# Craver Solutions:
## MDS Capstone

**Christopher Prasetya Mulya, Jacob Rosen, Jade Yu, Natalie Crystal Coutinho, Pranav Kumar Mahesh**

# Introduction

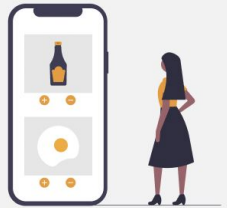
- Craver, an innovative engagement platform, facilitates seamless connections between restaurants and customers through various channels like mobile apps and online ordering.
- **PROBLEM STATEMENT:** Understanding **guest behavior** and optimizing **merchant success** within Craver's ecosystem.
- **DELIVERABLES:** Report & Dashboard
- The goal is to derive actionable insights to enhance customer engagement and increase profitability for Craver and its merchants.

# Aims & Objectives

The aim of this project is to provide actionable insights for Craver, focusing on enhancing customer engagement and optimizing merchant success within their ecosystem.

Key objectives to be accomplished include:

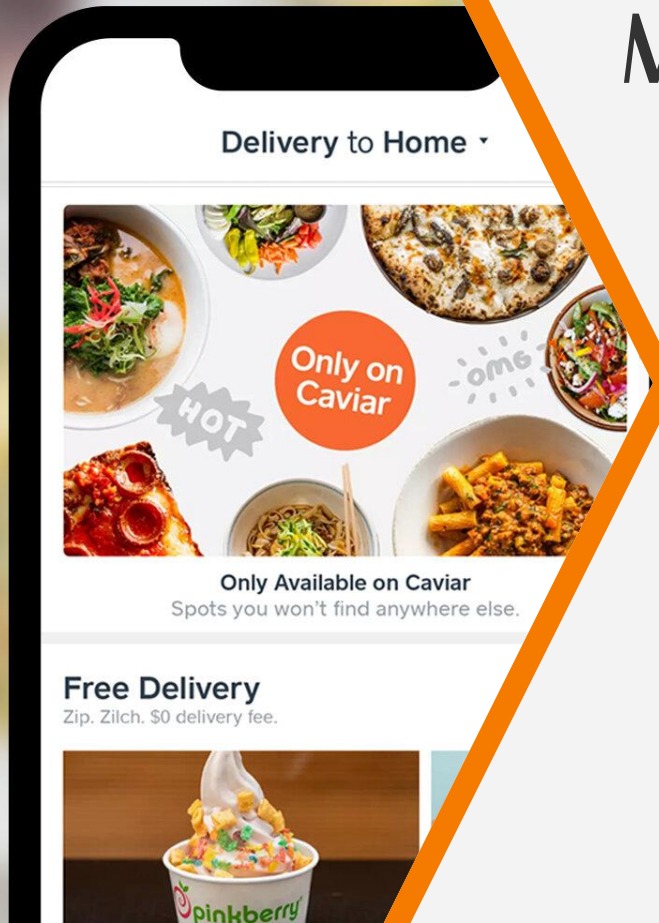
1. Case study by focusing on two large merchants: Merchant J and Merchant L
    a. Analyze loyalty program impact on guest behavior and merchant growth - Natalie Coutinho
    b. Analyze customer growth pattern of the two merchants - Jade Yu
    c. Correlated product items purchasing analysis - Natalie Coutinho
    d. The impact of Craver on customer growth - Jade Yu
    e. Recurring trends analysis on a consumer basis - Natalie Coutinho
2. Identify factors driving customer repurchase behavior. - Christopher Mulya
3. Assess how restaurant types affect merchant success metrics. - Jacob Rosen
4. Identify traits of high-revenue merchants. - Pranav Kumar Mahesh
5. Analyze cart abandonment rates and purchase trends for process optimization. - Jade Yu



# Dataset


103 tables hosted on BigQuery

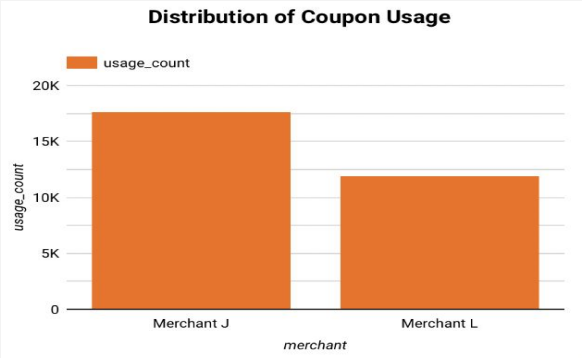
# Methodology & Analysis

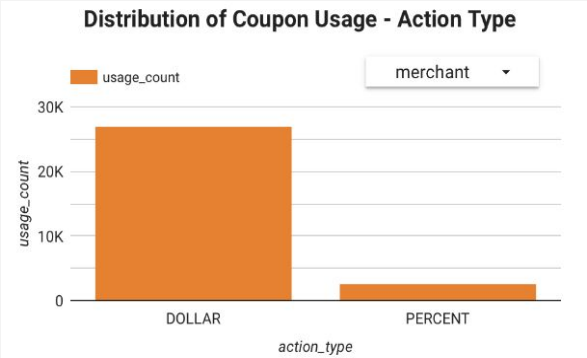


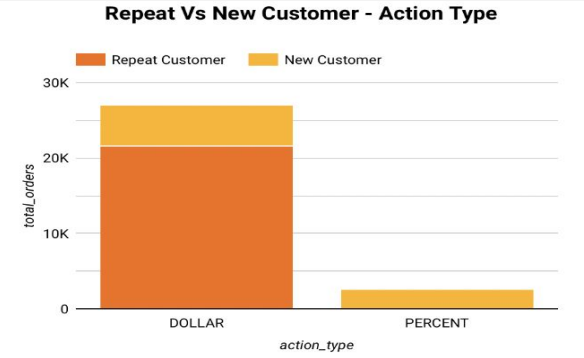

## Objective 1(a):

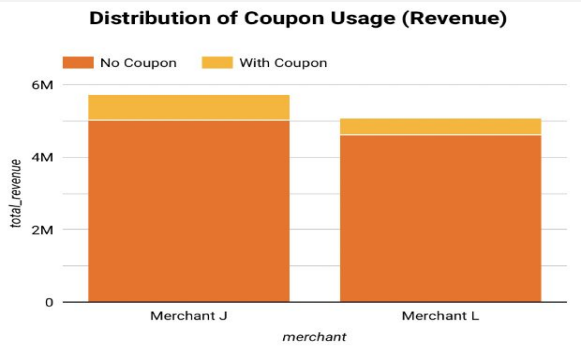
*(Merchant J/Merchant L) Analyzing **loyalty program influence** on guest return behavior, investigating how earning and using credit (coupons) influences guests' behavior when ordering.*

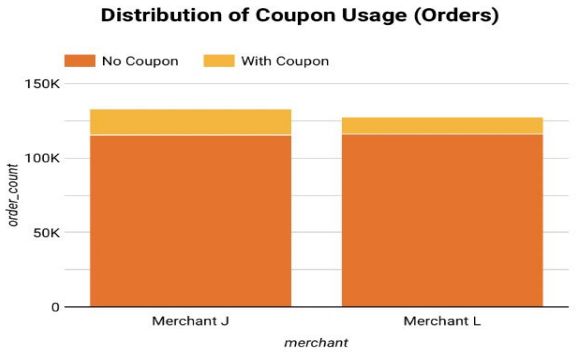
# Influence of Coupons on Customer Behaviour



