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## Introduction

### Project Overview

This report represents a comprehensive analysis of car sales data spanning from October 2022 to October 2025, encompassing 10000 transactions across 500 unique vehicle models. The analysis examines sales performance, customer behavior, inventory management, and profitability metrics within the automotive retail sector.

### Business Context

The automotive industry operates in a highly competitive environment where understanding customer preferences, optimizing inventory levels, and managing pricing strategies are critical to sustained profitability. This project addresses key business challenges including revenue optimization, customer segmentation, stock management, and salesperson performance evaluation.

### Project Objective

- Evaluate Sales Performance
- Understand Customer Behavior
- Optimize Inventory Management
- Analyze Profitability according to margin performance
- Monitor Market Dynamics

### Tools & Technology

- Database Management : MySQL for data warehousing and query execution
- Data Visualization : PowerBI for interactive dashboards and executive reporting
- Data Modeling: Star schema with fact and dimension tables

## Methodology

### Analytical Framework

The project employs a structured multi-phase combining data engineering, statistical analysis, and business intelligence techniques to derive actionable insights from automotive sales data.

### Data Collection and Profiling

- Dataset Collected from kaggle dataset
- Data Profiling
  - Uniqueness Analysis : validation of primary integrity across all tables
  - Cardinality Assessment : Evaluation of distinct value counts and uniqueness percentage
  - Data type Classification : Categorization of fields into numerical, categorical, temporal, and text types
  - Completeness Check : identification of null values and missing data patterns

## Data Modeling and Normalization

- Fact table identification and implementation
- Dimension table design
- Surrogate key Implementation
- Fiscal Calendar creation
- Denormalization

## Feature Engineering Insight

- Margin Class
- Price Class

## Analytical Techniques

- Cumulative Pattern
- Time related pattern
- Transition pattern
- Basket analysis
- Ranking
- Segmentation
- ABC Classification

## Statistical Method

- Estimates of Location
  - Mean
  - median
  - Outlier
- Estimates of Variability :
  - Variance,
  - Standard deviation
  - Range ,Percentile

## Data Schema and Modification

### Pre-Normalization Data Schema

- Sales

Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
sale_id	text	10000	10000	Unique Identifier	100.00%
sale_price	double	9993	10000	Numerical Continuous	99.93%
quantity	bigint	3	10000	Numerical Discrete	0.03%
payment_method	text	3	10000	Nominal / Categorical	0.03%
car_id	text	500	10000	Nominal / Text (High Cardinality)	5.00%
customer_id	text	1986	10000	Nominal / Text (High Cardinality)	19.86%
sale_date	text	1095	10000	Nominal / Text (High Cardinality)	10.95%
salesperson	text	9380	10000	Nominal / Text (High Cardinality)	93.80%

- Customers

Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
customer_id	text	2000	2000	Unique Identifier	100.00%
email	text	1998	2000	Unique Identifier	99.90%
name	text	1967	2000	Unique Identifier	98.35%
phone	text	2000	2000	Unique Identifier	100.00%
age	bigint	53	2000	Numerical Continuous	2.65%
gender	text	2	2000	Nominal / Categorical	0.10%
city	text	1851	2000	Nominal / Text (High Cardinality)	92.55%

- Cars

Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
car_id	text	500	500	Unique Identifier	100.00%
price	double	500	500	Numerical Continuous	100.00%
quantity_in_stock	bigint	21	500	Numerical Continuous	4.20%
year	bigint	11	500	Numerical Discrete	2.20%
brand	text	7	500	Nominal / Categorical	1.40%
color	text	6	500	Nominal / Categorical	1.20%

engine_type	text	4	500	Nominal / Categorical	0.80%
status	text	3	500	Nominal / Categorical	0.60%
transmission	text	2	500	Nominal / Categorical	0.40%
model	text	21	500	Nominal / Text (High Cardinality)	4.20%

## Normalization & Data Modeling

- Primary Key Validation
  - Sales Table : sale\_id demonstrate 100% uniqueness
  - Customer Table: customer\_id demonstrate 100% uniqueness
  - Cars Table: car\_id demonstrate 100% uniqueness
- Fact Table Classification
  - Identification
    - The sales table contains transactional/event data with measurable quantities .Includes foreign key references to dimension tables.Records temporal information(sale\_date)
  - Determination:
    - We will create a table fact\_sales for fact tabel
- Dimension table classification
  - Identification
    - Customers:Descriptive attributes about who made purchases
    - Cars:Descriptive attributes about what was purchased
    - Date: Temporal context for when transactions occured
  - Determination
    - Dim\_customer for customer
    - Dim\_Date for date or transaction occurred
    - Dim\_cars for car information
- Schema Architecture
 

