

Sales Analysis for Retail Optimization

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1.0 Introduction

1.1 Overview of project and focus of the study

The overview of this project is to undertake a thorough study of a provided sales data in order to extract significant insights that can be used to inform strategic retail decisions. The research will look into numerous areas of retail operations, such as product sales, customer interactions, seasonal trends, etc. The fundamental dataset will be transformed into a rich source of information, revealing vital statistics and patterns with the ability to greatly alter retail strategy, marketing plans, and operational techniques.

The focal point of this study are the following key areas:

a. Product Sales Analysis

- i. Understand the performance of various items in terms of amount sold, income earned, and detecting trends or patterns linked with certain products on a monthly and annual basis.

b. Customer Interactions and Demographics

- i. Analyzing consumer demographics to establish target groupings, studying customer interactions, and investigating potential links between customer traits and purchase behavior.

c. Seasonal Influences

- i. Investigate the impact of seasons on sales trends and identify peak periods.

d. Business Enhancement Opportunities

- i. Discovering meaningful information and recommendations for stakeholders, including store managers and marketing executives, to improve sales performance, refine stock management, and personalize customer experiences.

1.2 Aims and importance

This study research aims to provide stakeholders with data-driven insights that can help guide decision-making processes, optimise resource allocation, and contribute to the overall performance of retail operations. By traversing the complicated environment of retail sales, this study hopes to uncover trends, preferences, and chances for business improvement in the dynamic and competitive retail market.

1.3 Approach to achieving aims

To achieve the ultimate goals of providing stakeholders with actionable insights for informed decision-making and optimizing retail operations, this study will use a strategic approach that revolves around thorough data analysis and visualization using Excel following the key steps as illustrated in Figure 1.0.

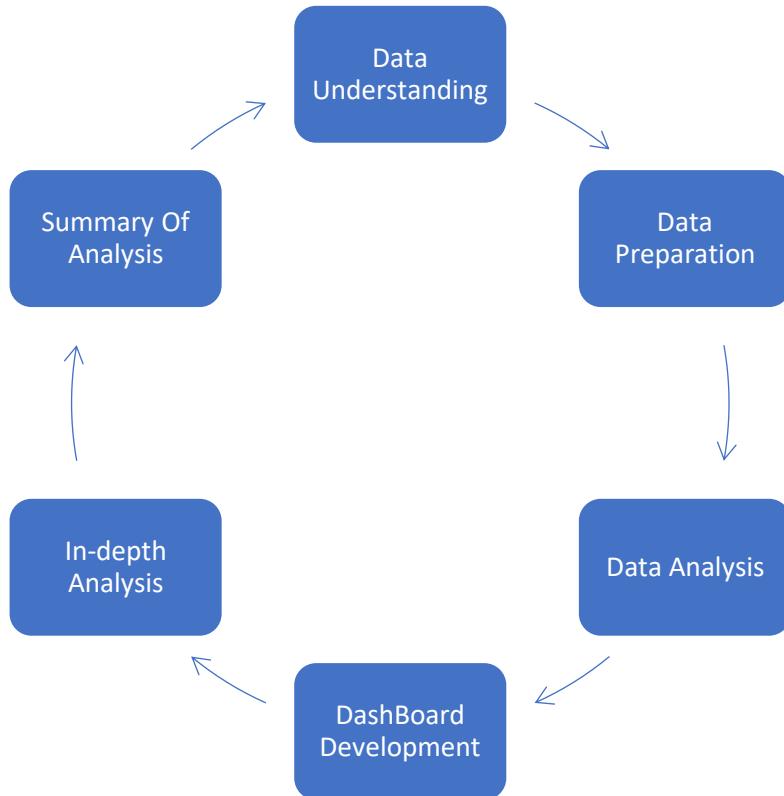


Figure 1.0 - Data Visualization Process Cycle

2.0 Methodology

2.1 How was the data gathered

The chosen dataset, obtained from Kaggle, includes a wide range of variables relevant to retail activity with a total of 25 variables. These variables include Order Number, Quantity Ordered, Price Each, Order Line Number, Sales, Order Date, Status, QTR_ID, MONTH_ID, YEAR_ID, Product Line, MSRP, Product Code, Customer Name, Phone, Address Line 1, Address Line 2, City, State, Postal Code, Country, Territory, Contact Last Name, Contact First Name, and Deal Size.

a. Feature Selection

- i. Only the variables Quantity Ordered, Sales, Status, QTD_ID, MONTH_ID, YEAR_ID, Product Line, Customer Name, Country, Territory, and Deal Size were chosen, with the rest being discarded.

b. Data Quality

- i. To assure the data quality for in-depth research, the variable Month and Company Type was added as a new variable.
- ii. The following two are the formulas used to construct the new variables:
 - Month
 - =TEXT(DATE(G2,E2,1), "MMM")

	A	B	C	D	E	F	G
1	Quantity Ordered	Sales	STATUS	QTR_ID	MONTH_ID	Month	YEAR_ID
2	30	\$2,871.00	Shipped	1	2	Feb	2003
3	34	\$2,765.90	Shipped	2	5	May	2003

- Company Type
 - This is the first stage to clear all the noises in this variable, such as .com, and a new column is added called Customer Name (Clean) to derive Company Type Variable
 - a. =CONCATENATE(SUBSTITUTE(SUBSTITUTE(SU
BSTITUTE(I2,"","",""),".com","",""),".",""),".")

	G	H	I	J
1	YEAR_ID	Product Line	Customer Name	Customer Name (Clean)
2	2003	Motorcycles	Land of Toys Inc.	Land of Toys Inc.
3	2003	Motorcycles	Reims Collectables	Reims Collectables.

- This is the second stage where it extracts out the company type such as Co., Ltd., and Inc. from the Customer Name (Clean) variable
 - a. =IF(OR(RIGHT(J2,4)="Inc.",RIGHT(J2,4)="Ltd."),IF(RIGHT(J2,4)="Inc.", "Inc.", "Ltd."), "Co.")

	G	H	I	J	K
1	YEAR_ID	Product Line	Customer Name	Customer Name (Clean)	Company Type
2	2003	Motorcycles	Land of Toys Inc.	Land of Toys Inc.	Inc.
3	2003	Motorcycles	Reims Collectables	Reims Collectables.	Co.

Data Analysis

It is the process of reviewing, interpreting, and extracting relevant insights from clean data in order to make informed decisions. It entails employing statistical methods and tools to identify patterns, trends, and linkages in data, allowing for more informed decisions.

Dashboard Development

It is the process of creating visual presentations that summaries analyzed data for quick and informed decision-making. Dashboards turn complex facts into easy, interactive formats that help stakeholders comprehend trends and performance measures. Refer to section 2.3 for the calculations used for dashboard creation.

In-depth Analysis

It is an enhancement to the dashboard, which now includes more in-depth analysis findings such as the purchasing behavior among different types of companies. Refer to section 2.3 for the calculations used for dashboard creation.

Summary Of Analysis

This section summarizes the important findings and insights gained from the detailed data analysis. It provides a succinct overview by reducing complex patterns, trends, and key insights into an understandable style. The summary serves as a quick reference for stakeholders, highlighting the most significant and impactful findings from the investigation.

