2023

SQL & DATABASE

Hritika Vaishnav

Great Learning

11/5/2023

Index

Contents	Page No.
Problem : New-Wheels sales	4
Business Context……..	4
Problem Statement…….....	4
Objective……...	4
Data Dictionary…….	4
Entity-Relationship Diagram……	6
Business Overview……	6
Customer Metrics……...	9
Queries	
1. QUESTIONS RELATED TO CUSTOMERS	9
[Q1] What is the distribution of customers across states? (Hint: For each state, count the number of customers) ……...	9
[Q2] What is the average rating in each quarter? Very Bad is 1, Bad is 2, Okay is 3, Good is 4, Very Good is 5. (Hint: Use a common table expression and in that CTE, assign numbers to the different customer ratings. Now average the feedback for each quarter.) ……...	11
[Q3] Are customers getting more dissatisfied over time? (Hint: Need the percentage of different types of customer feedback in each quarter. Use a common table expression and determine the number of customer feedback in each category as well as the total number of customer feedback in each quarter. Now use that common table expression to find out the percentage of different types of customer feedback in each quarter. Eg: (total number of very good feedback/total customer feedback)* 100 gives you the percentage of very good feedback.) ……..	12
[Q4] Which are the top 5 vehicle makers preferred by the customer. (Hint: For each vehicle make what is the count of the customers.) ……	14
[Q5] What is the most preferred vehicle make in each state? (Hint: Use the window function RANK() to rank based on the count of customers for each state and vehicle maker. After ranking, take the vehicle maker whose rank is 1.)…….	15
2. QUESTIONS RELATED TO REVENUE and ORDERS	16

[Q6] What is the trend of number of orders by quarters? (Hint: Count the number of orders for each quarter.)…… 16

[Q7] What is the quarter over quarter % change in revenue? (Hint: Quarter over Quarter percentage change in revenue means what is the change in revenue from the subsequent quarter to the previous quarter in percentage. To calculate you need to use the common table expression to find out the sum of revenue for each quarter. Then use that CTE along with the LAG function to calculate the QoQ percentage change in revenue.)…….. 17

[Q8] What is the trend of revenue and orders by quarters? (Hint: Find out the sum of revenue and count the number of orders for each quarter.)…… 18

3. QUESTIONS RELATED TO SHIPPING 19

[Q9] What is the average discount offered for different types of credit cards? (Hint: Find out the average of discount for each credit card type.)…….. 19

[Q10] What is the average time taken to ship the placed orders for each quarters? (Hint: Use the dateiff function to find the difference between the ship date and the order date.)... 21

Overall Observations / findings 22

Recommendations 24

LIST OF FIGURES

1.	Entity-Relationship Diagram	6
2.	Overview of New-Wheels sales(2.1 &2.2)	9
3.	Bar chart of Customer Count by State	10
4.	Line chart of Average Rating by Quarter	11
5.	Line plot of Feedback Counts by Quarter	13
6.	Bar plot of Customer Count by Vehicle Maker	14
7.	Line plot of Number of Orders by Quarter	16
8.	Line plot of Revenue and QoQ Percentage Change	17
9.	Line plot of Revenue and Number of Orders by Quarter	19
10.	Bar plot of Average Discount by Credit Card Type	20
11.	Line plot of Average Shipping Time by Quarter	21

LIST OF TABLES

1.	vehdb database tables	6
2.	Description of `customer_t` table	6
3.	Description of `order_t` table	7
4.	Description of `product_t` table	7
5.	Description of `shipper_t` table	7
6.	`customer_t` table	8
7.	`order_t` table	8
8.	`product_t` table	8
9.	`shipper_t` table	9
10.	The distribution of customers across states	10
11.	Average rating in each quarter	11
12.	Types of customer feedback in each quarter	12
13.	The top 5 vehicle makers preferred by the customer	14
14.	The most preferred vehicle make in each state	15
15.	The trend of number of orders by quarters	16
16.	The quarter over quarter % change in revenue	17
17.	The trend of revenue and orders by quarters	18
18.	The average discount offered for different types of credit cards	20
19.	The average time taken to ship the placed orders for each quarters	21

Problem: New-Wheels sales

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 are now preferring 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.

Problem Statement:

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.

Objective:

As a data scientist, you see that there is an array of questions that are being asked at the leadership level that needs 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.

Data Dictionary:

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

Entity-Relationship Diagram:

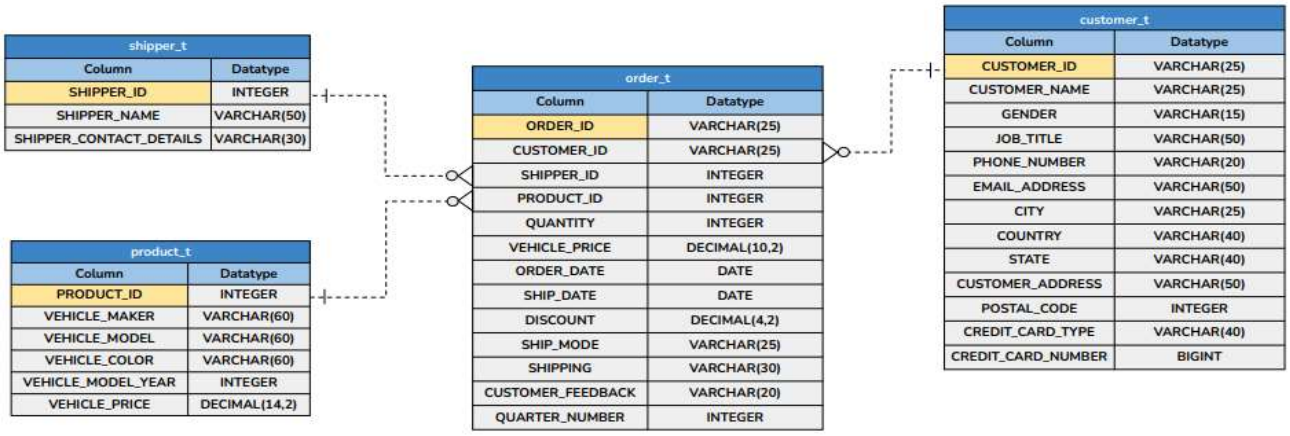

Fig 1: Entity-Relationship Diagram

Business Overview:

For the New-Wheels sales problem, create a database vehdb and create 4 tables: 'customer_t, 'order_t',product_t, and'shipper_t, and insert the values in each table, where table `customer_t` has 13 columns, table `order_t` has 13 columns, `product_t` has 6 columns, and'shipper_t' has 3 columns.

