Rocket Fuel Case Analysis

Digital Marketing and Analytics 2

MSDS 2020

LT 7 (Cuballes, Peña, Salvano, J. Uy)

1. Was the advertising campaign effective? Did additional consumers convert as a result of the ad campaign?

TaskaBella's campaign with Rocket Fuel may be considered effective. However, due to the lack of a rigorous reference framework, we refer to the following data to gauge the success of the campaign.

Users	Exposed to Ads	Not Exposed to Ads	Total
Converted	14,423	420	14,843
Not Converted	550,154	23,104	573,258
Total	564,577	23,524	588,101

User Condition	Conversion Rate
Exposed to Ad	2.55%
Not Exposed to Ad (baseline)	1.79%

The campaign resulted to a 2.55% conversion rate for users subjected to the ad impressions. The control group, which was not exposed to the ads had a conversion rate of 1.79%, meaning 1.79% of the market is receptive to the social media and other campaigns ran by TaskaBella at the time. The Rocket Fuel thus presents a 0.76% improvement over the previous campaigns.

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Increase in converted users:
2.55% converted exposed users - 1.79% converted not exposed users
= 0.76% increase in converted users with the ad
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To test the significance of the results of the survey, two sampled T-test were done to determine whether there is statistical evidence that the associated results of two groups are significantly different. The null hypothesis states that there is no significant difference between two groups while the alternative hypothesis states that there is a statistical significance between the two groups. After the simulation in Python, a p-value of 1.70e-13 was obtained. Thus, we reject the null hypothesis since the 0.76% increase in converted users has a significant effect on TaskaBella's sales.

2. *Was the campaign profitable?*

   a. *How much more money did TaskaBella make by running the campaign (excluding advertising costs)?*

Sales	$ 1,500,000
Less:	
Cost of goods sold	-900,000
Advertising expense	-130,500
Profit	$ 469,500

Notes:
*15,000 handbags bought * $100 per handbag = $1,500,000 revenue*
*15,000 handbags bought * $60 per handbag = $900,000 cost of goods*
*14,500,000 impressions * $9 per 1,000 impressions = $130,000 cost of campaign*

With about 15,000 handbags bought after the campaign was run, the resulting profit after deducting the cost of goods and the cost of the campaign is $469,500. The assumption here is that 15,000 handbags bought is equivalent to 15,000 users (i.e. each user bought 1 handbag only). Thus, the 15,000 users represented 2.55% of the total users who were exposed to the campaign.

   b. *What was the cost of the campaign?*

$$Total\ cost = 14,500,000\ impressions \times \frac{\$\ 9}{1000\ impressions} = \$\ 130,500$$

The total cost is $130,500 for 564,577 users.

   c. *Calculate the ROI of the campaign. Was the campaign profitable?*

To obtain the ROI of the campaign, the total cost of the campaign will be divided by the unit cost of conversion, estimated to be $40, to get the breakeven number of users to be converted.

$$\frac{\$\ 130,500\ total\ campaign\ cost}{\$\ 40\ VC\ per\ user} = 3263\ users\ to\ be\ converted$$

Since there were 3,952 users converted, it exceeded the expected number of users to breakeven, making the campaign profitable.

By running the campaign, Rocket Fuel's computation is that there will be a 0.76% improvement in the sales of TaskaBella. 0.76% is equivalent to 4,471 users or new handbags bought. Therefore, from the total profit of $470,000, the profit that can be directly attribute to the campaign is around $140,000.00.

$$\frac{15{,}000\ handbags}{2.55\%} \times\ 0.76\% = 4{,}471\ handbags$$

$$\frac{\$\ 469{,}500\ profit}{2.55\%} \times\ 0.76\% = \$139{,}929$$

The profit of $140,000.00 which can be directly attributed to the campaign cost is more than enough to cover the campaign cost of $130,000.00. Therefore, the campaign cost is immediately recovered.

d. What was the opportunity cost of including a control group; how much more could TaskaBella made with a smaller control group or not having a control group at all?

One of the benefits of having a control group is for TaskaBella to have baseline data on how many customers will buy the new handbag without digital ads. Results of the control group will also serve as a measure of the effectivity of TaskaBella's current marketing efforts.

One opportunity to improve on is the size of the control group. From a statistical perspective, the number of sample population is too large, increasing the CPM. Ideally, for a study with an error margin of 1% and 99% confidence interval, a sample size of 17,000 is needed.