2.3 Dashboard development calculations and analysis

2.3.1 Dashboard Development

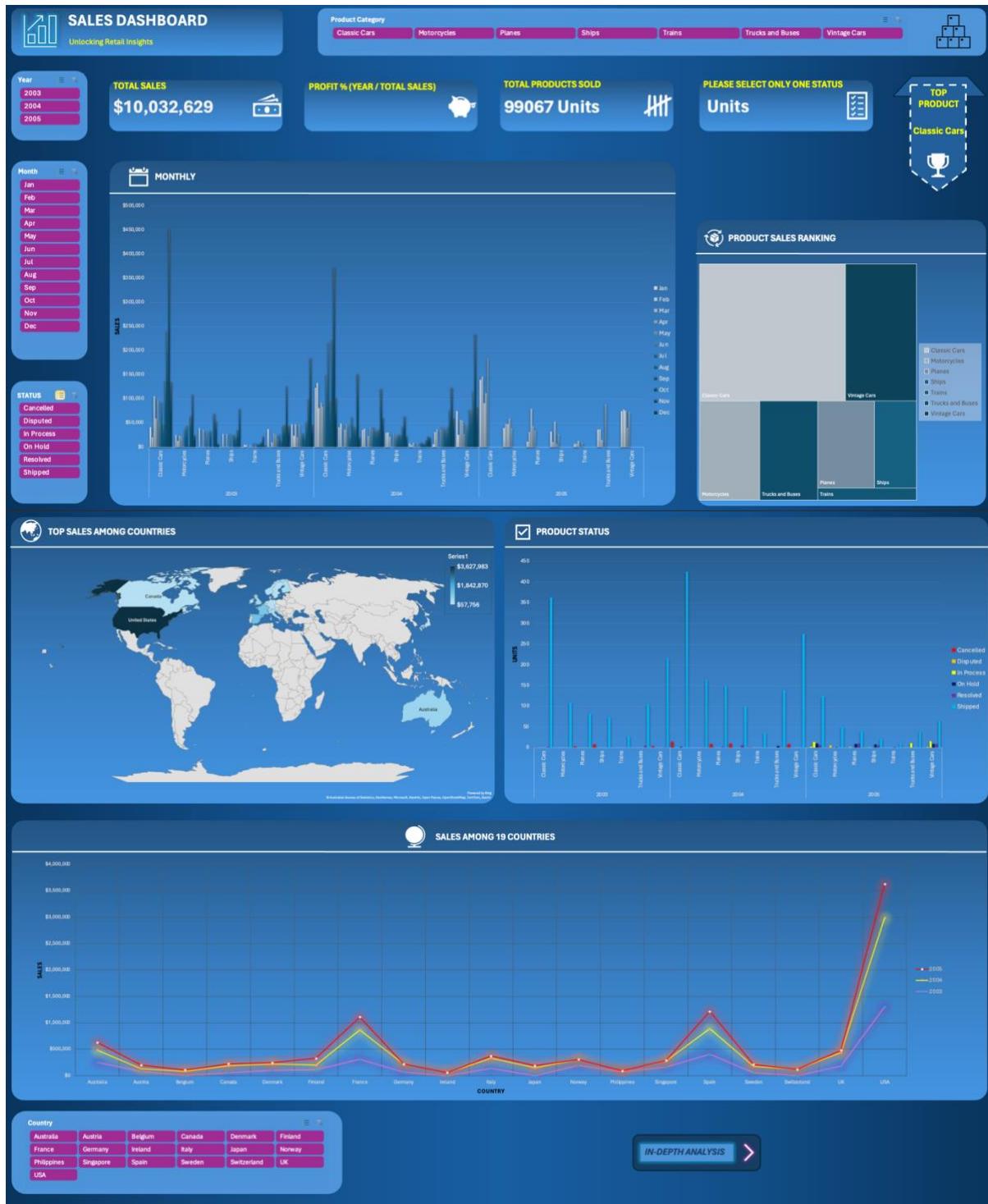


Figure 4.0 – Dash Board

Figure 4.0 shows several visualizations, including Total Sales, Profit%, Total Products Sold, and so forth. Pivot tables were used as the primary tool for this visualization since they summarize, sort, reorganize, group, count, total, and average data.

2.3.1.1 Total Sales Analysis

The formula for calculating total sales in Figure 5.0 is =TotalSales_ProductCategory!B16, where TotalSales_ProductCategory is a worksheet designed for use with Sales Analysis and the sales amount will be derived from cell B16, as illustrated in Figure 6.0.



Figure 5.0 - Total Sales Without Year and Product Category Filter Applied

Sales Analysis											
Total Sales For Different Product Categories Within 2003 to 2005											
Total Sales	Column Labels	Motorcycles	Planes	Ships	Trains	Trucks and Buses	Vintage Cars	Grand Total	Row Label	Classic Cars	Motorcycles
Row Labels	Classic Cars								Planes		
2003	1484785.29	370895.58	272257.6	244821.09	72802.29	420429.93	650987.76	3516979.5	Motorcycles		
2004	1762257.09	560545.23	502671.8	341437.97	116523.85	529302.89	911423.77	4724162.6	Planes		
2005	672573.28	234947.53	200074.17	128178.07	36917.33	178057.02	340739.31	1791486.7	Ships		
Grand Total	3919615.66	1166388.3	975003.57	714437.13	226243.47	1127789.8	1903150.8	10032629	Trains		
TOTAL SALES		\$10,032,629							Vintage Cars		

Figure 6.0 - Snippet For Total Sales Analysis

As shown in Figure 7.0, after selecting the year 2003, the sales amount will change accordingly based on the filters applied.



Figure 7.0 - Total Sales With Year and Without Product Category Filter Applied

As shown in Figure 8.0, after selecting the product category “Classic Cars”, the textbox will change to the total sales of the selected product category and the formula used to capture which product was selected is =IF(ISBLANK(J8),"TOTAL SALES - "&UPPER(J7),"TOTAL SALES") as illustrated in Figure 9.0.



Figure 8.0 - Total Sales Without Year But Product Category Filter Applied

Sales Analysis										
Total Sales For Different Product Categories Within 2003 to 2005										
Total Sales	Column Labels									Row Label
Row Labels	Classic Cars	Motorcycles	Planes	Ships	Trains	Trucks and	Vintage Car	Grand Total	Motorcycles	
2003	1484785.29	370895.58	272257.6	244821.09	72802.29	420429.93	650987.76	3516979.5	Planes	
2004	1762257.09	560545.23	502671.8	341437.97	116523.85	529302.89	911423.77	4724162.6	Ships	
2005	672573.28	234947.53	200074.17	128178.07	36917.33	178057.02	340739.31	1791486.7	Trains	
Grand Total	3919615.66	1166388.3	975003.57	714437.13	226243.47	1127789.8	1903150.8	10032629	Trucks and Buses	
TOTAL SALES										Vintage Cars

Figure 9.0 - Snippet For Total Sales Analysis

As shown in Figure 10.0, after selecting the year 2003 and product category “Classic Cars”, the sales amount will change accordingly based on the filters applied.



Figure 10.0 - Total Sales With Year and Product Category Filter Applied

2.3.1.2 Profit % Earned Analysis

The formula for calculating the profit earned in Figure 11.0 is =TotalSales_ProductCategory!B30, where TotalSales_ProductCategory is a worksheet designed for use with Sales Analysis and the profit earned will be derived from cell B30, as illustrated in Figure 12.0.



Figure 11.0 - Total Profit Earned Based On Total Sales With Year Filter Applied

B30	A	B	C	D	E	F	G	H	I	J	K
Sales Analysis											
1											
2											
3											
19											
20 Total Sales For 2003 to 2005											
21											
22 Row Labels											
23 2003											
24 2004											
25 2005											
26 Grand Total											
27											
28											
29											
30 PROFIT % (YEAR / TOTAL SALES)											
31											
32											

Figure 12.0 - Snippet For Yearly Basis Profit Earned Analysis

Figure 4.0 shows that if all years are selected, no data are calculated. The profit earned value will only be calculated if only one year is chosen. The full formula for calculating the profit earned based on the year selected is =IF(ISBLANK(C24),IF(C23=2003,GETPIVOTDATA("Sales",\$A\$22,"YEAR_ID",2003)/GETPIVOTDATA("Sales",\$A\$22)*100,IF(C23=2004,GETPIVOTDATA("Sales",\$A\$22,"YEAR_ID",2004)/GETPIVOTDATA("Sales",\$A\$22)*100,IF(C23=2005,GETPIVOTDATA("Sales",\$A\$22,"YEAR_ID",2005)/GETPIVOTDATA("Sales",\$A\$22)*100,"")),"")

2.3.1.3 Total Products Sold Analysis

The formula for calculating total products sold in Figure 13.0 is =TotalUnitSold_ProductCategory!B16, where TotalUnitSold_ProductCategory is a worksheet designed for use with Unit Sold Analysis and the amount of units sold will be derived from cell B16, as illustrated in Figure 14.0.



