Assignment Snapshot

- **Background**
    - The data set provided constitutes the data of a Café Chain for one of its restaurants. We need to do a thorough analysis of the data and come up with the following analysis:
        - Exploratory Analysis
        - Menu Analysis
        - Price Analysis
- **Exploratory Analysis**
    - What kind of trends do you notice in terms of consumer behavior over different times of the day and different days of the week? Can you give concrete recommendations based on the same?
    - Are there certain menu items that can be taken off the menu?
    - Are there trends across months that you are able to notice?

- **Menu Analysis**
    - Identify the most popular combos that can be suggested to the restaurant chain after a thorough analysis of the most commonly occurring sets of menu items in the customer orders
    - The restaurant doesn't have any combo meals. Can we suggest the best combo meals?

- **Pricing Analysis**
    - Identify pricing changes and menu items which saw a positive impact and / or negative impact of the price changes?
    - Show a price analysis chart with four quadrant price analysis as below, along with quantification of the volume increase and decrease in relation to the price changes
        - Price increased – sales volume decreased in post period of 2-4 weeks (take a pre period window of sales of 1-2 weeks)
        - Price increased – Sales volume increased
        - Price decreased – Sales volume increased
        - Price decreased – Sales volume decreased

EXPLORATORY DATA ANALYSIS

There are a total of 8 categories of
items served in the cafe
they are
1. beverage
2. food
3. liquor
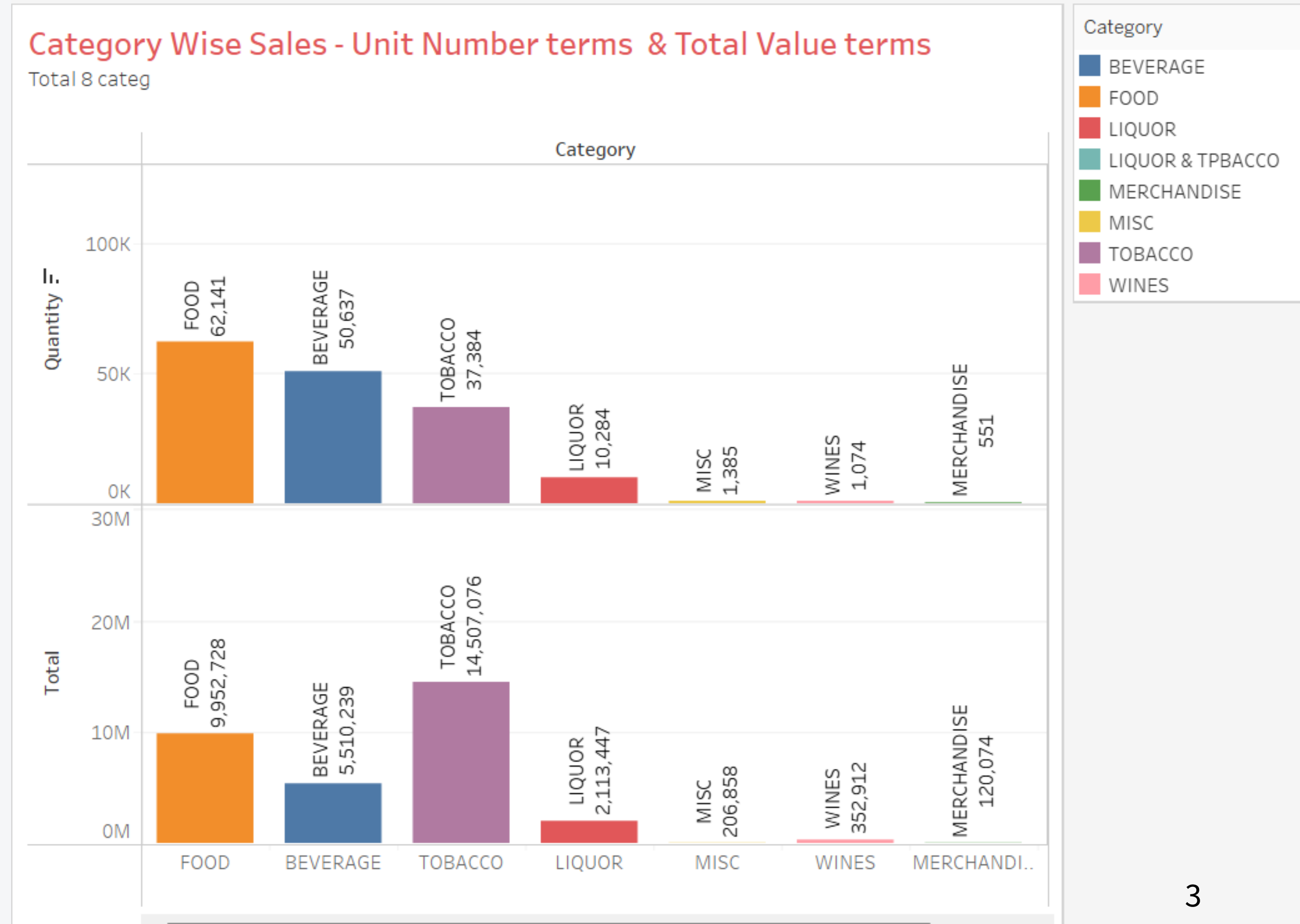4. liquor & tobacco
5. merchandise
6. misc
7. Tobacco
 8. wines

