Customer Segmentation using RFM Analysis

MRA Project Milestone - 1

Submitted by:

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Presentation Content

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Problem Statement and Solution Approach

Problem Statement:

“An automobile parts manufacturing company has collected data of transactions for 3 years. They do not have any in-house data science team, thus they have hired you as their consultant. Your job is to use your magical data science skills to provide them with suitable insights about their data and their customers.”

Solution Approach:

Agenda of this project to identify the underlying pattern of customer of an automobile part manufacturer, based on the past 3 years of the Company's transaction data. Solution approach will include performing EDA, customer segmentation using RFM analysis on given dataset and thus recommend customized marketing strategies for different segments of customers.

Dataset information

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2747 entries, 0 to 2746
Data columns (total 20 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   ORDERNUMBER           2747 non-null   int64
 1   QUANTITYORDERED       2747 non-null   int64
 2   PRICEEACH             2747 non-null   float64
 3   ORDERLINENUMBER       2747 non-null   int64
 4   SALES                 2747 non-null   float64
 5   ORDERDATE             2747 non-null   datetime64[ns]
 6   DAYS_SINCE_LASTORDER  2747 non-null   int64
 7   STATUS                2747 non-null   object
 8   PRODUCTLINE           2747 non-null   object
 9   MSRP                  2747 non-null   int64
 10  PRODUCTCODE           2747 non-null   object
