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GloBox Project

Recommendations on launching a new banner for the GloBox website.

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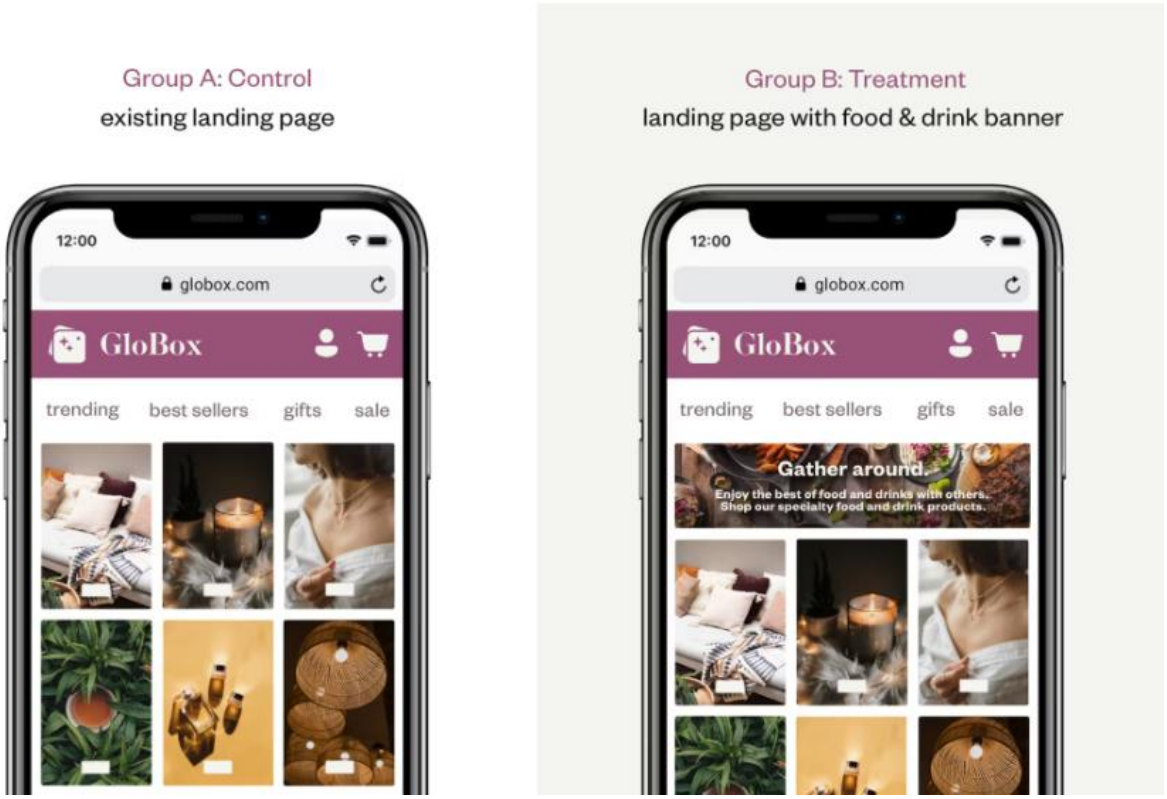
INTRODUCTION

The GloBox company is launching a new banner on their website that highlights key products in the food and drink category at the top of the website. The control group does not see the banner, and the test group sees it as shown below:



During the analysis, we studied the purchase activity, group assignments, and demographic data of 48,943 users over a span of 2 weeks. The primary goal was to evaluate the potential impact of releasing the banner on the website. We focused on key metrics such as conversion rates and average amounts spent to determine whether the banner's introduction would be beneficial or not.

ANALISYS

The A/B test results indicated a significant difference in conversion rates between the group that saw the banner and the control group. Although the difference may seem small in percentage terms (between 0.35% and 1.07%), the potential impact on revenue can be substantial. Assuming an estimated user base of 48,943 every two weeks (it is recommended to conduct additional tests to confirm this estimation, but for the purpose of calculation, we'll use this estimated value), launching the banner could result in gaining between 171 and 523 additional users making purchases. Considering the average amount spent by a user (USD 3.38), this translates to a potential revenue increase of approximately USD 578 to USD 1,770 every two weeks. These numbers highlight the significant improvement that the banner can bring to the company's bottom line.

However, when it comes to the average amounts spent by users, we didn't find a significant difference between the two groups. This suggests that while the banner affected the user's decision to convert, it didn't have a significant impact on the overall amount they spent. One possible explanation for this lack of significant difference between the two groups is that our study did not account for variations in spending across different product categories. The banner specifically featured food and drink products, while the total amount spent encompassed a broader range of products such as beauty items, clothing, and household articles. To gain a more comprehensive understanding of the relationship between the banner and spending behavior, it would be recommendable to collect and analyze data specifically capturing the amounts spent within each product category.