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RangeIndex: 145830 entries, 0 to 145829
Data columns (total 9 columns):
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---  ------       --------------    -----
 0   Date         145830 non-null   object
 1   Bill Number  145830 non-null   object
 2   Item Desc    145830 non-null   object
 3   Quantity     145830 non-null   int64
 4   Rate         145830 non-null   float64
 5   Tax          145830 non-null   float64
 6   Discount     145830 non-null   float64
 7   Total        145830 non-null   float64
 8   Category     145830 non-null   object
dtypes: float64(4), int64(1), object(4)
memory usage: 10.0+ MB
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Higher Category sold every month is, Tobacco followed by food then beverage
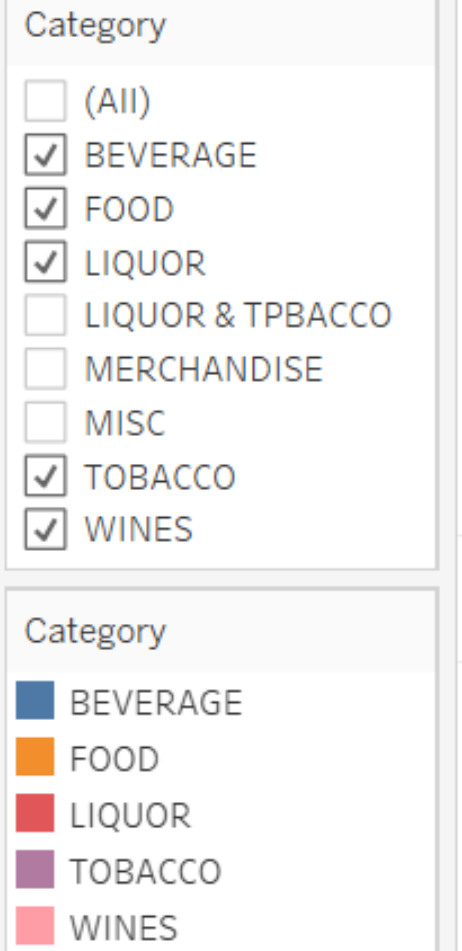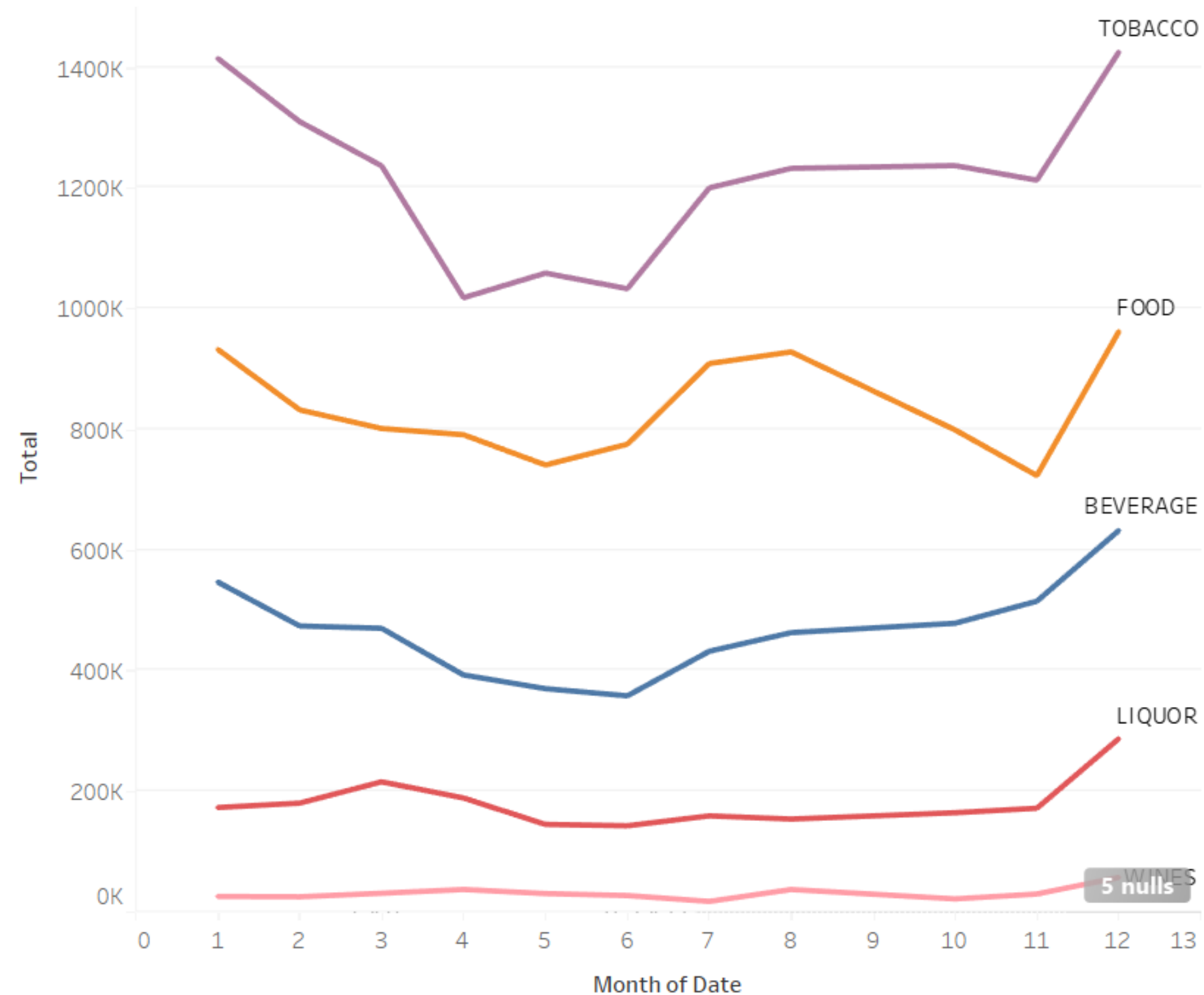
- Highest sales in category unit wise is of food followed by Tobacco and accuse least sales is of liquor and wine

- Highest sales in category in values wise is of tobacco and least is liquor and tobacco

Category Wise Sales - Unit Number terms & Total Value terms
Total 8 categ

Category
- BEVERAGE
- FOOD
- LIQUOR
- LIQUOR & TPBACCO
- MERCHANDISE
- MISC
- TOBACCO
- WINES

Quantity:
- FOOD 62,141
- BEVERAGE 50,637
- TOBACCO 37,384
- LIQUOR 10,284
- MISC 1,385
- WINES 1,074
- MERCHANDISE 551

Total:
- FOOD 9,952,728
- BEVERAGE 5,510,239
- TOBACCO 14,507,076
- LIQUOR 2,113,447
- MISC 206,858
- WINES 352,912
- MERCHANDISE 120,074

Category: FOOD, BEVERAGE, TOBACCO, LIQUOR, MISC, WINES, MERCHANDI..

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Hence the top categories are
1. Tobacco 2. Food 3. Beverage 4. liquor

Most frequent item in Liquor Category is

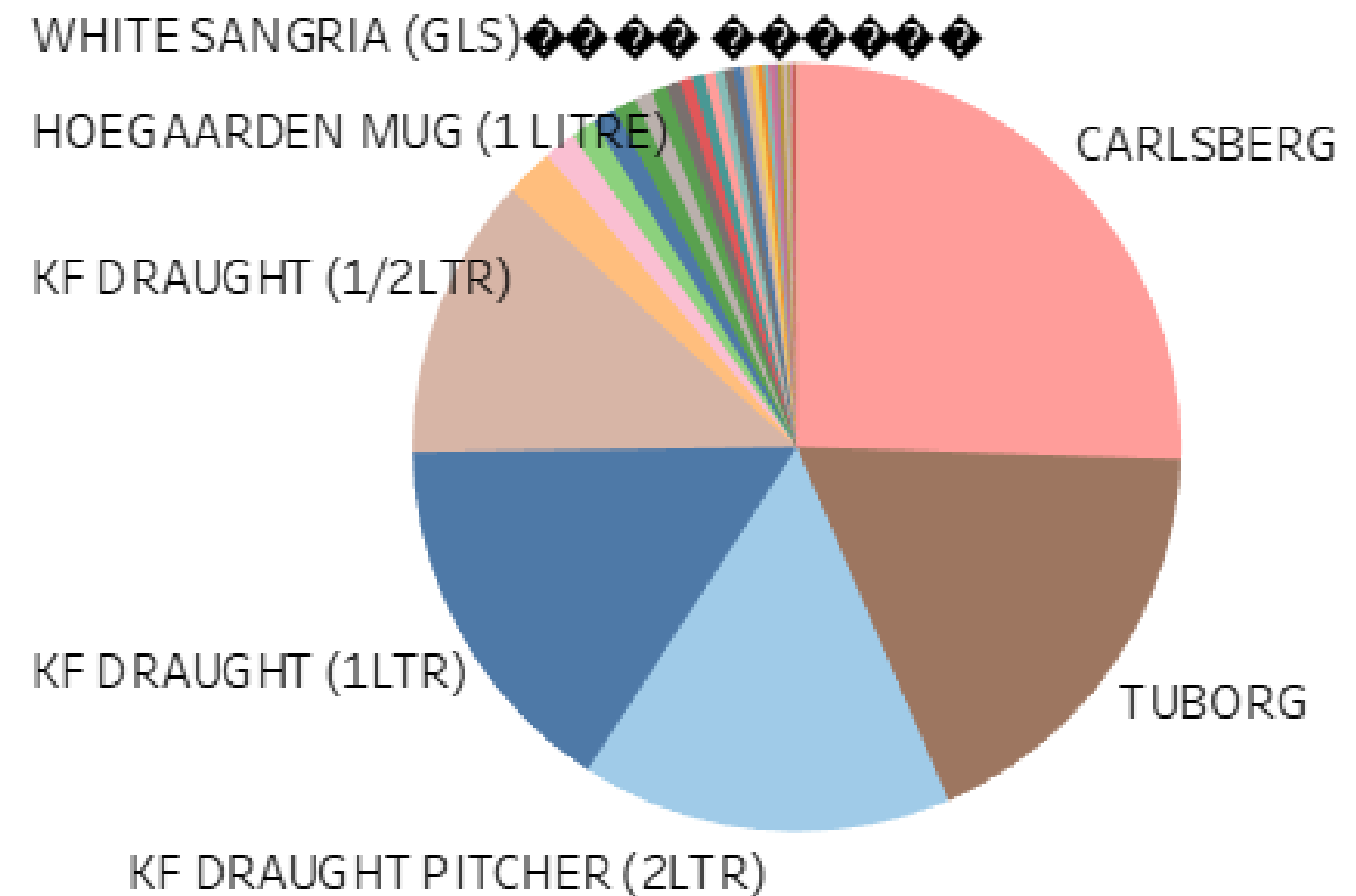Most frequent item in Liquor Category is
1. Carlsberg (5,38,802)
2. Tuborg (3,81,051
3. KF Draught (2 ltr) (3,30,617)
4. Kf draught (1ltr)(3,30,074)
And least is Whiskey (Sm) (525)
followed by Zinzi White (BTL) 882