Tables_in_vehdb
customer_t
order_t
product_t
shipper_t

Table 1: vehdb database tables

Field	Type	Null	Key	Default	Extra
customer_id	varchar(25)	NO	PRI	NULL	
customer_name	varchar(25)	YES		NULL	
gender	varchar(15)	YES		NULL	
job_title	varchar(50)	YES		NULL	
phone_number	varchar(20)	YES		NULL	
email_address	varchar(50)	YES		NULL	
city	varchar(25)	YES		NULL	
country	varchar(40)	YES		NULL	
state	varchar(40)	YES		NULL	
customer_address	varchar(50)	YES		NULL	
postal_code	int	YES		NULL	
credit_card_type	varchar(40)	YES		NULL	
credit_card_number	bigint	YES		NULL	

Table 2: Description of `customer_t` table

Field	Type	Null	Key	Default	Extra
order_id	varchar(25)	NO	PRI	NULL	
customer_id	varchar(25)	YES		NULL	
shipper_id	int	YES		NULL	
product_id	int	YES		NULL	
quantity	int	YES		NULL	
vehicle_price	decimal(10,2)	YES		NULL	
order_date	date	YES		NULL	
ship_date	date	YES		NULL	
discount	decimal(4,2)	YES		NULL	
ship_mode	varchar(25)	YES		NULL	
shipping	varchar(30)	YES		NULL	
customer_f...	varchar(20)	YES		NULL	
quarter_nu...	int	YES		NULL	

Table 3: Description of `order_t` table

Field	Type	Null	Key	Default	Extra
product_id	int	NO	PRI	NULL	
vehicle_maker	varchar(60)	YES		NULL	
vehicle_model	varchar(60)	YES		NULL	
vehicle_color	varchar(60)	YES		NULL	
vehicle_model_year	int	YES		NULL	
vehicle_price	decimal(14,8)	YES		NULL	

Table 4: Description of `product_t` table

Field	Type	Null	Key	Default	Extra
shipper_id	int	NO	PRI	NULL	
shipper_name	varchar(50)	YES		NULL	
shipper_contact_details	varchar(30)	YES		NULL	

Table 5: Description of `shipper_t` table

Table **'customer_t** has 994 rows and 13 columns; table **`order_t`** has 1000 rows and 13 columns; table **`product_t`** has 1000 rows and 6 columns; and table'shipper_t' has 1000 rows and 3 columns.

customer_id	customer_name	gender	job_title	phone_number	email_
0002-4115	Rafaela Hummerston	Female	Research Associate	862-362-4311	rhumme
0002-4465	Minerva Noir	Female	Safety Technician II	317-472-9307	mnoirfc
0002-7597	Foss Ratcliffe	Male	Chief Design Engineer	360-923-0728	fratcliff
0006-0740	Tirrell Hegg	Male	Account Executive	916-275-2214	theggr
0006-0951	Felike Penvarne	Male	Media Manager II	202-786-2819	fpenva
0008-1123	Timi Limpricht	Female	Senior Developer	409-884-0947	tlimpric
0013-2653	Edi Stodd	Female	Senior Financial Analyst	571-949-9499	estoddi
0023-4385	Ileana Meran	Female	Research Associate	630-947-3323	imeranl
0023-4964	Flss Darker	Female	Design Engineer	727-155-1700	fdarker
0024-2792	Hobie McRoberts	Male	Civil Engineer	720-577-2387	hmcrob
0025-1851	Donelle Gwatkins	Female	VP Accounting	515-903-2317	dgwatk
0054-0435	Nalani Micka	Female	Engineer III	714-463-6030	nmicka
0054-8181	James Doneld	Male	Computer Systems An...	205-979-4979	jdoneld

Table 6:`customer_t` table

order_id	customer_id	shipper_id	product_id	quantity	vehicle_price	order_date	ship
0002-7502	0409-7139	3804	4680	1	72762.15	2018-11-27	2019
0004-0259	11673-067	3712	4925	1	78679.57	2018-10-28	2019
0006-0078	65044-9961	3284	4361	2	94338.83	2018-03-26	2018
0013-2651	36987-3061	1718	4214	2	73071.88	2018-10-31	2019
0019-0862	68151-1471	2849	3603	2	85151.49	2018-11-10	2019
0049-0032	60429-028	2370	4762	2	63492.66	2018-11-10	2019
0049-4940	59078-039	2781	4893	1	85609.02	2018-11-12	2019

Table 7:`order_t` table

product_id	vehicle_maker	vehicle_model	vehicle_color	vehicle_model_year	vehicle_price
3500	Kia	Rio	Pink	2006	85650.88623000
3501	Volkswagen	GTI	Blue	2011	80690.46000000
3503	Maserati	430	Blue	1990	73400.60700000
3508	Jaguar	S-Type	Violet	2006	94846.19000000
3509	GMC	2500 Club Coupe	Puce	1993	83682.33300000
3511	Maserati	Quattroporte	Green	2005	85502.00000000
3512	Saab	09-May	Indigo	2006	88856.59500000

Table 8: `product_t` table

	shipper_id	shipper_name	shipper_contact_details
▶	1003	Tavu	187-20-9550
	1005	Rhybox	655-21-6931
	1007	Katz	815-87-7868
	1009	Brainlounge	571-38-4231
	1013	Realbridge	457-27-6078
	1015	Yakijo	616-53-0046
	1022	InnoZ	415-48-2318

