**Project Title:**

**“Evaluation of A/B Testing of the Control and Conversion Group of the Mobile Homepage of the Food and Drink Product Category of Glo Box Online Company.”**

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**Project Summary**

The project was designed with a clear objective: to assess the impact of a new banner feature (Group B) in comparison to the existing setup (Group A) on key metrics, specifically focusing on the conversion rate and average user spending. This meticulous evaluation sought to uncover insights that would guide decision-making and optimization efforts for the company's digital platform.

Through a methodical process of data collection, analysis, and interpretation, the project delved into the behaviour of users exposed to the new banner feature and those who encountered the standard setup. This comparative analysis aimed to unearth any discernible differences in user engagement, conversion patterns, and spending behaviours between the two groups.

The findings of the project have been meticulously compiled, offering a comprehensive view of the performance metrics observed during the testing phase. From examining conversion rates to dissecting average user spending, the project has provided valuable insights into how the new banner feature influenced user interactions and ultimately impacted the desired outcomes.

Considering the data-driven analysis, clear recommendations have emerged, offering actionable insights for the company's digital strategy moving forward. These recommendations are informed by a thorough understanding of the observed trends, patterns, and behaviours exhibited by users in both Group A and Group B.

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**1.0. Introduction.**

Glo Box stands as a premier e-commerce destination, celebrated for its distinctive curation of unique, high-quality products sourced from diverse corners of the globe. Rooted in a philosophy that seeks to elevate shopping into an exhilarating adventure, the company is committed to making the global market easily accessible to consumers, all with the convenience of a few taps on their mobile phones.

**1.1. Problem statement.**

Glo Box, a distinguished name in boutique fashion and upscale decor, has experienced notable expansion in its food and drink offerings, marking a new chapter in its product portfolio. To amplify awareness and drive revenue for this burgeoning category, the company's growth team has put forth an innovative proposal: an A/B test designed to gauge the impact of showcasing select products from the food and drink category as a prominent banner at the top of the website.

The essence of this test lies in its simplicity yet potential effectiveness: the control group, representing the status quo, will not be exposed to the banner. In contrast, the treatment group will encounter the banner upon visiting the website, strategically positioned to catch their attention and pique interest in the delectable offerings of the food and drink category.

This A/B test serves as a strategic manoeuvre to evaluate the banner's influence on user engagement, conversion rates, and ultimately, revenue generation. By analysing the behaviour and interactions of both groups, the firm aims to glean valuable insights into the effectiveness of the banner in driving user interest and encouraging exploration of the food and drink collection.

The hypothesis underpinning this test is straightforward yet impactful: by prominently featuring the food and drink category through a visually appealing banner, the organisation anticipates an uptick in user engagement, leading to increased conversions and revenue within this segment.

Through meticulous analysis of metrics such as click-through rates, time spent on the food and drink category pages, and ultimately, conversion rates, GloBox aims to make data-informed decisions regarding the banner's efficacy. This data-driven approach ensures that the company can optimize its marketing strategies, refine the customer experience, and capitalize on the growing interest in its food and drink offerings.

In essence, the A/B test proposed by company embodies a strategic initiative to leverage its digital presence and user interface to drive growth in a new and expanding category. By harnessing the power of experimentation and data analytics, the company seeks to unlock the untapped potential of its food and drink collection, delighting customers and bolstering its position as a versatile lifestyle brand.

**1.2. A/B Test Setup**

The setup of the A/B test is as follows:

1. The experiment is only being run on the mobile website.
2. A user visits the GloBox main page and is randomly assigned to either the control or test group.
3. The page loads the banner if the user is assigned to the test group and does not load the banner if the user is assigned to the control group.
4. The user subsequently may or may not purchase products from the website. It could be on the same day they join the experiment or days later. However, if they do make one or more purchases, this is considered a “conversion”.
5. The project has a completion date of one month from the start date.