Most frequent item in Liquor Category is

Most sold item in Liquor category

Category	Item Desc	
LIQUOR	CARLSBERG	538,802
	TUBORG	3
	KF DRAUGHT PITCHER (2LTR)	3
	KF DRAUGHT (1LTR)	3
	KF DRAUGHT (1/2LTR)	2
	HOEGAARDEN MUG (1 LITRE)	43,378
	BUDWEISER	28,298
	1+1 KF 1/2 LITER	22,312

Category: **LIQUOR**
Item Desc: **CARLSBERG**
Total: 538,802

Most sold item in Liquor category

Category	Item Desc	
LIQUOR	CARLSBERG	538,802
	TUBORG	381,052
	KF DRAUGHT PITCHER (2L..	330,618
	KF DRAUGHT (1LTR)	330,074
	KF DRAUGHT (1/2LTR)	251,397
	HOEGAARDEN MUG (1 LIT..	43,378

Most frequent item in Food Category is

Most frequent item in Food category is

1. Great Lakes Shakes (843,122)
2. JR CHL Avalanche(713,566)
3. Poutine with Fries (580,284)
4. Oreo Cookie shake(405,645)

And least is B.M.T Panini(391,067) followed by Kitkat shake(303,865)

Most sold item in Food category
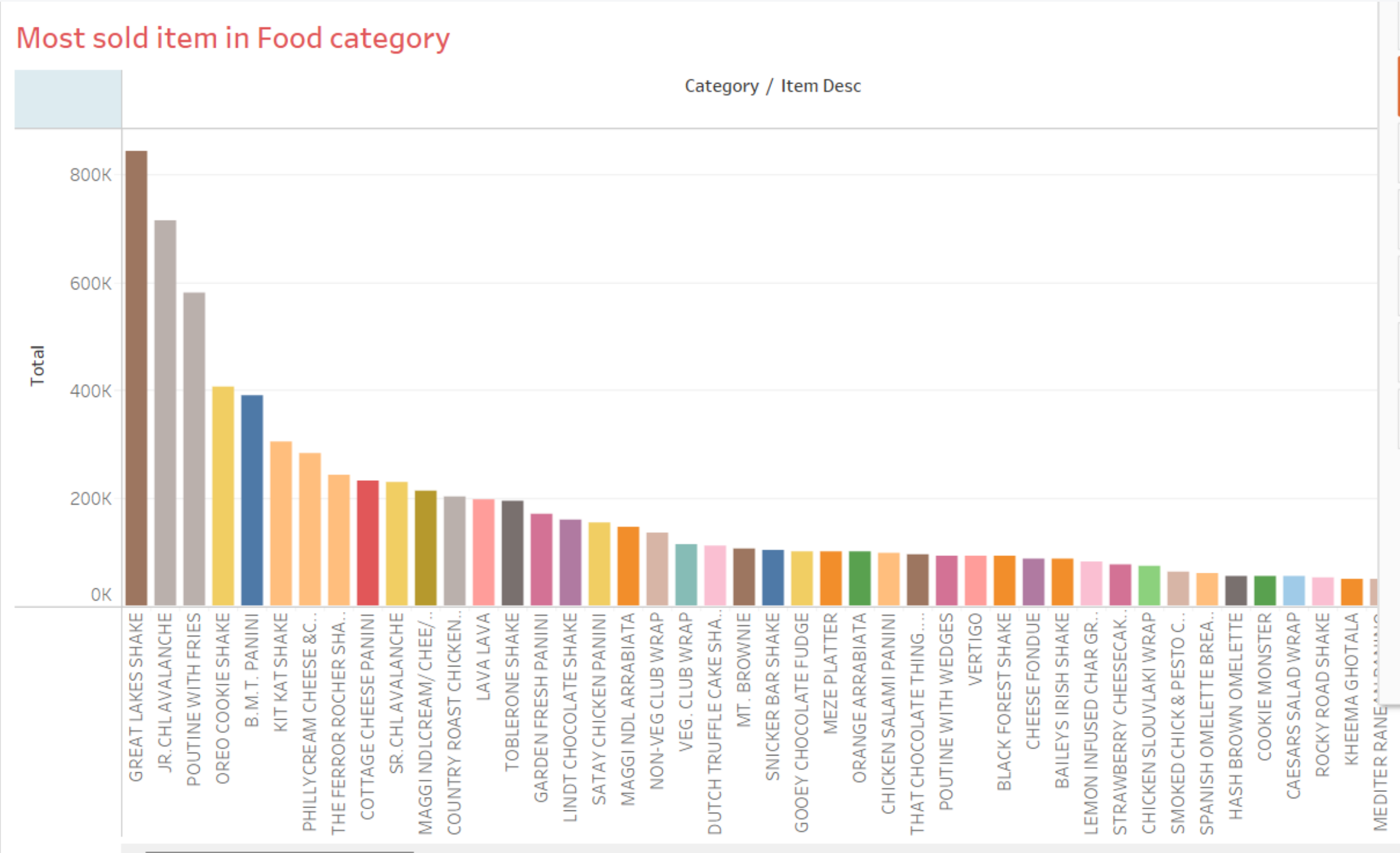
Most frequent item in Food Category is

Category	Item Desc	
FOOD	GREAT LAKES SHAKE	843,122
	JR.CHL AVALANCHE	713,566
	POUTINE WITH FRIES	580,284
	OREO COOKIE SHAKE	405,645
	B.M.T. PANINI	391,067
	KIT KAT SHAKE	303,835
	PHILLYCREAM CHEESE &C...	282,259
	THE FERROR ROCHER SH...	243,406
	COTTAGE CHEESE PANINI	231,350

•Most frequent item in Tobacco Category is

- Most frequent item in Tobacco category is
1. Nirvana Hookah Single (2,953,135)
2. Sambuca (2,291,058)
3. Mint Flavour Single(1,840,501)
4. Calcutta Mint(1,640,860)

