



# **E-commerce Customer Behavior Analysis**

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**Presented By:  
Toasean Elmah Tasean**

# Problem Statement

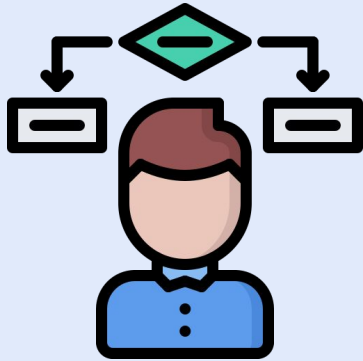
Understanding consumer behavior is essential for increasing sales, enhancing client retention, and developing individualized shopping experiences in the cutthroat world of e-commerce today. But raw data by itself cannot yield meaningful insights.

## The challenge is to:

- Preprocess and clean the dataset for reliable analysis.
- Explore and visualize customer behavior patterns using EDA.
- Extract insights that answer key business questions from the Question Set.
- Translate findings into actionable strategies that improve customer engagement and business performance.



# Hypothesis



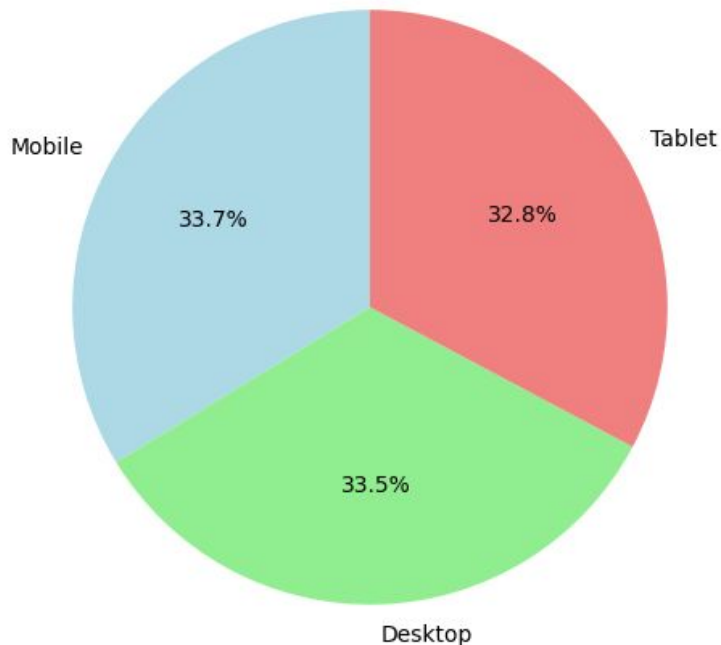
- Product categories, age, gender, and frequency of purchases each have an influence on customer behavior in e-commerce.
- By analyzing these patterns, we can make a prediction that certain groups of customers show higher consumption and retention trends.
- By identifying these segments, firms can create more focused marketing campaigns that increase sales and customer loyalty.



