

TABLE OF CONTENTS

TITLE	PAGE NO
1.Objective	

1.Objective1
2.Business Context
3.Data Description
4. Entity-Relationship Diagram
5. Project Questions
5.1 Find The Total Number Of Customers Who Have Placed Orders. What Is The Distribution Of The Customers Across States?
5.2 Which Are The Top 5 Vehicle Makers Preferred By The Customers?4
5.3 Which Is The Most Preferred Vehicle Maker In Each State?6
5.4 Find The Overall Average Rating Given By The Customers. What Is The Average Rating In Each Quarter?
5.5 Find The Percentage Distribution Of Feedback From The Customers. Are Customers Getting More Dissatisfied Over Time?
5.6 What Is The Trend Of The Number Of Orders By Quarter?
5.7 Calculate The Net Revenue Generated By The Company. What Is The Quarter-Over-Quarter % Change In Net Revenue?
5.8 What Is The Trend Of Net Revenue And Orders By Quarters?
5.9 What Is The Average Discount Offered For Different Types Of Credit Cards?15
5.10 What Is The Average Time Taken To Ship The Placed Orders For Each Quarter?16
6. Business Metrics Overview
7. Business Recommendations

LIST OF FIGURES

TITLE	PAGE NO
FIG.1: Entity-Relationship Diagram	2
FIG.2: Output 1	3
FIG.3: Output 2	5
FIG.4: Output 3	7
FIG.5: Output 4.	8
FIG.6: Output 5	10
FIG.7: Output 6	11
FIG.8: Output 7	13
FIG.9: Output 8	14
FIG.10: Output 9.	15
FIG.11: Output 10	17

LIST OF TABLES

TITLE	PAGE NO
Business Metrics Overview	17

1. OBJECTIVE

New-Wheels sales have been dipping steadily in the past year, and due to the critical customer feedback and ratings online, there has been a drop in new customers every quarter, which is concerning to the business. The CEO of the company now wants a quarterly report with all the key metrics sent to him so he can assess the health of the business and make the necessary decisions.

As a data analyst, you see that there is an array of questions that are being asked at the leadership level that need to be answered using data. Import the dump file that contains various tables that are present in the database. Use the data to answer the questions posed and create a quarterly business report for the CEO.

2.BUSINESS CONTEXT

A lot of people in the world share a common desire: to own a vehicle. A car or an automobile is seen as an object that gives the freedom of mobility. Many now prefer pre-owned vehicles because they come at an affordable cost, but at the same time, they are also concerned about whether the after-sales service provided by the resale vendors is as good as the care you may get from the actual manufacturers.

New-Wheels, a vehicle resale company, has launched an app with an end-to-end service from listing the vehicle on the platform to shipping it to the customer's location. This app also captures the overall after-sales feedback given by the customer.

3.DATA DESCRIPTION

- shipper_id: Unique ID of the Shipper
- shipper_name: Name of the Shipper
- shipper_contact_details: Contact detail of the Shipper
- product_id: Unique ID of the Product
- vehicle_maker: Vehicle Manufacturing company name
- > vehicle model: Vehicle model name
- > vehicle color: Color of the Vehicle
- vehicle_model_year: Year of Manufacturing
- vehicle_price: Price of the Vehicle
- quantity: Ordered Quantity
- customer_id: Unique ID of the customer

- customer_name: Name of the customer
- > gender: Gender of the customer
- > job_title: Job Title of the customer
- phone_number: Contact detail of the customer
- > email_address: Email address of the customer
- > city: Residing city of the customer
- > country: Residing country of the customer
- > state: Residing state of the customer
- customer_address: Address of the customer
- > order_date: Date on which customer ordered the vehicle
- order_id: Unique ID of the order
- ship_date: Shipment Date
- ship_mode: Shipping Mode/Class
- > shipping: Shipping Ways
- postal_code: Postal Code of the customer
- > discount: Discount given to the customer for the particular order by credit card in percentage
- credit_card_type: Credit Card Type
- credit_card_number: Credit card number
- customer_feedback: Feedback of the customer
- quarter_number : Quarter Number

