Ecommerce-Capstone Project

ElecKart-Recommendation for Marketing Budget

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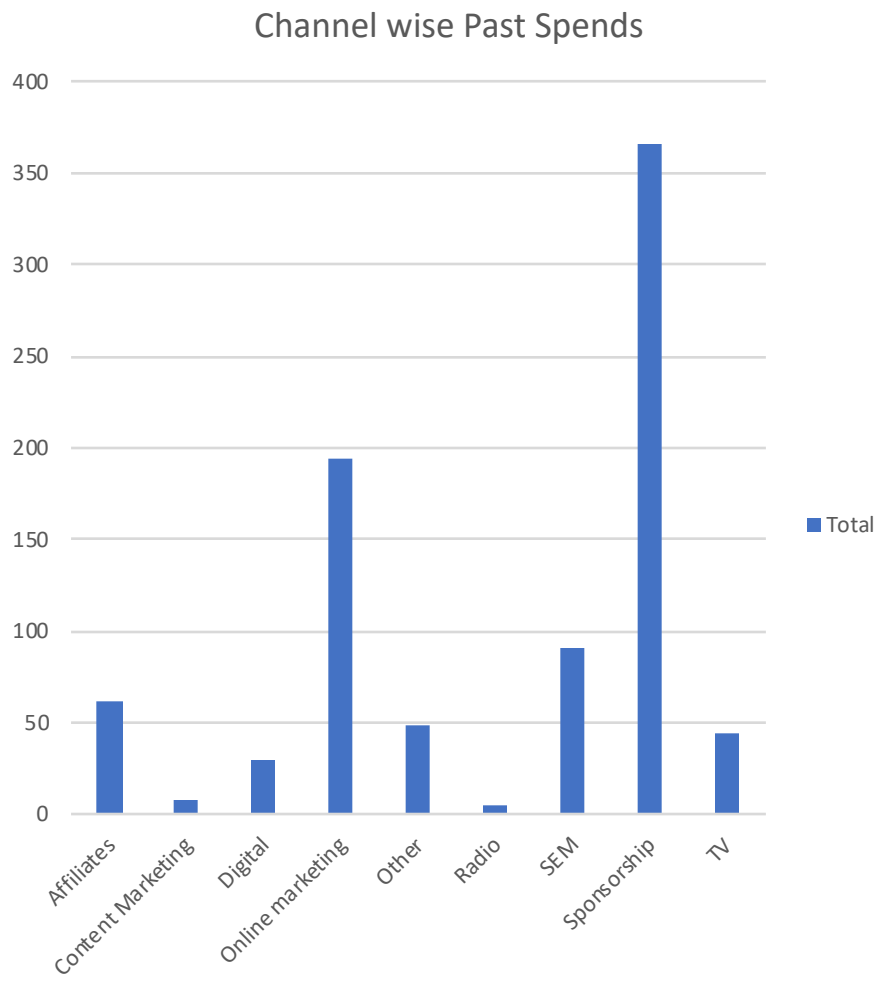
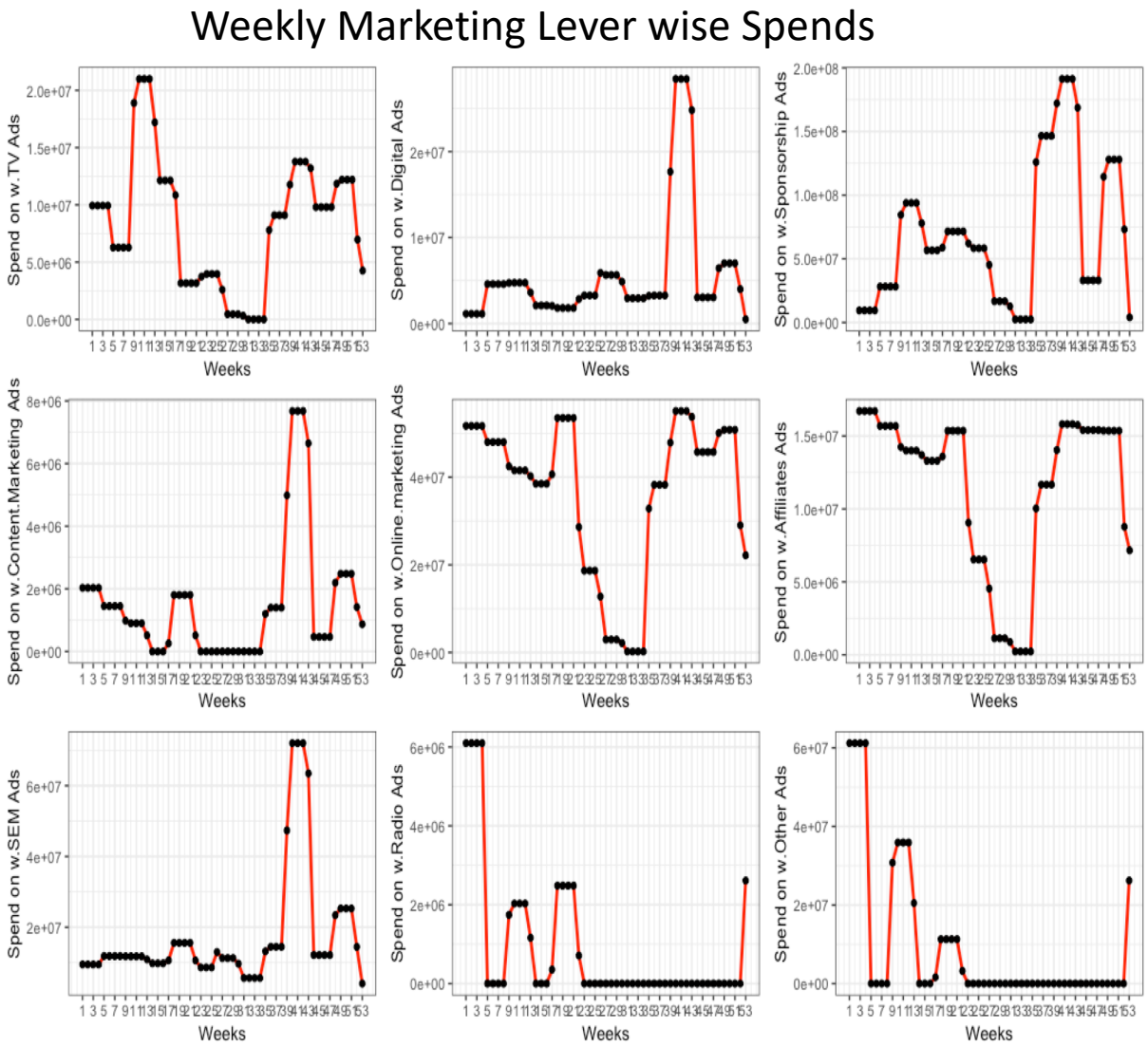
Objectives

