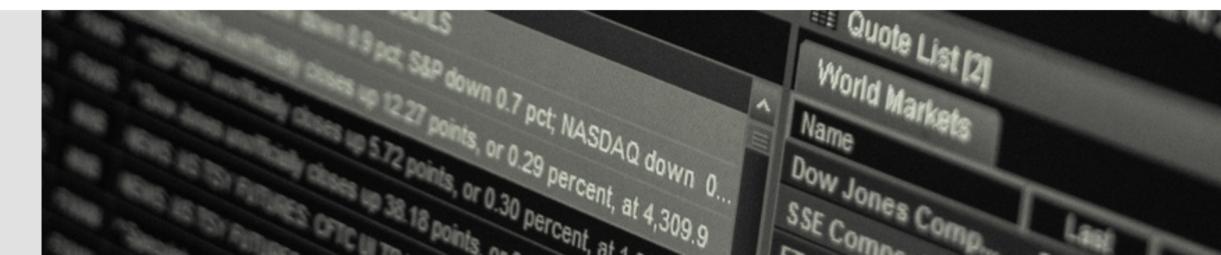


# CAFE REWARDS INSIGHTS & ANALYSIS

By Phạm Thành Đạt

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Dashboard: [PowerBI](#)





# REPORT OUTLINE

## TOPIC HIGHLIGHTS



- 1. Project Overview/Context** 
- 2. Data Overview** 
- 3. Terms/Definition of metrics used** 
- 4. Executive Summary**
- 5. Recommendations**
- 6. Approach: Pre-Processing & Issue Tree**
- 7. Data Analyst**

# PROJECT OVERVIEW



PROJECT TITLE: DATA-DRIVEN CAFE REWARDS ANALYSIS

## Project Context:

- **Scope:** Tracks the *behavior* of Cafe Rewards *members* over *a 30-day period*.
- **Data Tracked:** Includes customer *transactions* and *responses* to *offers*.
- **Types of Offers:**
  - Informational*.
  - Discount offers*.
  - "Buy One, Get One" (BOGO)* offers.

## Goal of the project:

- Analyze Maven Cafe's rewards program *performance*, and *customer behavior*, and *offer effectiveness* through data-driven *insights*.
- Suggest a *strategic* approach to improve promotional campaigns in terms of: *targeting key customer segments*, *enhancing offer relevance*, and *boosting customer engagement*.

# DATASET OVERVIEW



PROJECT TITLE: DATA-DRIVEN CAFE REWARDS ANALYSIS

## Table Definition:

Table	Field	Description
offers		Details on the offers sent to customers during the 30-day period
	offer_id	Unique offer ID (primary key)
	offer_type	type of offer: bogo (buy one, get one), discount, or informational
	difficulty	minimum amount required to spend in order to be able to complete the offer
	reward	reward (in dollars) obtained by completing the offer
	duration	days a customer has to complete the offer once they have received it
	channels	list of marketing channels used to send the offer to customers
customers		Demographic data for each member
	customer_id	Unique customer ID (primary key)
	became_member_on	Date when the customer created their account (yyyymmdd)
	gender	Customer's gender: (M)ale, (F)emale, or (O)ther
	age	Customer's age
	income	Customer's estimated annual income, in USD
events		Data on customer activity, with records for transactions, offers received, offers viewed, and offers completed
	customer_id	Customer the event is associated with (foreign key)
	event	Description of the event (transaction, offer received, offer viewed, or offer completed)
	value	Dictionary of values associated with the event (amount for transactions, offer_id for offers received and viewed, and offer_id & reward for offers completed).
	time	Hours passed in the 30-day period (starting at 0)

# TERMS/DEFINITION OF METRICS USED



## PROJECT TITLE: DATA-DRIVEN CAFE REWARDS ANALYSIS

### Definition of Metrics:

#### View Rate (%)

- **Definition:** The percentage of offers viewed out of those sent.
- **Formula:**

$$\text{View Rate (\%)} = \left( \frac{\text{Total Viewed}}{\text{Total Sent}} \right) \times 100$$

- **Purpose:** Measures engagement level.

#### Completion Rate (%)

- **Definition:** The percentage of offers completed out of those viewed.
- **Formula:**

$$\text{Completion Rate (\%)} = \left( \frac{\text{Total Completed}}{\text{Total Viewed}} \right) \times 100$$

- **Purpose:** Measures the effectiveness of the offer in driving action.

#### Success Rate (%)

- **Definition:** The percentage of offers completed out of those sent.
- **Formula:**

$$\text{Success Rate (\%)} = \left( \frac{\text{Total Completed}}{\text{Total Sent}} \right) \times 100$$

- **Purpose:** Indicates overall offer effectiveness.

#### ROI (%)

- **Definition:** The return on investment for the offer campaign, showing profitability.
- **Formula:**

$$\text{ROI (\%)} = \left( \frac{\text{Total Reward}}{\text{Total Spend}} \right) \times 100$$

- **Purpose:** Evaluates the financial success of the offers.

# APPROACH: PRE-PROCESSING & ISSUE TREE

[LINK: PRE-PROCESSING CHECKLIST](#)

## Data Preprocessing Checklist:

Area of Improvement	Table	Column	Issue	Solution
<b>Data Integrity &amp; Relationships</b>	events	customer_id, offer_id	Missing foreign key constraints	Added foreign key constraints to ensure data integrity between the 'events', 'customers', and 'offers' tables
<b>Missing Data Handling</b>	events, customers	customer_id	Missing demographic data (age > 100, gender, income)	Removed rows with missing demographic data in both tables to ensure data quality for analysis
<b>Data Deduplication</b>	events	value, event	Duplicate "Offer completed" events	Removed duplicate "offer completed" events, keeping only the latest record to avoid overcounting
<b>Data Transformation</b>	events	offer_id, value	Inconsistent offer_id format	Extracted and standardized the 'offer_id' from the JSON string in the value column, handling variations for consistency
	events	amount, value	Transaction amounts embedded in value	Extracted transaction amounts and created a dedicated amount column
	events	reward, value	Offer rewards embedded in value	Extracted reward amounts and created a dedicated reward column
	customers	became_member_on	Incorrect data type (numeric)	Converted the became_member_on column to the correct DATE data type
	customers	became_member_on	Inconsistent date formatting	Standardized the date format in became_member_on for consistency
<b>Missing Data Handling</b>	customers	gender, age, income	Missing values for gender, age, and income	Gender filled based on existing distribution; age and income predicted using machine learning models based on other customer features
<b>Data Cleaning</b>	customers	age, income	Invalid age (over 100) and inconsistent income data	Removed invalid age values (age > 100); Predicted missing income using age as a feature and removed outliers from the income data
<b>Data Integrity &amp; Relationships</b>	events	time, offer_id	Missing links between events and offers	Established relationships between events and corresponding offers based on customer_id and offer_id
<b>Offer Completion Tracking</b>	events	value, offer_id	Inconsistent or missing data related to offer completions	Standardized offer_id extraction and added transaction-attribution logic to track valid offer completions accurately
<b>Offer Timing &amp; Durations</b>	events	time, day	Incorrect time window for offer completions	Added logic to compute offer windows based on received offer date and offer duration, ensuring valid completion attribution

# EXECUTIVE SUMMARY



PROJECT TITLE: DATA-DRIVEN CAFE REWARDS ANALYSIS

## I. Offer Performance Analysis

- **Discount Offers:** Best performance (**83.52% completion**), focus on scaling.
- **Difficulty \$5 & \$7:** Best balance between ROI, completion, and engagement.
- **Duration:** Focus on **7-10 days** for optimal performance.
- **Channels:** **Web** for action (**67.44%**), **Social** for awareness (**93.31% view rate**).

## II. Customer Behavior

- **Top Segments:** Age **65+**, **high-income** (100k+), Female—**highest engagement and completion**.
- **Key Segments:** **Frequent** low-spenders (Cluster 1) and **high-spenders** (Cluster 4).
- **Response Time:** BOGO offers have **faster** responses (**53.7 hours**).

## III. Offer-Customer Interaction

- **Best Combinations:** **Discount offers** work **best** for **high-income, older, and female customers**.



# RECOMMENDATIONS

## DEVELOP STRATEGIES BASED ON THE KEY CUSTOMER SEGMENTS

### Future Promotional Messaging & Targeting

In consideration of the findings, I would recommend the following:

- **Cluster 1 - Frequent Low-Spenders (30% of Revenue):** This demographic should be targeted with offers that possess lower complexity (due to their diminished income) and shorter timeframes. Although their average transaction value is modest, their consistent patronage of the store indicates that such incentives could further enhance their frequency of visits.
- **Cluster 2 - Weekly Low-Spenders:** These consumers would gain from offers that are less complex (due to their reduced income) but extended in duration, considering their infrequent engagement with the café.
- **Cluster 3 - Weekly Mid-Spenders (44% of Revenue):** This segment would likely respond positively to offers characterized by higher complexity and longer durations. Such incentives can assist in sustaining their elevated spending patterns and promoting ongoing participation. It is advisable to utilize the web channel, as a higher proportion of older customers resides within this cluster.
- **Cluster 4 - Frequent High-Spenders:** To optimize revenue and ensure the retention of this segment, it is advisable to present offers with high complexity and medium durations. This strategy aims to both challenge these consumers and uphold their substantial spending. Additionally, employing the web channel is recommended, as a greater number of older customers belong to this group.

