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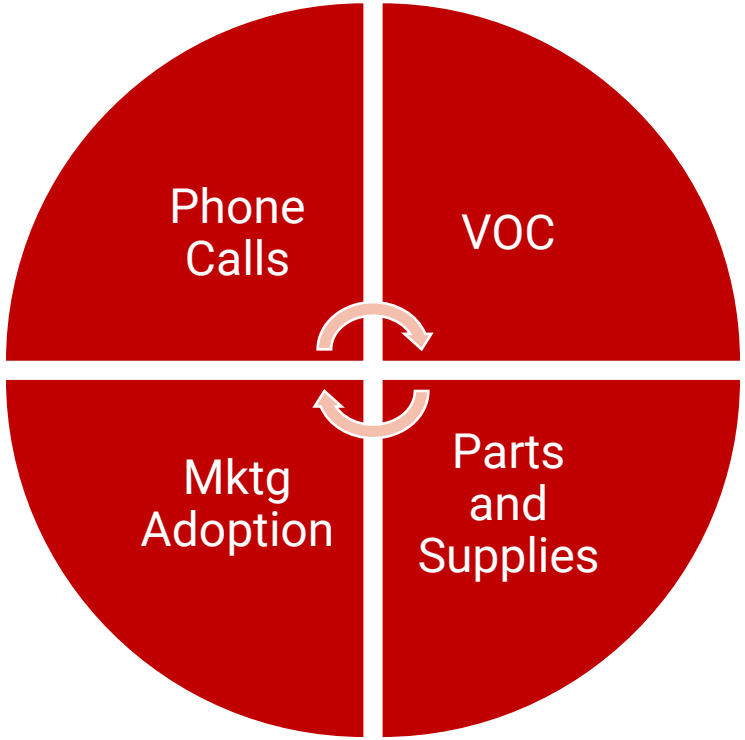
THE ULTIMATE DATA SCIENCE CHALLENGE

TEAM DATA WRANGLERS

Key KPIs and Recommendation

- Focus more on phone calls conversion rates
- Continue incentivising Marketing Adoption



- Develop methods to capture loyalty of customers – Net Promotor Scores
- Closely Monitor sales of Parts and Supplies

KPIS such as Phone Calls and Customer Experiences(VOC), can increase the performance of a plant which can eventually lead to increased Foot Traffic and WC Sales of the Plant.

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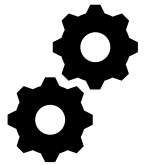
PROJECT OUTLINE

STEPS TAKEN TO CREATE THE AWESOME MODEL

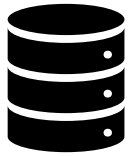


DATA PREPARATION

Consolidation, Transformation and Missing values

EXPLORATORY DATA ANALYSIS

Understanding the predictors



PREDICTIVE MODELLING

Random Effects, OLS

RESULTS AND ANALYSIS

What affects Will Call Sales?

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COMBINING CENSUS DATA

Dealer ZIP code was mapped to each store and use grouped census data for modelling.

DATA CONSOLIDATION

- The billing data was summarised to plant level and combined with other files using Alteryx pipeline for repeatability.
- Recipe package in R for transformation and modelling pipeline.

PREDICTING 2015 STORE METRIC KPIs

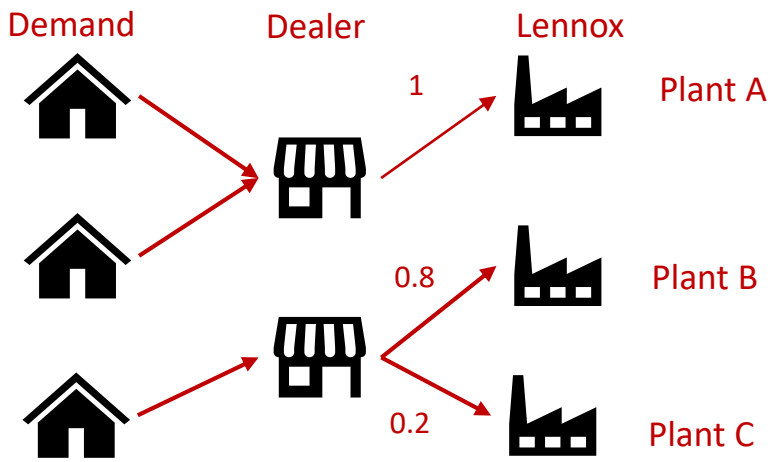
Exponential Time Smoothening was used to predict store KPIs of 2015