- Analyze 2015-2106 order data, marketing spends and revenue
- Get business insights using exploratory data analysis
- Build five type of models for each of three product sub categories
- Compare and propose suitable model for each sub category
- Recommend budget allocation to marketing levers for next year

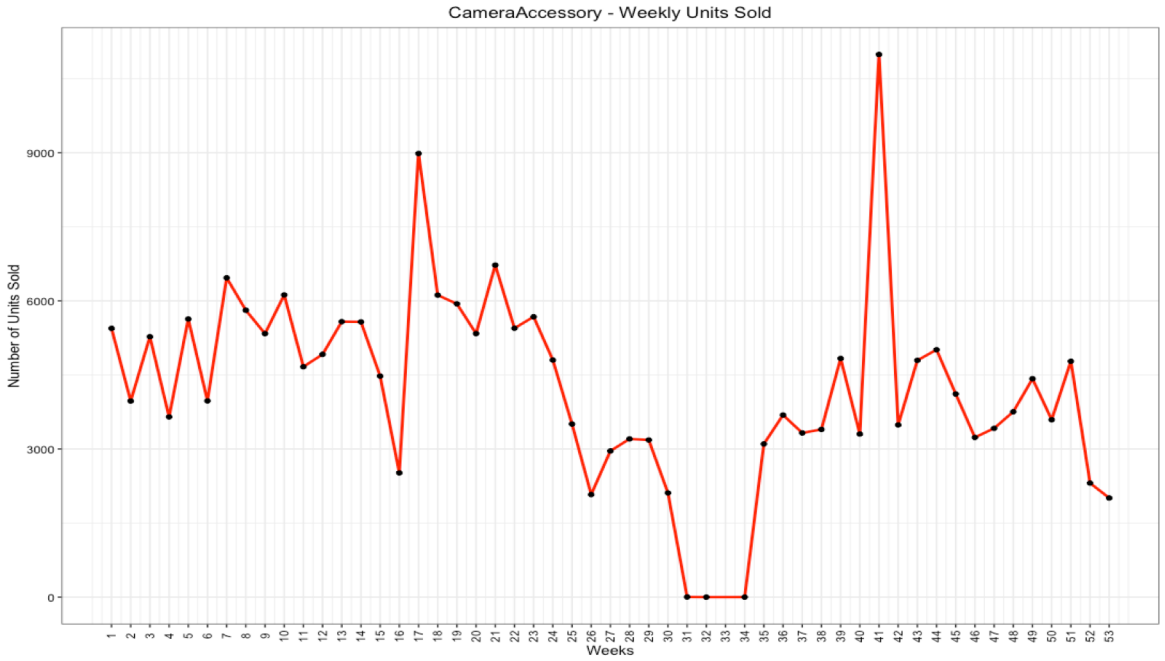
Exploratory Data Analysis - Spends Analysis