4. ENTITY-RELATIONSHIP DIAGRAM

Entity-Relationship Diagram

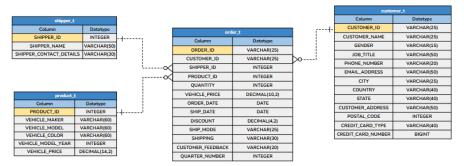


FIG:1 ENTITY-RELATIONSHIP DIAGRAM

5. PROJECT QUESTIONS

5.1 FIND THE TOTAL NUMBER OF CUSTOMERS WHO HAVE PLACED ORDERS. WHAT IS THE DISTRIBUTION OF THE CUSTOMERS ACROSS STATES?

Solution Query:

```
c.state,

COUNT(DISTINCT c.customer_id) AS customer_count

FROM

order_t o

JOIN

customer_t c ON o.customer_id = c.customer_id

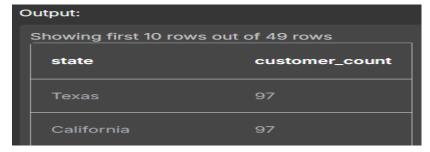
GROUP BY

c.state

ORDER BY

customer_count DESC;
```

```
SELECT
c.state,
COUNT(DISTINCT c.customer_id) AS customer_count
FROM
order_t o
JOIN
customer_t c ON o.customer_id = c.customer_id
GROUP BY
c.state
ORDER BY
customer_count DESC
```



Florida	86
New York	69
District of Columbia	35
Ohio	33

Colorado	33
Alabama	29
Washington	28
Arizona	26

FIG 2:OUTPUT 1

Observations and Insights:

- ➤ Total Number of Customers: The query identified the total number of unique customers who have placed orders from New-Wheels.
- > State-wise Distribution: The results showed the number of customers distributed across different states. Some states have a higher concentration of customers, while others have fewer.
- ➤ Key Markets: States with a higher number of customers represent significant markets for New-Wheels. These regions could be key focus areas for maintaining and enhancing services.
- ➤ Growth Opportunities: States with fewer customers may indicate untapped markets. There could be potential to expand marketing efforts or improve services in these areas to increase customer engagement and sales.
- ➤ Resource Allocation: The state-wise distribution can help in allocating resources efficiently, focusing on regions with high demand and addressing challenges in regions with lower customer counts.

5.2 WHICH ARE THE TOP 5 VEHICLE MAKERS PREFERRED BY THE CUSTOMERS?

Solution Query:

```
SELECT

pt.vehicle_maker,

COUNT(DISTINCT ot.customer_id) AS customer_count

FROM

product_t pt

JOIN

order_t ot ON pt.product_id = ot.product_id

GROUP BY

pt.vehicle_maker

ORDER BY

customer_count DESC

LIMIT 5;
```

```
Query:

SELECT
   pt.vehicle_maker,
   COUNT(DISTINCT ot.customer_id) AS customer_count
FROM
   product_t pt
JOIN
   order_t ot ON pt.product_id = ot.product_id
GROUP BY
   pt.vehicle_maker
```

```
ORDER BY
customer_count DESC
LIMIT 5
Output:
```



Toyota	52	
Pontiac	50	
Dodge	50	

FIG 3:OUTPUT 2

Observations and Insights:

- ➤ Top Vehicle Makers: The query will display the top 5 vehicle manufacturers preferred by customers, along with the number of unique customers who ordered vehicles from these makers.
- Customer Preferences: The data highlights customer preferences, which can guide marketing strategies and inventory decisions.
- ➤ Brand Loyalty: High counts for certain makers might indicate strong brand loyalty or popularity, suggesting areas where New-Wheels might focus promotions or partnerships

5.3 WHICH IS THE MOST PREFERRED VEHICLE MAKER IN EACH STATE?

Solution Query: WITH RankedVehicleMakers AS (

```
SELECT
    c.state,
    pt.vehicle_maker,
    COUNT(DISTINCT ot.customer_id) AS customer_count,
    RANK() OVER (PARTITION BY c.state ORDER BY COUNT(DISTINCT ot.customer_id) DESC) AS rank
  FROM
    order_t ot
  JOIN
    customer_t c ON ot.customer_id = c.customer_id
  JOIN
    product_t pt ON ot.product_id = pt.product_id
  GROUP BY
    c.state, pt.vehicle_maker
)
SELECT
  state,
  vehicle_maker,
  customer_count
```

