

# GloBox Homepage Launch

## 1.0 Summary

The data analysis report aims to provide insights into the A/B test experiment conducted by GloBox. The goal of the experiment was to assess the viability of launching a new homepage experience to maximise user engagement, drive more traffic, and increase sales on the platform. The report presents findings from the data analysis, comparing the performance of the control group (Group A) exposed to the existing landing page with the treatment group (Group B) experiencing the revamped homepage design featuring a food and drink banner.

GloBox divided 48,943 users into 2 groups. Group A was the Control group and was exposed to the original homepage and consisted of 24,343 users. Group B was the Treatment group and was exposed to the new homepage with the banner and consisted of 24,600 users.

From the data analysis, the average total spent and conversion rate in group B was greater than group A. The amount spent per user was greater in group B. The majority of users used an Android device to access the website. The data showed that most users were females and this allows us to target this gender when marketing. We found out that high GDP countries have higher spending and conversion rates compared to low GDP countries.

It is logical to launch the banner based on the conversion rate improvement found in group B. However, there was no evidence to show that the average amount spent increased between the 2 groups.

The experiment lacked several key elements that could affect the validity and reliability of the results found. Some of the limitations include;

**Randomisation and sample size:** The experiment may have not used the correct randomisation technique to assign users to different groups. The sample size of each group was not large enough to draw statistically significant conclusions.

**Selection Bias:** There might be selection bias in the method used to assign users to the group.

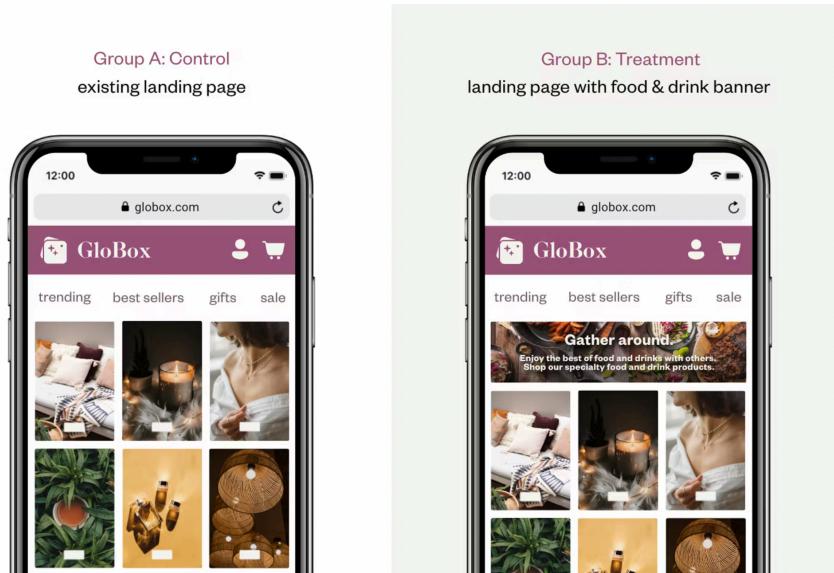
**Duration:** The duration of the experiment was not sufficient to allow us to draw conclusions. A short experiment like this will not account for novelty effect or long term behaviour. Also, the season could affect users behaviour, some users spend more before Christmas or other festivities for example.

**Missing variables:** The experiment did not take user demographics into account or past behaviour and app version.

## **2.0 Introduction**

GloBox, an online marketplace renowned for its exceptional collection of premium products sourced globally. They want to drive more traffic and sales on their online platform and have made a strategic decision to re-design their homepage to maximise user experience and drives more sales.

To achieve this goal, they have initiated an A/B test experiment to assess the viability of launching a new user experience homepage. The experiment consists of two groups: Group A, the control group, will be exposed to the existing landing page, while Group B, the treatment group, will experience the revamped homepage design and layout, featuring a food and drink banner. By comparing the performance of both groups, GloBox aims to make an informed decision about deploying the new homepage experience to all users.



## **3.0 Objectives For The Project**

1. Increase User Engagement: Enhance the homepage design and layout to encourage users to spend more time exploring GloBox's online platform and its unique product offerings.
2. Improve Conversion Rate: Optimise the homepage to drive more sales by implementing persuasive elements and a seamless user journey, resulting in a higher conversion rate from visitors to customers.
3. Enhance User Experience: Redesign the homepage to provide a visually appealing and intuitive interface, ensuring a positive user experience that keeps visitors engaged and encourages repeat visits.
4. Evaluate A/B Test Results: Analyse the performance metrics and user behaviour data from both Group A (control group) and Group B (treatment group) to determine the effectiveness of the revamped homepage in driving traffic, sales, and user satisfaction.

5. Provide Insights with Data Analysis: Utilise SQL, spreadsheets, and Tableau to extract meaningful insights from the collected data, presenting clear and actionable recommendations on whether GloBox should launch the new homepage experience to all users.

6. Track Key Performance Indicators (KPIs): Define and monitor relevant KPIs, such as traffic volume, conversion rates, bounce rates, and customer satisfaction, to evaluate the success of the new homepage.

7. Collaborative Decision Making: Collaborate with GloBox's stakeholders, including marketing, design, and development teams, to ensure a holistic approach to the homepage redesign and align the project objectives with the company's overall goals and strategies.

## **4.0 Methodology**

The methodology employed for the data analysis in this project involved several key steps to gather and analyse relevant data. The following provides an overview of the methodology used:

### **1. A/B Test Experiment Setup:**

- GloBox divided 48,943 users base into two groups: Group A (control group, 24,343 users) and Group B (treatment group, 24,600 users).
  - Group A was exposed to the existing landing page, representing the current user experience.
  - Group B was presented with the revamped homepage design and layout, featuring a food and drink banner.

### **2. Data Collection:**

- Various metrics were collected to assess the performance of both groups.
- Relevant data points included website traffic, conversion rates, average spent, user engagement metrics, sales performance.

### **3. Data Analysis Tools:**

- SQL: Structured Query Language was utilised to extract and manipulate data from the relevant databases.
- Spreadsheets: Google Sheets were employed to organise and analyse data.
- Tableau: Data visualisation software like Tableau was used to create interactive visualisations for comprehensive analysis.