# Customer Behaviour Analysis

# What percentage of customers used devices to make purchases? (Mobile, Desktop, Tablet)

Device Usage for Purchases



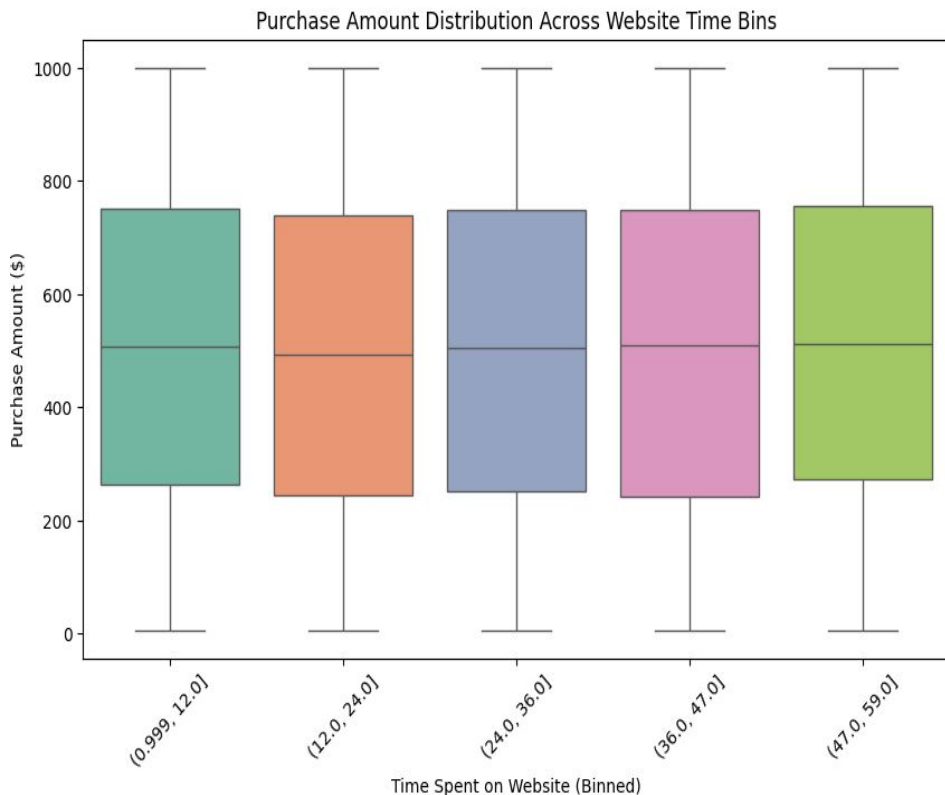
## Key Insights

Customers are equally comfortable shopping **across all device types**, with no single device showing dominance.

## Business Implication

- The e-commerce platform must ensure a **seamless, consistent shopping experience** across all devices.
- **Responsive design, mobile optimization, and cross-device compatibility** are crucial to retain engagement and sales.

# Correlation Between Time Spent on Website and Purchase Amount



## Key Insights

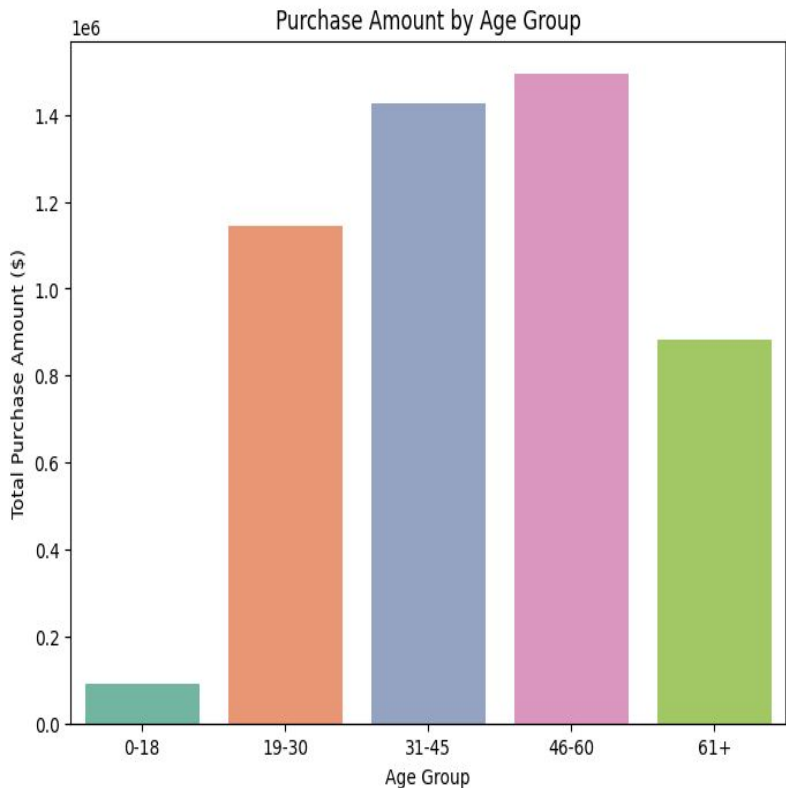
The calculated correlation coefficient is 0.01 ( $\approx 1\%$ ), which indicates an extremely weak positive relationship.

- Customers who spend more time on the website **do not necessarily spend more money**.
- This suggests that **time on site is not a strong driver of purchase amount**.

## Business Implication

Instead of just increasing browsing time, the platform should focus on **improving product discovery, personalization, and checkout efficiency to boost sales**.