The figure below shows the relationship of sample size and confidence interval with margin of error equal to 1%. Confidence interval provides a range of values which is likely to contain the population parameter with confidence. It can be observed that increasing the confidence interval of the sampling would require larger sample size.

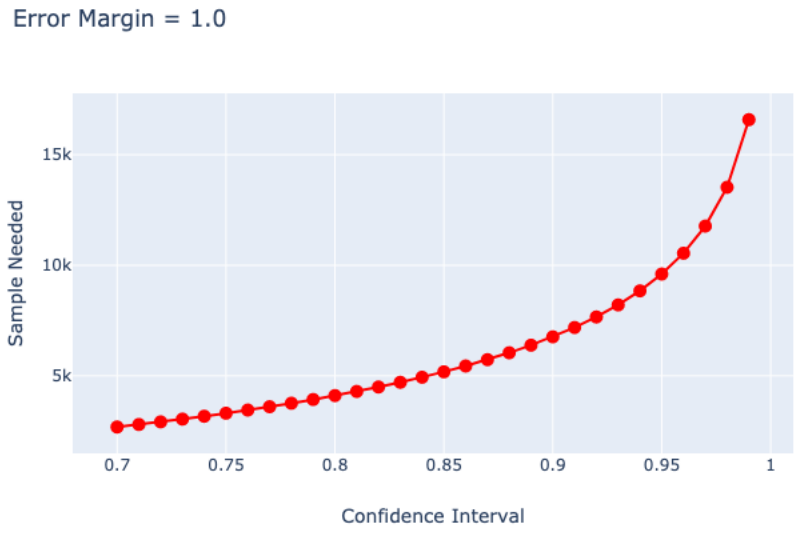

Figure 1. Sample size vs. Confidence Interval with Error Margin = 1.0%

Note also that increasing the sample size would reduce the error of the sampling to be done. However, there is an optimal sample size to be selected since the results of the sampling or experiment will not change as the sample size increases, demonstrated in the figure below.

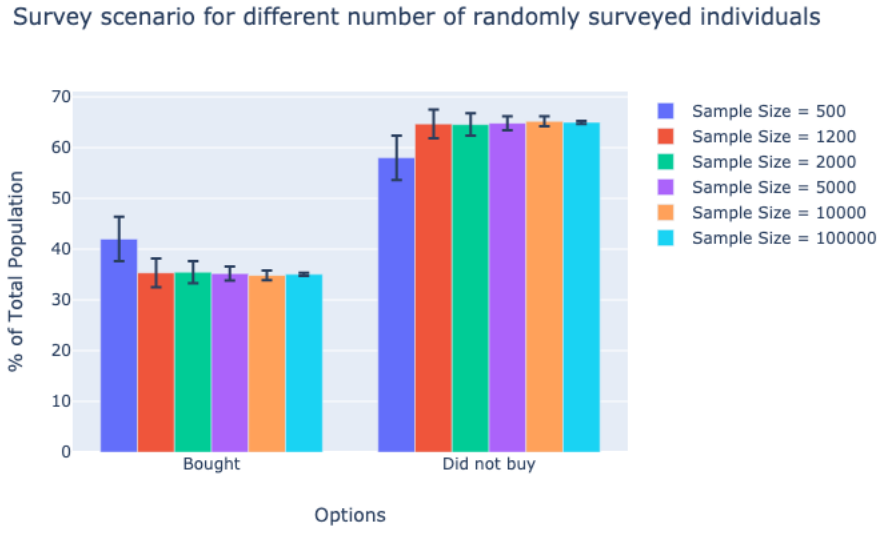

Figure 2. Sampling results for different sampling size

For the case of TaskaBella, a total of 582, 481 impressions were served for the control group with a sample size of 23,524. Due to limited information available, the average impression per member of the control group was obtained to have a baseline on the cost of oversampling.

$$\frac{582{,}481\ impressions}{23{,}524\ users} = 25\ impressions\ per\ user$$

Cost of oversampling:

$$25\frac{impressions}{user} \times (23{,}524 - 17{,}000)\ users \times \frac{\$\ 9}{1000\ impressions} = \$\ 1{,}468$$

An additional cost of $ 1,468 was shouldered by TaskaBella due to oversampling.