### **4. Data Analysis Process:**

- The collected data was thoroughly examined and analysed for both Group A and Group B.
- Various statistical techniques were applied to identify patterns, trends, and differences in performance between the two groups.
  - Metrics such as website traffic, conversion rates, average spent, user engagement and sales performance were evaluated and compared.

## 5. Data Visualization:

- Visualisations, including charts, graphs, and tables, were created using data visualisation tools in Tableau.
- Visual representations aided in presenting the findings in a clear and concise manner, enhancing understanding and insights.

## 6. Interpretation and Insights:

- The analysed data was interpreted to derive meaningful insights and understand the impact of the revamped homepage design.
- Patterns, trends, and statistical significance were considered in evaluating the performance of the treatment group compared to the control group.

## 7. Recommendations:

- Based on the insights gained from the data analysis, recommendations were formulated regarding the launch of the new homepage experience.
- These recommendations considered factors such as improved user engagement, increased conversion rates and enhanced sales performance.

# 5.0 Data Analysis

## 5.1 Data Preparation

- The data set was collected from GloBox
- The data was extracted from Beekeeper Studio using the following SQL code:

```

SELECT (u.id) AS user_id, Coalesce((u.country), 'unknown') AS country,
COALESCE(u.gender,'unknown') as gender, Coalesce((g.device), 'unknown') AS device_type,
g.group AS test_group,
CASE WHEN a.spent > 0 THEN 1 ELSE 0 END AS converted,
COALESCE(SUM(a.spent), 0) AS total_spent
FROM users u
left JOIN groups g
ON u.id = g.uid
left JOIN activity a
ON u.id = a.uid AND g.device = a.device
GROUP BY u.id, u.country, u.gender, g.device, g.group, converted

```

- The data set was extrapolated and collected for **48, 943** users

## **5.2 Descriptive Analysis**

- We used a pivot table to summarise the data in google sheets.
- Pivot table was used as there was a large amount of data and this was the best method to quickly and efficiently transform the raw data for easy analysis.

Test Group	STDEV of Total Spent	AVERAGE of total Spent	Count of Total Spent
A	25.93639056	3.374518468	24343
B	25.4141096	3.390866946	24600
<b>Grand Total</b>	<b>25.67494579</b>	<b>3.38273563</b>	<b>48943</b>

Figure 1: Pivot Table One: Standard Deviation and Average Spent in group A (control group) and group B (treatment group) (see appendix for link)

- The **total spent** in each group was calculated using a pivot table.
- The data was cleaned and users that spent zero was omitted from the data.

Test Group	Total Spent
A	955
B	1139
<b>Grand Total</b>	<b>2094</b>

Figure 2: Pivot Table Two: Total Spent in group A (control group) and group B (treatment group) (see appendix for link)

### **5.3 Comparative Analysis**

#### **Hypothesis Test for the Difference in Conversion Rates between the Control (A) and Treatment (B) Group**

1. Conduct a hypothesis test to see whether there is a difference in the conversion rate between the two groups.

- Two-Sample Z-Test With Pooled Proportion

Test group	Sample Size	Users that Spent	Average Amount Spent	Sample Standard Deviation	Sample Proportion (Conversion Rate)
Control group A	24343	955	3.37	25.94	0.0392
Treatment group B	24600	1139	3.39	25.41	0.0463
Total		2094			

Figure 3: Comparative analysis for group A and B.

Pooled Proportion	0.04278446356
Standard Error	0.001829526081
z-score	-3.880786436
p-value	0.00005205962005
p-value (Two-Tail)	0.0001041192401

Figure 4: Comparative statistical analysis using the data from the data set in figure 3. (See appendix for link)

#### **Hypothesis Testing using p < 0.05**

##### **Null Hypothesis (H0)**

There is no significant difference between the conversion rate between group A and group B

##### **Alternative Hypothesis (H1)**

There is a significant difference between the conversion rate between group A and group B

##### **Conclusion**

We rejects the null hypothesis as our p value (two-tail) is less than 0.05 and therefore conclude that there is a significant difference between conversion rate in group A and B.

### **95% Confidence Interval for a Difference in Conversion Rate**

1. Use the 95% confidence interval for the difference in the conversion rate between the treatment and control group, use normal distribution and unpooled proportions for the standard error.
- Two-Sample z-interval with unpooled variance

<b>Sample Statistic / Point Estimate</b>	0.0071
<b>Standard Error</b>	0.001828159355
<b>Degrees Of Freedom (DF)</b>	24342
<b>Critical Value - t</b>	1.959963986
<b>Margin Of Error</b>	0.003583126497
<b>Lower Bound</b>	0.003516873503
<b>Upper Bound</b>	0.0106831265

Figure 5: Comparative statistical analysis using the data from the data set in figure 3. (See appendix for link)

### **Interpretation**

With 95% confidence, we believe that the actual difference in conversion rates between the treatment group and the control group is somewhere between 0.0035 and 0.0107. Since the range does not include zero, it indicates that there is a significant difference in conversion rates between the two groups.

### **Conclusion**

From the interpretation of the 95% confidence interval for the difference in conversion rates between Group A (control group) and Group B (treatment group), which falls within the range of 0.003516873503 to 0.0106831265, we can deduce the following:

1. Group B has a higher conversion rate than Group A: Since the confidence interval is entirely above zero, it suggests that the conversion rate in Group B is significantly higher than that in Group A.
2. The treatment has a positive impact: The analysis indicates that the changes implemented in the treatment group (Group B) have led to a statistically significant improvement in the conversion rate compared to the control group (Group A). The revamped homepage with the banner, has had a positive effect on the conversion rate.
3. Confidence in the difference: With 95% confidence, we can state that the true difference in conversion rates between the treatment and control groups falls within the provided confidence interval. This means we can be reasonably confident that the observed difference is not due to random chance or sampling error.

Based on these findings, it can be concluded that the changes implemented in Group B have positively influenced the conversion rate compared to Group A. This suggests that the modifications made to the homepage (Group B) have had a significant impact on increasing the likelihood of conversions compared to the original design present in Group A.