We can be 95% confident that the true difference in conversion rates between the treatment and control groups falls within the range of 0. 35% to 1.07%. Similarly, the range of $-0.471 to $0.439 represents the 95% confidence interval for the difference in averages amounts spent. These confidence intervals provide us with a range of values within which the true differences lie, with a high level of confidence.

Furthermore, it's worth noting the considerable difference in conversion rates and average amounts spent between users with iOS and Android devices. While iOS users demonstrated higher values, the majority of GloBox's user base consists of Android users. It would be beneficial to invest in campaigns aimed at increasing the number of iOS users to tap into their higher conversion rates and average amounts spent.

Similarly, female users exhibited higher conversion rates and average amounts spent compared to the rest of users. This suggests the importance of targeted marketing strategies to attract and retain female customers.

Additionally, the analysis revealed that users from Canada and the United States had higher conversion rates and average amounts spent compared to other countries. This indicates an opportunity to focus on these regions and tailor marketing efforts accordingly.

While these calculations seem promising for releasing the banner, after calculating the test's power for the difference in conversion rates, we determined that a sample size of 6 million users is necessary for accurate results. However, given our current rate of 48,943 users every 2 weeks, it would take us an approximate of 5 years to reach that number, making it costly.

The experiment showed a significative decline in the conversion rate over its duration. This decrease can be explained by the Novelty Effects, which refer to the initial impact of introducing a new element, such as the banner, on consumer behavior. Initially, customers may exhibit heightened interest and involvement, resulting in a temporary increase in revenue. However, this effect diminishes over time, leading to a stabilization or decrease in revenue. To overcome this issue, one possible solution would be to extend the duration of the experiment until the conversion rate stabilizes.

While the first results seem promising for releasing the banner, it is essential to acknowledge and address potential factors that could introduce noise into the data, such as Novelty Effects, sample size number and the design of the experiment. To be certain about the results, it’s recommended to relaunch the experiment, extending its duration until the conversion rate stabilizes and the sample size increases. Additionally, the types of products that the users are purchasing should be considered for this new study.

RESULTS

1) a. *<u>A/B test for the difference in the conversion rates between the groups.</u>*

p_A: Conversion rate for the control group.

p_B: Conversion rate for the treatment group.

H_0) $p_A = p_B \Rightarrow p_A - p_B = 0$

H_1) $p_A \neq p_B \Rightarrow p_A - p_B \neq 0$

$$\hat{p} = \frac{0.039 * 24344 + 0.046 * 24601}{24344 + 24601} = 0.043$$

Test statistic

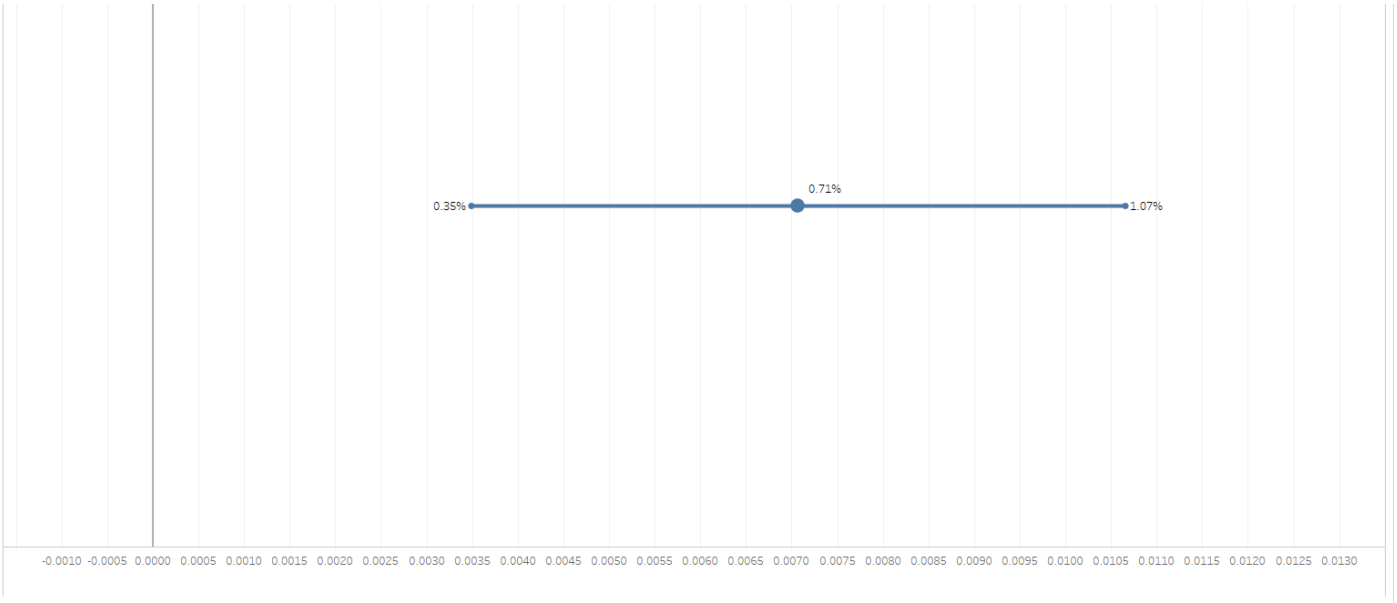
$$T = \frac{0.039 - 0.046}{\sqrt{0.043 * 0.957 * \left(\frac{1}{24344} + \frac{1}{24601}\right)}} = -3.81$$