# Which age group contributes the highest purchase amount?



## Key Insights

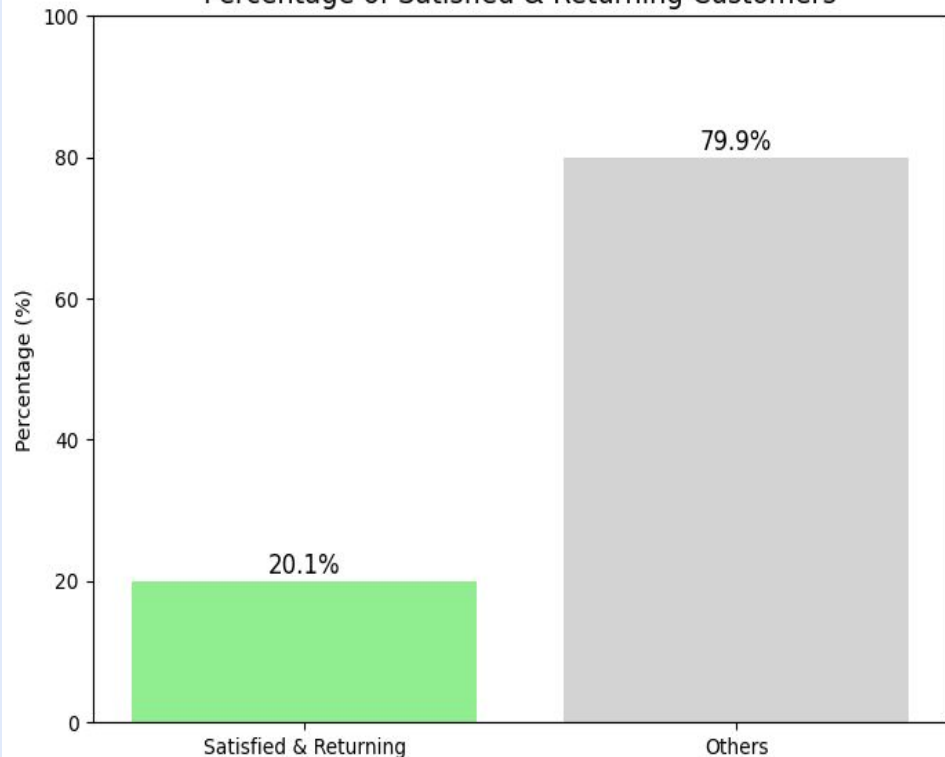
- The **46–60 age group** contributes the **highest** to total purchase amount, followed closely by 31–45.
- **Younger groups (19–30)** contribute **moderately**, while 0–18 and 61+ contribute the least.

## Business Implication

- Marketing and promotions should focus on **31–60 age segments** to maximize revenue.
- Tailored campaigns for younger or older groups can help **increase engagement and expand the customer base**.

# What percentage of customers are satisfied (rating of 4 or 5) and are also return customers?

Percentage of Satisfied & Returning Customers



## Key Insights

- Only **20.1% of customers** are both satisfied (rating 4–5) and returning.
- A **large majority (~80%)** of customers either do not return or are less satisfied.
- High satisfaction alone **does not guarantee customer loyalty**.

## Business Implication

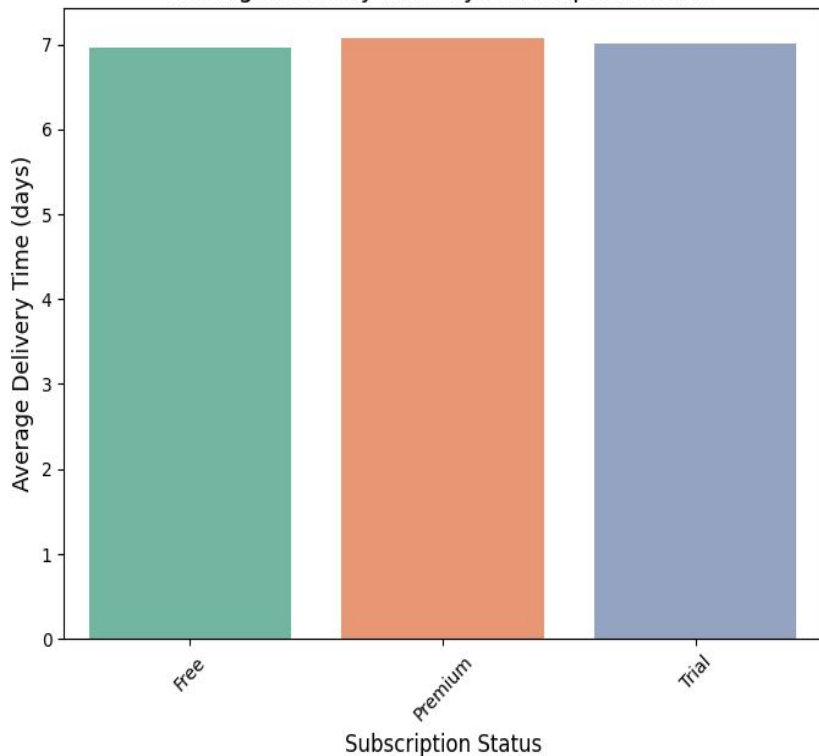
**Retention strategies are needed:** Focus on converting satisfied customers into repeat buyers.