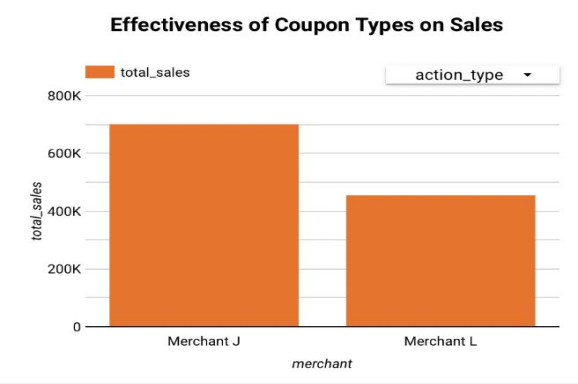



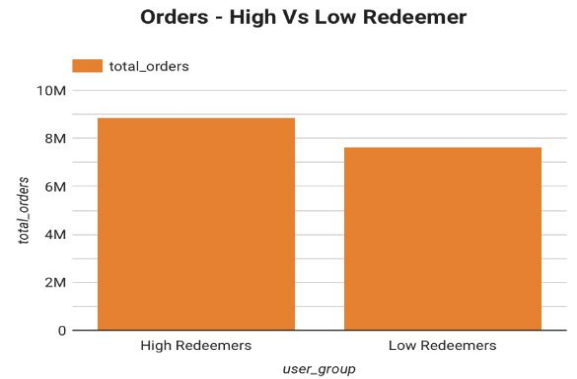



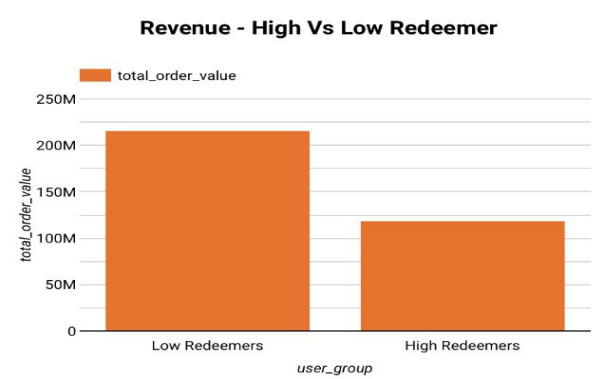



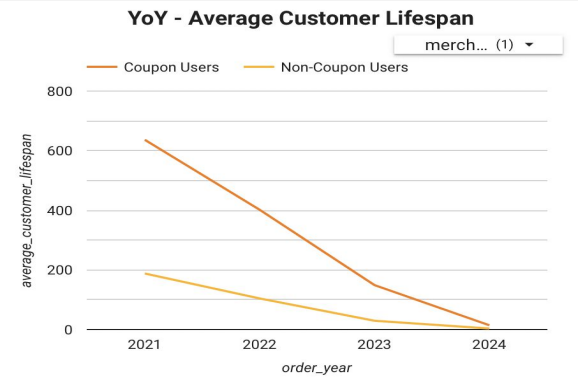



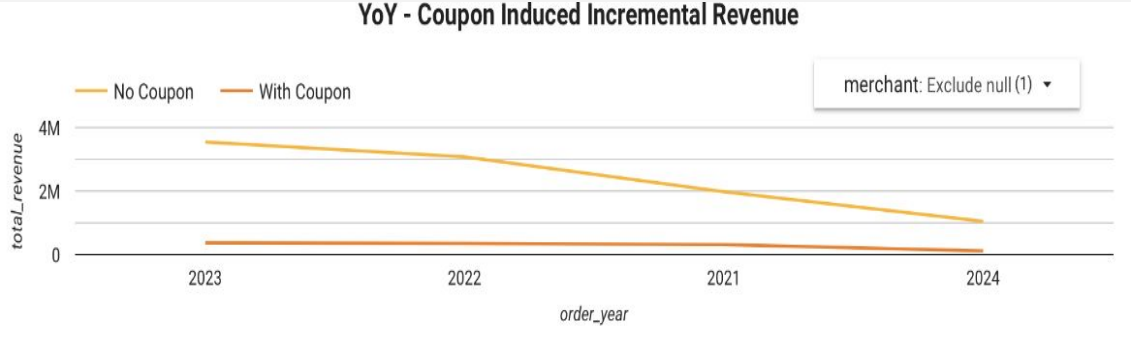
# Influence of Coupons on Customer Behaviour



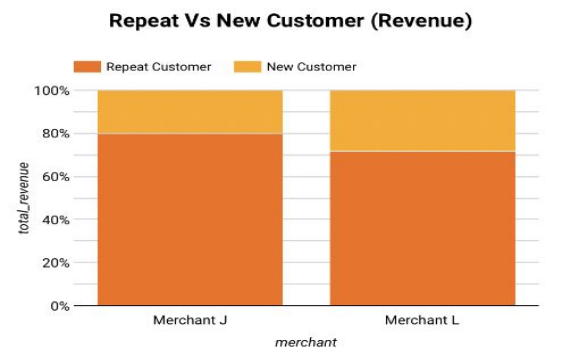



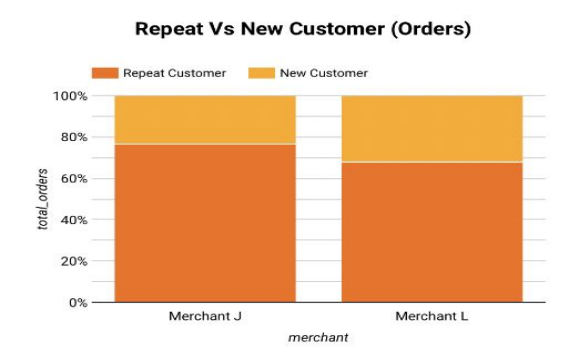



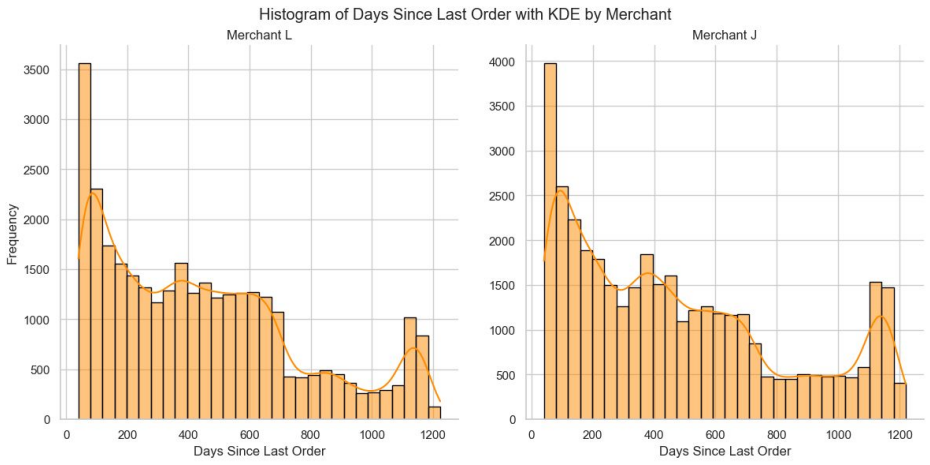



# Retention Analysis




# Objective 1(b):

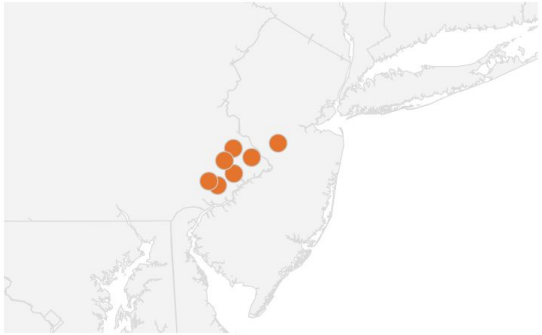
*Comparing the **growth of customer behavior** in terms of their evolution as a Merchant J and/or Merchant L customer (i.e. if they were just a customer of Merchant J and then became one at Merchant L too and vice versa)*

# Active Locations

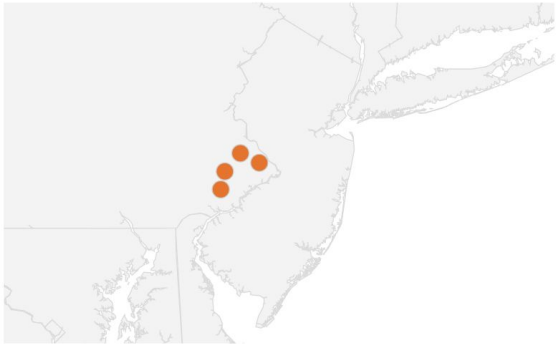
**Square Payment History**

| location_name_anoynomous ▲ | earliest_payment | latest_payment | total_payment_count | total_payment_count |
|---|---|---|---|---|
| J 1 | Nov 1, 2020 | Mar 31, 2024 | 69527 | 69,527 |
| J 2 | Nov 1, 2020 | Mar 31, 2024 | 57055 | 57,055 |
| J 3 | Nov 1, 2020 | Mar 31, 2024 | 123763 | 123,763 |
| J 4 | Nov 1, 2020 | Mar 31, 2024 | 67673 | 67,673 |
| J 5 | Nov 1, 2020 | Mar 31, 2024 | 97933 | 97,933 |
| J 6 | Nov 1, 2020 | Mar 31, 2024 | 78675 | 78,675 |
| J 7 | Nov 1, 2020 | Mar 31, 2024 | 48915 | 48,915 |
| L 1 | Jan 1, 2023 | Mar 31, 2024 | 22013 | 22,013 |
| L 2 | Nov 1, 2020 | Mar 31, 2024 | 51986 | 51,986 |
| L 3 | Nov 1, 2020 | Mar 31, 2024 | 77475 | 77,475 |
| L 4 | Nov 1, 2020 | Mar 31, 2024 | 49194 | 49,194 |
| | | | **Grand total** | **744,209** |

