

Coffee Chain Tableau Project

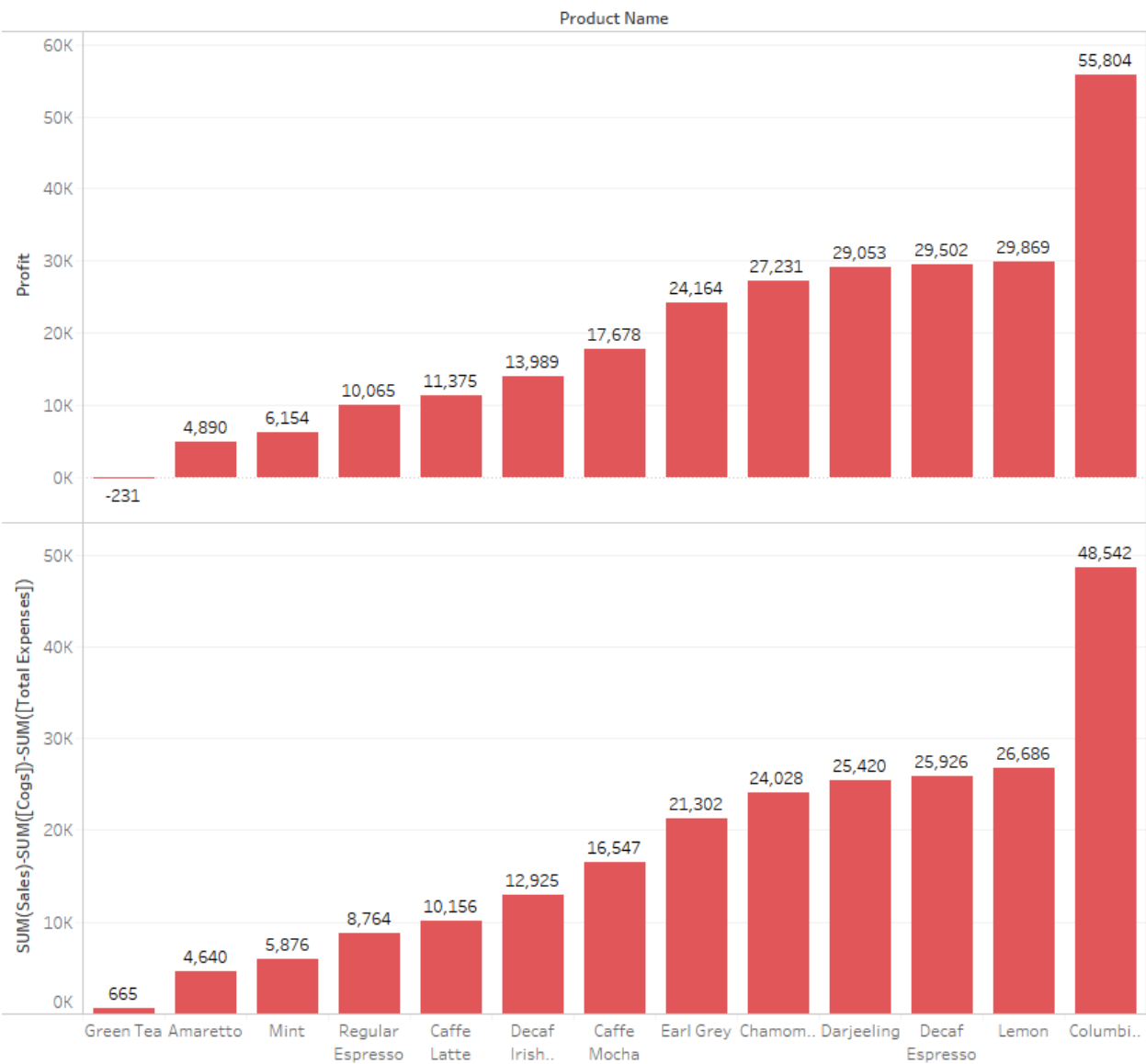
Group 3

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Exploration Set 1 - Determining data integrity using Tableau

When looking at this data set, what we are most interested in are sales, profits, and profit drivers. Therefore, we chose to first take a look at the integrity of the data with reference to profit and product SKUs.

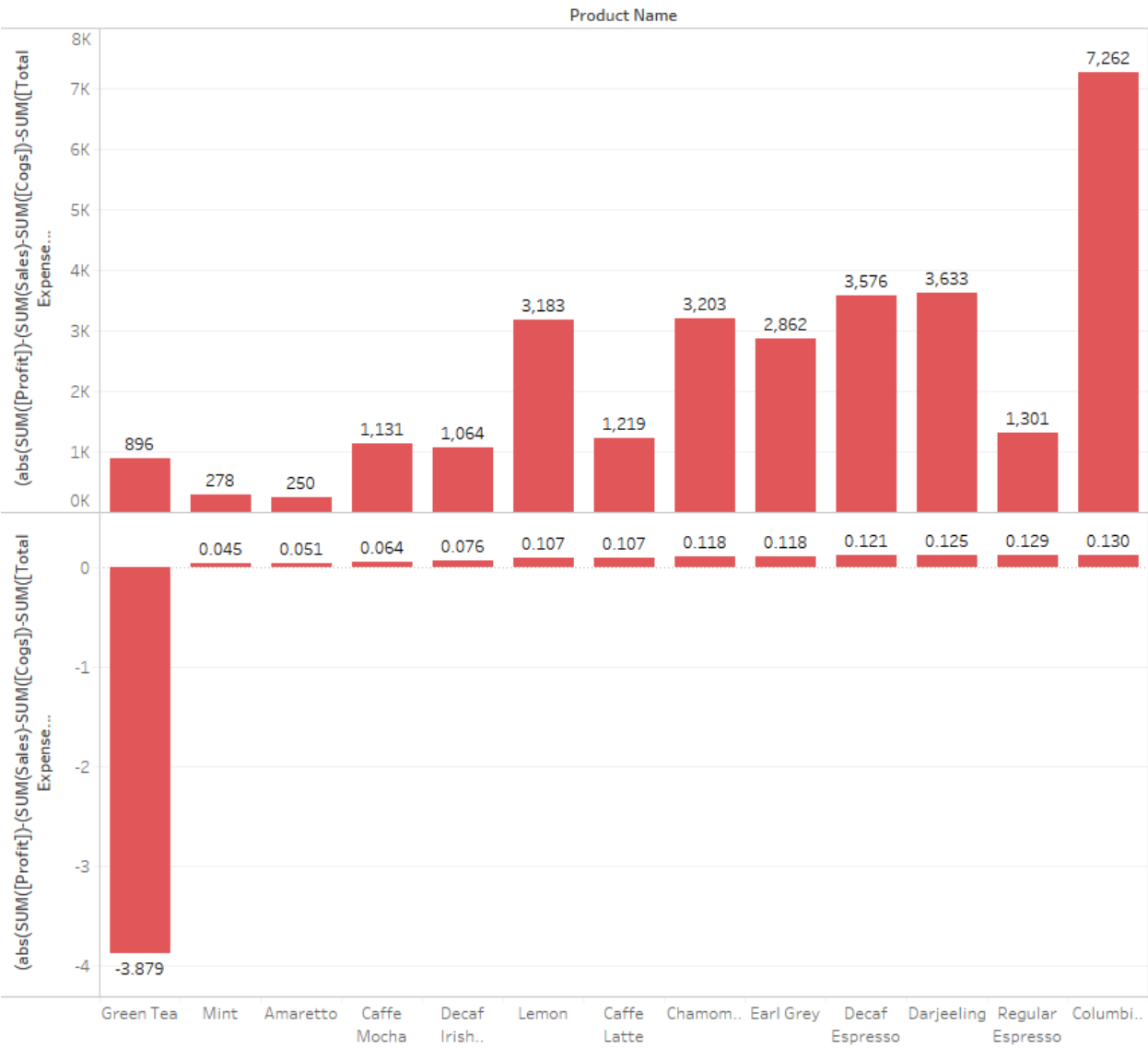
Profit by Type vs Calculated Profit by Type



Sum of Profit and SUM(Sales)-SUM(Cogs)-SUM(Total Expenses) for each Product Name.

Next, we calculated the difference between entered profit & calculated profit, again by product, and calculated the percentage by which the two differed using the entered profit as the base.

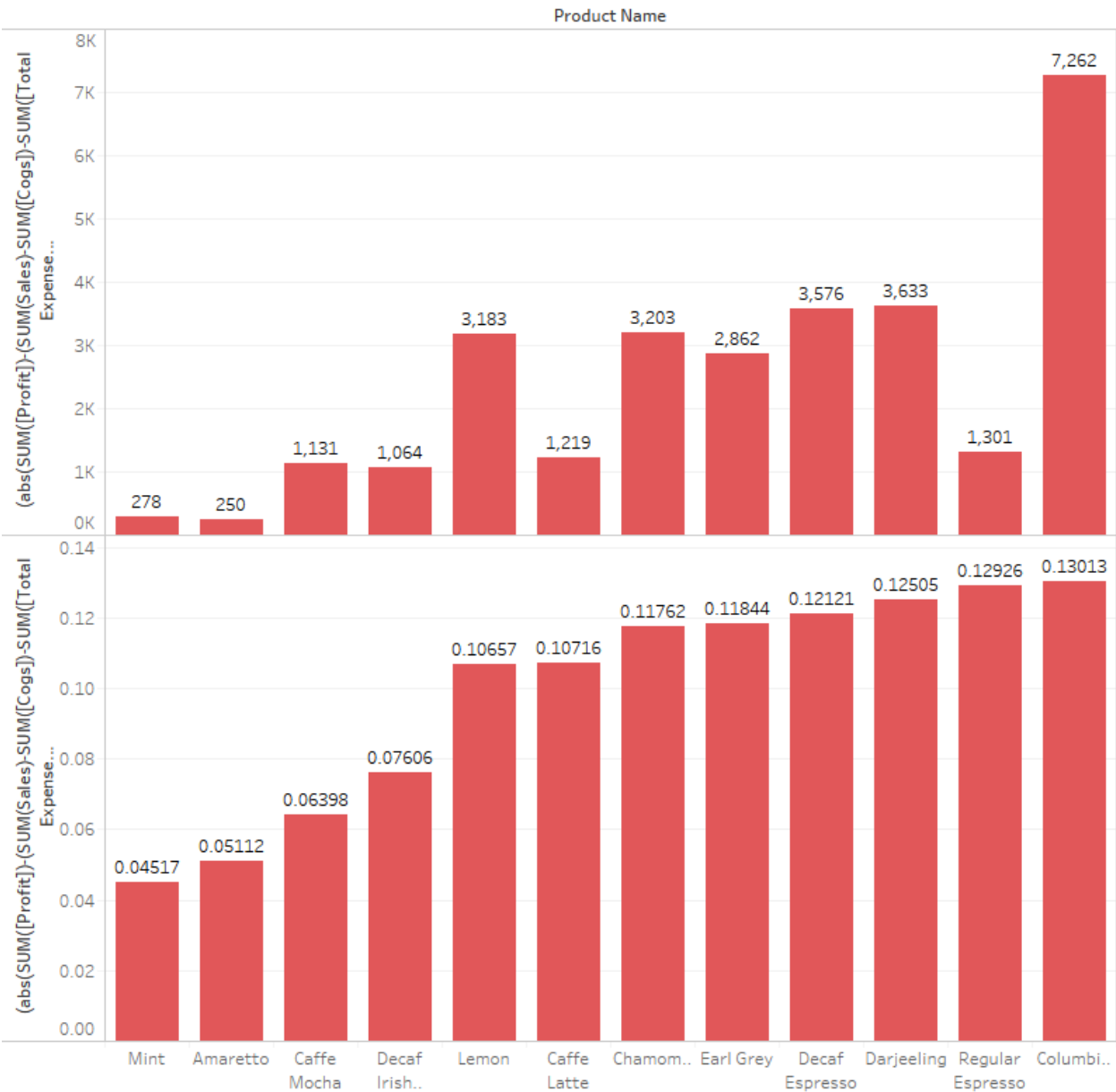
Difference between Profit & Calculated Profit by Product



(abs(SUM([Profit])-(SUM(Sales)-SUM([Cogs])-SUM([Total Expense... and (abs(SUM([Profit])-(SUM(Sales)-SUM([Cogs])-SUM([Total Expense... for each Product Name.