DATA PREPARATION

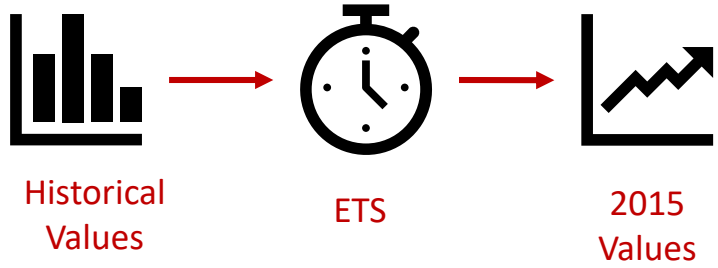
STEPS WE TO PREPARE THE DATA TO ANSWER THE QUESTION

Data Consolidation

CENSUS DATA CONSOLID-ATIOTION



2015 STORE METRICS PREDICTION



DATA PIPELINE

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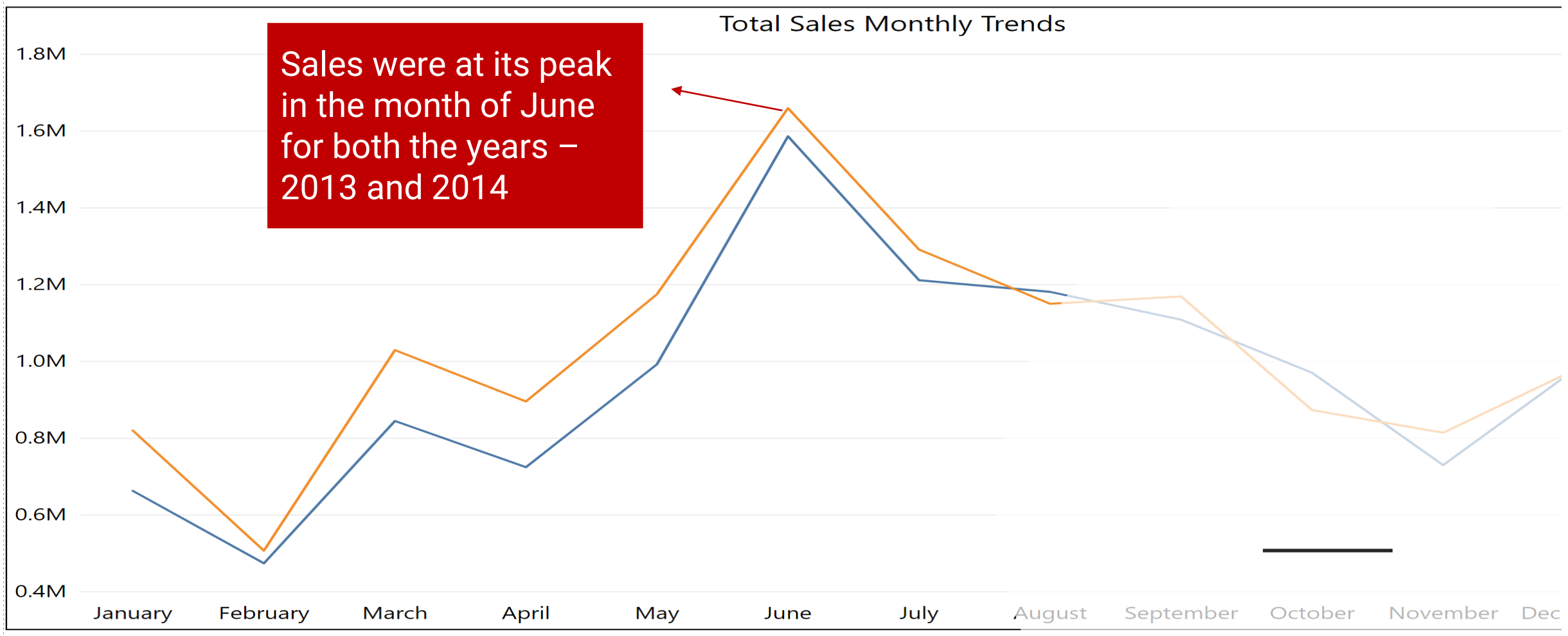
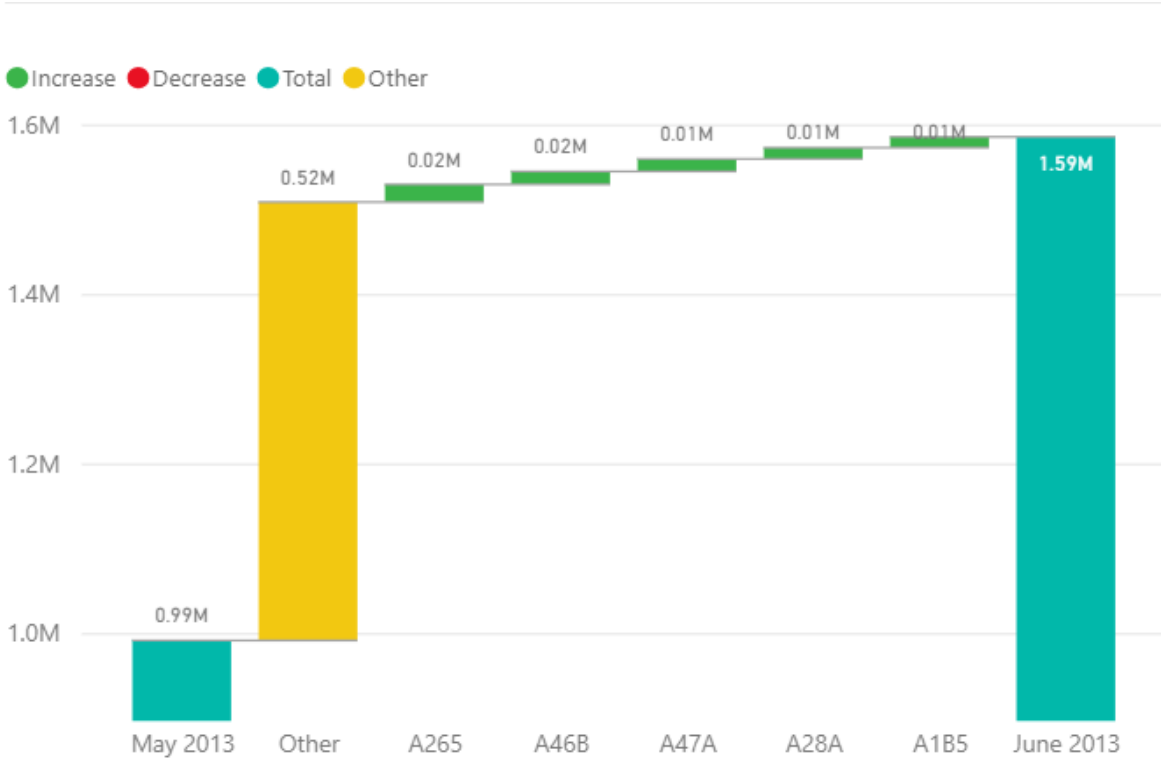
EXPLORATORY DATA ANALYSIS

Monthly Sales Trend – 2013 and 2014

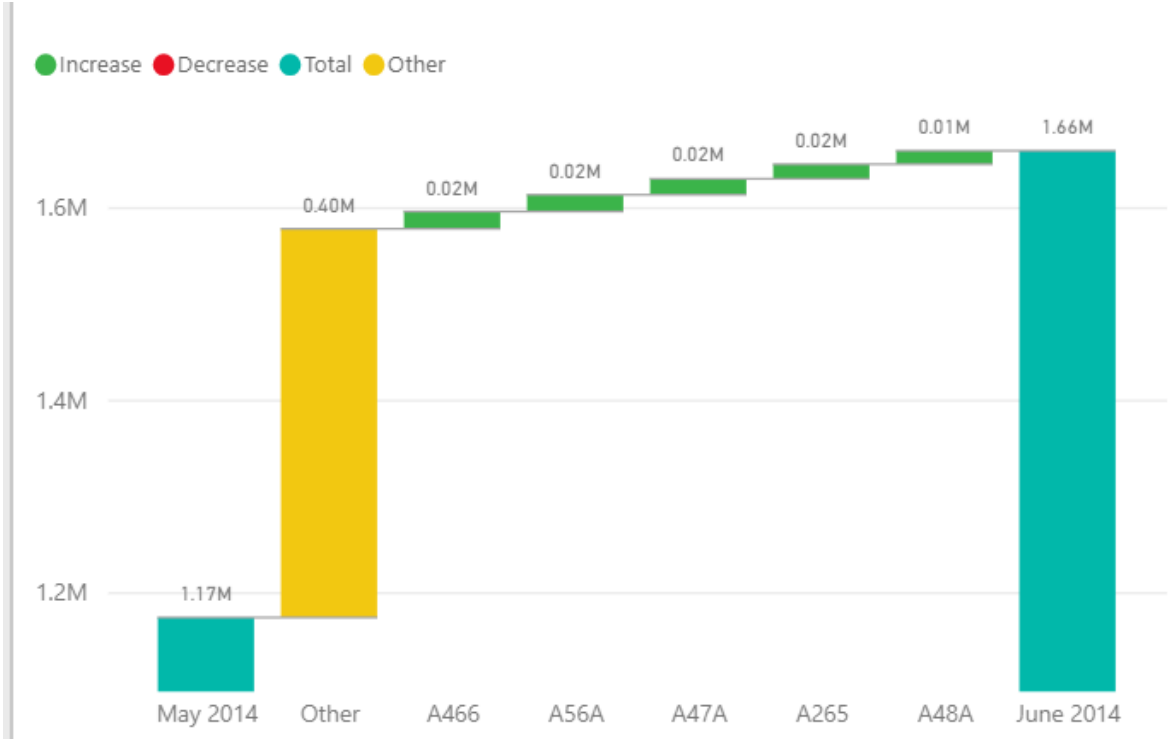


Yearly trend shows seasonality in Sales with peaks in the month of June and drops during winter. We defined a season variable to capture the effect.