**Active Locations of J**



**Active Locations of L**



# Customer Profile

History Distinct Customers of Merchant J

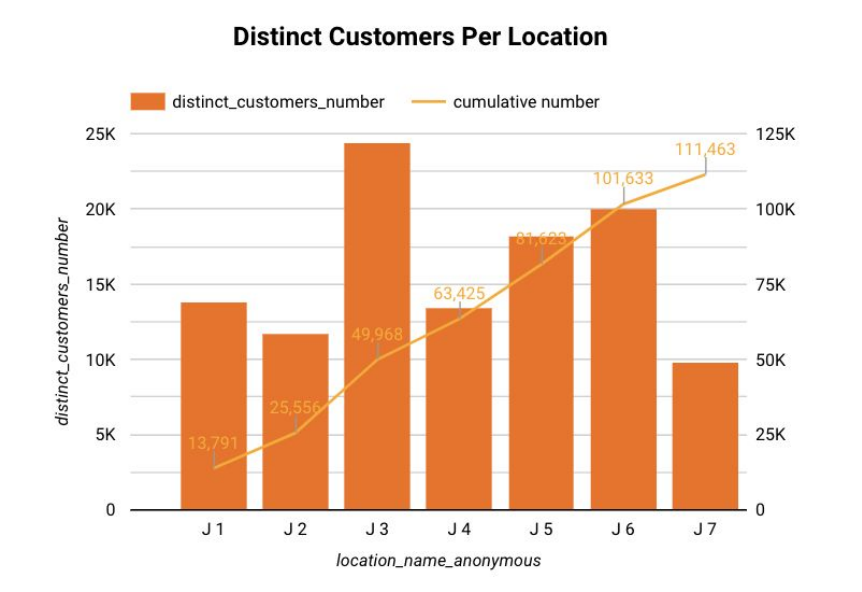
106,132

History Distinct Customers of Merchant L

41,415

Shared Customers

7,609




# Shared Customers Analysis

Average Time to Become Customer of Both Merchant(days)

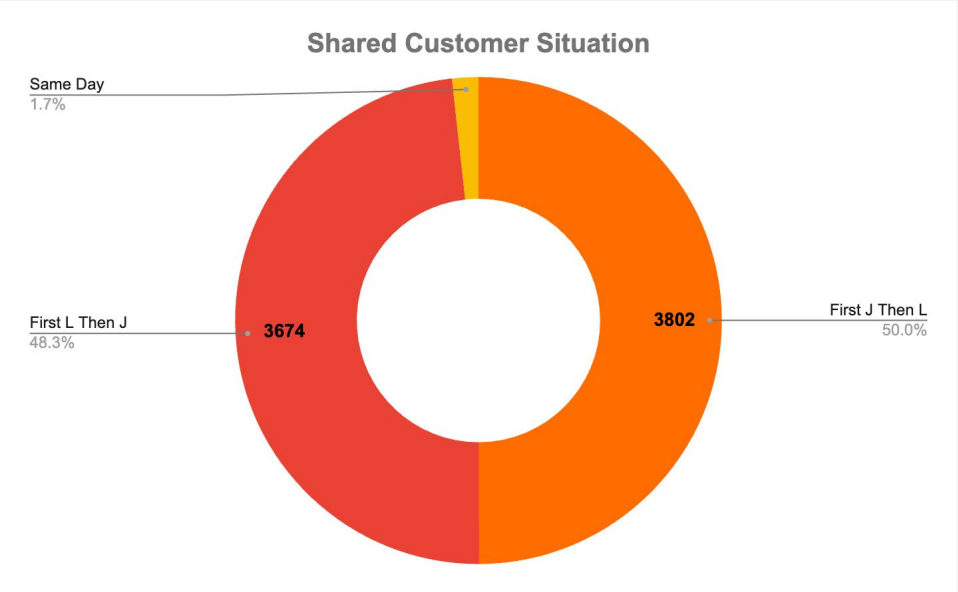
175.83

Average Time to Become Customer of L After J(days)

162.85

Average Time to Become Customer of J After L(days)

195.63




# Objective 1(c):

*(Merchant J/Merchant L) How we can **increase ticket values** based on recurring trends.*

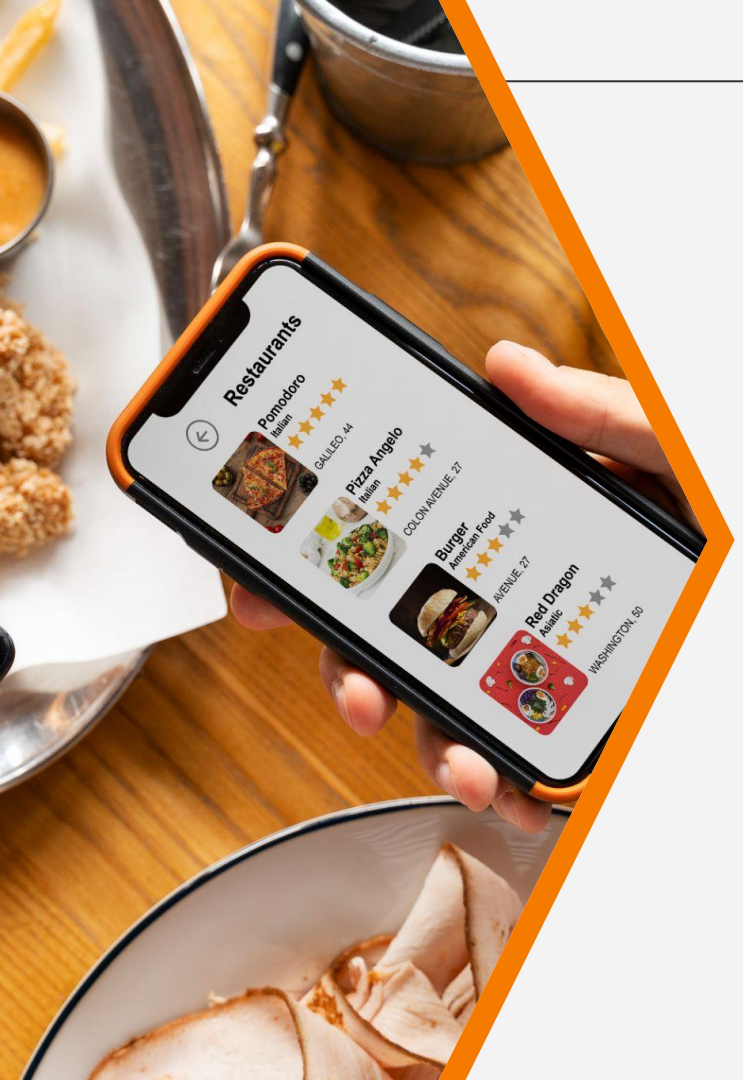
# Market Basket Analysis

| Row | product_id_1 | product_id_2 | product_name_1 | product_name_2 | pair_count | basket_count | support | confidence | lift |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 36878 | 37452 | 10 Burger Pack | Pino Noir / Poppy | 41760 | 36161 | 0.003478186429... | 0.100042605462... | 9.585122317534... |
| 2 | 78345 | 78351 | Hot Chocolate | Tea | 38634 | 31358 | 0.003016204476... | 0.623357519133... | 9.027625186579... |
| 3 | 37452 | 37454 | Pino Noir / Poppy | Route Stock Cabernet | 37076 | 32191 | 0.003096327517... | 0.030842326736... | 6.881744389808... |
| 4 | 37452 | 41022 | Pino Noir / Poppy | Mtsvadi and Wine for dad | 28125 | 25346 | 0.002437933498... | 0.024284104670... | 3.185093014565... |
| 5 | 78348 | 78351 | Dirty Chai | Tea | 23013 | 17994 | 0.001730773115... | 0.623535934576... | 9.030209045274... |
| 6 | 37452 | 37472 | Pino Noir / Poppy | 327-Sequin Manuel Bourgogne ... | 20833 | 18233 | 0.001753761598... | 0.017469110726... | 1.101089215215... |
| 7 | 36877 | 37454 | Clam Strips & Fries | Route Stock Cabernet | 20079 | 17235 | 0.001657767847... | 0.084740345943... | 1.890782771571... |
| 8 | 47172 | 47173 | Toast and Jam | Add Grilled Chicken | 18657 | 10237 | 0.000984657351... | 0.242588686935... | 8.996428219384... |
| 9 | 78339 | 78351 | Flat White | Tea | 15464 | 13936 | 0.001340449824... | 0.538818434890... | 7.803308253297... |
| 10 | 37252 | 37452 | Carlsberg | Pino Noir / Poppy | 14752 | 12654 | 0.001217139213... | 0.093123546554... | 8.922204497188... |