Figure 13.0 - Total Products Sold Without Year and Product Category Filter Applied

Units Sold Analysis										
Total Units Sold For Different Product Categories Within 2003 to 2005										
Sum of Quantity Ordered	Column Labels									Row Labels
Row Labels	Classic Cars	Motorcycles	Planes	Ships	Trains	Trucks and Buses	Vintage Cars	Grand Total		
2003	12473	3739	2996	2844	1000	4056	7504	34612	Planes	
2004	15418	5690	5524	3937	1303	5002	9950	46824	Ships	
2005	6101	2234	2207	1346	409	1719	3615	17631	Trains	
Grand Total	33992	11663	10727	8127	2712	10777	21069	99067	Trucks and Buses	
										Vintage Cars
TOTAL PRODUCTS SOLD	99067 Units									

Figure 14.0 - Snippet For Units Sold Analysis

Figure 4.0 shows that the Total Products Sold section was added with the word “Units”, and the following formula was used to append the term “Units” to the computation, =CONCATENATE(GETPIVOTDATA("Quantity Ordered",\$A\$7), " Units")

As shown in Figure 15.0, after selecting the year 2003, the amount of Total Products Sold will change accordingly based on the filters applied.



Figure 15.0 - Total Products Sold With Year and Without Product Category Filter Applied

As shown in Figure 16.0, after selecting the product category “Classic Cars”, the textbox will change to the total number of units sold of the selected product category and the formula used to capture which product was selected is =IF(ISBLANK(J8),UPPER(J7) & " SOLD","TOTAL PRODUCTS SOLD") as illustrated in Figure 17.0.



Figure 16.0 - Total Products Sold Without Year But Product Category Filter Applied

A16	B	C	D	E	F	G	H	I	J	K
1	Units Sold Analysis									
2										
Total Units Sold For Different Product Categories Within 2003 to 2005										
7	Sum of Quantity Ordered	Column Labels	Classic Cars	Motorcycles	Planes	Ships	Trains	Trucks and Buses	Vintage Cars	Grand Total
8	Row Labels									Row Labels
9	2003		12473	3739	2996	2844	1000	4056	7504	34612
10	2004		15418	5690	5524	3937	1303	5002	9950	46824
11	2005		6101	2234	2207	1346	409	1719	3615	17631
12	Grand Total		33992	11663	10727	8127	2712	10777	21069	99067
13										
14										
15										
16	TOTAL PRODUCTS SOLD		99067 Units							
17										
18										

Figure 17.0 - Snippet For Units Sold Analysis

As shown in Figure 18.0, after selecting the year 2003 and product category “Classic Cars”, the total number of units sold will change accordingly based on the filters applied.



Figure 18.0 - Total Products Sold With Year and Product Category Filter Applied

2.3.1.4 Product Status Analysis

The formula for calculating products status in Figure 19.0 is =ProductStatus!B36, where ProductStatus is a worksheet designed for use with Product Status Analysis and the total number of units cancelled, disputed, in process, on hold, resolved, or shipped will be derived from cell B36, as illustrated in Figure 20.0.

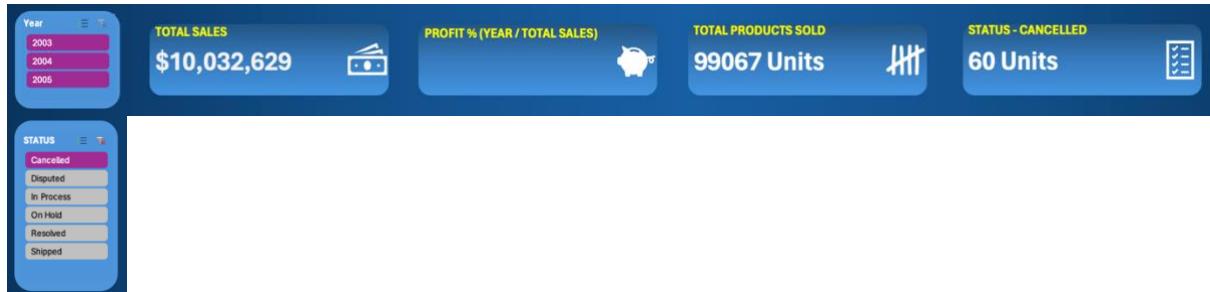


Figure 19.0 - Product Status Without Year But Status Filter Applied

B36	A	B	C	D	E	F	G	H	I	J	K
	Product Status Analysis										
	Product Status For Different Product Category Within 2003 to 2005										
6	Count of STATUS	Column Labels	Cancelled	Grand Total							
7	Row Labels										
8	2003		16	16							
9	Classic Cars		1	1							
10	Planes		3	3							
11	Ships		8	8							
12	Vintage Cars		4	4							
13	=2004		44	44							
14	Classic Cars		15	15							
15	Planes		9	9							
16	Ships		10	10							
17	Trains		1	1							
18	Vintage Cars		9	9							
19	Grand Total		60	60							
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36	STATUS - CANCELLED	60 Units									
37											
38											

Figure 20.0 - Snippet For Product Status Analysis

Figure 19.0 shows that the Status section was added with the word “Units”, and the following formula was used to append the term “Units” to the computation, =CONCAT(IF(A36="PleaseSelectOnlyOneStatus","",GETPIVOTDATA("STATUS",\$A\$6)), " Units"). In addition, Figure 4.0 shows that if all status or more than one status applied, no data are calculated. It will only be calculated only if one status is chosen.

As shown in Figure 19.0, after selecting the Status “Cancelled”, the textbox will change to the total number of units based on the selected status and the formula used to capture which status was selected is =IF(ISBLANK(I18),UPPER("Status - " & I17), "PLEASE SELECT ONLY ONE STATUS") as illustrated in Figure 21.0.

Product Status Analysis						
Product Status For Different Product Category Within 2003 to 2005						
Count of STATUS						
Row Labels						
Count of STATUS	Column Labels	-T	Cancelled	Grand Total		
2003			16	16		
2004			44	44		
2005						
Classic Cars			1	1		
Planes			3	3		
Ships			8	8		
Vintage Cars			4	4		
Grand Total			60	60		
Row Labels -T						
Cancelled						
STATUS - CANCEL 60 Units						

Figure 21.0 - Snippet For Product Status Analysis

As shown in Figure 22.0, after selecting the year 2003, status “Cancelled”, and product category “Classic Cars”, the total number of units sold will change accordingly based on the filters applied.



Figure 22.0 - Product Status With Year, Status, and Product Category Filter Applied

As shown in Figure 25.0, after selecting the year 2003, month “Jan” and “Feb”, and product category “Classic Cars”, the sales amount displayed in the chart will change accordingly based on the filters applied.

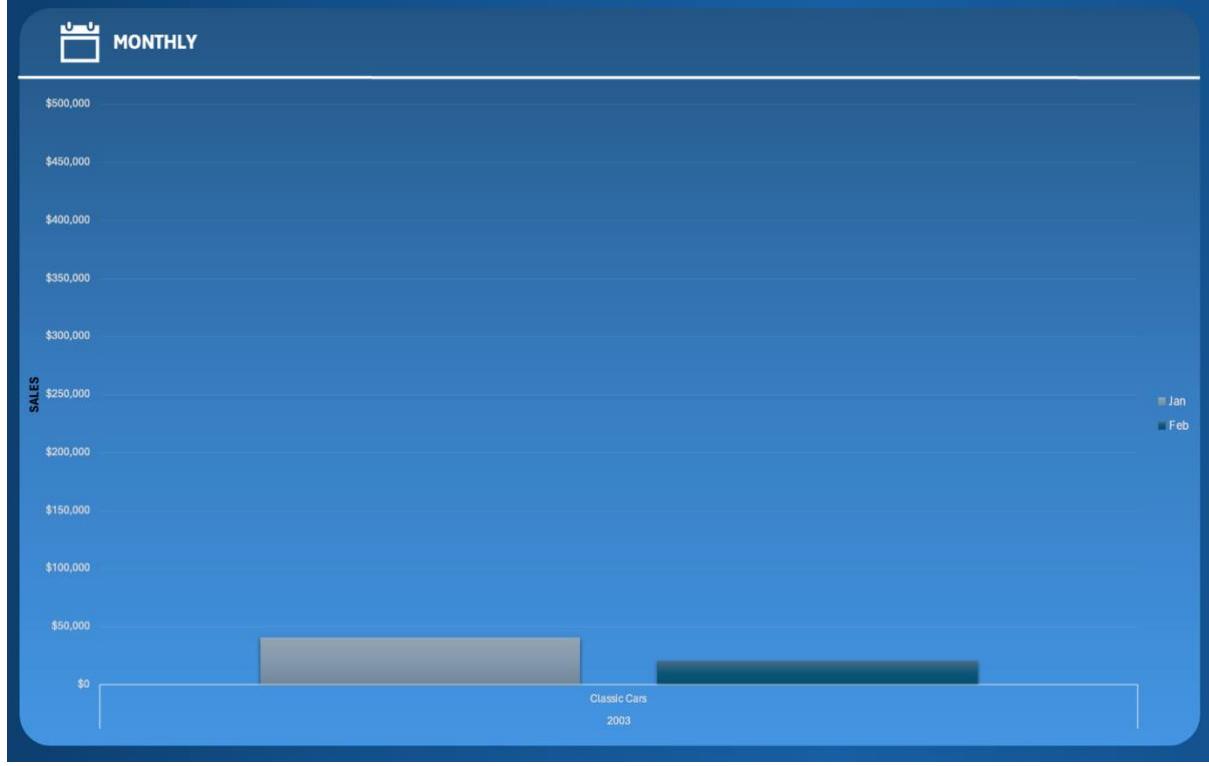


Figure 25.0 - Monthly Sales Chart With Year, Month, and Product Category Filter Applied