 11  CUSTOMERNAME          2747 non-null   object
 12  PHONE                 2747 non-null   object
 13  ADDRESSLINE1          2747 non-null   object
 14  CITY                  2747 non-null   object
 15  POSTALCODE            2747 non-null   object
 16  COUNTRY               2747 non-null   object
 17  CONTACTLASTNAME       2747 non-null   object
 18  CONTACTFIRSTNAME      2747 non-null   object
 19  DEALSIZE              2747 non-null   object
```

- Shape of the Dataset - includes information about 2747 customers with 20 different attributes about them
- The data type includes: 5 integer, 2 float, 1 data time and 12 object types

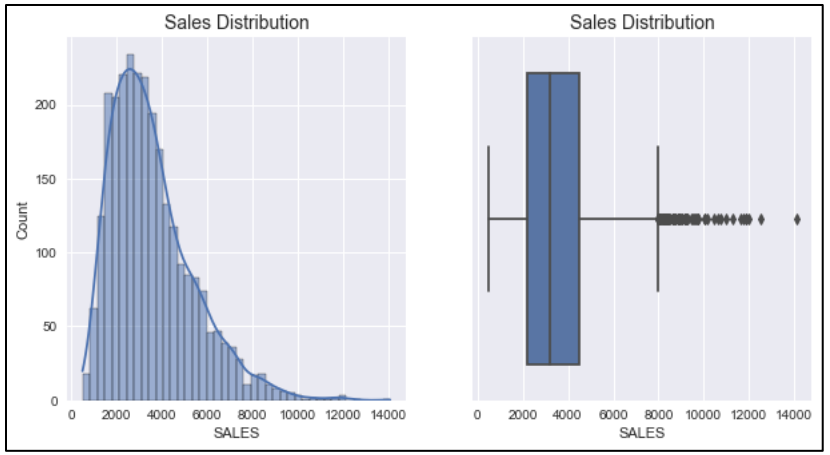
Descriptive Statistics

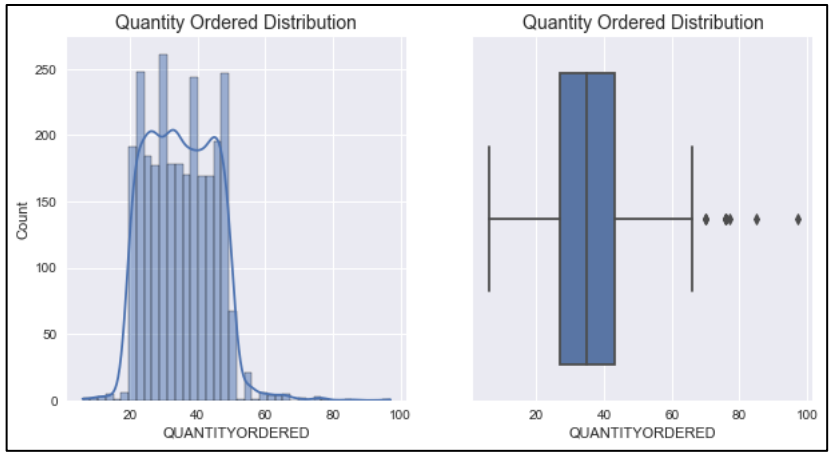
	count	mean	std	min	25%	50%	75%	max
ORDERNUMBER	2747.0	10259.761558	91.877521	10100.00	10181.000	10264.00	10334.500	10425.00
QUANTITYORDERED	2747.0	35.103021	9.762135	6.00	27.000	35.00	43.000	97.00
PRICEEACH	2747.0	101.098951	42.042548	26.88	68.745	95.55	127.100	252.87
ORDERLINENUMBER	2747.0	6.491081	4.230544	1.00	3.000	6.00	9.000	18.00
SALES	2747.0	3553.047583	1838.953901	482.13	2204.350	3184.80	4503.095	14082.80
DAYS_SINCE_LASTORDER	2747.0	1757.085912	819.280576	42.00	1077.000	1761.00	2436.500	3562.00
MSRP	2747.0	100.691664	40.114802	33.00	68.000	99.00	124.000	214.00
year	2747.0	2018.822352	0.696288	2018.00	2018.000	2019.00	2019.000	2020.00
month	2747.0	7.083364	3.641826	1.00	4.000	8.00	11.000	12.00

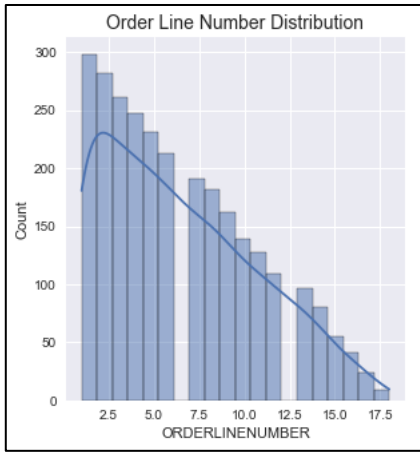
Key observations:

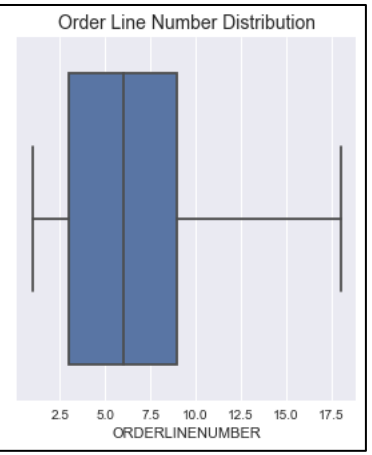
- Minimum and maximum quantity ordered are 6 and 97 units respectively
- Mean and maximum sales are 3553 and 14082 units respectively

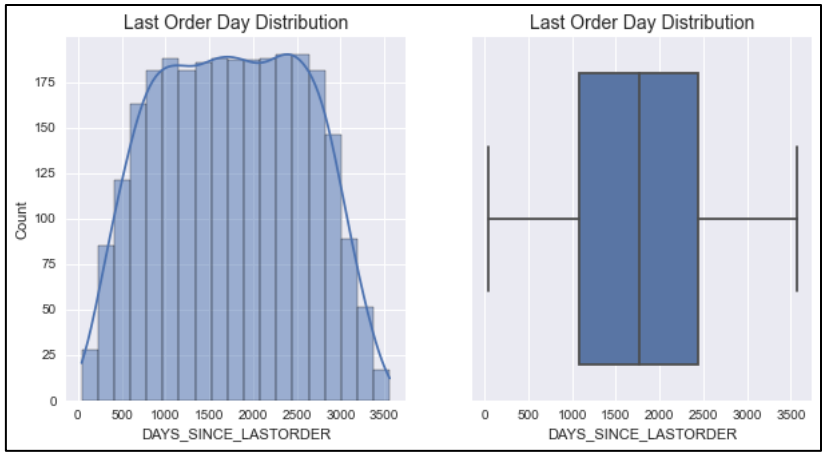