Sales in Peak Month

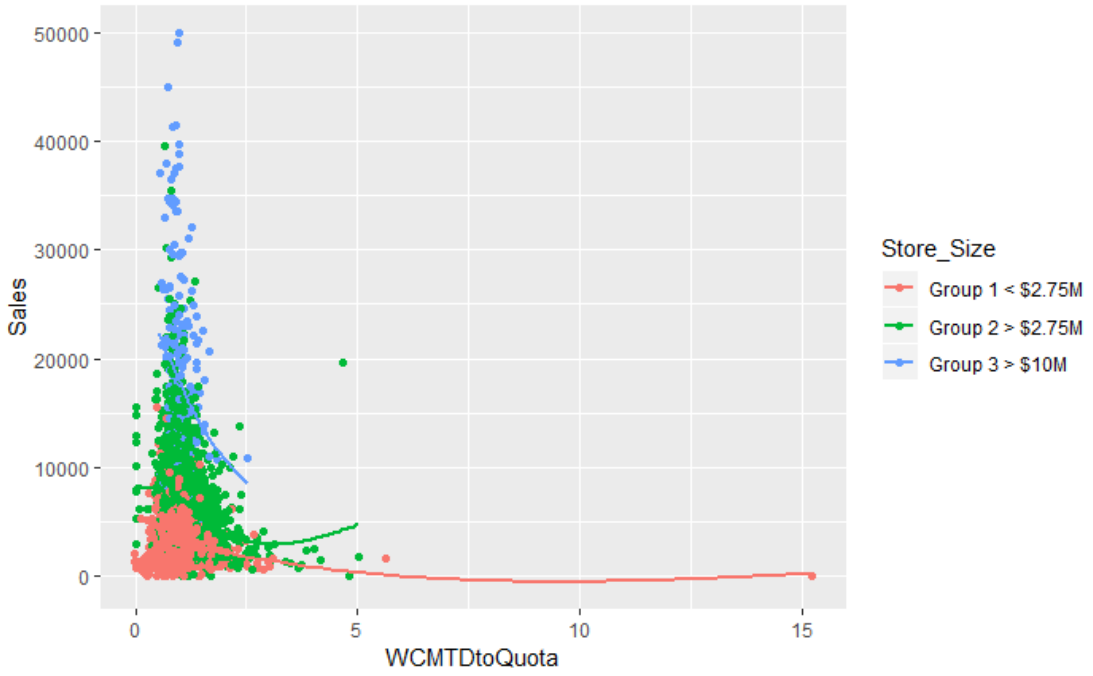


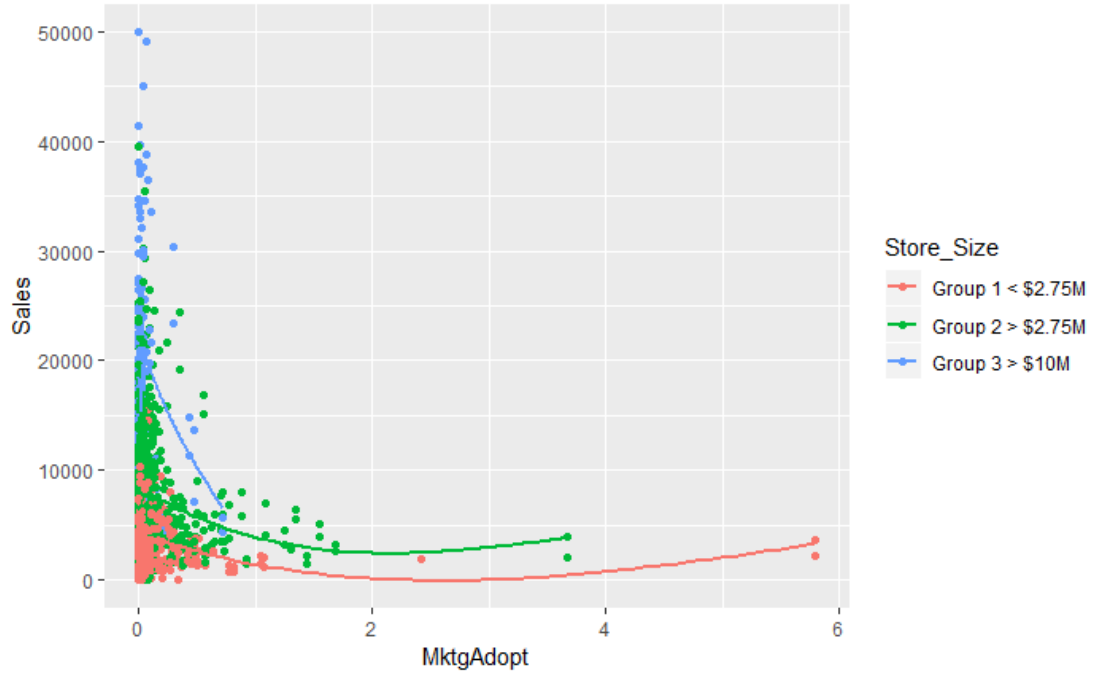
The plot shows the analysis of 59.86% increase in sales between May 2013 and June 2013. A265, A46B and A47A had the largest increase in sales among Plants



The plot shows the analysis of 41.28% increase in sales between May 2014 and June 2014. A446, A56A and A47A had the largest increase among plants