### Hypothesis Test for the Difference in Average Amount Spent Per User Between the Two Groups

**1. Conduct a hypothesis test to see whether there is a difference in the average amount spent between group A and B. Use the t distribution and a 5% significance level and assume unequal variance.**

- Used t-distribution and 5% significance level assuming unequal variance

Degrees of Freedom	24342
standard error	0.2321388387
t-Test	0.08615533752
p-Value	0.4656718214
p-Value (Two Tail)	0.9313436427

Figure 6: Comparative statistical analysis using the data from the data set in figure 3. (See appendix for link)

### Hypothesis Testing using p > 0.05

#### Null Hypothesis (H0)

There is no significant difference between the average amount spent between group A and group B

#### Alternative Hypothesis (H1)

There is a significant difference between the average amount spent between group A and group B

#### Interpretation

Since the two-tail p-value (0.9313436427) is greater than the significance level of 0.05, we fail to **reject the null hypothesis**. This means that there is not enough evidence to suggest a statistically significant difference in the average amount spent per user between Group A and Group B.

The p-value of 0.9313436427 indicates that the observed difference in the average amount spent per user between the two groups could be due to random chance or sampling variation.

## **Conclusion**

The analysis found that there is no significant difference in the average amount of money spent per user between Group A (the control group) and Group B (the treatment group). This means that the changes made in Group B did not have a significant impact on how much money people spent compared to Group A.

The results suggest that factors other than the changes made in Group B may have influenced spending pattern, such as individual preferences or random variation.

### **95% Confidence Interval for a Difference in Average Amount Spent**

1. **Use the 95% confidence interval for the difference in the average amount spent between the treatment and control group, use t distribution and assume unequal variance.**
  - Two-sample T distribution with unequal Variance

<b>Sample Statistic / Point Estimate</b>	0.02
<b>Standard Error</b>	0.2321388387
<b>Degrees of Freedom(df)</b>	24342
<b>Critical Value - t</b>	1.960061445
<b>Margin of Error</b>	0.4550063877
<b>Lower Bound</b>	-0.4350063877
<b>Upper Bound</b>	0.4750063877

Figure 7: Comparative statistical analysis using the data from the data set in figure 3. (See appendix for link)

## **Interpretation**

We are 95% confident that the true difference in the average amount spent per user between the treatment and control groups is somewhere between -0.44 and 0.48 (rounded values).

This means that there is a range of possible differences in spending between the two groups.

However, based on the data, we cannot say for certain whether the treatment group spends more or less on average compared to the control group. To have a clear understanding, we would need to analyse more data and conduct further investigation.

## **Conclusion**

Based on the interpretation of the confidence interval for the difference in the average amount spent per user between Group A (control group) and Group B (treatment group), we can draw the following conclusions:

1. No definitive conclusion about the difference: The confidence interval (-0.44 to 0.48) includes both positive and negative values, indicating a range of possible differences in the average amount spent per user between the two groups.
2. Lack of statistical significance: The confidence interval includes zero, suggesting that there is no statistically significant difference in the average amount spent per user between Group A and Group B.
3. Uncertainty about the true difference: Since the confidence interval spans positive and negative values, we cannot definitively conclude whether the treatment group (Group B) spends more or less on average compared to the control group (Group A).
4. Need for further analysis: Additional data and analysis are necessary to determine the actual difference in spending between the two groups.

## **Final Findings and Conclusion**

1. Conversion Rates: There is a significant difference in the conversion rates between Group A and Group B. Group B has a higher conversion rate, indicating that the changes implemented in Group B, revamped homepage with the banner, have positively impacted the likelihood of conversions compared to the original design in Group A.
2. Average Amount Spent: There is no significant difference in the average amount spent per user between Group A and Group B. The changes made in Group B did not have a significant impact on the spending behaviour compared to Group A.
3. Further Analysis Needed: It is important to conduct additional analysis and investigate other factors that may influence spending behaviour and conversion rates. The current data does not provide a clear conclusion, and more information is required for a comprehensive understanding.

## 6.0 Visualisations

### 6.1 Chart Representing the Average Amount Spent (\$) and Conversion Rate in Group A and Group B

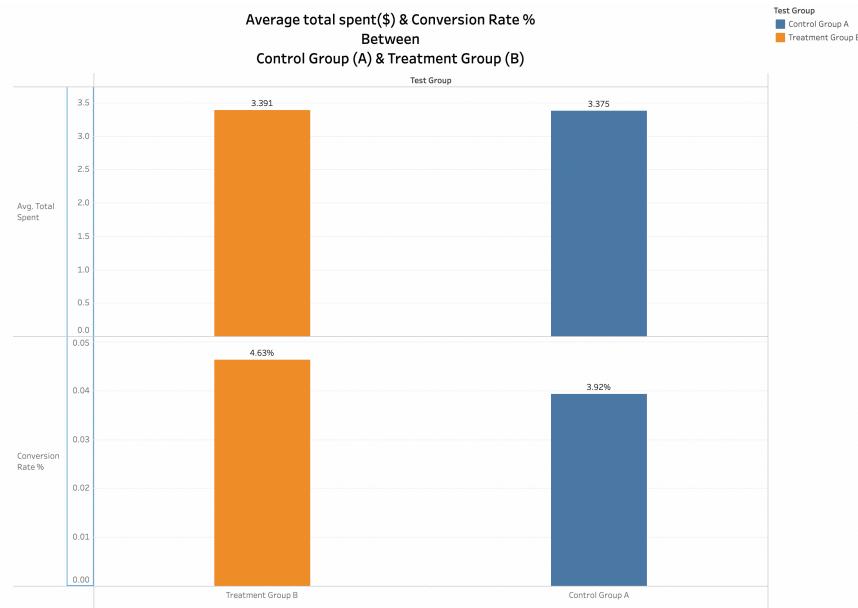


Figure 8: Above Chart Graph represents the average total spent in each group and the conversion rate. We can see that the average total spent for group B is greater than group A and therefore the conversion rate in group B is also greater than group A. (Link for visualisation linked in appendix)