3. How did the number of impressions seen by each user influence the effectiveness of advertising?

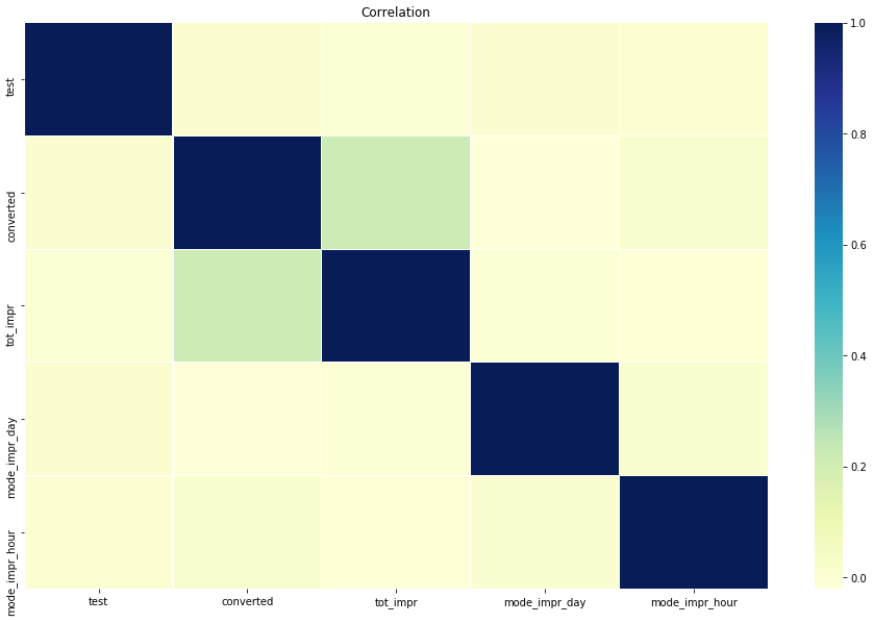

Figure 3. Correlation heat map of variables

From the Correlation Heat Map which shows the correlation among the variables in the dataset, there is high correlation between the total number of impressions which the user is subjected to and the conversion of the user. Therefore, the higher the total number of impressions, the higher probability for conversion.

a. *Create a chart of conversion rates as a function of the number of ads displayed to users. Plot conversion rates for those who were in the control group and for those who were exposed to the ad. Group together number of impressions in 10's (1-10, 11-20...)*

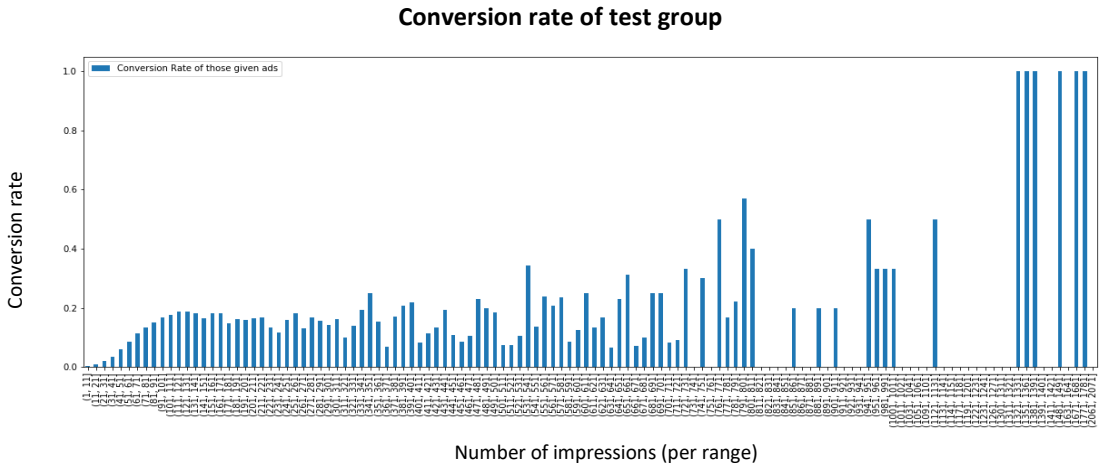

Figure 4. Conversion rate as a function of number of impressions (test group)