This normalize schema provide a start schema after normalization and data modeling as all the table join in a center table where transaction happened and all dimension provide information about the fact

## Normalization Data Schema

- dim\_car

Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
car_id	varchar	500	500	Unique Identifier	100.00%
base_price	decimal	500	500	Numerical Continuous	100.00%
sk_car	int	500	500	Numerical Continuous	100.00%
year_model	int	11	500	Numerical Discrete	2.20%
car_type	varchar	4	500	Nominal / Categorical	0.80%
category	varchar	3	500	Nominal / Categorical	0.60%
transmission	varchar	2	500	Nominal / Categorical	0.40%
model	varchar	21	500	Nominal / Text (High Cardinality)	4.20%
quantity_in_stock	varchar	21	500	Nominal / Text (High Cardinality)	4.20%

- dim\_customer

Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
customer_id	varchar	2000	2000	Unique Identifier	100.00%
customer_name	varchar	1967	2000	Unique Identifier	98.35%
email	varchar	1998	2000	Unique Identifier	99.90%
sk_customer	int	2000	2000	Numerical Continuous	100.00%
is_active	tinyint	1	2000	Numerical Discrete	0.05%
valid_from	datetime	1	2000	Temporal	0.05%
valid_to	datetime	1	2000	Temporal	0.05%
age_group	varchar	3	2000	Nominal / Categorical	0.15%

- dim\_date

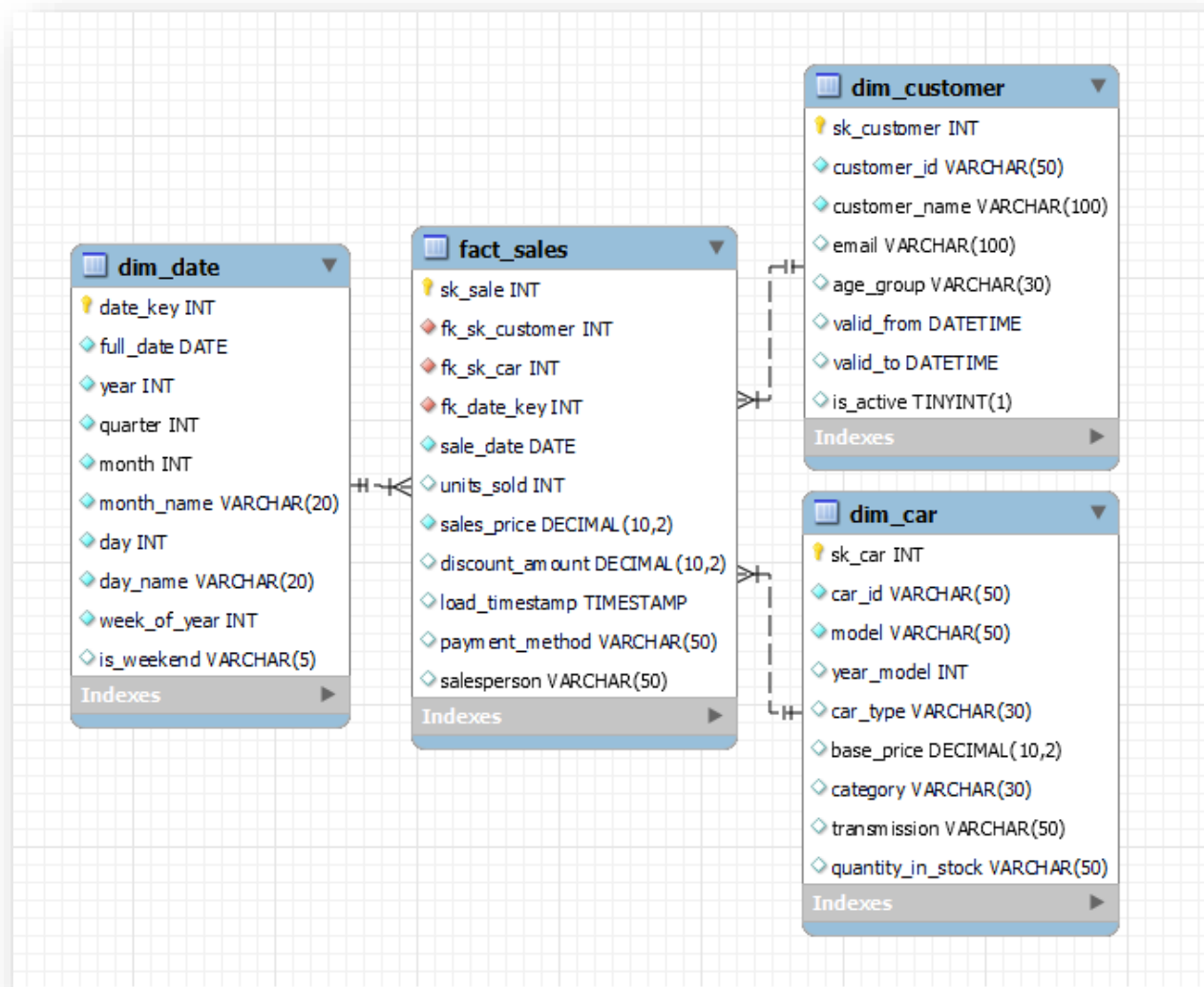
Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
date_key	int	1095	1095	Numerical Continuous	100.00%
day	int	31	1095	Numerical Continuous	2.83%
week_of_year	int	54	1095	Numerical Continuous	4.93%
month	int	12	1095	Numerical Discrete	1.10%
quarter	int	4	1095	Numerical Discrete	0.37%
year	int	4	1095	Numerical Discrete	0.37%
full_date	date	1095	1095	Temporal	100.00%
day_name	varchar	7	1095	Nominal / Categorical	0.64%
is_weekend	varchar	2	1095	Nominal / Categorical	0.18%
month_name	varchar	12	1095	Nominal / Categorical	1.10%