While it is obvious that green tea’s differential as a percentage is horrendous, it is not conducive to our analysis as it makes it seem as if the other’s error is marginal by comparison. Here’s the same graph without green tea.

Difference between Profit & Calculated Profit by Product



(abs(SUM([Profit])-(SUM(Sales)-SUM([Cogs]))-SUM([Total Expense... and (abs(SUM([Profit])-(SUM(Sales)-SUM([Cogs]))-SUM([Total Expense... for each Product Name. The view is filtered on Product Name, which excludes Green Tea.

As you can see, there are marked differences between the data, to be overly sure, we ran the data through a few IF statements on excel. We found that the former half of the data, for the most part was error-free. But the latter half was littered with errors, in fact, we found at least 49.55% of the data was incorrect in some way. (2105/2948)

1	Margin	Sales	Cogs	Calculated Margin	Total Expenses	Calculated Profit	Calculated Profit v2	if Margin = calculated Margin	if Profit = Calculated profit (s - cogs - te)	if Profit = calculated profit (margin - TE)
134	105	190	85	105	66	39	39	TRUE	TRUE	TRUE
135	228	456	228	228	88	140	140	TRUE	TRUE	TRUE
136	145	250	105	145	128	17	17	TRUE	TRUE	TRUE
137	312	546	234	312	109	203	203	TRUE	TRUE	TRUE
138	139	234	95	139	37	102	102	TRUE	TRUE	TRUE
139	245	452	207	245	85	160	160	TRUE	TRUE	TRUE
140	107	190	83	107	40	67	67	TRUE	TRUE	TRUE
141	130	219	89	130	36	94	94	TRUE	TRUE	TRUE
142	80	134	54	80	26	54	54	TRUE	TRUE	TRUE
143	108	180	72	108	54	54	54	TRUE	TRUE	TRUE
144	50	145	95	50	52	-2	-2	TRUE	TRUE	TRUE
145	407	678	271	407	145	262	262	TRUE	TRUE	TRUE
146	-26	118	144	-26	91	-117	-117	TRUE	TRUE	TRUE
147	26	43	17	26	15	11	11	TRUE	TRUE	TRUE
148	27	45	18	27	17	10	10	TRUE	TRUE	TRUE
149	26	43	17	26	15	11	11	TRUE	TRUE	TRUE
150	34	62	28	34	30	4	4	TRUE	TRUE	TRUE
151	145	250	105	145	129	16	16	TRUE	TRUE	TRUE
152	201	345	144	201	90	111	111	TRUE	TRUE	TRUE
153	139	234	95	139	53	86	86	TRUE	TRUE	TRUE
154	312	546	234	312	109	203	203	TRUE	TRUE	TRUE
155	228	456	228	228	87	141	141	TRUE	TRUE	TRUE
156	-245	17	245	-228	126	-354	-371	FALSE	TRUE	FALSE
157	42	76	34	42	45	-3	-3	TRUE	TRUE	TRUE
158	72	130	58	72	56	16	16	TRUE	TRUE	TRUE
159	80	140	60	80	47	33	33	TRUE	TRUE	TRUE
160	171	341	170	171	72	99	99	TRUE	TRUE	TRUE
161	83	140	57	83	41	42	42	TRUE	TRUE	TRUE
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1	Margin	Sales	Cogs	Calculated Margin	Total Expenses	Calculated Profit	Calculated Profit v2	if Margin = calculated Margin	if Profit = Calculated profit (s - cogs - te)	if Profit = calculated profit (margin - TE)
4216	420	745	279	466	149	317	271	FALSE	FALSE	FALSE
4217	-32	205	224	-19	117	-136	-149	FALSE	FALSE	FALSE
4218	329	614	247	367	114	253	215	FALSE	FALSE	FALSE
4219	251	534	250	284	94	190	157	FALSE	FALSE	FALSE
4220	-294	33	294	-261	145	-406	-439	FALSE	FALSE	FALSE
4221	187	343	135	208	155	53	32	FALSE	FALSE	FALSE
4222	310	569	224	345	116	229	194	FALSE	FALSE	FALSE
4223	185	332	127	205	63	142	122	FALSE	FALSE	FALSE
4224	43	46	0	46	12	34	31	FALSE	FALSE	FALSE
4225	25	44	16	28	15	13	10	FALSE	FALSE	FALSE
4226	35	62	23	39	18	21	17	FALSE	FALSE	FALSE
4227	49	94	39	55	48	7	1	FALSE	FALSE	TRUE
4228	38	74	31	43	30	13	8	FALSE	FALSE	FALSE
4229	44	78	29	49	19	30	25	FALSE	FALSE	FALSE
4230	133	236	88	148	60	88	73	FALSE	FALSE	FALSE
4231	186	341	134	207	65	142	121	FALSE	FALSE	FALSE
4232	36	64	24	40	17	23	19	FALSE	FALSE	FALSE
4233	104	197	81	116	38	78	66	FALSE	FALSE	FALSE
4234	57	110	46	64	51	13	6	FALSE	FALSE	FALSE
4235	73	135	54	81	45	36	28	FALSE	FALSE	FALSE
4236	153	326	153	173	66	107	87	FALSE	FALSE	FALSE
4237	65	119	47	72	72	0	-7	FALSE	FALSE	FALSE
4238	57	104	41	63	56	7	1	FALSE	FALSE	TRUE
4239	60	108	41	67	35	32	25	FALSE	FALSE	FALSE
4240	66	114	41	73	36	37	30	FALSE	FALSE	FALSE
4241	63	113	43	70	35	35	28	FALSE	FALSE	FALSE
4242	76	140	55	85	79	6	-3	FALSE	FALSE	FALSE
4243	174	308	115	193	69	124	105	FALSE	FALSE	FALSE
4244	71	128	49	79	25	54	46	FALSE	FALSE	FALSE
4245	32	60	24	36	19	17	13	FALSE	FALSE	FALSE
4246	80	155	65	90	57	33	23	FALSE	FALSE	FALSE
4247	96	188	80	108	45	63	51	FALSE	FALSE	FALSE
4248	104	188	72	116	46	70	58	FALSE	FALSE	FALSE
4249	145	266	105	161	125	36	20	FALSE	FALSE	FALSE
4250					# of FALSE statements			2088	2093	2105

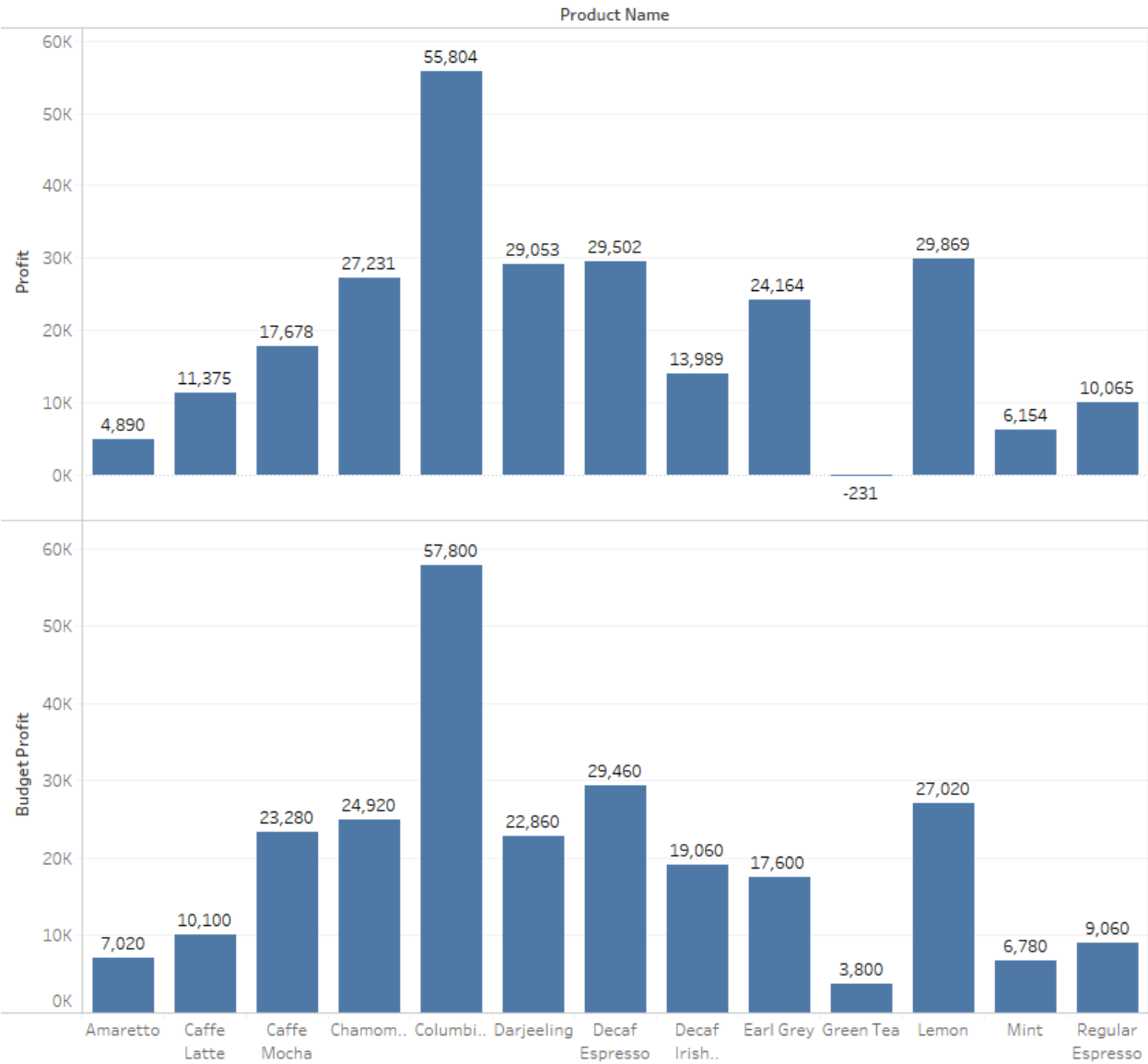
Formulas we used (conditional formatting was used to determine TRUE/FALSE statements):

	A	B	C	D	E	F	G	H	I	J	K
1	Profit	Margin	Sales	Cogs	Calculated Margin	Total Expenses	Calculated Profit	Calculated Profit v2	if Margin = calculated Margin	if Profit = Calculated profit (s - cogs - te)	if Profit = calculated profit (margin - TE)
4249	30	145	266	105	=C4249-D4249	125	=C4249-D4249-F4249	=B4249-F4249	=IF(E4249=B4249,TRUE)	=IF(G4249=A4249,TRUE)	=IF(H4249=A4249,TRUE)
4250						# of FALSE statements			=COUNTIF(I1:I4249,FALSE)	=COUNTIF(J1:J4249,FALSE)	=COUNTIF(K1:K4249,FALSE)

Seeing as Tableau is a data visualization tool, we chose not to clean the data beforehand, therefore any statements made after this are made using entered data, we are not considering the amount of error when making our calculations. Considering about half the data is prone to error, it is possible that even records which show to be TRUE may have been entered incorrectly. Therefore, we attribute this to human error, but any conclusions we draw must consider the invalidity of the data.

