

Assignment 1 Artea Case

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1. Why did Artea run this experiment?

Among all the customers who landed on Artea's website, the proportion of those who actually made a purchase is much lower than they expected even though the engagement metrics indicate nothing wrong. Therefore, in order to solve this situation and improve the revenue generated, the CEO of Artea is considering incentivizing purchases via distributing discounted coupons to registered users. Since this strategy may potentially backfire and destroy the profit margins by encouraging potential customers to only buy on discounts, A/B testing is used to test the effect of this potential strategy.

2. Do you think the discount coupons work? Why?

To check if the marketing strategy works or not, we first need to check whether the experiment is random or not. We separated the dataset based on whether participants received coupons or not. We then looked into the proportions of factor variables and the mean and standard deviation of numerical variables within each group.

First of all, the number of participants that received no coupon is 2498 while the number of participants with a coupon is 2502. The difference in the number of participants between these two groups is not substantial, around 0.08%. Further descriptive analysis of both groups reveals that the distribution of factors variables is mostly the same. The maximum difference of distribution in percentage is around 1%. For numerical variables, the only variable that has a relatively uneven distribution in two groups is *spent_last_purchase*. For the no coupon group, the mean of total spend in previous purchases is 56.68948, while the mean of participants with a coupon is 58.15582. However, the difference is not considered to be huge. Thus the randomization of this experiment has been verified.

To examine whether the discount coupons work, we ran a descriptive analysis on the indicative variables, *trans_after*, and *revenue_after*, for the effectiveness of coupons and compared the result across two groups. The result is listed in the following table:

| | revenue | number of purchased customer | number of unpurchased customer |
|--------------------|----------|------------------------------|--------------------------------|
| <i>no coupon</i> | 19434.86 | 267 | 2231 |
| <i>with coupon</i> | 18861.76 | 310 | 2192 |

Table 1

Based on the result above, we observed that the percentage of customers who made a transfer after receiving coupons is 12.39% while the percentage of customers who made a transfer without a coupon is 10.69%. The difference is not substantial. Moreover, the total revenue generated by customers without a coupon is more than customers who received a coupon. Thus, even though coupons bring slightly more customers to the websites, the amount of purchase they made is not desirable. Hence we believe the couple does not work effectively.

To prove our point, we conducted hypothesis testing with the null hypothesis being: the revenue is not significantly different between two groups of customers, customers with coupons and customers without coupons. Based on the T-test, the test statistic is contained in the 95% confidence interval, thus we cannot reject the null hypothesis.

There is no significant evidence that customers with coupons generate more revenue than customers without coupons.

3. Which customers do you think Artea should be targeting?

We believe there are two KPIs that Artea should consider sequentially. First is the conversion rate, which measures how many website viewers make the purchase. One of the purposes of sending out coupons is to stimulate potential customers and convert site traffic into purchases. Subject to this purpose, the target variable is whether customers made purchases after receiving the coupon.

We developed a logistic regression model on the treatment group to discover the relationship between purchase behavior and customers' features. We found that predictors except minority, spending in the previous purchase, and browsing minutes are significantly related to making transactions after the experiment. The odds of female users making transactions is 1.82 times that of non-female users making transactions, thus female users are more likely to turn into active buyers. The odds of making transactions for users with non-empty shopping carts is 5.15 times that of the users with empty carts, users who added products to carts during last visits are more inclined to purchase. In addition, when the number of previous purchases increases by 1 unit, the odds of making transactions increase by 30.5%. The odds of making purchases for users coming from channels other than Google tend to be 3 to 6 times higher. In other words, we believe that customer groups with past purchase records or having items in their shopping carts should be our target to improve the higher conversion rate. Female customers can also be a target segmentation since they appear to have a higher potential to make the purchase.

In the long run, after the conversion reaches an ideal level, the next step is to improve the average revenue generated by the target customer to obtain a higher profit margin

for the company. Following this purpose, we need to research how customers in the different segments perform differently toward the discount. With a better understanding of customers' features, we will be able to optimize the coupon strategy and provide the coupon in a more precise way that minimizes the cost and maximize the revenue. Within the treatment group, we performed the hypothesis test and feature importance test to examine the difference among different groups by dividing the dataset into subsets by gender, minority, shopping cart...respectively.