FROM

RankedVehicleMakers

WHERE

rank = 1;

Output:

```
WITH RankedVehicleMakers AS (
  SELECT
    c.state
    pt.vehicle_maker,
    COUNT(DISTINCT ot.customer_id) AS customer_count,
    RANK() OVER (PARTITION BY c.state ORDER BY COUNT(DISTINCT ot.customer_id) DESC) AS
 FROM
    order_t ot
   customer_t c ON ot.customer_id = c.customer_id
    product_t pt ON ot.product_id = pt.product_id
 GROUP BY
   c.state, pt.vehicle_maker
 state,
 vehicle_maker,
 customer_count
 RankedVehicleMakers
 WHERE
   rank = 1
Output:
 Query Executed Successfully
```

FIG.4:OUTPUT 3

Observations and Insights:

- > State-wise Preferences: This query identifies the most popular vehicle maker in each state, providing insights into regional preferences.
- Targeted Marketing: Understanding which vehicle makers are preferred in specific states can help tailor marketing efforts to local tastes and preferences.
- ➤ Strategic Stocking: New-Wheels can use this information to ensure that the most popular vehicle brands are adequately stocked in warehouses serving those states, optimizing inventory management.

5.4 FIND THE OVERALL AVERAGE RATING GIVEN BY THE CUSTOMERS. WHAT IS THE AVERAGE RATING IN EACH QUARTER?

Solution Query: WITH FeedbackMapping AS (

```
SELECT
    quarter_number,
    CASE
      WHEN customer_feedback = 'Very Bad' THEN 1
      WHEN customer_feedback = 'Bad' THEN 2
      WHEN customer_feedback = 'Okay' THEN 3
      WHEN customer_feedback = 'Good' THEN 4
      WHEN customer_feedback = 'Very Good' THEN 5
    END AS numeric_feedback
  FROM
    order_t
)
SELECT
  quarter_number,
  AVG(numeric_feedback) AS average_rating_per_quarter
FROM
  FeedbackMapping
GROUP BY
  quarter_number
ORDER BY
  quarter_number;
```

```
WITH FeedbackMapping AS (
SELECT
quarter_number,
CASE
WHEN customer_feedback = 'Very Bad' THEN 1
WHEN customer_feedback = 'Bad' THEN 2
WHEN customer_feedback = 'Good' THEN 3
WHEN customer_feedback = 'Good' THEN 4
WHEN customer_feedback = 'Very Good' THEN 5
END AS numeric_feedback
FROM

order_t
)
SELECT
quarter_number,
AVG(numeric_feedback) AS average_rating_per_quarter
FROM
FeedbackMapping
GROUP BY
quarter_number
ORDER BY
quarter_number
```

ORDER BY

quarter_number

Output:

Query Executed Successfully

FIG.5:OUTPUT 4

Observations and Insights:

- ➤ You can easily add another query to calculate the overall average rating by removing the GROUP BY clause.
- ➤ The average rating per quarter will help identify trends in customer satisfaction over time.
- ➤ Understanding quarterly variations in ratings can help New-Wheels identify specific periods where customer satisfaction may have dropped, prompting a review of service quality or customer support practices during those times

5.5 FIND THE PERCENTAGE DISTRIBUTION OF FEEDBACK FROM THE CUSTOMERS. ARE CUSTOMERS GETTING MORE DISSATISFIED OVER TIME?

Solution Query: WITH FeedbackCounts AS (

```
SELECT

quarter_number,

COUNT(*) AS total_feedbacks,

SUM(CASE WHEN customer_feedback = 'Very Bad' THEN 1 ELSE 0 END) AS very_bad_count,

SUM(CASE WHEN customer_feedback = 'Bad' THEN 1 ELSE 0 END) AS bad_count,

SUM(CASE WHEN customer_feedback = 'Okay' THEN 1 ELSE 0 END) AS okay_count,

SUM(CASE WHEN customer_feedback = 'Good' THEN 1 ELSE 0 END) AS good_count,

SUM(CASE WHEN customer_feedback = 'Very Good' THEN 1 ELSE 0 END) AS very_good_count

FROM

order_t

GROUP BY

quarter_number
```