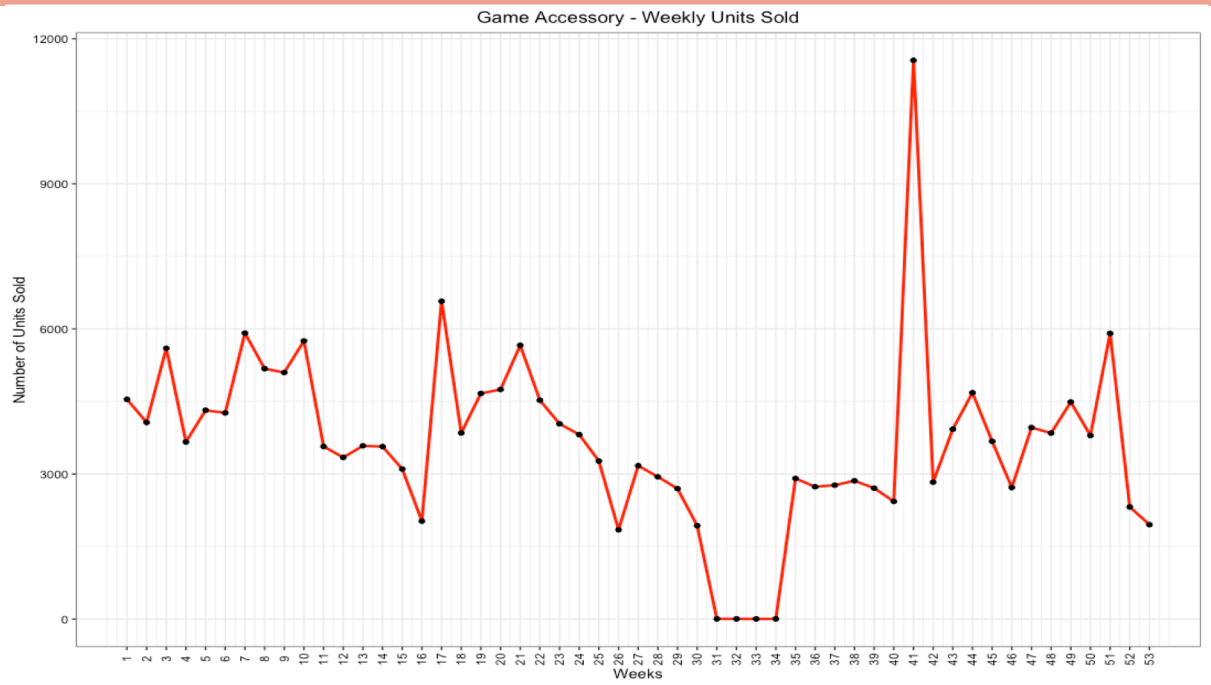


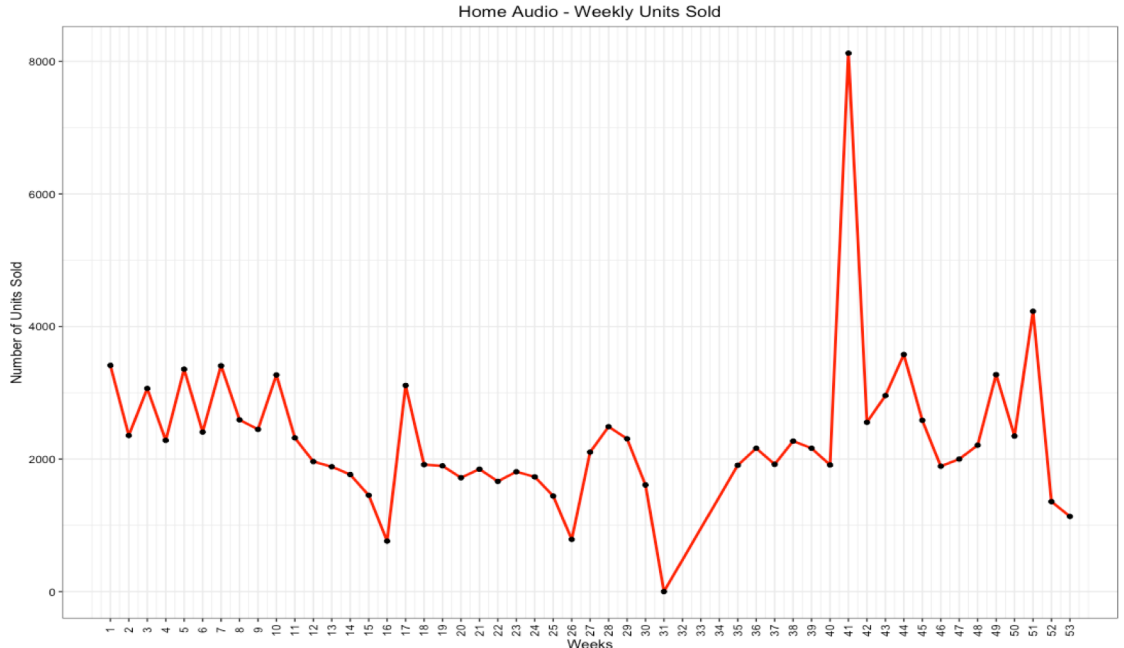


Note: Data is aggregated at weekly level

Exploratory Data Analysis – Sales Analysis (units sold)