And least is N R G Hookah(1,193,015) followed by Green Apples Flavour(793,683)
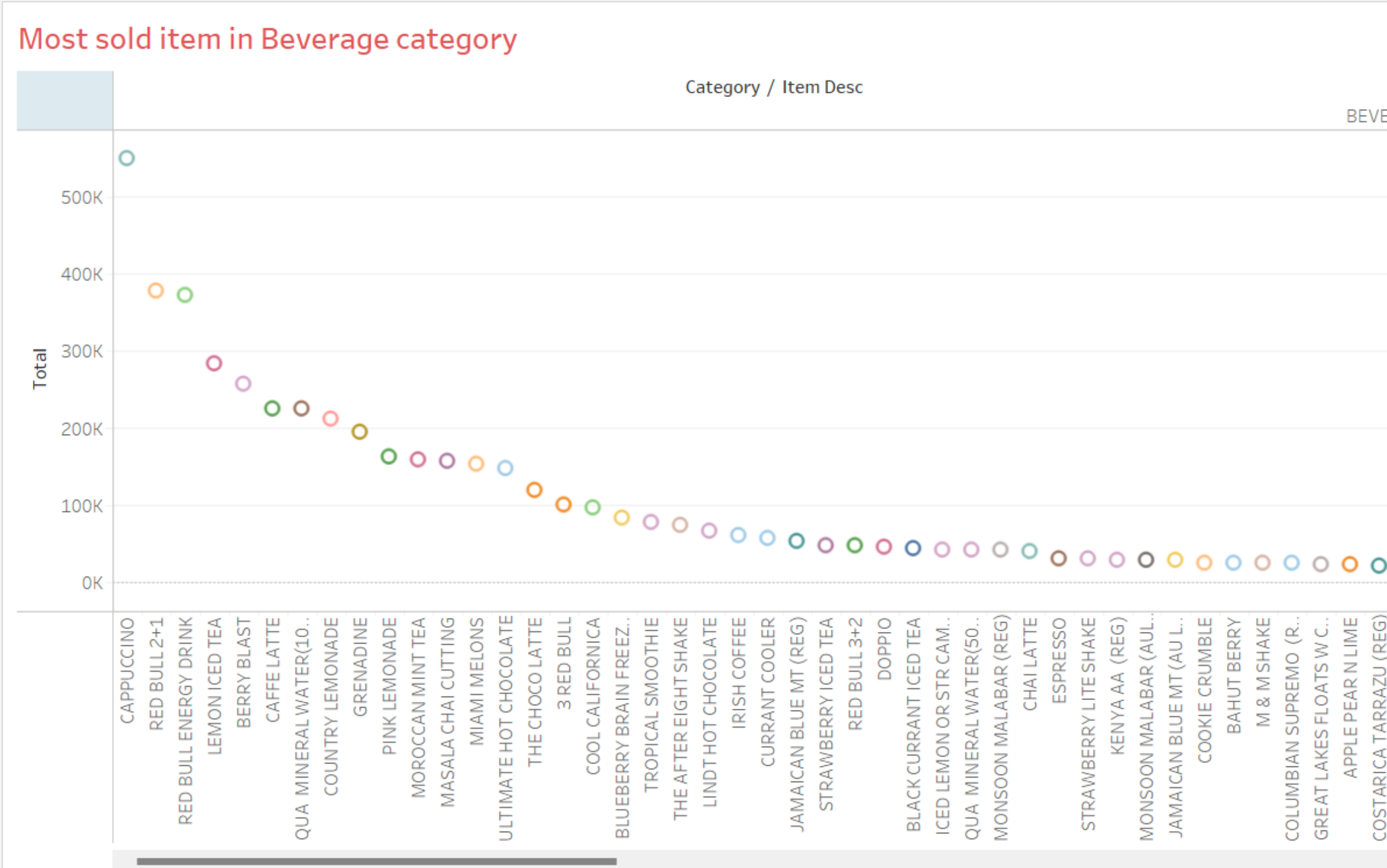

Most sold item in Tobacco category

5
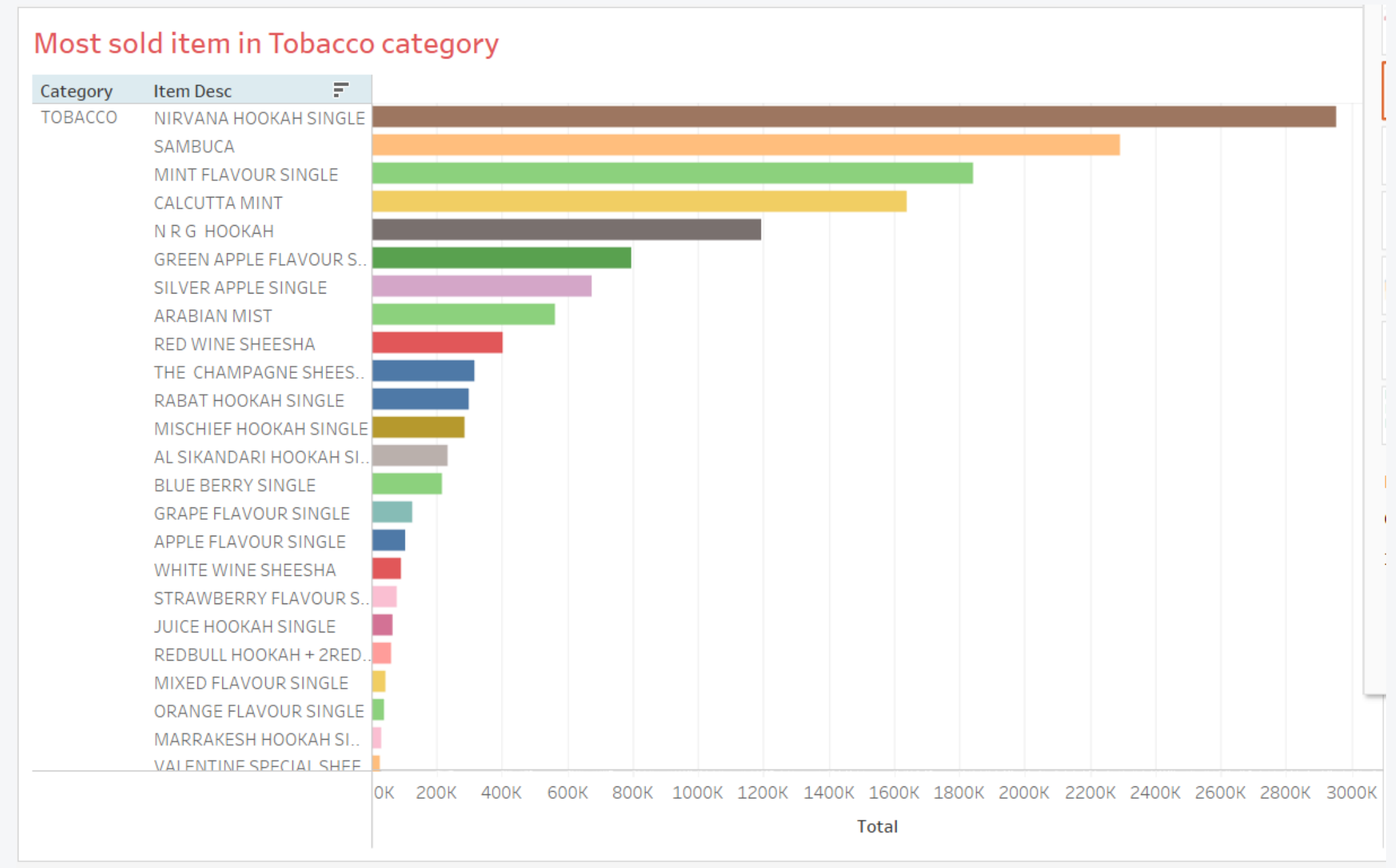
•**Most frequent item in Tobacco Category is**

Most sold item in Tobacco category

Category	Item Desc	
TOBACCO	NIRVANA HOOKAH SINGLE	2,953,135
	SAMBUCA	2,291,058
	MINT FLAVOUR SINGLE	1,840,501
	CALCUTTA MINT	1,640,860
	N R G HOOKAH	1,193,015
	GREEN APPLE FLAVOUR S...	793,683
	SILVER APPLE SINGLE	673,525
	ARABIAN MIST	560,406
	RED WINE SHEESHA	402,278
	THE CHAMPAGNE SHEES...	317,691
	RABAT HOOKAH SINGLE	296,802
	MISCHIEF HOOKAH SINGLE	284,150
	AL SIKANDARI HOOKAH SI...	232,835
	BLUE BERRY SINGLE	217,100
	GRAPE FLAVOUR SINGLE	127,215
	APPLE FLAVOUR SINGLE	105,336
	WHITE WINE SHEESHA	89,991
	STRAWBERRY FLAVOUR S...	79,926
	JUICE HOOKAH SINGLE	64,541
	REDBULL HOOKAH + 2RED...	62,073
	MIXED FLAVOUR SINGLE	42,168
	ORANGE FLAVOUR SINGLE	36,993
	MARRAKESH HOOKAH SI...	31,238
	VALENTINE SPECIAL SHEE...	25,080
	CASABLANKA HOOKAH SI...	23,879
	PEACH FLAVOUR SINGLE	22,242

Most frequent item in Beverage Category is

Most frequent item in Beverage category is

1. Cappacino (550,252)
2. Red Bull 2+1 (378,632)
3. Red Bull Energy Drink (373,016)
4. Lemon Iced Tea (282,714)

And least is Berry Blast(258,198) followed by Caffe Latte(224,818)

