Artea Case Study

Artea observed from their past customer dashboard that 87% of those who visited their website were not making any transactions ; even though their engagement metrics rate on their website seemed to be good enough. Their main concern was to identify what kind of marketing strategy they can use to get people to buy and generate more revenue for the firm. To solve this issue, they decided to run an A/B experiment test by randomly selecting 5000 users who had visited the website the last 2 months and didn't end up making a transaction. From this pool of users, they randomly selected half of those customers and sent them a 20% discount on their next purchase.

As the results from the experiment were coming through, Artea was also trying to understand behavioral patterns among customers who received the coupons, to identify potential groups of customers they should target and send coupons to and also decide further strategies for future campaigns.

Before running any analysis, we thought it would be important to do a randomization check, as it mentioned in the case that coupons had been randomly sent to half of the customers selected for the experiment. To achieve this, we used the "Wilcoxon test" to determine if the control group (test_coupon=0) and the treatment group (test_coupon=1) are different from one another in a statistically significant manner. Observing the p-values from our test results, the p-value for each variable is greater than 0.05. This indicated a weak evidence against the null hypothesis (Ho: test_coupon=0 = test_coupon=1). Therefore, there is no significant difference between the two groups.

In order to understand if the discount coupons effectively work, we ran two simple linear regressions with dependent variables respectively 'trans_after' & 'revenue_after' and used others attributes as independent variables ('test_coupon', 'num_past_purch', etc..). The goal was to observe the coefficient and p-value of 'test_coupon' in both regressions and see if discount coupons improve the number of transactions or sales revenues.

In the 'trans_after' regression, the p-value of 'test_coupon' is less than 0.05, which is statistically significant; meaning there is a possibility that discount coupons increase the number of transactions on the website. However, for 'revenue_after' regression the p-value is greater than 0.05. Then, discount coupons don't have a significant impact on sales revenues.

If Artea'goal is to increase the firm revenue, sending discount coupons to customers only may not be the best strategy, even though coupons increase the number of transactions on the website. Figure 1 compares the revenue and transactions done by customers with and without coupons
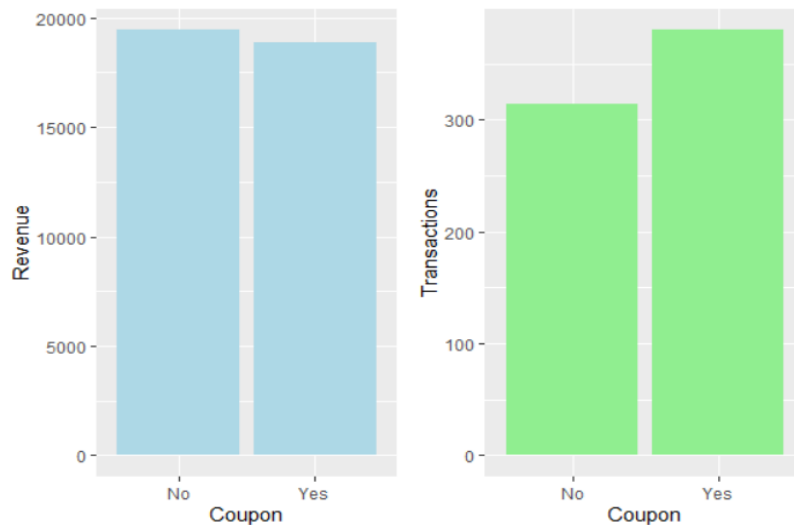

Figure 1

We have identified two different customer targeting strategies that have the potential to yield better results in terms of revenue.

The first strategy is to target customers who have an item in their shopping cart but have not made a transaction yet. Artea reports that customers are engaged by their website and products but do not make a purchase. Table 1 shows that customers participating in the experiment generated more revenue when they were given a coupon which was supported by a linear regression model which gave shopping cart and customer with coupon and cart loaded as significant (appendix 1). It seems that the coupon provided the necessary incentive for customers to convert. The revenue numbers indicate that the loss of revenue that the coupons created via diminished margins are more than offset by the increased number of transactions. Moreover, A/B test data set showed revenue and transactions were more for customers with coupons.