$p - value = 2 * \left(1 - \mathrm{P}(\mathrm{Z} < 3.81)\right) < 0.0001 < 0.05 = \alpha \Rightarrow$ Reject H_0

There's a significant difference between the conversion rates of both groups.

1) b. *Confidence Interval of the Difference in Conversion Rates between Treatment and Control Groups.*

Difference in Proportions	Std Error	Critical Value	$CI\ p_B - p_A$	
0.007	0.0018	1.96	**0.0035**	**0.0107**



2) a. *A/B test for the difference between average amounts spent.*

$\bar{x}_A$: Average amount spent by the control group.

$\bar{x}_B$: Average amount spent by the treatment group.

$H_0)\ \bar{x}_A = \bar{x}_B$

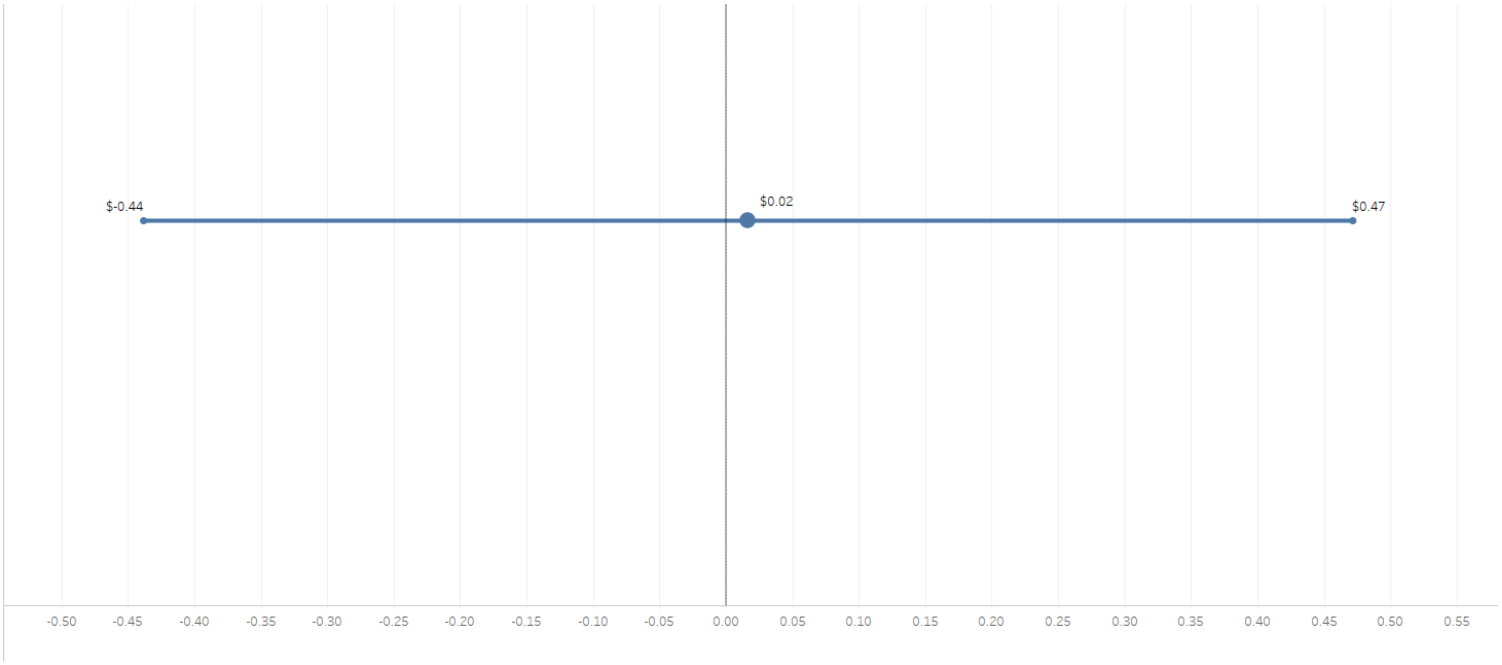
$H_1)\ \bar{x}_A \neq \bar{x}_B$

$p - value = 0.94 > 0.05 = \alpha \Rightarrow$ Fail to reject H_0

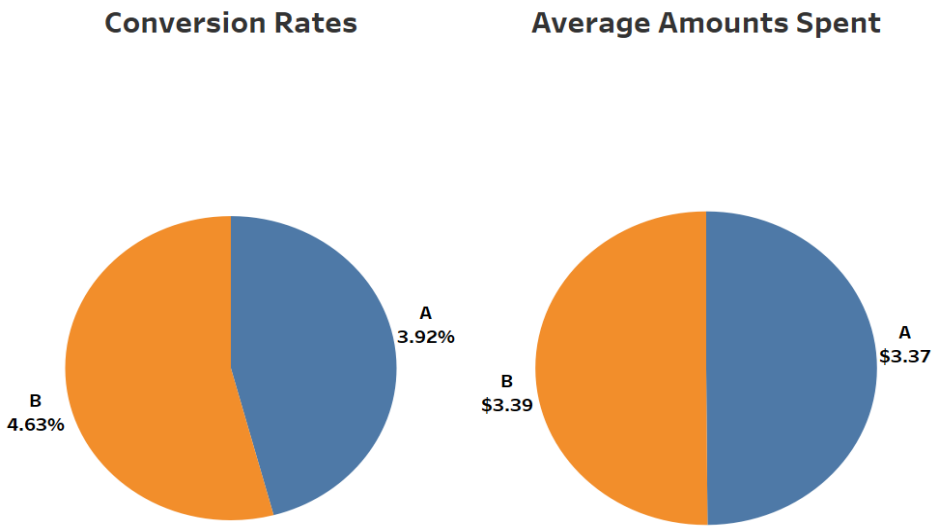
There's no significant difference between the average amounts spent by both groups.

2) b. *Confidence Interval of the Difference in Means between the Treatment and Control Groups.*

Difference in Means	Std Error	Critical Value	$CI\ \ \bar{x}_B - \bar{x}_A$	
0.016	0.232	1.96	**-0.439**	**0.471**

