Auto lib Electric cab Project Hypothesis report

Introduction

Auto lib electric cab company vision is to “create the most compelling car service company of the 21st century by driving the world’s transition to electric vehicles,” while its mission is to reimagine the way the world moves for the better. We specialize in offering corporate taxi and car hire services but also offer quality and personalized services for individuals as well.

Problem Statement

The logistics manager has noticed a lot of clients' requests being denied leading to some drivers being overworked to cover these shifts and a lot of complaints from the employees on specific requests. He forwarded this concern to the company Management team who rolled out a poll to try and get a better understanding of the situation. Cab drivers anonymously forwarded a claim that there were more number of Blue Cars taken compared to those returned which in return caused delay and overworking of those drivers who had completed their shifts. Their concern was this was a high predisposing factor of nurn out which is a hazard overall to the personel, business and the clientele

DynastyAnalytics, which is their consulting firm, has been tasked to investigate these claims and further analyze in respect to their peak days which is the weekdays.

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Justification of the study

There is need to investigate the claims made since they have a economic impact towards the business both financially and reputation wise

Research Questions

As the consulting firms we went ahead and come up with some research questions to investigate using the data set provided

1. Which are the peak days for the company
2. Is there a correlation between the cars taken vs returned

Hypothesis

H0 - The average number of cabs taken equals number of cabs returned on a weekday

H1 - The average number of cabs taken doesn't equal number of cabs returned on a weekday

Sampling

It's important to note one key emphasis put is that the selected periods of interest be either weekdays or weekends but not a mix of both

We decided to continue with **simple random sampling** where it is a subset of a statistical population in which each member of the subset has an equal probability of being chosen. A simple random sample is meant to be an unbiased representation of a group in our case the weekday period.

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Determining our sample size

To get to the preferred sample size there are things we need to consider:

- **Population size - population is 11544**. so we need a sample that doesn't under-represent us.
- **How confidence** we want our results to be in respect to our population - ***The confidence interval expected is 95%*** for our sample size
- **Margin of error** - since errors are inevitable we want to take into account how much difference we'll allow between the mean number of our sample and the mean number of our population.** our margin of error 5%**

From this we arrived at a **sample of 372**

Hypothesis Testing

Hypothesis testing is used to assess the plausibility of a hypothesis by using sample data. The test provides evidence concerning the plausibility of the hypothesis, given the data. Statistical analysts test a hypothesis by measuring and examining a random sample of the population being analyzed.

The first step is to state the two hypotheses

★ **H0** - The average number of cabs taken equals number of cabs returned on a weekday

★ **H1** - The average number of cabs taken doesn't equal number of cabs returned on a weekday

Auto lib Electric cab Project Hypothesis report

The next step is to formulate an analysis plan,

Since our sample size is greater than 30 will use the z test. Will use the formula below

$$z = \frac{X - \mu}{\sigma}$$

u = population mean

X = sample mean

S (represented by theta) = sample standard deviation

The third step is to carry out the plan and physically analyze the sample data.

From our calculation:

Our sample mean is

```
BlueCars_taken_sum       137.540323
```

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```
BlueCars_returned_sum    136.760753
```

Our population mean is

```
BlueCars_taken_sum       125.926951
BlueCars_returned_sum    125.912714
```

Our sample standard is

```
BlueCars_taken_sum       194.434299
BlueCars_returned_sum    192.830860
```

We round off to nearest two decimal points to calculate the z score a

Z score = `0.05971300725196721`

Which give us a probability of **0.52** which means we have no enough statistical evidence to reject the null hypothesis hence we Accept it

Confidence Intervals to test our hypothesis

Our population mean for BlueCars_taken_sum is 116.028673 and the confidence Interval of our is (98.79128883304787, 133.26605697429792)

Our population mean for BlueCars_returned_sum is 115.639380 and the confidence Interval of our is (98.53228735600315, 132.7464721727564)

This observation tell us that indeed our sample is accurate to test our hypothesis and prove our null hypothesis to be true

Decision and Conclusion

- Weekdays are indeed the peak days for the company
- There is indeed a strong correlation between cars taken and cars returned

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- We can confidently say from our analysis the average number of cars taken equals the average number of cars returned. This is because statistically there is no evidence to dispute this claim.
- Indeed our data is not a normal distribution since it has a positive skewness towards weekdays. This is expected since there are two days on the weekend and five on the weekday. Also the company's peak days are the weekdays.

Recommendation

- Since the presented claim is actually affecting the daily activities which reflect on the overall output, It's important to look at other aspects like qualitative aspects such as motivation of employees.
- Checking on miles and charging on different area codes which could be influencing the claim e.g. maybe some area codes are too far and have the same rate as the closer ones

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