After verifying the integrity of the data, we chose to compare budgeted profits to actual profits per product SKU.

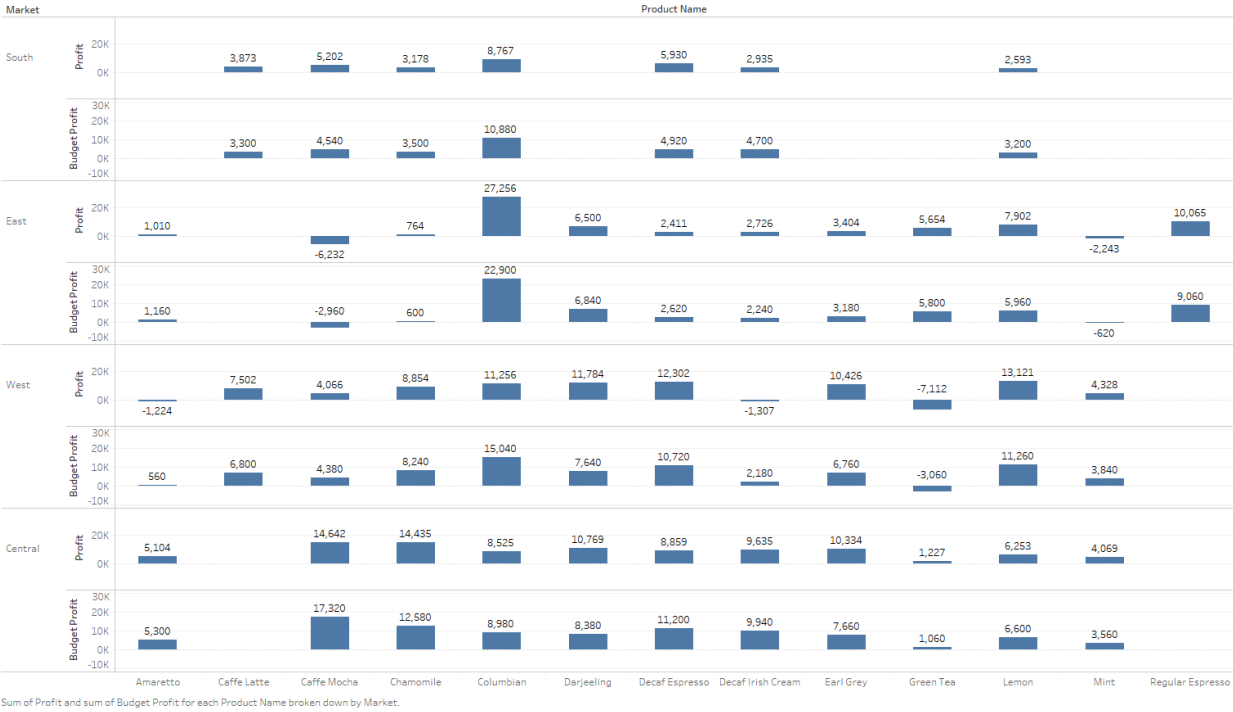
Profit v Budgeted Profit



Sum of Profit and sum of Budget Profit for each Product Name.

We then wanted to check budgeted profit vs actual profit again, but based on market location as well:

Profit v Budgeted Profit by Market Location

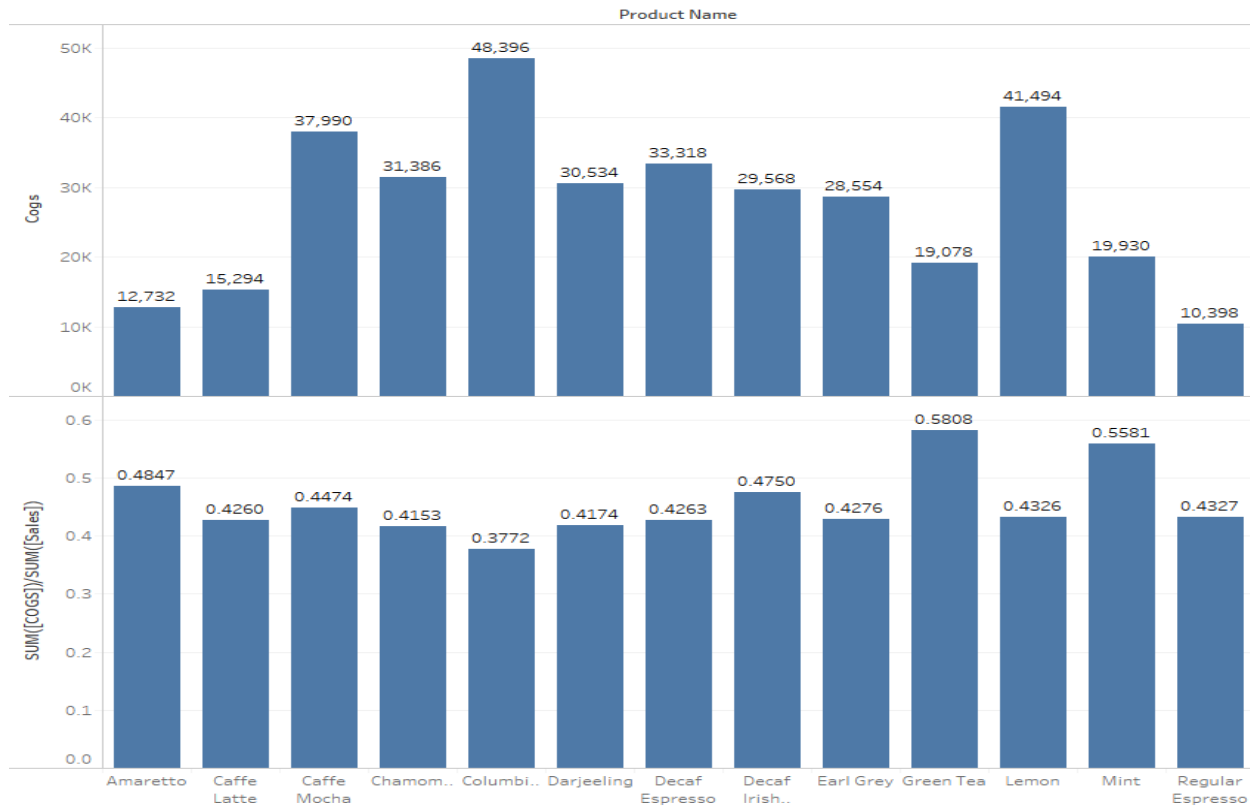


Sum of Profit and sum of Budget Profit for each Product Name broken down by Market.

Green tea is an obvious underperformer, only marginally outperforming in the market where it's sales expected to the weakest. It should be noted that Darjeeling is a star SKU in the central and west markets; Columbian is the same in the eastern market. There do not appear to be any star performers in the southern market, aside from Decaf Espresso, whose profits outperformed the budget by 20%.

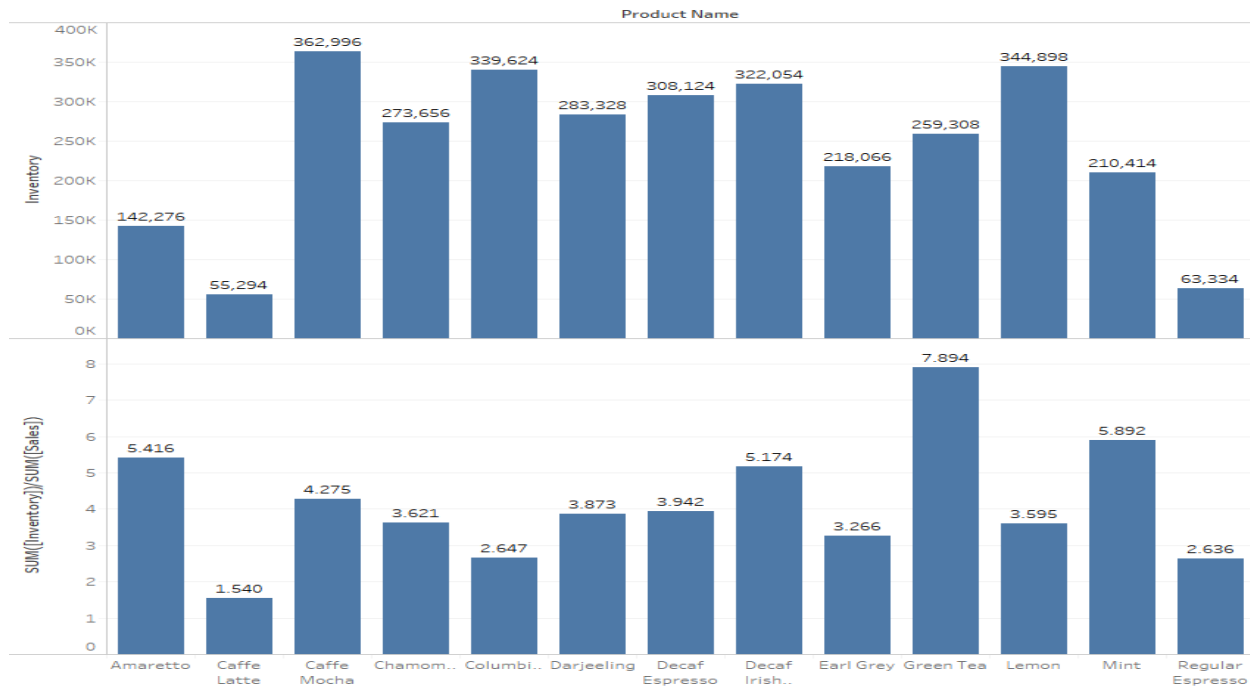
Next, we wanted to have an idea of expenses for each product SKU, and as a percentage of sales. The next 3 worksheets display COGs, Inventory, & SG&A for each SKU, and as a percentage of sales.