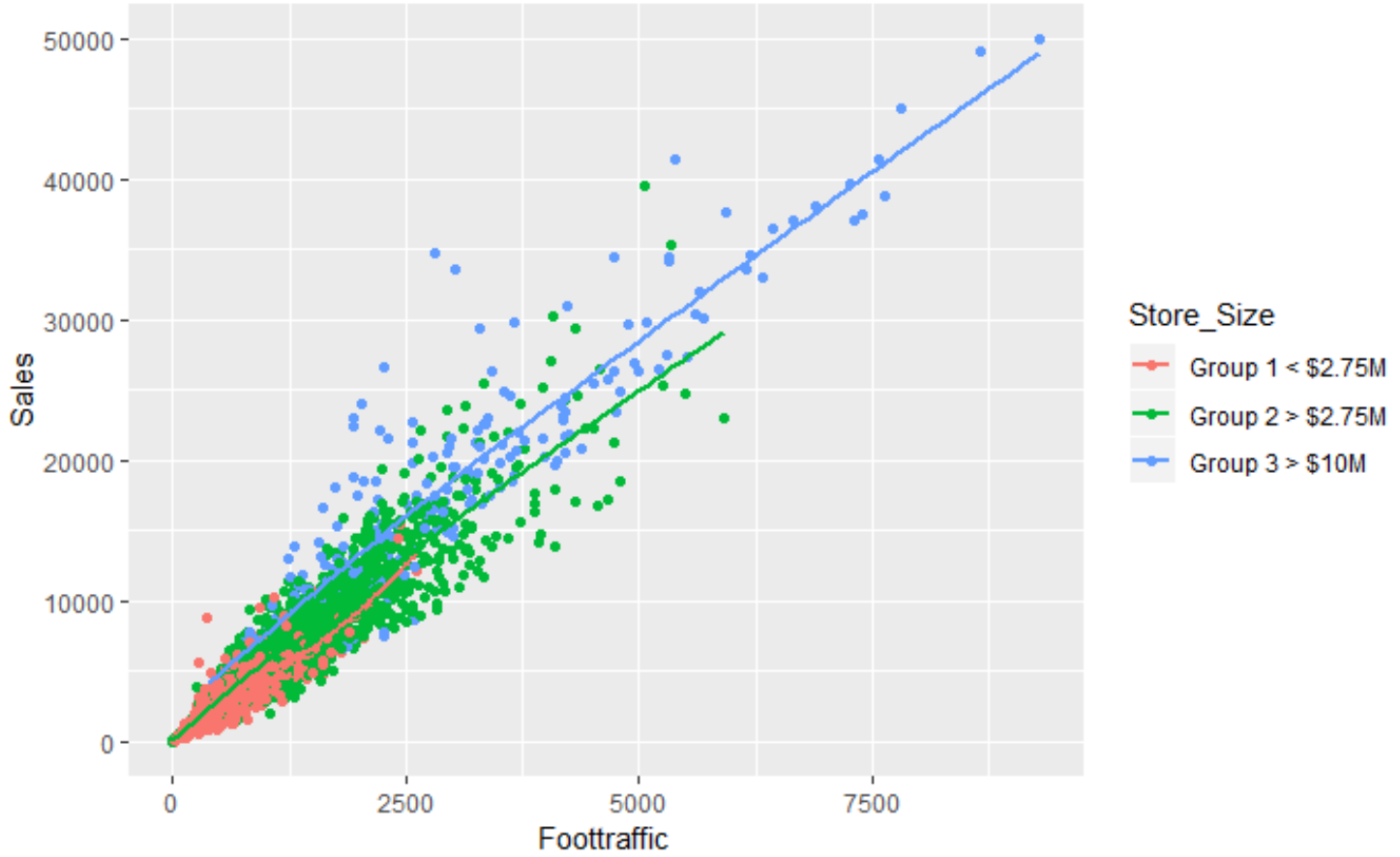
Sales V/S Performance Variables





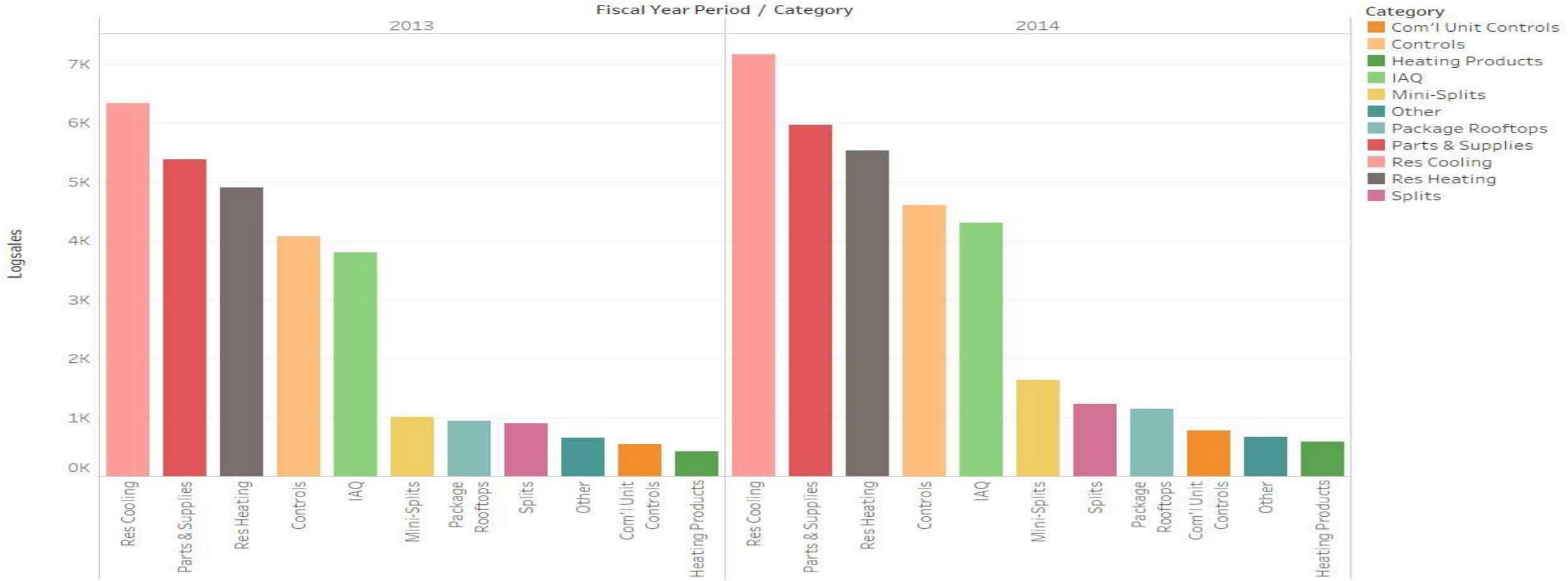
We observe a non-linear effect of these variables on sales. We see possible interaction effect with other variables.

Store Foot Traffic



We observe Store Foot Traffic to be the important predictor across all the plants