Most sold item in Beverage category

Most frequent item in Beverage Category is

Most sold item in Beverage category

| Category	Item Desc	
BEVERAGE	CAPPUCCINO	550,252
	RED BULL 2+1	378,632
	RED BULL ENERGY DRINK	373,016
	LEMON ICED TEA	282,714
	BERRY BLAST	258,198
	CAFFE LATTE	224,818
	QUA MINERAL WATER(10..	224,696
	COUNTRY LEMONADE	212,323
	GRENADINE	194,964
	PINK LEMONADE	163,423
	MOROCCAN MINT TEA	159,744
	MASALA CHAI CUTTING	157,279
	MIAMI MELONS	153,341
	ULTIMATE HOT CHOCOLA..	147,442
	THE CHOCO LATTE	120,328
	3 RED BULL	100,188
	COOL CALIFORNICA	96,866
	BLUEBERRY BRAIN FREEZ..	84,662
	TROPICAL SMOOTHIE	77,590
	THE AFTER EIGHT SHAKE	75,062
	LINDT HOT CHOCOLATE	66,287
	IRISH COFFEE	60,793
	CURRANT COOLER	58,066
	JAMAICAN BLUE MT (REG)	53,294
	STRAWBERRY ICED TEA	48,369
	RED BULL 3+2	48,262

Graph based on the avg amount of sale and avg amount of tax in cafe - category wise
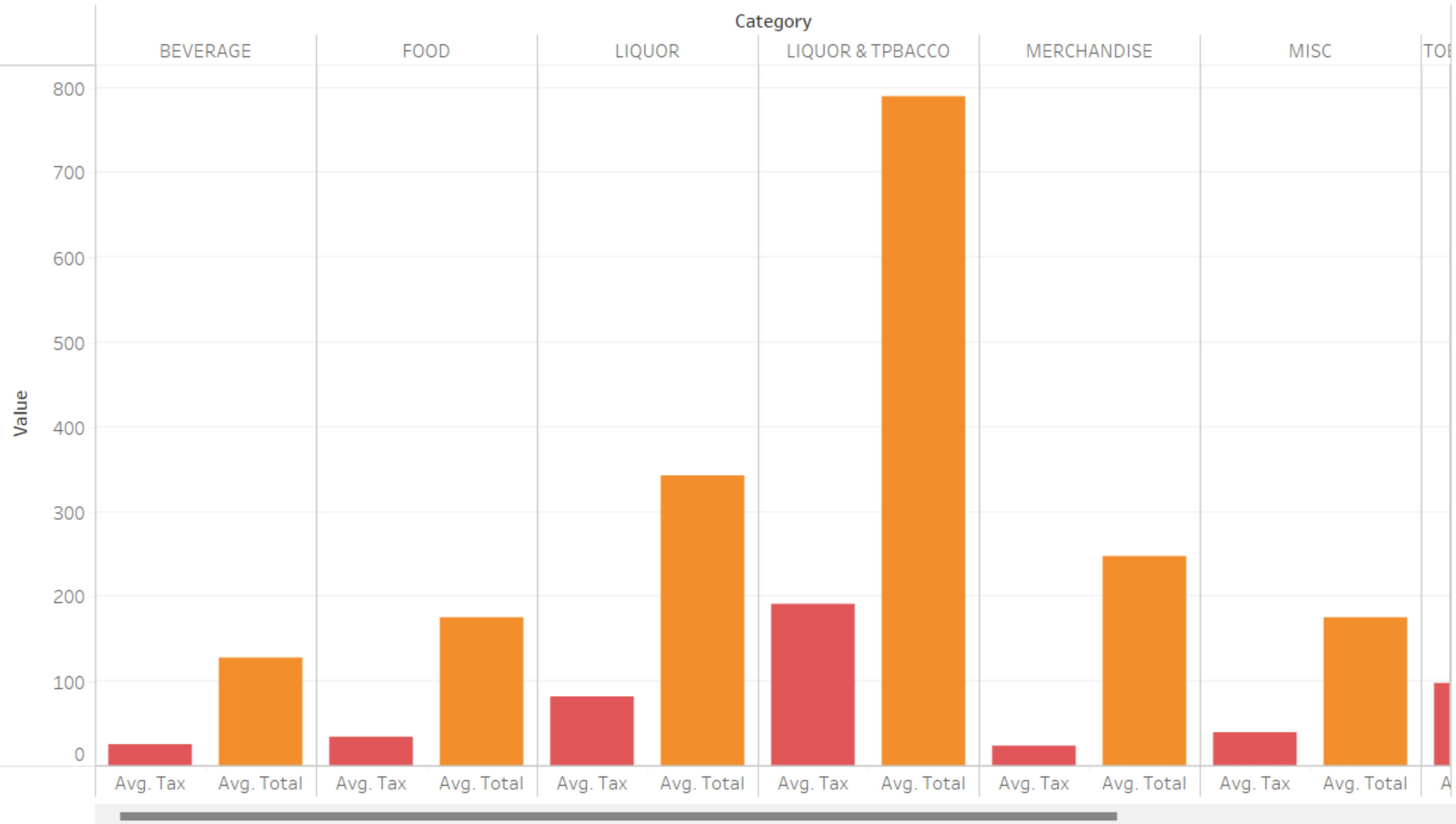
Measure Names
- Avg. Tax
- Avg. Total

- Sales of products increase from June and peak up in Dec month.
- From Jan till June, sales usually are low for all the products.
- The months of July and August notice a sharp increase in sales for Food and Beverage.
- Liquor and Tobacco show contrasting trends for other months except for December when the sale peaks up for both alike.

Top categories according to Salesvalue on Monthly basis
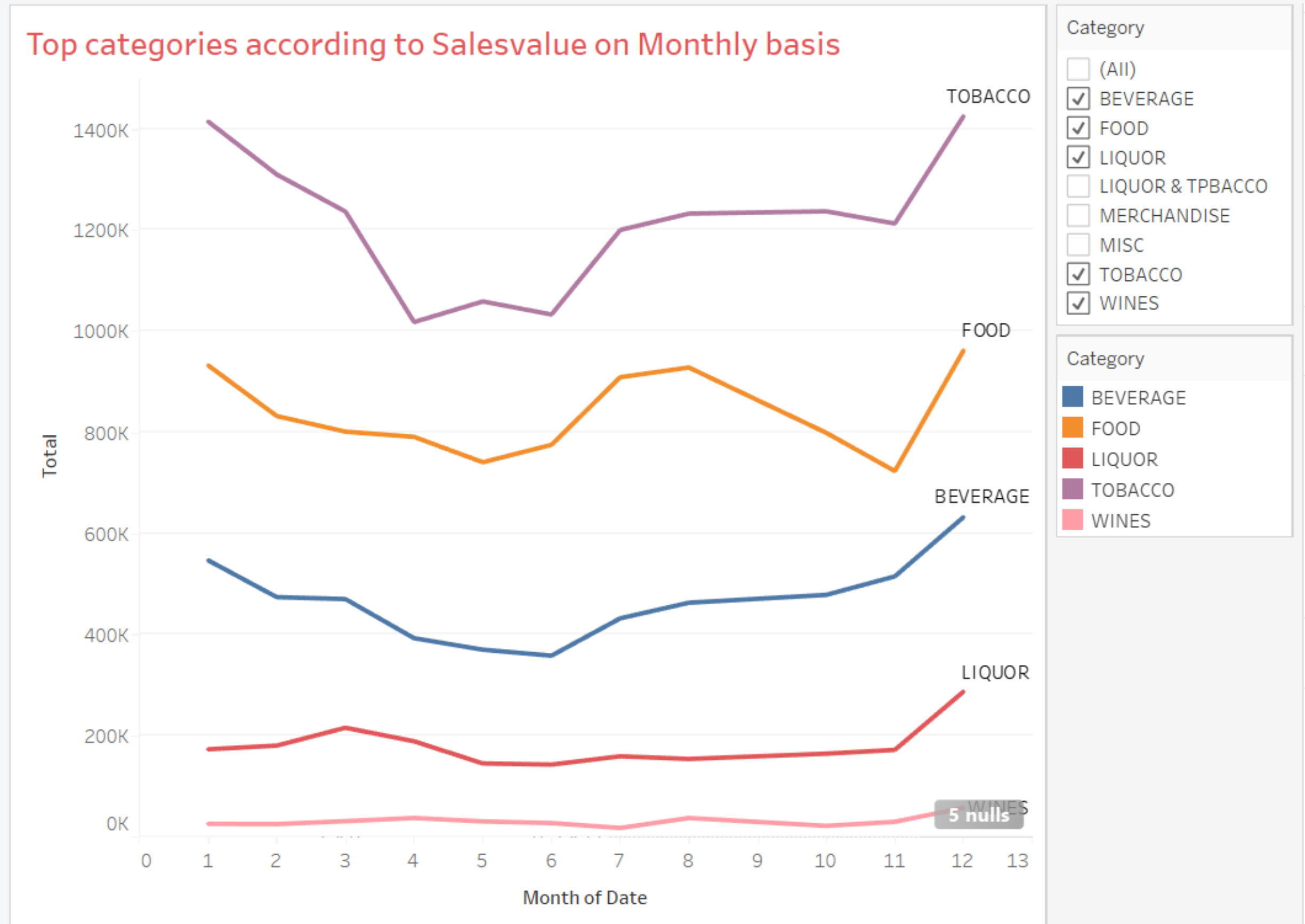
Sales value chart Weekly basis (showing quantity and sales)

