

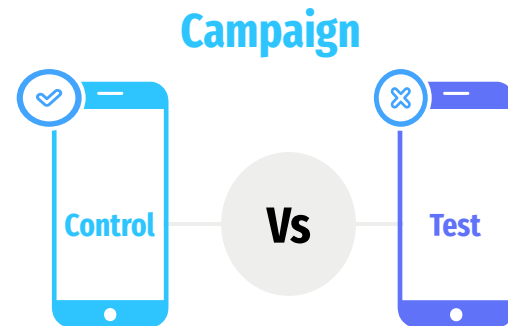
Campaign A/B Testing

Portfolio
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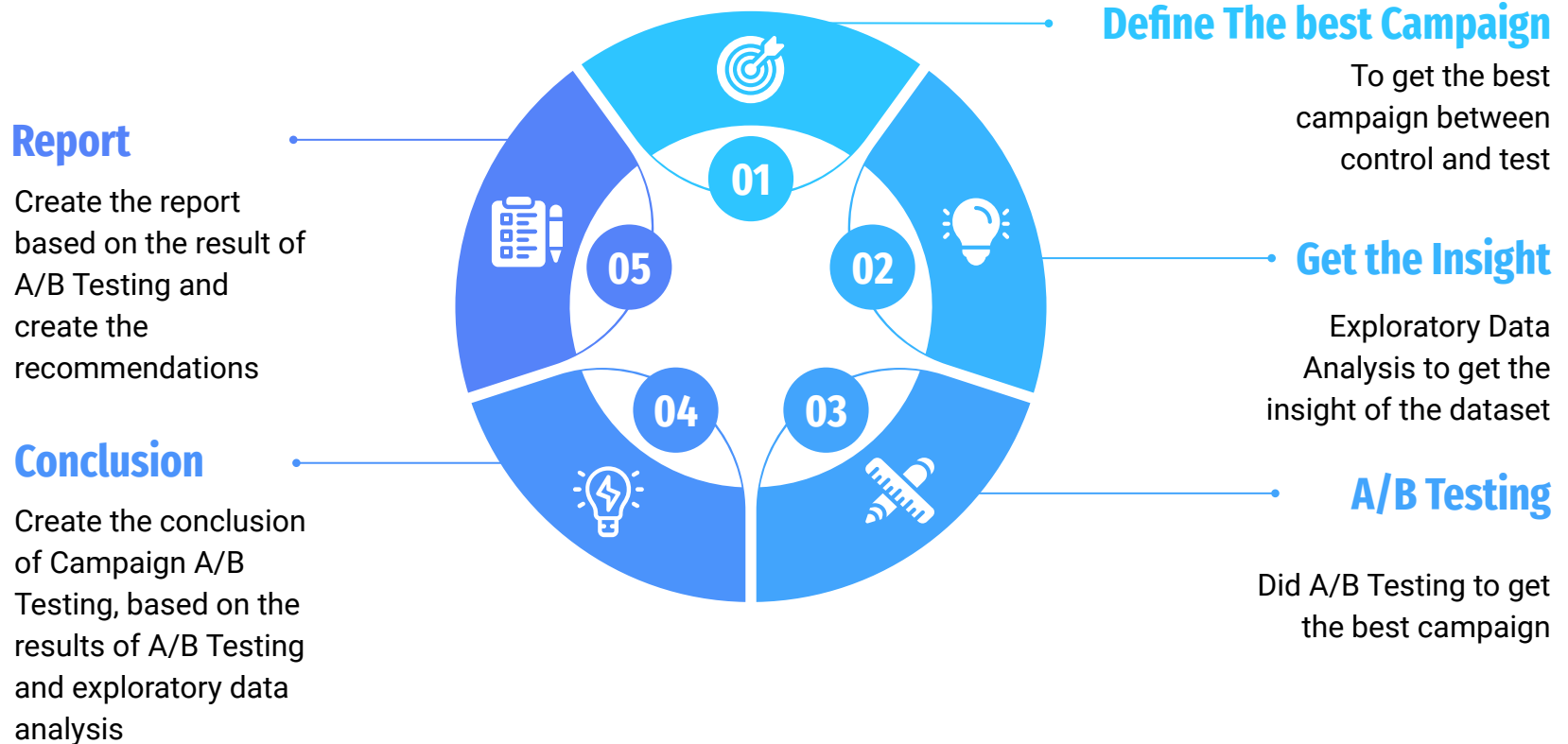
Case