Figure 2

The second strategy combines strategy one with specific channels, namely Instagram and Facebook. The A/B test data shows that the revenue-increasing effects of sending a coupon to customers that have an item in the cart and to those signed up through Instagram or Facebook are interactive. Figure 3 shows the total post-test revenue grouped by the different channels customers came through when they first signed up to Artea. We can see that customers that signed up through Facebook and Instagram generate more revenue when they are offered a coupon than otherwise. Additionally figure 2 supports the effect on the total and average revenue numbers which are relatively higher for this strategy. Regression model too gave users using instagram, facebook and their cart loaded as significant (Appendix 1).
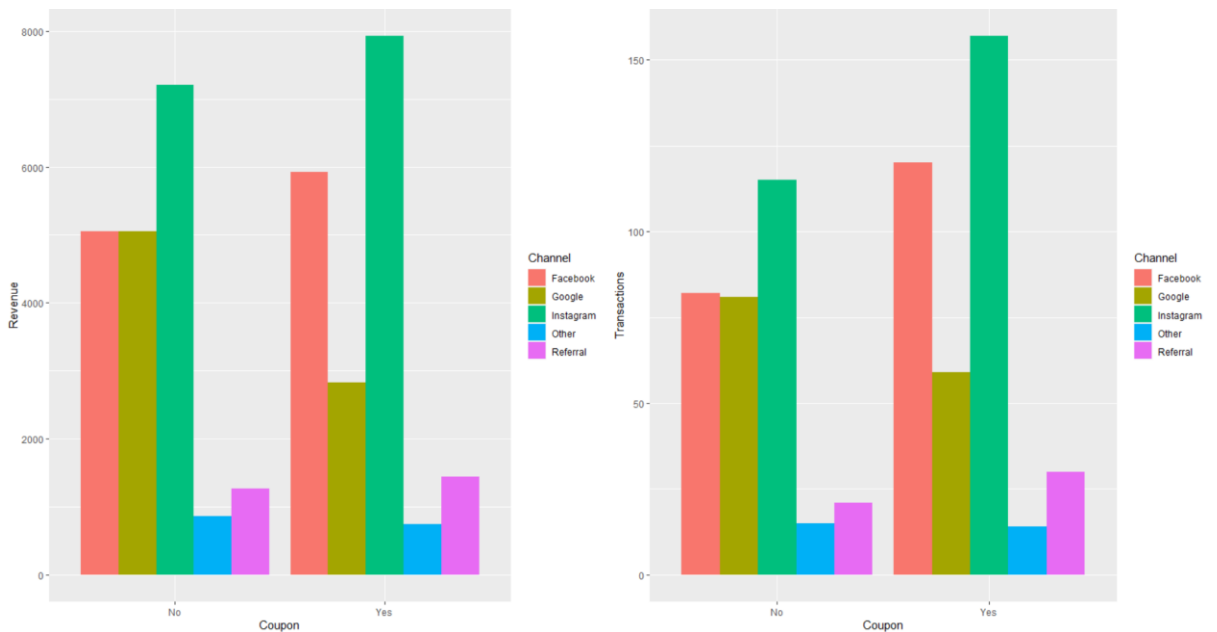

Figure 3

Using these strategies we can make predictions for future revenue. Regression models were trained on the data collected from the A/B test and then used to make predictions with the data collected from the next Artea campaign. Two different baseline revenue numbers are calculated in order to compare the results of our different recommended strategies.

The first baseline model involves distributing a coupon to every customer. This is not an option for Artea, who feel that customers will learn to time their expensive purchases with their coupons in order to minimize costs to themselves. Our model indicates that such a strategy would yield a revenue of $44,080.

The second baseline model is based on not giving out coupons at all. This is also likely not an option as Artea is looking for a strategy different to the current status quo. Our model predicts a revenue of around $45,843 with this strategy.

Our first recommended strategy, targeting customers who had items on shopping carts predicted revenue of $48,868 and our second strategy predicted a revenue of $47,384. The revenue was higher than the first and second baseline (Table 1). These predictions indicate that we should privilege the first strategy, which is also the most restrictive one in that it targets the least amount of customers, thereby limiting the amount of learning behavior and preventing the customer base from abusing the coupon system to the detriment of Artea's revenue.