2.3.1.6 Product Sales Ranking Analysis

As shown in Figure 26.0, it represents the sales ranking for each product in the form of treemap chart and the chart was derived from the worksheet, TotalSales_ProductCategory, as illustrated in Figure 27.0. TotalSales_ProductCategory is a worksheet designed for use with Sales Analysis.



Figure 26.0 - Product Sales Ranking For Different Product Categories

65	Total Sales For Different Product Categories						
66	Classic Cars	Motorcycles	Planes	Ships	Trains	Trucks and Buses	Vintage Cars
67	3919615.66	1166388.34	975003.57	714437.13	226243.47	1127789.84	1903150.84
68							
69							
70							
71							

Figure 27.0 - Snippet For Product Sales Ranking Analysis

2.3.1.7 Top Sales Among Countries Analysis

As shown in Figure 28.0, it represents the top sales among countries in the form of world map chart and the chart was derived from the worksheet, TotalSales_ProductCategory, as illustrated in Figure 29.0. TotalSales_ProductCategory is a worksheet designed for use with Sales Analysis.

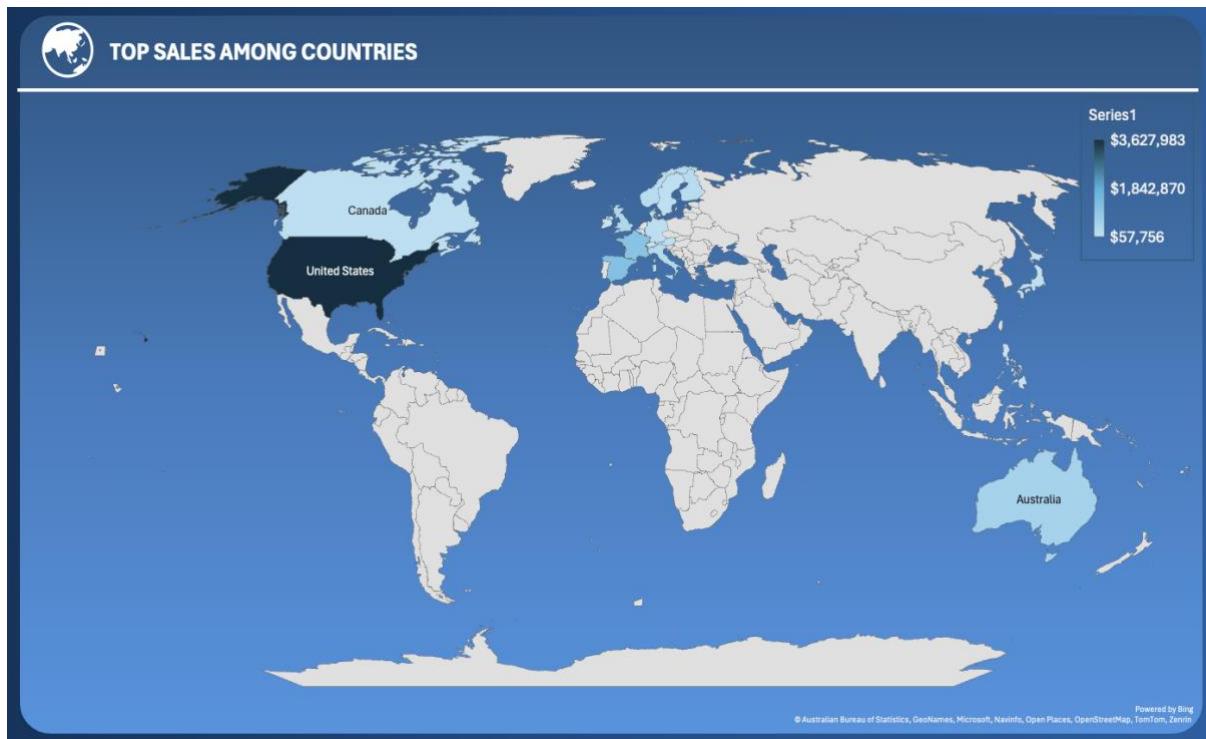


Figure 28.0 - Top Sales Among Different Countries Throughout All Years

72	Total Sales In Different Country
73	
74	
75	Australia \$630,623
76	Austria \$202,063
77	Belgium \$108,413
78	Canada \$224,079
79	Denmark \$245,637
80	Finland \$329,582
81	France \$1,110,917
82	Germany \$220,472
83	Ireland \$57,756
84	Italy \$374,674
85	Japan \$188,168
86	Norway \$307,464
87	Philippines \$94,016
88	Singapore \$288,488
89	Spain \$1,215,687
90	Sweden \$210,014
91	Switzerland \$117,714
92	UK \$478,880
93	USA \$3,627,983
94	
95	

Figure 29.0 - Snippet For Top Sales Among Countries Analysis

2.3.1.8 Product Status Analysis

As shown in Figure 30.0, it represents the total number of units cancelled, disputed, in process, on hold, resolved, or shipped in the form of bar chart and the chart was derived from the worksheet, ProductStatus, as illustrated in Figure 31.0. ProductStatus is a worksheet designed for use with Product Status Analysis.