Table 9: `shipper_t` table

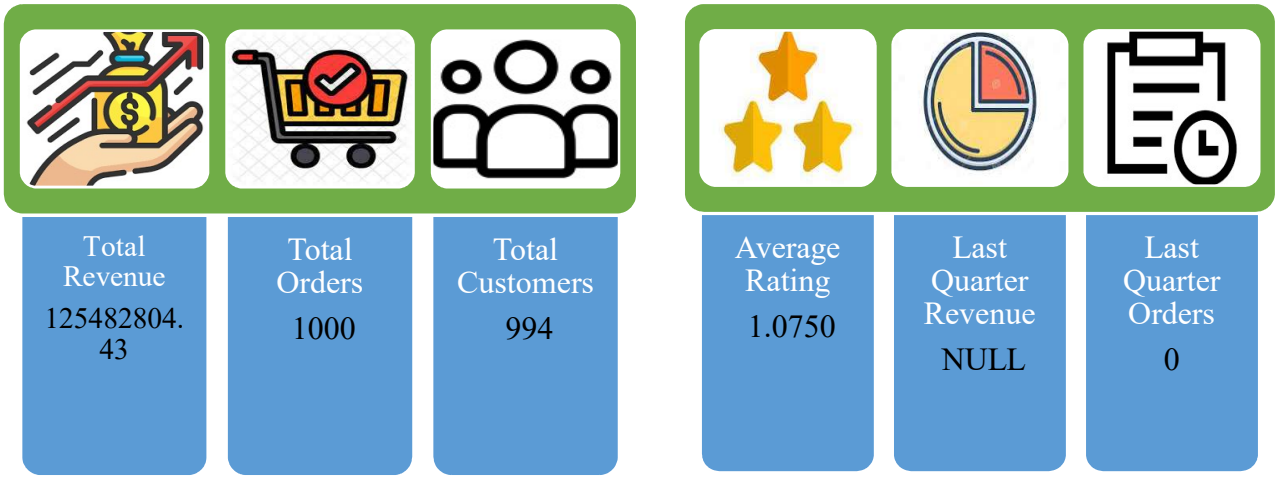

Fig 2.1 Overview of New-Wheels sales

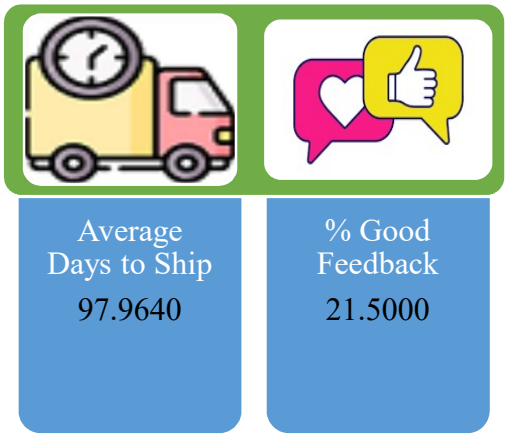

Fig 2.2 Overview of New-Wheels sales

Customer Metrics:

Queries:

1. QUESTIONS RELATED TO CUSTOMERS

[Q1] What is the distribution of customers across states?

(Hint: For each state, count the number of customers)

state	customer_count
California	97
Texas	97
Florida	86
New York	69
District of Columbia	35
Colorado	33
Ohio	33
Alabama	29

Table 10: The distribution of customers across states

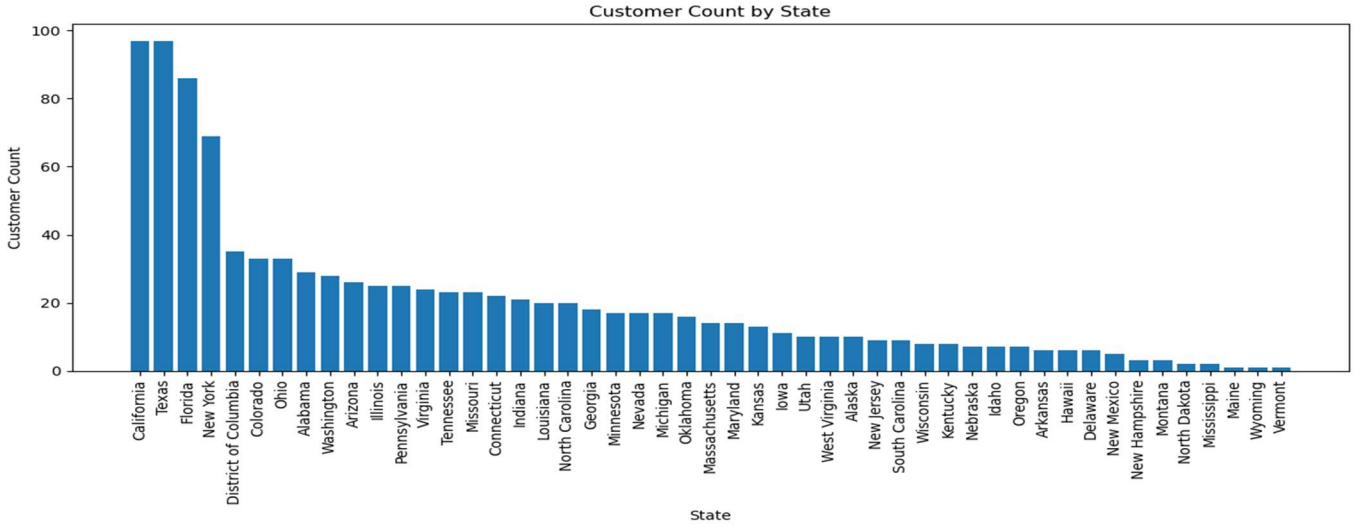

Fig 3: Bar chart of Customer Count by State

Insights:

- California and Texas have the most purchases, each with 97. This shows that these two states are the most popular with customers, which is a good sign for the industry.
- Florida is the third most popular state with 86 shoppers. New York follows close behind with 69 customers, indicating that they are also important markets for the business.
- Columbia, Colorado and Ohio have a healthy subscriber base, with subscribers ranging from 33 to 35. This indicates a strong presence in these states.
- Gradual decline in the number of customers. States like Alabama, Washington, and Arizona are at 20-year highs in consumers, indicating reasonably good attendance.
- Illinois, Pennsylvania, Virginia, Tennessee, Missouri and many other states each have 20-25 customers. This indicated that it was formally located in these areas.
- Some countries have few clients, some have less than 1 or 2 clients. These countries may not be the main focus of the business at the moment.

- Customer data is lacking in some countries, indicating the possibility of an untapped market for future exploration of the business.

[Q2] What is the average rating in each quarter?

Very Bad is 1, Bad is 2, Okay is 3, Good is 4, Very Good is 5.

