

Americas-Retail-Brazil-Analysis

1.1 Data type of all columns in the "customers" table.

Ans:

Query: `SELECT column_name,data_type
FROM `SQLBusinessCase.INFORMATION_SCHEMA.COLUMNS`
WHERE table_name = 'customers';`

Insights:

Data Types:

- customer_id, customer_unique_id, customer_city, and customer_state are of string type (STRING).
- customer_zip_code_prefix is of integer type (INT64).

1.2 Get the time range between which the orders were placed.

Ans:

Query: `SELECT
MIN(order_purchase_timestamp) AS min_placement_time,
MAX(order_purchase_timestamp) AS max_placement_time
FROM `SQLBusinessCase.orders``

Insights:

The time range between which the orders were placed spans from September 4, 2016, at 21:15:19 UTC to October 17, 2018, at 17:30:18 UTC.

1.3 Count the Cities & States of customers who ordered during the given period.

Ans:

Query: `SELECT
COUNT(DISTINCT c.customer_city) AS distinct_cities,
COUNT(DISTINCT c.customer_state) AS distinct_states
FROM `SQLBusinessCase.customers` c
INNER JOIN `SQLBusinessCase.orders` AS o
ON c.customer_id = o.customer_id
WHERE o.order_purchase_timestamp >= (
SELECT MIN(order_purchase_timestamp)`

```

FROM `SQLBusinessCase.orders`
)
AND o.order_purchase_timestamp <= (
SELECT MAX(order_purchase_timestamp)
FROM `SQLBusinessCase.orders`
);

```

Insights:

During the given period, there were 4,119 distinct cities and 27 distinct states from which customers placed orders.

2.1 Is there a growing trend in the no. of orders placed over the past years?

Ans:

Query: SELECT

```

EXTRACT(YEAR FROM order_purchase_timestamp) AS order_year,
EXTRACT(MONTH FROM order_purchase_timestamp) AS order_month,
COUNT(*) AS num_orders
FROM `SQLBusinessCase.orders`
GROUP BY order_year, order_month
ORDER BY order_year, order_month;

```

Insights:

1. 2016 :

- In September 2016, there were only 4 orders recorded. This is quite low compared to the other months.
- October 2016 saw an increase in orders, with 324 orders recorded.
- December 2016 had the lowest number of orders, with only 1 order recorded.

2. 2017:

- In January 2017, there was a significant increase in orders, with 800 orders recorded.
- From July to November 2017, the number of orders increased steadily each month.
- November had the highest number of orders, which shows that more people were buying stuff during that time.
- In December 2017, the number of orders dropped a bit compared to November. This might be because of the holiday season when customers might be spending their money on gifts and other things.

3. 2018:

- In the beginning months of 2018 (January to June), the number of orders stayed pretty stable. It means that customers were still buying things regularly.
- However, in September and October 2018, there was a huge drop in the number of orders. This was surprising and could be because of some reasons we need to find out.

Recommendations :

- **Investigate the Drop:** I noticed fewer orders in September and October 2018. It could be due to issues like website downtime, product availability, or changes in customer preferences.
- **Customer Feedback:** Collect feedback from customers during the period of low orders. This could be through surveys, reviews, or direct communication. Understanding their concerns or reasons for not ordering can help in improving services or products.
- **Marketing Strategies:** Since more customers tend to buy products in November, it might be a good idea to increase advertising efforts before that time. Options could include sending out more emails or running extra ads on social media to make sure customers notice products.
- **Improve Customer Experience:** Focus on improving the overall customer experience. This includes website usability, product quality, delivery speed, and customer service. Satisfied customers are more likely to make repeat purchases and recommend the business to others.
- **Competitor Analysis:** Keep an eye on competitors to understand market dynamics. Analyze their strategies and offerings to find areas for improvement or differentiation.