COGS & COGS/Sales



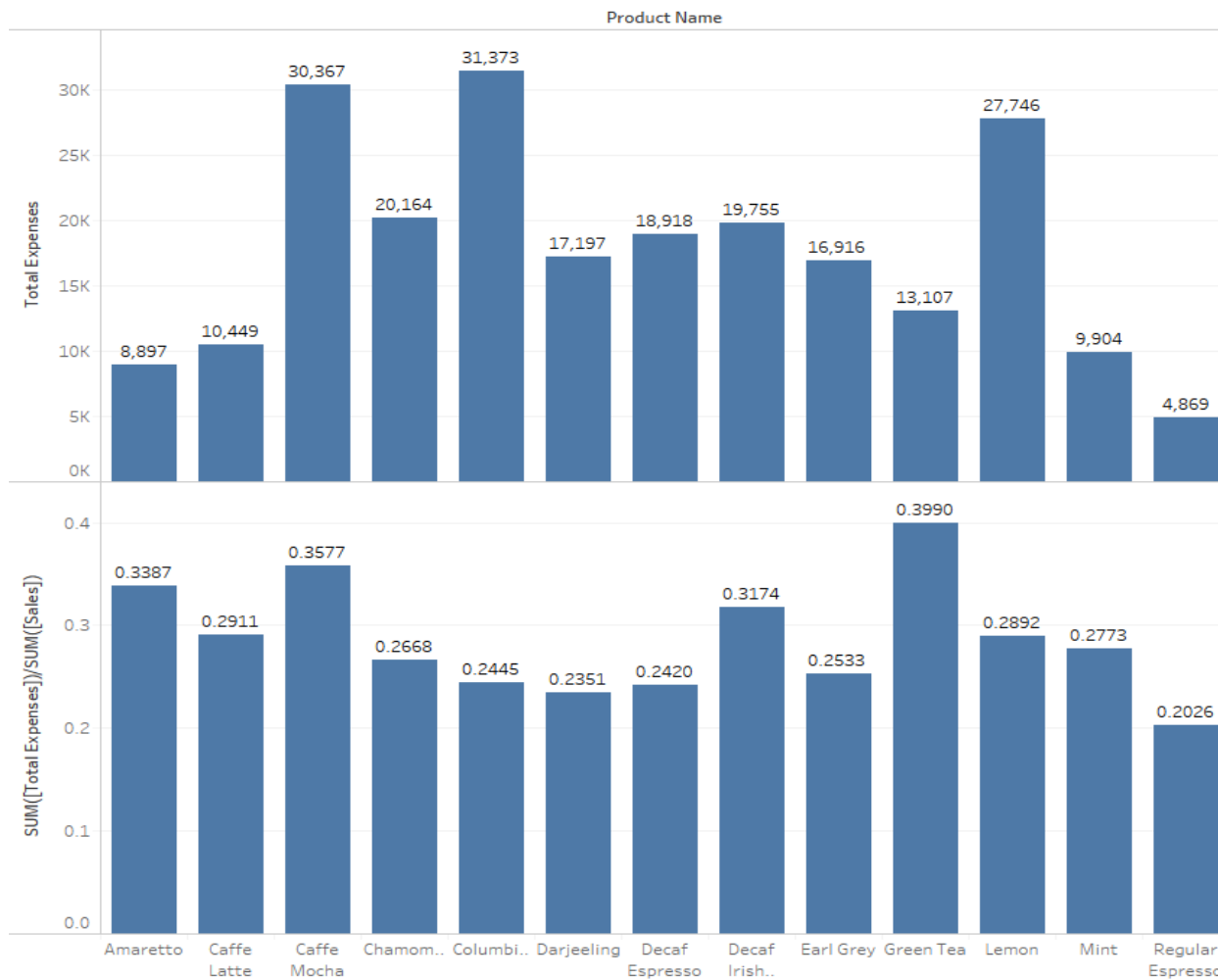
Sum of Cogs and SUM([COGS])/SUM([Sales]) for each Product Name.

Inventory & Inventory/Sales



Sum of Inventory and SUM([Inventory])/SUM([Sales]) for each Product Name.

SG&A & SG&A/Sales



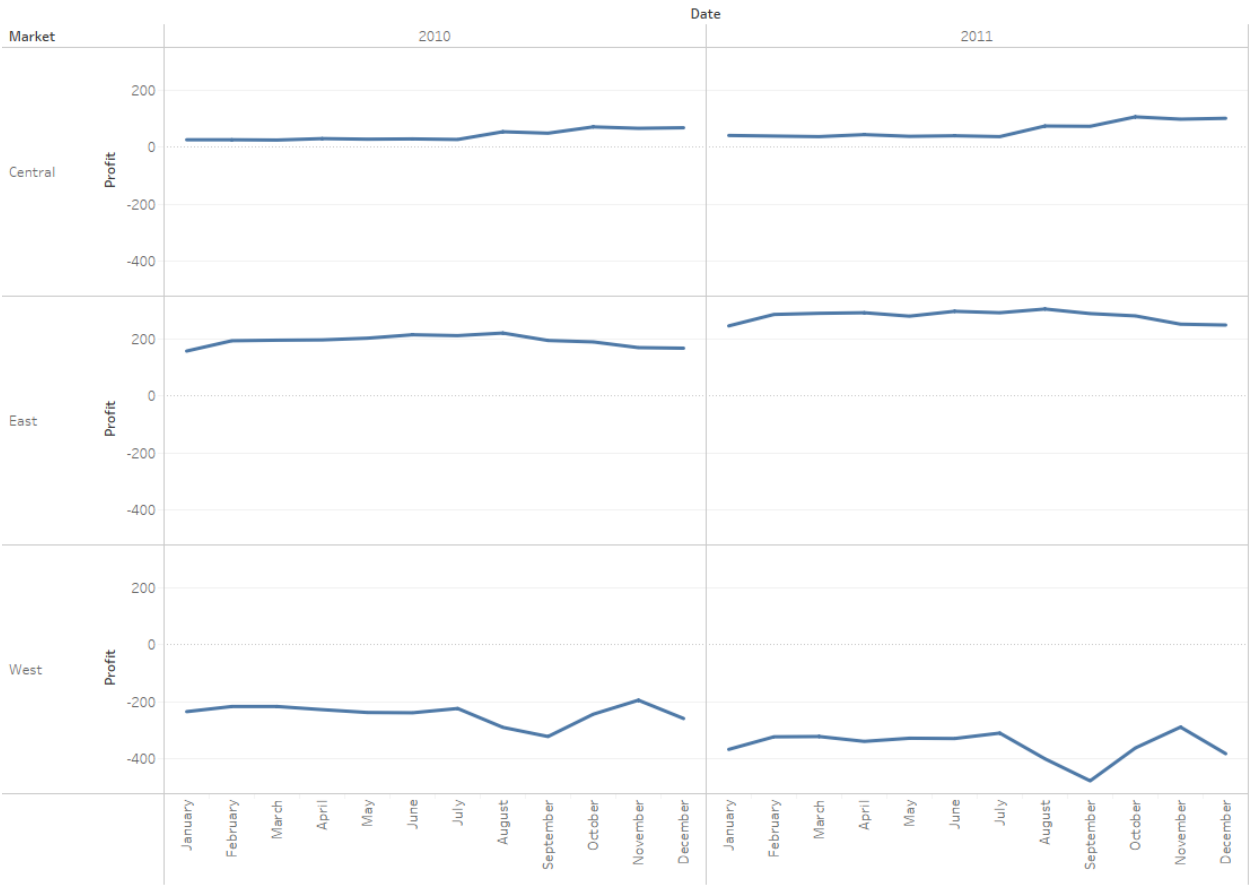
Sum of Total Expenses and SUM([Total Expenses])/SUM([Sales]) for each Product Name.

Upon further inspection, a bar graph as an aggregate of inventory was the incorrect way to display the data. We had wanted to find an inventory turnover ratio to see whether or not the company was optimizing their usage of inventory over the year, however, we had some questions about the dataset and could not find average inventory for 2011. We'd like to believe that they aren't holding quite as much inventory as shown in the aggregate bar graphs.

In particular, Green Tea again seems to have a very high COGS/sales ratio as well as a high SG&A/sales ratio. Seeing as it seems to be the obvious underperformer. We chose to then home in on the SKU to decide whether or not it was worth keeping the SKU at the coffee house at all.

We created a line graph of profit/time by different markets to isolate the markets in which Green Tea seems to be losing the most money in.:

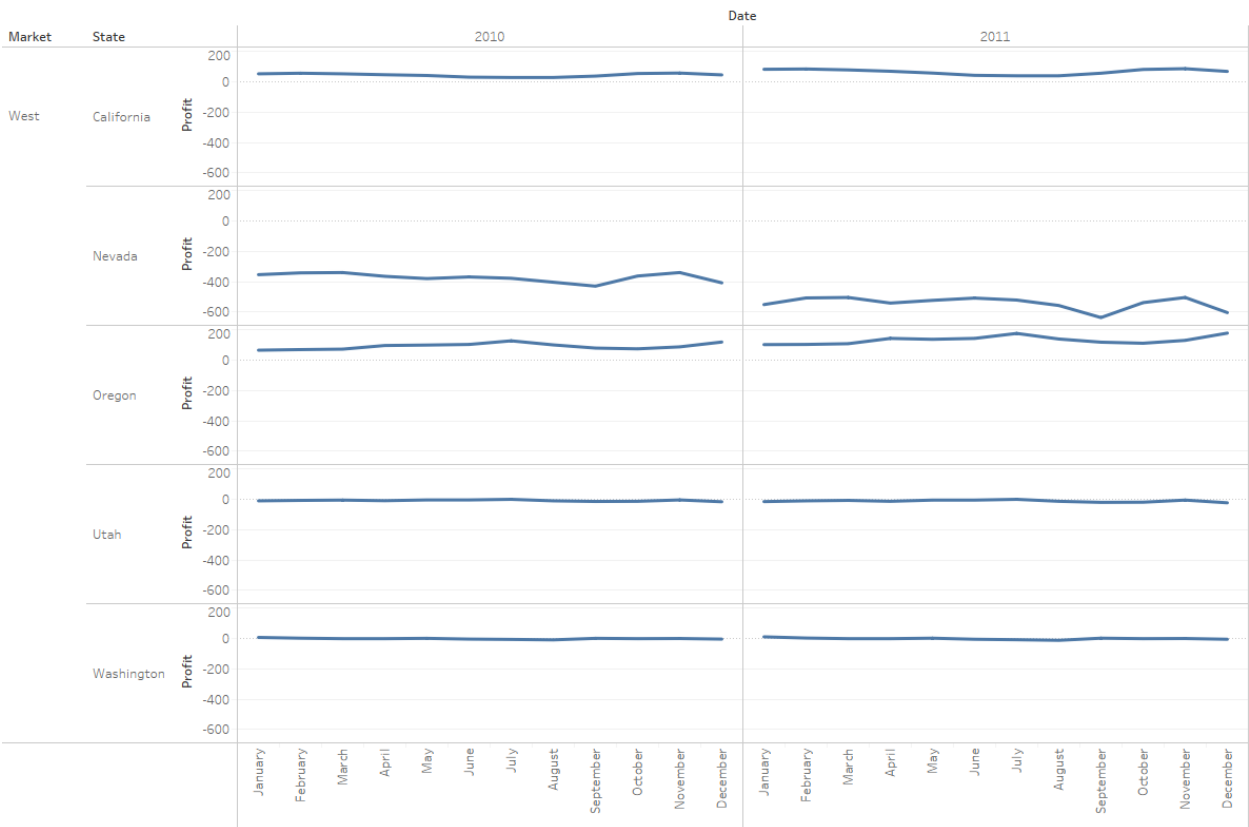
Green Tea Sales/Time by Market



The trend of sum of Profit for Date Month broken down by Date Year vs. Market. The data is filtered on Product Name, which keeps Green Tea.