(Hint: Use a common table expression and in that CTE, assign numbers to the different customer ratings. Now average the feedback for each quarter.)

quarter_number	average_rating
1	3.5548
2	3.3550
3	2.9563
4	2.3970

Table 11: Average rating in each quarter

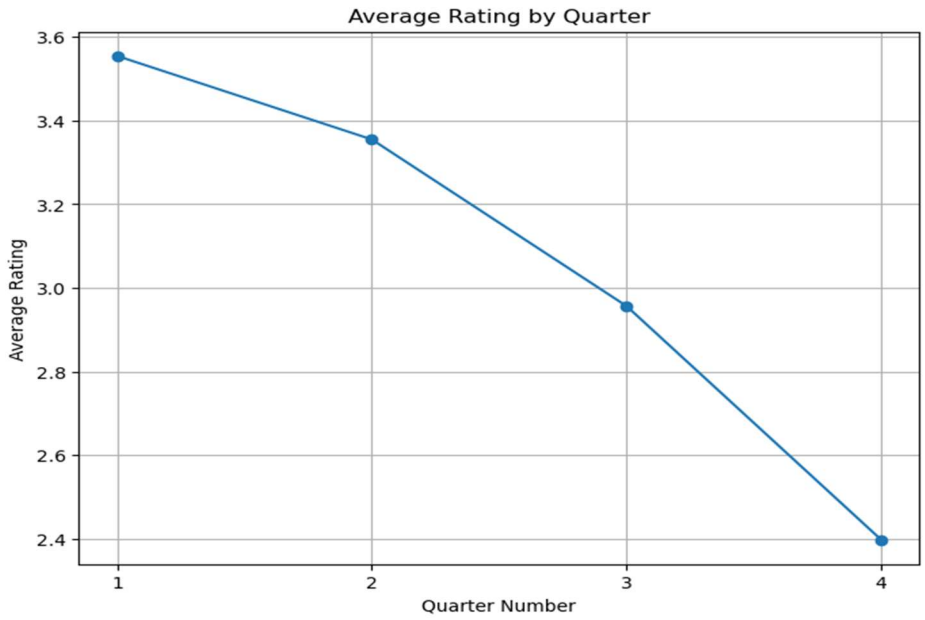

Fig 4: Line chart of Average Rating by Quarter

Insights:

- From the primary area to the fourth zone, the average fee suggests a decrease because the 12 months progresses. This means that client pride or remarks typically declines over time.
- The highest common inside the first area is 3.5548. This manner that on average, customers were greater happy and provided high-quality comments at the start of the year.

- The lowest average quantity for the region is two.3970. This way that purchaser satisfaction or remarks deteriorated notably at the quit of the 12 months.
- Rating variations are high-quality, with the best average rankings inside the first quarter of the century and the lowest in the nineteenth century in within the fourth version. These adjustments can also mirror seasonal factors or adjustments in purchaser sentiment in the course of the yr.
- The indicator in question describes the usage of CTE to assign numbers to client values. This technique lets in for a standardized approach to the estimation of the reaction that is critical within the calculation of the common.

[Q3] Are customers getting more dissatisfied over time?

(Hint: Need the percentage of different types of customer feedback in each quarter. Use a common table expression and determine the number of customer feedback in each category as well as the total number of customer feedback in each quarter. Now use that common table expression to find out the percentage of different types of customer feedback in each quarter. Eg: (total number of very good feedback/total customer feedback)* 100 gives you the percentage of very good feedback.)

quarter_number	very_bad_count	bad_count	okay_count	good_count	very_good_count	total_feedback_count
4	61	58	40	20	20	199
1	34	35	59	89	93	310
3	41	52	50	48	38	229
2	39	37	53	58	75	262

total_feedback_count	very_bad_percentage	bad_percentage	okay_percentage	good_percentage	very_good_percentage
199	30.6533	29.1457	20.1005	10.0503	10.0503
310	10.9677	11.2903	19.0323	28.7097	30.0000
229	17.9039	22.7074	21.8341	20.9607	16.5939
262	14.8855	14.1221	20.2290	22.1374	28.6260

Table 12: Types of customer feedback in each quarter

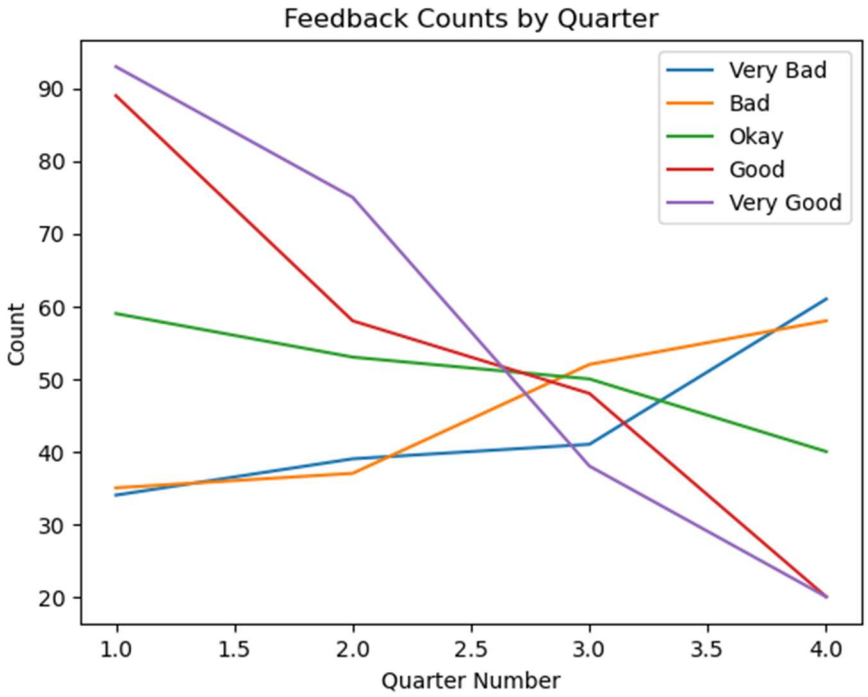

Fig 5: Line plot of Feedback Counts by Quarter

Insights:

- Response categories are divided into five categories: very bad, bad, good, good, and very good, including very bad and very bad and very good and very good.
- The data shows how the distribution of customer feedback changes by quarter of the year.
- The percentage of negative answers increased during the fourth quarter at 30.65%. This means that a significant proportion of consumers received negative feedback in the last quarter. In addition, the percentage of incorrect answers is also very high at 29.15%. This indicates a decline in customer satisfaction in the second half of the year.
- The percentage of positive responses is very high at 30% in the first quarter. This means that a large proportion of customers had a very positive experience at the beginning of the year. The overall level of satisfaction is slightly higher this quarter.
- Decline in satisfaction: In the third quarter, customer satisfaction declined sharply. The responses are evenly distributed, with no single categories. In terms of consumer behaviour, these four years represent a relatively challenging period.
- The data highlights the importance of tracking and managing customer data throughout the year. A sharp increase in negative reviews, especially in the fourth quarter, may indicate the need for corrective action to improve customer satisfaction.