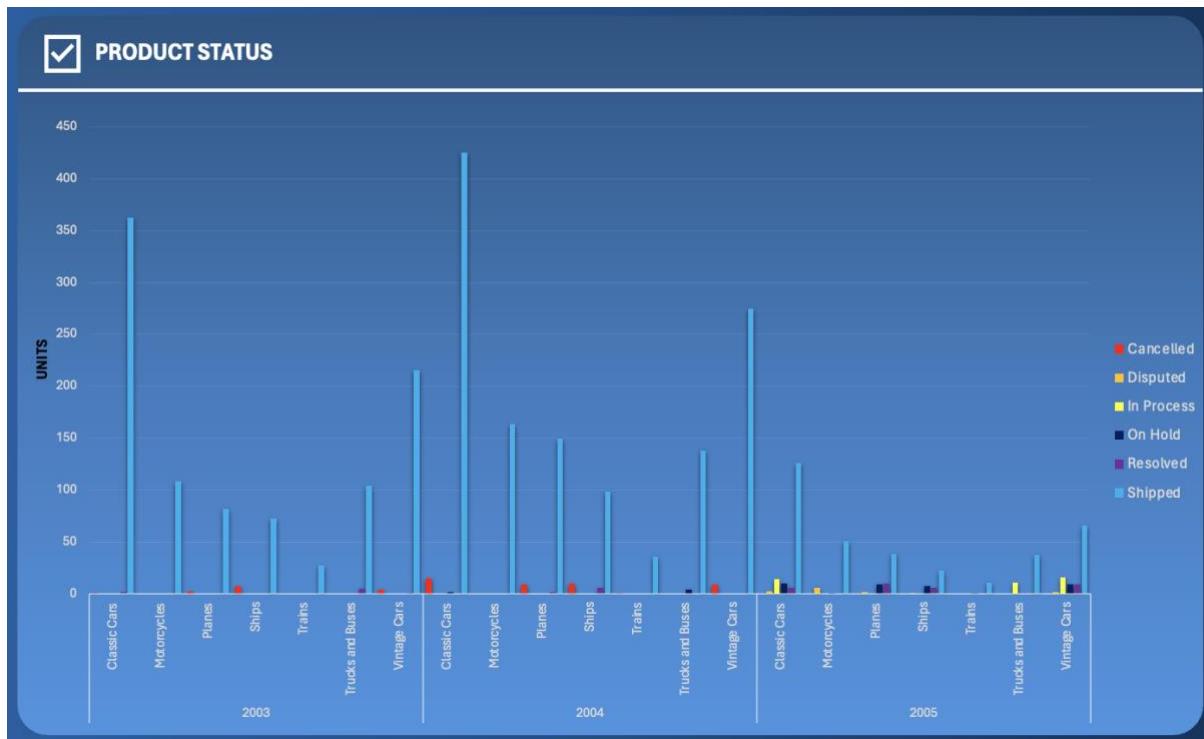


Figure 30.0 - Product Status Analysis

Product Status For Different Product Category Within 2003 to 2005								
Count of STATUS	Column Labels	Cancelled	Disputed	In Process	On Hold	Resolved	Shipped	Grand Total
Row Labels								
2003		16			8	976	1000	
	Classic Cars		1		2	360	366	
	Motorcycles					109	109	
	Planes		3			82	85	
	Ships		8			73	81	
	Trains					28	28	
	Trucks and Buses				5	105	110	
	Vintage Cars	4			1	216	221	
2004		44			6	8	1287	1345
	Classic Cars	15		2		425	442	Cancelled
	Motorcycles					164	164	Disputed
	Planes	9			2	150	161	In Process
	Ships	10			6	99	115	On Hold
	Trains	1				36	37	Resolved
	Trucks and Buses				4	138	142	Shipped
	Vintage Cars	9				275	284	
2005		14	41	38	31	354	478	
	Classic Cars	3	14	10	6	126	159	
	Motorcycles	6				51	58	
	Planes	2		9	10	39	60	
	Ships	1		8	6	23	38	
	Trains				1	11	12	
	Trucks and Buses			11		38	49	
	Vintage Cars	2	16	9	9	66	102	
Grand Total		60	14	41	44	47	2617	2823

Figure 31.0 - Snippet For Product Status Analysis

As shown in Figure 32.0, after selecting the year 2003, status “Cancelled” and “Resolved”, and product category “Classic Cars” and “Vintage Cars”, the units displayed for the product status selected in the chart will change accordingly based on the filters applied.

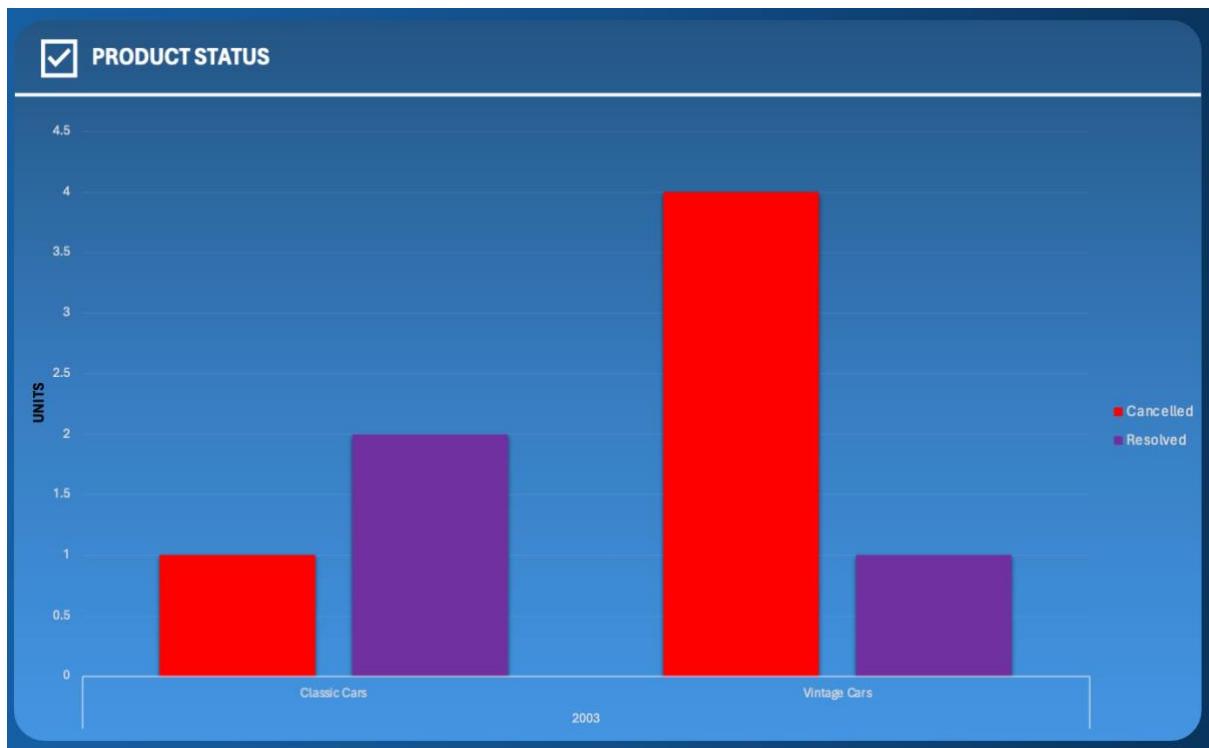


Figure 32.0 - Product Status Chart With Year, Status, and Product Category Filter Applied

2.3.1.9 Sales Among 19 Countries

As shown in Figure 33.0, it represents the total sales amount for each country in the form of line chart and the chart was derived from the worksheet, TotalSales_ProductCategory, as illustrated in Figure 34.0. TotalSales_ProductCategory is a worksheet designed for use with Sales Analysis.

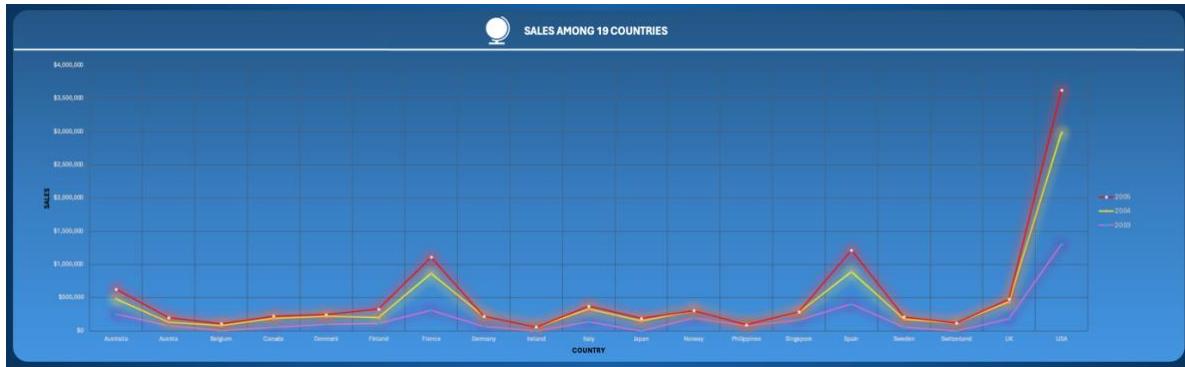


Figure 33.0 - Sales Among Countries Analysis

Total Sales In Different Country Within 2003 to 2005					
	Sum of Sales	Column Labels	2003	2004	2005
Row Labels			Grand Total		
Australia	253134	232397	145092	630623	
Austria	82118	51694	68250	202063	
Belgium	3348	80024	25040	108413	
Canada	54610	135776	33693	224079	
Denmark	99193	120432	26013	245637	
Finland	111155	91576	126852	329582	
France	312761	555199	242956	1110917	
Germany	70053	150419		220472	
Ireland		57756		57756	
Italy	140929	192236	41510	374674	
Japan		149422	38745	188168	
Norway	196533	110931		307464	
Philippines	78087	15929		94016	
Singapore	165686	116039	6763	288488	
Spain	405343	483545	326798	1215687	
Sweden	58460	119948	31607	210014	
Switzerland		117714		117714	
UK	180422	257656	40803	478880	
USA	1305148	1685471	637364	3627983	
Grand Total	3516980	4724163	1791487	10032629	

Figure 34.0 - Snippet For Sales Among Countries Analysis

As shown in Figure 35.0, after selecting the year 2003, Country “Canada”, “UK”, and “USA”, the sales amount displayed change accordingly based on the filters applied.