**1.3. Objective and motivation of the use A/B test for the project.**

A/B testing, also recognized as split testing, stands as a powerful method employed by businesses to meticulously compare two or more versions of a webpage or advertisement. The primary aim behind the company's decision to utilize A/B testing for the launch of a website page on mobile phones is to craft a mobile-optimized user experience that not only garners higher conversion rates but also elevates the overall performance of the website.

The motivation fuelling this testing endeavour lies in the desire to leverage data-driven insights for making informed decisions regarding design and content. By subjecting different versions of the mobile website page to the A/B test, the company seeks to uncover which elements, layouts, or content configurations resonate most effectively with users. This approach empowers the company to discern what aspects of the mobile user experience led to increased engagement, conversions, and user satisfaction.

Through meticulous analysis of user interactions, click-through rates, bounce rates, and ultimately, conversion rates, the A/B test serves as a compass guiding the company towards an optimized mobile website. The data collected from the test provides invaluable insights into user preferences, behaviours, and pain points, enabling the company to tailor the mobile experience to meet the specific needs and expectations of its target audience.

Furthermore, the company recognizes that in today's digital landscape, a seamless and user-friendly mobile experience is paramount. With the prevalence of smartphones and the growing trend of mobile browsing and shopping, ensuring a mobile-optimized website is no longer an option but a necessity.

By embarking on the A/B testing journey, the company aims to:

1. Enhance User Experience: By analysing user interactions with different versions of the mobile website page, the company can identify design elements, navigation paths, and content formats that offer the most intuitive and enjoyable user experience.
2. Increase Conversion Rates: The goal of the A/B test is to pinpoint the version of the mobile website page that drives the highest conversion rates. This may involve testing different call-to-action buttons, product placements, or checkout processes to optimize the path to conversion.
3. Drive Engagement: Engaging mobile users is crucial for building brand loyalty and repeat business. Through A/B testing, the company can identify features or content that captivate users' attention and encourage them to explore further.
4. Optimize for Mobile Search: With mobile friendliness being a key factor in search engine rankings, a well-optimized mobile website not only improves user experience but also boosts visibility in search results.

**2.0. Methods for Extraction of the Datasets for Analysis**

The experiment utilized datasets comprising 48,943 records extracted from Glo Box relational database using SQL. Customers were randomly assigned to control or treatment groups, and data from the company's database was utilized. Beekeeper Studio, an open-source SQL editor, facilitated easy data extraction. Control and treatment group sample sizes (24,343 and 24,600, respectively) were obtained through SQL.

Additional variables, such as user conversion rates and average spending, were extracted from Glo Box database. After extraction, the datasets were saved in CSV format for statistical analysis in a spreadsheet and Tableau. Test metrics were applied, and visualizations were created to produce a performance-oriented dashboard on Tableau. The objective was to enhance understanding and facilitate a comprehensive overview of the study.

**3.0. Analysis of the A/B test results using statistical methods**

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

The hypotheses are defined as below:

* The null hypothesis (H0): There is no significant difference in the conversion rates between the control and treatment group:
* The alternative hypothesis (Ha): There is a significant difference in the conversion rates between the control and treatment groups:

The significance level (α) for the test is set as 0.05, which corresponds to a 5% significance level. The test is conducted for a difference in proportions as a two-sample z-test with pooled proportion with formular below:

z= P1-P2/sqrt(P(1-p) (1/n1 + 1/n2))

Where:

P1​ and P2 are the sample proportions of conversions in the control and treatment groups, respectively.

N1​ and N2 are the sample sizes of the treatment and control groups.

p^ is the overall pooled sample proportion. Which is calculated as:

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Description automatically generated

P1 =4.63, P2=3.92, N1=24600, N2=24343, P=4.28

z= PT-PC/sqrt(P(1-P) (1/NT + 1/NC))

4.63-3.92/sqrt (4.28(1-4.28) (1/24600 + 1/24343))

0.71/sqrt (-14.04) (8.172)

0.71/sqrt (-114.73)

0.71/-10.71

z = -0.06

The p-value for a z-score of -0.06 at a 5% significance level (95% confidence level) is greater than 0.05. In other words, the observed z-score of -0.06 is not extreme enough to be considered statistically significant at the 0.05 significance level.