Sales are high on Saturday with a total sales of 5642039 and the number of items sold was 28479 followed by Sunday and Friday and the same for the rest of the days


Sales value Line Chart - Weekly basis

Sales value chart monthly basis (showing quantity and sales)

Sales are high in December with a total sales of 3473691 and the number of items sold was 17148 followed by January and August and the same for the rest of the Month

Sales value Line Chart - Monthly basis

Sales Trend chart Hour of the basis (showing quantity and sales)

Sales shows steady progress from 11:00 hours onwards. Restaurant makes max sales in the evenings between 19:00-23:00 hours. Peak time is 19:00-20:00 hours
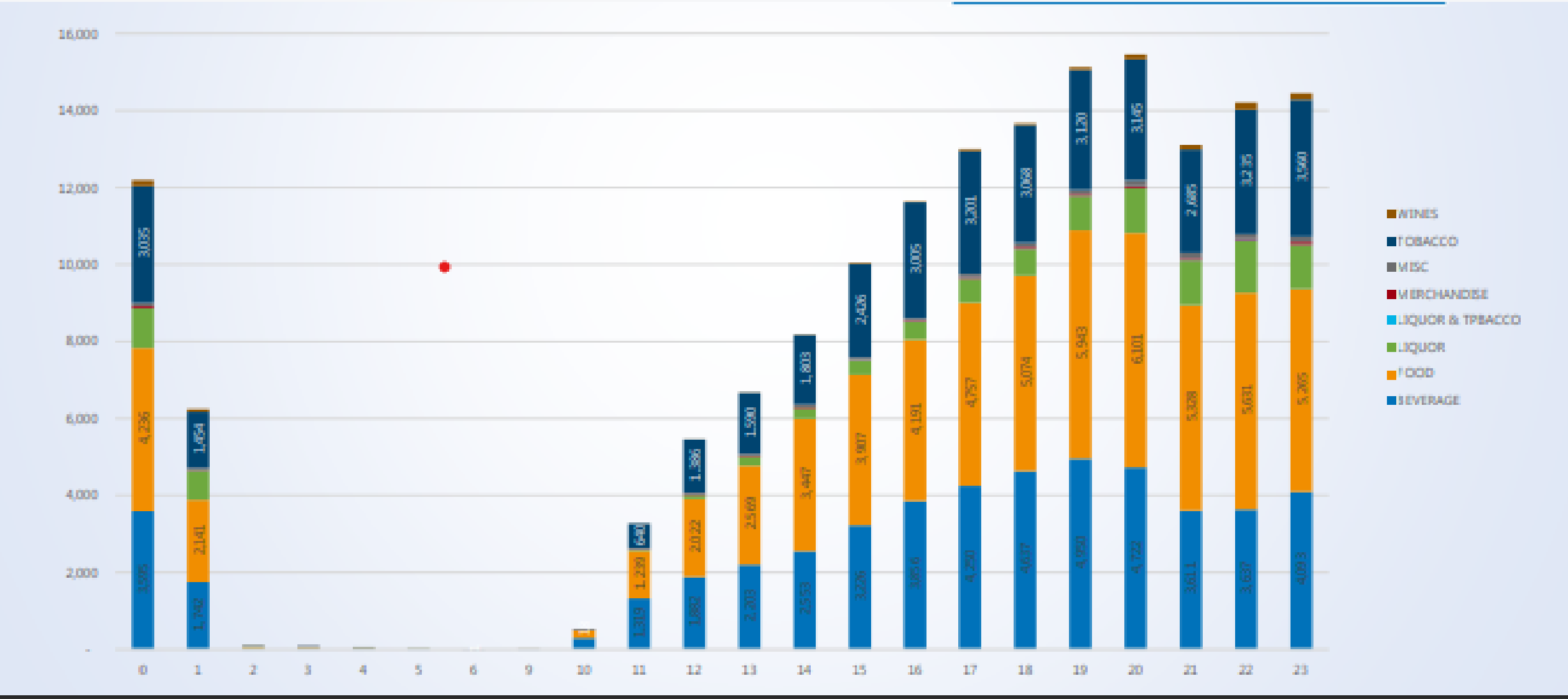
item to be discontinued

Item_Desc	Quantity
1 AXE TWIST	6
1+1 BTL4 SEASON WHITE	2
1+1 KF 2 LITER	7
1+1 VLN CAB SAUV (BTL)	1
1+1 VLN CAB SAUV CLASIQ (BTL)	2
...	...
WHISKEY (SM)	2
WHITE RUM (SM)	7
WHITE SANGRIA (CARAFE)áááááááá	6
ZEN ROCK SQUARE VASE	1
ZINZI WHITE (BTL)	1

151 rows × 1 columns

Menu Analysis

Suggestion For Best Combo Meals

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final_result
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	Product 1	Product 2	Support(%)	Confidence(%)	lift	Rule
0	ADD FRIES	B.M.T. PANINI	0.215770	20.079787	5.394333	ADD FRIES->B.M.T. PANINI
1	ADD FRIES	COTTAGE CHEESE PANINI	0.104313	9.707447	4.214309	ADD FRIES->COTTAGE CHEESE PANINI
2	ADD FRIES	COUNTRY ROAST CHICKEN PANINI	0.124318	11.569149	6.124298	ADD FRIES->COUNTRY ROAST CHICKEN PANINI
3	ADD FRIES	PHILLYCREAM CHEESE &CHILLY PAN	0.117173	10.904255	4.102697	ADD FRIES->PHILLYCREAM CHEESE &CHILLY PAN
4	ADD FRIES	QUA MINERAL WATER(1000ML)	0.128604	11.968085	2.516678	ADD FRIES->QUA MINERAL WATER(1000ML)
...	...	...	...	...	...	...
170	QUA MINERAL WATER(1000ML)	SAMBUCA	0.468692	9.855769	1.559409	QUA MINERAL WATER(1000ML)->SAMBUCA
171	SATAY CHICKEN PANINI	QUA MINERAL WATER(1000ML)	0.101455	7.222787	1.518825	SATAY CHICKEN PANINI->QUA MINERAL WATER(1000ML)
172	QUA MINERAL WATER(500ML)	SAMBUCA	0.134320	11.284514	1.785469	QUA MINERAL WATER(500ML)->SAMBUCA
173	RED BULL 2+1	SAMBUCA	0.414392	24.850043	3.931846	RED BULL 2+1->SAMBUCA
174	RED BULL ENERGY DRINK	SAMBUCA	0.404390	15.215054	2.407370	RED BULL ENERGY DRINK->SAMBUCA