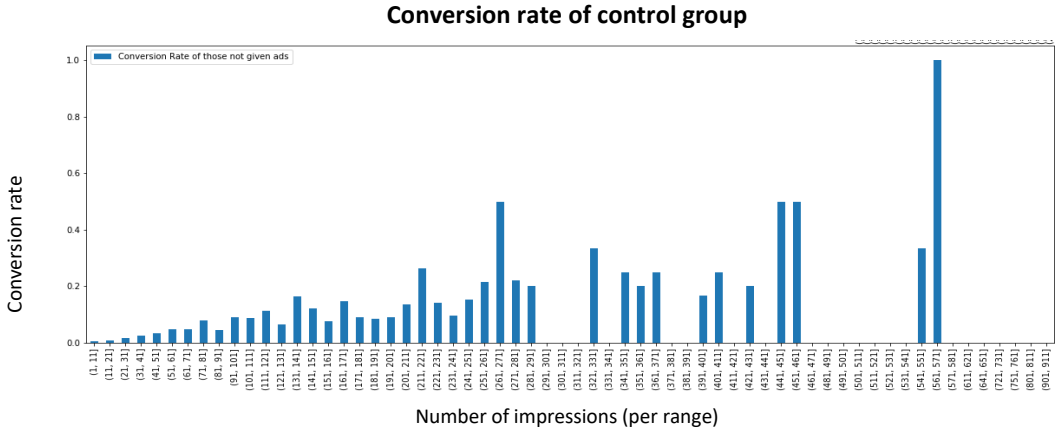

Figure 5. Conversion rate as a function of number of impressions (control group)

b. What can you infer from the charts? In what region is advertising most effective?

For those exposed to ads, the conversion rate increases as the number of impressions increases. Same logic applies to those in the control group, the only difference is that at a certain number of impressions, the conversion rate plummets up to zero percent.

For those exposed to ads, the most effective number of impressions is between 1320 to 1780 impressions per user. While the optimal for those in the control group is between 560 to 570 impressions. If goes too high from this range, the user might not convert thus increasing the cost and not gaining profit.

c. *What do the above figures imply for the design of the next campaign assuming that consumer response will be similar?*

Increase the number of impression if you will give ads since it will ensure at most a hundred percent of conversion. However, the optimal number of impressions should be computed carefully since there is a risk of not converting users at all like what happened in the control group.

4. How does consumer response to advertising vary on different days of the week and at different times of the day?

a. *Create a chart with conversion rates for the control group and the exposed group as a function of the day of the week when they are shown the most impressions*

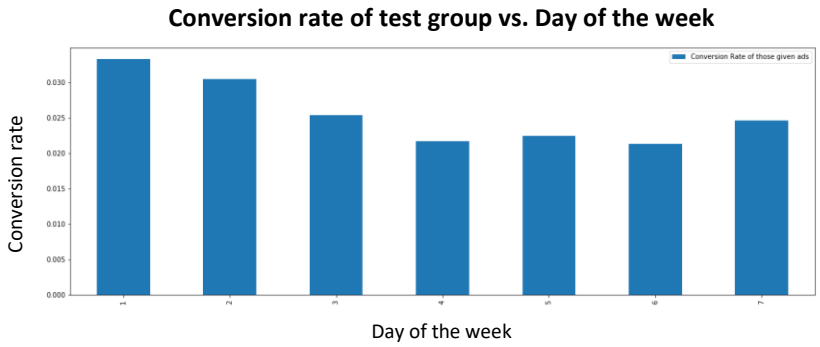

Figure 6. Conversion rate as a function of day of the week (test group)

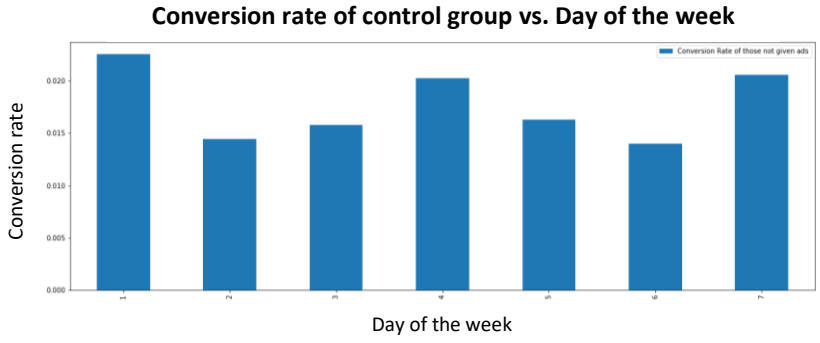

Figure 7. Conversion rate as a function of day of the week (control group)

For those exposed to ads, the trend of conversion rate is high in Monday and goes down day after day, then it goes up again when it nears Sunday. However, in the control group, it is high on three specific days: Monday, Thursday and Sunday.