- fact\_sales

Column Name	Data Type	Distinct Values	Total Rows	Category	Uniqueness %
fk_date_key	int	1095	10000	Numerical Continuous	10.95%
fk_sk_car	int	500	10000	Numerical Continuous	5.00%
fk_sk_customer	int	1986	10000	Numerical Continuous	19.86%
sales_price	decimal	9993	10000	Numerical Continuous	99.93%
sk_sale	int	10000	10000	Numerical Continuous	100.00%
discount_amount	decimal	1	10000	Numerical Discrete	0.01%
units_sold	int	3	10000	Numerical Discrete	0.03%
load_timestamp	timestamp	1	10000	Temporal	0.01%
sale_date	date	1095	10000	Temporal	10.95%
payment_method	varchar	3	10000	Nominal / Categorical	0.03%

salesperson	varchar	9380	10000	Nominal / Text (High Cardinality)	93.80%
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## ERD Diagram





## Identifier based Analysis

- Basics of sales data

metric_ name	count_ value	distinct_ count	avg_value	sum_value	min_v alue	max_v alue	stddev_value
sales_price	10000	9993	57421.35441	574213544.1	15000	99995.	24568.85381
total_price	10000	9997	114652.4572	1146524572.	15000	29998	70770.52226
			3899985	3899984	.37	5.66	323835

- Insight Analysis

- The distinct count suggests minimal duplication , implying high variability in pricing per transaction
- The standard deviation 70770.22 is shows that high value customers

- Z-score in year to year comparison

Segment	2022 Number of Transitions	2023 Number of Transitions	2024 Number of Transitions	2025 Number of Transitions	Total Transitions	Avg Price (\$)	Overa ll %
1. Very Low (< -1.50)	39	222	218	190	669	17810. 39	6.69
2. Low (-1.50 to -1.00)	86	449	492	369	1396	26655. 07	13.96
3. Below Average (- 1.00 to - 0.50)	80	507	477	432	1496	38912. 10	14.96
4. Average (- 0.50 to 0.50)	180	926	990	826	2922	57360. 26	29.22
5. Above Average (0.50 to 1.00)	82	467	475	383	1407	75928. 50	14.07
6. High (1.00 to 1.50)	82	487	478	380	1427	88375. 98	14.27
7. Very High (>= 1.50)	39	212	225	207	683	97108. 06	6.83

➤ Insight Analysis

- The distribution of transition across z-score segment forms a bell-shaped pattern ,with highest concentration around the Average(-0.5 to .5 ) range ,accounting for 29.22% of all transitions.This indicates that majority of data points cluster around the mean ,reflecting a relatively normal distribution of performance
- Extreme Z-score bands – very low(<-1.50) and Very High (=>1.50) –together represent only 13.5% of total transitions,confirming that outliers are limited within the dataset
- A progressive increase in average price is observed with rising Z-score ,moving from \$17,810 in the very low segment to \$97,108 in the very high segment .This shows that strong positive correlation between performance –score and pricing.
- The average and below average categories dominates the highest contribution

• Payment Method used year to year

payment_method	2022	2022 %	2023	2023 %	2024	2024 %	2025	2025 %
	Count		Count		Count		Count	
Cash	211	35.88	1070	32.72	1163	34.66	910	32.65
Credit	181	30.78	1084	33.15	1065	31.74	921	33.05
Installment	196	33.33	1116	34.13	1127	33.59	956	34.30

➤ Insight Analysis – Payment Method Trends(2022-2025)

- Customer preferences has shifted from cash to installment paymentsbetween 2022 and 2025
- Installments now dominate ,reflecting rowing reliance on structured financial options
- Cash usage declined steadily ,while credit card remain stable , indicating the installment is increasing.