**Targeted engagement:** Use personalized emails, discounts, or loyalty programs to encourage repeat purchases



# How does the average delivery time vary between subscription statuses (Free, Trial, Premium)?

Average Delivery Time by Subscription Status



## Key Insights

Surprisingly, Premium customers do not experience faster deliveries compared to Free or Trial users – in fact, their average delivery time is slightly higher. This may signal:

- A gap between **customer expectations and service delivery**.
- Possible **inefficiencies in handling Premium orders** (e.g., special packaging, priority inventory).

## Business Implication

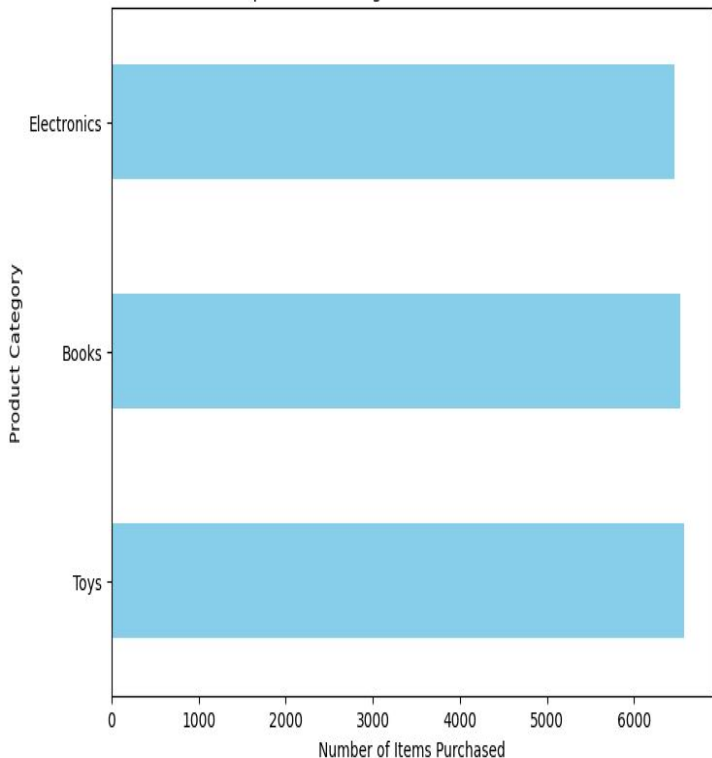
To strengthen the value proposition of Premium subscriptions, the company should ensure **shorter and more reliable delivery times** for paying members.