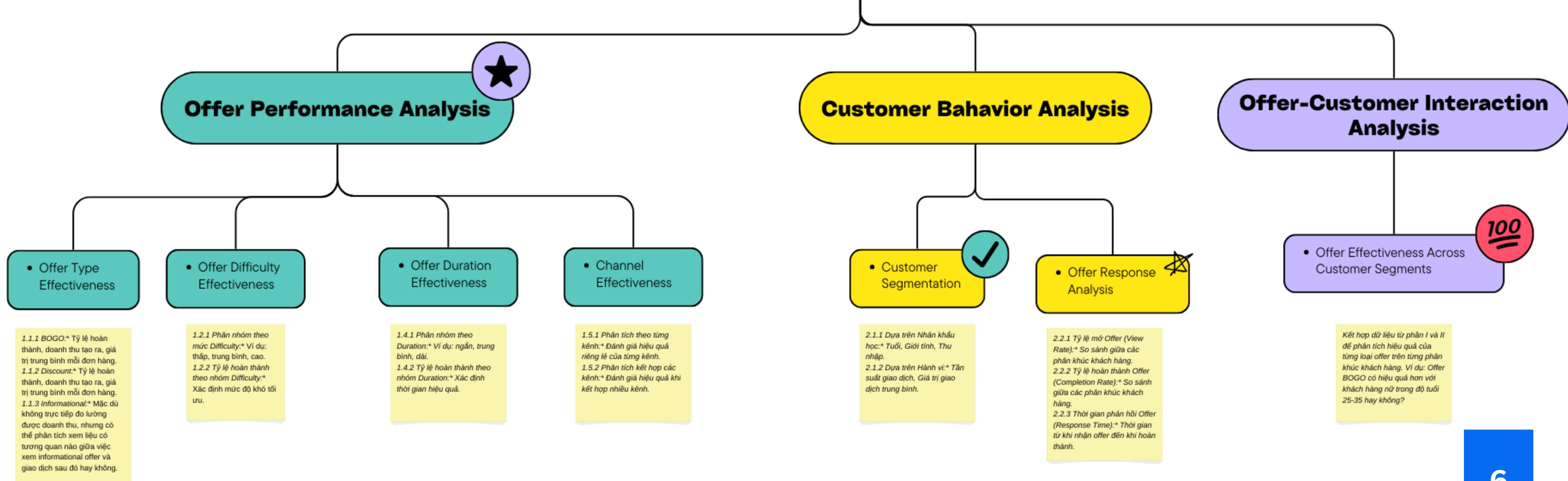
# APPROACH: PRE-PROCESSING & ISSUE TREE

LINK: [ISSUE TREE](#)

## Issue Tree of Cafe Rewards Offers:

# Cafe Rewards Offers

### How to improve the Performance & Efficiency of the Cafe Rewards Program

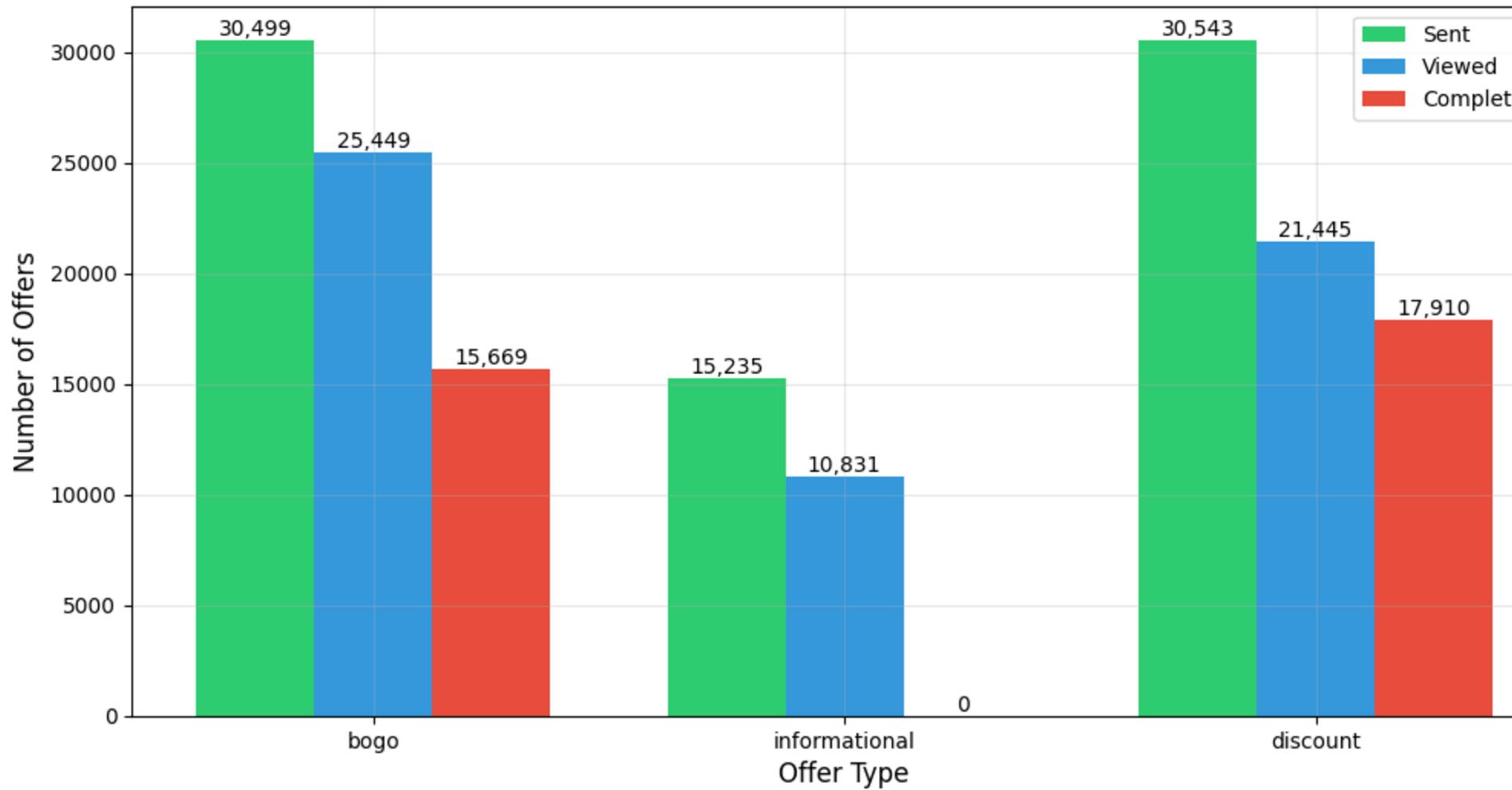


# OFFER PERFORMANCE ANALYSIS

SCALE UP DIRECT DISCOUNTS (83.4% CONVERSION), REPOSITION BOGO STRATEGICALLY

## Offer Type Effectiveness Analysis

Offer Performance by Type



Offer Type	Success Rate (%)
bogo	51.38
informational	0
discount	58.64

Offer Type	Total Completed	Completion Rate (%)
bogo	15,669	61.57
informational	0	0
discount	17,910	83.52

Offer Type	Total Sent	Total Viewed	View Rate (%)
bogo	30,499	25,449	83.44
informational	15,235	10,831	71.09
discount	30,543	21,445	70.21

## Takeaways

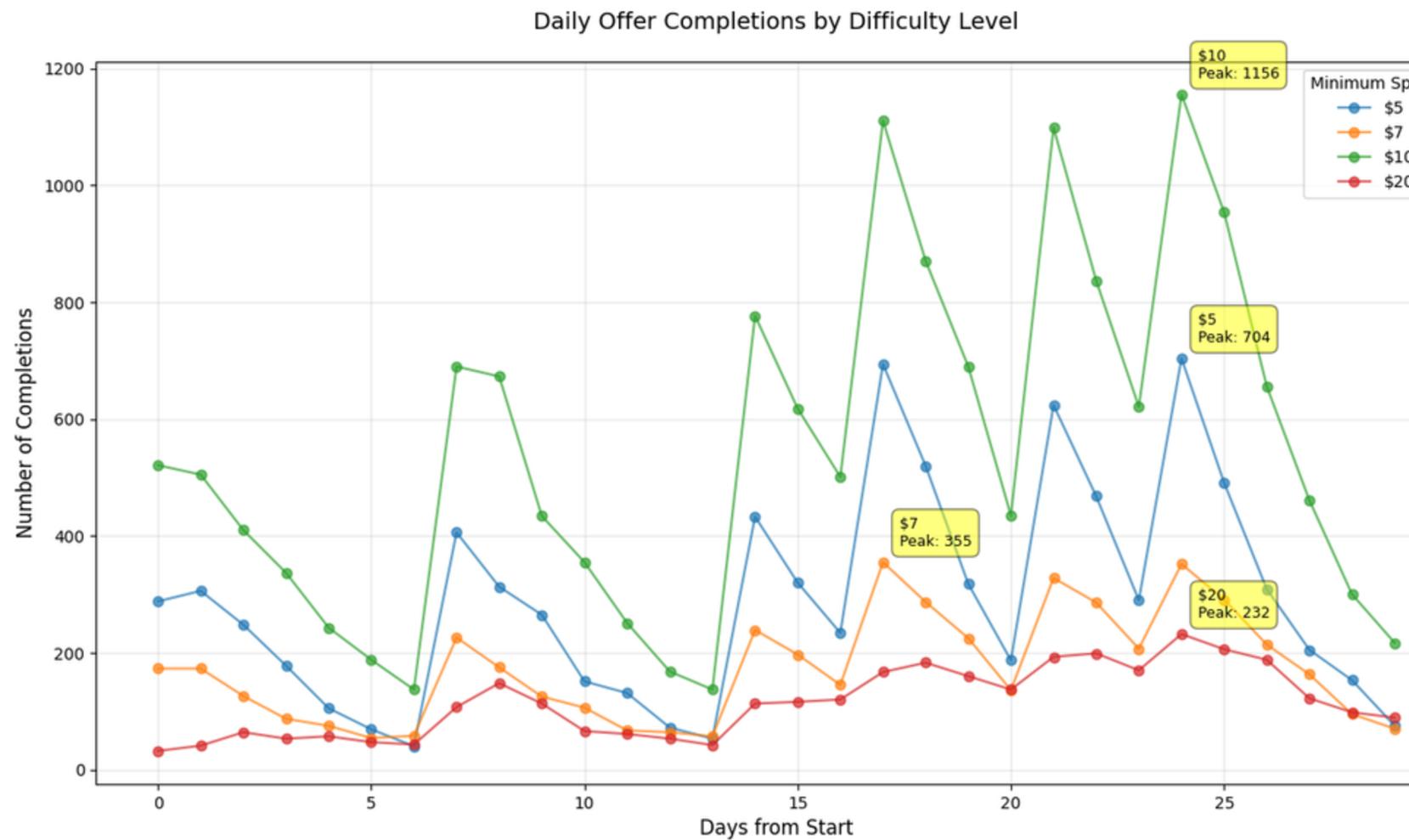
- Overall, Discount Offers accounted for ~58.6% of Total Completed Offers.
- View Rate Comparison:
  - BOGO leads: 83.44%
  - Discount: 70.21%
  - Informational: 71.09%
- Completion Rate Comparison:
  - Discount outperforms BOGO (83.52% vs 61.57%).
  - Informational offers: 0% completion rate.

=> Discount Offers are the most effective type, with superior completion and success rates compared to BOGO and Informational Offers.

# OFFER PERFORMANCE ANALYSIS

FOCUS PROMOTIONAL EFFORTS ON DIFFICULTY LEVELS \$5 AND \$7

## Offer Difficulty Effectiveness Analysis



1

Difficulty Level	Number of Completions	Total Reward	Total Required Spend	ROI (%)
\$0	0	0	0	0
\$5	8,650	43,250.00	43,250.00	100
\$7	5,156	15,468.00	36,092.00	42.86
\$10	16,353	88,858.00	163,530.00	54.34
\$20	3,420	17,100.00	68,400.00	25

4

2

Difficulty Level	Total Sent	Total Viewed	Total Completed	View Rate (%)	Completion Rate (%)	Success Rate (%)
\$0	15,235	10,831	0	71.09	0	0
\$5	15,248	11,435	8,650	74.99	75.64	56.73
\$7	7,646	7,337	5,156	95.96	70.27	67.43
\$10	30,480	25,459	16,353	83.53	64.23	53.65
\$20	7,668	2,663	3,420	34.73	128.43	44.6

3

## Takeaways

1. **Best ROI:** Difficulty level **\$5** achieves the **highest ROI** at **100%** while maintaining strong performance metrics.