Suggestion For Best Combo Meals
Top 10 item in terms of Quantity sold

Row Labels	Sum of Quantity	Average of Rate
NIRVANA HOOKAH SINGLE	86,86,258	
CAPPUCCINO	7,144,62	
MINT FLAVOUR SINGLE	60,19,232	
GREAT LAKES SHAKE	59,14,115	
SAMBUCA	47,65,365	
POUTINE WITH FRIES	37,41,125	
QUA MINERAL WATER(1000ML)	3,633,50	
JR.CHL AVALANCHE	34,46,167	
CARLSBERG	33,80,121	
CALCUTTA MINT	3,339	

Pricing Analysis

- **Our R-squared value is close to 1 for both train and test sets indicating our model is both accurate and precise**
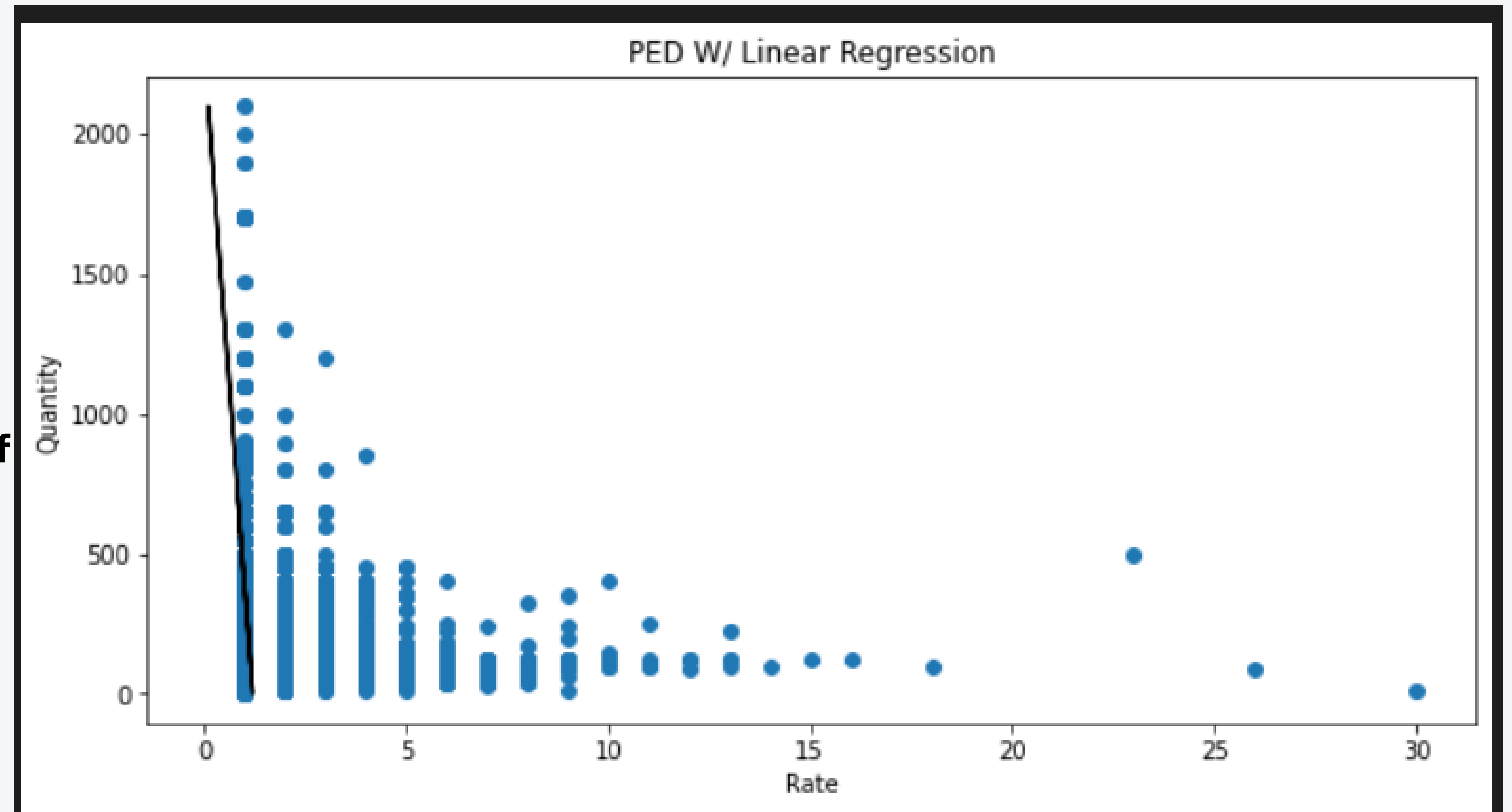
  Train RMSE 0.469
  Train R2 0.013

- **RMSE tells us that our model's predictions are off by 045.–0.50 units of demand on average**
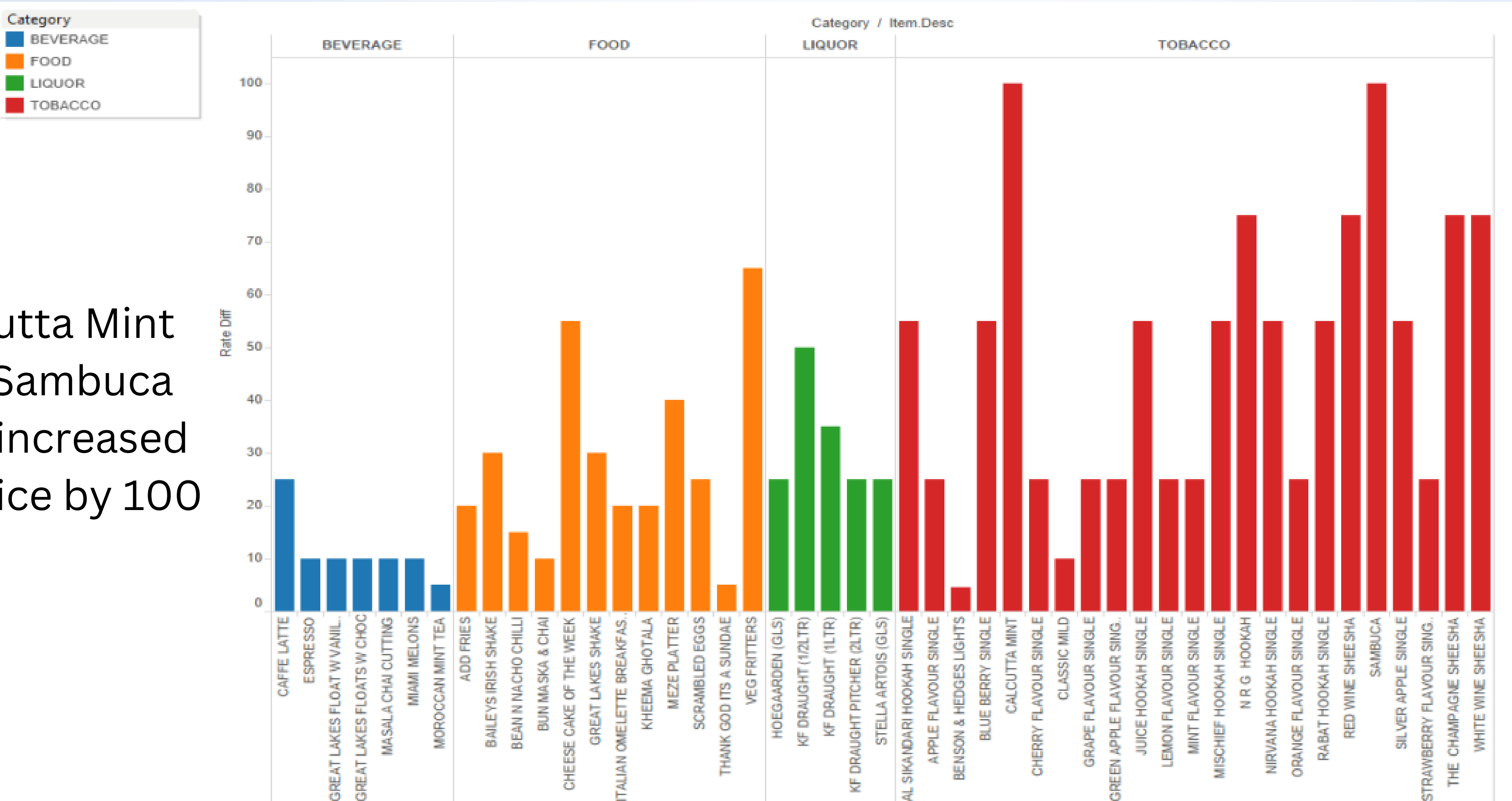
  Test RMSE 0.491
  Test R2 0.01