# Product and Sales Analysis

# What are the top three product categories based on the number of purchases?

Top Product Categories Based on Purchases



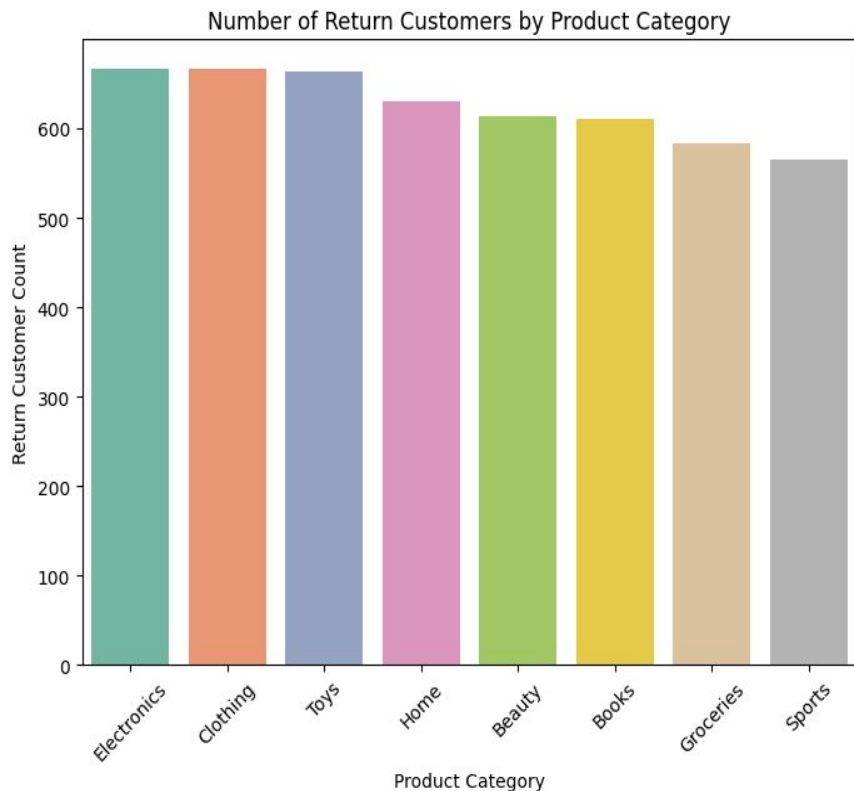
## Key Insights

- **Toys (6,580 purchases)** slightly lead, suggesting strong demand among households with children or for gifting.
- **Books (6,533 purchases)** are close behind, highlighting a consistent preference for educational and leisure products.
- **Electronics (6,469 purchases)** remain a key driver, reflecting the popularity of tech gadgets and digital devices.

## Business Implication

- Targeted promotions (e.g., bundle Toys + Books).
- Seasonal campaigns (e.g., Toys for holidays, Electronics for back-to-school/tech sales).
- Stock management to prevent shortages in these fast-moving categories.

# Which product category has the highest number of return customers?



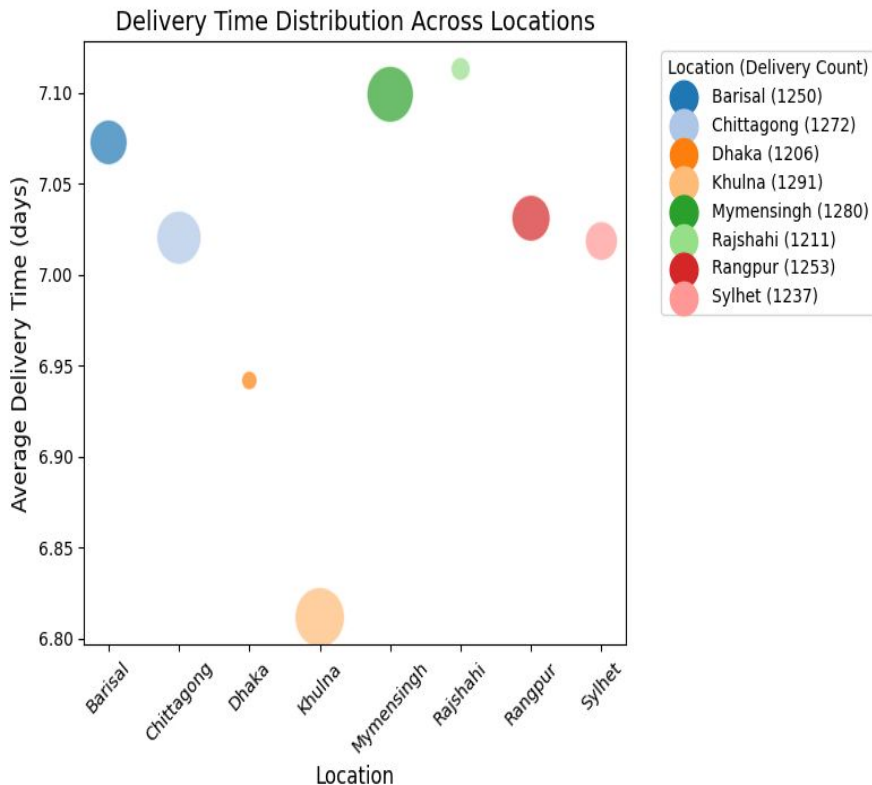
## Key Insights

- **Electronics** has the highest number of **return customers (666)**, followed by other categories.
- Indicates that customers buying **Electronics are more likely to return**, possibly due to satisfaction with the product or the need for repeat purchases.

## Business Implication

- Focus **retention programs and loyalty offers** on Electronics buyers.
- Consider **upselling or cross-selling** complementary products in this category.
- Monitor return reasons in Electronics to ensure quality and reduce negative feedback.