2.2 Can we see some kind of monthly seasonality in terms of the no. of orders being placed?

Ans:

```
Query: WITH MonthlyOrders AS (
    SELECT
        EXTRACT(MONTH FROM order_purchase_timestamp) AS order_month,
        COUNT(*) AS num_orders
    FROM `SQLBusinessCase.orders`
    GROUP BY
        EXTRACT(YEAR FROM order_purchase_timestamp),
        EXTRACT(MONTH FROM order_purchase_timestamp)
)
SELECT order_month, SUM(num_orders) AS total_orders
FROM MonthlyOrders
GROUP BY order_month
ORDER BY order_month;
```

Insights:

- **Monthly Trends:** Looking at the data, we can see that the number of orders fluctuates throughout the year. Some months have more orders, while others have fewer.
- **Peak Months:** Months like March, May, July, and August tend to have higher numbers of orders compared to other months. Witnessed a peak with 10573 orders in May, possibly due to seasonal events or promotions.
- **Low Months:** In September and October, there aren't as many orders compared to other times of the year. In September, there was a big drop to 4305 orders, which might mean things slow down after the busy summer period. October stayed low too, with only 4959 orders, suggesting that customers are buying less during this time.
- **Year-End Increase:** Towards the end of the year, especially in November and December, there's an increase in the number of orders. This could be due to holiday shopping and people buying gifts for special occasions like Christmas.

Recommendations :

- **Advertise More:** Increase advertising, especially during slower months like September and October. This can help attract more customers.
- **Customer Feedback:** Collect feedback from customers during the period of low orders. This could be through surveys, reviews, or direct communication. Understanding their concerns or reasons for not ordering can help in improving services or products.
- **Plan for Seasonal Changes:** Prepare for seasonal changes by stocking popular items before busy times like holidays. This way, we can meet customers needs and keep them happy.
- **Offer Deals:** Give discounts or special offers during slower months to encourage customers to shop more.
- **Improve Customer Experience:** Focus on improving the overall customer experience. This includes website usability, product quality, delivery speed, and customer service. Satisfied customers are more likely to make repeat purchases and recommend the business to others.

2.3 During what time of the day, do the Brazilian customers mostly place their orders?

(Dawn, Morning, Afternoon or Night)

- 0-6 hrs : Dawn
- 7-12 hrs : Mornings
- 13-18 hrs : Afternoon
- 19-23 hrs : Night

Ans:

```
Query: WITH BrazilianOrders AS (
    SELECT
        EXTRACT(HOUR FROM order_purchase_timestamp) AS order_hour,
        CASE
            WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 0
AND 6 THEN 'Dawn'
            WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 7
AND 12 THEN 'Morning'
            WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 13
AND 18 THEN 'Afternoon'
            WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 19
AND 23 THEN 'Night'
            ELSE 'Unknown'
        END AS order_time_category
    FROM `SQLBusinessCase.orders` )

    SELECT order_time_category, COUNT(*) AS num_orders
    FROM BrazilianOrders
    GROUP BY order_time_category
    ORDER BY num_orders DESC;
```

Insights:

- **Afternoon Orders:** Brazilian customers tend to place the most orders during the afternoon, with a total of 38,135 orders. This suggests that many customers prefer shopping during this part of the day.
- **Night Orders:** Following closely behind, there are 28,331 orders made during the night. It seems that a significant number of customers also choose to shop later in the evening.
- **Morning Orders:** There were 27,733 orders placed in the morning. Although not as many as in the afternoon and at night, it shows that many customers like to shop early.
- **Dawn Orders:** Dawn sees the fewest orders, totaling 5,242. It appears that only a small number of customers make purchases during the early hours of the day, perhaps indicating a less popular time for shopping.

Recommendations :

- **Adjust Marketing Times:** Since many orders are placed in the afternoon and at night, consider focusing marketing efforts during these times to capture more customers.
- **Improve Morning Engagement:** Even though fewer orders come in the morning, there's still a lot happening. Think about offering special deals or bonuses in the morning to get more people shopping at that time.
- **Monitor Dawn Orders:** Dawn sees the fewest orders, totaling 5,242. It appears that only a small number of customers make purchases during the early hours of the day, perhaps indicating a less popular time for shopping.