### 6.2 Histogram Representing the Amount Spent Per User in Group A and Group B

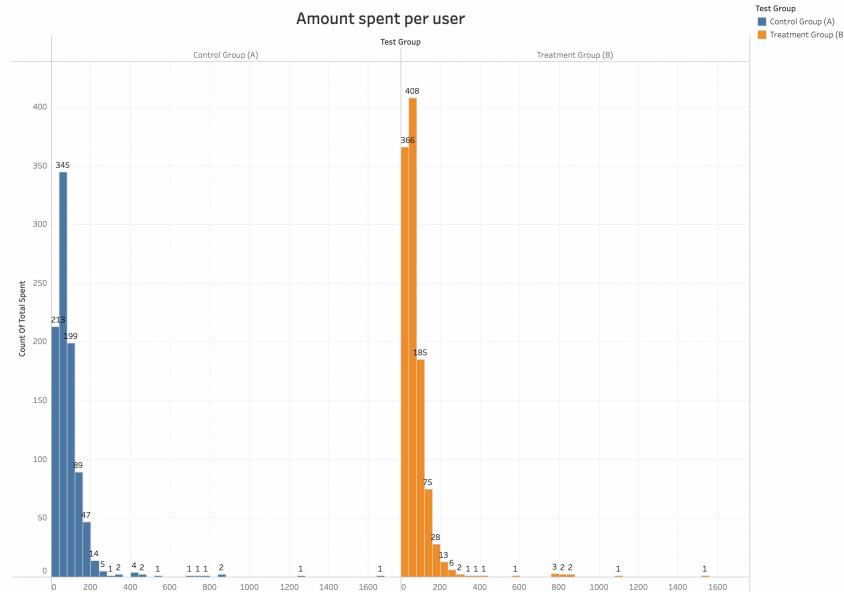


Figure 9: Above Histogram represents the amount spent per user in each group. The histogram is positively right skewed for both groups. The right skewed distributions suggests that there are fewer observations with lower spending and larger observations with higher spending values. The amount spent per user in both groups indicates that there are fewer users with lower spending values and large number of users with higher spending values. We can also observe from the histogram above that group B has a higher spending compared to group A and can therefore conclude that the banner may have some influence on spending more. (Link for visualisation linked in appendix)

### **6.3 Relationship Between the Test Metrics (Conversion Rate and Average Amount Spent) and the Users Device (iOS, Android, Unknown)**

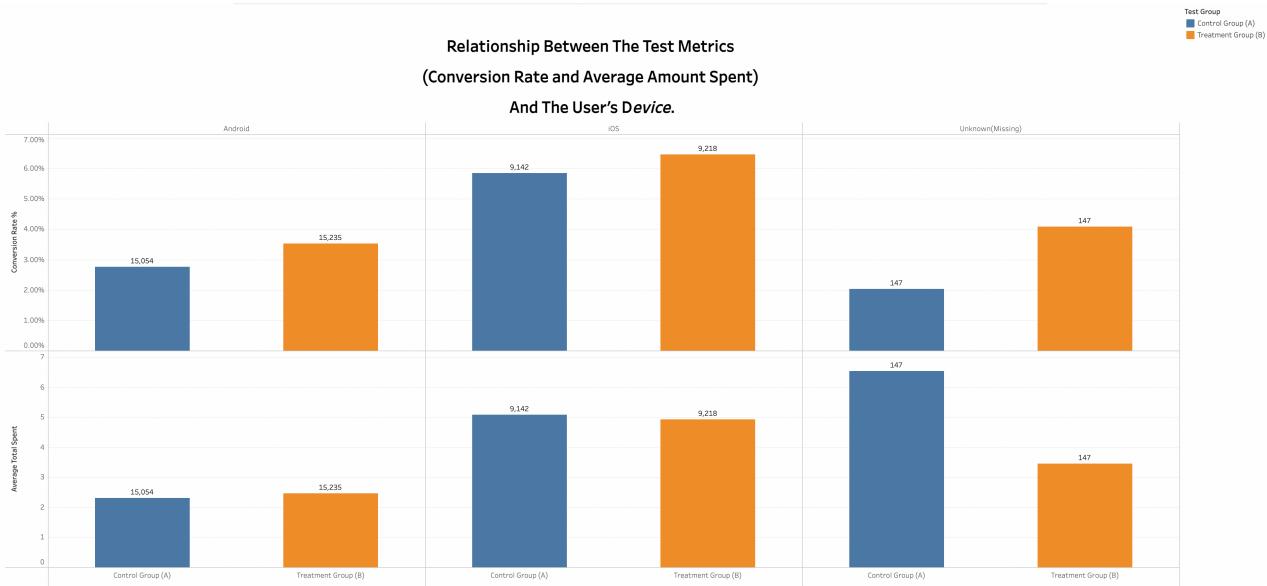


Figure 10: Multi-bar chart representing the device used by each user when accessing the GloBox website. We can see that the majority of users use an Android device. Therefore, the design team should take this into consideration and make sure that the website is compatible on both android and iOS devices (including laptops, desktops, iPads etc.) however they should give preference to Android devices as majority of users use this type of device. (Link for visualisation linked in appendix)

#### **6.3.1 Analysis**

The data indicates that the number of Android users in both Group A and Group B was significant, with 15,054 and 15,235 users, respectively. On the other hand, iOS users were fewer in number but still significant, with 9,142 in Group A and 9,218 in Group B.

The higher number of Android users compared to iOS users in both groups suggests a strong preference for Android devices. This preference might be influenced by factors such as regional popularity, affordability, or specific features of Android devices.

It is essential for the product team to ensure optimal performance and compatibility on both Android and iOS platforms. Platform-specific features and user experiences can be tailored to accommodate the distinct behaviours and expectations of Android and iOS users.

Understanding the device distribution can help prioritise app updates, bug fixes, and feature enhancements based on the number of users affected on each platform. This ensures overall user experience and satisfaction.