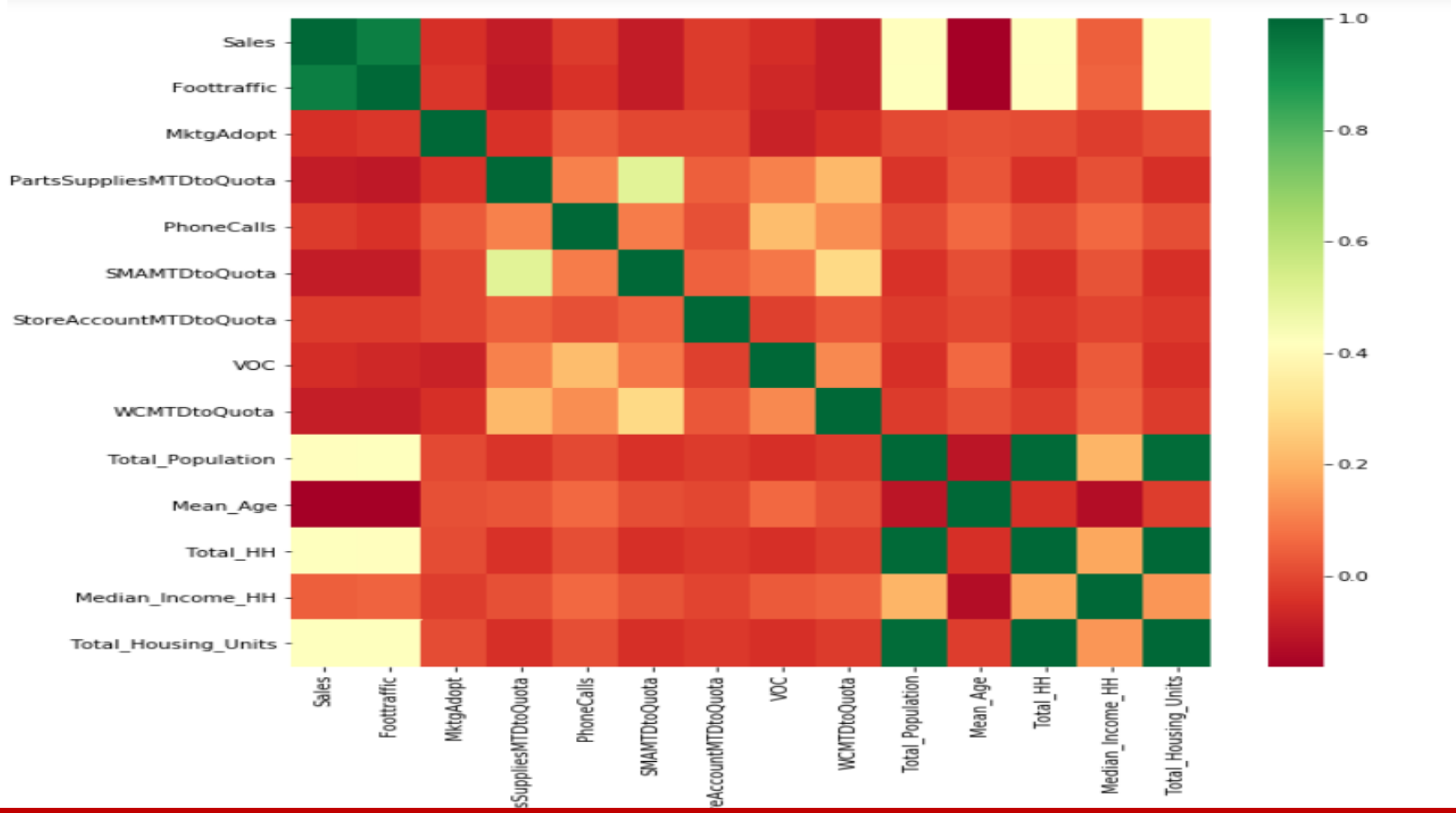
Sales across Categories



Sum of Logsales for each Category broken down by Fiscal Year Period Year. Color shows details about Category. The view is filtered on Fiscal Year Period Year and Category. The Fiscal Year Period Year filter keeps 2013 and 2014. The Category filter excludes 9 members.

We could see the maximum sales from Residential Cooling followed by Part & Supplies and Residential Heating.

Correlation Matrix



From the given heat map, we observe that foot traffic and sales have a strong correlation where as the Total Population, Total Household Units and Total Households have moderate correlations. We can consider possible variable interactions.

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PREDICTIVE DATA MODELING

THE AWESOME MODEL!!

Predictive Model

DATA TRANSFORMATIONS

The sales, census data have high variation and skewed. Log transformations are used for effective modelling.

UNKNOWN VARIABLE PROBLEM

To understand the exact effects of each variable panel data provides better methods than OLS.

VARIATION EXPLAINED

The model explained around 90% of the variation in the data.

	Least_Squares	Random_Effects
Store_SizeGroup 2 > $2.75M	0.14 (0.01) ***	0.14 (0.03) ***
Store_SizeGroup 3 > $10M	0.35 (0.02) ***	0.32 (0.07) ***
TruckY	0.04 (0.01) ***	0.03 (0.04)
Foottraffic	0.91 (0.01) ***	0.92 (0.01) ***
seasonsSummer	0.00 (0.01)	0.00 (0.01)
seasonsWinter	-0.09 (0.01) ***	-0.08 (0.01) ***
MktgAdopt	-0.33 (0.15) *	0.24 (0.10) *
WCMTDtoQuota	0.48 (0.15) **	0.32 (0.12) **
I(WCMTDtoQuota^2)	0.02 (0.01) **	0.03 (0.01) ***
PhoneCalls	3.83 (1.49) *	2.44 (1.13) *
VOC	-0.00 (0.02)	0.04 (0.01) **
PartsSuppliesMTDtoQuota	-0.13 (0.20)	-0.49 (0.14) ***
SMAMTDtoQuota	-0.65 (0.24) **	-0.01 (0.17)
StoreAccountMTDtoQuota	0.09 (0.03) **	0.05 (0.02)
Total_Housing_Units	0.23 (0.11) *	0.19 (0.08) *
seasonsSummer:MktgAdopt	0.03 (0.19)	-0.30 (0.12) *
seasonsWinter:MktgAdopt	0.28 (0.15)	-0.28 (0.10) **
WCMTDtoQuota:Total_Housing_Units	-0.05 (0.01) ***	-0.04 (0.01) ***
PhoneCalls:Total_Housing_Units	-0.27 (0.11) *	-0.18 (0.09) *
PartsSuppliesMTDtoQuota:Total_Housing_Units	0.01 (0.02)	0.04 (0.01) ***
SMAMTDtoQuota:Total_Housing_Units	0.05 (0.02) *	0.00 (0.01)
StoreAccountMTDtoQuota:Total_Housing_Units	-0.01 (0.00) **	-0.00 (0.00)
R^2	0.91	0.90
Adj. R^2	0.91	0.90
Num. obs.	3992	3992

*** p < 0.001, ** p < 0.01, * p < 0.05

ANALYSIS AND RESULTS

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Effect of Variables on Sales

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Variables	Units	% Sales Change
Store Characteristics		
Store Size	Sales > 2.5M	14%
	Sales > 10M	32%
Truck Available	Yes	0%
Foot Traffic	10%	9%
Seasonal Changes		
Summer	Other Seasons	0%
Winter	Other Seasons	-9%
Store Metric		
Market Adoption	0.1 at Summer	-0.6%
	0.1 at Winter	-0.4%
	0.1 at Other Seasons	2.4%
MTD WC	0.1	-0.2%
Phone Calls	0.1	1.4%
Voice of Customer	0.1	0.4%
MTD Parts supplies	0.1	0.2%
MTD SMA	0.1	0%
MTD Store Account	0.1	0%
Demographics		
Total_Housing_Units	10%	25%