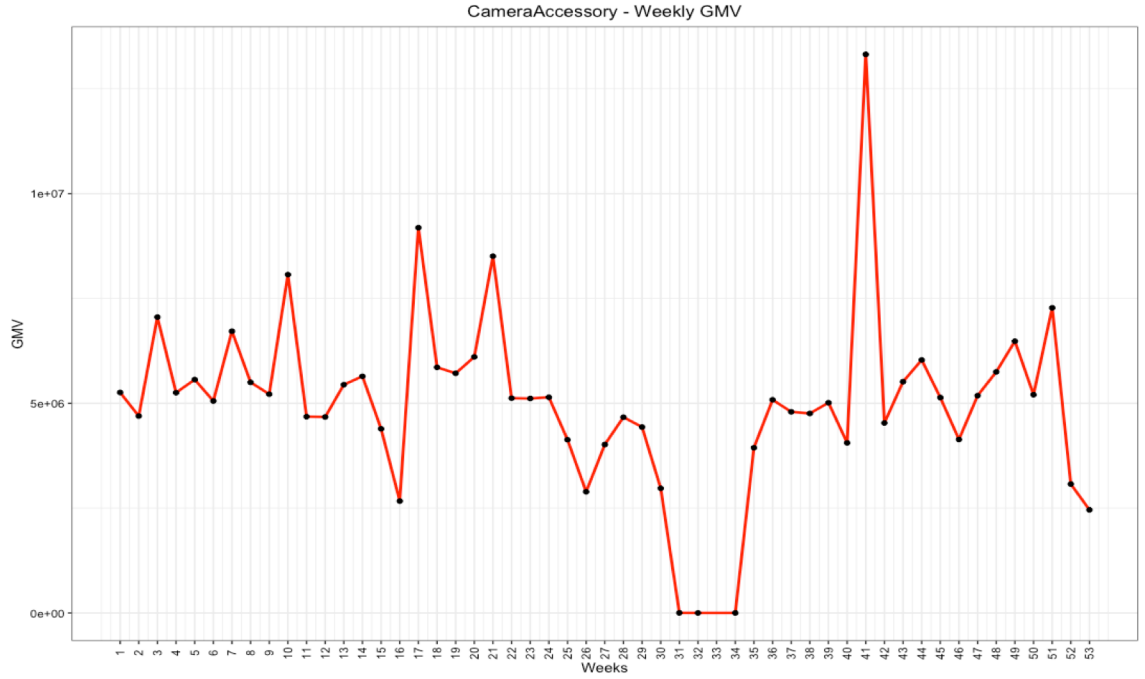


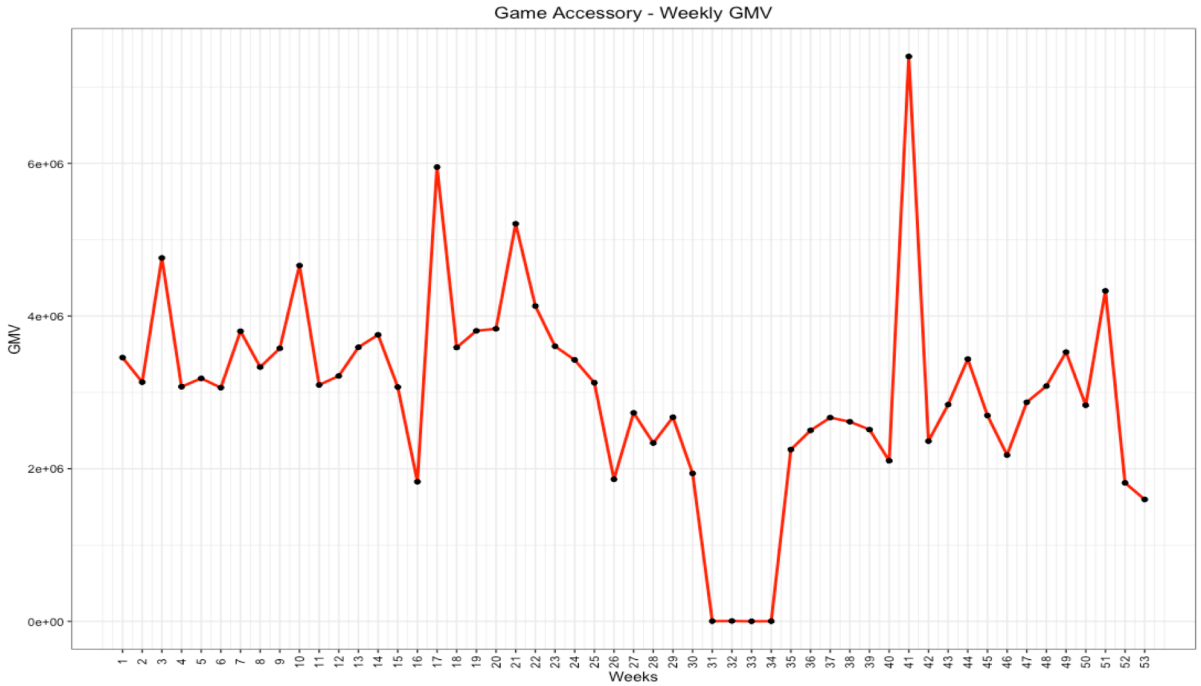


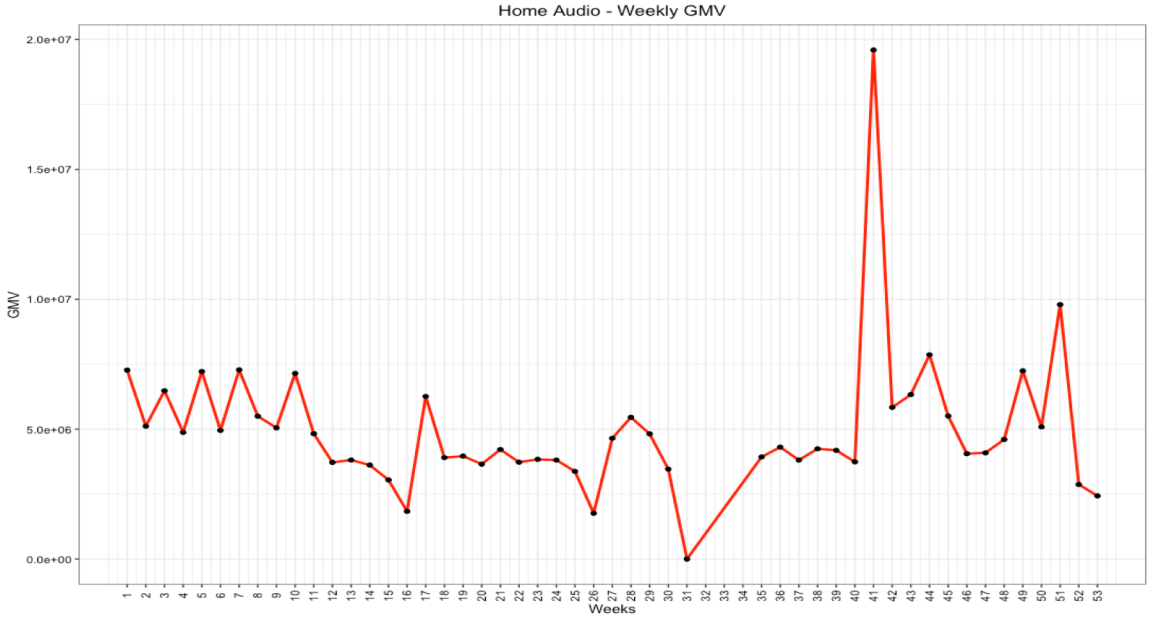
Highlights

- Week 41 sees highest units sale for all 3 sub-catg, This is a Dussera week.
- Weeks 31 to 34 had least sale in Camera & Game Acc. Home Audio also had least sale in week 31. This period lies in early August. Could be an opportunity to increase sale.