Throughout both 2010 & 2011, Green Tea lost money in the western market. We dug deeper to see if there are any particular problem states:

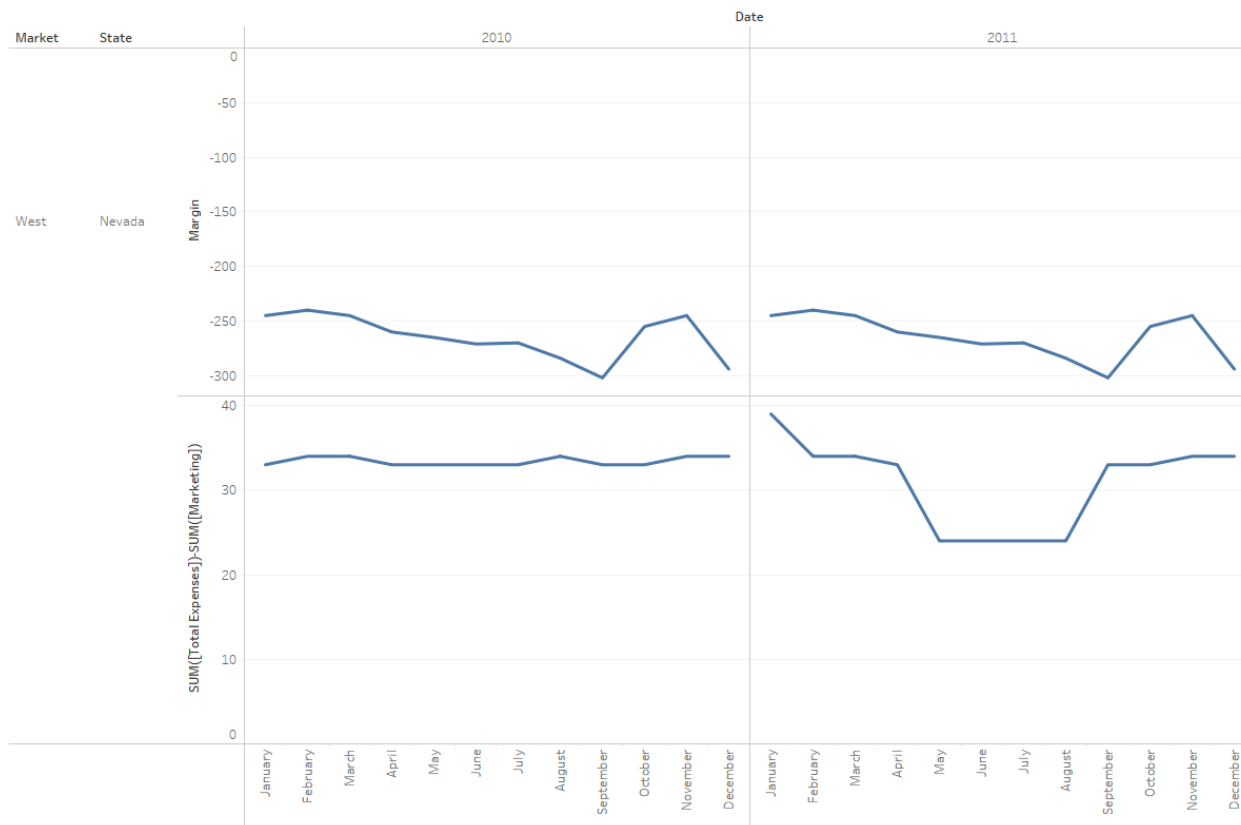
Green Tea Sales/Time by Western States



The trend of sum of Profit for Date Month broken down by Date Year vs. Market and State. The data is filtered on Product Name, which keeps Green Tea. The view is filtered on Market, which excludes Central and East.

It became very obvious that Nevada was driving Green Tea profits down by a large margin. We then compared Margin to SG&A less marketing expenses to see whether or not keeping the SKU in the state was even worth it to allocate fixed expenses:

Margin v. Fixed Expenses in Nevada



The trends of sum of Margin and SUM([Total Expenses])-SUM([Marketing]) for Date Month broken down by Date Year vs. Market and State. The data is filtered on Product Name, which keeps Green Tea. The view is filtered on Market and State. The Market filter excludes Central and East. The State filter excludes California, Oregon, Utah and Washington.

After seeing this graph, we realized we'd jumped the gun. Even before we could consider fixed expenses, sales were so abysmal in Nevada that they didn't even cover the cost of selling in the state.

Conclusions:

- Green Tea is currently operating as a downward profit driver, an easy first step would be to stop selling it in the state of Nevada as that alone would make it profitable if not almost profitable
- Darjeeling, Columbian, and Decaf Espresso are all star SKUs in particular markets, consider pushing sales for all 3 SKUs with marketing promotions in their respective markets?
- Consider testing SKUs for price elasticity, could potentially make more money by increasing margin on well-selling SKUs, tea/coffee are usually suitable substitutes for each other, therefore increasing the price on the most popular SKUs may increase profits by marginally decreasing sales of higher-priced SKUs but customers will potentially move to lower-priced SKUs

Exploration Set 2 – Using Tableau to Identify Overall Business Performance

Problem

First, let's take a look at overall sales on Diagram 1 for the coffee chain for 2010 and 2011. Profits vs sales are denoted by the color field to the right. 2010 was not a profitable year (Sales in 2010 was \$1,135,057 less than it is in 2011). However, 2011 shows to have more stable balance between sales and profits.

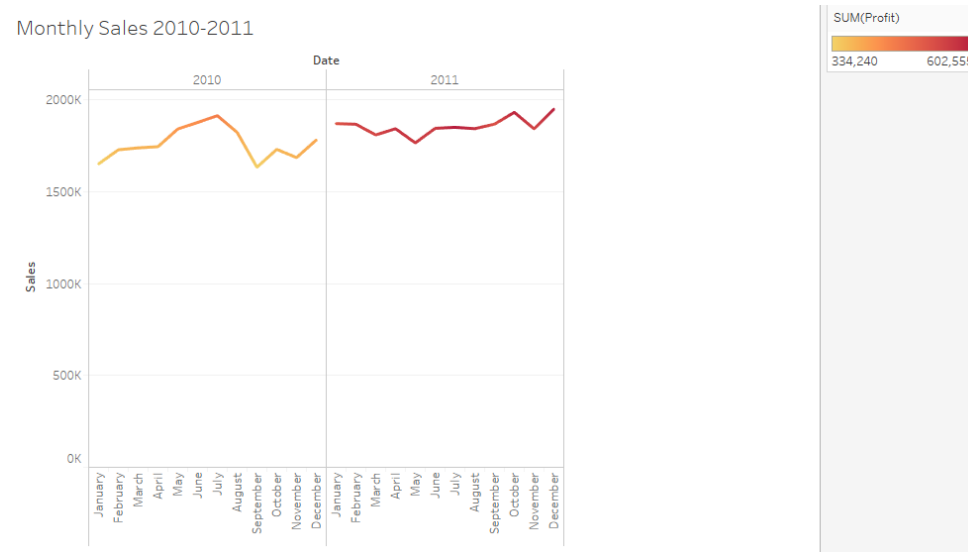


Diagram 1

As shown on Diagram 2, we can drill down to see the annual sales total by product types to see which products are doing better than others.

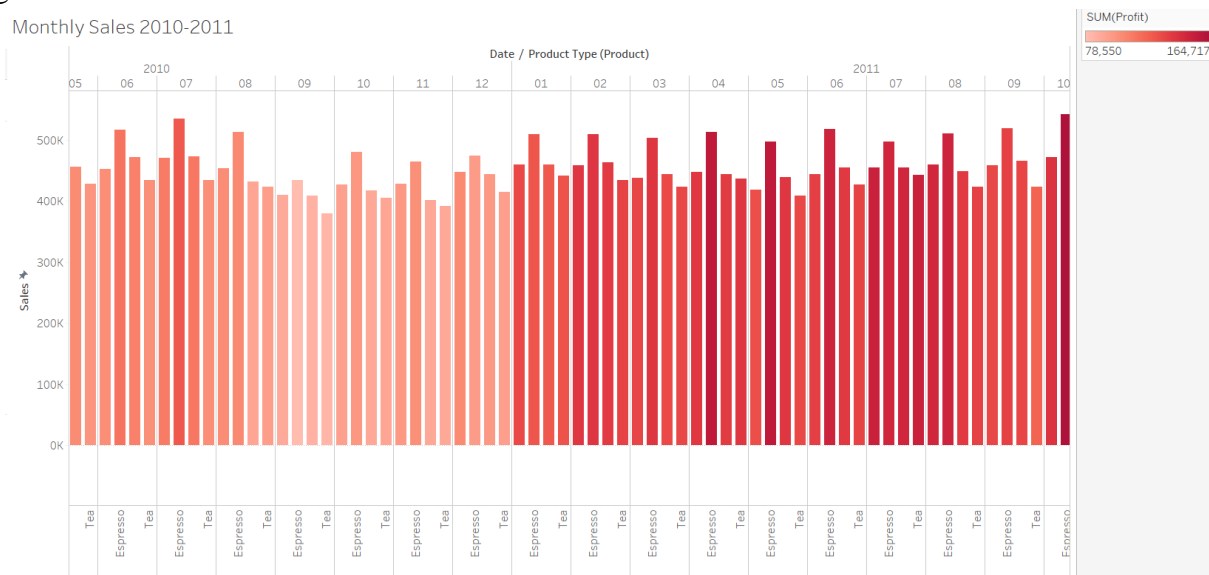


Diagram 2

According to the diagram, in overall, espressos produced the highest profit while tea profits seem to be the lowest performing product type. Espresso, coffee, and herbal tea have become more profitable in 2017. The sales of teas have a steady growth rate in 2011, however its sales in the first half of the year is lower than the second half of the year in 2011. Generally, sales including all types of product are comparatively low in the first half of the year in 2011.

We can get a broader picture of each product with a bar graph. This graph represents the actual sales for all the products organized by market type.

As on Diagram 3, the east region have the lowest sale and west market appears to have the strongest presence in sales. But how profitable is the coffee chain?

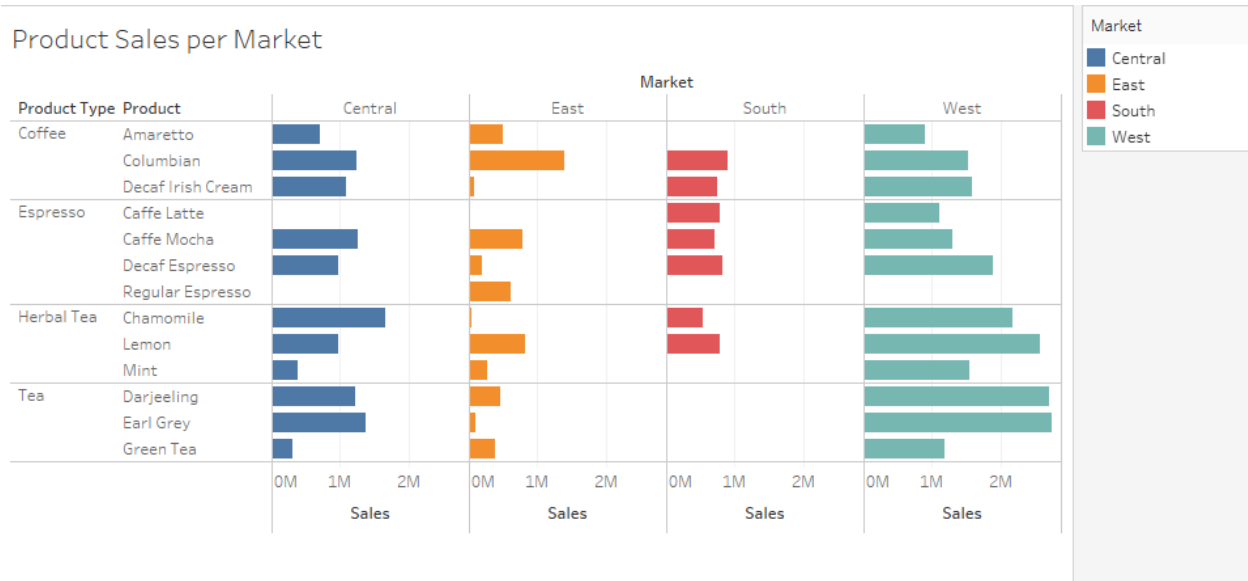


Diagram 3

This bar graph represents the actual profits that each product produced within each market. Overall, the coffee chain appears to be profitable with their products. On the market level, the east may be struggling a bit to be profitable. However, in the west, there is one product type that is causing negative profits: green tea; besides of that, decaf Irish cream has some loss in profit in the south market, the sale of Caffe Mocha made a loss of \$10,258 in the east region. (Diagram 4)