Take a decision:

Compare the p-value to the significance level (α).

* If p-value < α, at 5%, reject the null hypothesis.
* If p-value ≥ α, at 5%, fail to reject the null hypothesis.

Conclusion:

Since the p-value is greater than 0.05, we fail to reject the null hypothesis, which indicates that there is not enough evidence to reject the null hypothesis. In other words, we do not have strong statistical evidence to conclude that there is a significant difference between the two groups.

**3.2. The confidence interval for a difference in proportion is calculated using Two-sample z- interval with unpooled proportions with the formular below:**

CI= (PT-PC) ± Z (sqrt (pt (1-PT)/NT + PC (1-PC)/NC)

Where:

The conversion rate in the treatment group (PT) = 4.63%

The conversion rate in the control group (PC)= 3.92%

The sample size of the treatment group (NT)= 24600

The sample size of the control group (NC) =24343

Z is the critical value from the standard normal distribution corresponding to a 95% confidence level. For a 95% confidence level, Z =1.96

Sample statistics = (4.63-3.92) = 0.71%

Critical value (Z), for a 95% confidence level is set at: 1.96.

Standard Error = sqrt ((4.63(1-4.63)/24600) + 3.92(1-3.92)/24343)) =0.0339.

Margin of Error = critical value \*standard error

Margin of Error= 1.96 \* 0.0339 = 0.0664

Substituting the formular:

4.63-3.92 ± 1.96 \*sqrt ((4.63(1-4.63)/24600 + 3.92(1-3.92)/24343))

0.71 ± 1.96 \* sqrt ((-16.8069/24600) + (-11.4464/24343))

0.71 ± 1.96 \* sqrt (-0.0006832) + (-0.00047)

0.71 ± 1.96 \* sqrt (0.00115) =0.0339

0.71 ± (1.96 \* 0.0339)

0.71 ± 0.0664

CI = 0.71 ± 0.0664

CI=0.7764 (Upper limit) and 0.6436 (Lower limit)

Conclusion: We conclude that with 95% confidence, we estimate that the true difference in the parameter (conversion rates) between the two groups lies somewhere between 0.6436 and 0.7764.

**3.3. A hypothesis test to see whether there is a difference in the average amount spent per user between the two groups.**

Define the Hypotheses:

* Null Hypothesis (*H*0​): There is no significant difference in the average amount spent per user between the two groups.
* Alternative Hypothesis (*Ha*​): There is significant difference in the average amount spent per user between the two groups.

The significance level (α) for the test is set at 0.05, which corresponds to a 5% significance level. The test is conducted as a two-sample t-test for the difference in means with unpooled variance with the formular below:

T = 



Where:

X1 as XT= 3.391 is the sample means of the amount spent in the treatment group

X2 as XC = 3.375 is the sample means of the amount spent in the control group

S1 as ST= 100.24 is sample standard deviations of the amount spent in the treatment group

S2 as SC= 100.24 is sample standard deviations of the amount spent in the control group

n1 as nc=24600 is the sample size of the treatment group

n2 as nc=24343 is the sample size of the control group

Substitute the formular:

T = 3.391 – 3.375 /sqrt ((94.03\*94.03)/24600) + (100.24\*100.24)/24343))

0.016/ sqrt ((8470/24600) +( 10048/24343))

0.016 / sqrt (0.3443+0.4127)

0.016 / sqrt (0.757)

0.016/0.87

T = 0.02

Degrees of Freedom:

Using the formular for DF: min (n1-1, n2-1)

DF = (24600-1) =24599

(24343-1) =24342

The minimum value is = 24342.

Level of significance:

The level of significance is estimated at 5%, for a 95% confidence level and degree of

freedom.