Univariate Analysis - Skew Plots

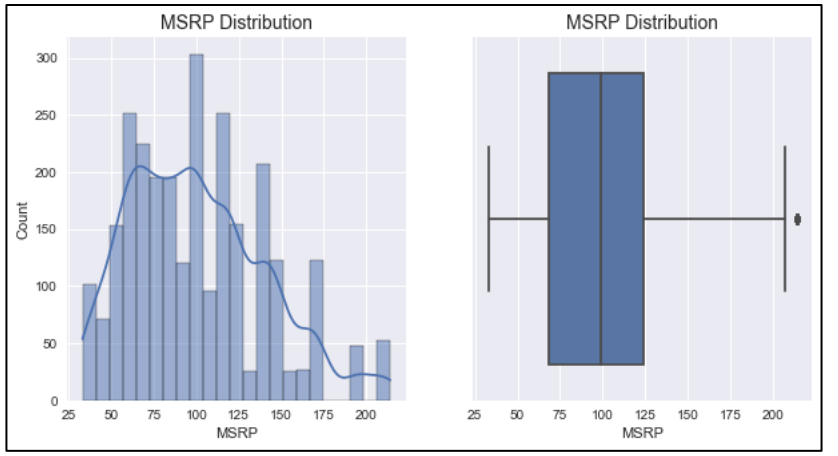


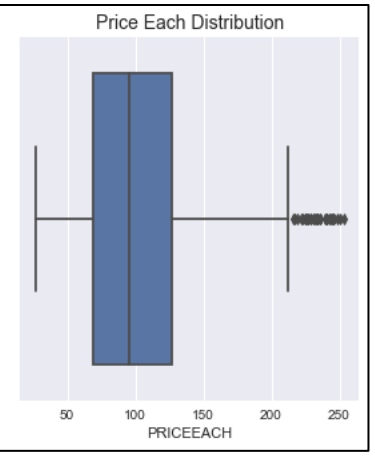






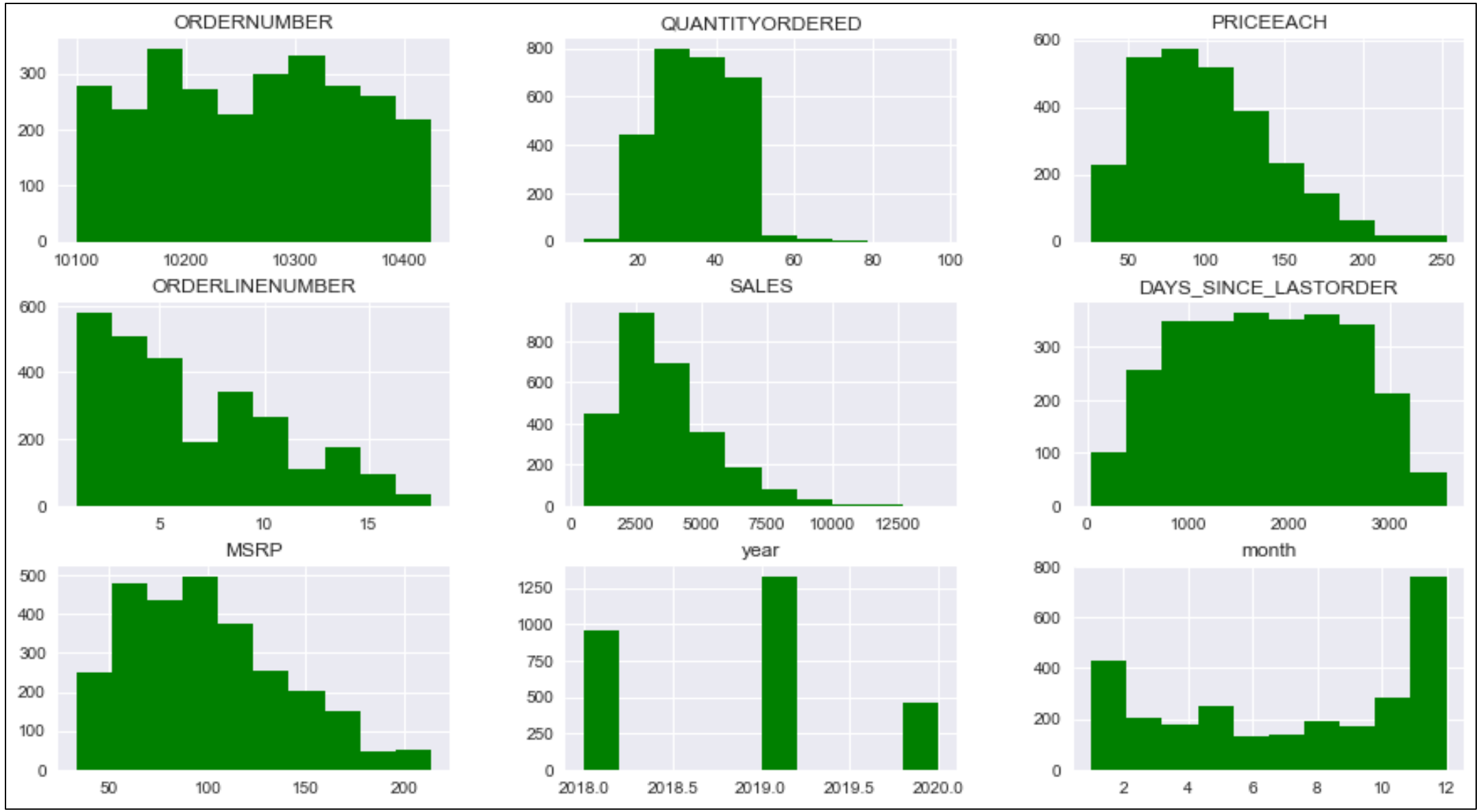






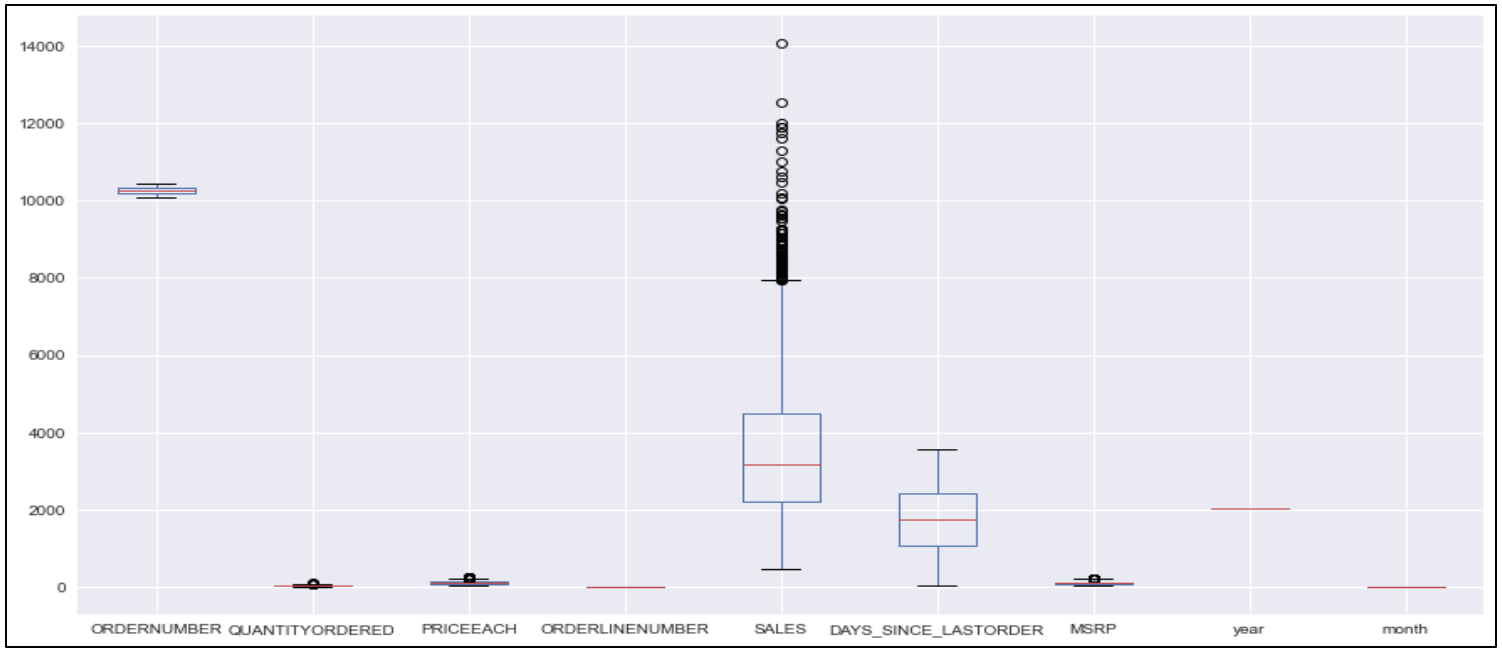
Skewness values							
Sales	0.78	MSRP	0.55	Year	0.26	Order number	-0.0069
PRICEEACH	0.59	Days since last order	-0.003	Quantity Ordered	0.21	Month	-0.2628

Univariate Analysis - Histogram Plots

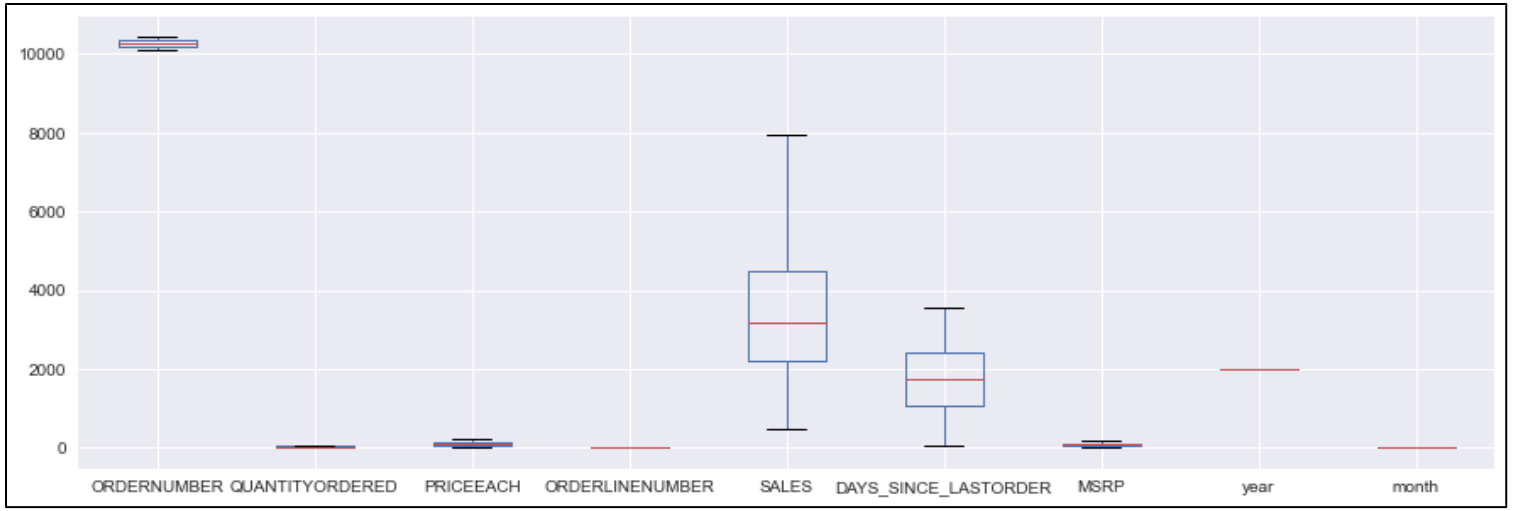


Outlier Check and Removal

Pre - Outlier Removal

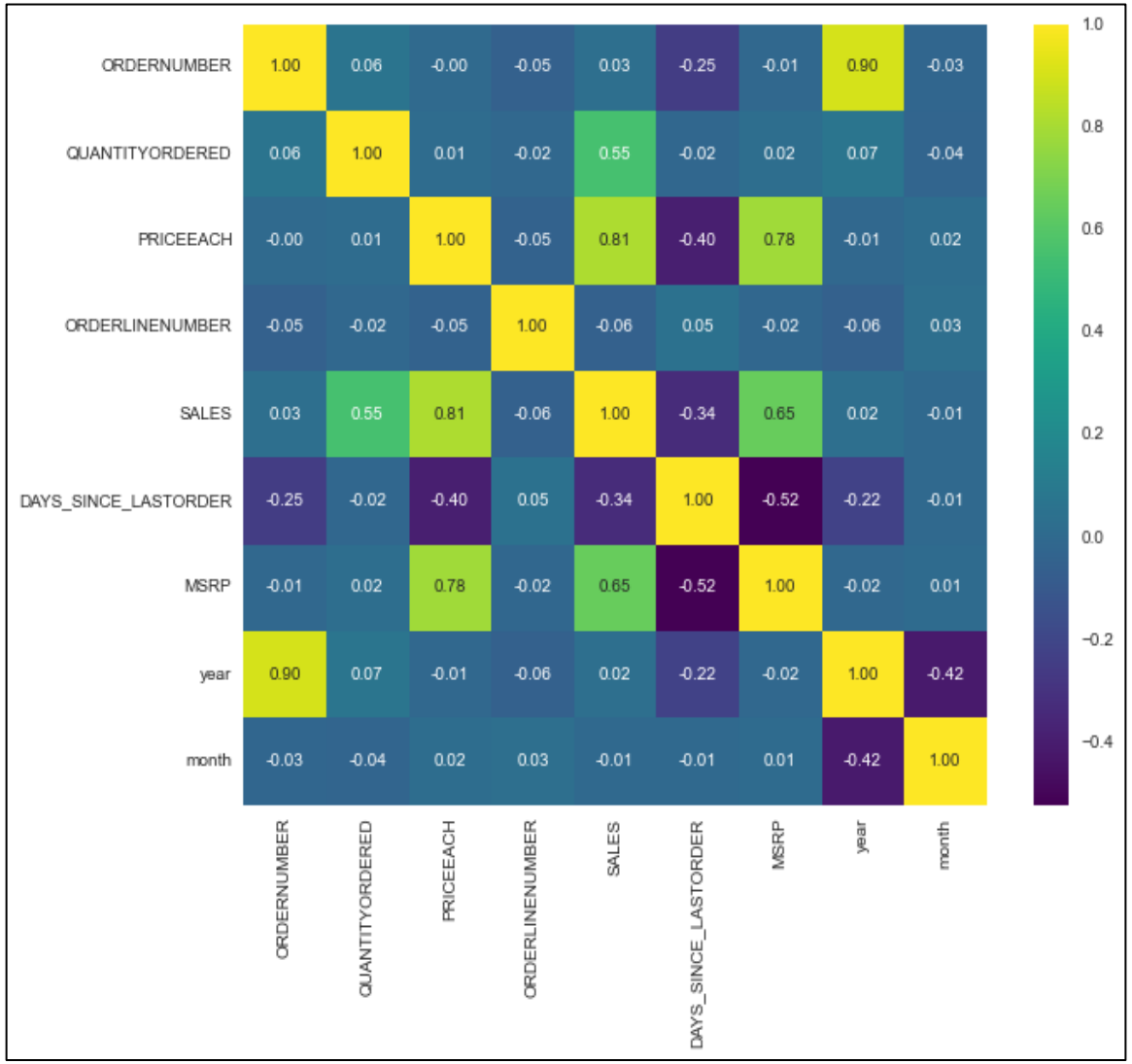


Post - Outlier Removal



Bivariate Analysis - Correlation Analysis

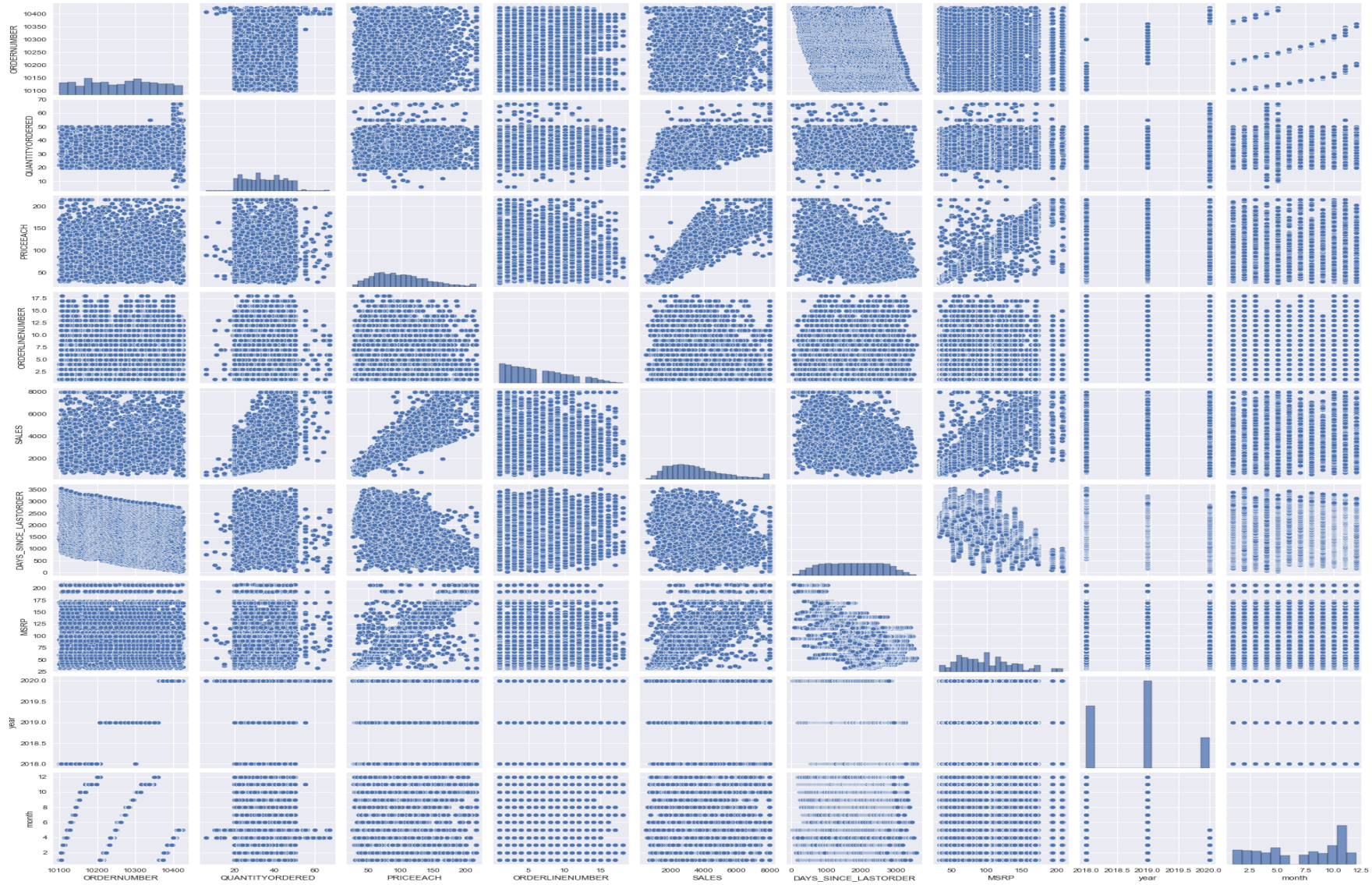
	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	DAYS_SINCE_LASTORDER	MSRP	year
ORDERNUMBER	1.000	0.063	-0.003	-0.054	0.028	-0.251	-0.014	0.904
QUANTITYORDERED	0.063	1.000	0.010	-0.016	0.551	-0.021	0.020	0.066
PRICEEACH	-0.003	0.010	1.000	-0.052	0.814	-0.397	0.781	-0.012
ORDERLINENUMBER	-0.054	-0.016	-0.052	1.000	-0.055	0.047	-0.021	-0.055
SALES	0.028	0.551	0.814	-0.055	1.000	-0.336	0.645	0.024
DAYS_SINCE_LASTORDER	-0.251	-0.021	-0.397	0.047	-0.336	1.000	-0.524	-0.225
MSRP	-0.014	0.020	0.781	-0.021	0.645	-0.524	1.000	-0.016
year	0.904	0.066	-0.012	-0.055	0.024	-0.225	-0.016	1.000
month	-0.029	-0.036	0.017	0.029	-0.006	-0.011	0.005	-0.422



Key observations:

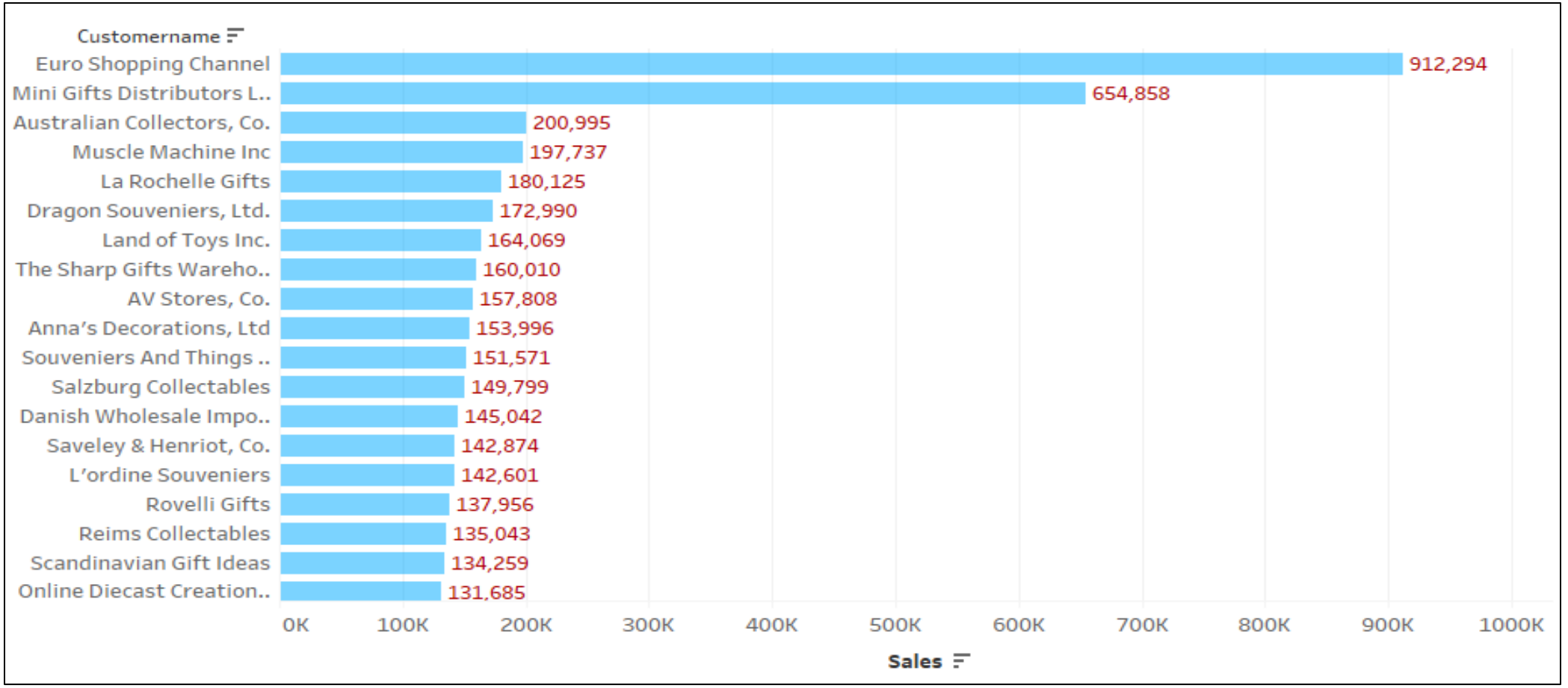
- Based on Correlation analysis, Quantity ordered and Sales are highly correlated
- Price of Each order and Sales, MSRP and Price of Each order are highly correlated; Sales and MSRP are least correlated with Days since last order

Multivariate Analysis - Pair plot



- Pair Plot analysis among all parameters additionally displays the correlation among them.