[Q4] Which are the top 5 vehicle makers preferred by the customer.

(Hint: For each vehicle make what is the count of the customers.)

	vehicle_maker	customer_count
▶	Chevrolet	83
	Ford	63
	Toyota	52
	Pontiac	50
	Dodge	50

Table 13: The top 5 vehicle makers preferred by the customer

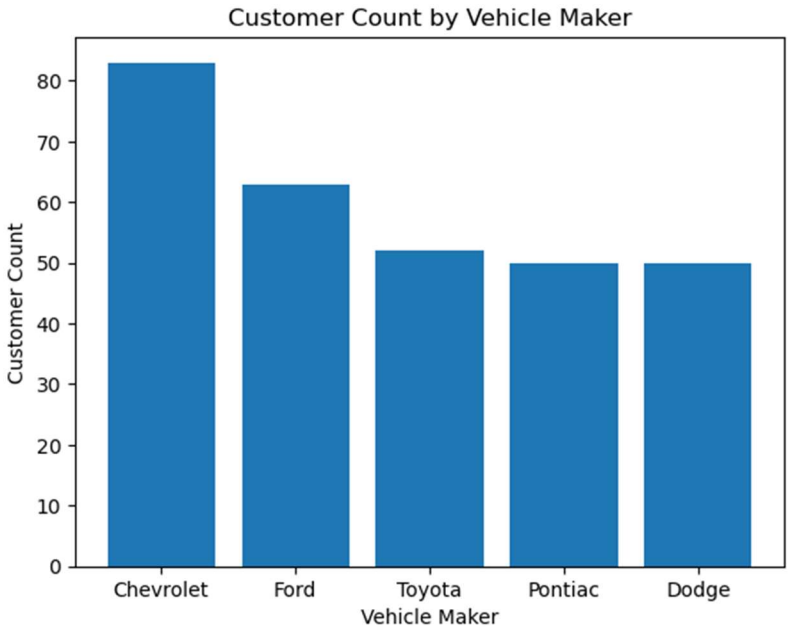

Fig 6: Bar plot of Customer Count by Vehicle Maker

Insights:

- Chevrolet is the maximum desired car maker, with 83 customers deciding on their vehicles. This suggests that Chevrolet is the top choice some of the clients.
- Ford and Toyota are the second and third maximum desired automobile makers, with sixty three and fifty two customers, respectively. They have a good sized customer base, displaying their recognition among customers.
- Pontiac and Dodge share the fourth function with 50 clients every. This indicates that these automobile makers are similarly favoured through the customers.
- The information shows that clients have diverse possibilities in relation to car makers. While Chevrolet leads, there is powerful competition amongst Ford, Toyota, Pontiac, and Dodge, as they all have a massive client base.

- Recognizing which automobile makers are favored by way of clients can assist the commercial enterprise tailor its offerings and advertising techniques. It's crucial to take note of patron choices to satisfy their desires and expectancies efficaciously.

[Q5] What is the most preferred vehicle make in each state?
(Hint: Use the window function RANK() to rank based on the count of customers for each state and vehicle maker. After ranking, take the vehicle maker whose rank is 1.)

state	most_preferred_vehicle_make	ranks
Alabama	Dodge	1
Alaska	Chevrolet	1
Arizona	Pontiac	1
Arizona	Cadillac	1
Arkansas	Suzuki	1
Arkansas	Chevrolet	1
Arkansas	Pontiac	1
Arkansas	Volkswagen	1
Arkansas	Mitsubishi	1

Table 14: The most preferred vehicle make in each state

Insights:

- The records shows an extensive sort of car choices throughout unique states. Each country has its own most favoured car make, reflecting local differences in client selections.
- There isn't an unmarried dominant car maker desired in all states. Instead, each country has its very own precise choice.
- Some states share the identical maximum preferred automobile maker. For instance, Chevrolet is the top desire in numerous states, inclusive of Alaska, California, and West Virginia, while Ford is favoured in Hawaii and Maryland, and Toyota is popular in Florida and New York.
- The facts indicates that patron options for vehicle makers are prompted through regional factors. Customers in unique states have their very own precise tastes and priorities with regards to deciding on a car.
- Understanding those regional choices is valuable for automakers and dealerships. It enables them tailor their advertising and distribution strategies to better meet the precise needs and alternatives of clients in distinctive states.

2. QUESTIONS RELATED TO REVENUE and ORDERS

[Q6] What is the trend of number of orders by quarters?

(Hint: Count the number of orders for each quarter.)

	year	quarter	number_of_orders
▶	2018	1	310
	2018	2	262
	2018	3	229
	2018	4	199

Table 15: The trend of number of orders by quarters

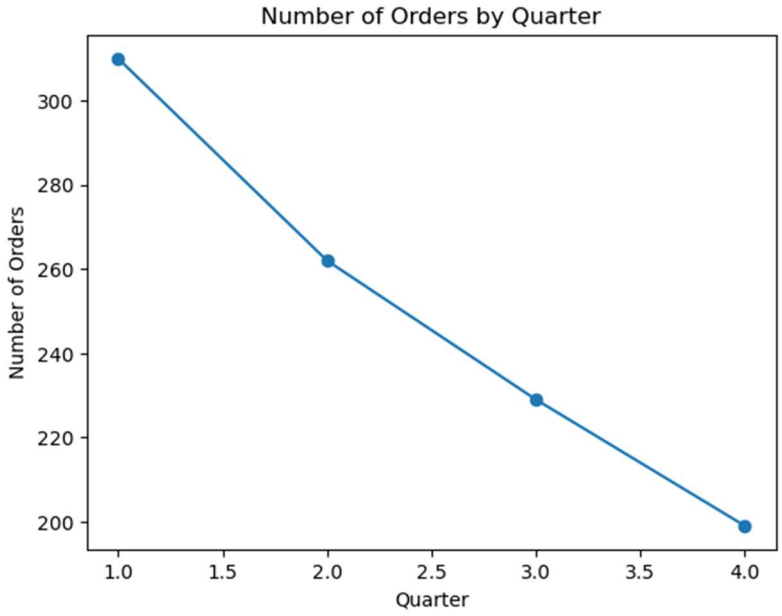

Fig 7: Line plot of Number of Orders by Quarter

Insights:

- The statistics indicates a decreasing trend inside the quantity of orders as the year progresses from the first quarter (Q1) to the fourth zone (Q4).
- In the first area of 2018, there were 310 orders, that's the best range of orders inside the year. This indicates a strong begin to the year in phrases of order quantity.
- The variety of orders regularly declines in every subsequent quarter. In the second one sector (Q2), there were 262 orders, inside the third region (Q3), there have been 229 orders, and inside the fourth sector (Q4), the range of orders in addition reduced to 199.
- The information suggests a cyclical pattern, with a top within the first zone and a trough in the fourth region. This sample may be prompted via different factors, including seasonal trends, marketplace situations, or enterprise cycles.

- Monitoring the fashion of the number of orders by using quarters is critical for corporations to make knowledgeable decisions approximately resource allocation, inventory control, and income techniques. Understanding those patterns can assist in adapting to seasonal fluctuations and optimizing enterprise operations.

[Q7] What is the quarter over quarter % change in revenue?

(Hint: Quarter over Quarter percentage change in revenue means what is the change in revenue from the subsequent quarter to the previous quarter in percentage. To calculate you need to use the common table expression to find out the sum of revenue for each quarter. Then use that CTE along with the LAG function to calculate the QoQ percentage change in revenue.)

quarter	revenue	qoq_percentage_change
2018 Q1	39637630.97	NULL
2018 Q2	32913737.76	-16.963408
2018 Q3	29435427.48	-10.567959
2018 Q4	23496008.22	-20.177792

Table 16: The quarter over quarter % change in revenue

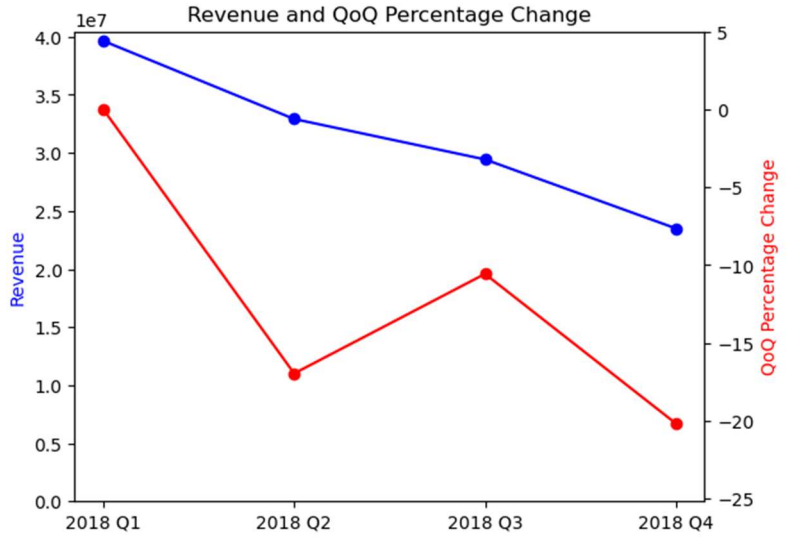

Fig 8: Line plot of Revenue and QoQ Percentage Change

Insights:

- The statistics famous a declining trend in revenue over the 4 quarters of the year 2018.
- In the primary area of 2018 (Q1), the revenue turned into the highest at approximately $39.6 million.

- In the following quarters, revenue skilled consistent declines. In the second area (Q2), revenue dropped by way of about sixteen.96% in comparison to Q1. This shows a giant lower in sales among the first and second quarters.
- The fashion endured within the 1/3 sector (Q3) with a further decline of approximately 10.Fifty seven% from Q2. This represents a particularly smaller lower as compared to the previous zone.
- The fourth area (Q4) had the lowest revenue, at approximately $23.Five million, that's a lower of approximately 20.18% as compared to Q3. This marks the most widespread quarterly decline in sales throughout the 12 months.
- The zone-over-region percentage trade in revenue is crucial for agencies to assess their financial overall performance and make knowledgeable decisions. In this example, the data suggests that the business enterprise skilled declining revenue throughout the year, which may additionally warrant a more in-depth examination of the reasons at the back of this trend and the implementation of techniques to reverse it.

[Q8] What is the trend of revenue and orders by quarters?

(Hint: Find out the sum of revenue and count the number of orders for each quarter.)

	quarter	revenue	number_of_orders
▶	2018 Q1	39637630.97	310
	2018 Q2	32913737.76	262
	2018 Q3	29435427.48	229
	2018 Q4	23496008.22	199

Table 17: The trend of revenue and orders by quarters

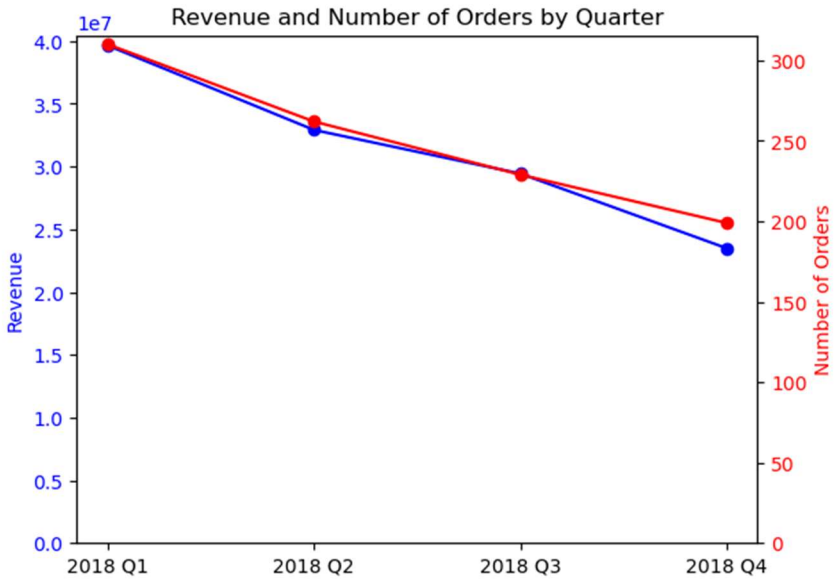

Fig 9: Line plot of Revenue and Number of Orders by Quarter

Insights:

- The records shows a steady decline in revenue because the year progresses from the primary region (Q1) to the fourth sector (Q4). This indicates a downward trend inside the agency's earnings over the course of the yr.
- In the primary zone of 2018 (Q1), the revenue was the very best at approximately $39.6 million, indicating a robust start to the 12 months.
- In the second one sector (Q2), sales decreased to round $32.9 million, marking a decline in comparison to Q1. This trend of declining revenue continued inside the 0.33 region (Q3) and the fourth quarter (Q4), with sales losing to about $29.Four million and $23.5 million, respectively.
- There is a clean correlation between the declining fashion in sales and the lowering number of orders over the yr. As revenue decreased, the wide variety of orders additionally declined.
- Tracking and know-how trends in revenue and the wide variety of orders by means of quarters is vital for groups to make knowledgeable choices. A declining trend may additionally require changes in advertising, income, and economic strategies to address the decreasing performance.

3. QUESTIONS RELATED TO SHIPPING

[Q9] What is the average discount offered for different types of credit cards?

Hint: Find out the average of discount for each credit card type.

credit_card_type	average_discount
jcb	0.607382
visa-electron	0.623469
switch	0.610233
diners-club-carte-blanche	0.614490
laser	0.643846
china-unionpay	0.622174
diners-club-enroute	0.599792

Table 18: The average discount offered for different types of credit cards

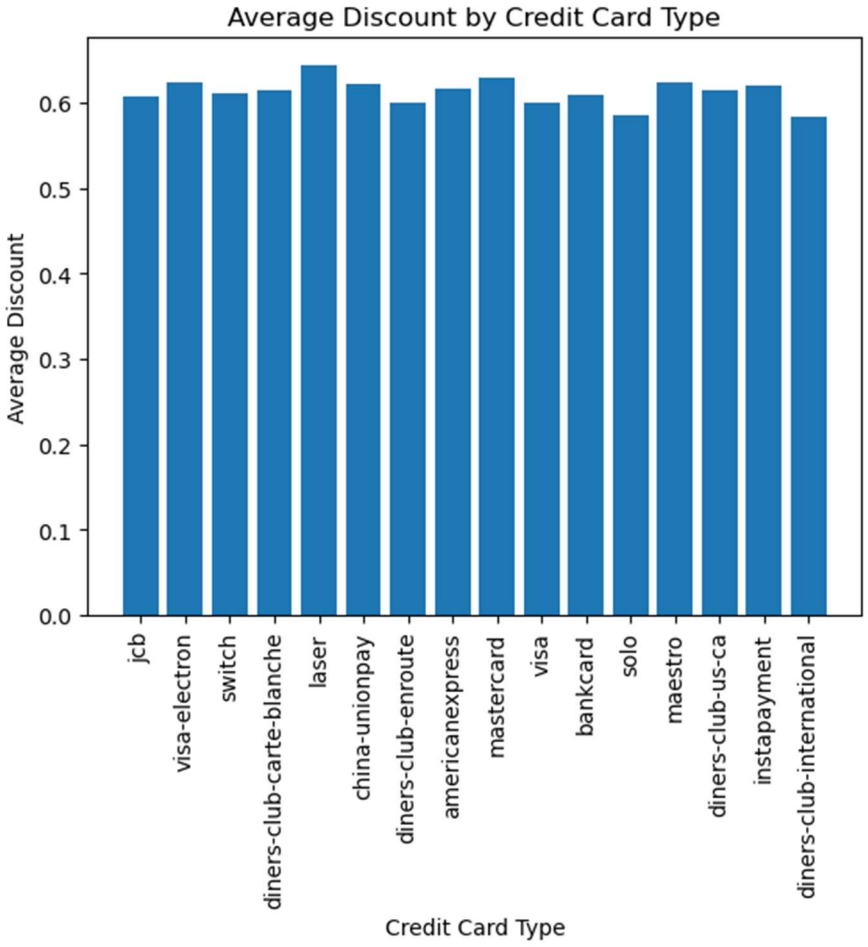

Fig 10: Bar plot of Average Discount by Credit Card Type

Insights:

- The records indicates versions in the average reductions presented for one of a kind kinds of credit cards.
- Laser and Visa-Electron credit score card types have the highest common reductions, with approximately 0.644 and 0.623, respectively. This indicates that those playing cards generally tend to get hold of extra big discounts on common.

- Master-card and Maestro have enormously higher common reductions of about zero.630 and 0.624, respectively. This indicates that clients using these card kinds obtain above-average reductions.
- Diners Club International and Solo credit card types have lower common reductions, with approximately 0.584 and zero.585, respectively. Customers using those playing cards receive pretty decrease reductions on their purchases.
- The variation in average discounts for different credit card types can offer insights into patron preferences and the way businesses tailor their pricing strategies. Offering attractive reductions for certain card types may be a part of an advertising approach to attract customers.
- Businesses must cautiously analyse these facts points to decide whether or not their pricing and discount strategies align with consumer choices and business desires.