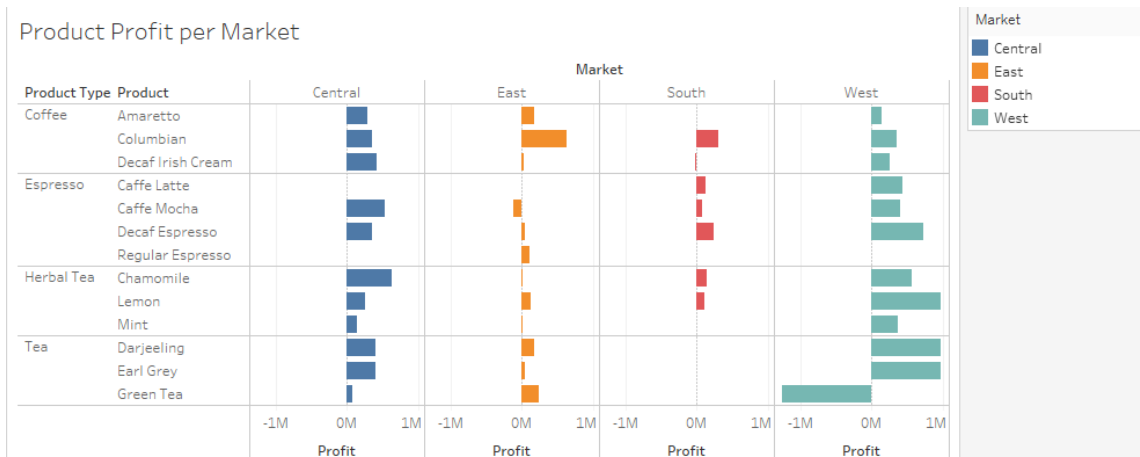


Diagram 4

We can create a crosstab view of sales on Diagram 5 with profit color coded to see the actual numbers.

Monthly Sales 2010-2011

		Date										
Product Type	Year of Date	January	February	March	April	May	June	July	August	Septemb..	October	Novemb
Coffee	2010	384,348	434,056	447,939	456,396	462,454	463,024	487,391	444,685	382,544	437,146	412,9
	2011	431,394	452,587	466,952	448,970	430,675	498,044	471,893	413,720	473,998	462,450	446,7
Espresso	2010	421,458	406,765	429,089	391,824	426,994	447,546	393,392	428,012	405,772	405,262	432,5
	2011	491,439	480,959	434,045	457,571	422,464	398,505	458,282	435,716	425,404	490,616	442,0
Herbal Tea	2010	441,108	471,287	447,849	472,764	513,292	516,895	556,171	509,360	440,206	463,780	447,7
	2011	504,046	515,676	469,362	501,562	459,098	494,886	506,091	526,697	488,245	495,615	502,5
Tea	2010	404,027	415,440	412,950	423,538	437,924	448,662	476,186	440,016	404,211	423,587	392,0
	2011	443,070	417,170	437,969	434,151	452,747	452,780	413,511	466,163	479,389	482,725	449,9
		<	>									

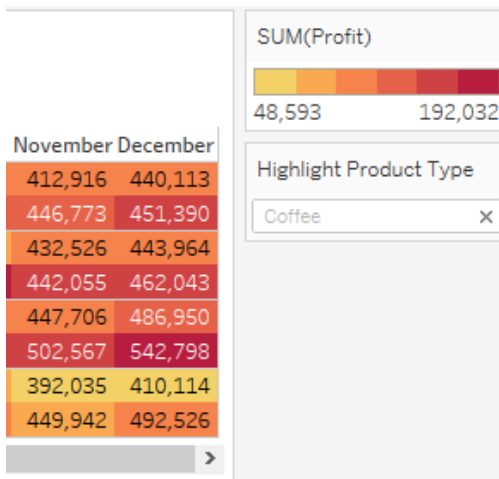


Diagram 5

The data can also be represented geographically. In this example, we can see profits (color) vs sales (size of circles) listed per market and state (Diagram 6).

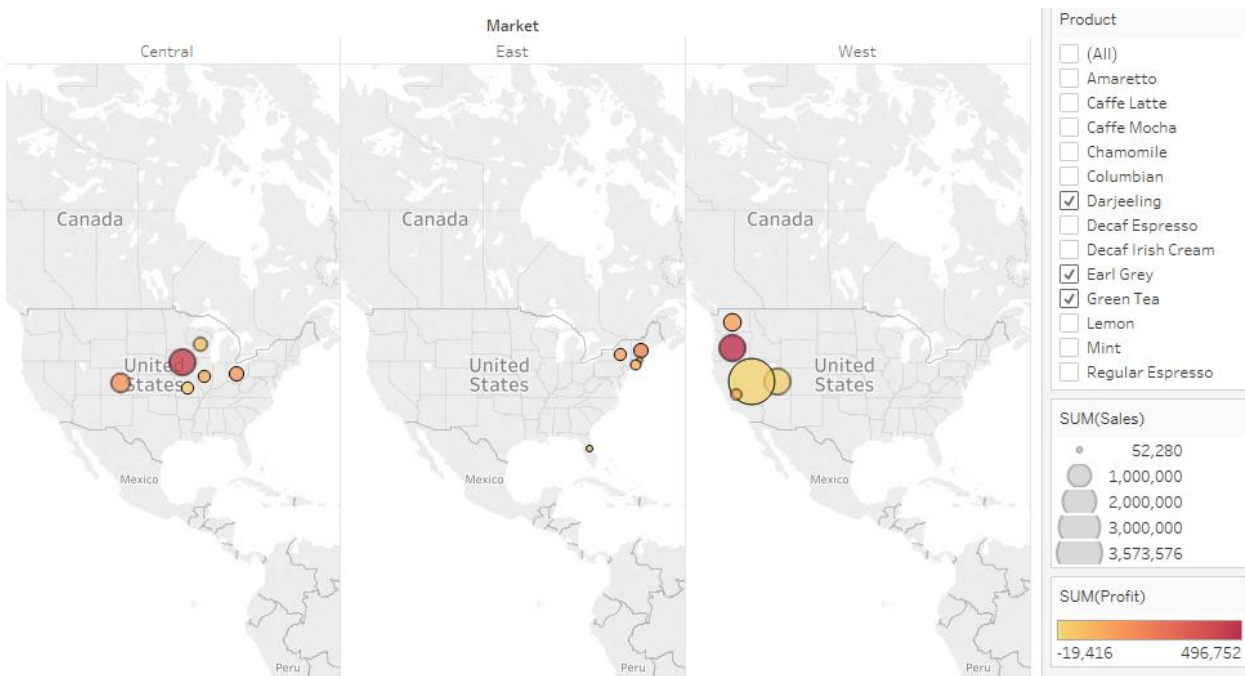


Diagram 6

We can go back to the basic bar graph to see that tea is the least profitable product type.

Sales by Product Type with Profit

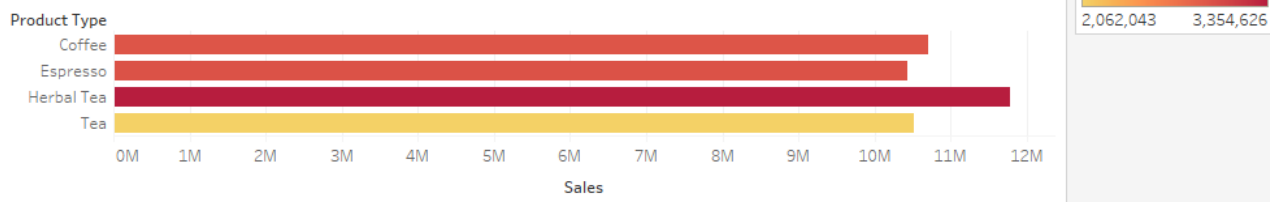


Diagram 7

Then drill down to see how well each individual product is doing:

Sales by Product Type with Profit

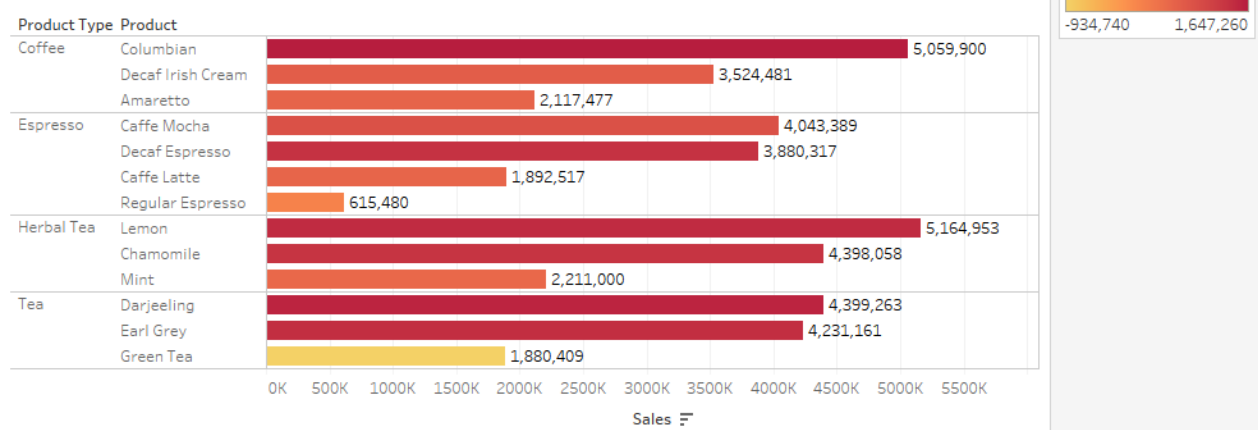


Diagram 8

Although the category Tea is not profitable overall, by drilling down, we can see that actually the only product that is bringing down profits is green tea. Darjeeling and Earl Grey are doing well in both sales and profitability.

We can drill down again to see if the loss of profit is overall across the markets or specific: Looks like green tea is only doing poorly from a profitable stand point in the Western Market.