# What is the distribution of delivery times across all locations?



## Key Insights

- Delivery times are fairly consistent across all locations, ranging from ~6.81 to 7.11 days, despite variations in delivery volume.

## Business Implication

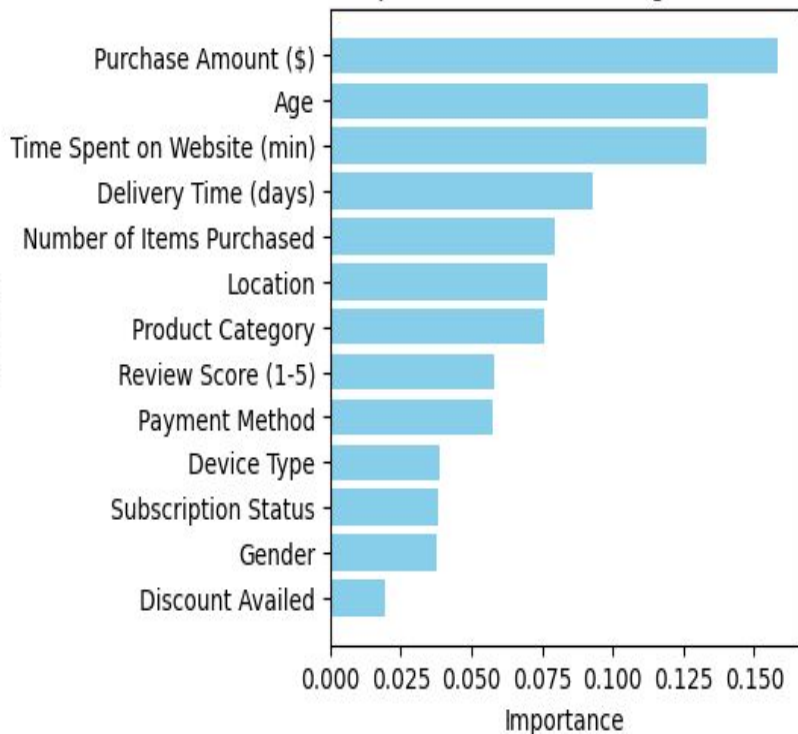
- Operational efficiency is stable, but slightly faster deliveries in Khulna suggest potential best practices that could be applied to other regions to optimize overall delivery performance.



# Critical Analysis

# What factors contribute most to a customer being classified as a return customer?

Feature Importance for Predicting Return Customer



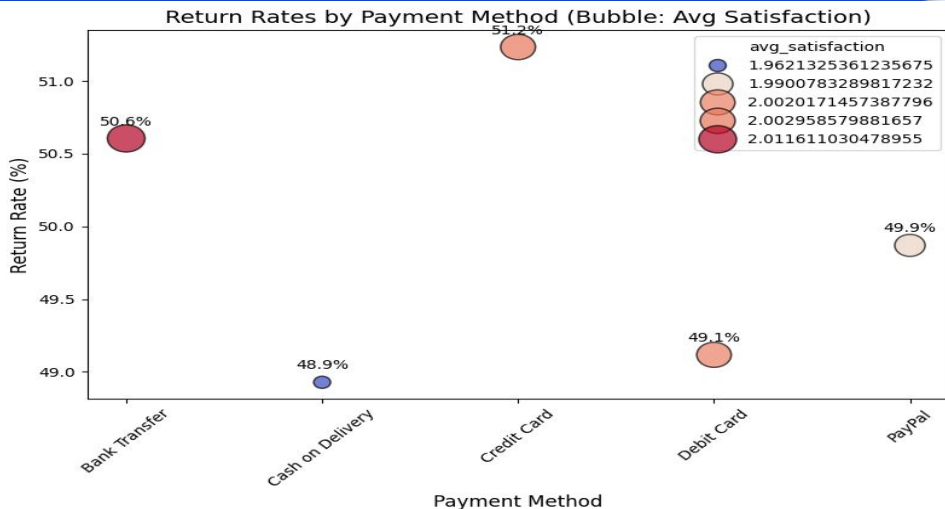
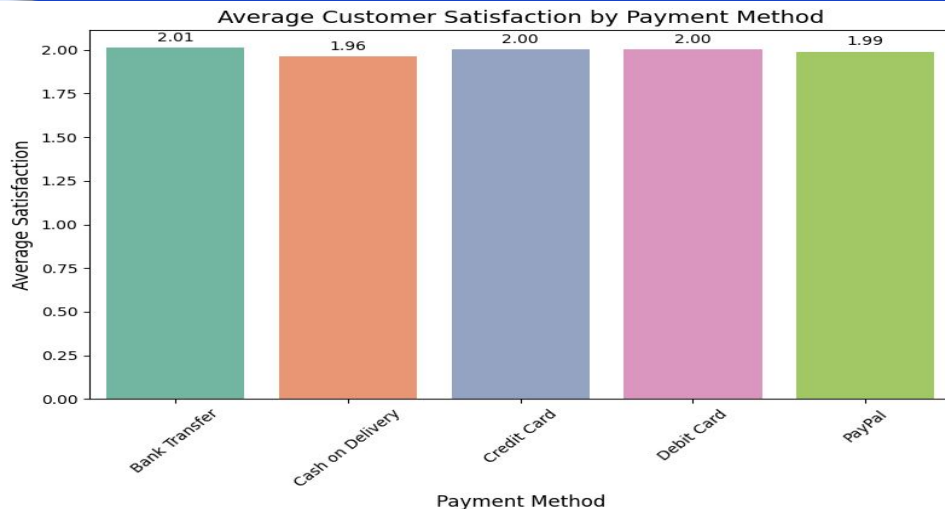
## Key Insights