[Q10] What is the average time taken to ship the placed orders for each quarters? (Hint: Use the dateiff function to find the difference between the ship date and the order date.)

	quarter	average_shipping_time
▶	2018 Q1	57.1677
	2018 Q2	71.1107
	2018 Q3	117.7555
	2018 Q4	174.0955

Table 19: The average time taken to ship the placed orders for each quarters

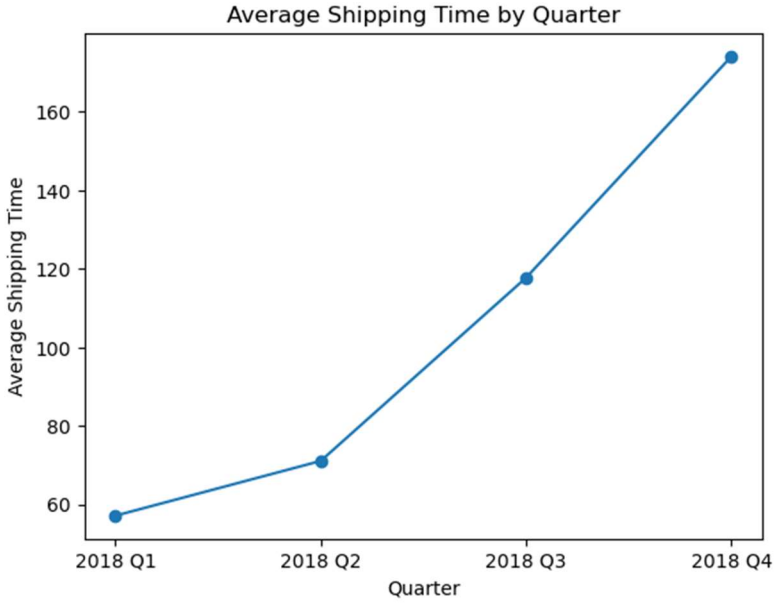

Fig 11: Line plot of Average Shipping Time by Quarter

Insights:

- The facts exhibits a clean trend of growing common transport instances as the year progresses from the primary region (Q1) to the fourth area (Q4).
- In the first sector of 2018 (Q1), the average transport time turned into the lowest at approximately fifty seven.17 gadgets (e.g., hours or days). This shows that, on average, orders were processed and shipped rather speedy during the initial area.
- The common shipping time regularly expanded within the next quarters. In the second one region (Q2), it rose to around 71.11 units, reflecting a longer time taken for orders to be shipped.
- The trend persisted, with even longer shipping instances within the third area (Q3), in which the average delivery time changed into about 117.Seventy six gadgets. The longest common transport time became discovered in the fourth sector (Q4), with a mean of about 174.10 devices.
- Increasing transport times can impact customer delight, as longer ready intervals can cause much less glad clients. Businesses must screen and manipulate delivery times to maintain patron satisfaction and make sure orders are introduced in a timely way.
- The statistics offers operational insights into order processing and transport efficiency, allowing businesses to optimize their logistics and success approaches.

Overall Observations / findings

1. California and Texas are the most popular states with 97 customers each, followed by Florida and New York. States like the District of Columbia, Colorado, and Ohio also show strong customer bases. Some states have moderate presence, while others need attention. States with no data could be untapped opportunities for expansion.
2. The analysis indicates a concerning decline in average customer ratings from Q1 to Q4, implying decreasing customer satisfaction. Q1 had the highest rating (3.5548), while Q4 had the lowest (2.3970), signifying a notable variation. This could be due to seasonal trends or changing customer sentiment. Using a standardized approach to evaluate feedback is essential for accurate insights. This information calls for attention and action to improve customer satisfaction.
3. The data reflects the evolving distribution of customer feedback over the year. In the fourth quarter, negative feedback (Very Bad and Bad) increases significantly, signalling

a decline in satisfaction. Conversely, the first quarter exhibits high Very Good feedback, indicating a positive start to the year. Quarters 2 and 3 show more balanced feedback. Consistent monitoring and response to feedback are essential for maintaining customer satisfaction.

4. Chevrolet is the top choice, preferred by 83 customers, followed by Ford (63) and Toyota (52). Pontiac and Dodge share the fourth position with 50 customers each. Diverse customer preferences highlight strong competition. Understanding these preferences is crucial for tailored offerings and effective marketing strategies to meet customer needs and expectations.
5. The data reveals diverse regional vehicle preferences, with each state having its own most preferred vehicle maker. No single maker dominates across states, indicating the influence of regional factors on customer choices. Recognizing these preferences enables tailored marketing and distribution strategies to meet the specific needs and tastes of customers in different states, aiding automakers and dealerships.
6. The data reveals a declining trend in quarterly order numbers throughout the year, with the highest in Q1 (310 orders) and the lowest in Q4 (199). This cyclical pattern may be influenced by seasonal factors or market conditions. Businesses should closely monitor these trends to allocate resources, manage inventory, and adapt sales strategies effectively.
7. The data displays a concerning revenue decline over 2018, with Q1 showing the highest revenue and Q4 the lowest. The most significant drop occurred between Q3 and Q4, indicating challenges. Monitoring quarter-over-quarter changes is essential for financial assessment and strategizing. Identifying and addressing the factors behind this trend is critical for improving the company's financial performance.
8. The data indicates a consistent revenue decline from Q1 to Q4, aligning with decreasing order numbers. Q1 marked a strong start, but subsequent quarters experienced revenue drops. Recognizing this trend is crucial for strategic decisions, necessitating adjustments in marketing, sales, and financial strategies to counter declining performance.
9. The data reveals variations in average discounts based on credit card types. Laser and Visa-Electron cards receive the highest discounts, while Mastercard and Maestro also enjoy above-average discounts. Diners Club International and Solo cards receive comparatively lower discounts. Businesses should align pricing and discount strategies with customer preferences and business objectives, considering these findings.

10. The data shows a notable increase in average shipping times from Q1 to Q4, potentially affecting customer satisfaction. Quick shipping in Q1 declines to significantly longer shipping times in Q4. Managing and optimizing order processing and shipping efficiency is vital to meet customer expectations and maintain satisfaction.

Recommendations

- Prioritize improving customer satisfaction by addressing feedback.
- Implement measures to maintain or enhance ratings throughout the year.
- Tailor marketing efforts to align with regional vehicle preferences.
- Understand regional factors influencing customer choices.
- Efficiently allocate resources based on quarterly order trends.
- Manage inventory and sales strategies to adapt to seasonal fluctuations.
- Investigate and address factors leading to revenue decline, especially in Q4.
- Develop strategies to reverse the declining trend and improve financial performance.
- Align pricing and discount strategies with customer preferences for various credit card types.
- Ensure discounts are consistent with business goals and customer expectations.
- Optimize order processing and shipping efficiency to reduce delivery times.
- Enhance shipping practices to meet customer expectations and maintain satisfaction.