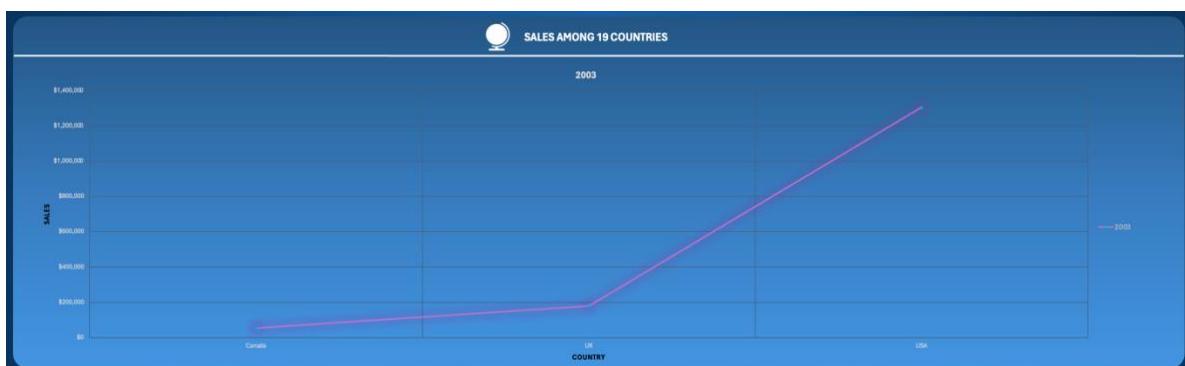


Figure 35.0 - Sales Amount Chart With Year and Country Filter Applied

2.3.2 In-Depth Analysis Dashboard Development



Figure 36.0 - In-depth Analysis Dash Board

Figure 36.0 shows several visualizations, including Total Sales, Total Sales from different type of company, and so forth. Pivot tables were used as the primary tool for this visualization since they summarize, sort, reorganize, group, count, total, and average data.

2.3.2.1 Total Sales For Different Type Of Company Analysis

The formula for calculating total sales for company type, Co, Inc, and Ltd, in Figure 37.0 is =CompanyType!B12 for company type Co, =CompanyType!B13 for company type Inc, and =CompanyType!B14 for company type Ltd, where CompanyType is a worksheet designed for use with Company Type Sales Analysis and the sales amount will be derived from cell B12, B13, and B14 for the company type of Co, Inc, and Ltd, as illustrated in Figure 38.0.



Figure 37.0 - Total Sales For Different Type Of Company Without Year Filter Applied

Company Type Sales Analysis		Company Type Sales Analysis		Company Type Sales Analysis	
Total Sales For Different Type Of Company Within 2003 to 2005		Total Sales For Different Type Of Company Within 2003 to 2005		Total Sales For Different Type Of Company Within 2003 to 2005	
Row Labels	Total Sales	Row Labels	Total Sales	Row Labels	Total Sales
Co.	6659194	2003	Co.	6659194	2003
Inc.	1431921	2004	Inc.	1431921	2004
Ltd.	1941514	2005	Ltd.	1941514	2005
Grand Total	10032629		Grand Total	10032629	
CO. TOTAL SALES	\$6,659,194		CO. TOTAL SALES	\$6,659,194	
INC. TOTAL SALES	\$1,431,921		INC. TOTAL SALES	\$1,431,921	
LTD. TOTAL SALES	\$1,941,514		LTD. TOTAL SALES	\$1,941,514	

Figure 38.0 - Snippet For Total Sales For Different Company Type

As shown in Figure 39.0, after selecting the year 2003, the textbox will change accordingly to the total sales of the selected year for different type of company and the formula used to capture which year was selected is =UPPER(TEXTJOIN("", TRUE, A7," TOTAL SALES ",IF(ISBLANK(C8),"IN "& C7,"))) for company type Co, =UPPER(TEXTJOIN("",TRUE,A8," TOTAL SALES ",IF(ISBLANK(C8),"IN "&C7,"))) for company type Inc, and =UPPER(TEXTJOIN("",TRUE,A9," TOTAL SALES ",IF(ISBLANK(C8),"IN "&C7,"))) for company type Ltd, as illustrated in Figure 40.0. In addition, after selecting the year 2003, the sales amount will change accordingly for each company type based on the filter applied.



Figure 39.0 - Total Sales For Different Type Of Company With Year Filter Applied

Company Type Sales Analysis		Company Type Sales Analysis		Company Type Sales Analysis	
Total Sales For Different Type Of Company Within 2003 to 2005		Total Sales For Different Type Of Company Within 2003 to 2005		Total Sales For Different Type Of Company Within 2003 to 2005	
Row Labels	Total Sales	Row Labels	Total Sales	Row Labels	Total Sales
Co.	2200667	2003	Co.	2200667	2003
Inc.	535672		Inc.	535672	
Ltd.	780641		Ltd.	780641	
Grand Total	3516980		Grand Total	3516980	
CO. TOTAL SALES IN 2003	\$2,200,667		CO. TOTAL SALES IN 2003	\$2,200,667	
INC. TOTAL SALES IN 2003	\$535,672		INC. TOTAL SALES IN 2003	\$535,672	
LTD. TOTAL SALES IN 2003	\$780,641		LTD. TOTAL SALES IN 2003	\$780,641	

Figure 40.0 - Snippet For Total Sales For Different Company Type

2.3.2.2 Monthly Sales For Different Type Of Company Analysis

As shown in Figure 41.0, it represents the monthly basis analysis for the sales amount of different type of company, and the bar chart was derived from the worksheet, CompanyType, as illustrated in Figure 42.0. CompanyType is a worksheet designed for use with Company Type Sales Analysis.