3.1 Get the month on month no. of orders placed in each state.

Ans:

Query:

```
WITH MonthlyOrders AS (
  SELECT
    EXTRACT(YEAR FROM o.order_purchase_timestamp) AS order_year,
    EXTRACT(MONTH FROM o.order_purchase_timestamp) AS order_month,
    c.customer_state,
    COUNT(*) AS num_orders
  FROM `SQLBusinessCase.orders` o
  INNER JOIN `SQLBusinessCase.customers` AS c
  ON o.customer_id = c.customer_id
  GROUP BY order_year, order_month, c.customer_state
  ORDER BY order_year, order_month, c.customer_state )
  SELECT order_year, order_month, customer_state, num_orders
  FROM MonthlyOrders;
```

Insights:

- **Big Differences Between States:** Some states, like SP and RJ, have lots of orders, while others, like AC and TO, have very few.
- **New Places to Grow:** States with fewer orders might be places where businesses can try to get more customers by advertising or offering special deals.
- **Seasonal Trends:** In January 2017, there were different numbers of orders in each state. This could mean that people in different places like to buy things at different times of the year. It shows that there might be patterns in how customers shop based on the season or where they live.

- **Getting Closer to Customers:** By understanding where orders come from, businesses can make sure they're offering the right things in the right places, and maybe even expand to new areas where people aren't buying as much yet.

Recommendations :

- **Marketing Efforts:** Focus marketing efforts more on states with lower order numbers. By targeting these areas, we can potentially attract more customers and increase sales.
- **Offer Special Promotions:** Consider offering special promotions or discounts in states where order numbers are lower. This can encourage customers to make purchases and help increase sales in those regions.
- **Customer Engagement:** Engage with customers through surveys or feedback forms to understand their preferences and needs better. This insight can help improve products and services to better match what customers want, leading to more orders.

3.2 How are the customers distributed across all the states?

Ans:

Query: `SELECT customer_state,
COUNT(DISTINCT customer_id) AS num_customers
FROM `SQLBusinessCase.customers`
GROUP BY customer_state
ORDER BY num_customers DESC ;`

Insights:

- **State-by-State Customer Count:** The data shows how many customers are in each state.
- **Different Numbers in Each State:** Some states have more customers than others. States like PE, CE, and PA have lots of customers, while others like AC, AP, and RR have fewer.
- **Population and Economic Factors:** States with more people or stronger economies tend to have more customers. This makes sense because there are more potential buyers in those places.
- **Opportunities in Less Populated Areas:** States with fewer customers might be places where businesses can grow more. Could try to attract more customers by advertising or offering special deals.

Recommendations :

- **Targeted Marketing:** Focus on advertising and promotional activities in states with fewer customers to attract more attention and increase customer base.
- **Special Deals:** Consider offering special discounts or deals in regions with lower customer counts to encourage more purchases and engagement.
- **Customer Engagement:** Use customer feedback and surveys to understand preferences and needs in different states. Then, adjust the products and services to match their preferences.
- **Offer Special Promotions:** Consider offering special promotions or discounts in states where order numbers are lower. This can encourage customers to make purchases and help increase sales in those regions.
- **Customer Engagement:** Engage with customers through surveys or feedback forms to understand their preferences and needs better. This insight can help improve products and services to better match what customers want, leading to more orders.
- **Monitor Trends:** Keep an eye on how customers are spread out in different areas. This helps in adjusting plans and using resources wisely across regions.

4.1 Get the % increase in the cost of orders from year 2017 to 2018 (include months between Jan to Aug only).

You can use the "payment_value" column in the payments table to get the cost of orders.

Ans:

```
Query: WITH PaymentYears AS (
SELECT
    EXTRACT(YEAR FROM o.order_purchase_timestamp) AS order_year,
    EXTRACT(MONTH FROM o.order_purchase_timestamp) AS order_month,
    p.payment_value
FROM `SQLBusinessCase.orders` AS o
JOIN `SQLBusinessCase.payments` AS p
ON o.order_id = p.order_id
WHERE
    EXTRACT(YEAR FROM o.order_purchase_timestamp) IN (2017, 2018)
    AND EXTRACT(MONTH FROM o.order_purchase_timestamp) BETWEEN 1
AND 8
)
```



```

SELECT
    ROUND(((SUM(CASE WHEN order_year = 2018 THEN payment_value ELSE 0 END) -
        SUM(CASE WHEN order_year = 2017 THEN payment_value ELSE 0 END)) /
        SUM(CASE WHEN order_year = 2017 THEN payment_value ELSE 0 END)) * 100, 2)
AS percentage_increase
FROM PaymentYears;

```

Insights:

- **Percentage Increase:** The cost of orders from 2017 to 2018, between January and August, increased by approximately 136.98%. This indicates a significant rise in the overall payment value of orders during this period from 2017 to 2018.