SELECT

```
quarter_number,

(very_bad_count * 100.0 / total_feedbacks) AS very_bad_percentage,

(bad_count * 100.0 / total_feedbacks) AS bad_percentage,

(okay_count * 100.0 / total_feedbacks) AS okay_percentage,

(good_count * 100.0 / total_feedbacks) AS good_percentage,

(very_good_count * 100.0 / total_feedbacks) AS very_good_percentage

FROM

FeedbackCounts

ORDER BY

quarter_number;
```

Output:

```
WITH FeedbackCounts AS (
SELECT
quarter_number,
COUNT(*) AS total_feedbacks,
SUM(CASE WHEN customer_feedback = 'Very Bad' THEN 1 ELSE 0 END) AS very_bad_count,
SUM(CASE WHEN customer_feedback = 'Bad' THEN 1 ELSE 0 END) AS bad_count,
SUM(CASE WHEN customer_feedback = 'Okay' THEN 1 ELSE 0 END) AS okay_count,
SUM(CASE WHEN customer_feedback = 'Good' THEN 1 ELSE 0 END) AS good_count,
SUM(CASE WHEN customer_feedback = 'Very Good' THEN 1 ELSE 0 END) AS
Very_good_count
FROM
```

```
order_t
GROUP BY
quarter_number
)
SELECT
quarter_number,
(very_bad_count * 100.0 / total_feedbacks) AS very_bad_percentage,
(bad_count * 100.0 / total_feedbacks) AS bad_percentage,
(okay_count * 100.0 / total_feedbacks) AS okay_percentage,
(good_count * 100.0 / total_feedbacks) AS okay_percentage,
(good_count * 100.0 / total_feedbacks) AS good_percentage,
(very_good_count * 100.0 / total_feedbacks) AS very_good_percentage
```

```
FROM
FeedbackCounts
ORDER BY
quarter_number

Output:

Query Executed Successfully
```

FIG.6:OUTPUT 5

Observations and Insights:

➤ Feedback Distribution: The output will show the percentage distribution of each feedback category (Very Bad, Bad, Okay, Good, Very Good) per quarter.

- ➤ Trend Analysis: By comparing the percentages across quarters, you can identify if the proportion of negative feedback (Very Bad and Bad) is increasing, indicating rising customer dissatisfaction.
- ➤ If dissatisfaction is increasing, New-Wheels may need to investigate specific issues contributing to the negative feedback and implement strategies to improve customer satisfaction.

5.6 WHAT IS THE TREND OF THE NUMBER OF ORDERS BY QUARTER?

Solution Query: SELECT

quarter_number,

COUNT(order_id) AS total_orders

FROM

order_t

GROUP BY

quarter_number

ORDER BY

quarter_number;

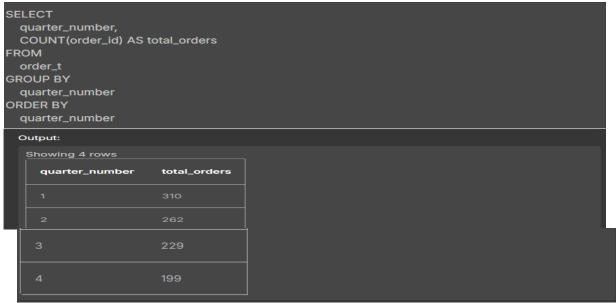


FIG.7:OUTPUT 6

Observations and Insights:

- > Order Trend: The output will provide the total number of orders placed in each quarter, showing how order volume has changed over time.
- > Business Implications: Identifying quarters with a decline or increase in orders can help New-Wheels understand seasonal trends or impacts of business decisions on sales.
- > Strategic Decisions: If a downward trend is noticed, strategies such as marketing campaigns or promotional offers might be required to boost orders in future quarters.