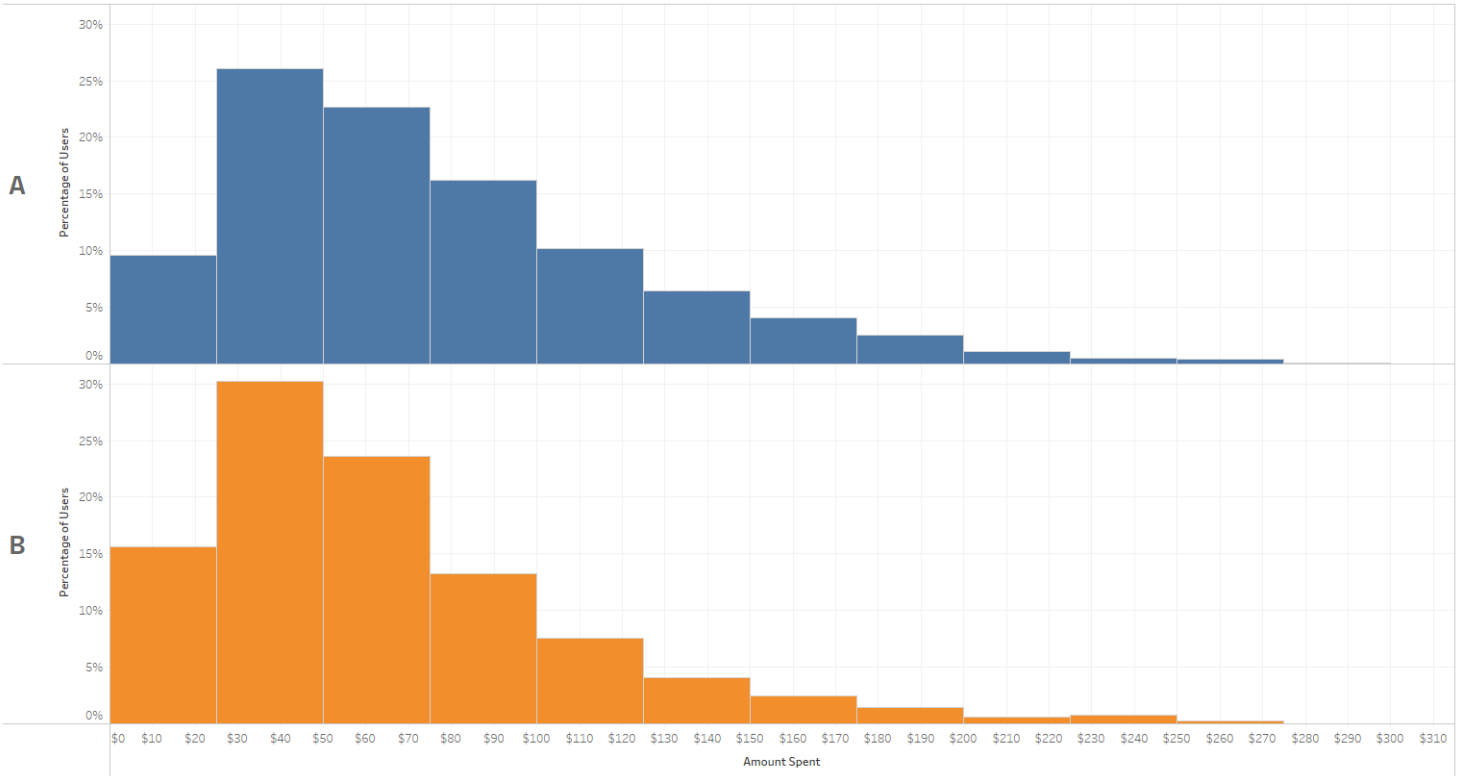


3) *<u>Conversion rate and average amounts spent between groups</u>*



- Control group is represented as “A” and treatment group as “B”.
- Similar average spending.
- Slight variation in conversion rates among groups.
- Despite being minor, these differences significantly impact overall revenue.