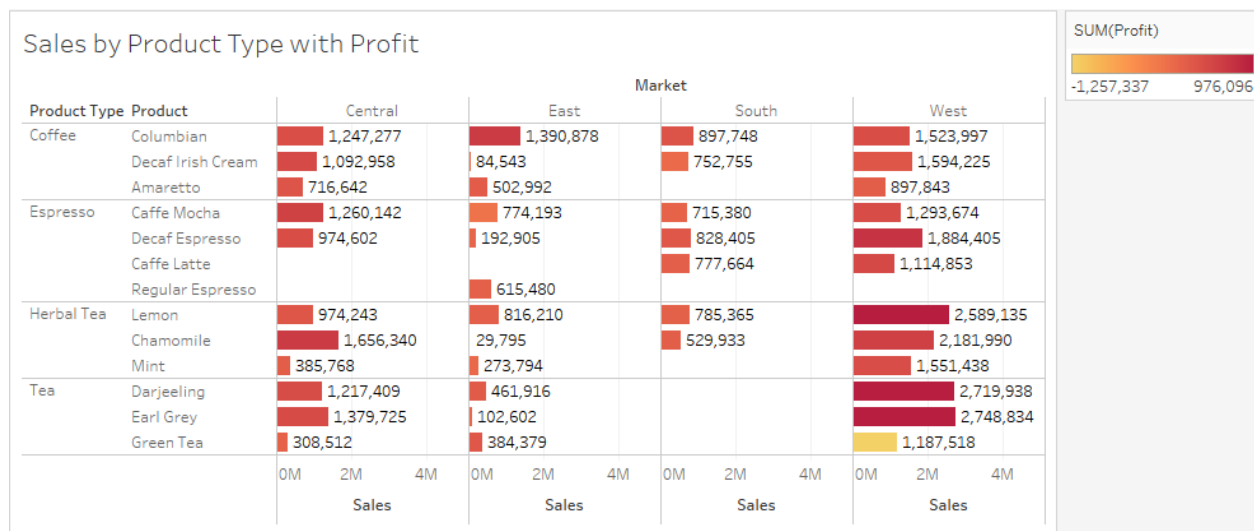


Diagram 9

What can this coffee chain do to increase profits of green tea in the west? First, we need to analyze the data to see what is causing profits to sink. The simplest cause for loss of profits is if a company’s resale is lower than costs. We can compare the COGS against actual sales for green tea in all markets (south market not shown since there were no sales in the south):

COGS vs Sales for Green Tea

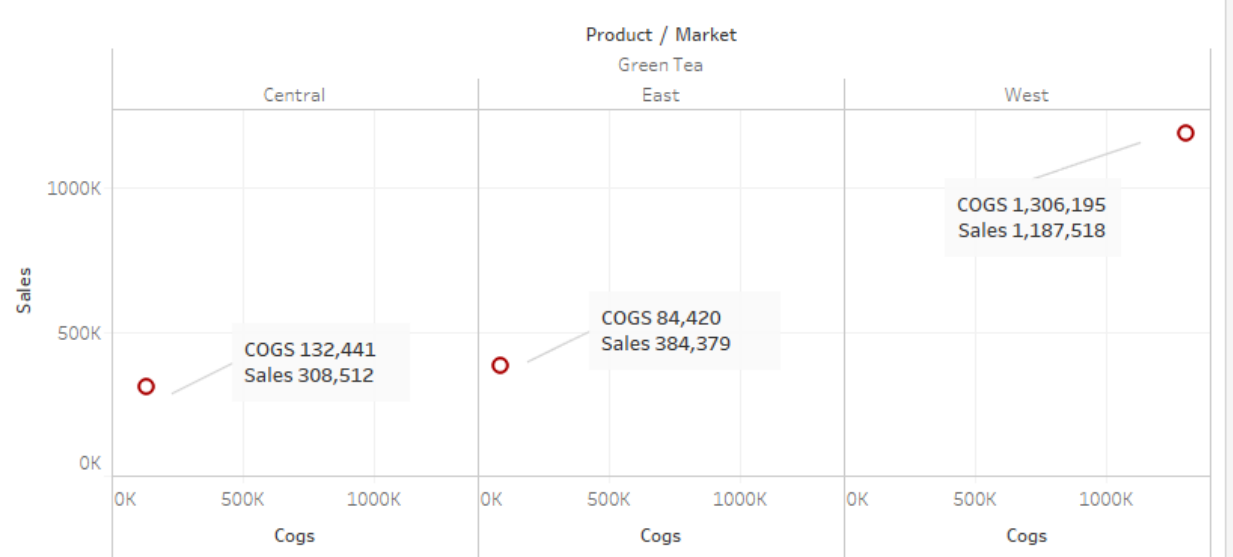
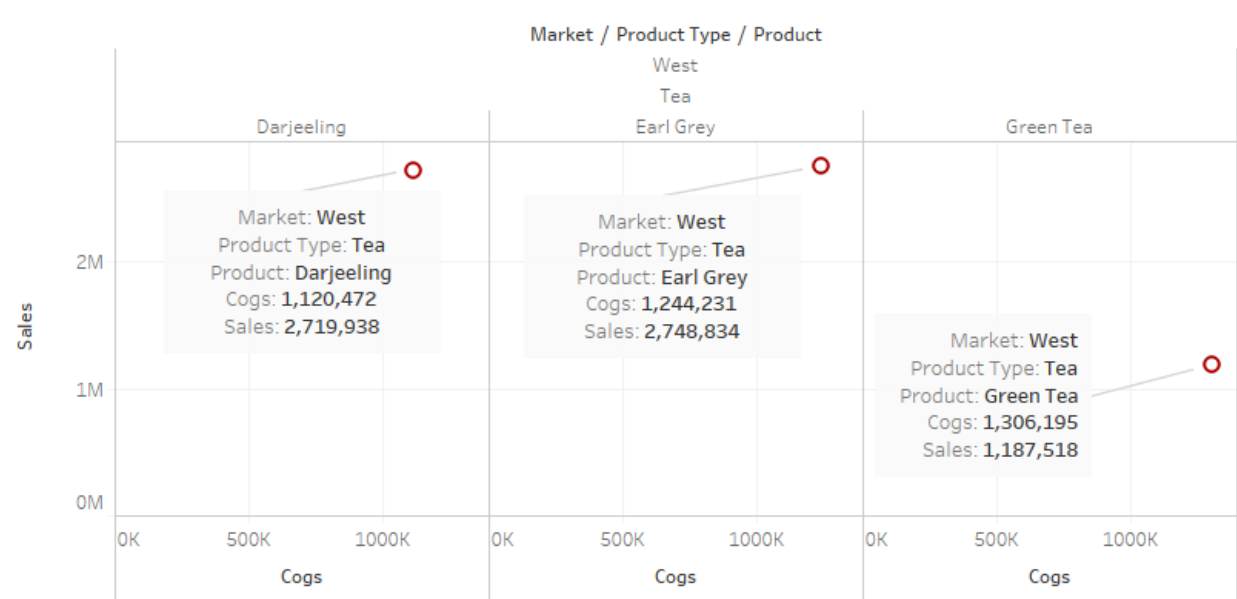


Diagram 10

For both central and east markets, COGS was less than sales. However, in the west, COGS is more than sales. This is causing the loss of profit.

We can further examine by comparing all tea products in the west. Darjeeling and Earl Grey both have COGS that are less than sales. This helps strengthen our assumption that COGS is what is affecting the negative profits for green tea in the west market.

COGS vs Sales for Tea - West Market



Summary

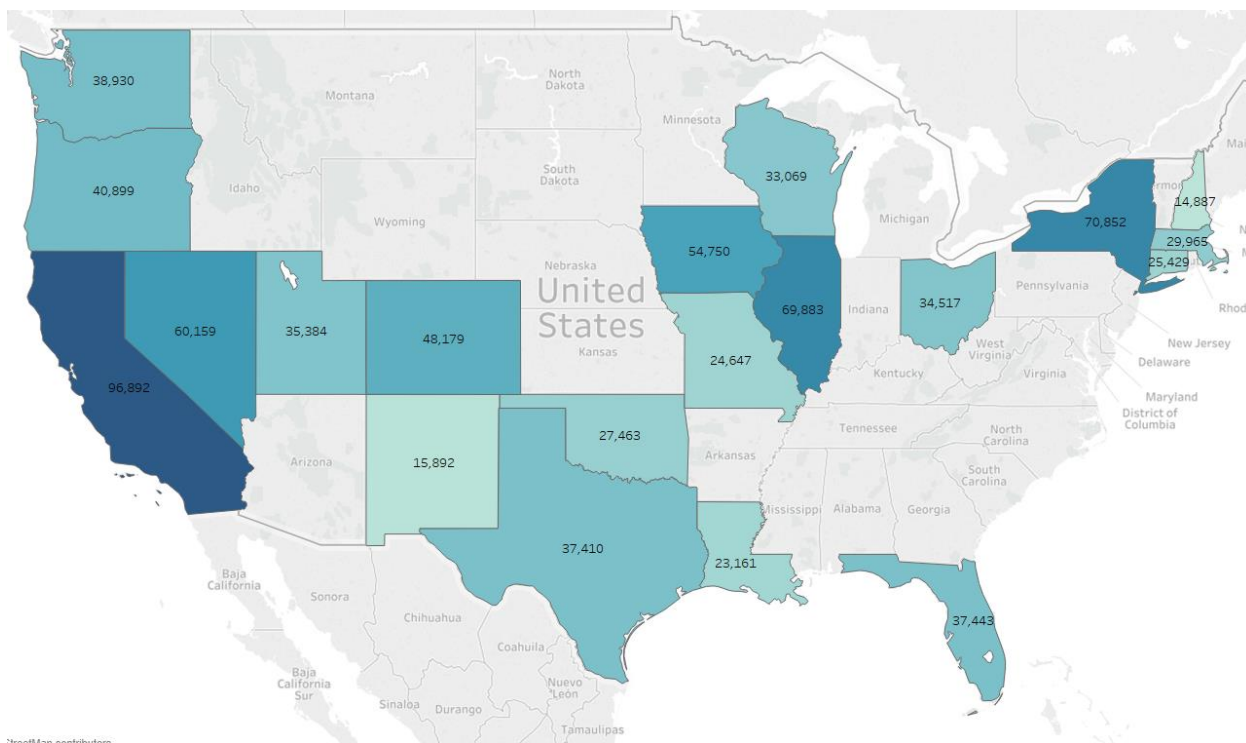
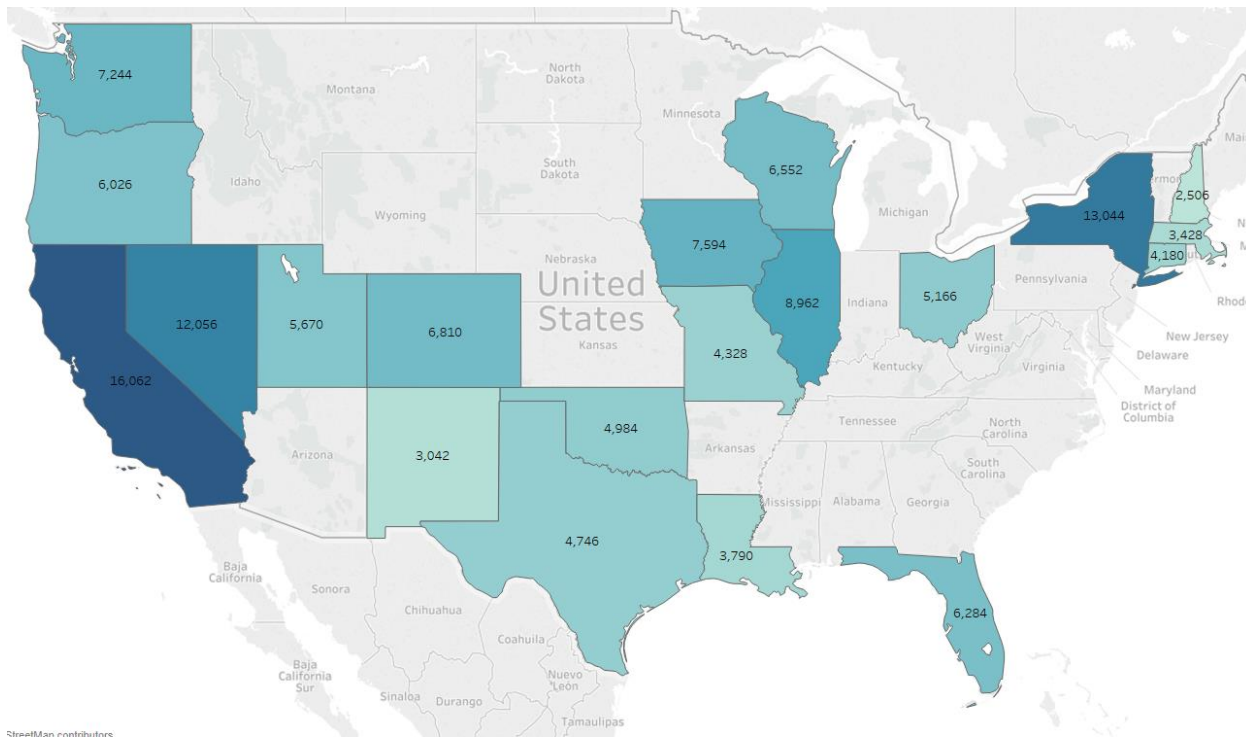
In 2011, the overall sales for our products increased compare to 2010. According to the visualization of the data, we detected that the most serious issue is that the tea category had lowest profitability among all product types in the west market. When we drill down, we found that green tea is the main factor causing loss in the tea category. We compare COGS of green tea with sales in all regions. The high COGS in the west was believed the reason causing the loss of profit. Therefore, our next step is to cut the COGS for green tea in the west by adjusting our logistic strategy or supplier selection.