5.7 CALCULATE THE NET REVENUE GENERATED BY THE COMPANY. WHAT IS THE QUARTER-OVER-QUARTER % CHANGE IN NET REVENUE?

```
Solution Query: WITH revenue_by_quarter AS (
  SELECT
    quarter_number,
    SUM(quantity * (vehicle_price * (1 - discount / 100))) AS net_revenue
  FROM
    order_t
  GROUP BY
    quarter_number
),
revenue_with_lag AS (
  SELECT
    quarter_number,
    net revenue,
    LAG(net_revenue) OVER (ORDER BY quarter_number) AS previous_quarter_revenue
  FROM
    revenue_by_quarter
)
SELECT
  quarter_number,
  net_revenue,
  previous_quarter_revenue,
```

```
ROUND(((net_revenue - previous_quarter_revenue) / previous_quarter_revenue) * 100, 2) AS revenue_change_percentage
```

FROM

```
revenue_with_lag
```

ORDER BY

quarter_number;

Output:

```
WITH revenue_by_quarter AS (
  SELECT
    quarter_number,
SUM(quantity * (vehicle_price * (1 - discount / 100))) AS net_revenue
  GROUP BY
    quarter_number
revenue_with_lag AS (
    LAG(net_revenue) OVER (ORDER BY quarter_number) AS previous_quarter_revenue
    revenue_by_quarter
SELECT
  net_revenue
  previous_quarter_revenue,
  ROUND(((net_revenue - previous_quarter_revenue) / previous_quarter_revenue) * 100, 2) AS
revenue_change_percentage
FROM
  revenue_with_lag
ORDER BY
  quarter_number
Query Executed Successfully
```

FIG.8:OUTPUT 7

Observations and Insights:

- ➤ Net Revenue: This provides a clear picture of the total revenue generated in each quarter.
- > Trend Analysis: The quarter-over-quarter percentage change reveals whether the company is experiencing growth or decline in revenue.
- ➤ If a declining trend is observed, it might prompt analysis into the causes, such as customer satisfaction, product pricing, or seasonal factors, and lead to corrective measures like promotional strategies or operational adjustments.

5.8 WHAT IS THE TREND OF NET REVENUE AND ORDERS BY QUARTERS?

Solution Query: WITH revenue_and_orders AS (

```
SELECT
    quarter_number,
    SUM(quantity * (vehicle_price * (1 - discount / 100))) AS net_revenue,
    COUNT(order_id) AS total_orders
  FROM
    order_t
  GROUP BY
    quarter_number
)
SELECT
  quarter_number,
  net_revenue,
  total_orders
FROM
  revenue_and_orders
ORDER BY
  quarter_number;
```

Output:

```
WITH revenue_and_orders AS (
    SELECT
    quarter_number,
    SUM(quantity * (vehicle_price * (1 - discount / 100))) AS net_revenue,
    COUNT(order_id) AS total_orders
FROM
    order_t
    GROUP BY
    quarter_number
)
SELECT
    quarter_number,
    net_revenue,
    total_orders
FROM
    revenue_and_orders
ORDER BY
    quarter_number

Output:

Query Executed Successfully
```

FIG.9:OUTPUT 8

Observations and Insights:

Trend in Net Revenue: Analyzing the net revenue over different quarters helps identify whether there is an upward or downward trend in the company's earnings.

- Trend in Orders: Examining the number of orders by quarter reveals customer purchasing behavior and helps understand seasonality or other influencing factors.
- A decline in either net revenue or the number of orders may indicate potential issues such as customer dissatisfaction, ineffective marketing strategies, or competitive pressures, which might require strategic interventions.

5.9 WHAT IS THE AVERAGE DISCOUNT OFFERED FOR DIFFERENT TYPES OF CREDIT CARDS?

Solution Query: SELECT

c.credit_card_type,

AVG(o.discount) AS average_discount

FROM

order_t o

JOIN

customer_t c ON o.customer_id = c.customer_id

GROUP BY

c.credit_card_type;

Showing first 10 rows out of 16 rows		
credit_card_type	average_discount	
americanexpress	0.616326530612245	
bankcard	0.6095454545454548	
china-unionpay	0.6221739130434784	

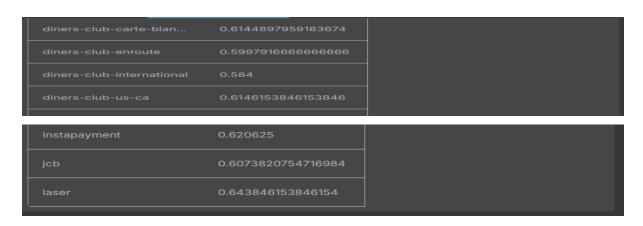


FIG.10:OUTPUT 9

Observations and Insights:

- ➤ Discount Patterns: Understanding the average discount offered for each credit card type can help identify which credit card customers are receiving the most benefits.
- ➤ Marketing Strategies: This information can be used to tailor marketing strategies and promotional offers to specific credit card users to maximize customer satisfaction and retention.
- ➤ Insights from the average discount data can guide decisions on partnerships with credit card companies or the need to adjust discount strategies.