- Key correlation observed among: Quantity ordered and Sales, MSRP and PRICEEACH

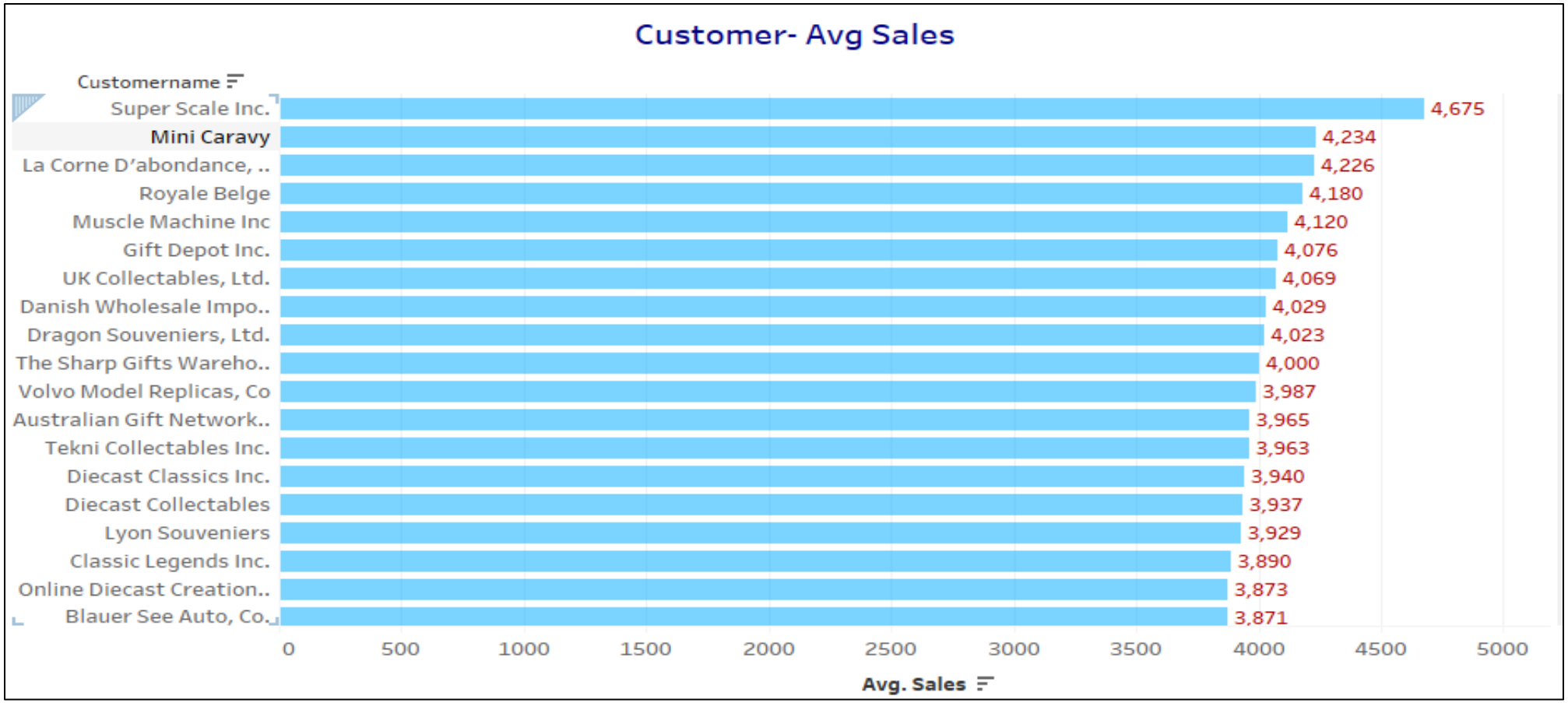
Customer Sales analysis



Key observations:

The company currently has 89 Customers from 19 countries across the globe. Euro Shopping Channel is the largest customer, with 9.34% of the total customer share.