• Revenue By Year

Fiscal_Year	Total_Revenue	Cumulative_Revenue	cumulative_growth
2022	163672270.66000023	163672270.66000023	
2023	373332312.6100003	537004583.2700006	228.09747253127028
2024	386173202.73000085	923177786.0000014	71.9124593645855
2025	223346786.38999978	1146524572.3900013	24.19325830593583

➤ Insight Analysis :

- Revenue rose sharply in FY2023 ,marking then stongest year-over-year expansion
- FY2024 continued positive momentum growth
- In FY2025 fiscal year did not finish ,so the growth looking low but overall perspective is good

- Revenue in Year By Month

Month	Revenue_2022	Growth_2022 %	Revenue_2023	Growth_2023 %	Revenue_2024	Growth_2024 %	Revenue_2025	Growth_2025 %
April	0		28878799.55		29464450.83		32746268.90	
May	0		29295175.72	1.44	32394574.89	9.94	33264463.47	1.58
June	0		30142923.63	2.89	34180980.43	5.51	33565604.06	0.91
July	0		32053713.84	6.34	36019506.36	5.38	33154033.99	-1.23
August	0		30435449.02	-5.05	33690369.07	-6.47	32430899.17	-2.18
September	0		32090422.02	5.44	29684680.73	-11.89	26728828.09	-17.58
October	370036.73		34343091.05	7.02	32557363.55	9.68	31456688.69	17.69
November	3501918.839		32126054.93	-6.46	30918006.66	-5.04	0	
December	34237249.6	-2.23	34421048.05	7.14	30664145.27	-0.82	0	
January	31312051.83	-8.54	32520314.37	-5.52	34628038.75	12.93	0	
February	28617497.91	-8.61	26717692.71	-17.84	27940550.74	-19.31	0	
March	34116246.19	19.21	30307627.68	13.44	34030535.39	21.8	0	

➤ Insight Analysis :

- Revenue generally increased through mid-year months (April-July) and then declined toward fiscal year end (August - September)
- FY2023–FY2024 showed steady mid-year growth on the other hand FY2025 began strong but this much data is available in dataset so we can say , steady growth is well
- Negative growth during August – September suggests post-peak slowdown ,possibly tied to inventory cycles.
- Overall pattern reflects a repeating growth then correction cycle.

- Customer Age Group used car in different year

Age_Group	Customer_2025	Pct_2022%	Customer_2023	Pct_2023%	Customer_2024	Pct_2024%	Customer_2025
Mid (30-49)	1016	34.01	1231	37.65	1330	39.64	1016
Young(18-29)	607	24.66	699	21.38	710	21.16	607
Senior(50+)	1164	41.33	1340	40.98	1315	39.20	1164
Total	588	100.00	3270	100.00	3355	100.00	2787

➤ Insight Analysis :

- Senior customers consistently represented the largest buyer ,maintiang around 40-42% of toal customers across year
- Mid\_age group showed steady growth from 34% to 39% ,indicate rising purchasing power among working professional
- Young buyers remain smallest segment
- The overall pattern reflects a mature customer base with stable dominance of senior and mid\_age group

- Top 10 car model by sold

model	Number_of_unit	pct_sold_units %
Cerato	76	0.38
Cerato	69	0.35
5 Series	69	0.35
Sunny	69	0.35
Tucson	64	0.32
GLA	64	0.32
Tucson	64	0.32
Camry	63	0.32
Qashqai	62	0.31
Elantra	61	0.31

➤ Insight Analysis :Top car models by units sold

- Cerato led sales across mutile years, maintain the highest unit volume among all models
- Models like 5 series ,Sunny ,and Tucson closely followed ,each contributing about 0.3 – 0.35% of total units sold.
- Sales distribution among top models remained evenly spread , indicating a diverse customer preference across popular mid- and high-range vehicles

- Top 10 car model by revenue

model	Revenue	pct_revenue %
Cerato	4745727.300000001	0.41
5 Series	4373874.52	0.38
Sunny	4120104.6700000004	0.36
Tucson	4100746.32	0.36
Cerato	4085431.72	0.36
Camry	3975933.19	0.35
E-Class	3885446.7500000005	0.34
Altima	3856102.45	0.34
E-Class	3827596.4299999997	0.33
Camry	3822284.5200000005	0.33

➤ Insight Analysis:

- Cerato generated the highest total revenue, maintain leadership both in units and value contribution .
- 5 series ,Sunny and Tucson followed closely ,each contributing around 0.35-0.38% of total revenue
- Repeated presence of models like Camry and E-class across the top list indicates consistent premium demand.
- Overall ,revenue distribution is balanced across multiple high performing models ,highlighting a diverse and competitive portfolio.