Calculate the P-Value:

Given the t-score of 0.02 and DF as 24342, a t-distribution online calculator was used for a two-tailed sample with a significance level of 5% which resulted to a p-value of 0.98.

p-value > 0.05

0.98 >0.05.

Take a decision:

* If the p-value is <than the chosen level of significance of 0.05, we reject the null hypothesis.
* If the p-value is > than or equal to the chosen level of significance of 0.05, we fail to reject the null hypothesis.

Conclusion:

Since the p-value is greater than 0.05, we fail to reject the null hypothesis. This suggest there is not enough evidence to conclude that there is a significant difference in the average amount spent per user between the groups. This also indicates a high probability that the observed result could occur by random chance.

**3.4. The confidence interval for a difference in Means is calculated using Two-sample t- interval with unpooled variance with the formular below:**

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* X1​ is the sample mean of the treatment group (average amount spent).
* X2​ is the sample mean of the control group (average amount spent).
* S1​ is the sample standard deviation of the treatment group.
* S2​ is the sample standard deviation of the control group.
* n1​ is the sample size of the treatment group.
* n2​ is the sample size of the control group.
* α/2​ is the significance level 0f 5% divided by 2 to account for the two tails for a 95% confidence interval.
* Df is the degrees of freedom for the distribution, which can be calculated using the formular for unequal variances:

CI= (3.391 – 3.375) ± *tα*/2​,df sqrt (94.03\*94.03)/24600) + (100.24\*100.24)/24343)

CI = 0.016 ± 1.96 sqrt (94.03\*94.03)/24600) + (100.24\*100.24)/24343

CI =0.016 ± 1.96 sqrt (8842/24600) + (10048/24343)

Sqrt (0.3594 +0.4128) = 0. 8787

CI =0.016 ± 1.9600 (0.8787)

CI = 0.016± 1.72

CI = -1.704(lower limit) and 1.736 (upper limit).

Conclusion:

In view of the result, we are 95% confident that the true difference in the average amount spent per user between the treatment and control groups falls between -1.704 and 1.736.

NOTE:

Critical value =*t* (α​/2, *df*)

t (0.05/2, 24342) = (0.025,24342)

However, due to the volume of the datasets, the df of 24342 cannot be accessed on the t-table and on the online calculator, hence a two-tailed 95% confidence interval was used at ±1.96 for a 95% confidence level.

Sample Statistics = Average amount spent (X1) - Average amount spent (X2)

3.391 – 3.375 = 0.016

Standard Error Formula:

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SE = Sqrt (0.3594 +0.4128) = 0.88

**4.0. Data Visualization/Chart.**

The study harnessed the formidable capabilities of Tableau to translate the results of the datasets into a dynamic and performance-driven dashboard. This choice was made due to Tableau's reputation for its robust data visualization features, enabling the creation of interactive and insightful visualizations that go beyond mere data representation.

With Tableau, the researcher was able to delve deep into the intricacies of the test results, identifying trends, patterns, and correlations within the data. The application's user-friendly interface and intuitive design tools allowed for the creation of visualizations that not only present data but also tell a compelling story, making it easier for stakeholders to grasp complex information.

One of the key advantages of using Tableau is its flexibility in connecting to a variety of data sources. Whether it's databases, spreadsheets, or other data repositories, Tableau seamlessly integrates the collected data, streamlining the analysis process. This flexibility not only saves time but also ensures that the analysis is comprehensive and inclusive of all relevant data points.

In the context of the test, five distinct visualizations and a comprehensive dashboard were crafted using Tableau. Each visualization served a specific purpose, ranging from trend analysis to comparison charts, allowing for a multi-faceted examination of the test results. These visualizations provided a clear and concise representation of the data, enabling the researcher to identify trends and patterns, compare results, understand user behaviour and summarize insights using a comprehensive dashboard. This allowed stakeholders to view the test results holistically, gaining a complete understanding of the findings briefly.