Exploratory Data Analysis – Sales Analysis (Revenue)



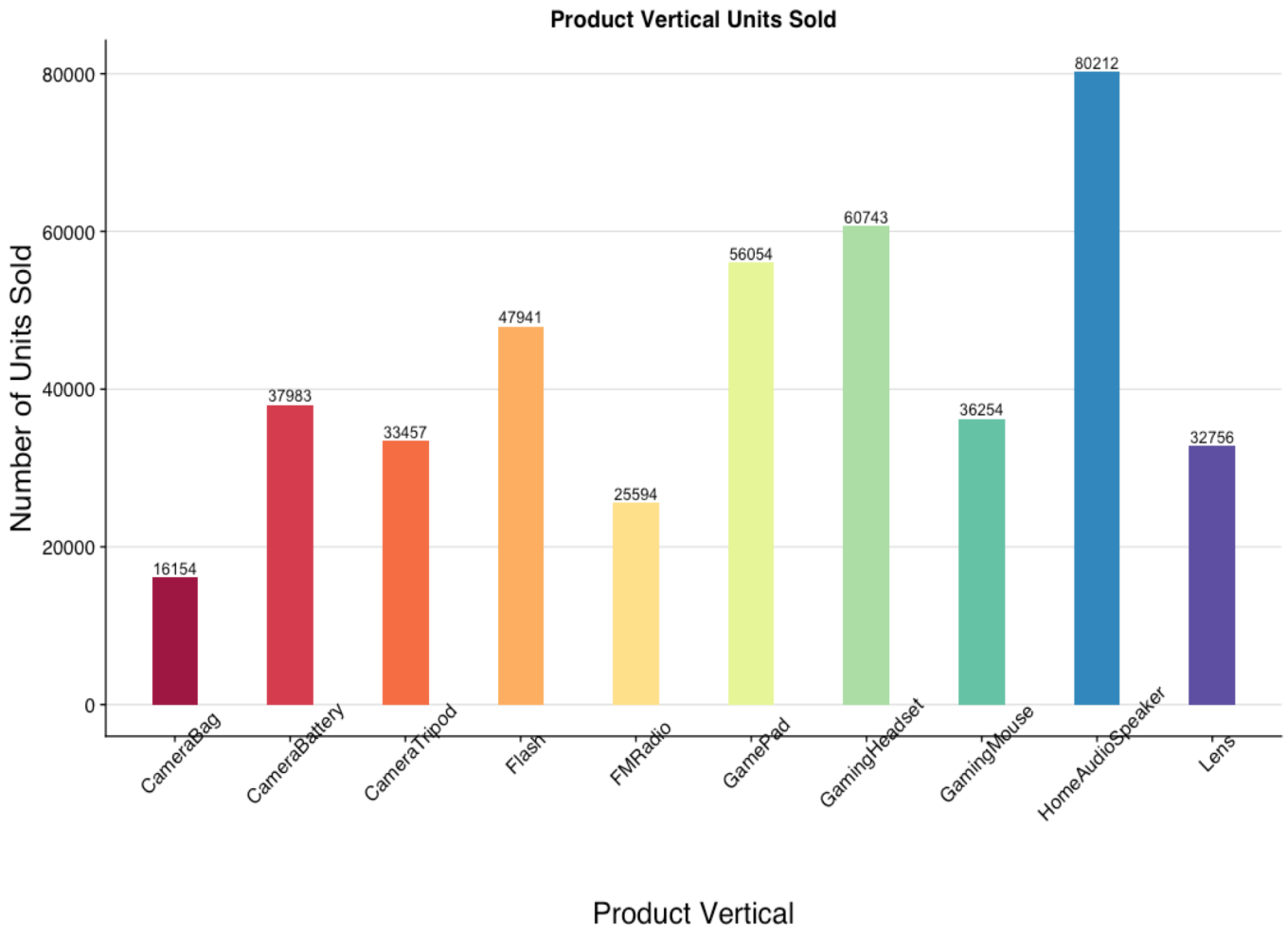




Highlights

- Week 41 sees highest revenue for all 3 sub-catg, This is a Dussera week.
- Weeks 31 to 34 had least sale in Camera & Game Acc. Home Audio also had least revenue in week 31. This period lies in early August. Could be an opportunity to increase sale by marketing.
- These plots aligns to units sold plots

Exploratory Data Analysis – Sales Analysis (Products sale)



Top 10 Products from 3 Sub-categories

- Home Audio Speaker sold most in Home Audio category.
- Flash and Camera Battery sold most in Camera Accessory category.
- Gaming Headset and Gaming Pad sold most in Gaming Accessory category.