- Top 10 customer by sold unit

customer_name	total_units_sold	pct_revenue %
Edward Hayes	37	1.85
Mrs. Heather Pace PhD	32	1.60
Jennifer Hart	29	1.45
Paula Reid	27	1.35
Katie Ryan	27	1.35
Andrew Robles	26	1.30
Jacob Cantrell	26	1.30
Bryan Watkins	26	1.30
Melissa Brown DDS	26	1.30
Ronald Smith	25	1.25

➤ Insight Analysis:

- Edward Haye ranked as the highest individual buyer , contribution 1.85% of total sales volume .
- Other top
- Other top customer such as Heather Pace,Jennifer Hart ,and Paula Reid each accounted 1.3 - 1.6% of toal revenue
- The top 10 custoers repret a small percentage of total units sold, showing broad market diversity ather than dependency on few buyers.

• Top 10 customer by revenue

customer_name	total_revenue	pct_revenue %
Edward Hayes	2125770.3499999996	1.85
Mrs. Heather Pace PhD	1810315.26	1.58
Melissa Brown DDS	1722980.2700000003	1.5
Teresa Ramirez	1663981.2599999998	1.45
Ronald Smith	1620156.3599999999	1.41
Bryan Watkins	1616523.5299999998	1.41
Jacob Cantrell	1616187.2	1.41
Tammy Reeves	1611430.59	1.41
Lisa Mccarty	1580570.16	1.38
Colleen Miller	1571480.3900000001	1.37

➤ Insight Analysis:

- Edward Hayes was the highest revenue contributor ,accounting for 1.85% of total sales
- Other major customers,such as Heather Pace,melisa Brown ,
- And Teresa Ramirez ,each contributed around 1.4 – 1.6%
- The top 10 customers collectively generated less than 15% of total revenue ,showing a well distributed customer base without heavy reliance on few buyers
- This indicators strong customer diversity and reduced revenue concentration risk.

- Fuel type changing year to year

car_type	count_in_2022	Pct_2022	count_in_2023	Pct_2023	count_in_2024	Pct_2024	count_in_2025	Pct_2025
Diesel	363	25.85	820	25.26	875	25.81	536	27.35
Electric	352	25.07	846	26.06	880	25.96	510	26.02
Hybrid	294	20.94	704	21.69	733	21.62	406	20.71
Petrol	395	28.13	876	26.99	902	26.61	508	25.92

➤ Insight Analysis:

- Petrol cars consistently held the largest share , though it slightly declined from 28% (2022) to 26% (2025)
- Electric vehicles showed steady adoption ,rising to 26% nearly matching petrol sales by 2025
- Diesel share remained stable with a mild uptick to 27% ,while Hybrid vehicles stayed around 21%
- The trend suggests a balance shift toward Electric and Diesel options,reflecting growing diversification in fuel preferences.

- Margin based different model

model	Premium class	High Margin	Near Base	Small Discount	Moderate Discount	Heavy Discount	Deep Discount
3 Series	269	91	87	99	163	110	119
5 Series	433	83	103	73	85	107	81
Altima	242	53	65	78	88	72	64
C-Class	324	70	94	120	134	98	104
Camry	414	89	142	132	163	154	172
Cerato	273	94	107	97	155	123	122
Corolla	186	73	74	68	87	95	90
E-Class	394	85	82	106	124	130	85
Elantra	235	42	47	57	83	93	84
GLA	277	132	106	128	180	185	165
Model 3	441	80	69	79	102	79	72
Model S	281	112	132	92	123	121	105
Model X	515	113	78	119	165	173	133
Qashqai	343	152	94	105	160	163	76
RAV4	183	88	63	95	100	125	95
Seltos	246	74	100	117	152	142	138
Sonata	233	40	59	52	70	60	72

Sportage	374	50	50	82	94	87	68
Sunny	436	107	153	114	169	174	173
Tucson	287	88	110	122	182	161	135
X5	192	89	85	133	161	123	160

➤ Insight Analysis:

- Sunny, Camry, and Model X lead in premium sales, showing strong pricing power. GLA and Tucson have wide margin spreads, suggesting flexible strategies. Seltos and Elantra lean heavily on discounts, while luxury models like E-Class balance premium and moderate markdowns. Steady demand across discounted ranges indicates balanced market appeal across both premium and price-sensitive buyers.