By leveraging the power of Tableau, the study not only analysed the test results but also transformed them into actionable insights. The interactive nature of the visualizations enabled stakeholders to explore the data, drill down into specific details, and derive meaningful conclusions. This not only facilitated data-driven decision-making but also enhanced communication of findings to stakeholders across the organization.

**4.1. Conversion rate and average amount spent between the test groups.**

A graph of a graph with numbers and a few lines

Description automatically generated with medium confidence

Fig. 4.1. Own Source: Tableau.

Figure 4.1 presents a bar chart comparing conversion rates and average spending between two groups: treatment and control. The chart reveals that the treatment group had an average spending of $3.39 per user, slightly higher than the control group's $3.37, showing a $0.02 difference. The treatment group also boasted a user conversion rate of 4.63%, compared to the control group's 3.92%, a 0.71% difference.

These insights highlight the effectiveness of the test conditions in boosting user engagement and conversion. Despite a seemingly small difference in spending, the higher conversion rate in the treatment group implies positive changes from the interventions. This data from Figure 4.1 can guide future strategies, helping refine marketing, enhance user experiences, and drive business growth with evidence-backed decisions.

**4.2. Distribution of the amount spent per user for each group.**

A graph of different colored lines

Description automatically generated

Fig. 4.2. Own Source: Tableau.

Figure 4.2 showcases the spending distribution for Group A and Group B using boxplots, revealing insights into their behaviour. Both groups exhibit similar median spending levels ($64 for Group A, $52 for Group B), indicating comparable average spending. However, Group A shows a wider interquartile range (IQR), suggesting diverse spending habits among its users.

The presence of outliers in both groups’ hints at potential data distortion, emphasizing the need for further investigation. Additionally, the impact of 117 filtered null values on the visualizations requires attention for accurate analysis.

In essence, Figure 4.2's boxplots highlight both similarities and differences in spending patterns between the groups. These insights are vital for refining strategies, enhancing user experiences, and fostering business growth by understanding user behaviours more deeply.

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**4.3. Relationship between the test metrics (conversion rate and average amount spent) and the user’s device.**

A graph with numbers and text

Description automatically generated with medium confidence

Fig. 4.3. Own Source: Tableau.

Figure 4.3 reveals a concise yet impactful comparison of spending patterns across devices in Group A and Group B.

Users in Group A show the highest average total spending of $75.71, notably associated with iPhone usage, suggesting a strong correlation between iPhones and higher spending.

Similarly, in Group B, users exhibit the highest average total spending of $68.22, also linked to iPhone usage. This consistent trend emphasizes the influence of iPhones on user spending behaviour in both groups.

In essence, Figure 4.3 provides a clear snapshot of device-related spending patterns, guiding stakeholders to refine strategies and enhance user experiences based on device preferences. These insights empower decisions to drive business growth with a nuanced understanding of user behaviour.

**4.4. Relationship between the test metrics (conversion rate and average amount spent) and the user’s gender.**

A graph with numbers and lines

Description automatically generated with medium confidence

Fig. 4.4. Own Source: Tableau.

Figure 4.4 presents a concise, yet impactful view of spending patterns based on gender within Group A.

Females in Group A show the highest average total spending of $76.75, indicating a distinct inclination towards higher spending habits. This insight suggests preferences for premium products or larger purchases among female users.

Males in Group A exhibit an average total spending of $72.82, showcasing a substantial spending capacity and willingness to invest in purchases.

The choice of a horizontal bar chart effectively conveys these gender-specific spending trends in Group A, facilitating informed decision-making for stakeholders. The chart's focus on the highest average spending among females highlights key insights for marketing strategies and product development, enabling tailored approaches to enhance user experiences based on gender-specific behaviours.

In summary, Figure 4.4 serves as a robust visual tool, shedding light on spending dynamics within Group A based on gender. These insights empower stakeholders to refine campaigns, customize products, and optimize user experiences, ultimately offering invaluable guidance for business strategies.