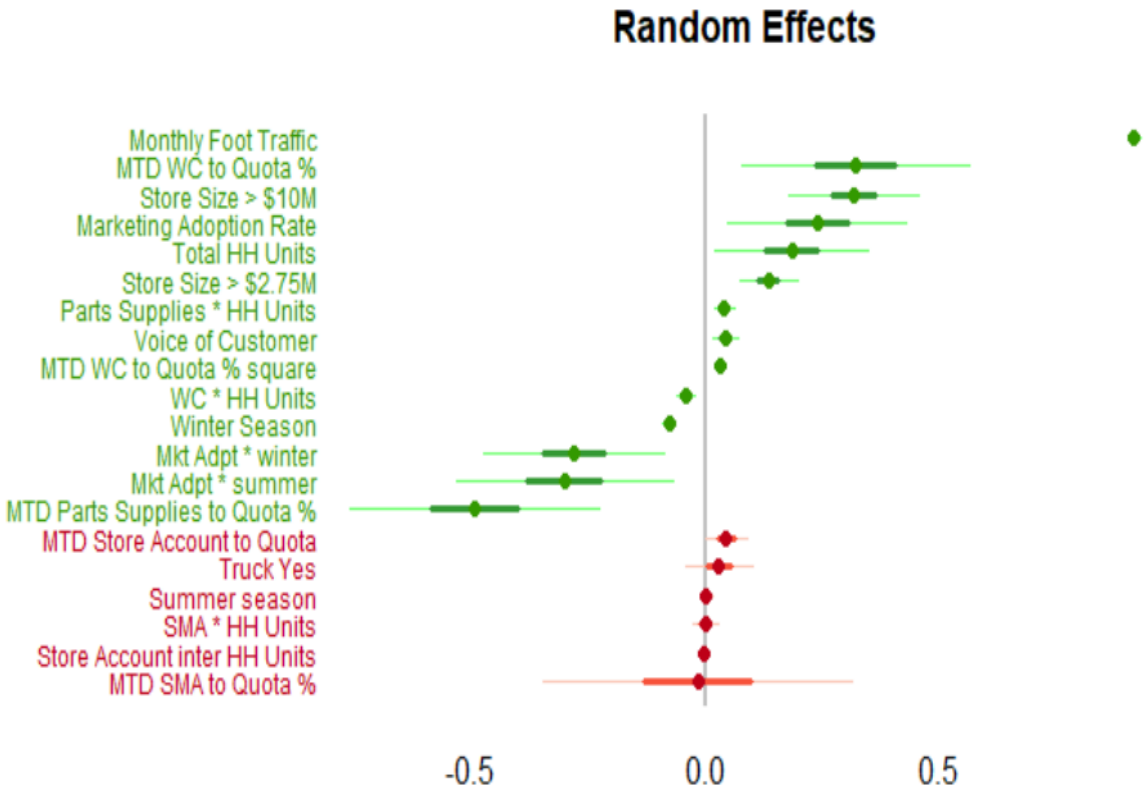
The GOOD

- **Market Adoption –** An increase in market adoption by 0.1 increases sales by 2.4% in normal months.
- **Phone Calls –** An increase in Phone Calls received improves by 0.1% increases sales by 1.4%.
- **Voice of Customer** - An increase in VOC rating by 0.1 basis points improves sales by 0.4%.

The BAD

- **Market Adoption –** higher market adoption on summer and winter seasons indicate lowering sales.
- **WC MTD –** For normal population higher value decreases sales by 0.2%.

Effect of Variables on Sales



The GOOD

- **Foot Traffic –** An increase in foot traffic by 10% increases the sales by 9%.
- **Total Housing Units –** If housings units differ by 10% between plants, the sales differs by 25%.

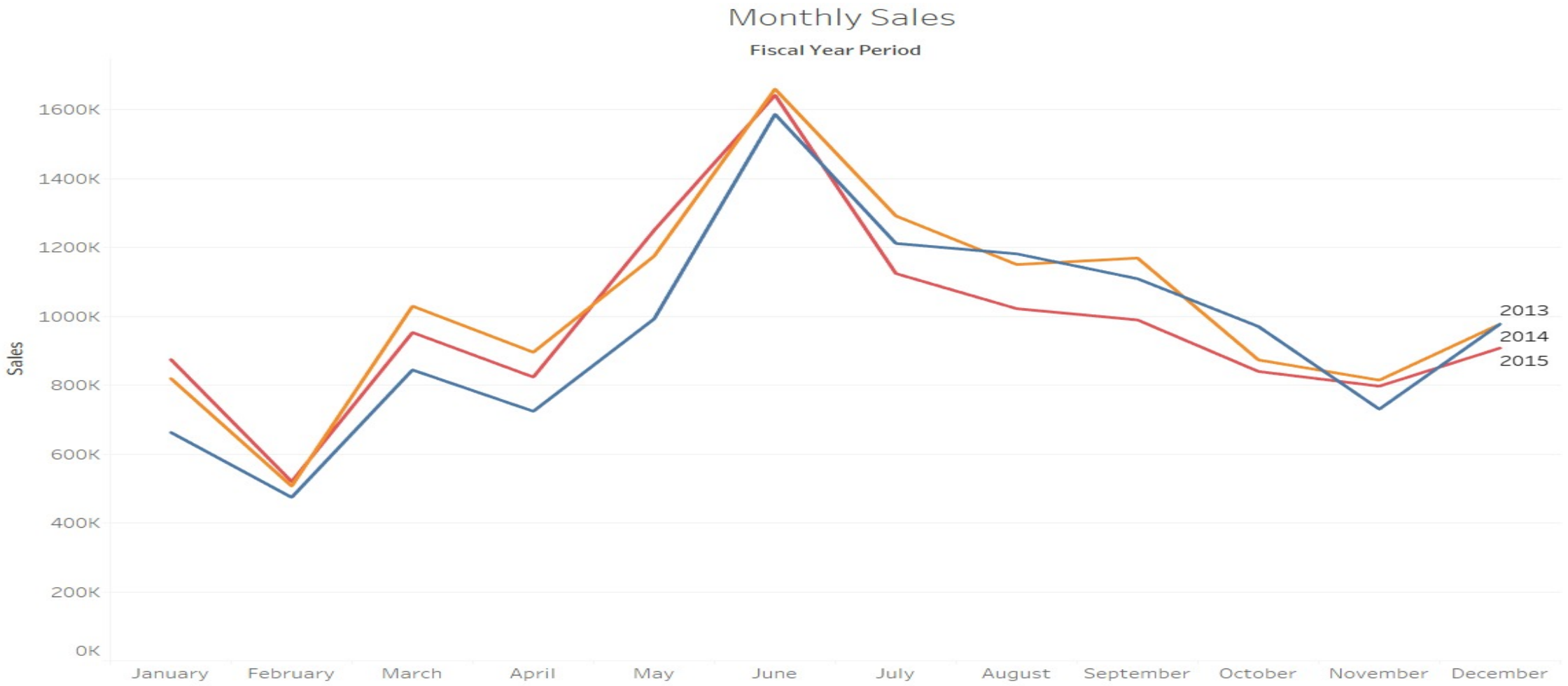
The MEH

- **Truck–** The store owning a truck doesn't increase sales.
- **Store Account & SMA to Quota –** These KPIs doesn't impact sales.

The BAD

- **Winter Season –** In winter season, sales decreases by 9% than other seasons.