## **6.4 Relationship Between Test Metrics and Users Gender**

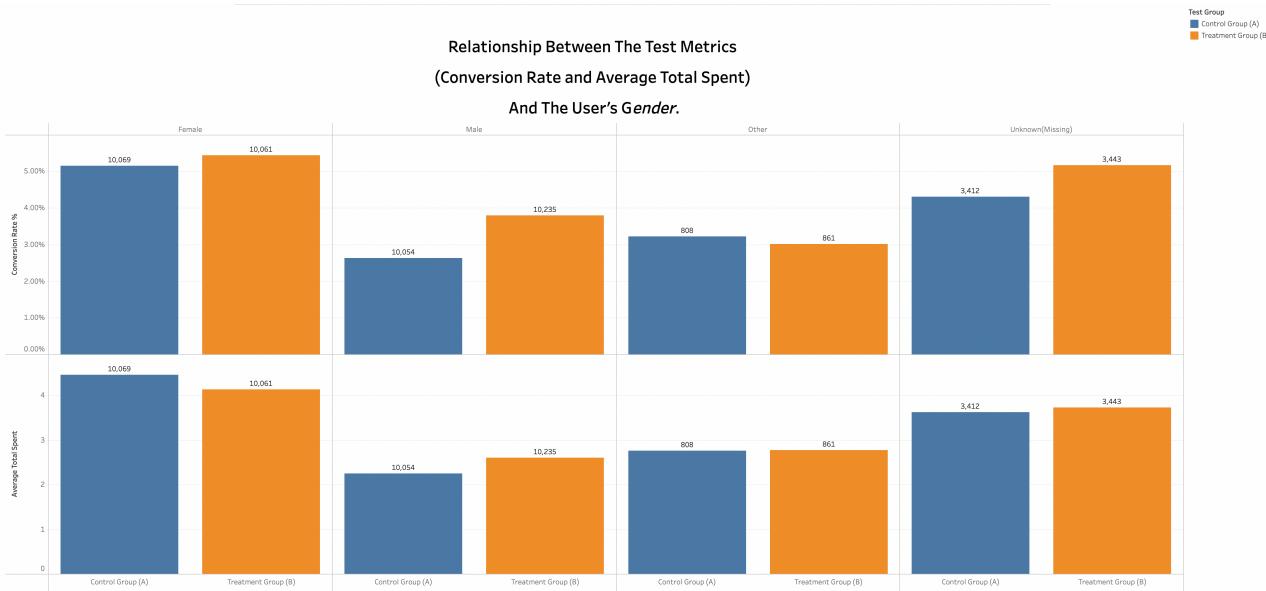


Figure 11: Multi-bar chart representing the gender (4 categories) and the test metrics. We can see that the majority of users identify as female and therefore this is useful as we can consider gender-based analysis and explore potential behaviour and preferences between the genders and help us to identify gender-specific patterns or trends that may be relevant to the homepage launch and design. We can perform targeted marketing such as fashion, home decor or gadgets for males etc. We can enhance the user experience for the dominant user group. (Link for visualisation linked in appendix)

## 6.5 Relationship Between Test Metrics and Users Country

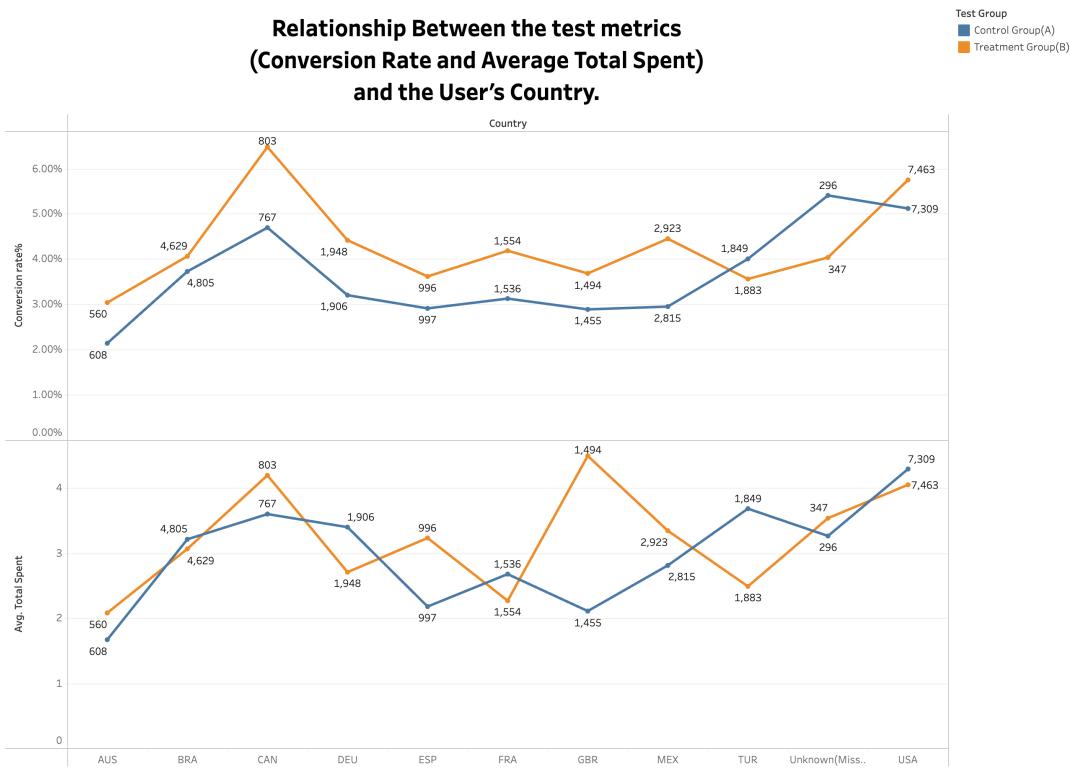


Figure 12: Line chart represents the conversion rate and average total spent and the users country. We can see from the above line chart that the conversion rate for group B in the USA was greater (therefore the banner is more effective for engagement with users) compared to group A. However, for the same country the average amount spent per use was greater for the control group (A) compared to the treatment group (B). This suggests that although engagement may be higher, it doesn't necessarily mean that spending will directly correlate. For Great Britain we can see that the Treatment Group was higher in conversion rate and also in average total spent and the banner may directly influence users spending in high GDP countries like the UK and Canada. (Link for visualisation linked in appendix)