Features	Explanation
Date	Date of the record
Spend	Amount spent on the campaign in dollars
of Impressions	Number of impressions the ad crossed through the campaign
Reach	The number of unique impressions received in the ad
of Website Clicks	Number of website clicks received through the ads
of Searches	Number of users who performed searches on the website
of View Content	Number of users who viewed content and products on the website
of Add to Cart	Number of users who added products to the cart
of Purchase	Number of purchases
CTR	Click Through Rate
Activity	Total Action by users
CPA	Cost per Action
Conversion Rate	An action you want people to complete



- The Company has performed two types of Campaign, but they don't know which one is the best. The Company has decided to do A/B Testing to evaluate the best Campaign between two types of campaign.
- The Company has 30 (30 days) sample data for control and test.
- I suggest they has done power analysis to determine the size of sample data.

Objectives



Hypothesis

H0

There is no significant difference statistically between the control and test campaign.

H1

There is significant difference statistically between the control and test campaign.

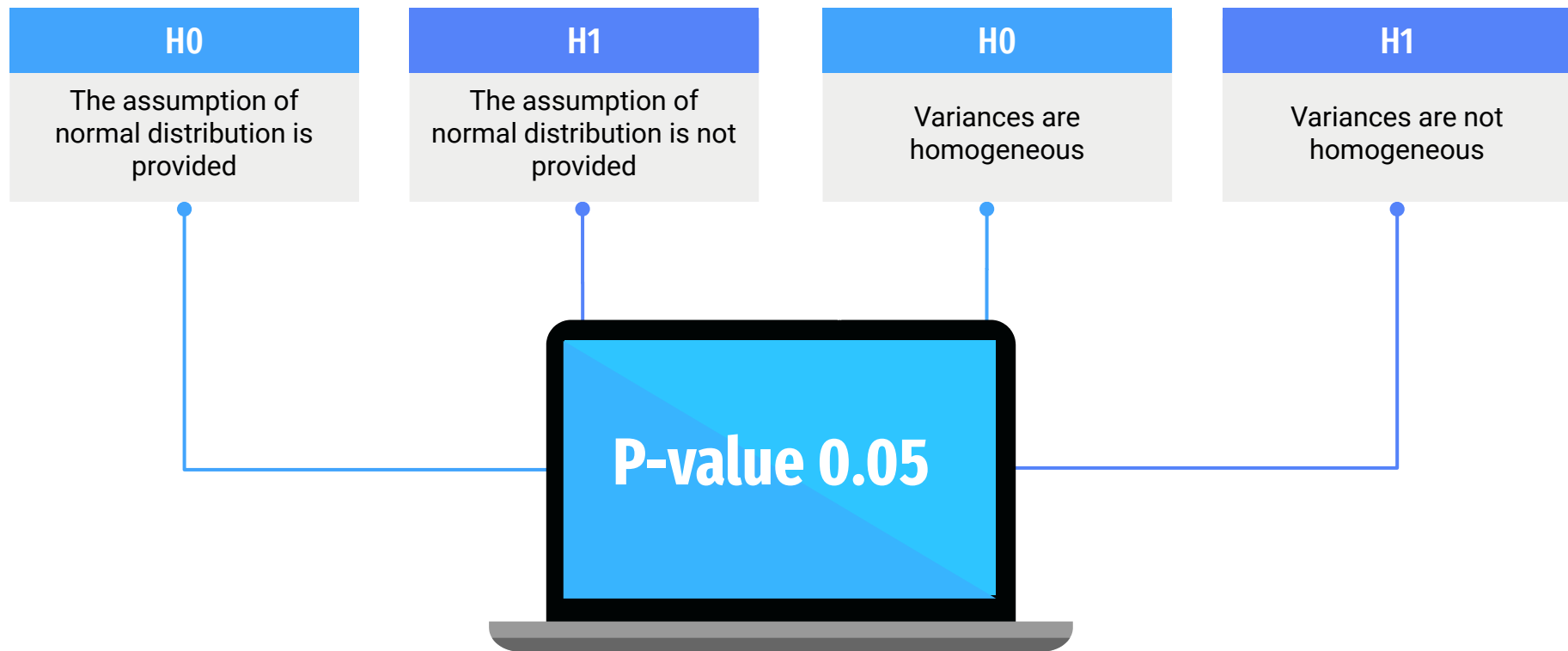


P-value 0.05

The diagram illustrates the relationship between two hypotheses and a central p-value. At the top, two boxes represent H0 and H1. H0 states there is no significant difference, while H1 states there is. Below these, a central laptop icon displays 'P-value 0.05'. Blue lines connect the bottom of each hypothesis box to the laptop screen, indicating that the p-value is the result of testing these hypotheses.

If the p-value is less than 0.05, it is considered significant, else is not significant.

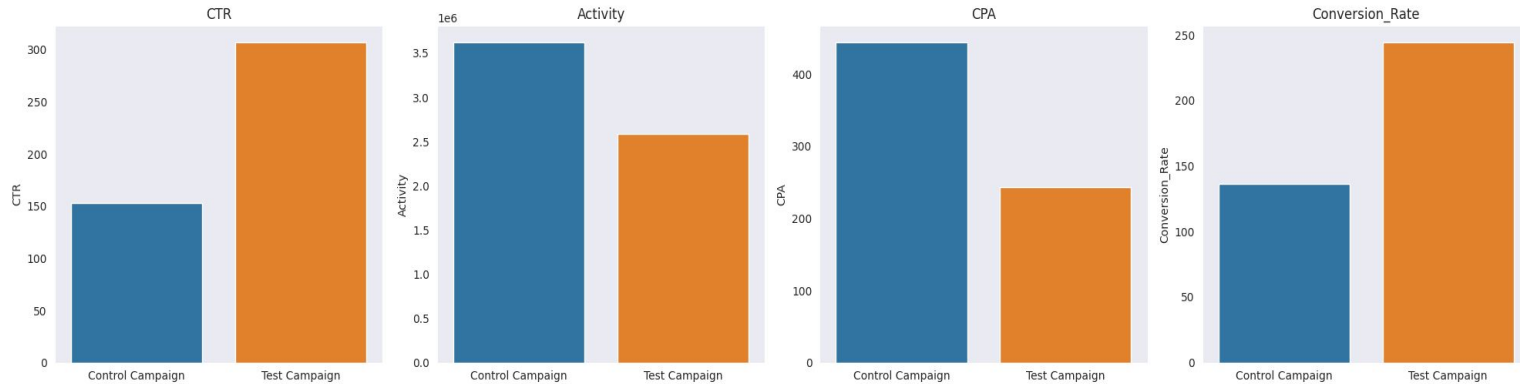
Normality & Variance Assumption



- If the p-value is less than 0.05, it is considered significant and a non-parametric test (mann whitney u test) will be used. Else Z-Test.
- If the p-value is less than 0.05, then the data are not homogeneous, I recommended to use non-parametric test (mann whitney u test).