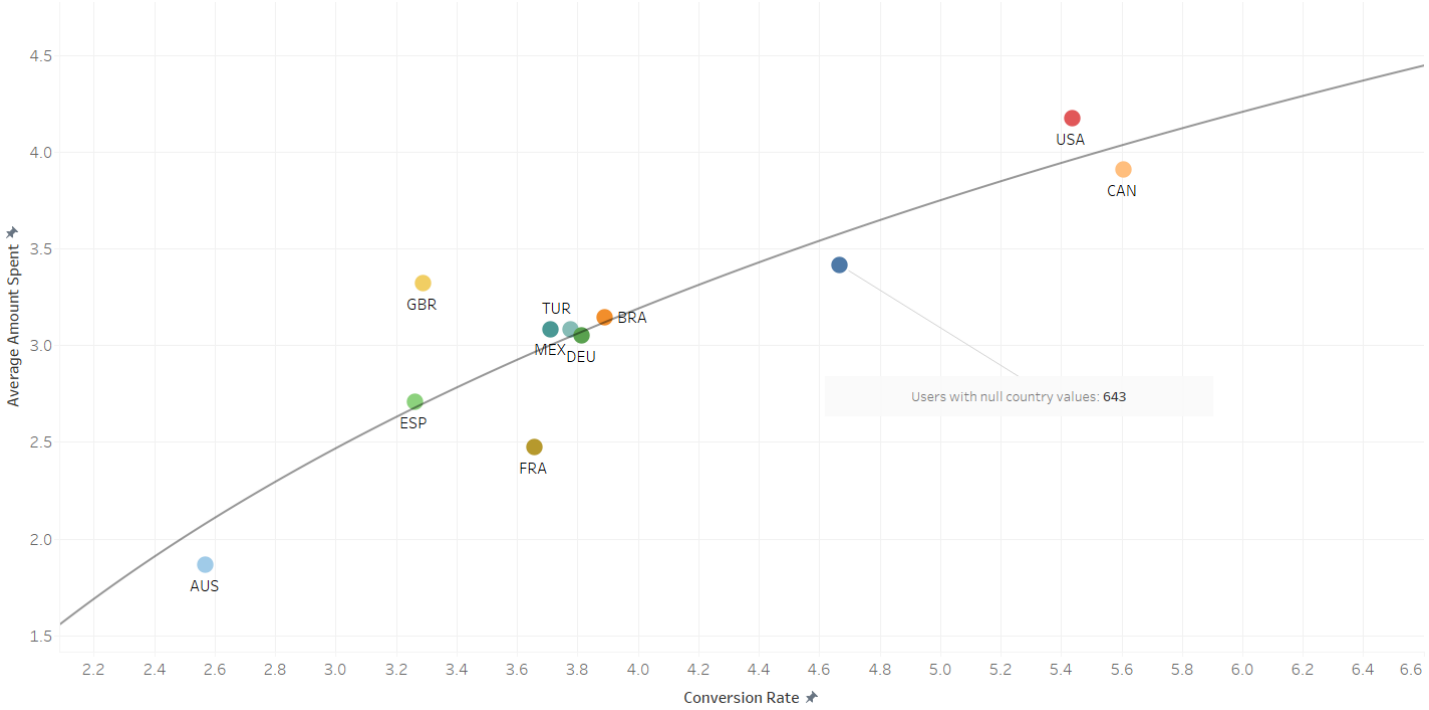
4) *Distribution of the amount spent by each group*



To analyze the amount spent, we excluded users who did not make any purchases on the website. This was because most of these users did not spend any money, which was causing a lot of irrelevant data. Additionally, we also removed outliers who spent more than 300 USD.