## 7.0 Advanced Tasks - Visualisations

### 7.1 Confidence Interval for Difference in the Conversion Rate & Average Amount Spent Between Both Groups

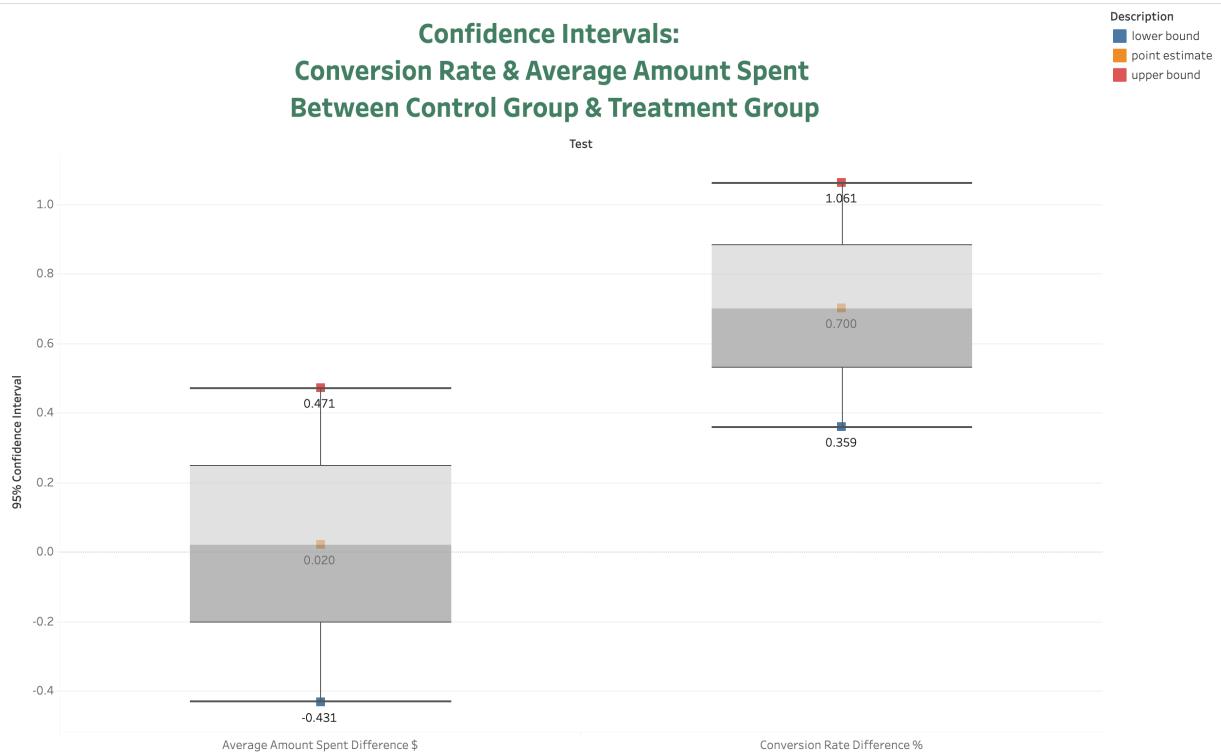


Figure 13: 95% Confidence interval plot graph representing the confidence interval between the difference in the test metric and both groups. The difference in the average amount spent includes zero, and we can see from the figure above that this indicates there is no significant difference in the amount spent between the two groups. For the difference in conversion rate, we can see from the graph above that it does not include zero and therefore can conclude that there is a significance difference between conversion rate in the two groups.

## **7.2 Novelty Effect Between Group A and Group B**

Novelty effect refers to the users initial response to new changes, such as a revamped homepage (new banner). It can lead to temporary changes in behaviour, increased engagement or spending. Long-term analysis can allow us to assess the following:

- Sustainability: is user behaviour sustainable over time or temporary due to novelty effect?
- User Adoption: analysing user behaviour (spending) long term can help us identify if users have fully adopted to the new feature/design.
- Trend Identification: allows us to identify trends and patterns that may be evident in short term assessment

```
SELECT (u.id) AS user_id, g.join_dt as join_date, a.dt as purchase_date,
       COALESCE(u.country, 'unknown') AS country,
       COALESCE(u.gender, 'unknown') AS gender,
       COALESCE(g.device, 'unknown') AS device_type, g.group AS test_group,
       CASE WHEN a.spent > 0 THEN 1 ELSE 0 END AS converted,
       COALESCE(SUM(a.spent), 0) AS total_spent
FROM users u
left JOIN groups g
ON u.id = g.uid
left JOIN activity a
ON u.id = a.uid AND g.device = a.device
GROUP BY u.id, u.country, u.gender, g.device, g.group, g.join_dt, a.dt, converted
```

The above SQL code was used in Beekeeper Studio to obtain the data for the novelty effect in the groups.

### **7.2.1 Novelty Effect of Average Total Spent Between Control and Treatment Group**



Figure 14: Line graph represents the novelty effect in both groups. Trend line has been used and we can see that on the 25th of January until the 30th of January, the novelty effect is not evident in group B and the average amount spent is less than group A. However, from the 30th of January we can see higher spending but this wears away. There is greater fluctuating behaviour in the group B. Although fluctuation is present in group A also, it is more consistent and the trend line goes down. However, we can see greater fluctuation behaviour in group B and the trend line increases, suggesting that the novelty effect of total spending is more prevalent in group B compared to group A.