- **Purchase Amount, Age, and Website Time** most influence return customers.
- **Delivery Time and Items Purchased** also affect repeat behavior.
- Discounts, Gender, and Subscription have minimal impact.

## Business Implication

- Target high-spending, engaged customers with personalized offers.
- Improve delivery speed and encourage multi-item purchases.
- Focus on experience over generic discounts.

# What factors contribute most to a customer being classified as a return customer?



## Key Insights

- **Credit Card users** show the **highest return rate (51.2%)** and relatively high satisfaction.
- **Bank Transfer and PayPal** have moderate satisfaction and return rates.
- **Cash on Delivery** has the **lowest satisfaction (1.96)** and slightly lower return rate (~48.9%).

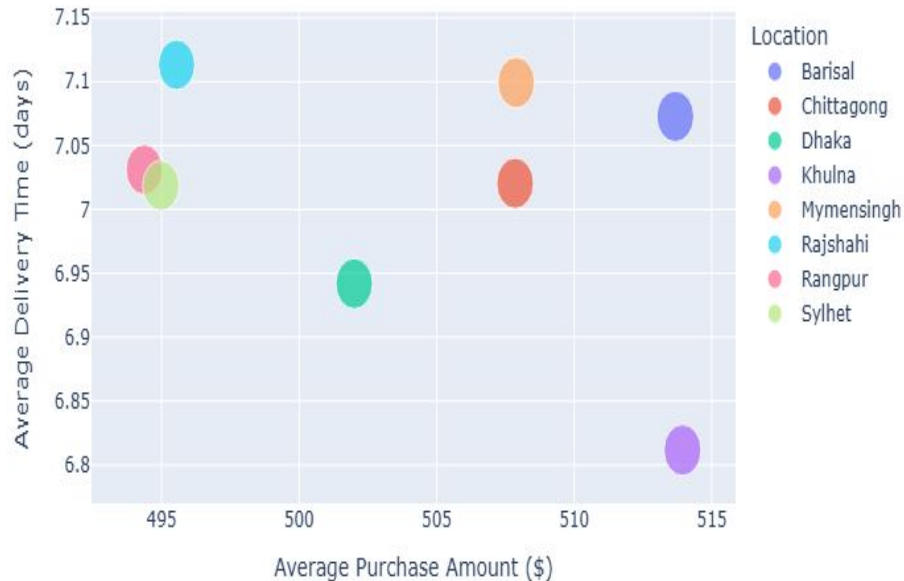
## Business Implication

- Encourage **Credit Card usage** through promotions or loyalty perks to boost repeat purchases.
- Improve **COD experience** to raise satisfaction and retention.



# How does the location influence both purchase amount and delivery time?

Average Purchase Amount vs Delivery Time by Location



## Key Insights

- **Khulna and Barisal** have the highest average purchase amounts (~514), while **Rangpur and Rajshahi** are the lowest (~494–496).
- **Khulna** also enjoys the fastest delivery (6.81 days), whereas **Rajshahi and Mymensingh** have the slowest (~7.11 days).
- Overall, higher purchase amounts **do not always correspond to faster delivery**.