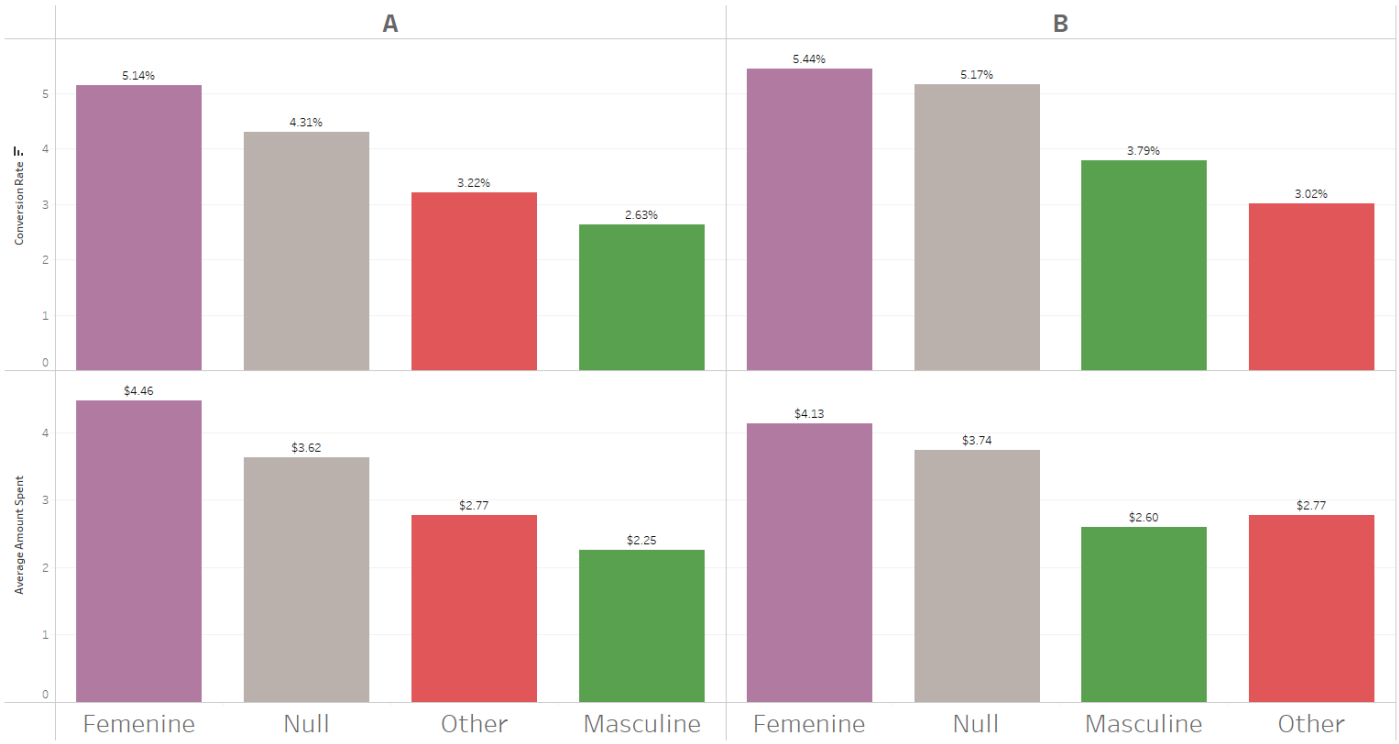
- Both groups follow similar distributions, with the slight difference that the treatment group seem to be spending less than the control group, but the A/B test results indicate that this difference is not statistically significant.
- Most users in both groups spent between 25 USD and 75 USD on the website.
- The average amount spent by users in the control group was 83.1 USD, while in the treatment group it was 71 USD.