2. **View Rate Comparison:**

- Highest View Rate: **\$7 (~96%)**
- Lowest View Rate: **\$20 (34.73%)**

3. **Completion Rate:**

- \$20** has the highest completion rate at **128.4%**, indicating strong engagement despite lower view rates.
- Difficulty **\$5** and **\$7** also perform well, with completion rates of **75.64%** and **70.27%**, respectively.

4. **Most Completions & Rewards:**

- Difficulty **\$10** leads with **16,353 completions** and generates the **highest total reward (\$88,858)**.

5. **Optimal Balance:** Difficulty levels **\$5** and **\$7** offer the best balance between ROI, completion rates, and customer engagement.

=> Focus promotional efforts on difficulty levels **\$5** and **\$7** to maximize engagement, ROI, and customer satisfaction. Adjust difficulty **\$20** offers to increase accessibility and improve ROI

# OFFER PERFORMANCE ANALYSIS

## FOCUS ON 7-10 DAY DURATIONS FOR OPTIMAL PERFORMANCE

### Offer Duration Effectiveness Analysis

Duration (Days)	Total Sent	Total Viewed	View Rate (%)
3 days	7,618	6,687	87.78
4 days	7,617	4,144	54.4
5 days	15,164	14,562	96.03
7 days	30,613	22,342	72.98
10 days	15,265	9,990	65.44

Duration (Days)	Total Completed	Completion Rate (%)	Success Rate (%)
3 days	0	0	0
4 days	0	0	0
5 days	7,627	52.38	50.3
7 days	17,215	77.05	56.23
10 days	8,737	87.46	57.24

Duration (Days)	Avg Days to Complete
3 days	Nan
4 days	Nan
5 days	15.7
7 days	16.4
10 days	16.8

Duration (Days)	Total Sent	Total Viewed	Total Completed	View Rate (%)	Completion Rate (%)	Success Rate (%)	Avg Days to Complete
3 days	7,618	6,687	0	87.78	0	0	Nan
4 days	7,617	4,144	0	54.4	0	0	Nan
5 days	15,164	14,562	7,627	96.03	52.38	50.3	15.7
7 days	30,613	22,342	17,215	72.98	77.05	56.23	16.4
10 days	15,265	9,990	8,737	65.44	87.46	57.24	16.8

### Takeaways

#### 1. Short Durations (3-4 days):

- View Rates are high (87.78% for 3 days) but no offers were completed within these durations.
- Action: Short durations might be insufficient for customers to act. Consider extending these to at least 5 days.

#### 2. Medium Durations (5-7 days):

- Best Performance: 7-day duration achieved the highest Completion Rate (77.05%) and significant Success Rate (56.23%).
- Action: Focus on 7-day durations as they provide a good balance between engagement and completion.

#### 3. Long Durations (10 days):

- Highest Completion Rate: 10-day duration had the highest Completion Rate (87.46%), but with lower view rates compared to shorter durations.
- Action: Test the cost-effectiveness of 10-day offers compared to 7-day durations to optimize impact.

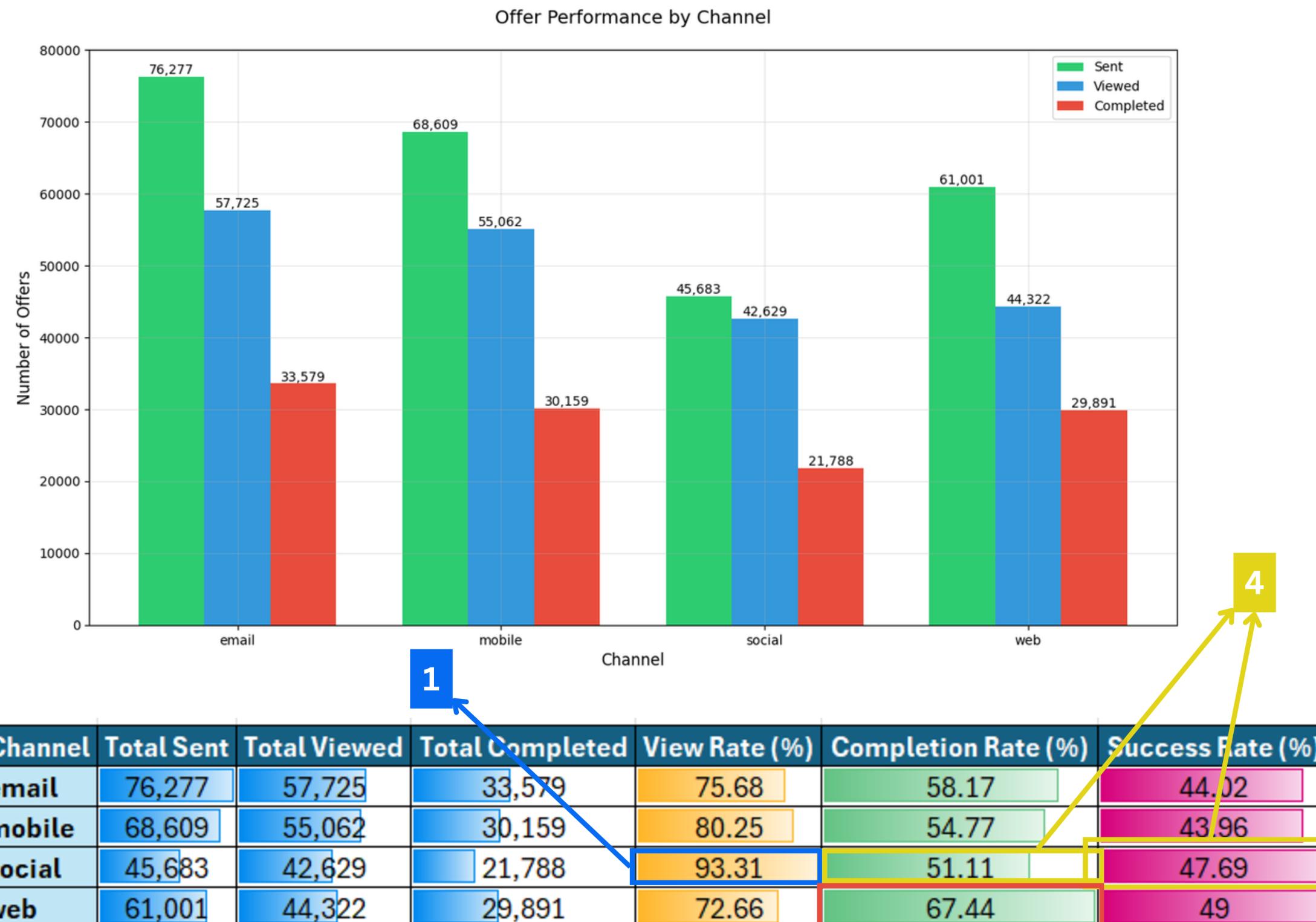
4. Customer Behavior: Average completion time aligns better with 7-10 day durations.

=> Focus on 7-10 day durations for optimal performance.

# OFFER PERFORMANCE ANALYSIS

FOCUS ON LEVERAGING WEB FOR ACTION AND SOCIAL FOR AWARENESS & ENGAGEMENT

## Channel Effectiveness Analysis



### Takeaways

- Best View Rate:**
  - Social channel leads with **93.31%**, indicating strong initial engagement.
- Best Completion Rate:**
  - Web channel performs best at **67.44%**, highlighting its effectiveness in driving action.
- Email and Mobile:**
  - Solid view rates (**75%-80%**) and moderate completion rates (**~54%-58%**).
- Social Success:**
  - While its **Completion Rate** is lower (**51.11%**), Social has a **strong Success Rate (47.69%)** for conversions.

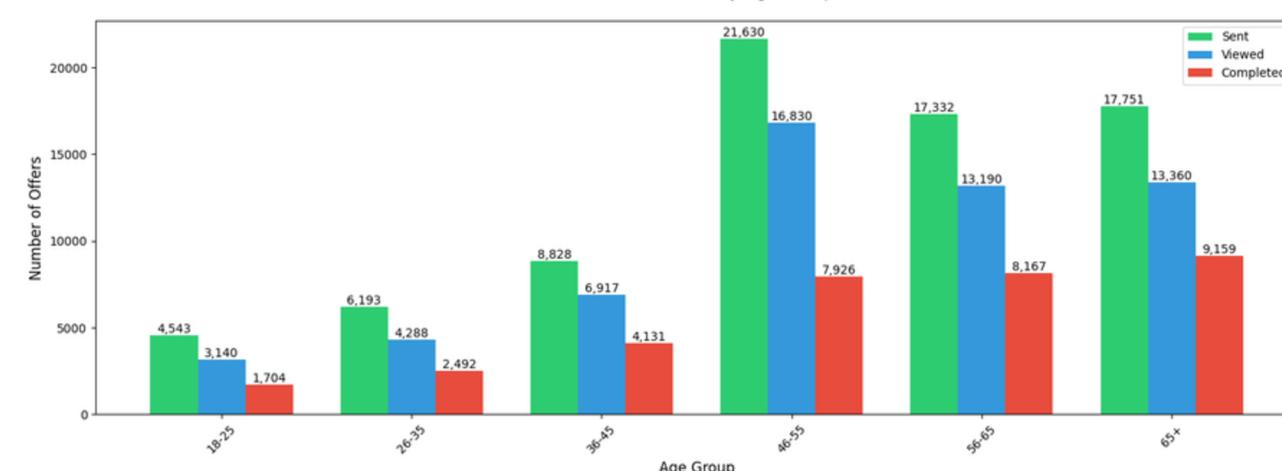
=> Focus on leveraging web for action and social for awareness and engagement. Combine channels strategically for maximum impact.