$$Support = \frac{freq(A,B)}{N}$$

$$Confidence = \frac{freq(A,B)}{freq(A)}$$

$$Lift = \frac{Support(A \cup B)}{Support(A) \times Support(B)}$$




# Objective 1(d):

*Customer patterns/growth* ***before and after the installation*** *of Craver*

# Craver Installation Date Identified

**Craver Order History**

| location_name_anonymous | earliest_order | latest_order | total_craver_orders_count | total_craver_orders_count |
|---|---|---|---|---|
| J 1 | Jan 23, 2021 | Apr 16, 2024 | 19432 | 19,432 |
| J 2 | Jan 17, 2021 | Apr 16, 2024 | 16098 | 16,098 |
| J 3 | Jan 18, 2021 | Apr 16, 2024 | 30904 | 30,904 |
| J 4 | Jan 24, 2021 | Apr 16, 2024 | 16553 | 16,553 |
| J 5 | Jan 7, 2021 | Apr 16, 2024 | 21224 | 21,224 |
| J 6 | Jan 24, 2021 | Apr 16, 2024 | 14065 | 14,065 |
| J 7 | Jan 22, 2021 | Apr 16, 2024 | 14771 | 14,771 |
| L 1 | Mar 20, 2021 | Apr 17, 2024 | 18417 | 18,417 |
| L 2 | Jan 19, 2021 | Apr 16, 2024 | 31349 | 31,349 |
| L 3 | Jan 16, 2021 | Apr 17, 2024 | 42471 | 42,471 |
| L 4 | Jan 21, 2021 | Apr 16, 2024 | 30772 | 30,772 |
| | | | Grand total | 256,056 |

**Square Payment History**

| location_name_anoynomous | earliest_payment | latest_payment | total_payment_count | total_payment_count |
|---|---|---|---|---|
| J 1 | Nov 1, 2020 | Mar 31, 2024 | 69527 | 69,527 |
| J 2 | Nov 1, 2020 | Mar 31, 2024 | 57055 | 57,055 |
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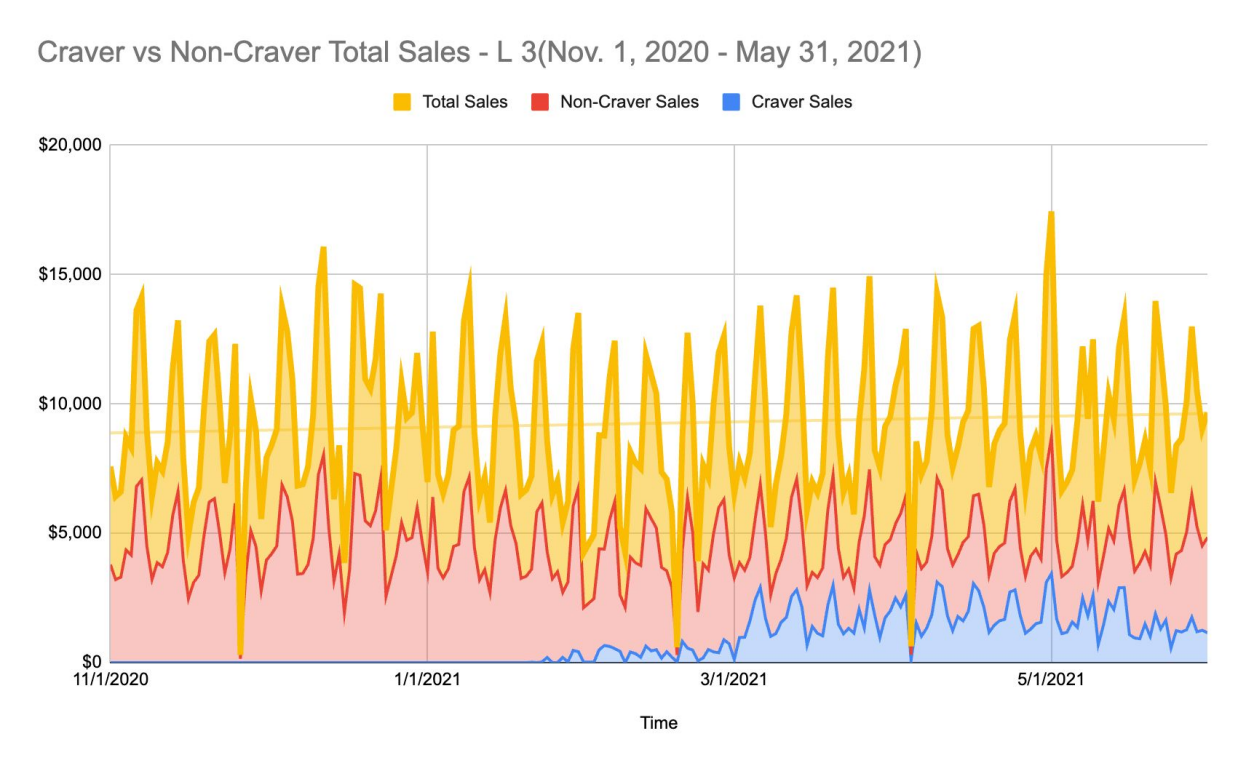
| L 3 | Nov 1, 2020 | Mar 31, 2024 | 77475 | 77,475 |
| L 4 | Nov 1, 2020 | Mar 31, 2024 | 49194 | 49,194 |
| | | | Grand total | 744,209 |

