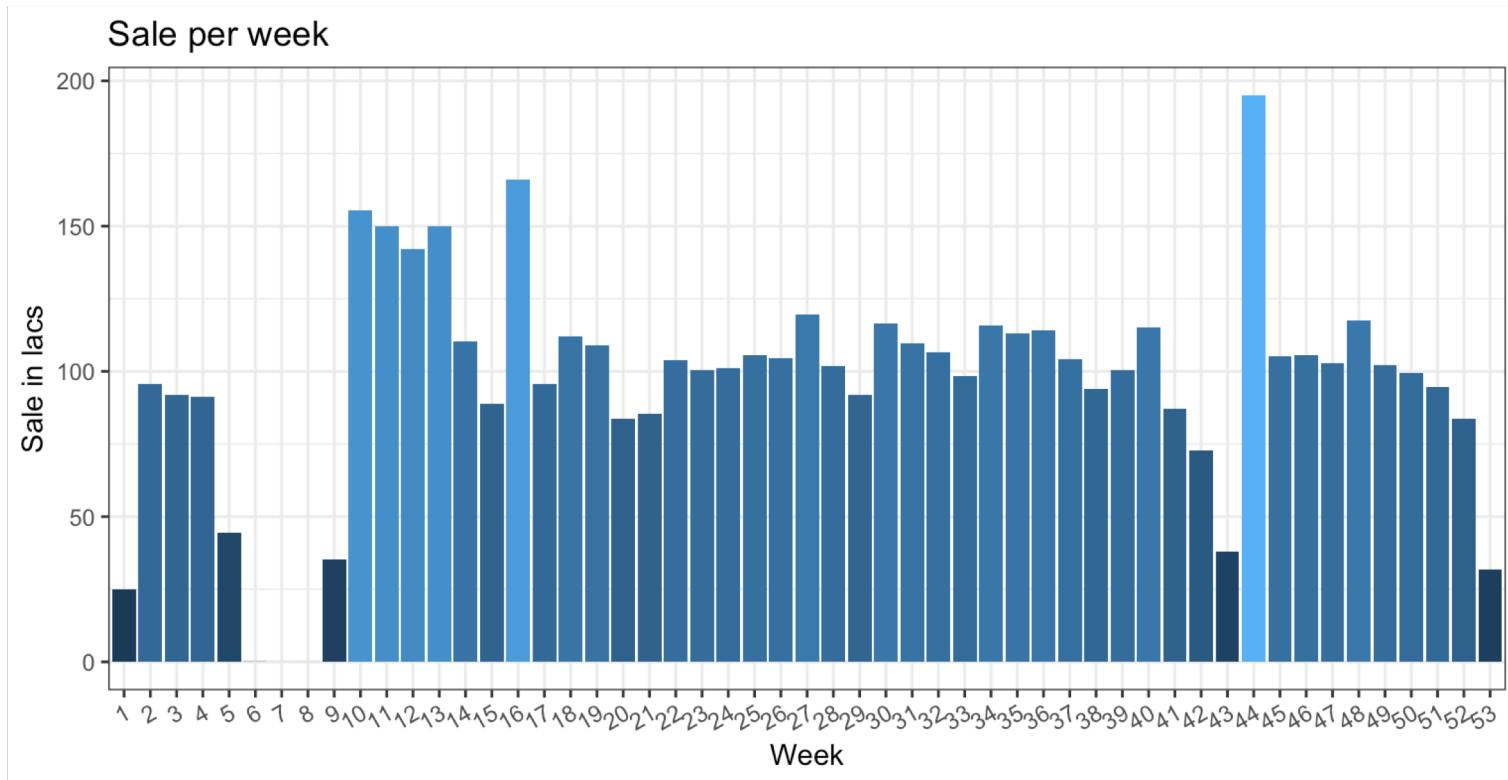
Online marketing shows positive elasticity in multiplicative model indicated exponential revenue return from this investment

Model	Significant variables	Adjusted R square	R square , 10 fold CV
Linear	units_per_order, Affiliates, HomeAudioSpeaker , FMRadio, daussera.sale, rakshabandhan.sale	0.80	0.81
Multiplicative	units_per_order, Online.marketing, FMRadio , DockingStatio	0.77	0.76
Kyock	weekly_listprice_infl, Affiliates, HomeAudioSpeaker, DockingStation	0.82	0.80
Lag distribution	tot_gmv_lag1_prc_change, FMRadio, HomeAudioSpeaker	0.81	0.78
Multiplicative Lag Distribution	TV, listprice_lag1, FMRadio, HomeAudioSpeaker	0.85	0.84



Thank you!

Revenue per Week and Category



Insight:

- From week 6 to 8 no sale and week 44 has maximum sale recorded.
- Maximum revenue product category is Camera Accessory