# CUSTOMER BEHAVIOR ANALYSIS

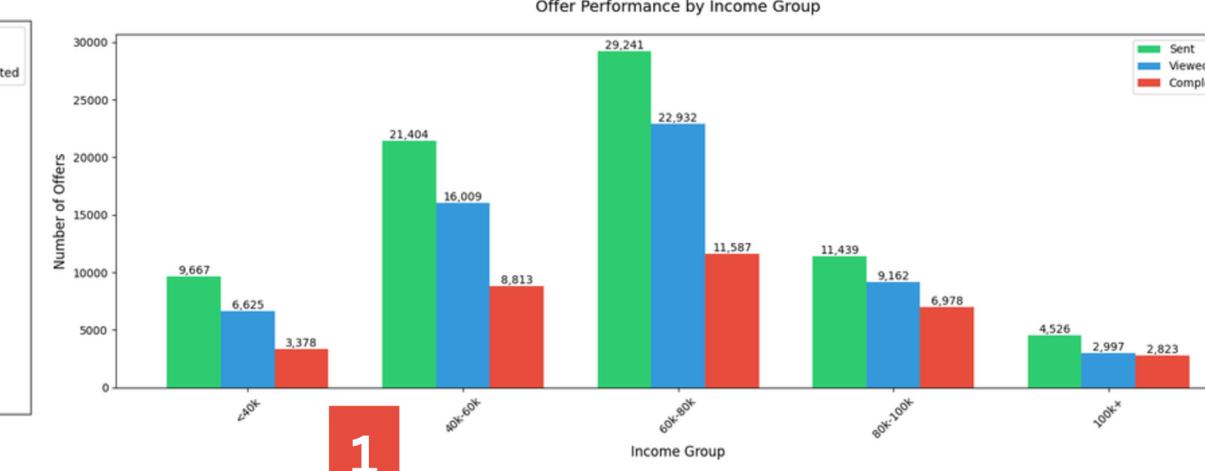
DEVELOP STRATEGIES TO BETTER ENGAGE YOUNGER AND LOWER-INCOME SEGMENTS

## Demographic Segmentation Analysis

Offer Performance by Age Group



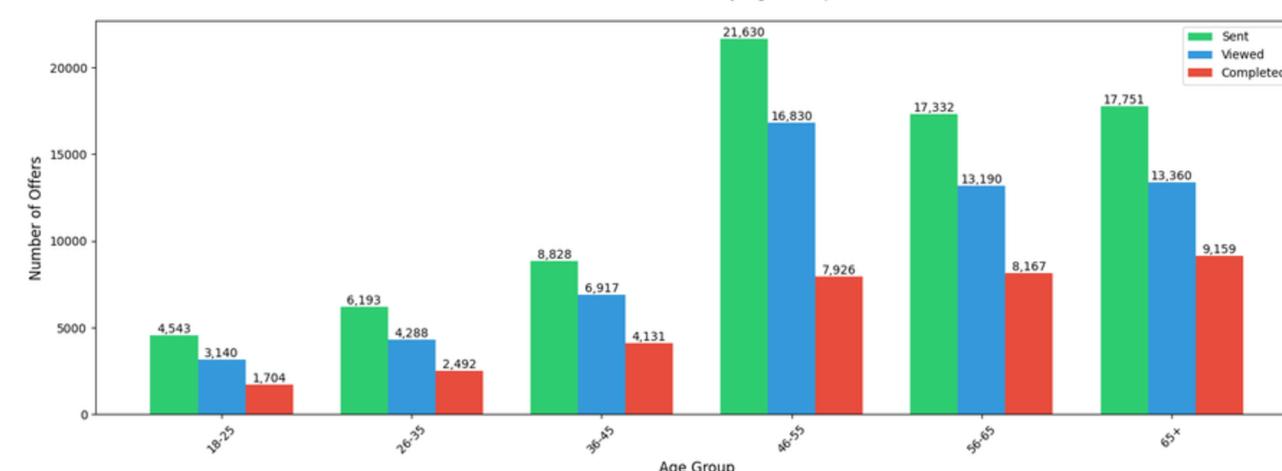
Offer Performance by Income Group



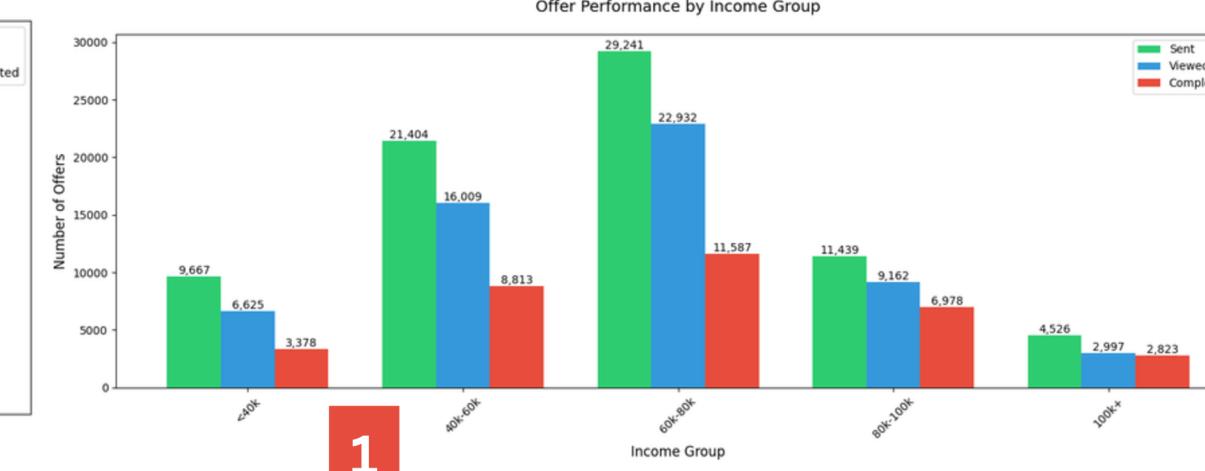
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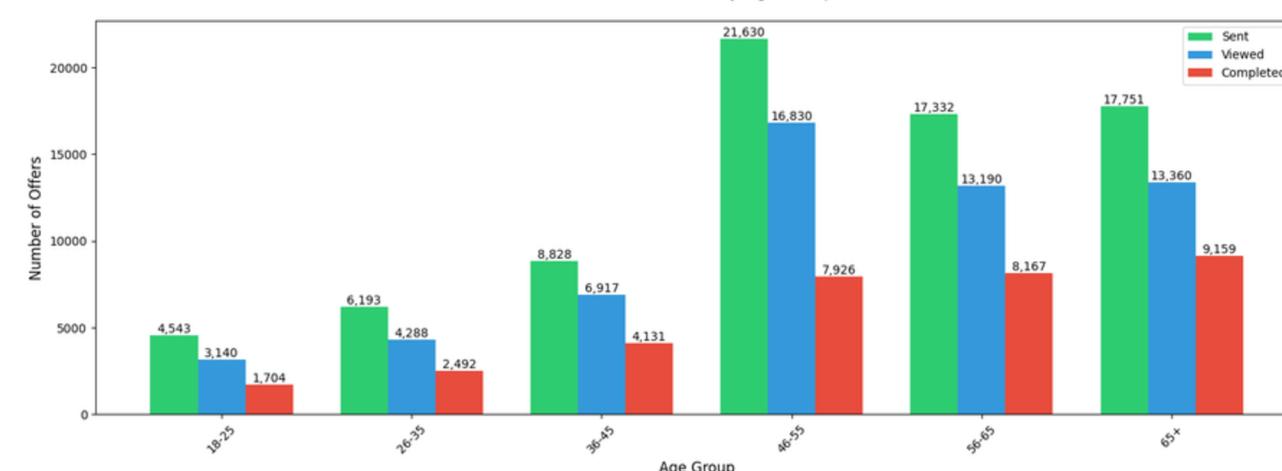
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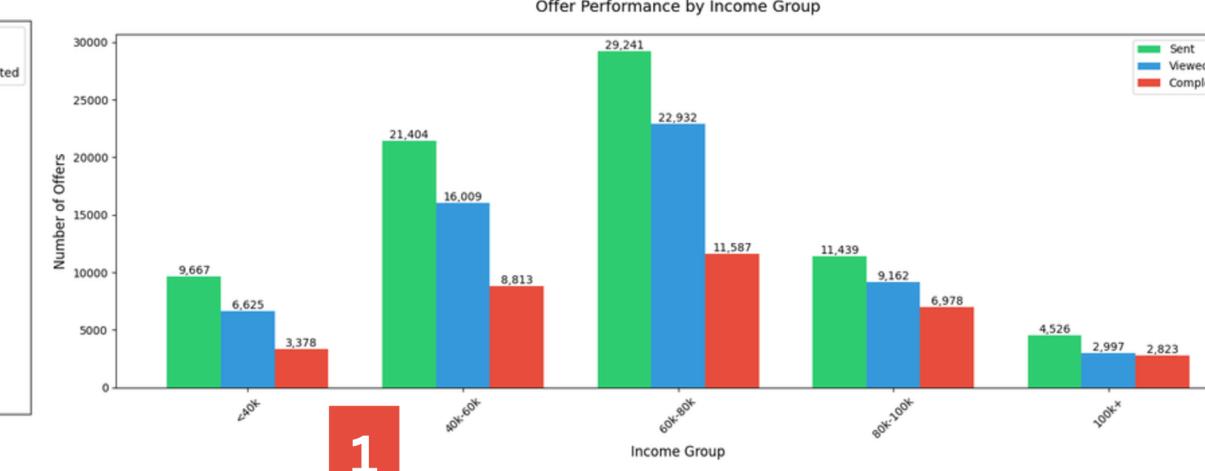
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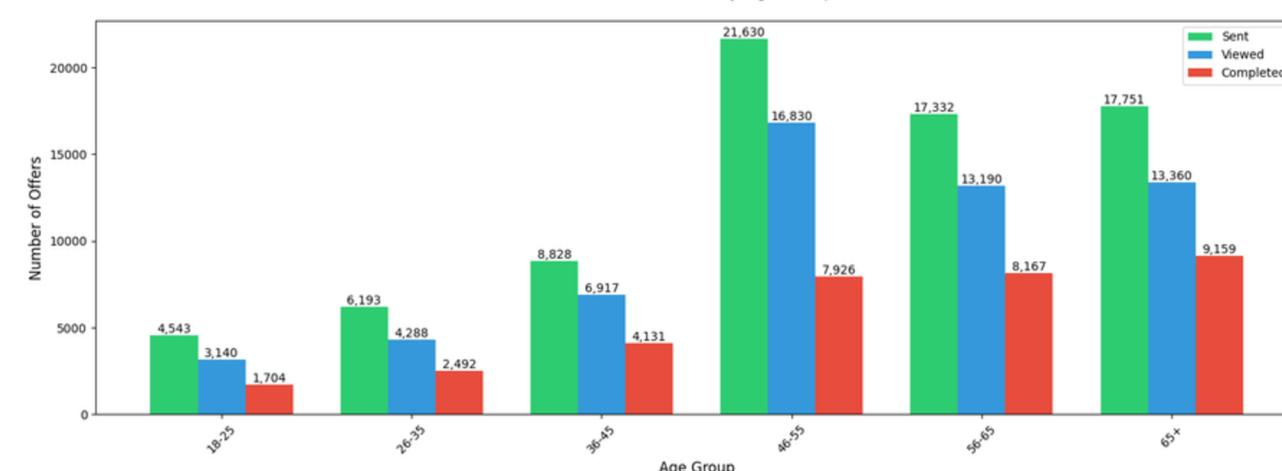
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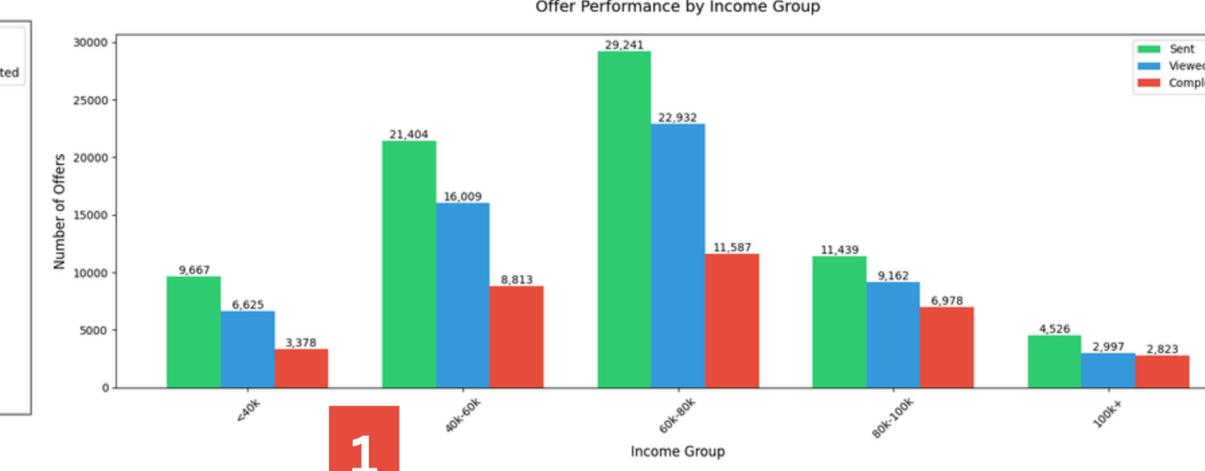
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## Demographic Segmentation Analysis