• Sales in different year according to margin class

margin_class	2022 Sales	2023 Sales	2024 Sales	2025 Sales
	Units	Units	Units	Units
C. Near Base (±5%)	301	592	619	388
E. Moderate Discount (20-40% off)	409	855	919	557
D. Small Discount (5-20% off)	302	682	725	359
F. Heavy Discount (40-60% off)	373	845	824	533
G. Deep Discount (60%+ off)	322	760	751	480
B. High Margin (10-30% above)	276	567	637	325
A. Premium (30%+ above base)	867	2193	2193	1325

➤ Insight Analysis:

- Premium Vehicles (30%+above base) consistently led sales from 2022-2025, underscoring strong customer preference for high value models.
- Steady volumes in discounted segments (20-60% off) reveal sustained demand among cost-conscious buyers, highlighting a balanced pricing strategy that appeals to both
- Premium and budget segments.

• Top Email domain used by customer

email_domain	Number of Email domain
yahoo.com	348
gmail.com	324
hotmail.com	322
smith.com	12
smith.net	6



williams.com	6
hernandez.com	6
jones.com	6
milller.com	5
gonzalez.com	4

➤ Insight Analysis:

- Mainstream providers dominate: Over 990 users use yahoo.com.gmail.com or Hotmail.com ,showing strong eliance on popular public email services.
- Corporate or custom domains are rare
- Long tail of niche domains

• Model based car stock year=2025 and month = 7

model	moderate	Out of stock	critical	low	Good
5 Series	6	7	0	0	7
Sportage	3	1	0	1	8
E-Class	2	2	0	2	10
Model X	5	3	2	4	10
GLA	3	0	1	1	9
Camry	1	0	0	1	7
Sunny	3	0	2	6	8
C-Class	8	0	0	0	4
Model 3	5	0	0	3	9
Qashqai	4	2	3	1	10
3 Series	5	0	1	3	7
RAV4	7	1	0	0	3
Corolla	3	0	2	1	5
Elantra	2	1	0	3	4
Model S	1	1	0	4	4
Sonata	0	1	1	2	4
Cerato	2	0	2	2	7
Tucson	1	1	4	0	4
Altima	1	0	1	1	2
Seltos	1	0	1	0	3
X5	2	0	1	0	6

### ➤ Insight Analysis:

- Well stocked models: E-class, Model X, Qashqai and Sportage show strong counts in Good category, indicating healthy inventory
- Critical alerts: Tucson, Sunny have elevated critical stock, suggesting urgent restocking needs.
- Out-of-stock risks: 5 series (7) and E-class face notable out-of-stock counts, potentially impacting availability
- Stable: Camry, GLA, and Model 3 maintain low critical and out of stock with solid Good stock

## Data Distribution & Visualization

### Initialization

This section outlines the visualization strategy implemented in Power BI dashboards, emphasizing the consistent use of a professional color palette to ensure clarity, readability

### Primary Color Scheme

Color Code	Color Name	Usage
#F4EDD3	Warm Beige	Background, neutral elements
#1D546C	Teal Blue	Primary KPIs, positive metrics
#1A3D64	Navy Blue	Secondary data series, comparison
#0C2B4E	Dark Navy	Text, negative metrics, emphasis