**4.5. Relationship between the test metrics (conversion rate and average amount spent) and the user’s country.**

A graph of numbers and a number of numbers

Description automatically generated with medium confidence

Fig. 4.5. Own Source: Tableau.

Figure 4.5 presents a visually impactful column chart, highlighting the highest average total spending within Group A and Group B across regions.

In Group A, Germany (DEU) shows the highest average spending at $95.32, indicating a propensity for higher spending levels. This could reflect economic conditions, consumer preferences, or popular products in the German market. In contrast, Group B's highest average spending is in the United Kingdom (GBR) at $95.27, suggesting robust spending among UK users and strong market demand.

The chart's horizontal layout effectively displays spending trends, with Group A's lowest average at $64.52 and Group B at $53.79. This provides a comprehensive view of spending patterns across regions, aiding informed decision-making.

Overall, Figure 4.5 illuminates’ regional influences on spending in Group A and Group B, empowering stakeholders to tailor strategies and enhance user experiences based on nuanced regional behaviours. These insights offer valuable guidance for marketing and product optimization strategies.

**5.0. Glo Box Dashboard System**

Below is the dashboard visualization of the variables, providing a comprehensive overview of key metrics and trends. The dashboard system enhances accessibility and allows for a more interactive exploration of the experiment results.

**A screenshot of a computer

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Fig. 5.0. Glo Box Dashboard system

**6.0. Findings**

The statistical test results are presented below:

1.Conversion Rate: The results of our hypothesis testing indicate that there is not enough evidence to conclude a significant difference in the conversion rate between Group A and Group B. This suggests that the observed variations in conversion rates could likely occur by random chance.

2.Average Amount Spent: Similarly, our analysis did not reveal a statistically significant difference in the average amount spent per user between the two groups. The observed differences in spending may also be attributed to random chance.

3.Visualization Results: The visualization of the test metrics showed that Group A exhibited higher values compared to Group B in various aspects. This further supports the notion that the observed results could be a result of random variation.

**7.0. Recommendations**

Based on the comprehensive analysis and insights derived from the A/B test, our recommendation leans against the immediate launch of the new banner feature. The results of our analysis did not exhibit a substantial enhancement in our key success metrics, indicating that the feature may not deliver the desired impact at this stage.

Thorough examination of the data suggests that the perceived benefits of launching the feature do not outweigh the associated costs. The lack of significant improvements in conversion rates and average spending raises concerns about the effectiveness and potential return on investment (ROI) of the feature.

Considering these findings, it appears prudent to exercise caution and refrain from releasing the feature to all users currently. Instead, we propose further refinement and reconsideration of the feature before proceeding with a full-scale launch. This approach will allow us to address any potential shortcomings, optimize the feature for maximum impact, and ensure a more successful rollout in the future.

Additionally, we recommend revisiting the initial objectives and goals of the feature to ensure alignment with user needs and preferences. Conducting additional user research, gathering feedback, and exploring alternative design iterations can provide valuable insights into how we can enhance the feature to better serve our users.

Ultimately, our decision is guided by a strategic cost-benefit analysis, aiming to maximize the value proposition for both the users and the company. By taking a deliberate and data-driven approach to feature development, we can ensure a more successful and impactful launch when the time is right.

In summary, based on the findings and insights from the A/B test, we advise against the immediate launch of the new banner feature. Further refinement, iteration, and consideration are warranted to optimize the feature for enhanced user engagement and success.

**8.0. Limitation of the Experiment**

While visualizing the data, the presence of outliers in both Group A and Group B poses a risk of distorting and biasing the distribution results. Furthermore, the decision to filter out and ignore nulls in the datasets could potentially impact our analysis negatively. This approach not only introduces changes but also raises concerns about data loss and the potential for bias in our findings. Acknowledging and addressing these limitations is crucial for a comprehensive understanding of the experiment results.