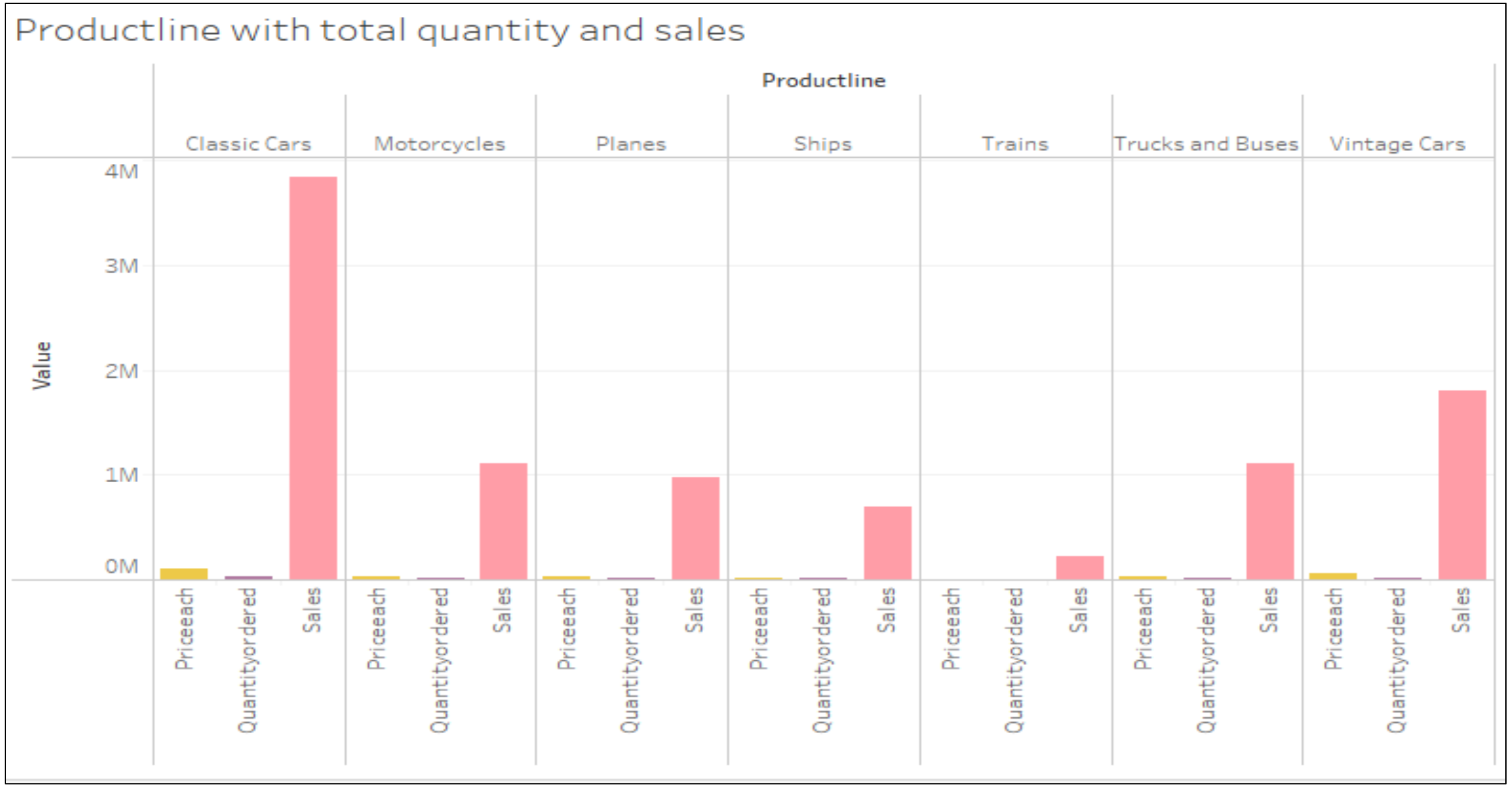
Customer – Average Sales analysis



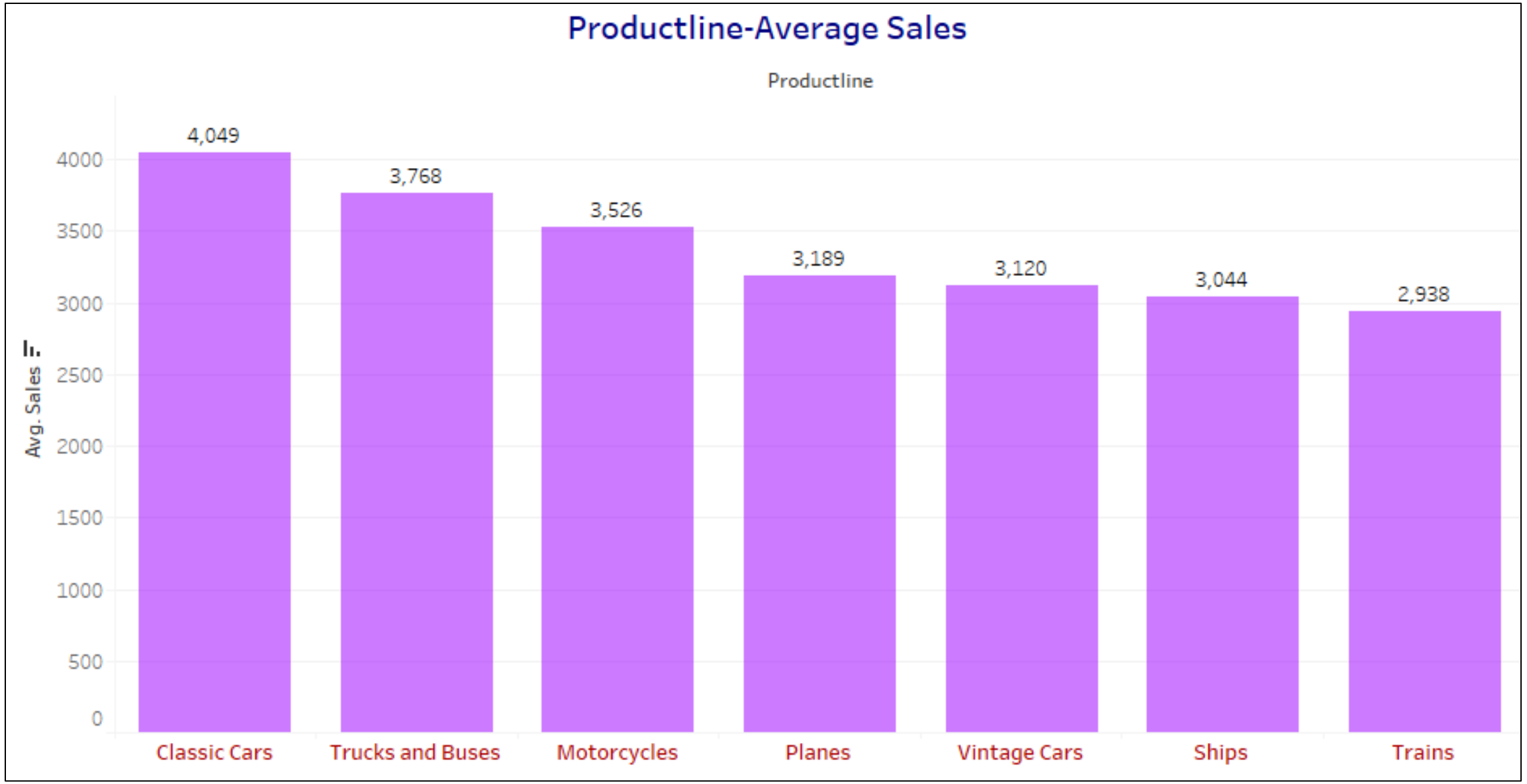
Key observations:

In terms of Average Sales, Super Scale Inc. is the highest, followed by Mini Caravy and La Corne

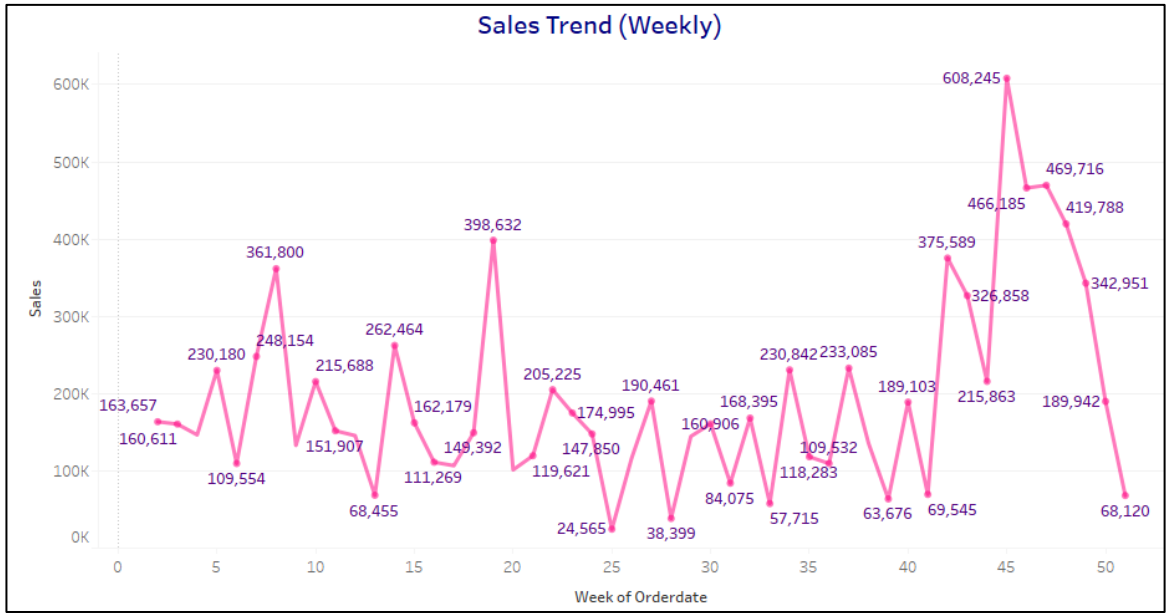
Analysis by Product Line