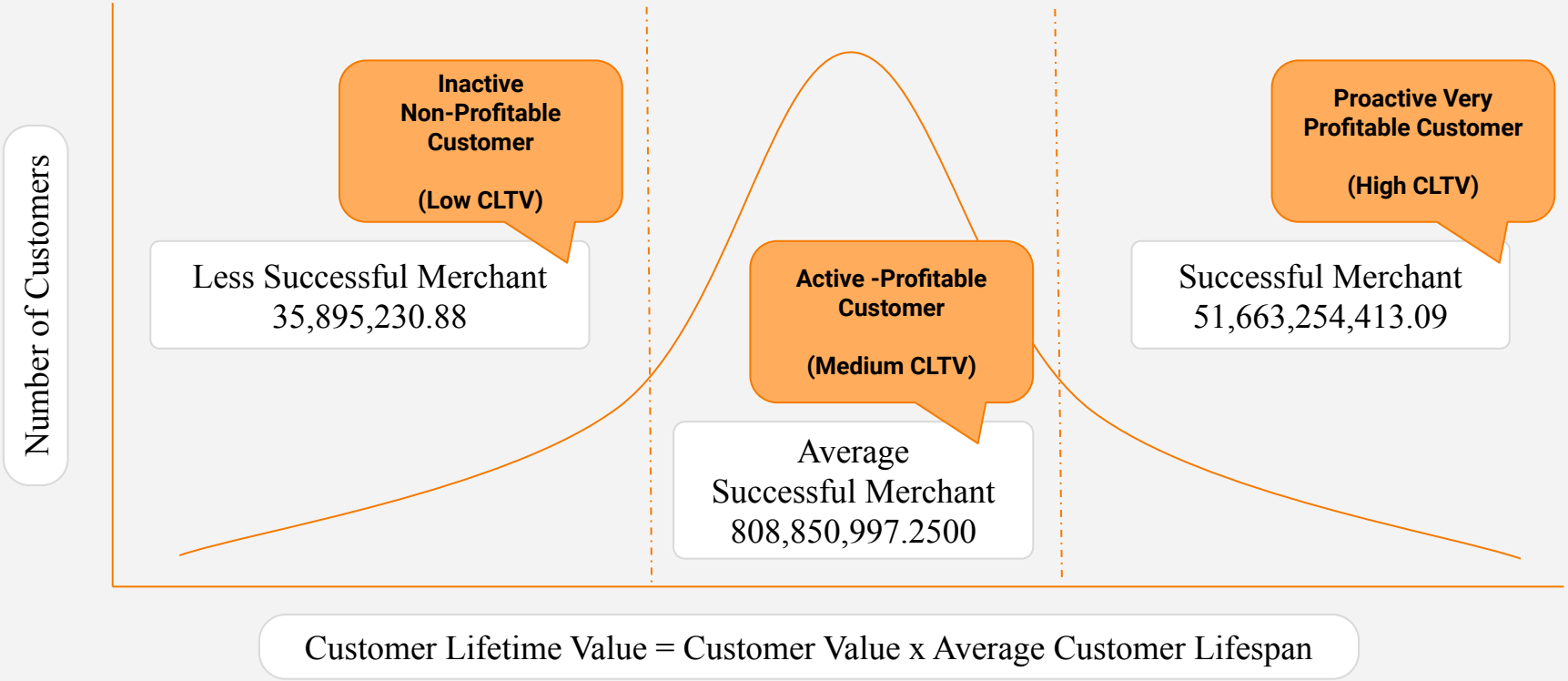
# Effect of the Installation of Craver



# Objective 1(e):

*(Merchant J/Merchant L) Other basic **recurring trends** on a consumer basis (i.e. popularity of items, what sells based on time of year, etc.).*

# Customer Lifetime Value




Customer Lifetime Value = Customer Value x Average Customer Lifespan

# Objective 2:

*Identify patterns from orders data to differentiate between **sticky** and **non-sticky** guests and the factors influencing customer repurchase behavior at **successful** and **less successful merchants.***

# Aggregated Table (via BigQuery)

Duration since last order
———————————
Expected time between orders

1

## Merchant X *(Successful Merchant)*

| Row | user_id | total_orders | points | orders_with_coupons | reorder_rate_per_we | reorder_rate_per_mo | avg_time_between_o | expected_time_betw | lapsed_metric |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 34897 | 490 | 87 | 140 | 2.37 | 10.21 | 3.0 | 3.0 | 0.0 |
| 2 | 35350 | 511 | 141 | 199 | 2.49 | 10.87 | 2.0 | 3.0 | 0.0 |
| 3 | 35542 | 383 | 20318 | 138 | 1.86 | 8.15 | 3.0 | 4.0 | 0.0 |
| 4 | 35789 | 38 | 70 | 34 | 0.2 | 0.86 | 34.0 | 54.0 | 0.43 |
| 5 | 35795 | 557 | 10380 | 266 | 2.7 | 11.6 | 2.0 | 2.0 | 1.68 |
| 6 | 37272 | 1 | 0 | 0 | null | null | null | null | null |
| 7 | 38334 | 123 | 194 | 0 | 0.6 | 2.67 | 11.0 | 13.0 | 1.24 |
| 8 | 38343 | 29 | 213 | 0 | 0.18 | 0.78 | 40.0 | 75.0 | 3.88 |

Results per page: 50 | 1 – 50 of 122039

2

## Merchant Y *(Less Successful Merchant)*

| Row | user_id | total_orders | points | orders_with_coupons | reorder_rate_per_we | reorder_rate_per_mo | avg_time_between_o | expected_time_betw | lapsed_metric |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 189959 | 28 | 1000 | 24 | 0.16 | 0.68 | 47.0 | 110.0 | 0.24 |
| 2 | 200270 | 7 | 131 | 4 | 3.5 | null | 4.0 | 9.0 | 136.44 |
| 3 | 200290 | 2 | 47 | 1 | null | null | null | null | null |
| 4 | 200407 | 1 | 40 | 0 | null | null | null | null | null |
| 5 | 200529 | 1 | 40 | 0 | null | null | null | null | null |
| 6 | 200662 | 1 | 40 | 0 | null | null | null | null | null |
| 7 | 200668 | 6 | 90 | 0 | 0.67 | 2.0 | 15.0 | 29.0 | 40.91 |
| 8 | 200673 | 305 | 21 | 256 | 3.11 | 13.26 | 2.0 | 3.0 | 220.63 |
| 9 | 200677 | 8 | 48 | 0 | 0.42 | 2.0 | 22.0 | 39.0 | 27.66 |

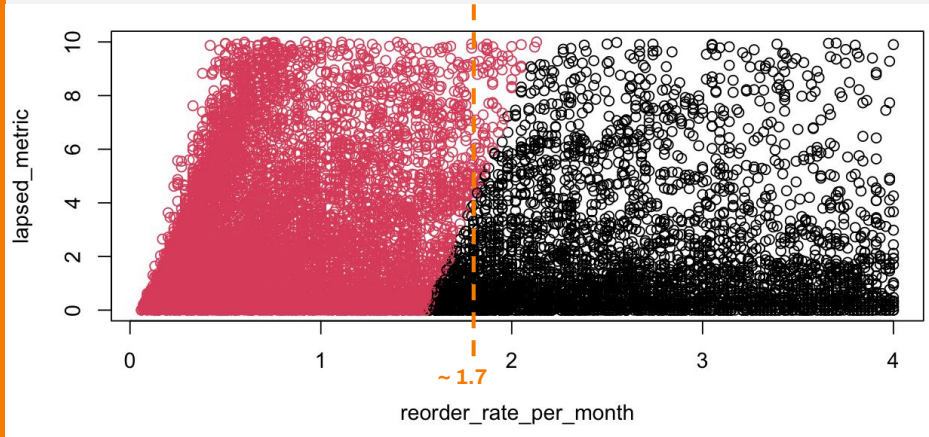
Results per page: 50 | 1 – 50 of 688

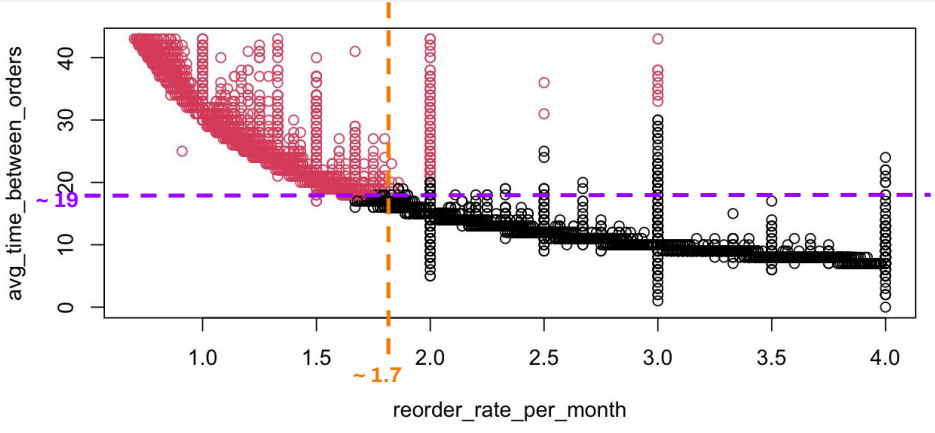
# Merchant X: *Statistics / Thresholds Determination*

| Category | Min | Q1 | Median | Q3 | Max | Average |
|---|---|---|---|---|---|---|
| total_orders | 1 | 10 | 42 | 123 | 2806 | 110.07 |
| points | -76 | 54 | 113 | 190 | 24916 | 187.80 |
| orders_with_coupons | 0 | 0 | 0 | 0 | 511 | 0.19 |
| reorder_rate_per_week | 0.01 | 0.18 | 0.39 | 0.85 | 13.62 | 0.73 |
| reorder_rate_per_month | 0.04 | 0.76 | 1.66 | 3.55 | 59.7 | 3.08 |
| avg_time_between_orders | 0 | 8 | 19 | 43 | 1422 | 41.17 |
| lapsed_metric | 0 | 0.45 | 2.22 | 9.63 | 2063.57 | 17.10 |

Users can be categorized as:

- **STICKY** : If 'reorder_rate_per_month' > 1.7 and 'avg_time_between_orders' < 19
- **NON-STICKY** : If 'reorder_rate_per_month' < 1.7 and 'avg_time_between_orders' > 19