5) *Correlation of measures grouped by country*



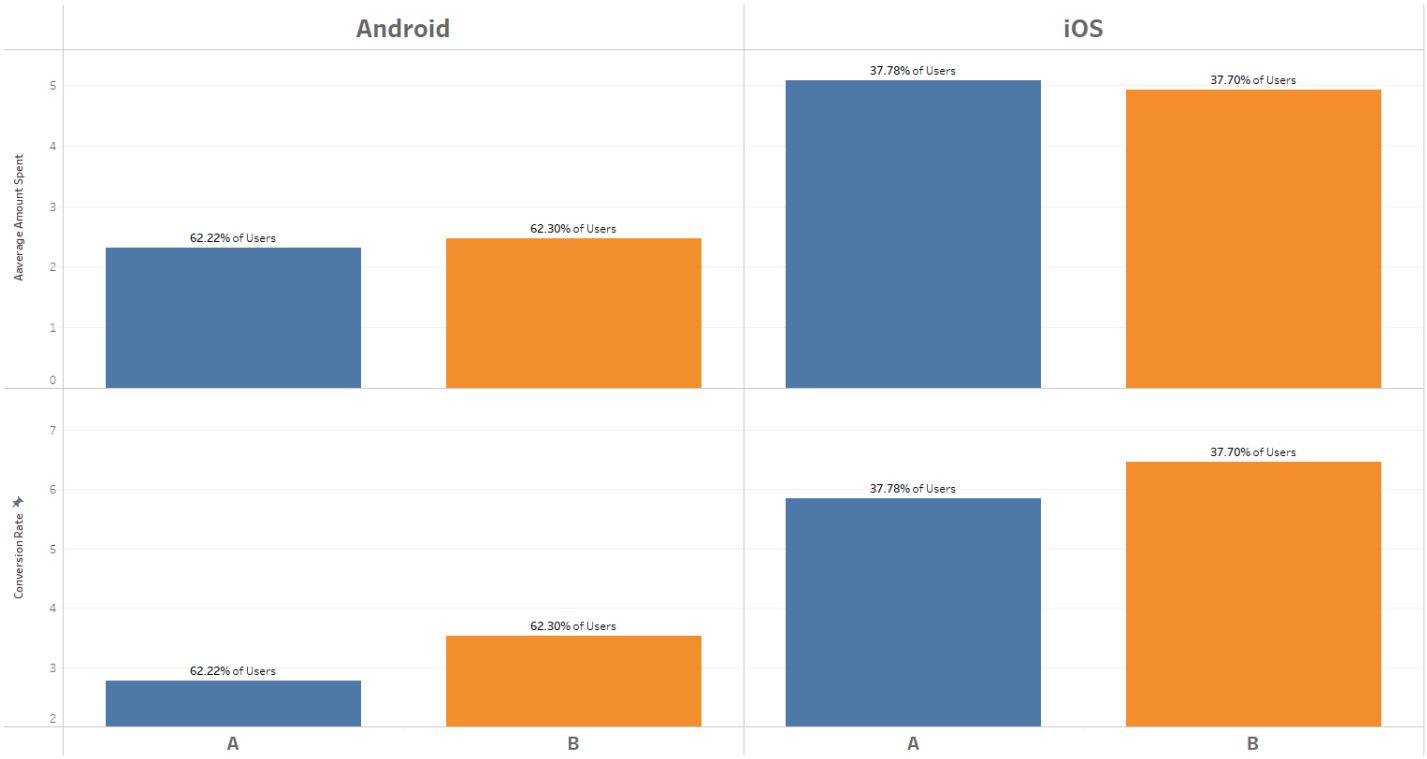
- Significant logarithmic correlation (p-value = 0.0002, R^2 = 0.8) found between variables when grouping users by country of purchase.
- United States and Canada had highest conversion rates and average amounts spent.
- Australia had lowest conversion rates and average amounts spent.
- 643 users had missing country values in the dataset.

6) <u>Measures grouped by gender</u>



- Female users had the highest conversion rates and average amounts spent.
- Among female users, those from control group ("A") had the highest average amounts spent.
- Female users from treatment group("B") had the highest conversion rates.
- Male users had the lowest average amounts spent overall.
- Male users from group A had the lowest conversion rates.
- Male users from group B had considerably higher conversion rates compared to group A (3.8 and 2.6 respectively).