Exploratory Data Analysis

Total Control vs Total Test



Campaign_Name	Total Spend [USD]	Total Impressions	Total Reach	Total Website Clicks	Total Searches	Total View Content	Total Add to Cart	Total Purchase
Control Campaign	\$68,653	3,286,792	2,665,347	159,623	66,639	58,313	39,000	15,683
Test Campaign	\$76,892	2,237,544	1,604,747	180,970	72,569	55,740	26,446	15,637

- The Control Campaign has better awareness than the Test Campaign.
- The Control Campaign has higher Impressions and Reach than the Test Campaign.
- The Test Campaign is more effective than the Control Campaign, since the Test Campaign has higher CTR than the Control Campaign.
- Seems like the Control Campaign is better on before entering the website, this indicated by it's higher Impressions and Reach than the Test Campaign, but the Test Campaign is better on the after entering the website, this indicated by it's lower Add to Cart and higher conversion rate than Control Campaign, but the Test Campaign has similar purchase with the Control Campaign.

A/B Testing

Normality & Variance Homogeneity

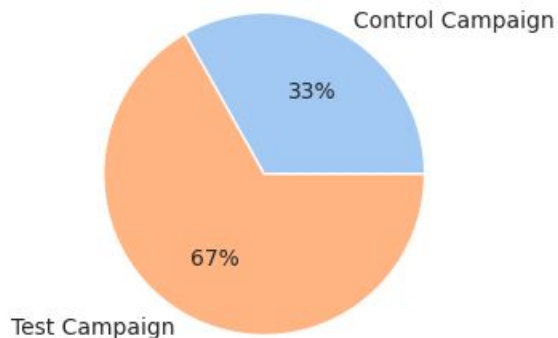
Campaign_Name	CTR Normality	Activity Normality	CPA Normality	Conversion Rate Normality
Control Campaign	0.2807	0.1392	0.0000*	0.2823
Test Campaign	0.0004*	0.1221	0.0005*	0.0144*
Conclusion	Mann Whitney U Test	T Test	Mann Whitney U Test	Mann Whitney U Test

Features	Variance Homogeneity Results	Final Conclusion
CTR	0.002*	Mann Whitney U Test Results
Activity	0.005*	Mann Whitney U Test Results
CPA	0.094	Mann Whitney U Test Results
Conversion Rate	0.001*	Mann Whitney U Test Results

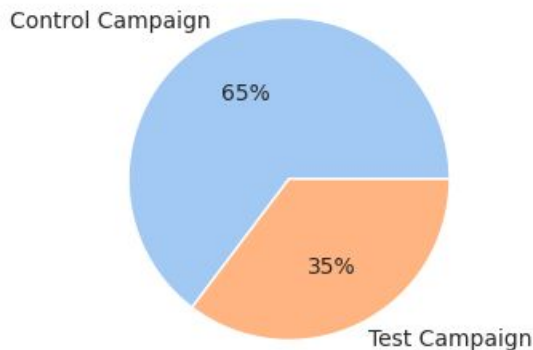
- Based on the results of normality and variance homogeneity, the A/B Testing would better done with Mann Whitney U Test.
- If the p-value is less than 0.05, it is considered significant and a non-parametric test (mann whitney u test) will be used. Else Z-Test.
- If the p-value is less than 0.05, then the data are not homogeneous, I recommended to use non-parametric test (mann whitney u test).
- * means significant.