### Typography

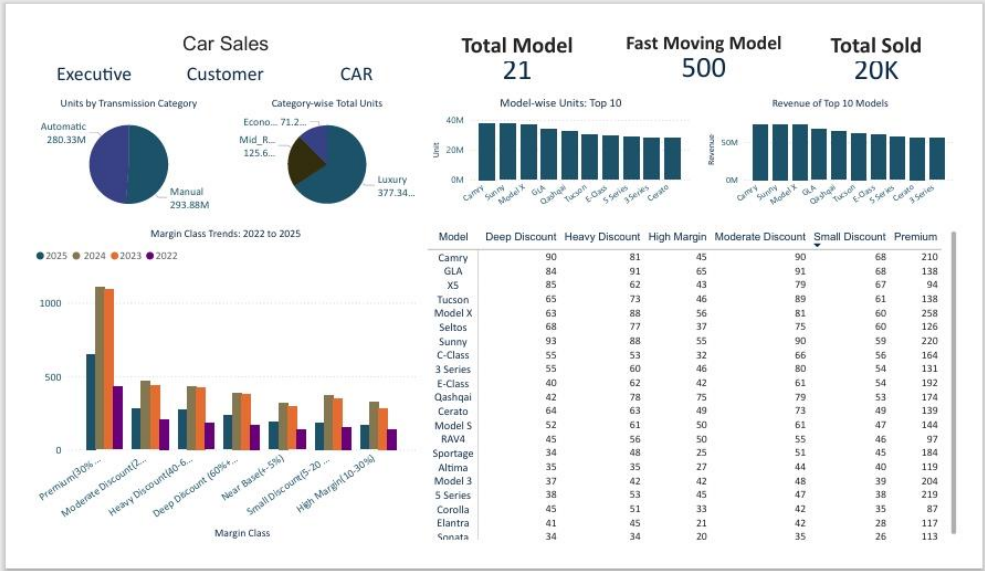
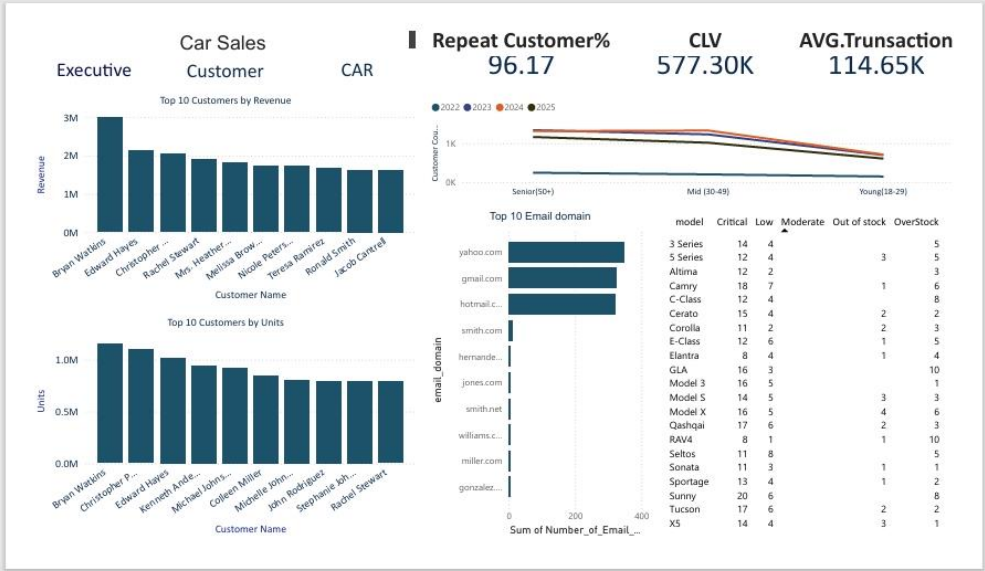
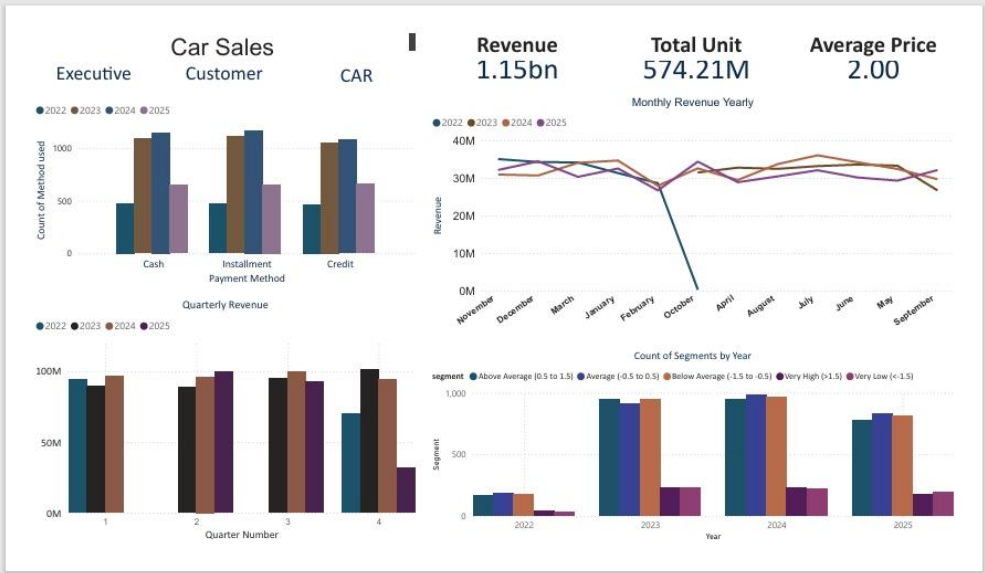
- ✓ Font Family: Clean, professional fonts (Arial, Segoe UI, or Open Sans).
- ✓ Headers: Bold, slightly larger (12–14pt) for emphasis.
- ✓ Body Text: Regular weight (10–11pt) for readability.
- ✓ Totals/Highlights: Bold with Teal Blue (#1D546C) text for recruiter attention.