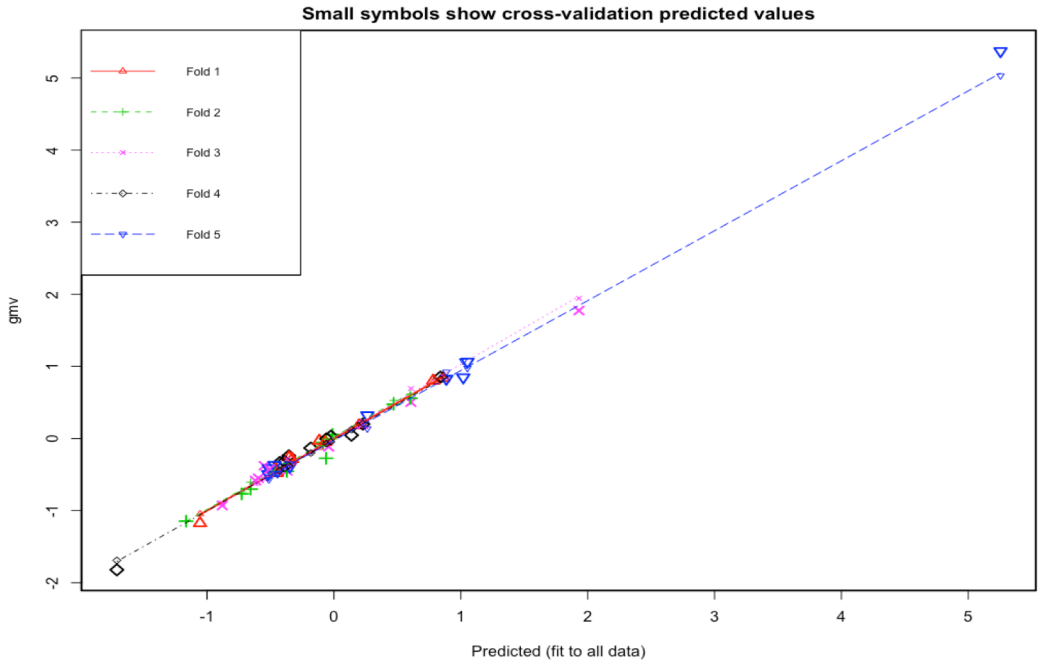
More units may be increased on these products by doing focused marketing spends.

Home Audio Model Selection - Koyck

Model	Variables	Adj R-squared	ACC (1-RSE)
Basic Linear	Prodct mrp, Digital	0.988	1-0.112=0.888
Multiplicative	FMRadio, Digital, Radio	0.932	1-0.294=0.706
Distributed Lag	GMV_lag_1, GMV_lag_2, HiFISystem, Dock, sla	0.673	1-0.572=0.423
Koyck	**Affliates, DockingStation, Digital, DJController, Digital_Adstock, HomeAudioSpeaker**	**0.993**	**1-0.087=0.913**
Multi+Distri	product_mrp, SEM_adstock, Radio_Adstock	0.997	1-.0.060=0.940

Recommended Model - Koyck

Variables	Coefficient.	P-value
Affiliates	-0.0629	9.9e-05
DockingStation	0.0775	3.3e-06
Digital	0.0733	0.00011
DJController	0.0744	2.7e-06
Digital_adstock	0.0532	0.00534
HomeAudioSpeaker	0.0951	1.56e-02



Recommended Model - Koyck

Koyck model is selected over Multiplicative+Distributed Lag model because Koyck model covers more significant variables with higher impacts on revenue.

Model Validation

Cross-validation plot indicates that model predicts well on multiple tests.

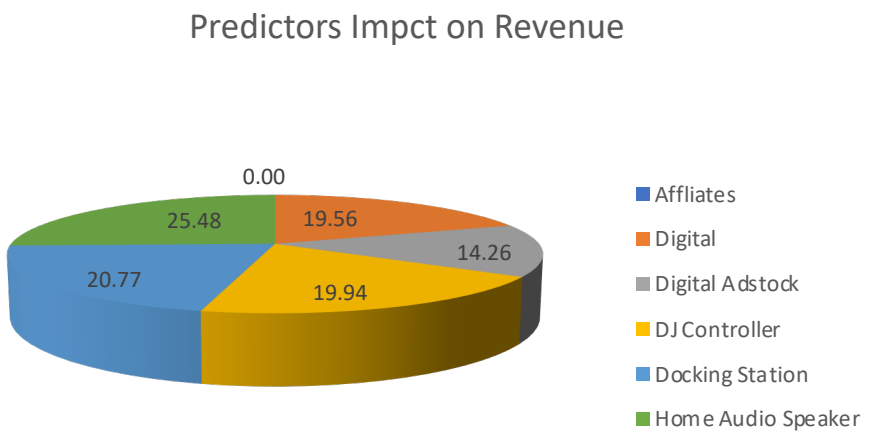
Home Audio- Recommended Budget Allocation

Positive Impact Revenue Predictors- Digital and Didgital_adstock

Product Focus – Docking Station, DJ Controller & Home Audio Speaker

Negative Market Levers - Affiliates

Predictor	Coefficient	%age Impact
Affliates	-0.0629	Negative
Docking Station	0.0775	20.77
DJ Controller	0.0744	19.94
Home Audio Speaker	0.0951	25.48
Digital	0.073	19.56
Digital Adstock	0.0532	14.26
Total (+ve)	0.3732	100