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Offer Performance by Income Group



## Takeaways

### 1. Age Insights:

- Highest View Rate: Age group 36-45 at 78.3%.
- Highest Completion Rate: Age group 65+ at 68.6%.
- Younger groups (18-25, 26-35) show lower completion rates but moderate engagement.

### 2. Income Insights:

- Highest View Rate: Income group 80k-100k at ~80.1%.
- Highest Completion Rate: Income group 100k+ at 94.2%, demonstrating strong engagement and loyalty.

### 3. Gender Insights:

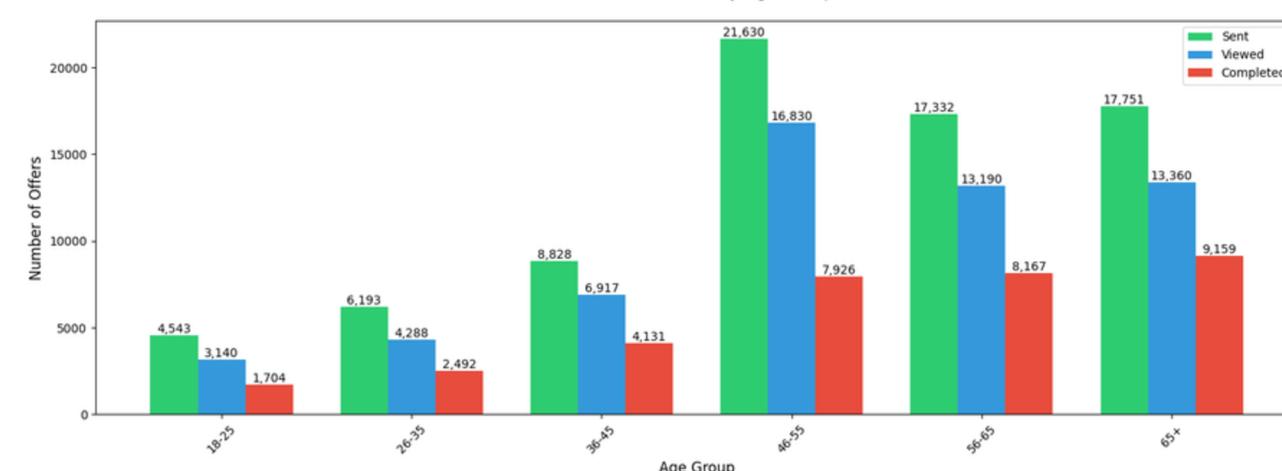
- Highest View Rate: Gender O (Other) at 84.4%.
- Highest Completion Rate: Female (F) at 66.2%, showing the most consistent engagement.

=> Focus resources on high-performing groups like older age brackets (65+), high-income customers (100k+), and female customers (F) to maximize campaign ROI.