	Coupon to all	No coupon to anyone	Alternate 1 (shopping cart)	Alternate 2 (facebook + instagram + shopping cart)
Revenue (in $)	44080.3	45843.47	48868.77	47384.79
Avg. Revenue (in $)	7.35	7.64	8.14	7.90

Table 1: Revenue generated from different alternatives

There are at least two main risks associated with our recommended strategy. The first concerns learning behavior. Though there are only a limited number of people who are given coupons, some customers may pick up the fact that they only receive one when they have an item in their cart. Social media allows customers to exchange information and tips instantly, and there are many different pages, blogs and forums dedicated to optimizing spending via coupon usage. Artea could therefore see an increase in customers adding products to their cart in an attempt to get a coupon. The effects of the coupon would stop being to push indecisive customers further down the conversion funnel and instead change customer behavior, causing unrepresentative data to be created and lowering revenue.

The second is that our analysis has picked up on a trend that only exists within the data created by the A/B test and that therefore does not occur through the year. Although graphical and regression analysis indicate that our targeting strategy will yield positive results, it may be that the data from the experiment was biased in some way, reducing the external validity of our analysis. The worst case scenario would be that we are targeting a group that sees a reduction in revenue when provided with coupons.

Our analysis of the demographic data available, and in particular of the effects of coupon assignment to the two demographic categories, indicated a few things. Firstly, there is a sizable difference in the total and average revenue generated by non-minorities compared to minorities. Giving coupons to minorities seems to drop their average revenue, however this difference is not statistically significant at all when performing a two-sample Wilcoxon test.

Secondly, women generate more revenue for Artea both in total and on average. Giving a coupon to women seems to increase their average revenue, and while this difference is not statistically significant either the p-value obtained was much higher (0.23 for female compared to 0.7187 for minority). This indicates that it may be worth targeting women with coupons.

Indeed, when looking at total and average revenue across the different groups generated by customers with items in their cart, customers who signed up through different channels and customer gender, we see that coupon assignment has a sizable effect on certain subgroups. Table 2 shows the difference that coupon assignment has on subgroups; significant positive differences are in blue.

Because we do not have demographic data available for the next campaign, we cannot make predictions and judge the relative performance of this strategy targeting these subgroups. This strategy may generate better results than random assignment of coupons and would limit the amount of coupons distributed, thereby reducing the potential for consumer learning and coupon usage optimization.

Item in Cart	Female	Channel	Difference in Revenue	Difference in Average Revenue
No	No	Google	-90.086	-0.339691482
Yes	No	Google	-956.362	-4.23165575
No	Yes	Google	-652.498	-1.606343654
Yes	Yes	Google	-529.916	-2.977393058
No	No	Facebook	-463.342	-3.678093985
Yes	No	Facebook	310.962	-2.040537206
No	Yes	Facebook	196.572	1.368054926
Yes	Yes	Facebook	828.168	16.67247651
No	No	Instagram	221.554	2.327838761
Yes	No	Instagram	-4.19	1.153113636
No	Yes	Instagram	-176.168	-0.735537205
Yes	Yes	Instagram	687.698	8.975831761
No	No	Referral	-181.26	-4.351269231
Yes	No	Referral	282.044	9.690116402
No	Yes	Referral	80.178	-1.127369748
Yes	Yes	Referral	-4.492	5.180333333
No	No	Other	51.992	2.475809524
Yes	No	Other	170.88	14.95461538
No	Yes	Other	-100.18	-2.811339713
Yes	Yes	Other	-244.654	-23.79941667

Table 2: Difference between subgroups after coupon assignment

Appendix 1: Regression model result

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Regression Results
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                              Dependent variable:
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                               AB test dataset
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Average timeplay              -1.12 (-2.32, 0.07)
Minimum number of players     3.20*** (2.99, 3.42)
Maximum number of Players     -0.02*** (-0.03, -0.01)
weeks_since_visit             -1.13*** (-1.35, -0.91)
browsing_minutes              0.16*** (0.08, 0.23)
shopping_cart1                5.63*** (3.73, 7.53)
coup_cart1                    2.86** (0.65, 5.07)
face_inst1                    3.56*** (2.36, 4.76)
fac_inst_cart1                4.54*** (2.33, 6.75)
Constant                      -0.54 (-2.27, 1.19)
------------------------------------------------------
Observations                         5,000
R2                                   0.17
Adjusted R2                          0.17
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Note:                     *p<0.1; **p<0.05; ***p<0.01
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