We found that the average revenue generated by females is statistically significant compared to that generated by non-female groups, and the majority group has better performance than the minority group in terms of contributing the revenue. By observing the shopping cart of users who received coupons, we also obtained some insights: within the group of receiving coupons, users with non-empty shopping carts tend to have a higher average revenue after the experiment than those with empty shopping carts. Similarly, the average revenue appears to be different for users with and without previous purchases in the treatment group. Users who have previous purchases appear to have a higher average revenue after the experiment than those who don't. Furthermore, results from the hypothesis test also indicate that users who received coupons but have not visited the website for at least 3 weeks tend to drive bigger average revenue.

Considering the several models and tests we've performed, we think in general, Artea should focus on loyal customers and stimulating those potential customers with non-empty shopping carts to make the purchase. Besides, gender, minority, and browsing record are also noteworthy attributes that Artea can include in their targeting strategy based on different purposes to maximize the effect of such marketing campaigns.

4. What are potential risks of using this targeting policy?

According to the hypothesis tests above, we would recommend offering coupons to previous customers who have made many purchases, the group of people with items in the shopping cart, and customers who haven't visited the website within the past three weeks. However, potential risks could arise if the company targets these groups.

One potential risk is, providing coupons based on specific customer groups might harm the brand reputation and social impression as communications between customers are inevitable. If two brand-lovers found out only one of them got the discounted coupon, the other one might turn to another brand due to the feeling of being discriminated against. In this way, it will damage the brand's reputation in the long run.

Nevertheless, offering coupons to people with items in the shopping cart and those people who haven't visited the website within three weeks are still feasible since people who haven't visited the website for weeks seem not to have the propensity to purchase; and people with items in the cart are more likely to visit the website again. In this case, misunderstanding will less likely happen, hence making them two suitable targeting groups. But if the company wants to maintain the market reputation by providing fewer coupons, they can focus on those customers with items in the cart. According to our linear regression model which measures how each factor affects revenue, fixing other factors, offering coupons to a customer with items in the cart will increase the company revenue by 9.65 units, which brings greater interest to the company compared with giving discounts to the other groups.

5. What do you learn from the demographics data? How do they influence your recommendations?

Demographic data describes who we are as individuals and normally cannot be changed, like race, gender, religion, and so on. Therefore, demographic data should be considered with each new strategy. Firstly, to segment the market by determining which subgroups exist in the overall population; Secondly, to create a clear and complete picture of the characteristics displayed by typical members of each segment. Once these profiles are constructed, we can use them to develop the targeting strategy and accompanying marketing strategy and marketing plan.

For the Artea case, after the comparison from the ANOVA test, we find that combining both gender and minority into our recommendation strategy has the lowest AIC score, which means both will influence our expected outcome and we should not ignore either of them. However, offering special discounts based on customers' demographic features might potentially lead to social issues such as racism and sexism. One solution to providing acceptable strategy is delivering coupons or special discounts to the specific group on preferably corresponding holidays or events to avoid misunderstanding.

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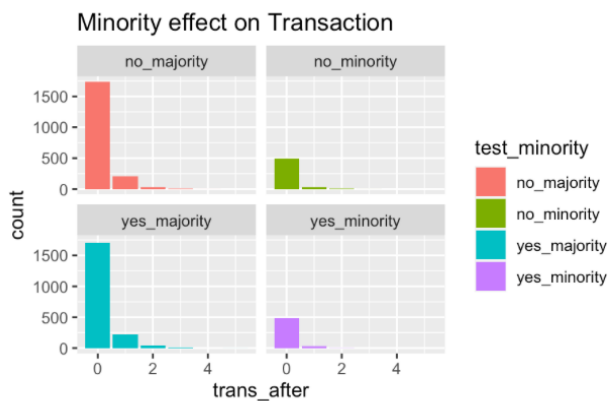


Figure 1

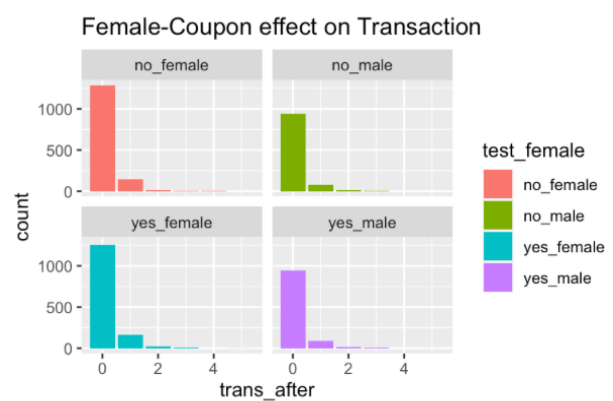


Figure 2

¹ Figure 1 and Figure 2 show the total number of transaction based on 4 subgroups: with and without the coupon, and the demographic features