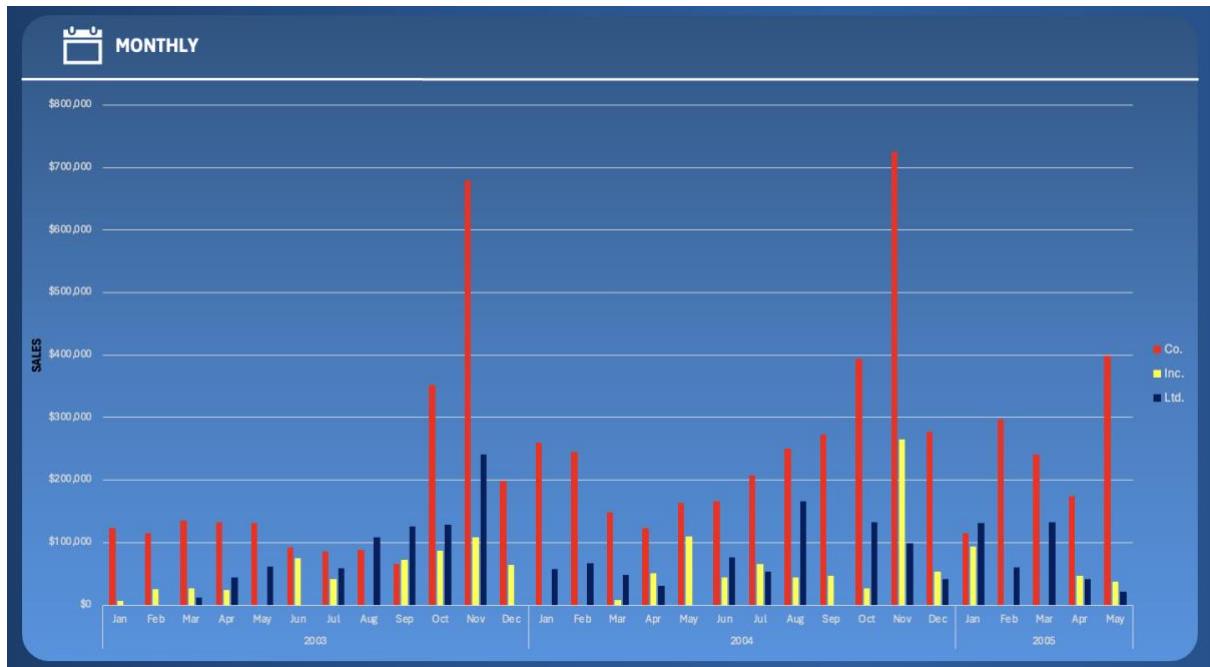


Figure 41.0 - Monthly Sales Chart For Different Type Of Company

Total Sales For Different Type Of Company Within 2003 to 2005 With Month Analysis				
	Total Sales	Column Labels ▾		
Row Labels	Co.	Inc.	Ltd.	Grand Total
2003	2200667	535672	780641	3516980
Jan	122890	6864	129754	
Feb	115052	25784	140836	
Mar	134708	27399	12399	174505
Apr	133175	24777	43657	201610
May	131600	61073	192673	
Jun	92343	75740	168083	
Jul	86420	42032	59281	187732
Aug	88983	108827	197809	
Sep	65968	72494	125511	263973
Oct	351935	87590	128766	568291
Nov	680034	108676	241128	1029838
Dec	197560	64316	261876	
	3232826	717855	773482	4724163
2004				
Jan	259215	57362	316577	
Feb	244869	66551	311420	
Mar	148089	8722	48923	205734
Apr	123242	51604	31303	206148
May	163120	110318	273438	
Jun	166207	44131	76337	286674
Jul	208175	65512	53456	327144
Aug	250172	44781	166548	461501
Sep	273302	47449	320751	
Oct	393460	27445	132018	552924
Nov	725560	264657	98831	1089048
Dec	277416	53235	42152	372803
	1225701	178394	387391	1791487
2005				
Jan	114592	94060	130891	339543
Feb	297347	60840	358186	
Mar	241599	132664	374263	
Apr	173758	46519	41357	261633
May	398406	37815	21640	457861
Grand Total	6659194	1431921	1941514	10032629

Figure 42.0 - Snippet For Monthly Sales Analysis With Different Type Of Company

As shown in Figure 43.0, after selecting year 2003, the sales amount displayed in the chart will change accordingly based on the filters applied.

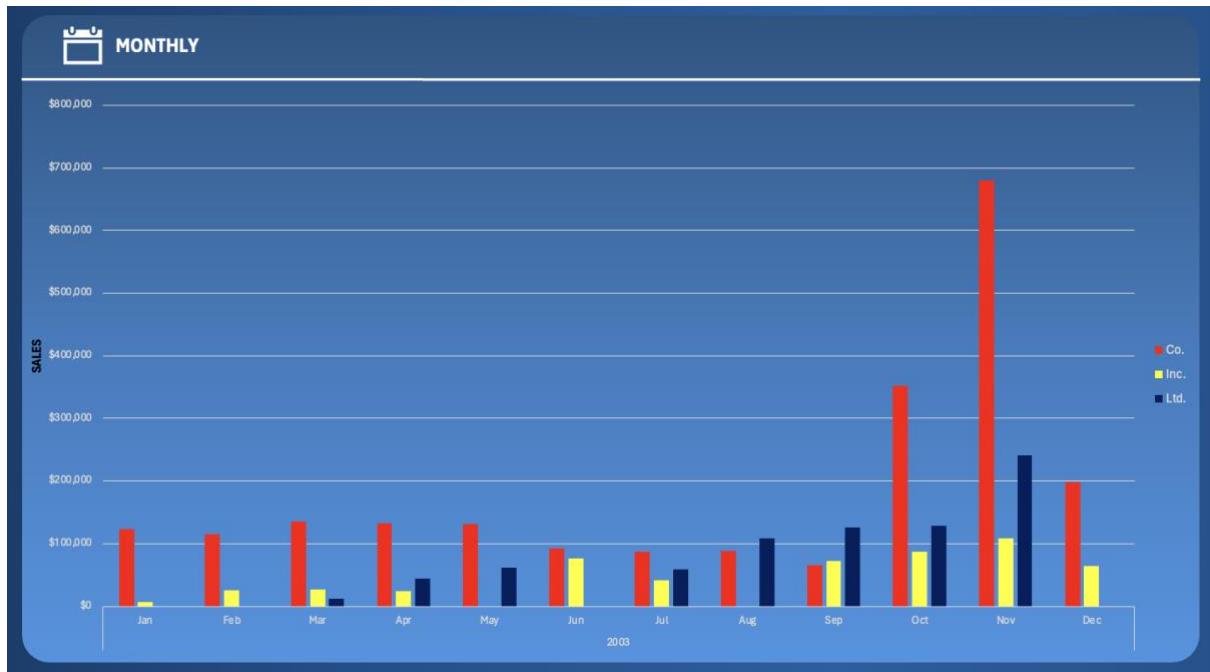


Figure 43.0 - Monthly Sales Chart For Different Type Of Company With Year Filter Applied

2.3.2.3 Profit % Analysis For Different Type Of Company

As shown in Figure 44.0, it represents the profit earned for different type of company, and the pie chart was derived from the worksheet, CompanyType, as illustrated in Figure 45.0. CompanyType is a worksheet designed for use with Company Type Sales Analysis.

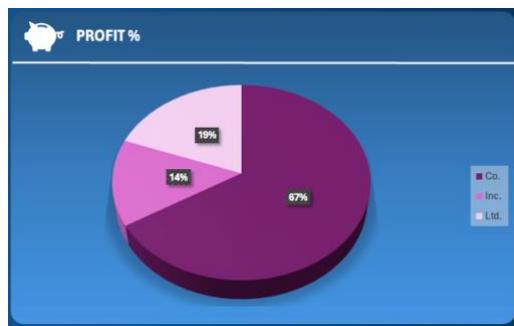


Figure 44.0 - Total Profit Earned Based On Total Sales For Different Company Type Without Year Filter Applied

3	Total Sales For Different Type Of Company Within 2003 to 2005	
4	Total Sales	Row Labels
6	Row Labels	Row Labels
7	Co.	2003
8	Inc.	2004
9	Ltd.	2005
10	Grand Total	10032629
11	CO. TOTAL SALES	\$6,659,194
12	INC. TOTAL SALES	\$1,431,921
13	LTD. TOTAL SALES	\$1,941,514
14		
15		
16		

Figure 45.0 - Snippet For Total Sales For Different Company Type

As shown in Figure 43.0, after selecting year 2003, the sales amount displayed in the chart will change accordingly based on the filters applied.

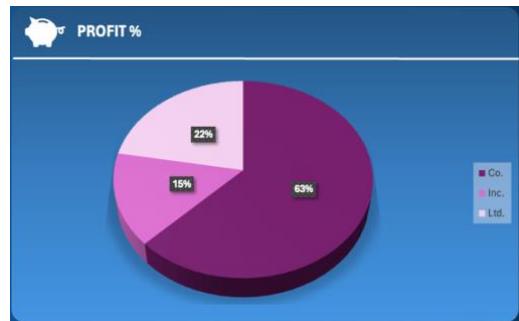


Figure 46.0 - Total Profit Earned Based On Total Sales For Different Company Type With Year Filter Applied

2.3.2.4 Quantity Sold Analysis For Different Product

As shown in Figure 47.0, it represents the quantity sold to different type of company, and the bar chart was derived from the worksheet, CompanyType, as illustrated in Figure 48.0. CompanyType is a worksheet designed for use with Company Type Sales Analysis.