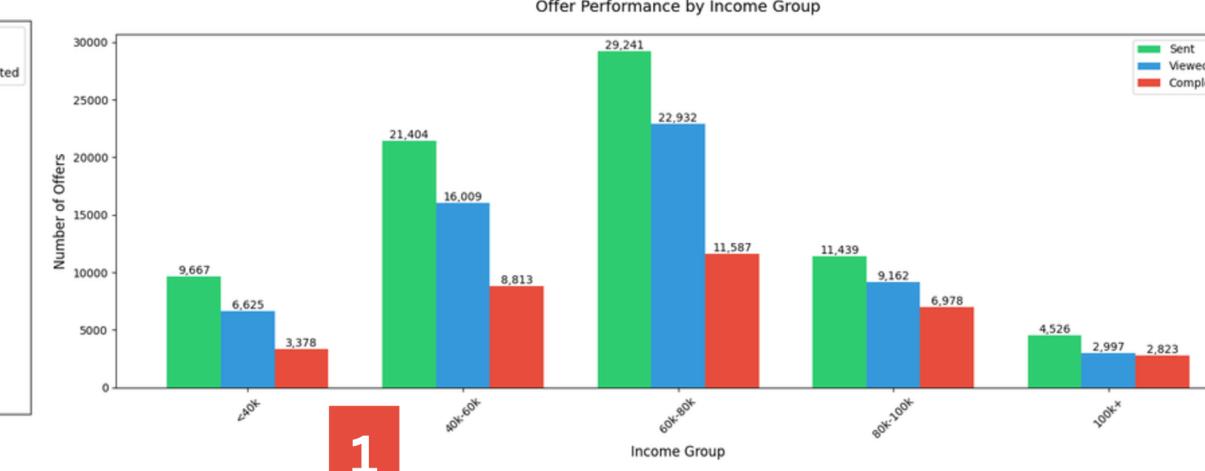
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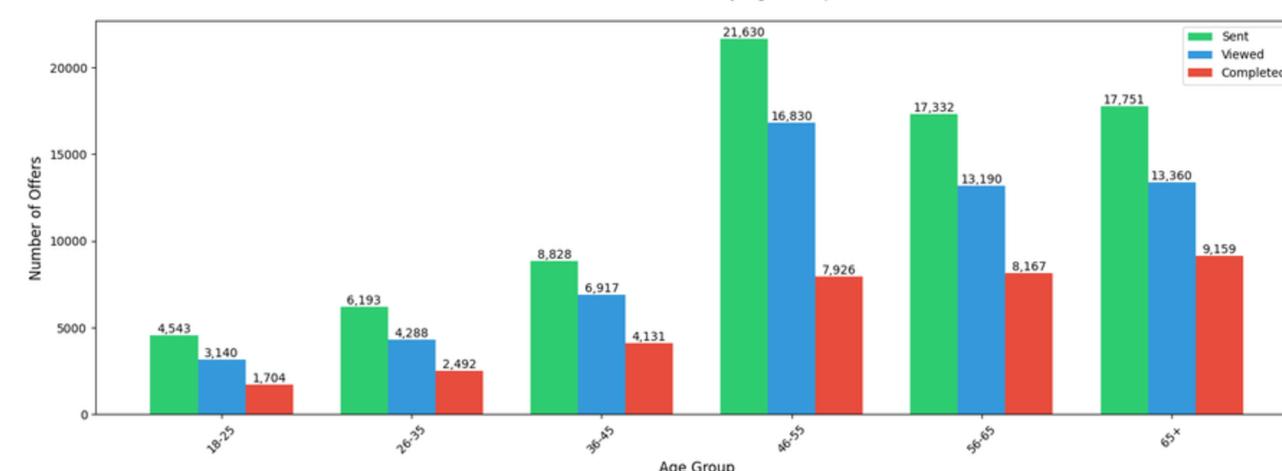
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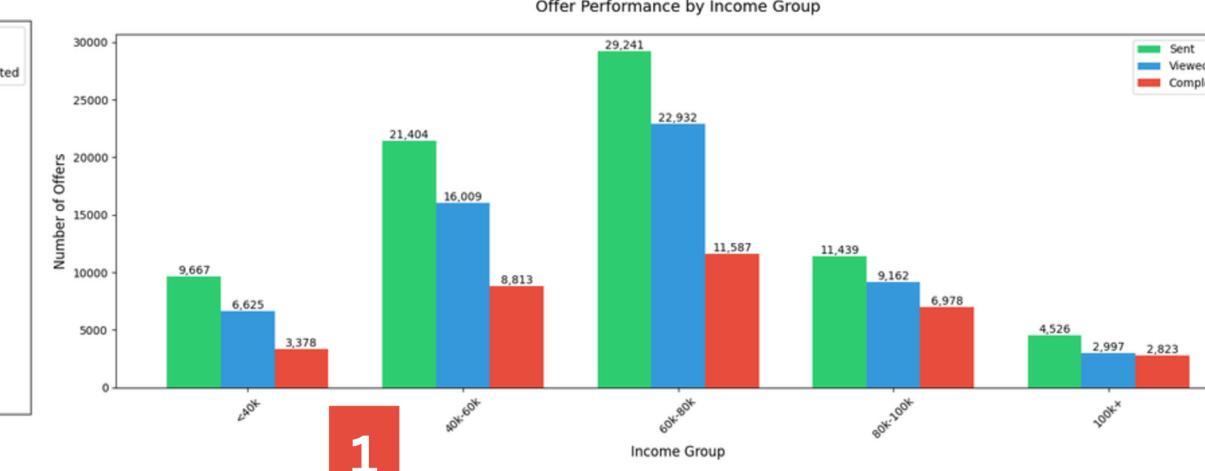
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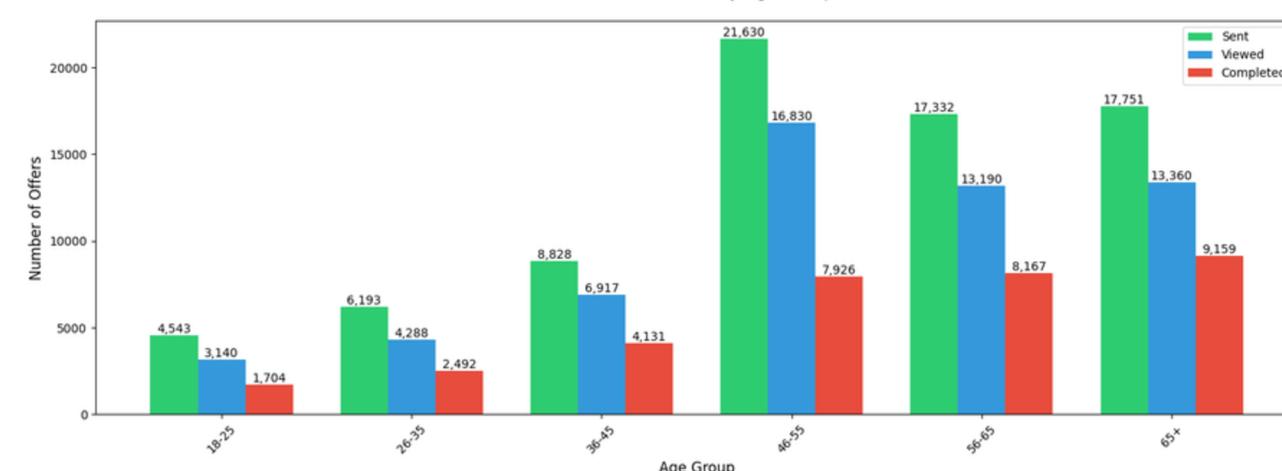
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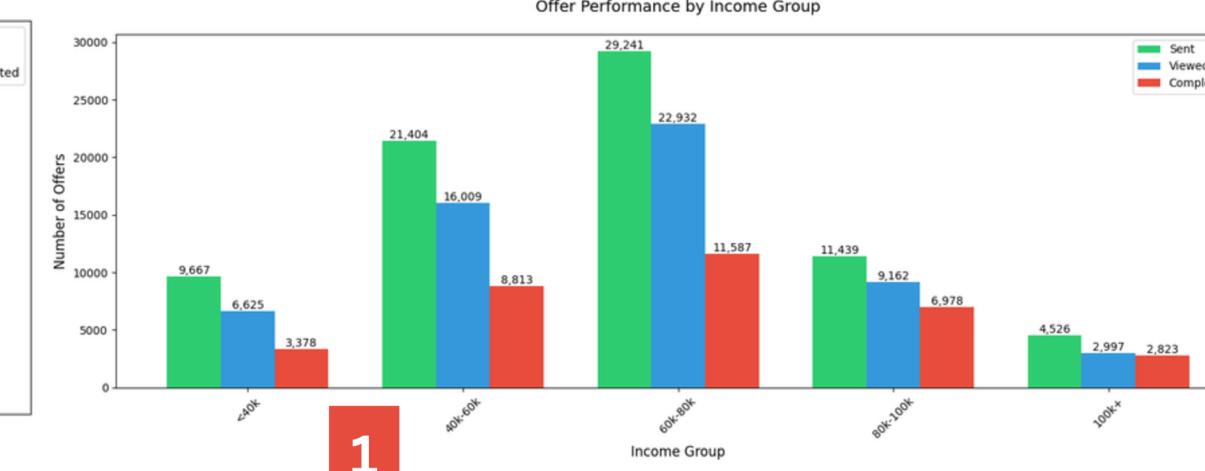
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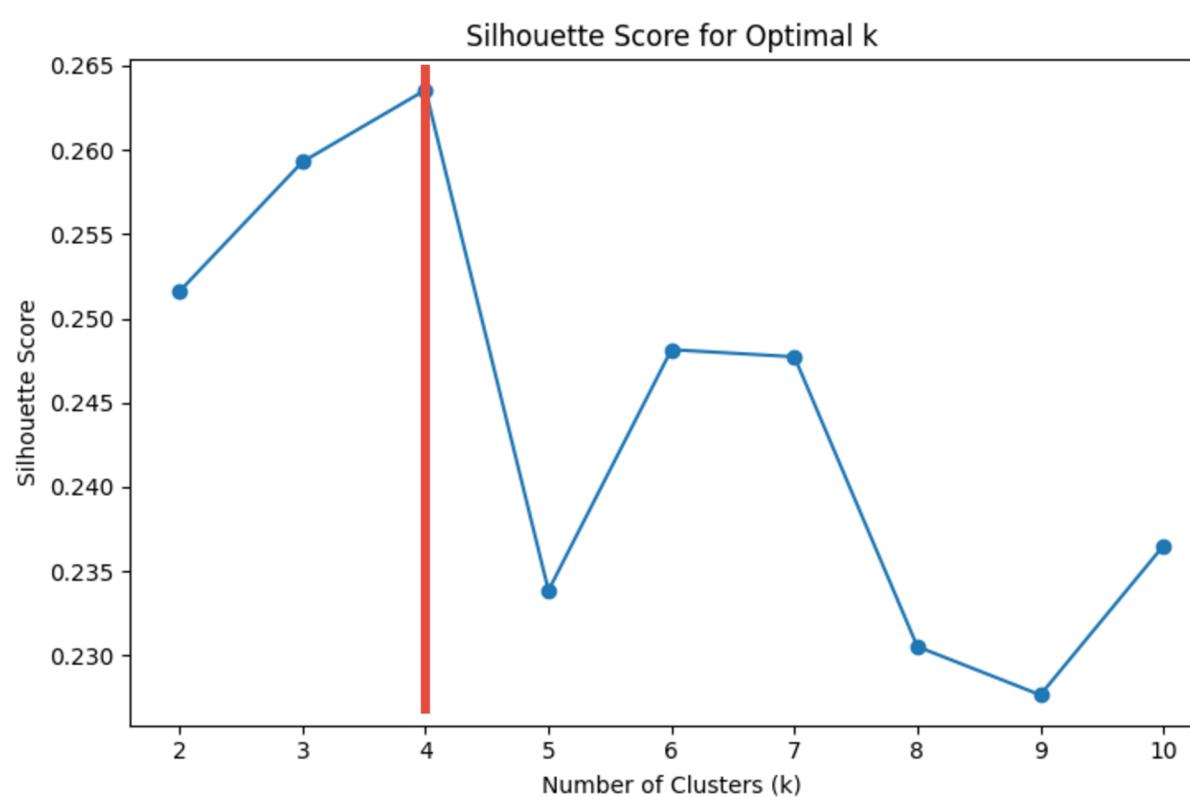
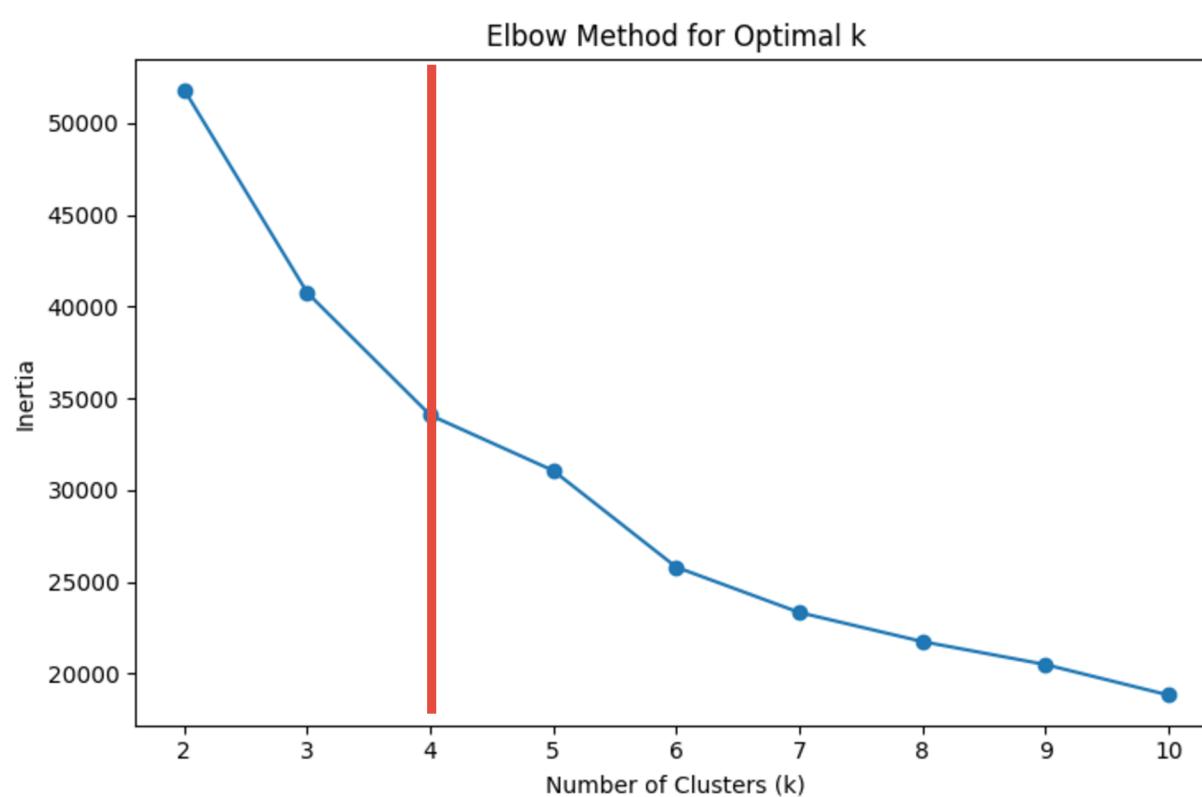
Offer Performance by Income Group



# CUSTOMER BEHAVIOR ANALYSIS

DEVELOP STRATEGIES TO BETTER ENGAGE YOUNGER AND LOWER-INCOME SEGMENTS

## Key Customer Segments Analysis



### Takeaways

#### 1. Age Groups:

- 18-24 (Young Adults), 25-34 (Early Career Professionals), 35-44 (Young Families), 45-54 (Mature Professionals), 55-64 (Pre-Retirement), 65+ (Retirees)

#### 2. Income Groups:

- 30-50k (Lower-Middle Income), 50-75k (Middle Income), 75k-100k (Upper-Middle Income) and 100-120k (Affluent)