Predicted Sales Trend - 2015



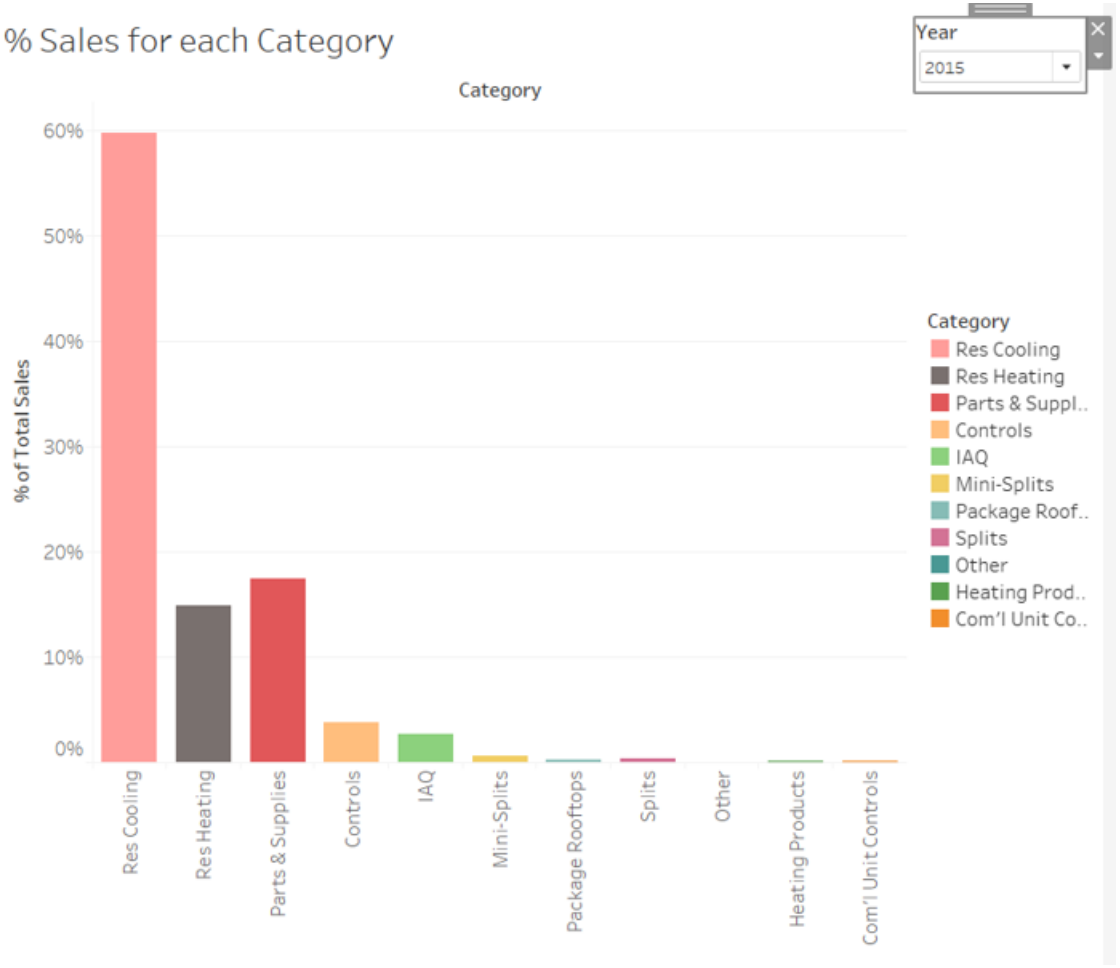
We can see that the predicted sales of 2015 has maximum sales in the month of June, similar to that for the year 2014 and 2013.

Predicted Category Sales - 2015

Total Sales for each Category

Category	
Res Cooling	6,708,931
Parts & Supplies	1,961,427
Res Heating	1,668,885
Controls	421,558
IAQ	301,291
Mini-Splits	63,404
Splits	44,030
Package Rooftops	33,232
Heating Products	9,561
Com'l Unit Controls	8,257
Other	6,144
Mini-Split Controls	458
Building Automation	362
VRF Accessories	131
Unit Controls	85

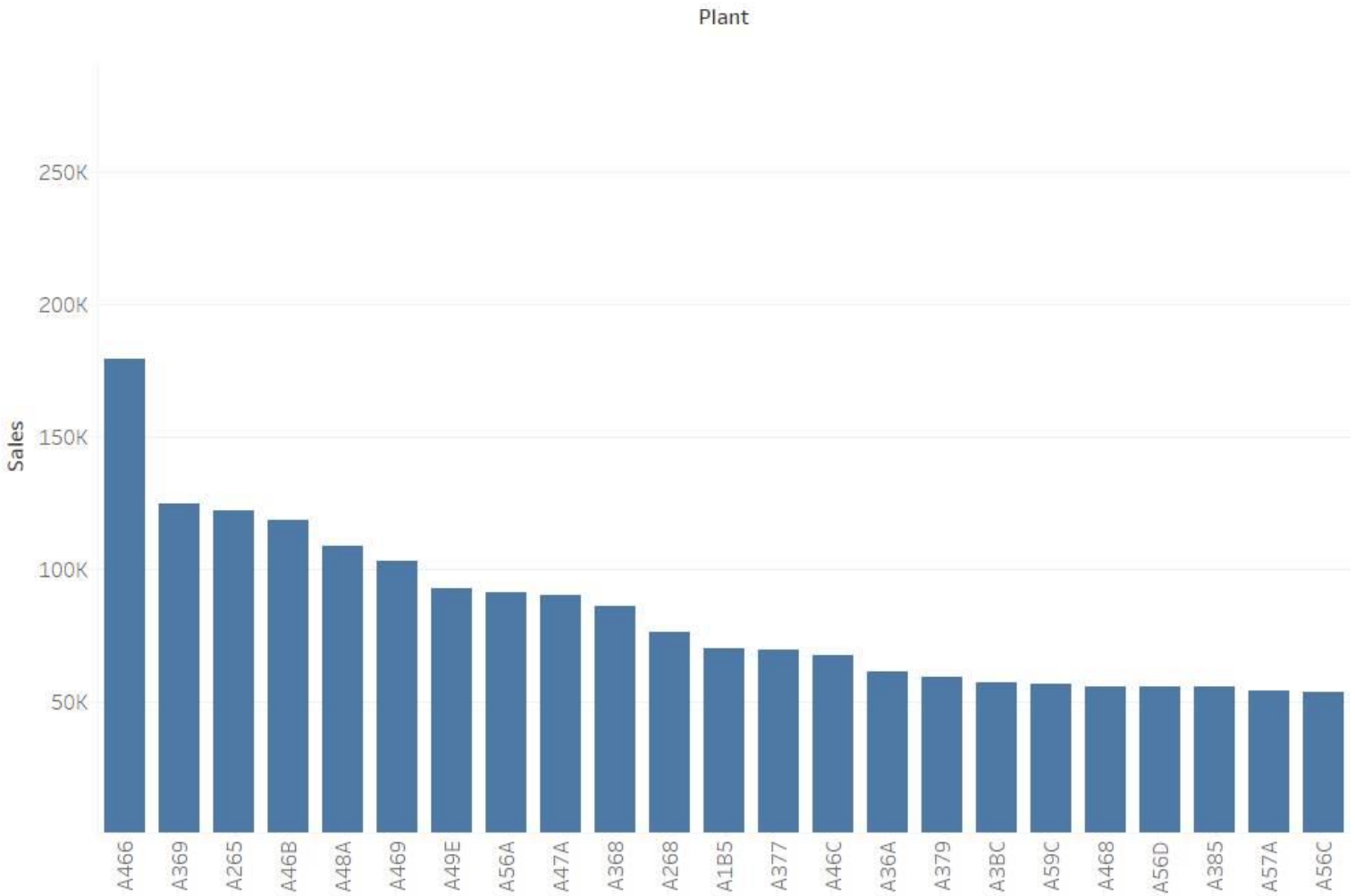
% Sales for each Category



For the year 2015, we see that the maximum sales that we can get is from residential cooling, followed by Parts and Supplies.