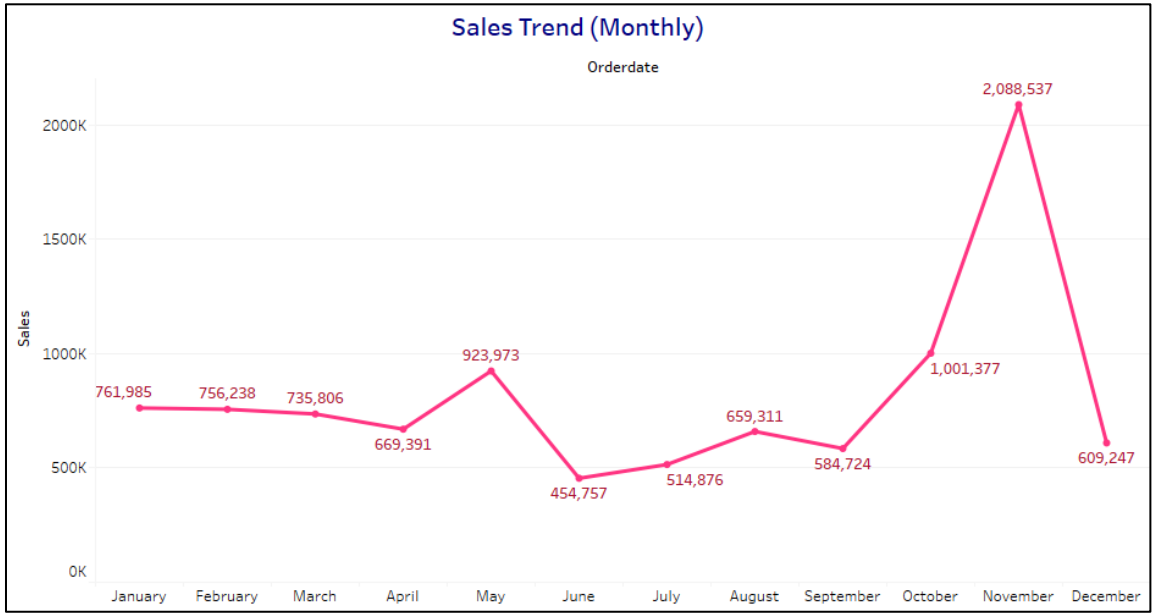


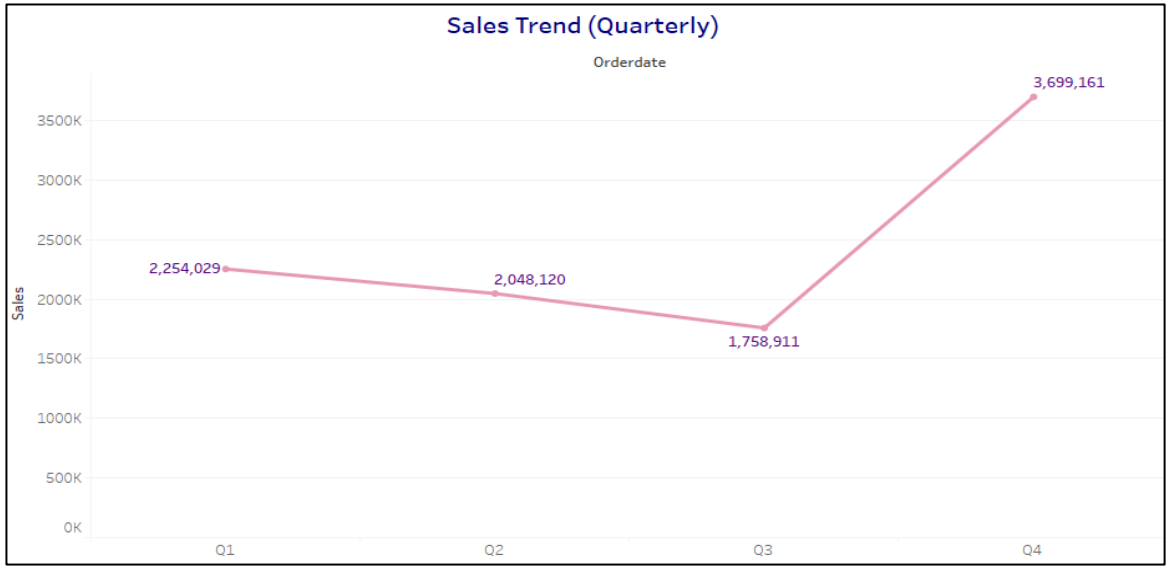
Analysis by Product Line - Average Sales

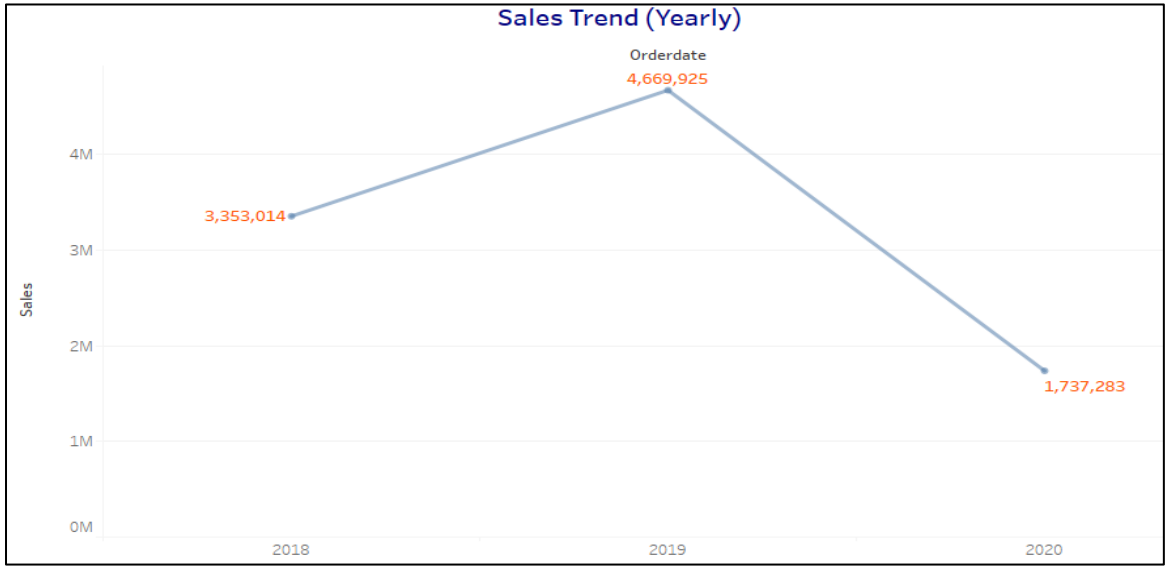


Trend Analysis

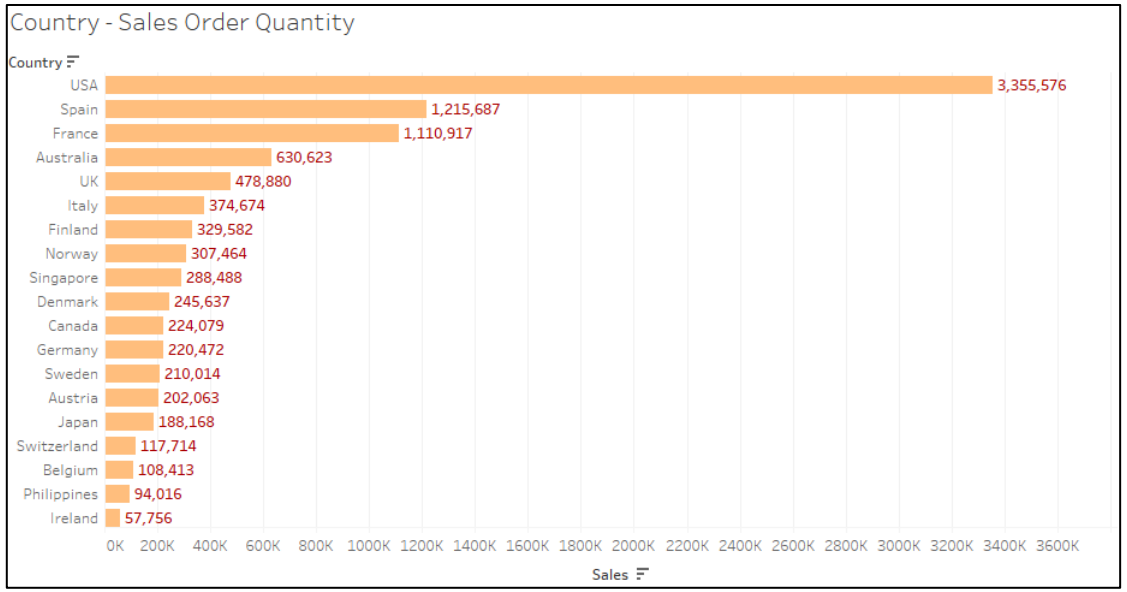


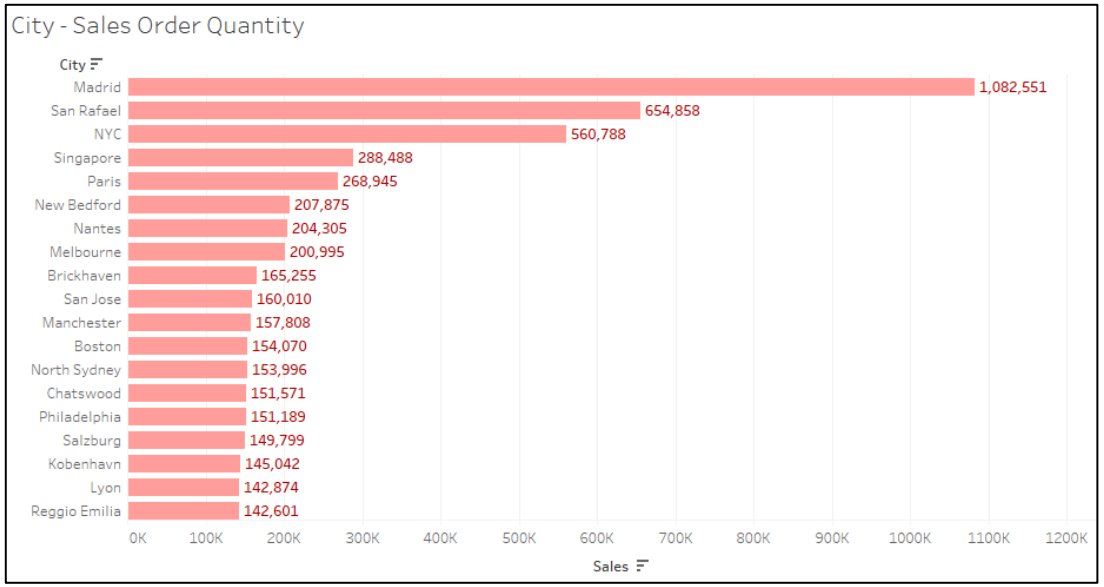


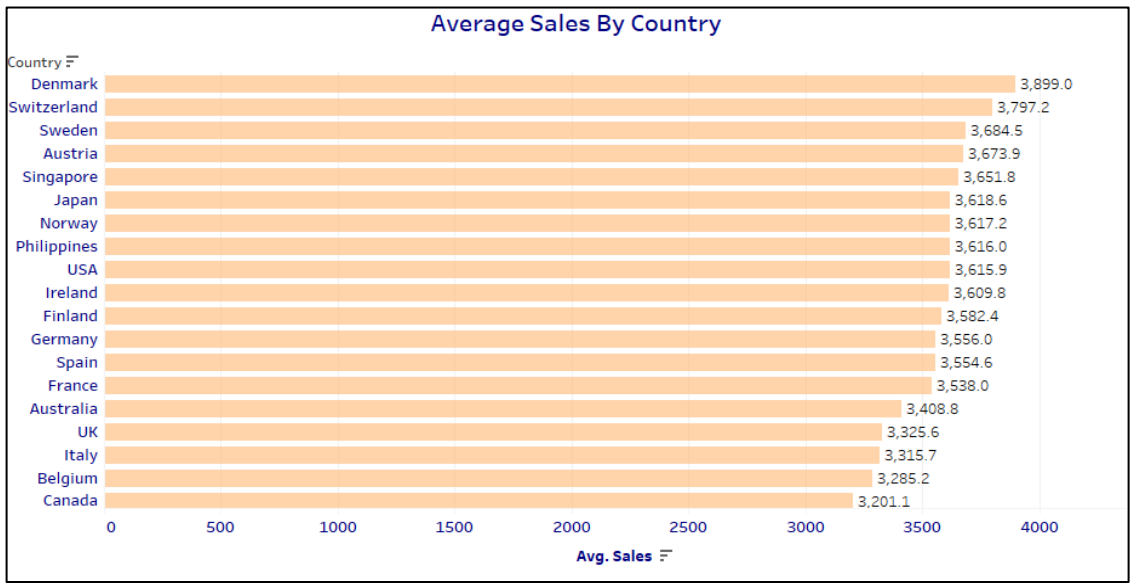