each increase in unit Price demand will decrease by coefficient -0.001

PED W/ Linear Regression

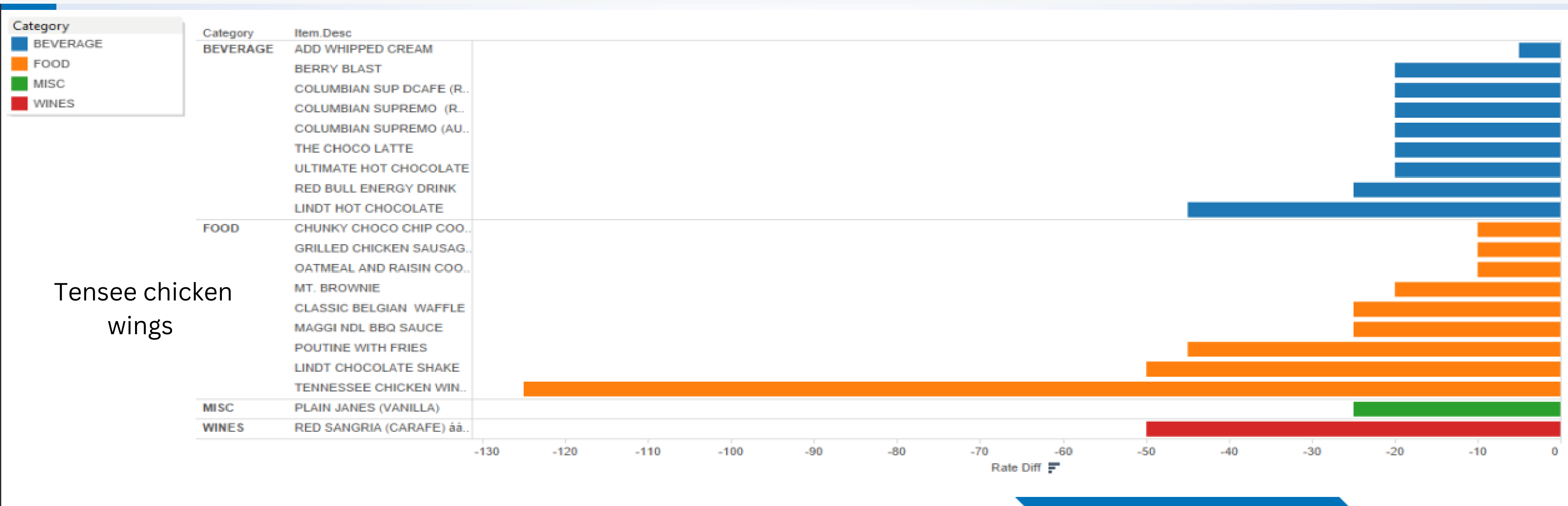# Items with Positive Price Change
The positive price change ranges from 4.5 to 100

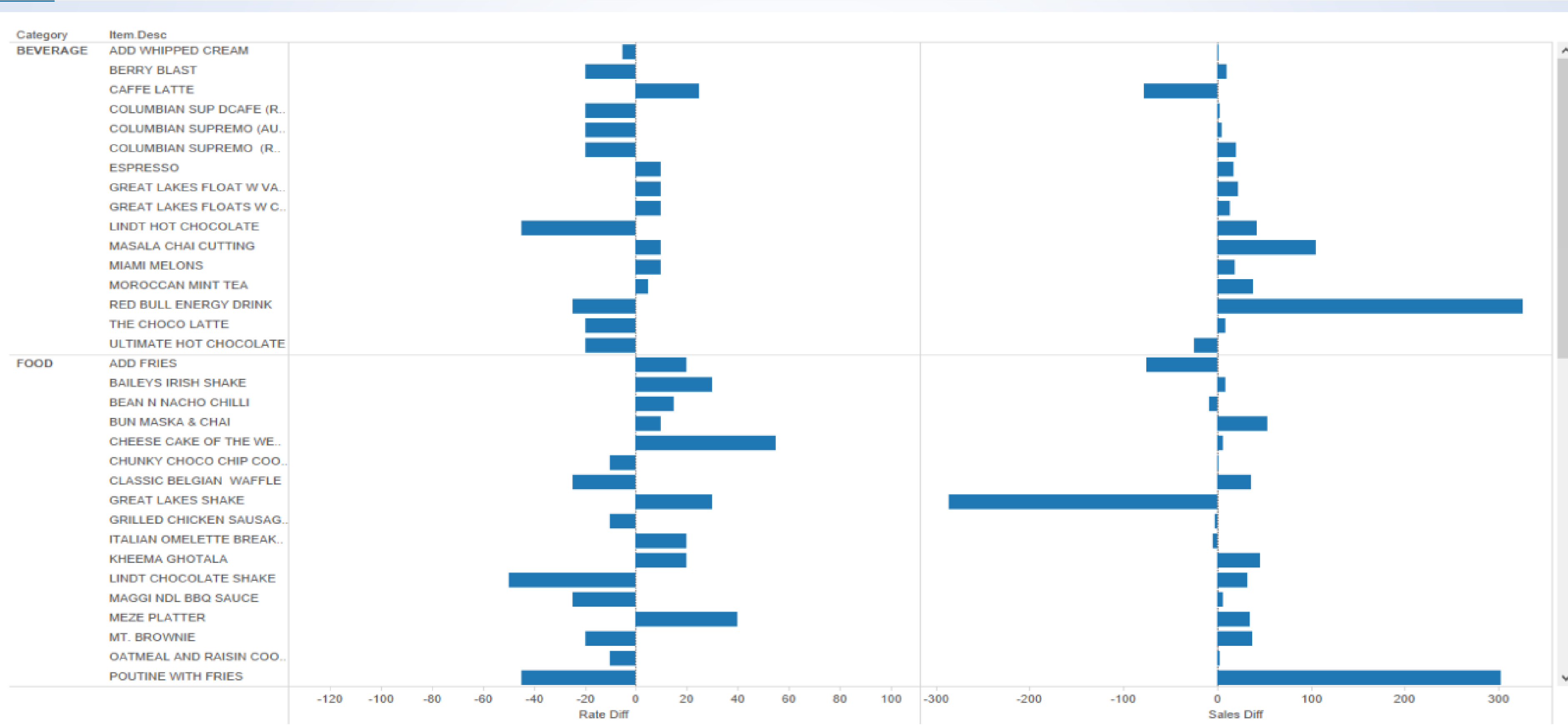

Culcutta Mint and Sambuca have increased the price by 100

Items With Negative Price Change

The negative price change ranges from 5 to 125

Tensee chicken wings

Price Change Vs. Sales volume Change

Top selling Category of the product for the Café is Tobacco, Food, Beverage, Liquor.

- Sales of most products starts increasing on Friday and reaches a peak on Saturday
- Sales of most products starts increasing on Friday and reaches a peak on Saturday
- food , beverage and Liquor and tobacco are the categories of product sold mostly in night
- Tobacco and Wine are sold throughout the day but increases up in night.
- Sales of products increases from June and peak up in Dec month.

Thank you!

The End