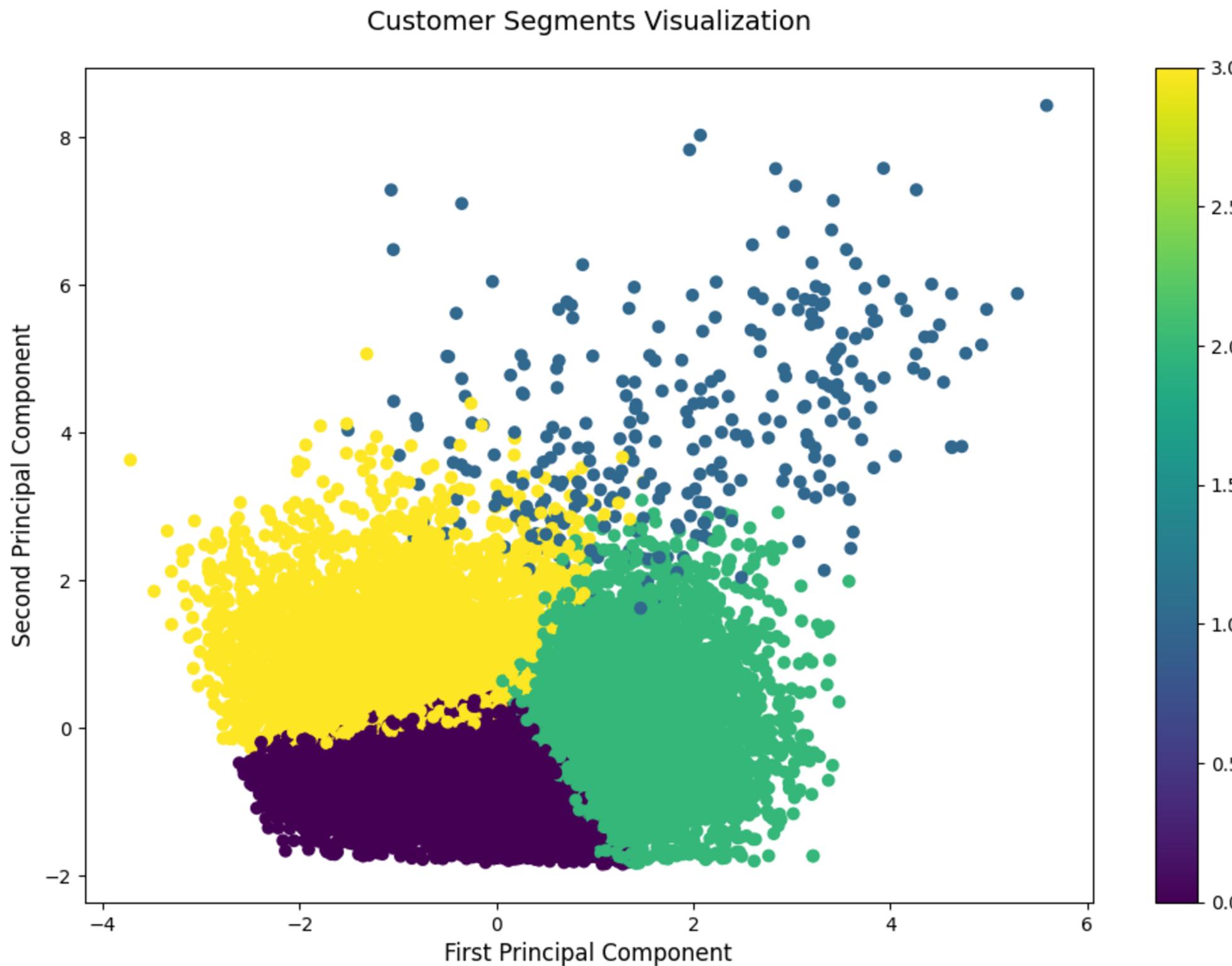
#### 3. Key Customer Segment:

- I employed a **K-Means clustering algorithm** in Python, using the variables **age**, **income**, **amount purchased**, and **number of transactions**
- Using **StandardScaler** determined the optimal number of clusters by applying the **elbow method** and **evaluating the silhouette score**

# CUSTOMER BEHAVIOR ANALYSIS

DEVELOP STRATEGIES BASED ON THE KEY CUSTOMER SEGMENTS

## Key Customer Segments Analysis



### Takeaways

#### Cluster 1 - Frequent Low-Spenders (30%)

- **Visits:** 15x per month
- **Buys:** For 10 USD
- **Total Spending:** 150 USD
- **Age:** 18-65+ ( $\bar{x}48$ )
- **Income:** 30-75k ( $\bar{x}52k$ )

#### Cluster 2 - Weekly Low-Spenders (13%)

- **Visits:** 6x per month
- **Buys:** For 7 USD
- **Total Spending:** 42 USD
- **Age:** 18-65+ ( $\bar{x}47$ )
- **Income:** 30-75k ( $\bar{x}51k$ )

#### Cluster 3 - Weekly Mid-Spenders (44%)

- **Visits:** 6x per month
- **Buys:** For 22 USD
- **Total Spending:** 132 USD
- **Age:** 45-65+ ( $\bar{x}65$ )
- **Income:** 50-120k ( $\bar{x}85k$ )

#### Cluster 4 - Frequent High-Spenders (13%)

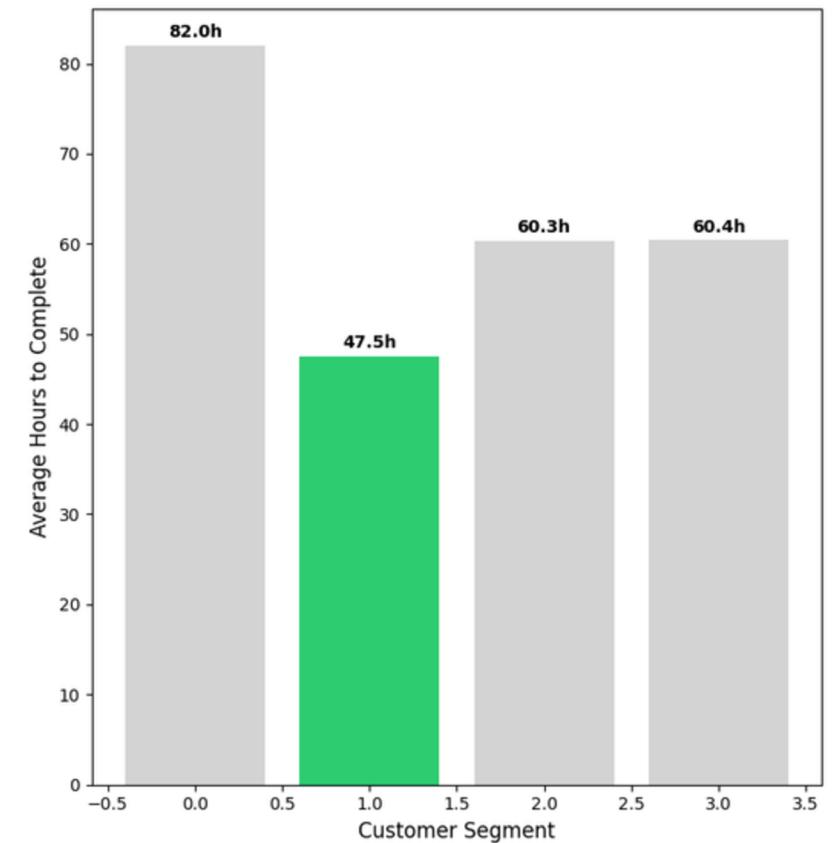
- **Visits:** 11x per month
- **Buys:** For 73 USD
- **Total Spending:** 803 USD
- **Age:** 35-65+ ( $\bar{x}57$ )
- **Income:** 50-120k ( $\bar{x}76k$ )