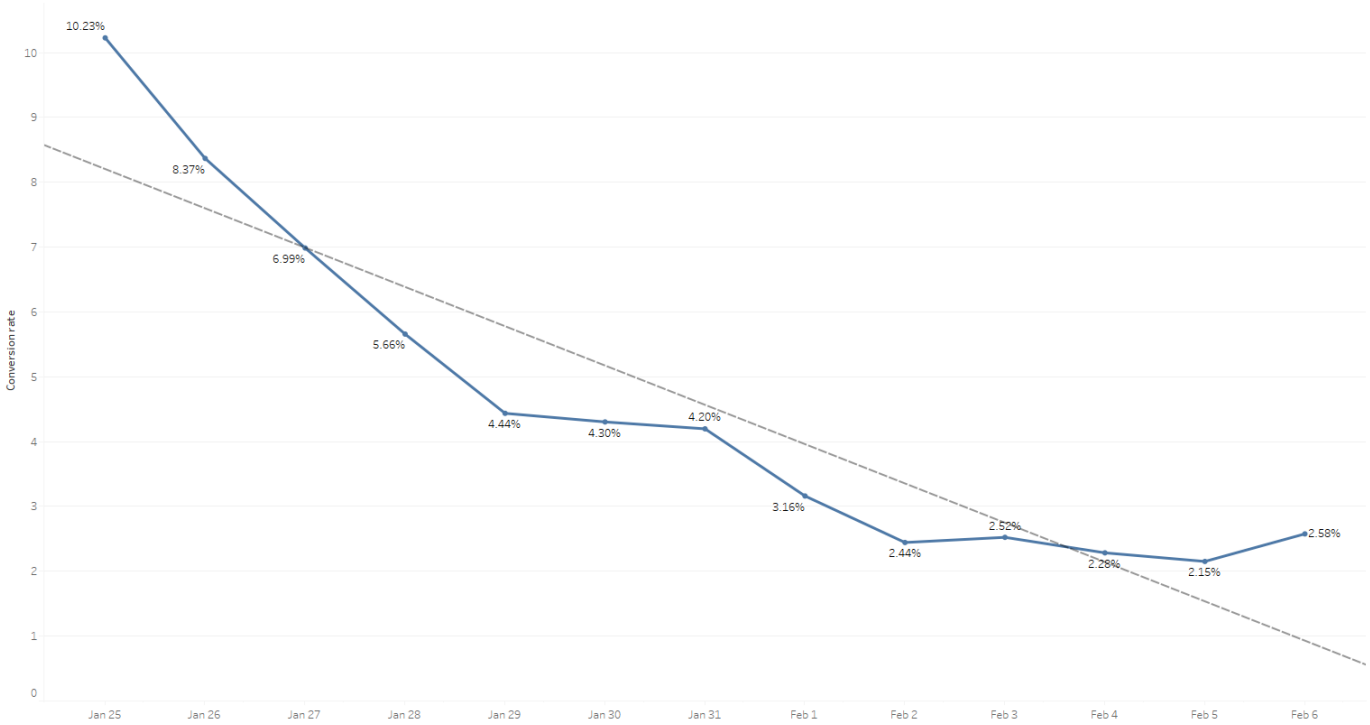
7) *Measures grouped by device*



The analysis focused on users with either Android or iOS devices, as the number of users with other device types was too low to be representative.

- Android users accounted for 62% of the total, while iOS users accounted for 38%.
- Users with iOS devices spent significantly more money and had higher conversion rates compared to Android users.
- There was no significant difference in the average amounts spent between the two groups for both Android and iOS devices.
- However, there was a noticeable difference in the conversion rates between the groups, this difference was slightly larger for Android devices.

8) <u>Change in the conversion rate throughout the experiment</u>



In this analysis, the number of users per day was not available to calculate the conversion rate for each day. Therefore, the estimated number of users per day was determined by dividing the total number of users by the number of days.

Based on the graph, it is evident that the conversion rate declines significantly as the experiment progresses. This decline can be attributed to the Novelty Effects, which refers to the initial impact of a new element, such as the banner, on consumer behavior. Initially, customers may show increased interest and engagement, resulting in a temporary boost in revenue. However, this effect diminishes over time, leading to a stabilization or decrease in revenue.

RECOMMENDATION

Upon initial observation, the results of the banner launch may seem promising, suggesting a potential improvement in revenue. However, it is crucial to interpret these findings with caution and acknowledge several factors that could be influencing the outcome.

One factor is the presence of Novelty Effects, where users may initially engage more with the banner due to its novelty, but this effect may diminish over time. To better understand the banner's long-term impact, we need to extend the duration of the experiment. This extension will allow us to observe trends beyond the initial novelty phase and determine if the improvements in conversion rates and revenue are sustained over time.

Another consideration is the limited size of the sample used for the experiment. A larger dataset would provide more robust and reliable results. To address this, we should aim to gather data from a more significant number of users over an extended period, which will enhance the statistical power of our analysis.

Additionally, the experiment's design should consider the type of product that users are purchasing. Currently, the analysis encompasses a broad range of product categories, and this could influence the results. By differentiating the type of products users are buying, we can gain insights into how the banner specifically impacts different product categories' sales.

To ensure a comprehensive understanding of the banner's true impact on revenue, we need to address these potential issues. By extending the experiment's duration and collecting data from a more substantial and diverse user base while accounting for product-specific effects, we can make well-informed decisions regarding the banner's effectiveness. Once the extended experiment is completed and thoroughly analyzed, we can confidently assess the banner's true impact and make any necessary adjustments before considering a relaunch. This rigorous approach will provide us with more reliable and actionable insights to optimize our marketing strategies effectively.

APPENDIX

All the analysis workbooks are stored in the following files:

- Spreadsheet File
- Tableau File
- SQL Query
- Presentation