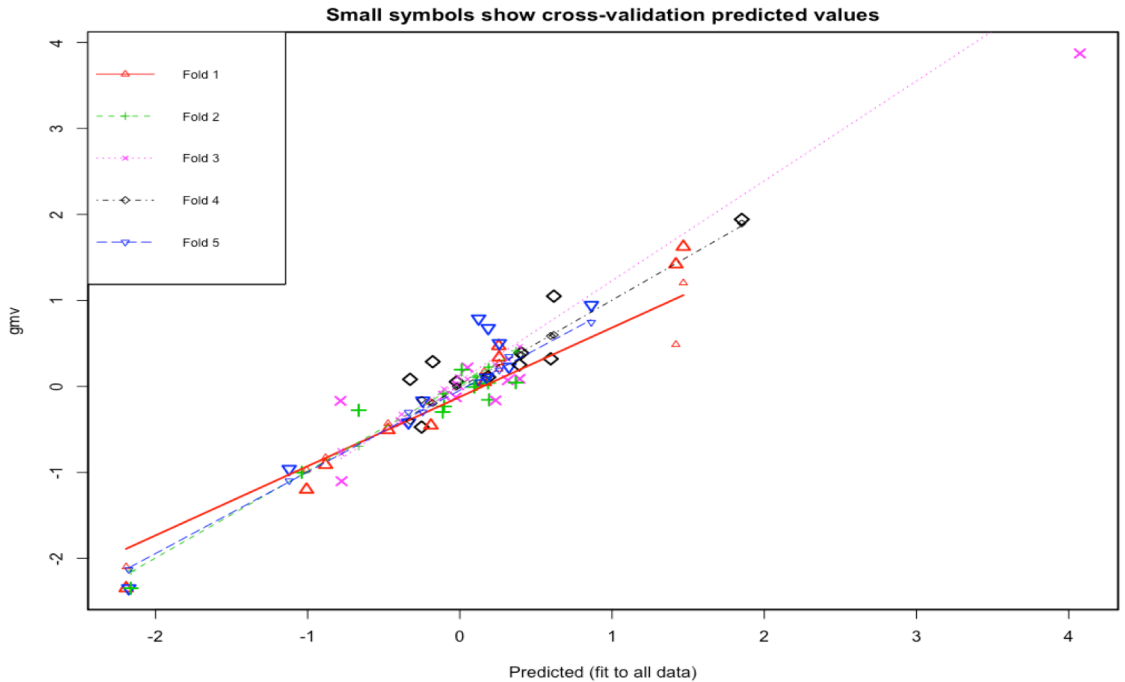


Budget Allocation and Recommendation

1. Most of the marketing budget should be allocated Digital channel. Recommend 75% allocation.
2. Docking Station, DJ Controller and Home Audio Speaker products contributing to revenue significantly.
3. These identified products should be covered more in marketing
4. Revenue should not be allocated to affiliates channel
5. 25% of budget should be allocated to other marketing levers.

Camera Accessories Model Selection - Koyck

Model	Variables	Adj R-squared	ACC (1-RSE)
Basic Linear	CameraMount, CameraBatteryGrip, Camera Housing, sla	0.572	1-.654=0.346
Multiplicative	sla, CameraTripod, Conent_marketing_astock, Sponsorship, sla	0.827	1-0.913=0.087
Distributed Lag	CameraTripod, CameraMount, Teleconverter, CameraBag	0.923	1-0.277=0.723
Koyck	**Online_Marketing, Digital_Adstock, Teleconverter, CAmeraBatteryGrip, Camerahousing, Flash, Filter**	**0.927**	**1-.0.270=0.730**
Multi+Distri	product_procur_sla, CameraTripod, Content_Marketing_Adstock, CameraHousing, Lens, Radio_adstock	0.96	1-0.130=0.870



Recommended Model - Koyck

Variables	Coefficient.	P-value
Online_Marketing	0.232.	1.4e-05
Digital_adstock	-0.0862	0.05546
Teleconverter	0.136	0.00121
CameraBatteryGrip	0.1.68.	0.00088
CameraHousing	0.1.63.	0.00096
Flash	0.139	0.01185
Filter	0.673	2.6e-16

Recommended Model - Koyck

Koyck model is selected over Multiplicative+Distributed Lag model because Koyck model is found to be more stable in Cross-validation test. Other model came out as overfitting.

Model Validation

Cross-validation plot indicates that model predicts well on multiple tests.

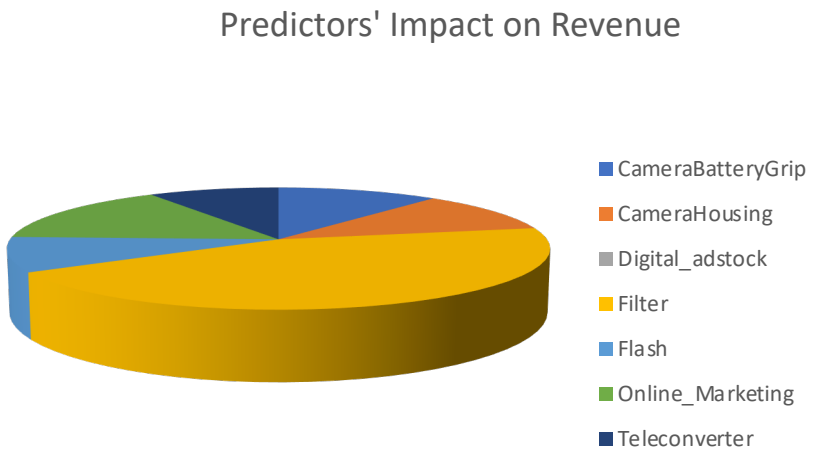
Camera Accessories Recommended Budget Allocation

Positive Impact Revenue Predictors- Online Marketing

Product Focus – Teleconverter, CameraBatteryGrip, Flash & Filter

Negative Market Levers – Digital_adstock

Predictor	Coeficient	%age Impact
Digital_adstock	-0.0862	Negative
Online_Marketing	0.232	15.35
Teleconverter	0.136	9.00
CameraBatteryGrip	0.168	11.12
CameraHousing	0.163	10.79
Flash	0.139	9.20
Filter	0.673	44.54