Recommendations :

- **Work Smarter:** Make operations more efficient to save money and manage the higher payment values.
- **Keep Customers Happy:** Focus on keeping customers satisfied to ensure they keep buying from the business despite the price increase.

4.2 Calculate the Total & Average value of order price for each state.

Ans:

Query:

```

SELECT c.customer_state,
    SUM(oi.price) AS total_order_price,
    AVG(oi.price) AS average_order_price
FROM `SQLBusinessCase.order_items` AS oi
INNER JOIN `SQLBusinessCase.orders` AS o
ON oi.order_id = o.order_id
INNER JOIN `SQLBusinessCase.customers` AS c
ON o.customer_id = c.customer_id
GROUP BY c.customer_state;

```

Insights:

- **Total Order Value :** The data provides the total value of orders placed by customers in each state.

- **Average Order Price:** It also gives the average order price for customers in each state.
- **Variation Across States:** There's variation in both total order value and average order price among different states.
- **State Spending Habits:** In some states, people tend to spend more money on their orders compared to others. This could mean that customers in those states are more willing to buy expensive items or spend more money when shopping online.

Recommendations :

- **Customized Marketing:** Customize marketing strategies to fit the spending habits and preferences of customers in each state.
- **Adjust Pricing:** Consider adjusting product pricing based on the average order prices in different states to remain competitive and appealing to customers.
- **Targeted Promotions:** Offer special deals or discounts to match the different ways customers in each state spend their money.
- **Customer Engagement:** Engage with customers through surveys or feedback forms to better understand their needs and preferences

4.3 Calculate the Total & Average value of order freight for each state.

Ans:

Query: `SELECT c.customer_state,
SUM(oi.freight_value) AS total_freight_value,
AVG(oi.freight_value) AS average_freight_value
FROM `SQLBusinessCase.order_items` AS oi
INNER JOIN `SQLBusinessCase.orders` AS o
ON oi.order_id = o.order_id
INNER JOIN `SQLBusinessCase.customers` AS c
ON o.customer_id = c.customer_id
GROUP BY c.customer_state;`

Insights:

- **Varied Freight Costs:** Freight costs vary across different states, with some states showing higher total and average freight values compared to others.

- **High and Low Spend States:** States like MA and PE have notably higher total freight values, indicating higher overall spending on shipping, while states like MS and ES have relatively lower total freight values.
- **Average Freight Values:** The average freight values also differ among states, with PB and RR showing higher average freight costs compared to others.
- **Shipping Preferences:** These variations may reflect differences in shipping preferences or distances between states, impacting the overall freight costs impacted by customers.

Recommendations :

- **Offer Flexible Shipping Options:** Give customers different choices for how they want their orders delivered. They can choose regular shipping, faster shipping, or even free shipping, depending on what works best for them.

5.1 Find the no. of days taken to deliver each order from the order's purchase date as delivery time.

Also, calculate the difference (in days) between the estimated & actual delivery date of an order.

Do this in a single query.

You can calculate the delivery time and the difference between the estimated & actual delivery date using the given formula:

- $\text{time_to_deliver} = \text{order_delivered_customer_date} - \text{order_purchase_timestamp}$
- $\text{diff_estimated_delivery} = \text{order_delivered_customer_date} - \text{order_estimated_delivery}$

Ans:

Query: `SELECT order_id,
DATE_DIFF(order_delivered_customer_date, order_purchase_timestamp,
DAY) AS time_to_deliver,
DATE_DIFF(order_delivered_customer_date,
order_estimated_delivery_date, DAY) AS diff_estimated_delivery
FROM `SQLBusinessCase.orders``

Insights:

- **Delivery Time:** On average, orders took around 34 days to deliver from the purchase date. However, delivery times varied significantly, with some orders being delivered in as little as 29 days and others taking up to 67 days.
- **Estimated vs. Actual Delivery:** The difference between the estimated and actual delivery date ranged from -1 days to 47 days. Negative values indicate that some orders were delivered before the estimated delivery date, while positive values show delays in delivery compared to the estimated timeframe.