**9.0. Conclusion**

In conclusion, the findings from the A/B testing experiment have provided valuable insights into user behaviour and preferences, yet the data does not currently support the implementation of the new banner feature. While the experiment offered important information, further refinement is needed to achieve the desired outcomes effectively.

The results indicate that the new banner feature did not lead to a significant increase in user engagement or conversion rates compared to the control group. This suggests that the current design or placement of the banner may not resonate effectively with users, or there may be other factors at play that are influencing user behaviour.

Therefore, we recommend revisiting the design and functionality of the banner feature. This could involve conducting additional tests with variations in design elements, placement, or messaging to identify what resonates best with users. A more thorough exploration of alternative strategies and iterations will allow us to pinpoint the most effective approach for achieving our objectives.

**10. References**

Control group (Group A)

SELECT \*

FROM users as u

JOIN groups as a

ON u.id = a.uid

WHERE a.group = 'A';

Treatment group (Group B)

SELECT \*

FROM users as u

JOIN groups as b

ON u.id = b.uid

WHERE b.group = 'B';

User conversion rate for the control and treatment groups

SELECT "group”, COUNT (DISTINCT u.id) As total users,

Round ((Count (DISTINCT a.uid) \*100.0)/

Count (DISTINCT u.id),2) As conversion\_rate

FROM users as u

LEFT JOIN groups as g

ON u.id=g.uid

LEFT JOIN activity as a

ON u.id=a.uid

GROUP BY "group";

Conversion rate of all users

SELECT

COUNT (DISTINCT a.uid) AS converted\_users,

COUNT (DISTINCT u.id) AS total\_users,

(COUNT (DISTINCT a.uid) \* 100.0 / COUNT (DISTINCT u.id)) AS conversion\_rate

FROM users as u

LEFT JOIN activity as a

ON u.id = a.uid

ORDER BY conversion\_rate;

Average amount spent per user for the control and treatment groups, including users who did not convert.

SELECT "group",

COALESCE(SUM(a.spent),0)As total\_spent,

Count(u.id) As total\_transactions,

Round (COALESCE (SUM(a.spent), 0)/COUNT(DISTINCT u.id),3) As average\_spent

FROM users as u

LEFT JOIN groups as g

ON u.id=g.uid

LEFT JOIN activity as a

ON u.id=a.uid

GROUP BY "group";

Aggregated database

SELECT u.id,sum(a.spent)as total\_sum\_spent,u.country,u.gender,g.device,g.group

FROM users as u

JOIN activity as a

ON u.id=a.uid

JOIN groups as g

ON a.uid = g.uid

WHERE spent >'0'

GROUP BY u.id,u.country,u.gender,g.device,g.group

ORDER BY total\_sum\_spent;

**11.0. Appendix**

Tableau charts

Q.1.<https://public.tableau.com/app/profile/ejikeme.justine.ekwem/viz/Book2_16946308920610/conversionrateandaverageamountspentbetweenthetestgroups_?publish=yes>

Q.2.<https://public.tableau.com/app/profile/ejikeme.justine.ekwem/viz/Book2_16946308920610/Distributionoftheamountspentperuserforeachgroup?publish=yes>

Q3.<https://public.tableau.com/app/profile/ejikeme.justine.ekwem/viz/Book2_16946308920610/RelationshipbetweenthetestmetricsandtheUsersdevice?publish=yes>

Q4.<https://public.tableau.com/app/profile/ejikeme.justine.ekwem/viz/Book2_16946308920610/RelationshipbetweenthetestmetricsandtheUsersgender?publish=yes>

Q5.<https://public.tableau.com/app/profile/ejikeme.justine.ekwem/viz/Book2_16946308920610/RelationshipbetweenthetestmetricsandtheUserscountry?publish=yes>

Dashboard

<https://public.tableau.com/app/profile/ejikeme.justine.ekwem/viz/Book2_16946308920610/Dashboard1?publish=yes>

<https://www.omnicalculator.com/statistics/critical-value#t-critical-values>