A/B Testing Result

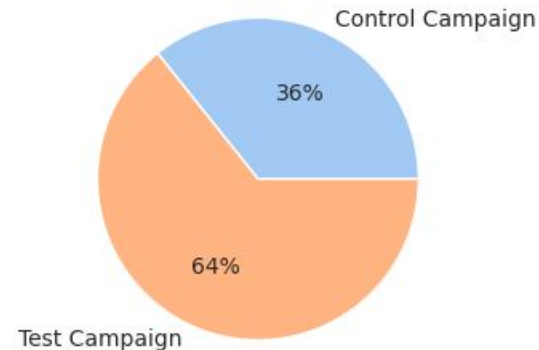
CTR



CPA



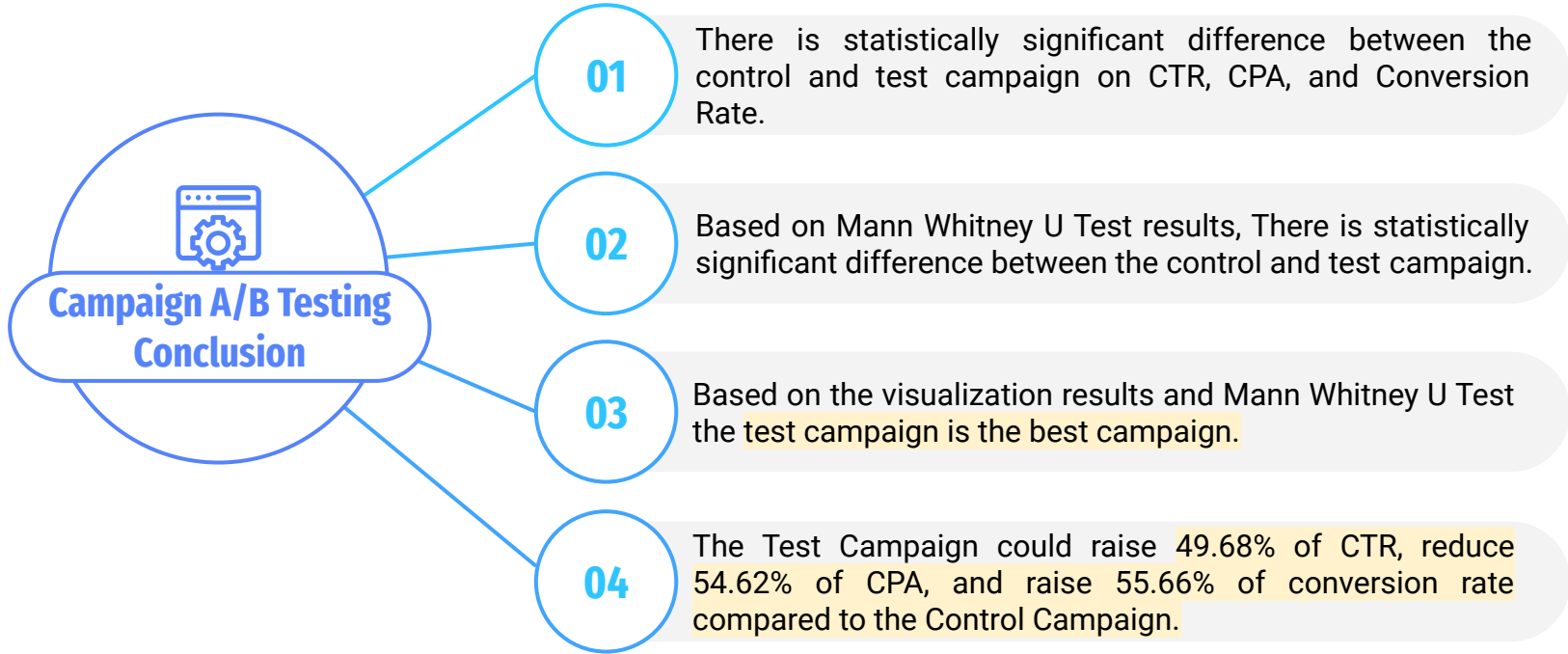
Conversion_Rate



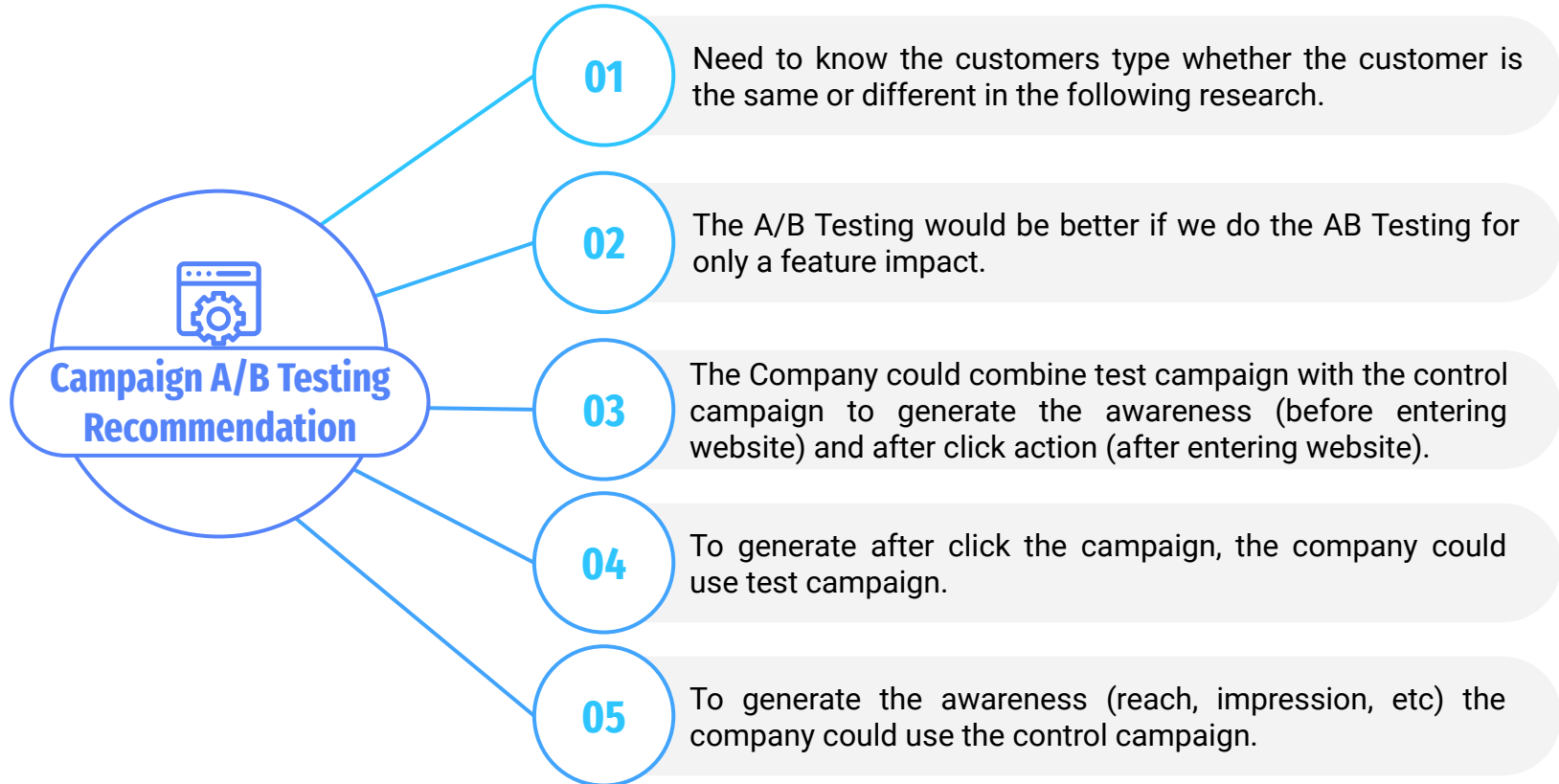
Features	Mann Whitney U Test Results
CTR	0.0002*
CPA	0.0198*
Conversion Rate	0.0001*

- Based on Mann Whitney U test, CTR, CPA, and Conversion Rate has significant different.
- Based on the visualization, Test Control has 67% of total CTR, 35% of total CPA, and 64% of total Conversion Rate
- a high CTR and Conversion rate is more likely to lead to a lower CPA.
- a high CTR is more likely to lead to a Conversion Rate.
- * means significant.

Conclusion



Recommendation



Thank you!