Recommendations :

- **Improve Delivery Estimates:** Make sure the estimated delivery dates given to customers are accurate. Keep track of delivery times and work on making them more consistent to avoid surprises and delays for customers.

5.2 Find out the top 5 states with the highest & lowest average freight value.

Ans:

```
Query: WITH state_freight_avg AS (
    SELECT c.customer_state,
    AVG(oi.freight_value) AS average_freight_value
    FROM `SQLBusinessCase.order_items` AS oi
    JOIN `SQLBusinessCase.orders` AS o
    ON oi.order_id = o.order_id
    JOIN `SQLBusinessCase.customers` AS c
    ON o.customer_id = c.customer_id
    GROUP BY c.customer_state
)
SELECT customer_state, average_freight_value
FROM (
    SELECT customer_state, average_freight_value,
    ROW_NUMBER() OVER (ORDER BY average_freight_value DESC) AS
high_rank,
    ROW_NUMBER() OVER (ORDER BY average_freight_value) AS low_rank
    FROM state_freight_avg
)
WHERE high_rank <= 5 OR low_rank <= 5
ORDER BY high_rank, low_rank;
```

Insights:

Top 5 States with Highest Average Freight Value:

RR has the highest average freight value at 42.98.
PB follows closely with an average freight value of 42.72.
RO ranks third with an average freight value of 41.07.
AC is fourth highest with an average freight value of 40.07.
PI completes the top 5 with an average freight value of 39.15.

Top 5 States with Lowest Average Freight Value:

SP has the lowest average freight value at 15.15.
PR follows with an average freight value of 20.53.
MG ranks third lowest with an average freight value of 20.63.
RJ is fourth lowest with an average freight value of 20.96.
DF completes the list with an average freight value of 21.04.

Recommendations :

- ***For States with High Average Freight Value:***

Check Shipping Policies: Review shipping rules to reduce high freight expenses.

Discuss Rates with Carriers: Talk to carriers about better rates to lower shipping costs.

Consider Flat-Rate Shipping: Think about offering flat-rate shipping to trim costs for customers.

- ***For States with Low Average Freight Value:***

Expand Reach: Look into reaching more customers in states with lower shipping costs.

Offer Free Shipping: Give free or discounted shipping to attract more buyers.

Track Shipping Performance: Keep an eye on shipping to ensure orders arrive on time and customers are happy.

5.3 Find out the top 5 states with the highest & lowest average delivery time.

Ans:

```
Query: WITH delivery_times AS (  
SELECT  
    c.customer_state,
```

```

        AVG(TIMESTAMP_DIFF(o.order_delivered_customer_date,
o.order_purchase_timestamp, DAY)) AS average_delivery_time
FROM
    `SQLBusinessCase.orders` AS o
JOIN
    `SQLBusinessCase.customers` AS c
ON
    o.customer_id = c.customer_id
WHERE
    o.order_status = 'delivered'
    AND o.order_delivered_customer_date IS NOT NULL
    AND o.order_purchase_timestamp IS NOT NULL
GROUP BY
    c.customer_state
),

state_delivery_ranks AS (
    SELECT
        customer_state,
        average_delivery_time,
        ROW_NUMBER() OVER (ORDER BY average_delivery_time DESC) AS high_rank,
        ROW_NUMBER() OVER (ORDER BY average_delivery_time) AS low_rank
    FROM
        delivery_times
)

SELECT
    customer_state,
    average_delivery_time
FROM
    state_delivery_ranks
WHERE
    high_rank <= 5 OR low_rank <= 5
ORDER BY
    high_rank,
    low_rank;

```

Insights:

- **States with Longer Delivery Times:** Some states like RR, AP, and AM take longer for orders to arrive, which could be due to challenges in shipping in these areas.
- **States with Shorter Delivery Times:** On the other hand, SP has the quickest delivery times, showing that shipping processes there work efficiently.

Recommendations :

- **Improve Shipping Routes:** Work on making shipping routes more efficient in states where deliveries take longer. This might involve finding better roads or transportation methods to speed up deliveries.
- **Build More Warehouses:** Consider building more warehouses in areas where delivery times are longer. This can help store products closer to customers, reducing the time it takes to deliver orders.
- **Use Better Technology:** Invest in technology like GPS tracking and software that helps plan delivery routes more effectively. This can help drivers find the fastest ways to deliver packages, saving time and money.