## Business Implication

- Focus marketing efforts on **high-spending locations** like Khulna and Barisal.
- Tailor strategies combining **purchase behavior and delivery efficiency** for regional growth.



# **Major Insights**

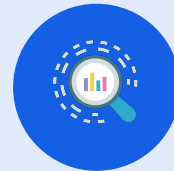
# Location Impact on Purchase Behavior

Drive growth by  
targeting high-value  
locations

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## Insight

Higher average purchase amounts indicate wealthier customers or high demand for premium products.



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## Example

Khulna and Barisal have the highest average purchase (~514)



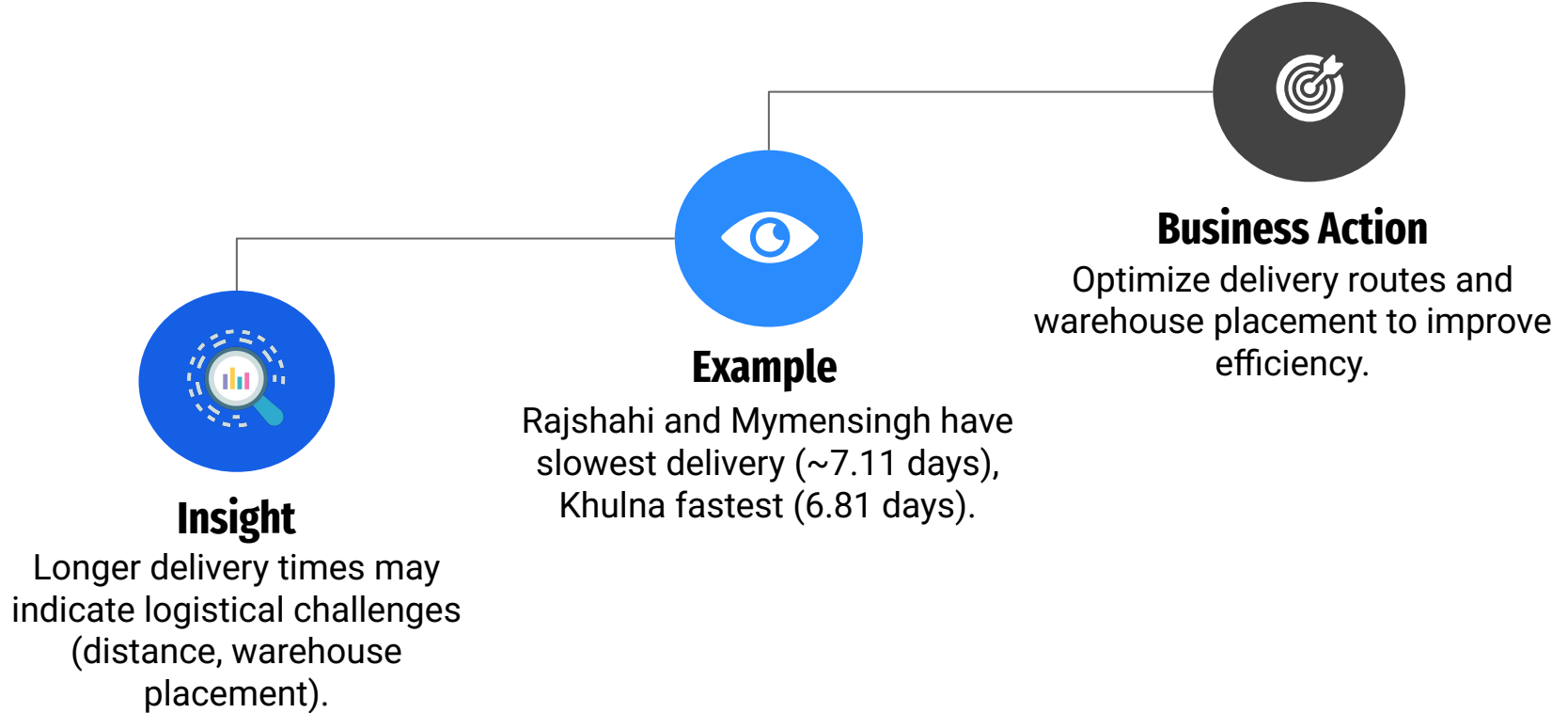
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## Business Action

Focus on premium offerings and exclusive campaigns



# Location & Delivery Time



# Combined Insights & Actions