### **7.2.2 Novelty Effect of Conversion Rate Between Control and Treatment Group**

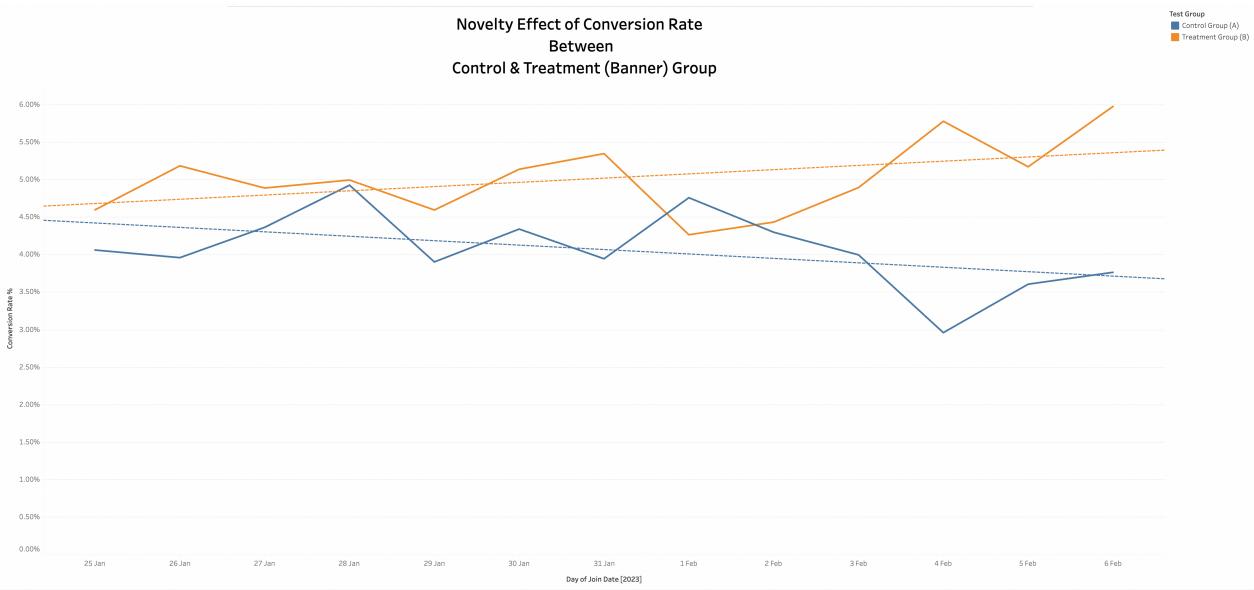


Figure 15: Line graph represents the novelty effect in both groups. We can see fluctuation behaviour between both groups. The trend line shows a decrease in novelty effect in group A, suggesting that conversion rate in this group decreased with date. On the opposite end, we can see an increase in novelty effect in group B suggesting a increase in conversion rate over time.

### **7.2.1 Conclusion**

The combination of the novelty effect, fluctuation in Group B, and the average amount spent being less than Group A suggests the following:

1. Novelty Effect: The initial response to the changes in Group B's revamped homepage design may have influenced user behaviour. Users may have been initially intrigued or motivated to explore the new features, resulting in fluctuations in their actions.
2. Fluctuation in Group B: The fluctuation in Group B implies that users in this group may have shown inconsistent or variable behaviour over time. This could be due to the novelty effect wearing off or other external factors influencing their actions.
3. Lower Average Amount Spent: The average amount spent being less in Group B compared to Group A indicates that, on average, users in Group B may have spent less money per user than those in Group A. This suggests that the changes made to the homepage design in Group B may not have had a significant positive impact on the spending behaviour of users compared to the original design in Group A.

Considering these findings, it may be important to further investigate the reasons behind the lower average amount spent in Group B. It could be necessary to analyse user feedback, conduct surveys, or explore other factors that could have influenced user behaviour in order to understand the underlying causes and make informed decisions for future improvements.

## 8.0 Results

1. Conversion Rates: The analysis indicates a **significant difference** in conversion rates between Group A (control group) and Group B (treatment group). The changes implemented in Group B, including the revamped homepage with the banner, have positively influenced the likelihood of conversions compared to the original design in Group A. Therefore, traffic to the website has increased.

2. Average Amount Spent: The analysis **does not show** a significant difference in the average amount spent per user between Group A and Group B. This suggests that the changes made to the homepage design in Group B **did not have a significant impact** on the spending behaviour compared to Group A.

**Based on these findings, it can be concluded that the new banner (revamped homepage) has shown a positive effect on conversion rates. However, it did not have a significant impact on the average amount spent per user.**

The decision of whether to launch the new banner or not depends on the specific objectives and priorities of the project. If the primary goal is to improve conversion rates, the positive impact observed in Group B supports the launch of the new banner. However, if increasing the average amount spent per user is a priority, the analysis suggests that further improvements or strategies may be needed.

## 9.0 Recommendation and Final Conclusion

From the above analysis and findings, I would rerun the experiment and would consider the following for the new experiment;

1. **Sample Size:** I would ensure that the sample size is large enough to detect smaller effects accurately. I don't have information about the number of users GloBox has so would request this information and then make a judgment about the sample size I would use for the new experiment. However, for reference, I have used the online sample size calculator and for the conversion rate of 3.92%, I would recommend a sample size of around 77K.

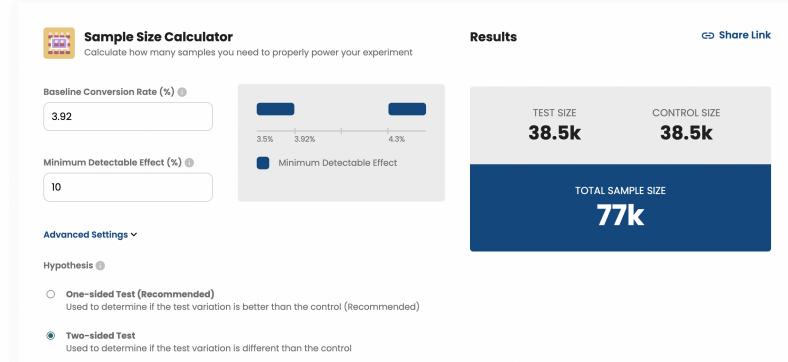


Figure 16: Sample size recommendation that I would use for the new experiment. (Linked in appendix)

## Sample Size Calculator for Comparing Two Independent Means

- ✓ Provides live interpretations.
- ✓ Evaluates the influence of changing input values.
- ✓ Adjusts sample sizes for continuity and clustering.

**Input Values**

Select one of the two options to specify input values. Hover over the ⓘ sign to obtain help.

Expected Means ⓘ

Mean of the Reference Group: 3.37

Mean of the Test Group: 3.39

Standard Deviation: 0.227

Expected Difference between Means ⓘ

Click the Options button to change the default options for Power, Significance, Alternate Hypothesis and Group Sizes. Use the Adjust button to adjust sample sizes for t-distribution (option applied by default), and clustering.

**Results and Live Interpretation** [Download](#)

Assuming a pooled standard deviation of 0.227 units, the study would require a sample size of:

**2023**

for each group (i.e. a total sample size of 4046, assuming equal group sizes), to achieve a power of 80% and a level of significance of 5% (two sided), for detecting a true difference in means between the test and the reference group of 0.02000000000000018 (i.e. 3.39 - 3.37) units.

In other words, if you select a random sample of 2023 from each population, and determine that the means of the test and the reference groups are 3.39 and 3.37 units, respectively, and the standard deviation is 0.227 units, you would have 80% power to declare that the two groups have significantly different means, i.e. a two sided p-value of less than 0.05.

**Reference:** Dhand, N. K., & Khatkar, M. S. (2014). Statulator: An online statistical calculator. Sample Size Calculator for Comparing Two Independent Means. Accessed 4 August 2023 at <http://statulator.com/SampleSize/ss2M.html>

**Note:** Statulator used the input values of a power of 80%, a two sided level of significance of 5% and equal group sizes for sample size calculation and adjusted the sample size for t-distribution. You may change the options by clicking [here](#) or the 'Options' button and the adjustments by clicking [here](#) or the 'Adjust' button.