### Layout Principles

- ✓ Consistency: Uniform spacing and alignment across all visuals.
- ✓ Neutral Background: Warm Beige (#F4EDD3) ensures KPIs stand out clearly.
- ✓ Highlighting: Teal Blue for positive metrics, Dark Navy for emphasis or negative values.
- ✓ Minimalism: Avoid clutter — focus on clarity and recruiter-friendly storytelling.

Dashboard Link : [Microsoft Power BI](#)

PDF Image :



## Overall Analysis

This comprehensive analysis of the car sales data from October 2022 to October 2025 reveals a healthy and growing business with a diverse customer base and product portfolio. The key takeaways can be summarized across four core areas: financial performance, customer dynamics, product strategy, and operational efficiency.

### 1. Strong and Diversified Financial Performance

- The company has demonstrated significant revenue growth, with a particularly sharp increase of 228% in FY2023, stabilizing to steady growth in subsequent years.
- A balanced pricing strategy is evident, with premium vehicles (30%+ above base price) being the largest sales segment, while consistently strong sales in discounted ranges (20-60% off) ensure volume and market penetration.
- The payment method trend shows a clear shift from Cash to Installments, which grew from 33.3% in 2022 to 34.3% in 2025. This indicates changing customer preferences and an opportunity for structured financing products.

### 2. Well-Distributed Customer Base with Clear Segments

- The customer base is diversified, with no single customer accounting for more than 1.85% of total revenue, minimizing reliance on a few key accounts.
- Senior customers (50+) consistently form the largest buying segment (~41%), followed by the growing Mid-age (30-49) segment. This points to a mature market with stable purchasing power, while the mid-age group represents a key growth opportunity.
- Top customers like Edward Hayes and Mrs. Heather Pace PhD are high-value targets for VIP and loyalty programs.

### 3. Robust and Evolving Product Portfolio

- Models like Cerato, 5 Series, and Sunny are consistent leaders in both units sold and revenue generation, forming the backbone of the product portfolio.
- The fuel type analysis shows a stable yet evolving market. While Petrol remains dominant, Electric vehicles have steadily grown to nearly 26% of sales by 2025, signaling a gradual market shift that requires continued attention.
- Margin analysis reveals distinct product strategies: models like Sunny and Camry command premium prices, while others like Seltos and Elantra rely more heavily on discounts to drive sales.

### 4. Inventory Management Presents both Risks and Opportunities

- The inventory snapshot (July 2025) highlights critical stock-out risks for high-demand models like the Tucson and 5 Series, which could lead to lost sales.
- Conversely, several models maintain healthy stock levels (e.g., E-Class, Qashqai), indicating good inventory planning for those lines.

- This mixed picture underscores the need for a more model-specific, dynamic inventory management system to align stock levels with sales velocity.

## Recommendation

### Inventory Management

- Critical Actions
  - Immediate Restocking : Tucson and Sunny models show critical stock levels
  - Optimize 5 series : High demand but frequent stockouts(7 units out of stock)
  - Balance E-class : Good inventory but monitor turnover
- Strategic
  - Implement dynamic safety stock levels for top 10 models
  - Reduce overstock in moderate performing models

### Pricing & Margin Optimization

- Immediate Opportunities
  - Leverage Premium Models : Sunny ,Camry,ModelX show strong premium pricing power
  - Review Discount Strategy : Seltos and Elantra rely heavily on deep discounts
  - Bundle Deals : Create packages for models with consistent moderate discounts
- Data Driven Pricing
  - Implement demand based pricing for high margin models
  - Reduce discount depth on consistently popular models

### Customer Strategy

- Target Segments
  - Senior Customers(41%) : Largest segment –develop loyalty programs
  - Mid-Age(36%) : Growing segment – target with financing options
  - High-Value Clients : Edward Hayes & top 10 customers deserve VIP treatment
- Retention
  - Create personalized offers based on purchase history
  - Implement customer tier system based on lifetime value

### Product Portfolio

- Focus Models
  - Cerato : Leader in both units and revenue – ensure continuous availability
  - 5 series & Sunny : High revenue contributors – prioritizing marketing

- Electric Vehicles : Steady growth to 26% -expand EV portfolio
- Fuel Strategy :
  - Maintain balanced portfolio across fuel types
  - Monitor electric adoption trends for future planning

## Sales & Operations

### Process Improvements

- Installment Growth
  - Capitalize on rising installment preference(34% in 2025)
- Technology
  - Develop customer behavior analytics

## Conclusion

The automotive retail operation is fundamentally strong, characterized by solid growth, a loyal and diverse customer base, and a product portfolio that appeals to both premium and price-sensitive buyers. The primary opportunities for enhancement lie in optimizing inventory to prevent stock-outs of high-performing models, refining discount strategies to protect margins, and capitalizing on the growing preference for installment payments and electric vehicles.