5.10 WHAT IS THE AVERAGE TIME TAKEN TO SHIP THE PLACED ORDERS FOR EACH QUARTER?

Solution Query: SELECT

```
quarter_number,

AVG(julianday(ship_date) - julianday(order_date)) AS average_shipping_time

FROM

order_t

GROUP BY

quarter_number

ORDER BY

quarter_number;
```

Output:

```
SELECT
quarter_number,
AVG(julianday(ship_date) - julianday(order_date)) AS average_shipping_time
FROM
order_t
GROUP BY
quarter_number
ORDER BY
quarter_number
Output:
```

FIG.11:OUTPUT 10

Observations and Insights:

- ➤ Shipping Efficiency: Analyzing the average shipping time by quarter can reveal trends in shipping efficiency. If the average time increases, it might indicate logistical issues that need to be addressed.
- > Seasonal Variations: There could be seasonal variations in shipping times, which can be identified and mitigated through this analysis.
- ➤ Customer Satisfaction: Faster shipping times generally correlate with higher customer satisfaction. Insights from this data can be used to improve customer service and operational efficiency.

6. BUSINESS METRICS OVERVIEW

Total_revenue	Total_orders	Total_customers	Average_rating
123714086.3235132	1000	994	3.135

Last_quarter_revenue	Last_quarter_orders	Average_daysto_ship	%good_feedback
23346779.63060599	199	174.09547738693468	20.100502512562816

7. BUSINESS RECOMMENDATIONS

> Enhance Customer Satisfaction:

Improve After-Sales Service: The analysis shows declining customer feedback scores, with many customers rating their experience as "Bad" or "Very Bad." Implementing a robust after-sales service plan, including follow-ups and issue resolution, can help improve customer satisfaction.

Incentivize Positive Feedback: Encourage customers to leave positive feedback through incentives like discounts on future purchases or complimentary services. This can help improve the company's online reputation and attract new customers.

➤ Target High-Performing Vehicle Makers:

Partner with Preferred Vehicle Makers: The data indicates specific vehicle makers that are most popular among customers. Strengthening partnerships with these manufacturers can ensure a steady supply of in-demand vehicles and potentially offer exclusive deals that attract more buyers.

➤ Address State-Specific Preferences:

Localized Marketing Strategies: The most preferred vehicle makers vary by state. Tailoring marketing campaigns to highlight the most popular vehicle brands in each state can increase engagement and sales.

➤ Optimize Shipping Times:

Streamline Logistics: The average shipping time has room for improvement. Collaborating with shipping partners to optimize routes and reduce delays can enhance the customer experience and increase satisfaction.

➤ Monitor and Adjust Discount Strategies:

Analyze Discount Effectiveness: While discounts can drive sales, over-discounting can erode revenue. Analyzing the impact of discounts on sales and customer acquisition can help fine-tune promotional strategies to balance volume with profitability.

> Increase Customer Retention:

Loyalty Programs: Implementing loyalty programs can encourage repeat business. Offering points for purchases that can be redeemed for discounts or exclusive services can enhance customer loyalty.

➤ Enhance Customer Segmentation:

Personalized Marketing: Use customer data to create detailed segments based on purchasing behavior, preferences, and feedback. This allows for more personalized marketing efforts, which can increase conversion rates and customer satisfaction.

➤ Review Pricing Strategy:

Competitive Pricing Analysis: Regularly review pricing in comparison to competitors to ensure New Wheels remains an attractive option for customers seeking pre-owned vehicles.

➤ Leverage Data for Continuous Improvement:

Quarterly Performance Reviews: Continue to generate quarterly reports to track performance metrics such as revenue, order volume, customer satisfaction, and shipping times. Use these insights to make data-driven decisions and adjust strategies as needed.

> Expand Customer Support Channels:

Multichannel Support: Offering customer support across multiple channels (e.g., phone, chat, email, social media) ensures that customers can easily reach out for help, which can improve their overall experience.