# CUSTOMER BEHAVIOR ANALYSIS

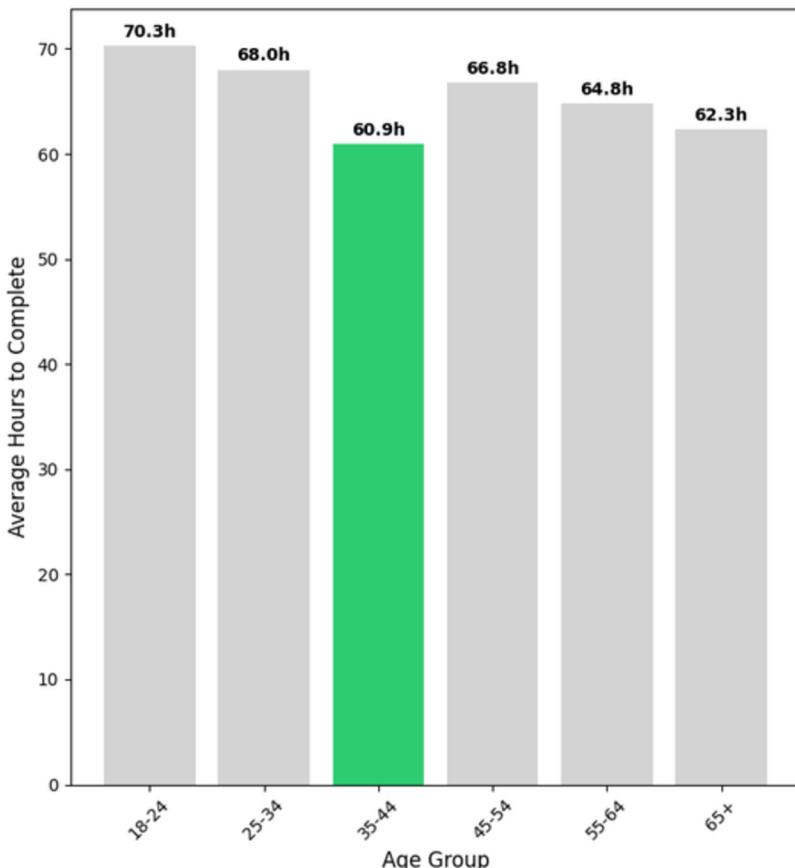
FOCUS ON OFFERING MORE BOGO PROMOTIONS FOR FASTER CUSTOMER RESPONSES

## Offer Response Analysis

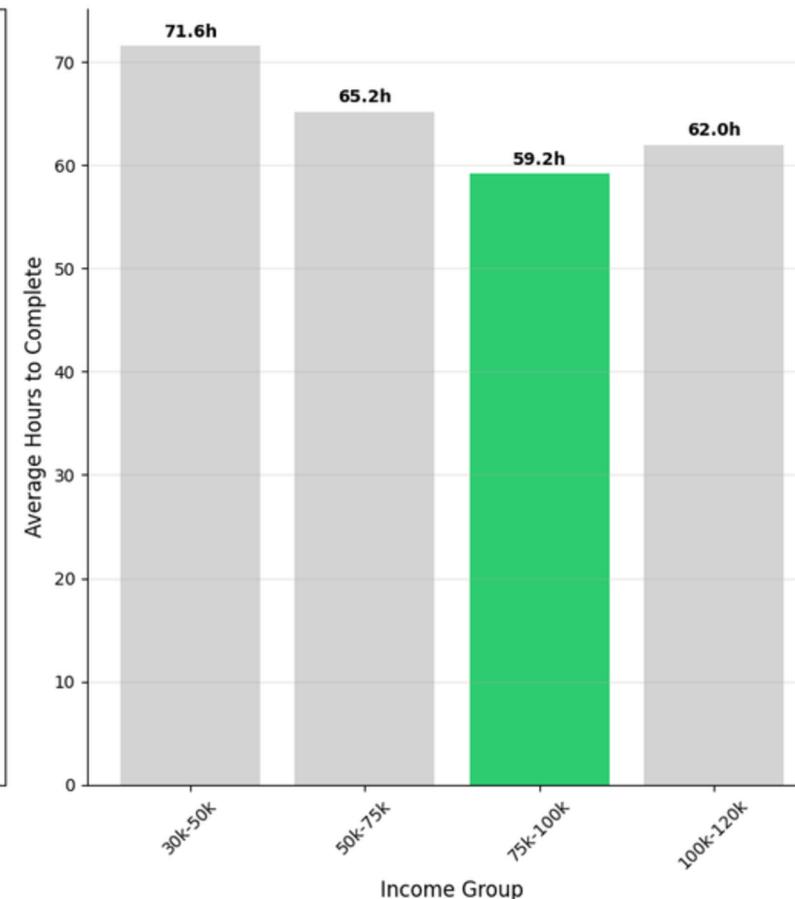
Response Speed by Customer Segment



Response Speed by Age Group



Response Speed by Income Level



Offer Type	Offer Completed	Offer Received	Offer Viewed
bogo	15,669	30,499	25,449
discount	17,910	30,543	21,445
informational	0	15,235	10,831

Offer Type	Avg Hours to Complete
bogo	53.7
discount	74

Demographic Segment	Avg Hours to Complete
Age Group: 35-44	60.9
Income Level: 75k-100k	59.2
Customer Segment: Cluster 1	47.5

## Takeaways

### 1. Fastest Responders:

- Age Group: 35-44 responds the **fastest** with an average of **60.9 hours**.
- Income Level: 75k-100k group responds in **59.2 hours**.
- Customer Segment: Cluster 1 shows the fastest response time of **47.5 hours**.

### 2. Offer Metrics:

- Highest Completed Offers:** Discount offers have the **highest completion rate** with **17,910 completions**.
- Highest Received Offers:** Both BOGO and Discount offers had a **high volume** of offers received (**30,000+**).
- No Completion for Informational Offers:** Informational offers have a **0% completion rate**.

### 3. Average Response Time:

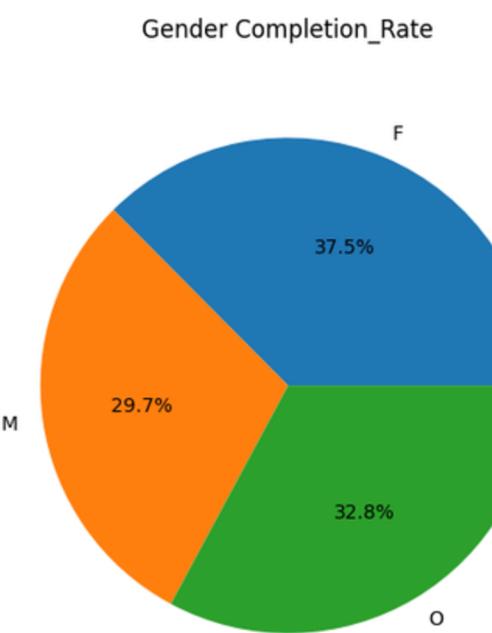
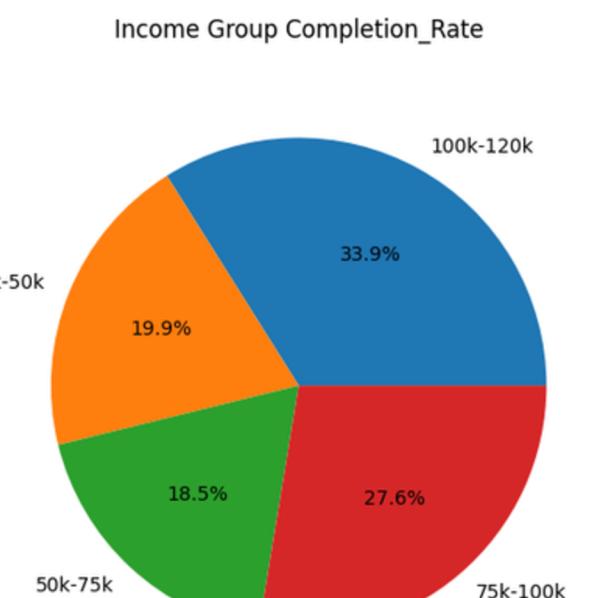
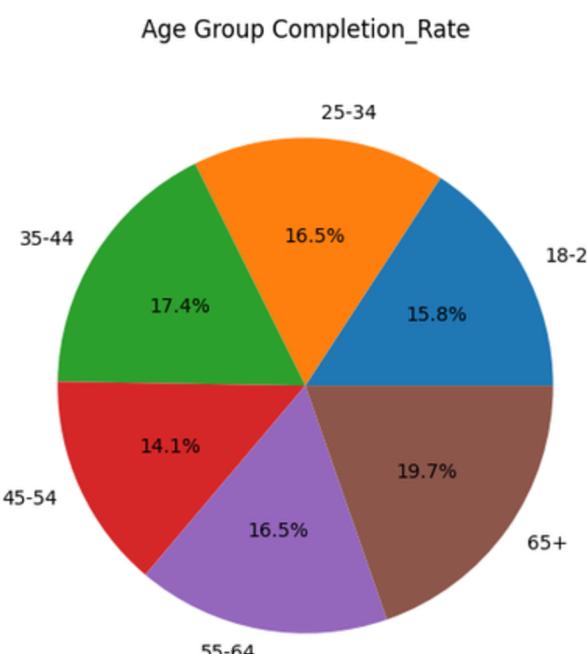
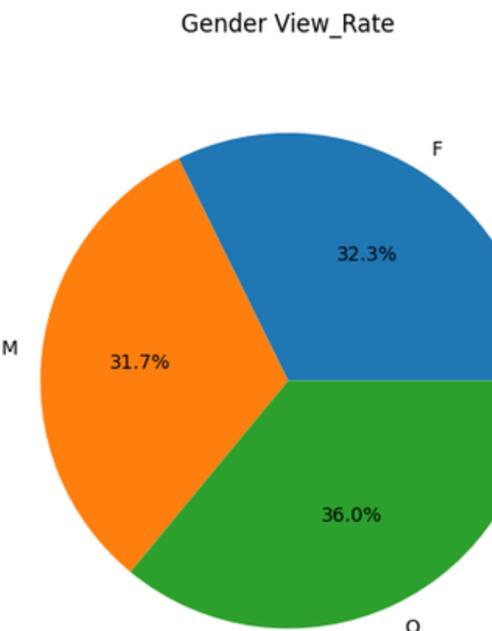
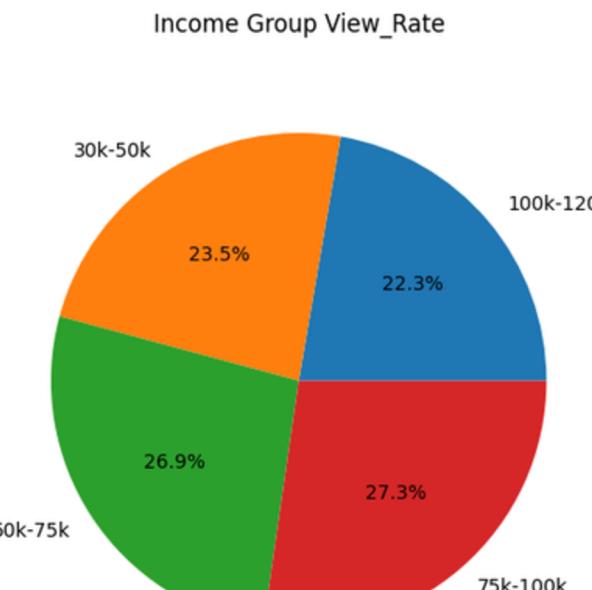
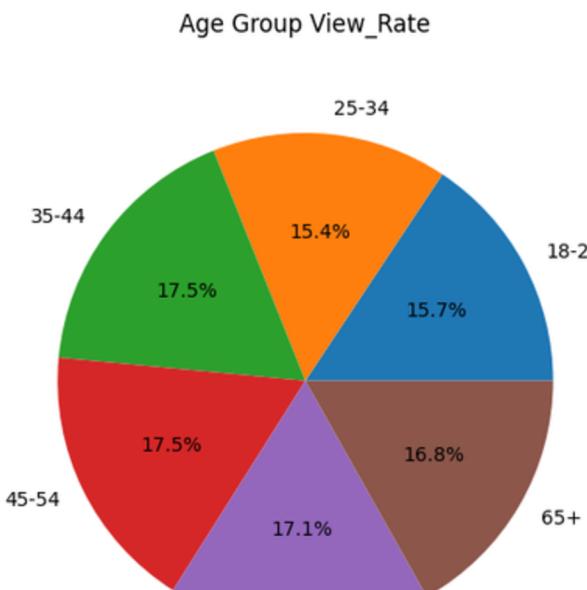
- BOGO Offers:** Responded in **53.7 hours** on average, **faster than discount offers**.
- Discount Offers:** Average response time is **74.0 hours**, **longer than BOGO**.

=> Focus on offering more BOGO promotions for faster customer responses, while considering reducing response time for Discount Offers.

# OFFER-CUSTOMER INTERACTION ANALYSIS

DEVELOP STRATEGIES BASED ON THE KEY CUSTOMER SEGMENTS

## Offer Effectiveness Across Customer Segments Analysis



### Takeaways

#### 1. Best Offer Types:

- **Highest View Rate:** BOGO offers (83.44%).
- **Highest Completion Rate:** Discount offers (83.52%).
- **No Completion:** Informational offers (0%).

#### 2. Fastest Responders:

- Cluster 1: Fastest (47.5 hours, 90.51% completion).
- Cluster 0: Slowest (82 hours, 30.40% completion).

#### 3. Top Combinations:

- **Best Performance:** Income 100k-120k with Discount offers (129.11% completion).
- **Older Customers:** Age 65+ with Discount offers (96.75% completion).
- **Female Customers:** 92.18% completion with Discount offers.

=> Focus on Discount Offers for high-income and older customer segments to boost performance.

# THANK YOU FOR YOUR ATTENTION

PLEASE DO NOT HESITATE TO CONTACT ME IF  
YOU HAVE ANY FURTHER QUESTIONS.

Link Dashboard: [PowerBI](#)