Predicted Plant Sales - 2015

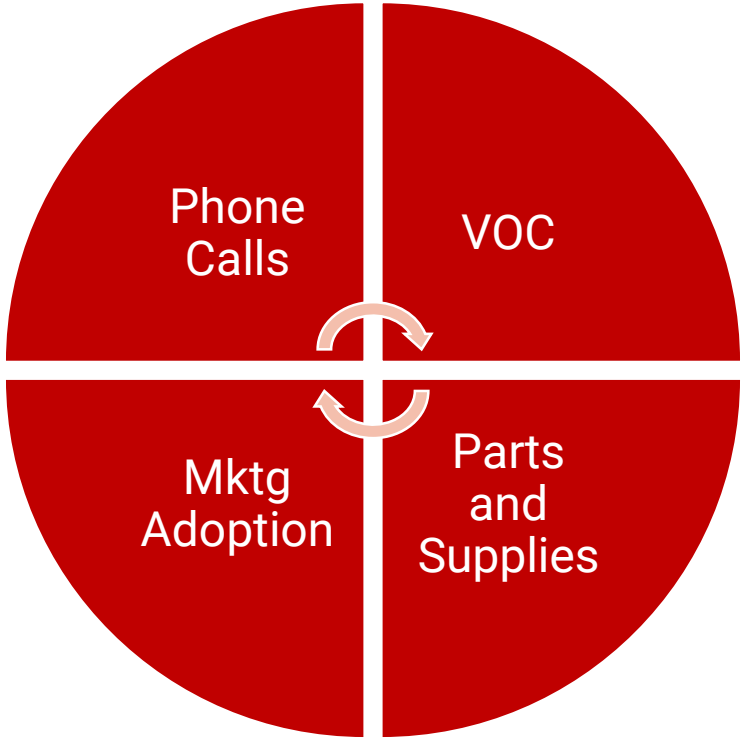
For the year 2015, Plant A466 showed maximum sales from all its categories, and Plant A57D showed the least sales over the 2015 period



Sum of Sales for each Plant. The data is filtered on Fiscal Year Period Year, which keeps 2015. The view is filtered on Plant and sum of Sales. The Plant filter keeps 189 of 189 members. The sum of Sales filter includes values greater than or equal to 53,000.

Key KPIs and Recommendation

Focus more on phone calls conversion rates



Develop methods to capture loyalty of customers – Net Promotor Scores

Continue incentivising Marketing Adoption

Closely Monitor sales of Parts and Supplies

KPIS such as Phone Calls and Customer Experiences(VOC), can increase the performance of a plant which can eventually lead to increased Foot Traffic and WC Sales of the Plant.

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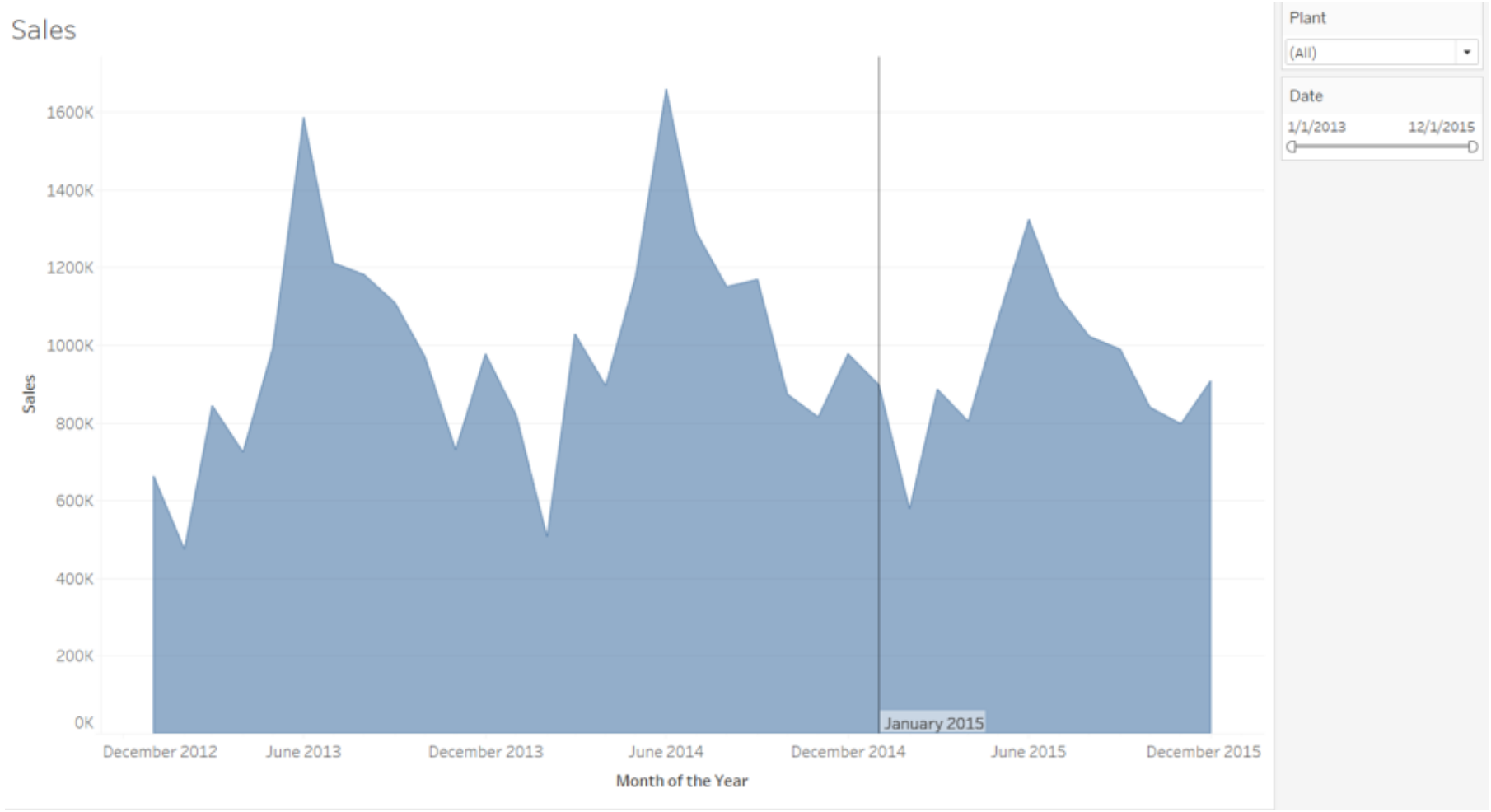
Store Sales UI

Store Sales UI Snapshot



DSC_Tableau.twb

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Tools Used

alteryx

python™

tableau

Microsoft Power BI

THANK YOU !!