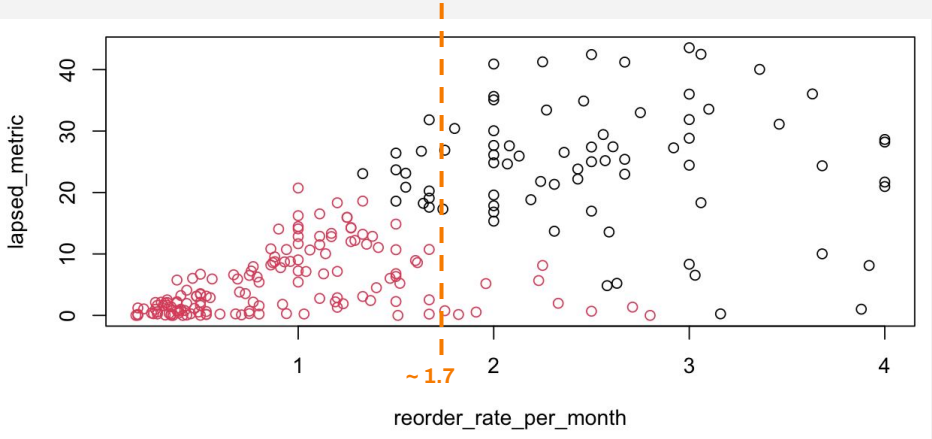

*k-means clustering visualizations*

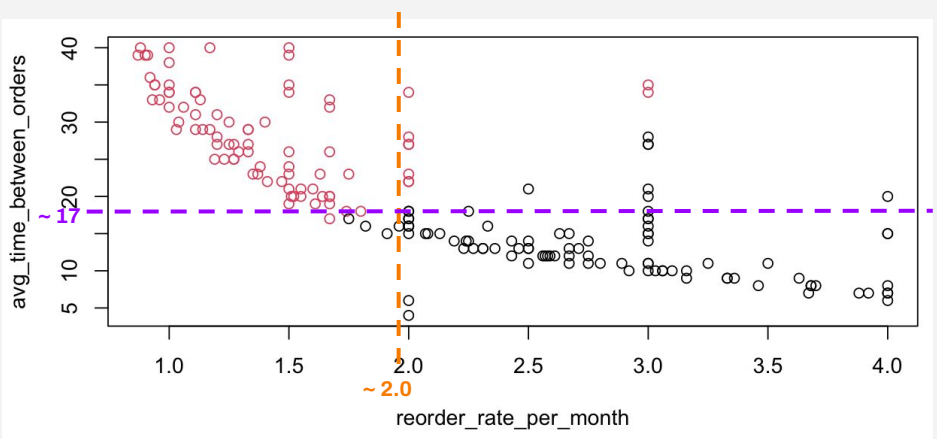
# Merchant Y: *Statistics / Thresholds Determination*

| Category | Min | Q1 | Median | Q3 | Max | Average |
|---|---|---|---|---|---|---|
| total_orders | 1 | 1 | 3 | 11 | 594 | 15.33 |
| points | 0 | 40 | 49 | 80 | 1917 | 83.28 |
| orders_with_coupons | 0 | 0 | 0 | 1 | 343 | 4.38 |
| reorder_rate_per_week | 0.04 | 0.23 | 0.5 | 1 | 6 | 0.82 |
| reorder_rate_per_month | 0.17 | 0.9125 | 2 | 3.5975 | 20 | 2.87 |
| avg_time_between_orders | 0 | 7 | 17 | 40 | 371 | 35.76 |
| lapsed_metric | 0 | 2.6525 | 14.375 | 43.805 | 1685.39 | 49.69 |

Users can be categorized as:

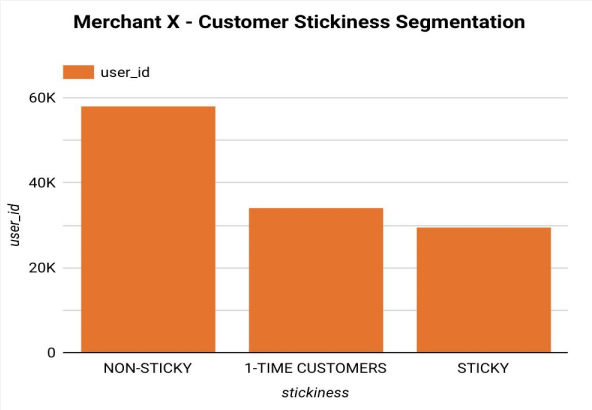
- **STICKY** : If 'reorder_rate_per_month' > 2.0 and 'avg_time_between_orders' < 17
- **NON-STICKY** : If 'reorder_rate_per_month' < 2.0 and 'avg_time_between_orders' > 17

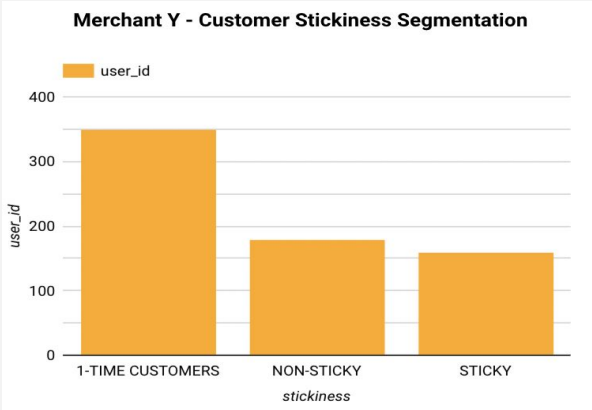


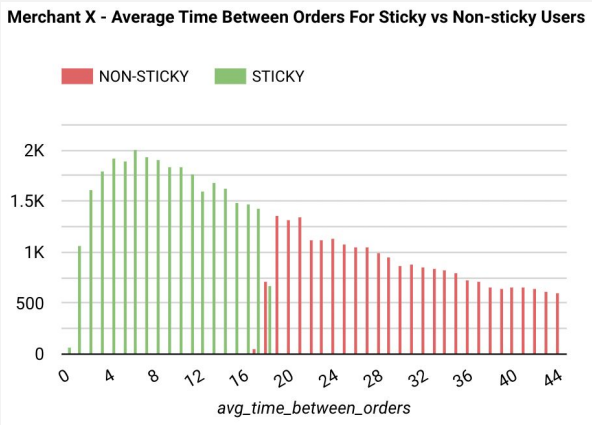



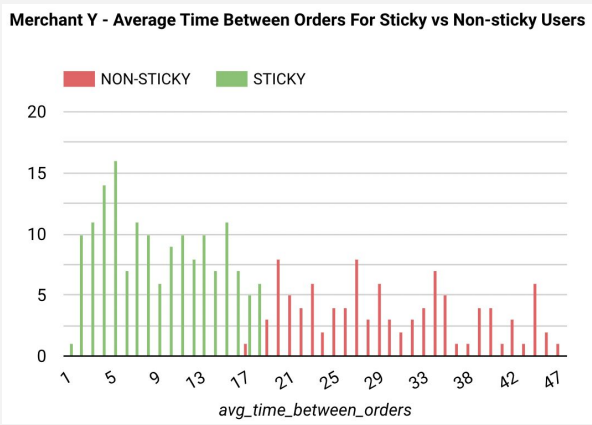

*k-means clustering visualizations*

# Preliminary User Profile Analysis



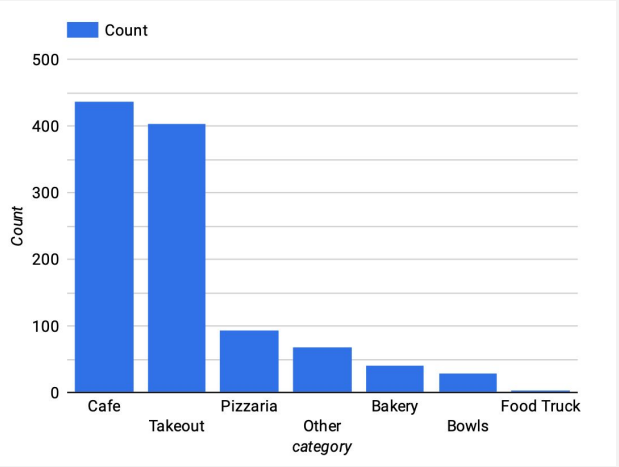




# Objective 3:

*Assess how* ***restaurant types*** *(cafe, coffee shop, pizzeria, etc) affect* ***merchant success.***