**2. Duration:** Evaluate the duration of the experiment. A longer duration allows for capturing potential long-term effects and mitigating the influence of short-term fluctuations or the novelty effect. Consider running the experiment for a more extended period to observe sustained effects. I would recommend an experiment to run for 3-6 months.

**3. Additional Metrics:** Consider collecting and analysing additional metrics related to user behaviour, such as click-through rates, bounce rates, or time spent on the website. These metrics can provide deeper insights into user engagement and help evaluate the overall impact of the changes made.

**4. User Feedback:** Gather qualitative feedback from users through surveys, interviews, or user testing sessions. This can provide valuable insights into their perceptions, preferences, and experiences with the new homepage design. Understanding user perspectives can help identify areas for improvement or uncover potential issues that quantitative analysis may not capture.

In summary, whether to launch the new banner or rerun the experiment depends on the specific objectives, priorities, and trade-offs of the project. However, GloBox is a business and would therefore need to sell products to make a profit and keep their business running. From the above analysis, it is not enough to conclude that the new banner is effective in drawing in more sales. **A rerun of the experiment is highly recommended.**

## **10. Appendix**

1. Figure 1: Pivot Table One: Standard Deviation and Average Spent in the Two Groups [Link:](https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=656819202) <https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=656819202>
2. Figure 2: Pivot Table Two: Total Spent in Group A and Group B [Link:](https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1560023632) <https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1560023632>
3. Figure 3 and 4: Hypothesis Test for the Difference in Conversion Rates Between Group A and B. [Link:](https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1052165649) <https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1052165649>
4. Figure 5: 95% Confidence Interval for a Difference in Conversion Rate in both groups using Data from the Data Set in figure 3. [Link:](https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1598577658) <https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1598577658>
5. Figure 6: Hypothesis Test for the Difference in Average Amount Spent Per User Between the Two Groups. [Link:](https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=2050605901) <https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=2050605901>
6. Figure 7: 95% Confidence Interval for a Difference in Average Amount Spent in both groups using Data from the Data Set in figure 3. [Link:](https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1650245564) <https://docs.google.com/spreadsheets/d/1bMGj5Y41DLf7k-ZmMZSKttJRruuO7kRj000qyvapc-8/edit#gid=1650245564>
7. Figure 8: Bar Chart Representing Average Amount Spent and Conversion Rate Between Group A and B. [Link:](https://public.tableau.com/app/profile/adam.mhedeni/viz/AveragetotalspentConversionRateBetweenABGroup/Sheet1) <https://public.tableau.com/app/profile/adam.mhedeni/viz/AveragetotalspentConversionRateBetweenABGroup/Sheet1>
8. Figure 9: Histogram Representing The Amount Spent Per User in Both Groups. [Link:](https://public.tableau.com/app/profile/adam.mhedeni/viz/Amountspentperuser/Sheet1) <https://public.tableau.com/app/profile/adam.mhedeni/viz/Amountspentperuser/Sheet1>
9. Figure 10: Relationship Between the Test Metrics (Conversion Rate and Average Amount Spent) and the Users Device (iOS, Android, Unknown). [Link:](https://public.tableau.com/app/profile/adam.mhedeni/viz/RelationshipBetweenthetestmetricsConversionRateandAverageAmountSpentandtheUsersDevice/Sheet1) <https://public.tableau.com/app/profile/adam.mhedeni/viz/RelationshipBetweenthetestmetricsConversionRateandAverageAmountSpentandtheUsersDevice/Sheet1>
10. Figure 11: Relationship Between Test Metrics and Users Gender. [Link:](https://public.tableau.com/app/profile/adam.mhedeni/viz/RelationshipBetweenthetestmetricsConversionRateandAverageTotalSpentandtheUsersGender/Sheet1) <https://public.tableau.com/app/profile/adam.mhedeni/viz/RelationshipBetweenthetestmetricsConversionRateandAverageTotalSpentandtheUsersGender/Sheet1>

11. Figure 12: Relationship Between Test Metrics and Users Countries. [Link: https://public.tableau.com/app/profile/adam.mhedeni/viz/relationshipbetweenthetestmetricsconversionrateandaverageamountspentandtheuserscountry/Sheet1](https://public.tableau.com/app/profile/adam.mhedeni/viz/relationshipbetweenthetestmetricsconversionrateandaverageamountspentandtheuserscountry/Sheet1)
12. Figure 13: Confidence Interval for Difference in the Conversion Rate & Average Amount Spent Between Both Groups. [Link: https://public.tableau.com/app/profile/adam.mhedeni/viz/95confidenceinterva/Sheet1](https://public.tableau.com/app/profile/adam.mhedeni/viz/95confidenceinterva/Sheet1)
13. Figure 14: Novelty Effect Between Average Total Spent and the 2 Groups. [Link: https://public.tableau.com/app/profile/adam.mhedeni/viz/noveltyeffectofAvgSpent/Sheet1](https://public.tableau.com/app/profile/adam.mhedeni/viz/noveltyeffectofAvgSpent/Sheet1)
14. Figure 15: Novelty Effect Between Conversion Rate and the 2 Groups. [Link: https://public.tableau.com/app/profile/adam.mhedeni/viz/RequestRejectedbyServerThe workbook NoveltyEffectofAverageTotalSpentBetweenControlTreatmentBannerGroupwasdeleted\\_PleasechooseSaveAstosaveasnewworkbook/Sheet2](https://public.tableau.com/app/profile/adam.mhedeni/viz/RequestRejectedbyServerThe workbook NoveltyEffectofAverageTotalSpentBetweenControlTreatmentBannerGroupwasdeleted_PleasechooseSaveAstosaveasnewworkbook/Sheet2)
15. Figure 16: Recommended Sample Size Calculation. [Link: https://www.statsig.com/calculator?mde=10&bcr=3.92&twoSided=true&splitRatio=0.5&alpha=0.05&power=0.95](https://www.statsig.com/calculator?mde=10&bcr=3.92&twoSided=true&splitRatio=0.5&alpha=0.05&power=0.95)