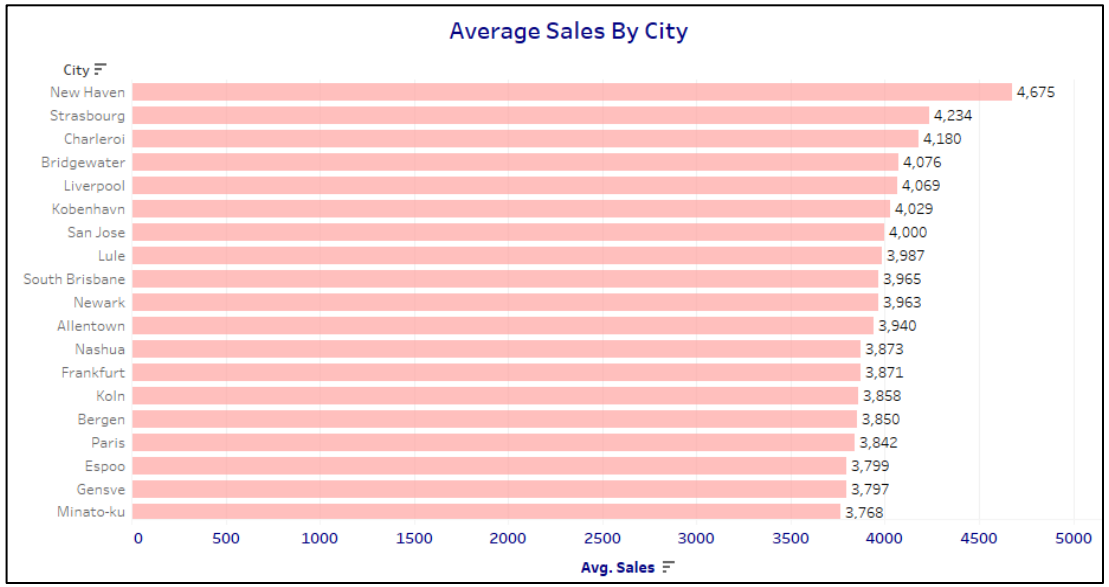


Geographic analysis of Sales

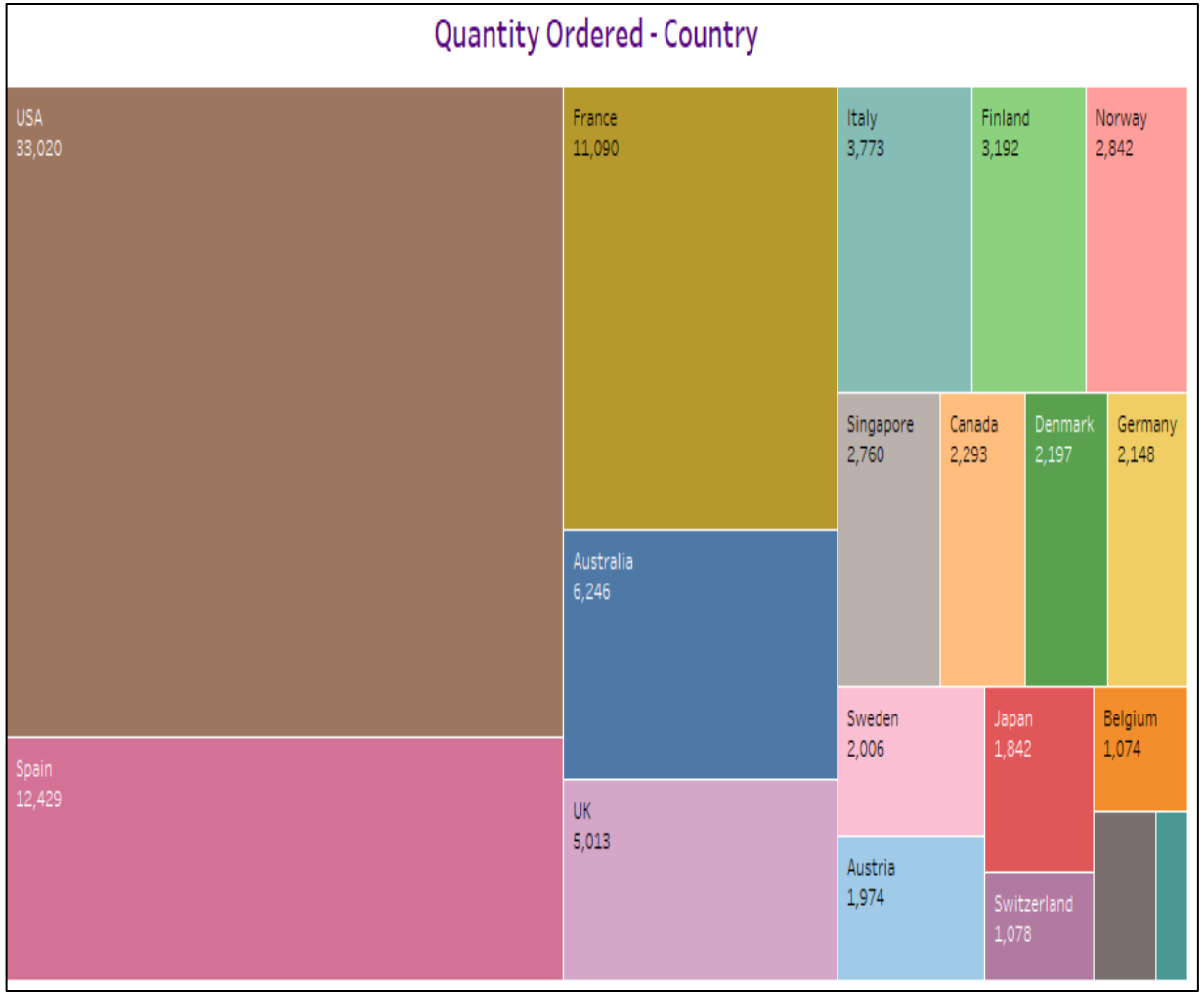


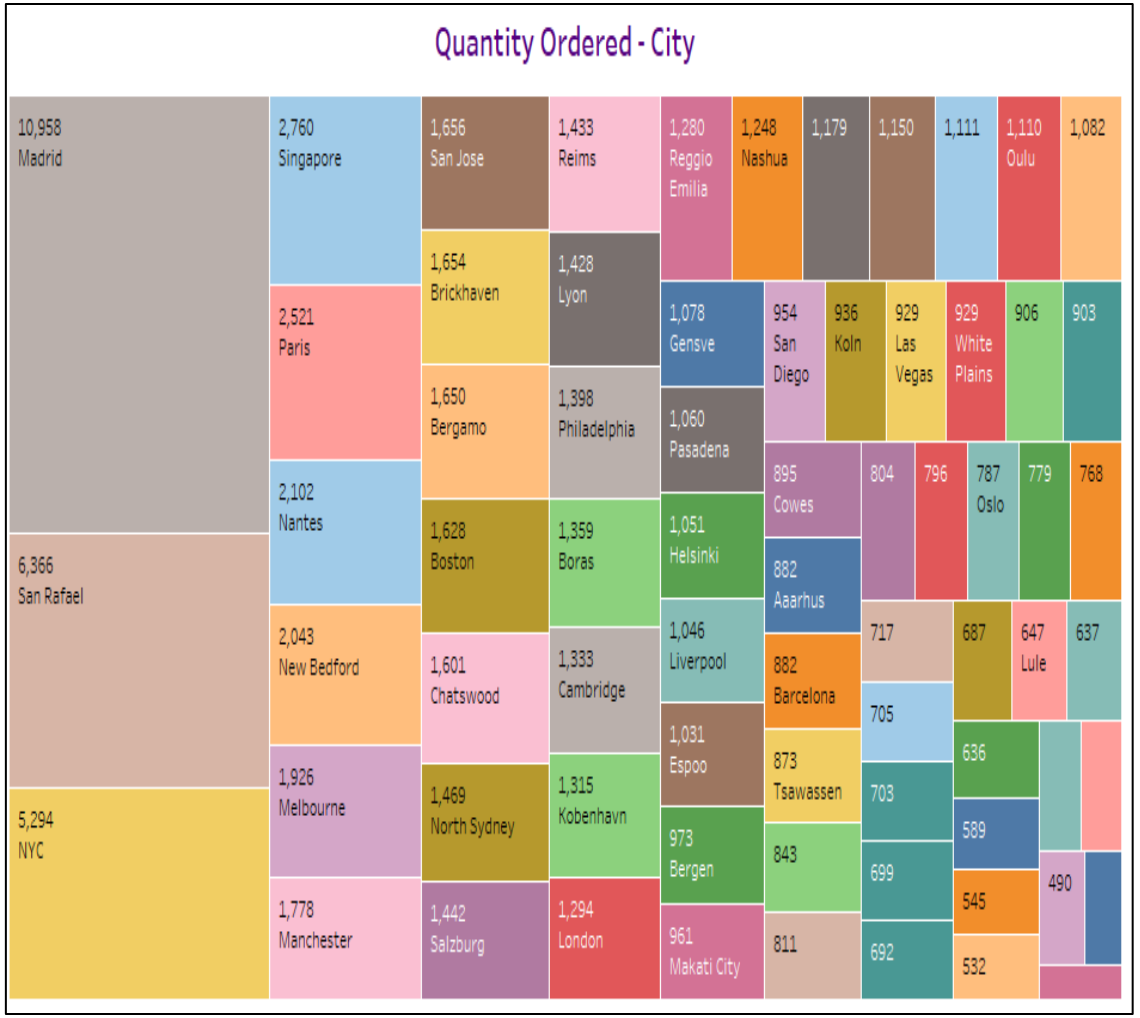






Quantity ordered by Country and City





Additional key analysis - Summary

Great Learning

Trend analysis

Week 45 has the highest sales as compared to other weeks.