# Restaurant Classification

- Locations classified into 7 categories
- Classified using various rules
- The dataset is clearly unbalanced, which could make comparison difficult
- Will need to consider how to handle locations with a small number of orders




| | category | Count ▼ |
|---|---|---|
| 1. | Cafe | 362 |
| 2. | Takeout | 267 |
| 3. | Pizzaria | 82 |
| 4. | Other | 47 |
| 5. | Bakery | 37 |
| 6. | Bowls | 29 |
| 7. | Food Truck | 3 |

| | category | Count ▼ |
|---|---|---|
| 1. | Cafe | 437 |
| 2. | Takeout | 403 |
| 3. | Pizzaria | 95 |
| 4. | Other | 68 |
| 5. | Bakery | 41 |
| 6. | Bowls | 30 |
| 7. | Food Truck | 3 |

# Classification Comparison

The goal of the objective is to compare locations across classifications

Initial statistics collected:

- number of orders per day
- gross order cost per order
- gross order cost per day

Next Steps:

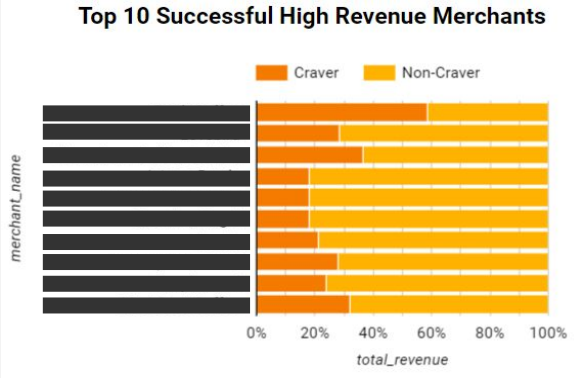
- Produce boxplots for each category
- T-test on group means
- Look at unique and sticky customers

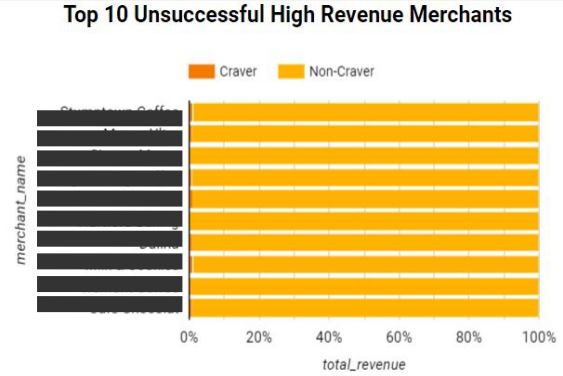
| location_id | category | days_operational | n_orders | orders_per_day | total_sale | avg_sale | sales_per_day |
|---|---|---|---|---|---|---|---|
| 1479 | Takeout | 200 | 379 | 1.895 | 5057.34 | 13.343905013 | 25.28 |
| 968 | Cafe | 839 | 1164 | 1.387365911799… | 11797.35 | 10.135180412 | 14.0612038 |
| 460 | Cafe | 1293 | 7272 | 5.624129930394… | 81038.17 | 11.143862761 | 62.6745320 |

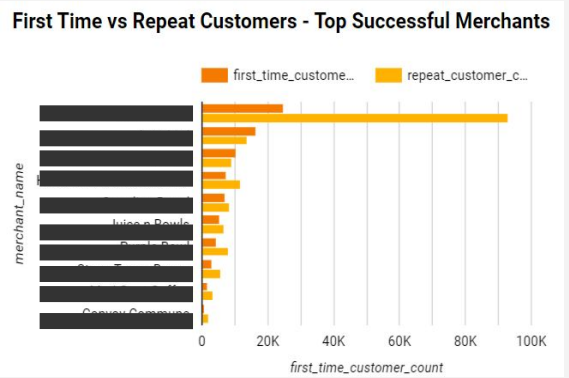
# Objective *4*:

*Identify **common features** of the **upper quartile (percentage revenue through Craver) merchants** and compare successful high revenue merchants and unsuccessful high revenue merchants.*

# Successful vs Unsuccessful Merchants




RFM Analysis of Top 10 Successful High Revenue Merchants

| | merchant_name | avg_recency_segment | avg_frequency_segment | avg_monetary_segment |
|---|---|---|---|---|
| 1. | [redacted] | 3.42 | 2.64 | 2.96 |
| 2. | [redacted] | 2.82 | 3.47 | 3.27 |
| 3. | [redacted] | 2.78 | 2.87 | 3.22 |
| 4. | [redacted] | 2.73 | 3.38 | 3.28 |
| 5. | [redacted] | 2.7 | 2.78 | 2.7 |
| 6. | [redacted] | 2.62 | 3.68 | 2.61 |
| 7. | [redacted] | 2.5 | 3.83 | 3.12 |
| 8. | [redacted] | 2.44 | 3.26 | 3.02 |
| 9. | [redacted] | 1.99 | 3.35 | 2.84 |
| 10. | [redacted] | 1.67 | 3.79 | 3.67 |

RFM Analysis of Top 10 Unsuccessful High Revenue Merchants

| | merchant_name | avg_recency_segment | avg_frequency_segment | avg_monetary_segment |
|---|---|---|---|---|
| 1. | [redacted] | 3.67 | 3.02 | 2.11 |
| 2. | [redacted] | 3.53 | 2.15 | 2.63 |
| 3. | [redacted] | 3.48 | 3.09 | 2.62 |
| 4. | [redacted] | 3.29 | 2.88 | 3.31 |
| 5. | [redacted] | 3.16 | 2.81 | 3.14 |
| 6. | [redacted] | 2.85 | 3.5 | 3 |
| 7. | [redacted] | 2.8 | 4 | 2.2 |
| 8. | [redacted] | 2.5 | 3.36 | 3.24 |
| 9. | [redacted] | 2.05 | 3.25 | 3.58 |
| 10. | [redacted] | 1.75 | 3.1 | 3.58 |

# Merchant Analysis

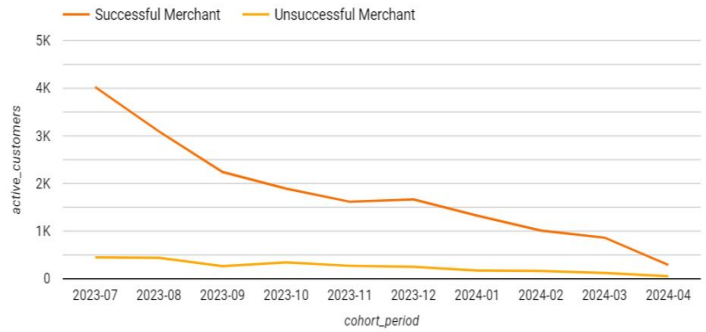
**Top 10 Product Categories - Successful Merchant**

| | category_name | total_orders | average_price |
|---|---|---|---|
| 1. | Shop Cold Brew | 3,856,661 | 5.37 |
| 2. | Shop Hot Coffee | 1,946,180 | 4.24 |
| 3. | shop now | 756,482 | 5.49 |
| 4. | Shop Snacks and Treats | 314,968 | 3.53 |
| 5. | Shop Bottles | 145,118 | 17.75 |
| 6. | Shop Bags | 134,224 | 17.68 |
| 7. | Shop Merchandise | 17,655 | 11.34 |
| 8. | Shop Gift Cards | 8,770 | 23.82 |
| 9. | LIMITEDS AND SEASONALS [Roastery Pic... | 3,515 | 6.03 |
| 10. | COLD BREW [Roastery Pickup] | 182 | 32.15 |

**Top 10 Product Categories - Unsuccessful Merchant**

| | category_name | total_orders | average_price |
|---|---|---|---|
| 1. | Espresso | 11,536 | 4.69 |
| 2. | Breakfast | 6,128 | 6.81 |
| 3. | Coffee | 4,384 | 3.44 |
| 4. | Specialty Drinks | 4,028 | 5.73 |
| 5. | Cold Brew | 3,853 | 4.95 |
| 6. | Seasonal Drinks | 3,676 | 5.51 |
| 7. | Pastries | 2,135 | 4.29 |
| 8. | Bean | 1,751 | 18.35 |
| 9. | Tea | 1,039 | 4.24 |
| 10. | Frappes | 923 | 5.87 |