Budget Allocation and Recommendation-

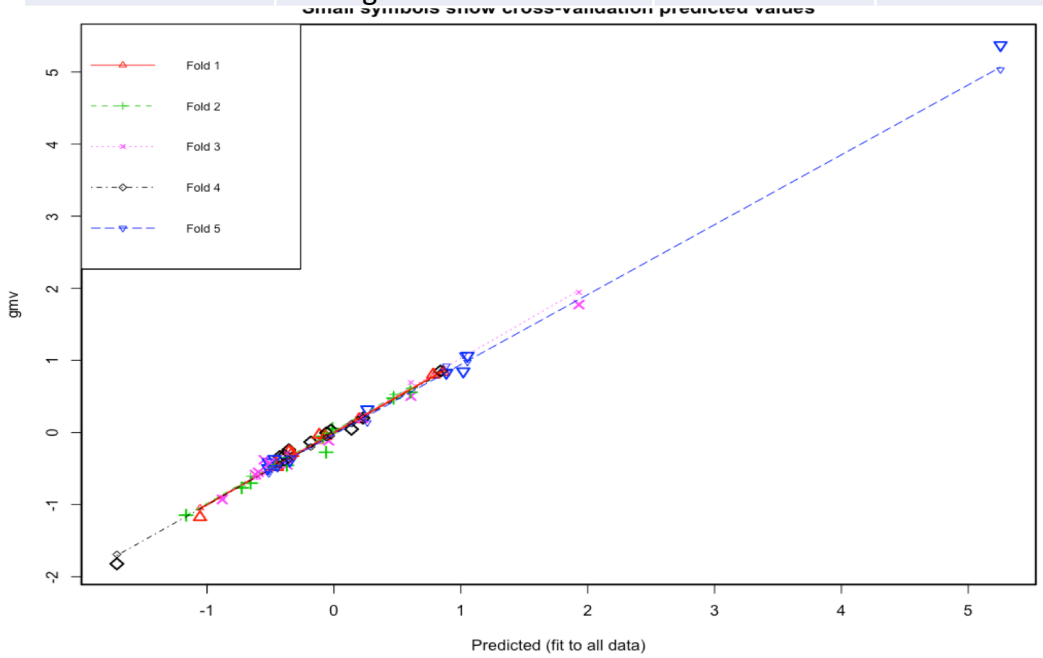
1. Online marketing level has most impact on revenue. 75% budget allocation should be made to it.
2. Digital has negative impact on revenue so stop budget for this lever.
3. Products Teleconverter, Camera Battery Grip, Flash and Filer are contributing most to revenue. So marketing expense should focus on these products.
4. 25% of marketing budget should be allocated to other marketing levers.

Game Accessories Model Selection - Koyck

Model	Variables	Adj R-squared	ACC (1-RSE)
Basic Linear	JoystickGamingWheel, GamingMouse, price_mark.xPROMISING , GamePad	0.96	1-0.201=0.799
Multiplicative	order_payment_type , Affiliates	0.899	1-0.621=0.279
Distributed Lag	GamingAccessoryKit , MotionController	0.969	1-0.176 =0.824
Koyck	**units, GamingAccessoryKit, Radio, Online_Marketing , MotionController**	**0.972**	**1-0.168=0.832**
Multi+Distri	GamingSpeaker product_procurement_sla, GamingMouse	0.967	1-0.356=0.644

Recommended Model - Koyck

Variables	Coefficient.	P-value
units	0.688.	2e-16
GamingAccessoryKit	0.225.	3.3e-06
Radio	0.0643	0.020
Online_Marketing	-0.0607.	0.084
MotionController	0.210	1.9e-08



Recommended Model - Koyck

Koyck model is selected over Multiplicative+Distributed Lag model because Koyck model covers more significant variables with higher impacts on revenue.

Model Validation

Cross-validation plot indicates that model predicts well on multiple tests.

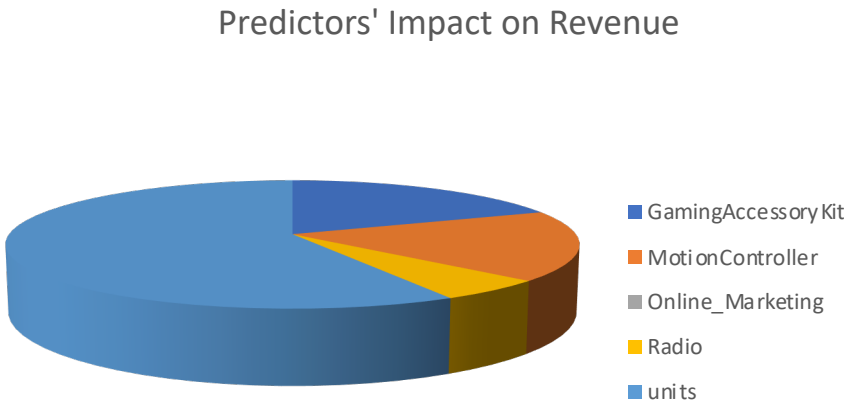
Game Accessories Recommended Budget Allocation

Positive Impact Revenue Predictors- Radio

Product Focus – Units, Gaming Accessory Kit & Motion Controller

Negative Market Levers – Online Marketing

Predictor	Coefficient	%age Impact
Online_Marketing	-0.0607	Negative
units	0.688	57.95
GamingAccessoryKit	0.225	18.95
Radio	0.0643	5.42
MotionController	0.21	17.69



Budget Allocation and Recommendation-

1. Radio marketing channel have positive impact on revenue but percent impact is low. Allocate 25% budget to it.
2. Products Gaming Accessory Kit and Motion Controller have positive correlation with revenue.
3. Marketing should give atleast 75% coverage to these products.
4. Online Marketing has negative impact but low. Reduce allocation to this channel.
5. Make 50% budget allocation to other channels.