5.4 Find out the top 5 states where the order delivery is really fast as compared to the estimated date of delivery.

You can use the difference between the averages of actual & estimated delivery date to figure out how fast the delivery was for each state.

Ans:

```
Query: WITH delivery_speed AS (
    SELECT
        c.customer_state,
        AVG(TIMESTAMP_DIFF(o.order_delivered_customer_date,
        o.order_estimated_delivery_date, DAY)) AS avg_delivery_speed
    FROM
        `SQLBusinessCase.orders` AS o
    JOIN
        `SQLBusinessCase.customers` AS c
    ON
        o.customer_id = c.customer_id
    WHERE
```

```

        o.order_status = 'delivered'
        AND o.order_delivered_customer_date IS NOT NULL
        AND o.order_estimated_delivery_date IS NOT NULL
    GROUP BY
        c.customer_state
)

SELECT
    customer_state,
    ABS(avg_delivery_speed) AS avg_delivery_speed
FROM
    delivery_speed
ORDER BY
    avg_delivery_speed ASC
LIMIT
    5;

```

Insights:

- AL has the fastest average delivery speed compared to the estimated date, followed by MA, SE, ES, and BA.

Recommendations :

- **Improve Logistics:** Upgrade transportation systems for prompt deliveries in all states.
- **Enhance Order Processing:** Simplify order processing to meet delivery deadlines consistently.
- **Optimize Delivery Routes:** Use technology to find efficient routes, especially where deliveries are slower than expected.

6.1 Find the month on month no. of orders placed using different payment types.

Ans:

Query:

```
SELECT payment_type,
        FORMAT_TIMESTAMP('%Y-%m', o.order_purchase_timestamp)
        AS order_purchase_ym,
        COUNT(DISTINCT o.order_id) AS total_orders
FROM `SQLBusinessCase.orders` AS o
INNER JOIN `SQLBusinessCase.payments` AS p
ON o.order_id = p.order_id
```



```
GROUP BY payment_type, order_purchase_ym
ORDER BY payment_type, order_purchase_ym;
```

Insights:

- **Payment Trends by Month:** The data reveals fluctuations in the number of orders placed using different payment types each month throughout years.
- **Variability in Payment Methods:** Certain payment types, like credit cards and UPI, show consistent usage across various months, while others, like vouchers and debit cards, display more variability.

Recommendations :

- **Payment Option Promotion:** Promote diverse payment options to customers to accommodate their preferences and ensure smooth transactions.
- **Monitor Payment Trends:** Regularly monitor payment trends to identify shifts in customer behavior and adjust payment methods accordingly.
- **Payment Method Optimization:** Analyze the popularity of each payment method and optimize platforms to support the most frequently used options effectively.

6.2 Find the no. of orders placed on the basis of the payment installments that have been paid.

Ans:

```
Query: SELECT payment_installments,
          COUNT(DISTINCT order_id) AS num_orders
        FROM `SQLBusinessCase.payments`
        WHERE payment_installments > 0
GROUP BY
    payment_installments
ORDER BY
    payment_installments;
```

Insights:

- The majority of orders (49,060) are paid in a single installment, indicating that a significant portion of customers prefers to complete their payments upfront. The data indicates that most orders are paid in fewer installments, with the majority being paid in 1 or 2 installments.
- As the number of installments increases, the number of orders tends to decrease gradually.
- There is a sharp decline in the number of orders beyond 8 installments, indicating that only a small percentage of orders are paid in more than 8 installments.

Recommendations :

- ***Simplify Payment Options:*** Encourage customers to choose payment options that require fewer installments to complete the transaction.
- ***Flexible Installment Plans:*** Offer flexible installment plans to accommodate varying customer preferences and financial situations.
- ***Encourage Faster Payments:*** Encourage customers to choose shorter payment periods to make the payment process quicker and reduce the chances of missed payments.
- ***Analyze Customer Behavior:*** Analyze customer behavior and preferences regarding payment installments to tailor offerings and improve customer satisfaction.
- ***Improve Payment Experience:*** Make paying easier for customers, no matter how they choose to pay or split their payments.