For the conversion rate, those exposed to ads have slightly higher conversion rate, going up to 30% while those in the control group have max of at most 25%.

b. Create the same chart for hours within the day (excluding period between midnight to 8am)

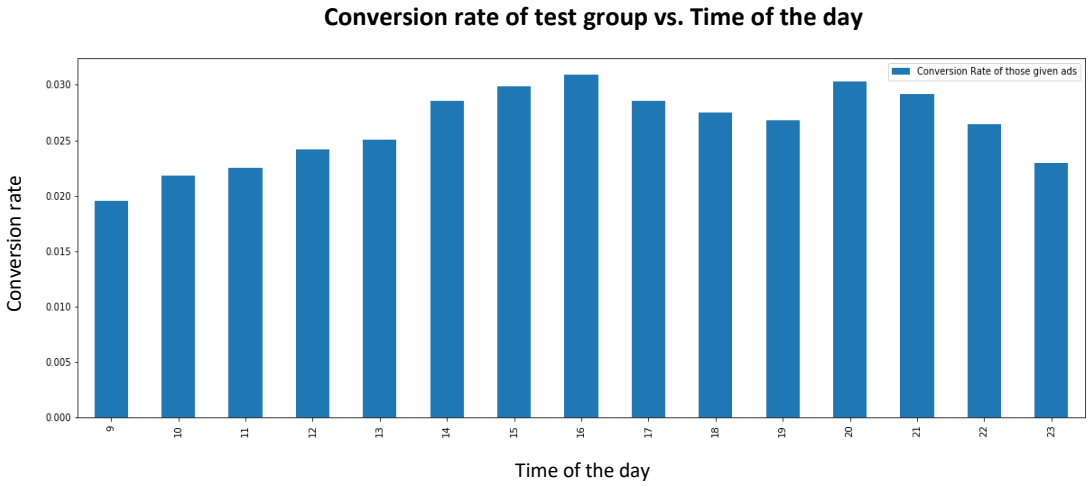

Figure 9. Conversion rate as a function of time of the day (test group)

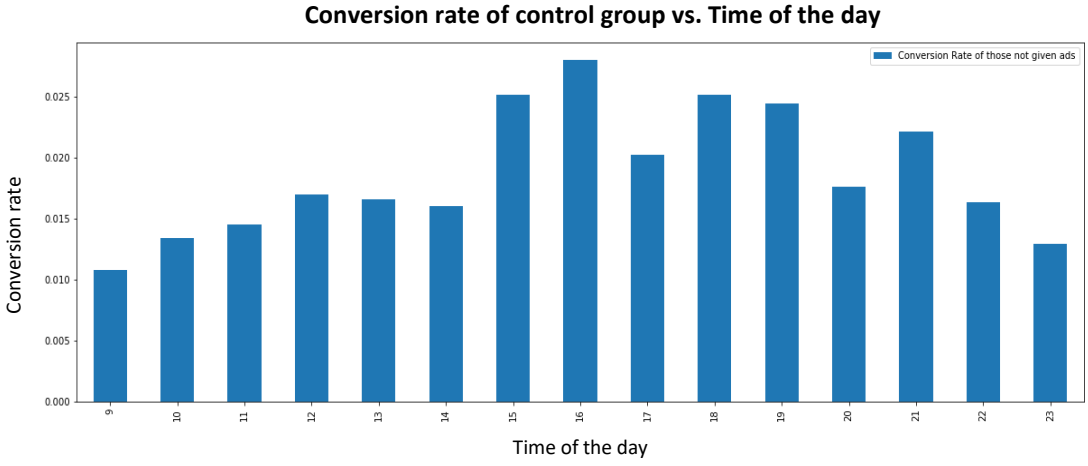

Figure 8. Conversion rate as a function of time of the day (control group)

Those exposed in the ads and in the control group have not much difference in trend of conversion rate as time passes by. The only difference is the conversion rate between those two groups, showing higher conversion rate to those exposed to ads (30%) than those in the control group (at most 25%). *Similar conversion rates if the x-axis is Mode Day Impression [4a].*

c. What days / hours is advertising most or least effective?

Based on the results of the graphs above, advertising is effective on Mondays and Sundays, and between 3pm to 10pm. Releasing impressions outside this optimal window may result to an ineffective campaign and inefficient allocation of cost and resources due to customers' current behavior. The findings from this study may be utilized to enhance the results of future campaigns by way of further segmenting websites and other channels which provide highest conversion rate given the above results.