November month has recorded the highest sales.

Sales has a decreasing trend from Q1 to Q3, and an increasing trend in Q4.

Year 2019 has delivered the highest sales

Customer Sales Analysis

Euro Shopping channel is the largest customer, in terms of Sales

In terms of profitability (Average Sales), Super Scale Inc. is the highest, followed by Mini Caravy and La Corne

Key Analysis - Summary

Product line analysis

Classic cars segment has the highest sales (and most purchased, highest average sales), while Trains segment have the lowest

Medium deal size tends to deliver much higher sales, as compared to Small and large ones

Geographic Analysis

USA is the top selling country and accounts for 34% of the total sales

Madrid, San Rafael and New York are the top 3 cities in terms of sales

RFM Analysis Overview and Approach

❖ **RFM Analysis objective:**

- RFM stands for Recency, Frequency, and Monetary value and is a data driven customer behavior segmentation technique.
- The analysis segments customers based on: When their last purchase was (recency), How often they have purchased in the past (frequency), and How much they have spent overall (monetary)
- RFM measures have proven to be effective predictors of a customer's willingness to engage in marketing messages and offers.

❖ **RFM Parameters used:**

- **Customer name, Quantity ordered, Price each, Order date, Order quantity and Sales**

❖ **RFM Prediction used:**

- **Recency** - Max Order date
- **Frequency** - Count of quantity orders for a particular customer
- **Monetary** - Sum of sales made through a particular customer

Customer Segmentation - “Best” Category

Best Customers RFM Score

RFM (group)	Customername	R	F	M	Days Since Lastord..	Quantityordered	Sales
Best	Euro Shopping Channel	5	5	5	463,893	9,327	912,294
	Mini Gifts Distributors Ltd.	5	5	5	298,001	6,366	654,858
	Australian Collectors, Co.	5	5	5	93,433	1,926	200,995
	Muscle Machine Inc	5	5	5	83,687	1,775	197,737
	La Rochelle Gifts	5	5	5	96,907	1,832	180,125
	Dragon Souveniers, Ltd.	5	5	5	79,143	1,524	172,990
	Land of Toys Inc.	5	5	5	79,158	1,631	164,069
	The Sharp Gifts Warehouse	5	5	5	70,255	1,656	160,010
	AV Stores, Co.	5	5	5	91,994	1,778	157,808
	Anna’s Decorations, Ltd	5	5	5	67,325	1,469	153,996
	Souveniers And Things Co.	5	5	5	77,365	1,601	151,571
	Salzburg Collectables	4	5	5	63,180	1,442	149,799
	Danish Wholesale Imports	5	5	5	69,293	1,315	145,042
	Saveley & Henriot, Co.	5	5	5	75,757	1,428	142,874
	L’ordine Souveniers	5	5	5	64,898	1,280	142,601
	Rovelli Gifts	5	5	5	109,600	1,650	137,956
	Reims Collectables	5	5	5	75,465	1,433	135,043
	Scandinavian Gift Ideas	4	5	5	64,213	1,359	134,259
	Technics Stores Inc.	5	4	4	65,227	1,179	120,783
	Corrida Auto Replicas, Ltd	4	4	4	56,357	1,163	120,615
	Tokyo Collectables, Ltd	4	4	4	53,149	1,150	120,563
	Baane Mini Imports	4	4	4	57,784	1,082	116,599
	Handji Gifts& Co	4	5	4	59,142	1,236	115,499
	Toys of Finland, Co.	4	4	4	52,361	1,051	111,250
	Mini Creations Ltd.	5	4	4	81,507	1,140	108,951
	Toys4GrownUps.com	4	4	4	49,039	1,060	104,562
	Oulu Toy Supplies, Inc.	4	4	4	61,967	1,110	104,370
	Signal Gift Stores	4	4	3	51,342	929	82,751

Customer Segmentation - “Loyal” Category

Loyal Customers RFM Score

RFM (group)	Customername	R	F	M	
Loyal	Online Diecast Creations ..	3	4	4	131,685
	Diecast Classics Inc.	3	4	4	122,138
	UK Collectables, Ltd.	3	4	4	118,008
	Vida Sport, Ltd	3	4	4	117,714
	Suominen Souveniers	3	4	4	113,961
	Herkku Gifts	3	4	4	111,640
	Marta’s Replicas Co.	3	4	4	103,080
	Heintze Collectables	3	4	4	100,596
	Cruz & Sons Co.	4	3	3	94,016
	Auto Canal Petit	3	4	3	93,171
	Stylish Desk Decors, Co.	4	3	3	88,805
	Vitachrome Inc.	3	3	3	88,041
	Collectable Mini Designs C..	4	3	3	87,489
	Mini Classics	4	3	3	85,556
	Gifts4AllAges.com	4	3	3	83,210
	Norway Gifts By Mail, Co.	3	3	2	79,224
	Enaco Distributors	4	2	2	78,412
	giftsbymail.co.uk	4	3	2	78,241
	Petit Auto	3	3	2	74,973
	Marseille Mini Autos	3	3	2	74,936
	Royal Canadian Collectabl..	4	3	2	74,635

Customer Segmentation - “Churn” Category

Verge of Churning

RFM (group)	Customername	R	F	M	Days Since Lastorder	Quantityordered	Sales
Verge of Churning	Alpha Cognac	3	2	2	44,724	687	70,488
	Amica Models & Co.	2	3	3	34,284	843	94,117
	Australian Collectables, L..	2	2	1	38,863	705	64,591
	Blauer See Auto, Co.	2	2	3	37,341	811	85,172
	Canadian Gift Exchange N..	2	2	2	35,641	703	75,239
	Classic Gift Ideas, Inc	2	2	2	35,030	668	67,507
	Classic Legends Inc.	2	2	2	38,632	720	77,795
	Collectables For Less Inc.	2	3	3	37,107	795	81,578
	Daedalus Designs Imports	2	2	2	37,512	699	69,052
	Diecast Collectables	2	2	2	33,049	695	70,860
	FunGiftIdeas.com	2	3	3	37,663	903	98,924
	Gift Depot Inc.	2	3	4	37,234	903	101,895
	Gift Ideas Corp.	3	2	1	45,978	666	57,294
	La Corne D’abondance, Co.	3	2	3	39,753	836	97,204
	Motor Mint Distributors I..	2	2	3	36,454	730	83,682
	Osaka Souveniers Co.	3	2	2	40,583	692	67,605
	Quebec Home Shopping N..	2	2	2	37,451	717	74,205
	Tekni Collectables Inc.	2	2	3	39,354	906	83,228
	Toms Spezialitten, Ltd	2	3	3	36,412	936	100,307

Customer Segmentation - “Lost” Category

Lost Customers RFM Score

RFM (group)	Customername	R	F	M	
Lost	Mini Caravy	1	2	3	80,438
	Super Scale Inc.	1	1	2	79,472
	Lyon Souveniers	1	2	2	78,570
	Volvo Model Replicas, Co	1	2	2	75,755
	Auto Assoc. & Cie.	1	2	2	64,834
	Australian Gift Network, ..	1	1	1	59,469
	Clover Collections, Co.	2	1	1	57,756
	Online Mini Collectables	1	1	1	57,198
	Iberia Gift Imports, Corp.	1	1	1	54,724
	Mini Auto Werke	1	1	1	52,264
	Signal Collectibles Ltd.	1	1	1	50,219
	CAF Imports	2	1	1	49,642
	West Coast Collectables C..	1	1	1	46,085
	Cambridge Collectables Co.	1	1	1	36,164
	Double Decker Gift Stores..	1	1	1	36,019
	Bavarian Collectables Imp..	2	1	1	34,994
	Royale Belge	1	1	1	33,440
	Microscale Inc.	1	1	1	33,145
	Auto-Moto Classics Inc.	1	1	1	26,479
	Atelier graphique	1	1	1	24,180
	Boards & Toys Co.	1	1	1	9,129

Identifying customers based on RFM analysis….(1/2)

Below are the top customers across the 4 major categories

	Customer	RFM Score
1. Best Customers	Euro Shopping Channel	555
	Mini Gifts Distributors Limited	555
	Australian Collectors, Co.	555
	Muscle Machine Inc.	555
	La Rochelle Gifts	555

	Customer	RFM Score
2. Loyal Customers	Online Diecast Creations Co.	344
	Diecast Classics Inc.	344
	UK Collectables, Ltd.	344
	Vida Sport, Ltd	344
	Suominen Souveniers	344

Identifying customers based on RFM analysis….(2/2)

Below are the top customers across the 4 major categories

	Customer	RFM Score
3. Verge of churning Customers	Gift Depot Inc.	234
	Toms Spezialitten, Ltd	233
	FunGiftIdeas.com	233
	La Corne D'abondance, Co.	323
	Amica Models & Co.	233

	Customer	RFM Score
4. Lost customers	Mini Caravy	123
	Super Scale Inc.	112
	Lyon Souveniers	122
	Volvo Model Replicas, Co	122
	Auto Assoc. & Cie.	122

Recommendations based on RFM analysis

Below are the recommendations for the four identified customer segments

1. **Best Customers**
   - Reward them with additional offers
   - Can be early adopters for new products
   - Use them as brand promoters
2. **Loyal**
   - Upsell higher value products
   - Ask for product reviews
   - Additional ways to engage them such as loyalty programs
3. **Verge of Churn**
   - Win them back via renewals/ discounts/newer products
   - Personalized emails to reconnect
   - Offer renewals & helpful resources
4. **Lost**
   - Revive interest with reach out campaign
   - Ignore, if the customer acquisition cost is too high

Thank You!