Strategies for Revitalizing Yulu: An In-Depth Analysis of Seasonal, User, and Environmental Factors Influencing Micro-Mobility Rentals in the Indian Market

Executive Summary

Yulu, India's leading micro-mobility service provider, has been experiencing a decline in revenues. To understand the factors influencing the demand for shared electric cycles in the Indian market, the company initiated a comprehensive analysis. The key objectives were to identify significant variables predicting demand and assess how well these variables describe electric cycle demand.

Colab Notebook

Insights from Seasonal Analysis:

- Fall, summer, and winter witnessed high demand for shared electric cycles.
- Holidays in fall and winter saw slightly greater rentals than non-holidays.
- Only in summer did the number of rentals on non-working days exceed working days.
- Clear and foggy weather conditions were associated with high total rentals.
- Clear days were the most popular for rentals, regardless of being a working day or holiday.
- Summer, fall, and winter were the preferred months among rental users.

User Segmentation Statistics Summary

Casual Users:
Mean: 36.31
Standard Deviation: 3.8
90% Confidence Interval: (30.07, 42.56)

Registered Users:
Mean: 154.52
Standard Deviation: 9.55
90% Confidence Interval: (138.81, 170.23)

Total Rental Count Users:
Mean: 191.15
Standard Deviation: 12.96
90% Confidence Interval: (169.84, 212.46)

This summary provides key statistics for different user segments, offering insights into the distribution of user counts and variations within each category.

Statistical Analysis

Working Day Impact Analysis on Electric Cycle Rentals

Objective:
Conduct a Sample T-Test to assess whether the average number of electric cycle rentals significantly differs between working days and non-working days.

Hypotheses:
Null Hypothesis (H0): Average number of rentals on working days = Average number of rentals on non-working days
Alternate Hypothesis (H1): Average number of rentals on working days ≠ Average number of rentals on non-working days

Significance Level:
Significance Level (α): 0.05 (standard value)

Analysis:
Applied a T-Test to evaluate the difference in mean rentals on working and non-working days.
Provided the t-statistic and p-value as outcomes of the statistical test.

Results:
The T-Test resulted in a t-statistic of 1.21 and a p-value of 0.23.
Failing to reject the null hypothesis indicates no significant difference in the average number of rentals on working and non-working days.

Holiday Impact Analysis on Casual Users Renting Cycles

Objective:
Conduct a Sample T-Test to assess whether the average number of casual users renting cycles significantly differs between holidays and non-holidays.

Hypotheses:
Null Hypothesis (H0): Average number of casual users on holidays = Average number of casual users on non-holidays
Alternate Hypothesis (H1): Average number of casual users on holidays > Average number of casual users on non-holidays

Significance Level:
Significance Level (α): 0.05 (standard value)

Analysis:

Calculated and displayed the mean number of casual users on holidays and non-holidays.
Utilized a t-test to assess the significance of the difference in means.
Provided t-statistic and p-value for the statistical test.

Results:
The t-test resulted in a t-statistic of 4.57 and a p-value of 2.42e-06.
Rejecting the null hypothesis indicates that casual users renting cycles on holidays are significantly greater than on non-holidays.
With a 5% significance level, it can be stated that rentals of casual users on holidays exceed those on non-holidays.

Working Day Impact Analysis on Registered Users Renting Cycles

Objective:
Conduct a Sample T-Test to assess whether the average number of registered users renting cycles significantly differs between working days and non-working days.

Hypotheses:
Null Hypothesis (H0): Average number of registered users on working days = Average number of registered users on non-working days
Alternate Hypothesis (H1): Average number of registered users on working days > Average number of registered users on non-working days

Significance Level:
Significance Level (α): 0.05 (standard value)

Analysis:
Calculated and displayed the mean number of registered users on working days and non-working days.
Utilized a t-test to assess the significance of the difference in means.
Provided t-statistic and p-value for the statistical test.

Results:
The t-test resulted in a t-statistic of 12.55 and a p-value of 3.40e-36.
Rejecting the null hypothesis indicates that registered users renting cycles on working days are significantly greater than on non-working days.
With a 5% significance level, it can be stated that rentals of registered users on working days exceed those on non-working days.

Seasonal Dependence Analysis on Weather Conditions

Objective:
Conduct a Chi-square test to investigate whether there is a significant association between the season and weather conditions.

Hypotheses:
Null Hypothesis (H0): There is no significant association between season and weather conditions.
Alternate Hypothesis (H1): There is a significant association between season and weather conditions.

Significance Level:
Significance Level (α): 0.05

Analysis:
Applied a Chi-square test to examine the dependence between season and weather conditions.
Provided the chi-square statistic and p-value as outcomes of the statistical test.

Results:
The chi-square test resulted in a chi-square statistic of 49.16 and a p-value of 1.55e-07.
Given that the p-value is much smaller than the significance level, it can be stated that there is a significant association between season and weather conditions.

Seasonal Variance Analysis on Cycle Rentals

Objective:
Perform a Kruskal-Wallis test (ANOVA alternative for non-normally distributed data) to assess whether the number of cycles rented varies significantly across different seasons.

Hypotheses:
Null Hypothesis (H0): All seasons have the same mean rental count.
Alternate Hypothesis (H1): One or more seasons have a different mean rental count.

Significance Level:
Significance Level (α): 0.05

Analysis:
Utilized the Kruskal-Wallis test to examine variance in rental counts across seasons.
Provided the test statistic and p-value as outcomes of the statistical test.

Results:
The Kruskal-Wallis test resulted in a test statistic of 699.67 and a p-value of 2.48e-151.
Rejecting the null hypothesis suggests that at least one season has a different mean rental count.

Weather Condition Impact Analysis on Cycle Rentals

Objective:
Conduct a Kruskal-Wallis test to assess whether the number of cycles rented varies significantly across different weather conditions.

Hypotheses:
Null Hypothesis (H0): All weather conditions have the same mean rental count.
Alternate Hypothesis (H1): At least one weather condition has a different mean rental count.

Significance Level:
Significance Level (α): 0.05

Analysis:
Employed the Kruskal-Wallis test to evaluate variance in rental counts across different weather conditions.
Provided the test statistic and p-value as outcomes of the statistical test.

Results:
The Kruskal-Wallis test resulted in a test statistic of 205.00 and a p-value of 3.50e-44.
Rejecting the null hypothesis indicates that at least one weather condition has a different mean rental count.

Conclusion:

Seasonal Marketing Strategies:

- Leverage the peak demand observed in fall, summer, and winter by implementing targeted marketing campaigns during these seasons.
- Offer seasonal promotions, discounts, or special events to attract more users during high-demand periods.

Holiday-focused Campaigns:

- Recognize the increased demand during holidays, especially in fall and winter, by launching holiday-specific promotions or events to incentivize more rentals.

Weather-Responsive Services:

- Capitalize on the popularity of clear and foggy weather conditions by providing incentives for users to rent during these weather conditions.
- Consider implementing dynamic pricing or weather-specific promotions to encourage usage during less favorable weather.

Working Day and Non-Working Day Strategies:

- Recognize the distinction in user behavior on working and non-working days. Implement targeted marketing on working days to appeal to registered users and on holidays for casual users.
- Tailor promotions, discounts, or events based on the day of the week to align with user preferences.

User Segmentation Strategies:

- Recognize the differences in user behavior between casual and registered users.
- Develop personalized marketing strategies for each segment, such as loyalty programs for registered users and occasional promotions for casual users.

Operational Adjustments:

- Optimize fleet management based on seasonal and weather-specific demand patterns.
- Consider redistributing electric cycles to high-demand locations during peak seasons or inclement weather.