After Thoughts on Exploration Set 2:

The finalized data displayed on Tableau did not match with the data from the access database files. The final results we received for sales were in the millions; however, the raw data had sales in the 100k range. This exercise taught us to be mindful of the original raw data and to scrutinize the tables we select for Tableau to query information from.

Exploration Set 3 – Using a Geographic Map to Display Measurement Metrics per State

The below diagrams (1 and 2) show a strong correlation between the investment made in marketing the company's products and the sale numbers that are observed. There is no 1:1 correlation between the two measures (for instance; marketing budget in Washington is higher than in Oregon, but sales numbers are lower in Washington than in Oregon). However, as is easily observable by comparing the above maps, states with a high marketing budget tend to have higher sales numbers than states with less marketing expenditures. The four states that have the highest marketing expenditures have the highest sale numbers (California, Illinois, Nevada and New York). Therefore, investing more in marketing in underperforming states might be a way to increase sales in these states.



Exploration Set 4 – Using Tableau to Analyze Total Sales

Total sales of every product

The total sales of Coffee House Chain is **2,451,960**.

Maximum sales: Espresso

Minimum Sales: Tea.

Also, we observe that the *profit is directly proportional to the sales* which means if they increase the production of Espresso by including new attributes for it to taste even better they might increase its sales more and thus, increase the profit of Coffee House.

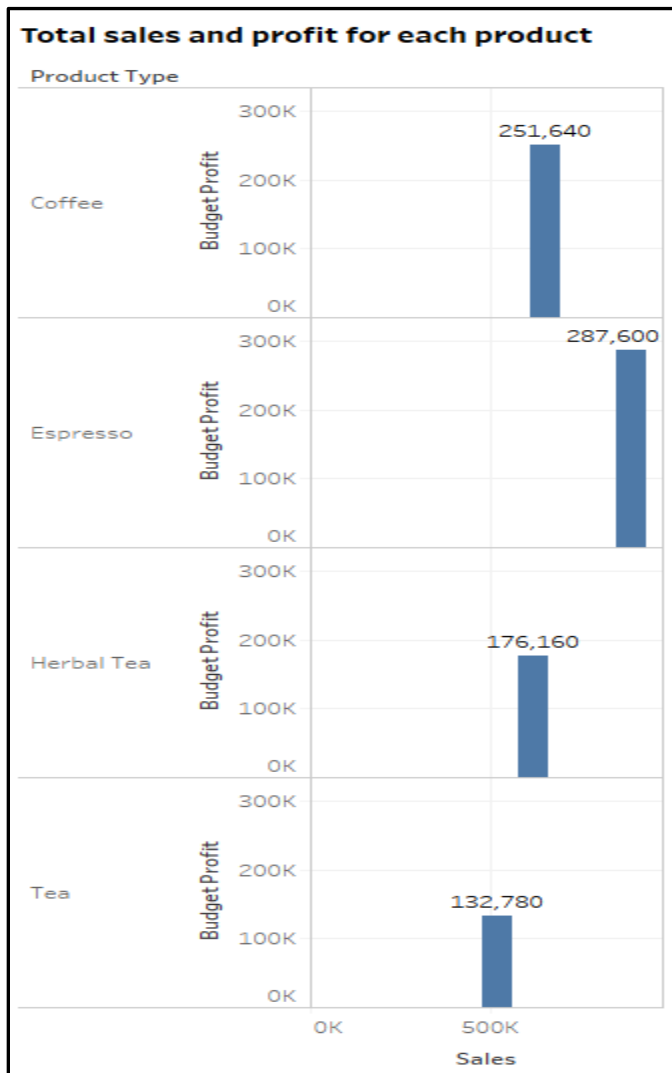


Diagram 1

Product sales in each state

Moreover, we can see from the below dashboard that the sales of Espresso is the most in California and Illinois, hence, the coffee house should plan to produce more of Espresso in these states and also provide customer friendly discounts in these states.

Further, it can be seen that the least sales is of Tea. So, we can increase the profit manifold by finding a way to increase tea sales specially in Iowa, Nevada, California and New York.

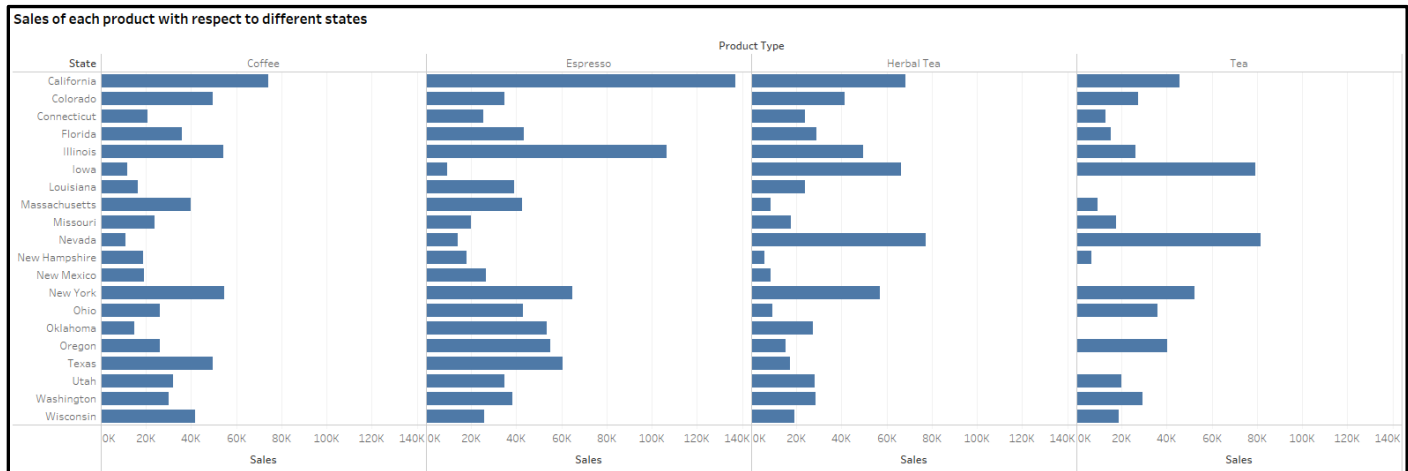


Diagram 2

Drilling down into the problematic area

As we observed above that tea might be the reason for low profit since it has the least number of sales. From the below dashboards we can also infer that basically, green tea is the one category of tea which is leading to lower sales and thus lower profit.

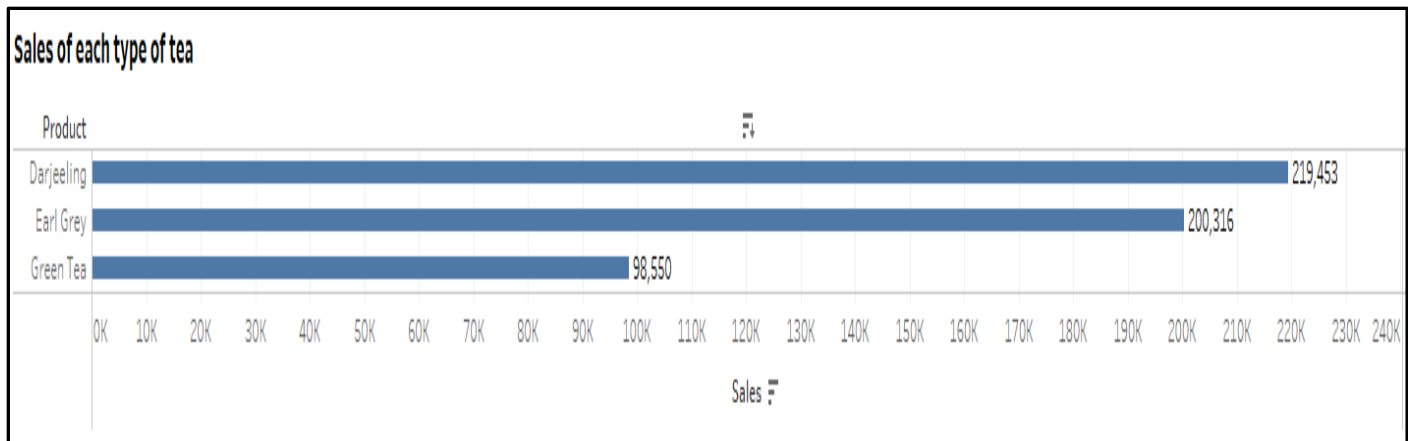


Diagram 3

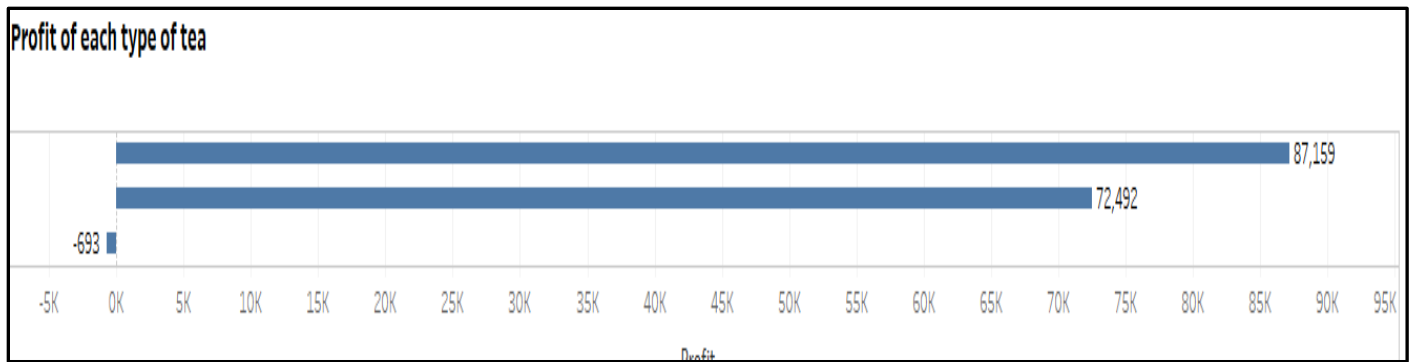


Diagram 4

Hence, by surveying the customers for the reason they prefer other tea categories over green tea, Coffee House can reach a solution for ballooning the sales of green tea. This solution might be either to replace green tea with another variety of tea, or add an attractive taste feature to green tea which might impress the customers.

Additionally, Coffee house can provide free drink to its customers on birthdays while maintaining the quality of beverages. In turn, this would attract more new customers and help retain the already existing customers.