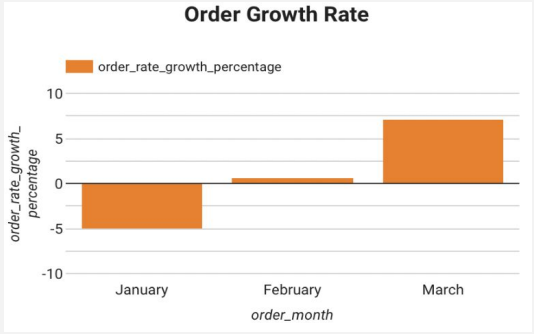
**Active Customers from Each Cohort (Successful Merchant vs Unsuccessful Merchant)**

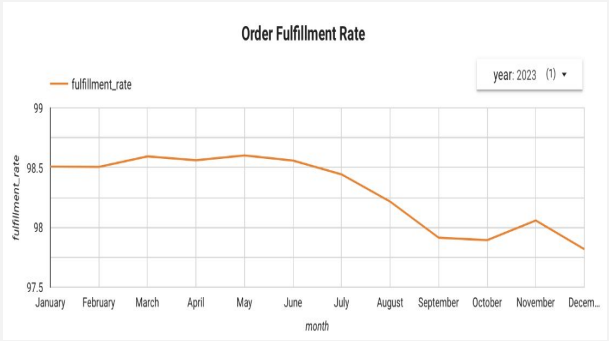


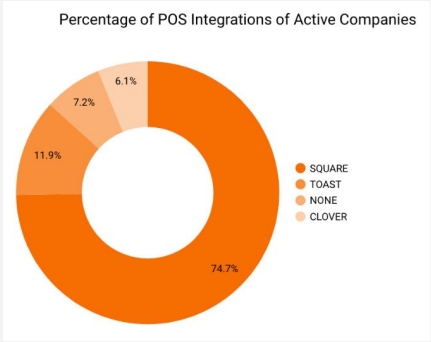

# Craver Dashboard Design

# Craver Demographics Overview

| total_revenue | total_orders | total_restaurants | total_merchants | avg_daily_customers |
|---|---|---|---|---|
| 10.1B | 16,470,746 | 1,729 | 611 | 4,009.1 |

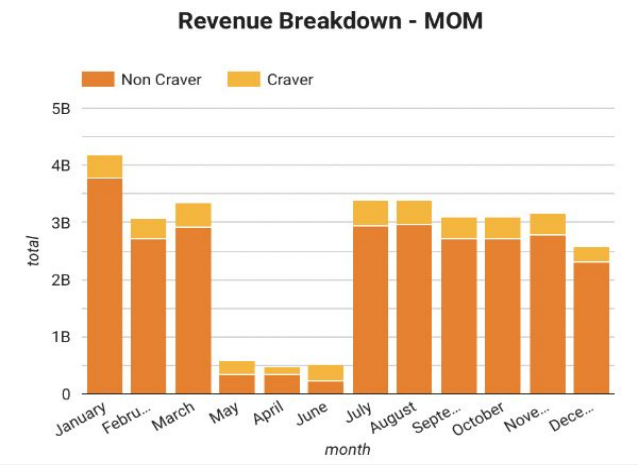


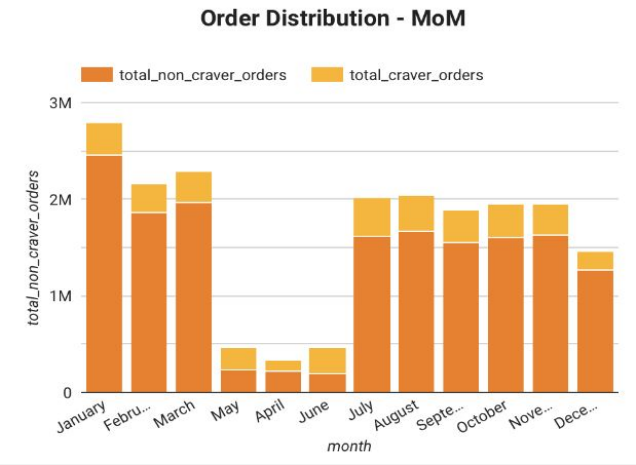



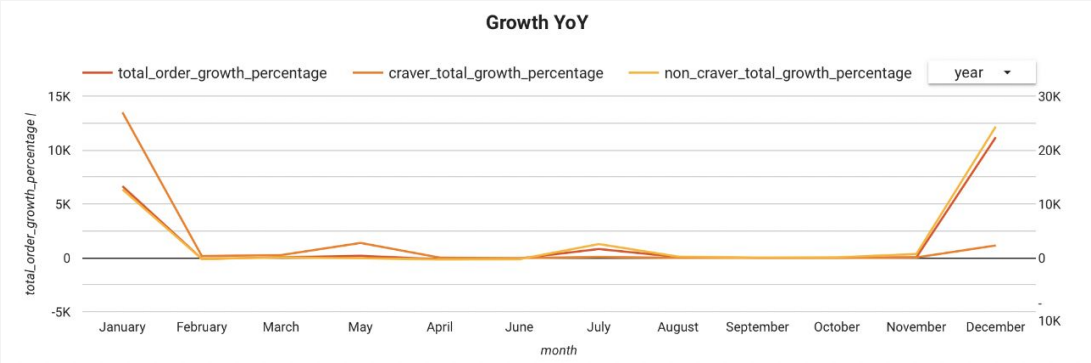





# Craver Vs Non-Craver

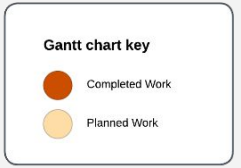


# Project Timeline

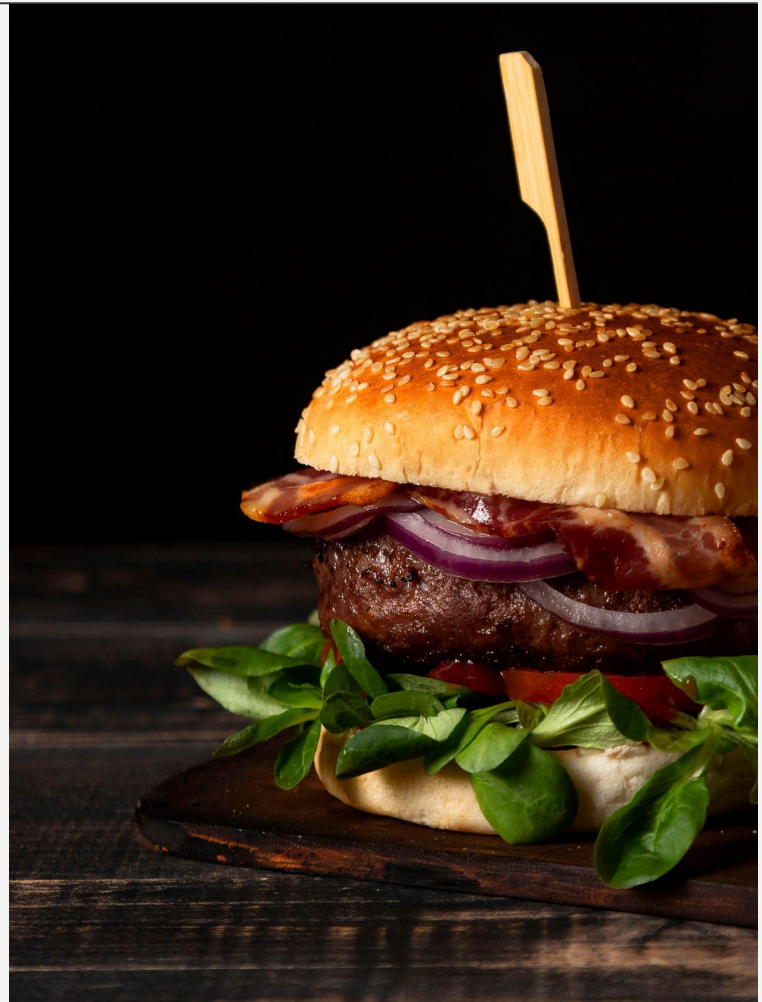
| Goals | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Explore the Data | | | | | | | | | | |
| Proposal Development | | | | | | | | | | |
| Conducting Analyses | | | | | | | | | | |
| Dashboard Development | | | | | | | | | | |
| Data Interpretation and Reporting | | | | | | | | | | |
| Final Review and Presentation | | | | | | | | | | |



# Conclusion

- Our systematic approach, supported by advanced data analysis techniques and a thorough understanding of Craver's ecosystem, aims to uncover valuable insights driving enhanced customer engagement and profitability for Craver and its merchants.

- We look forward to executing this project and delivering impactful results that contribute to the continued success of Craver's engagement platform.



# Thank You!