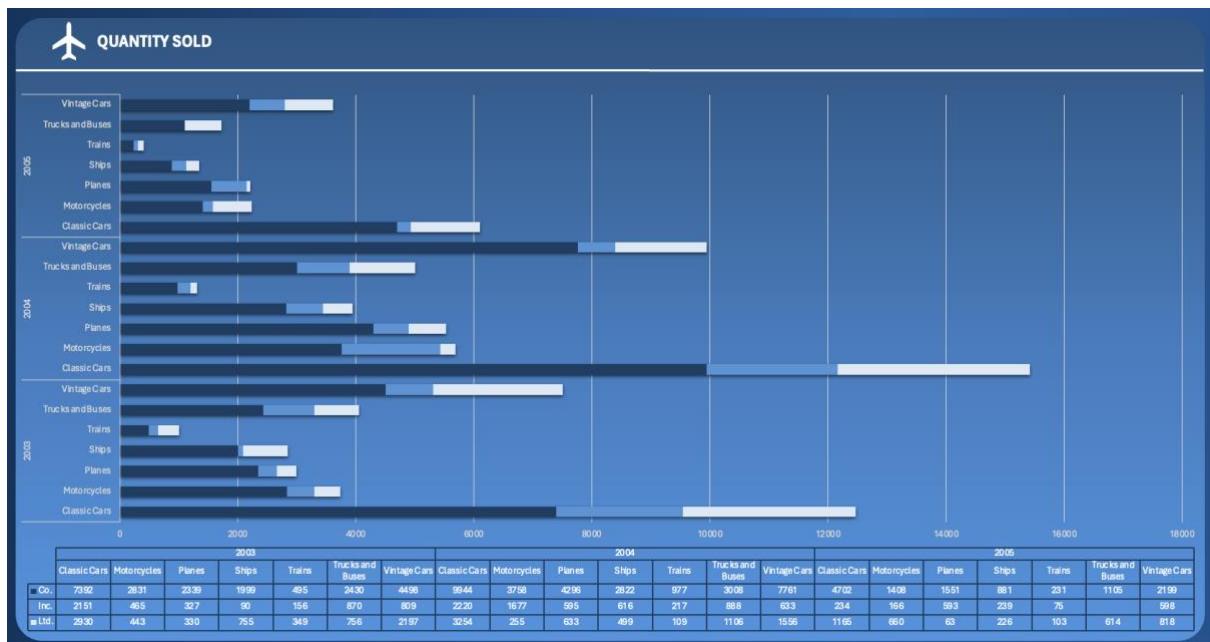


Figure 47.0 - Quantity Sold To Different Type Of Company Without Any Filters Applied

Row Labels	Column Labels	Co.	Inc.	Ltd.	Grand Total
Sum of Quantity Ordered					
2003		21984	4868	7760	34612
Classic Cars		7392	2151	2930	12473
Motorcycles		2831	465	443	3739
Planes		2339	327	330	2996
Ships		1999	90	755	2844
Trains		495	156	349	1000
Trucks and Buses		2430	870	756	4056
Vintage Cars		4498	809	2197	7504
2004		32566	6846	7412	46824
Classic Cars		9944	2220	3254	15418
Motorcycles		3758	1677	255	5690
Planes		4296	595	633	5524
Ships		2822	616	499	3937
Trains		977	217	109	1303
Trucks and Buses		3008	888	1106	5002
Vintage Cars		7761	633	1556	9950
2005		12077	1905	3649	17631
Classic Cars		4702	234	1165	6101
Motorcycles		1408	166	660	2234
Planes		1551	593	63	2207
Ships		881	239	226	1346
Trains		231	75	103	409
Trucks and Buses		1105	614	1719	
Vintage Cars		2199	598	818	3615
Grand Total		66627	13619	18821	99067

Figure 48.0 - Snippet For Quantity Sold Analysis For Different Type Of Company

As shown in Figure 49.0, after selecting year 2003, Month “Jan” and “Feb”, and Territory “EMEA” and “NA”, the quantity sold amount displayed in the chart will change accordingly based on the filters applied.

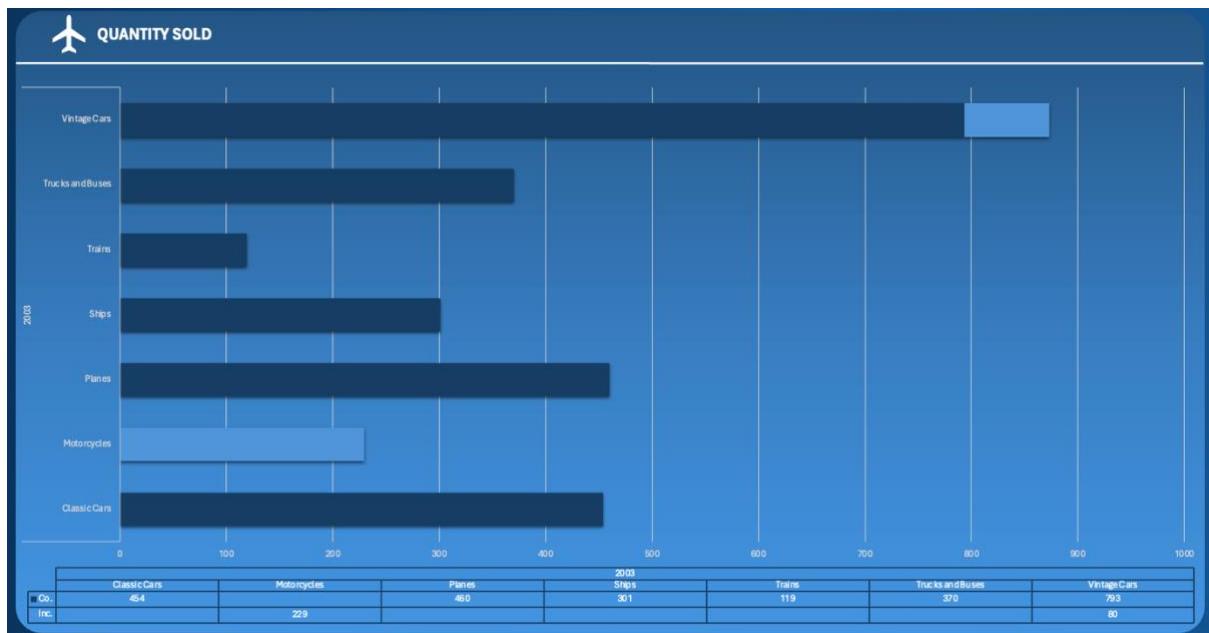


Figure 49.0 - Quantity Sold To Different Type Of Company With Year, Month, and Territory Filters Applied

2.3.2.5 Deal Size Analysis For Different Product

As shown in Figure 50.0, it represents the deal size dealt with different type of company, and the bar chart was derived from the worksheet, CompanyType, as illustrated in Figure 51.0. CompanyType is a worksheet designed for use with Company Type Sales Analysis.

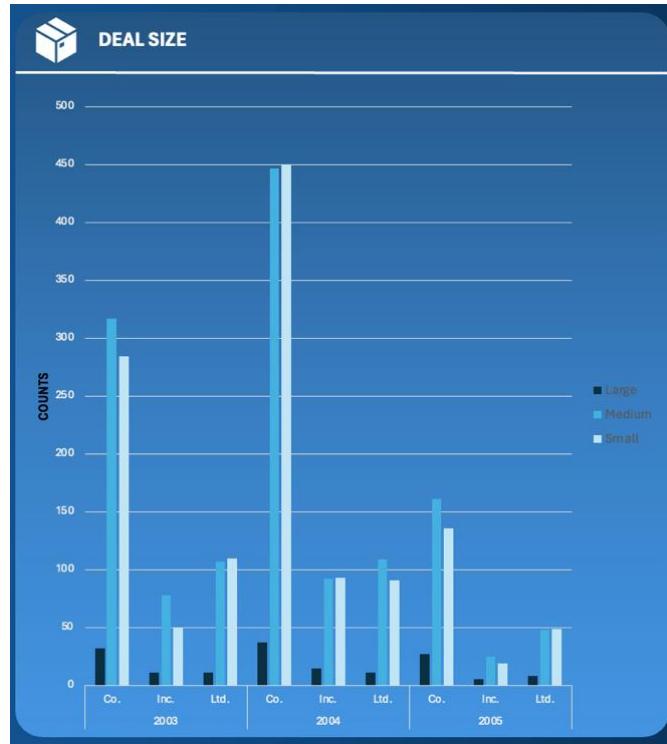


Figure 50.0 - Deal Size Dealt For Different Type Of Company Without Any Filters Applied

Count Of Deal Size From Different Type Of Companies Within 2003 to 2005					
Row Labels	Count of Deal Size	Column Labels			
	Large	Medium	Small	Grand Total	
2003		54	502	444	1000
Co.		32	317	284	633
Inc.		11	78	50	139
Ltd.		11	107	110	228
2004		63	648	634	1345
Co.		37	447	450	934
Inc.		15	92	93	200
Ltd.		11	109	91	211
2005		40	234	204	478
Co.		27	161	136	324
Inc.		5	25	19	49
Ltd.		8	48	49	105
Grand Total		157	1384	1282	2823

Figure 51.0 - Snippet For Deal Size Dealt For Different Type Of Company

As shown in Figure 52.0, after selecting year 2003, the amount of deal size dealt with different type of company displayed in the chart will change accordingly based on the filters applied.

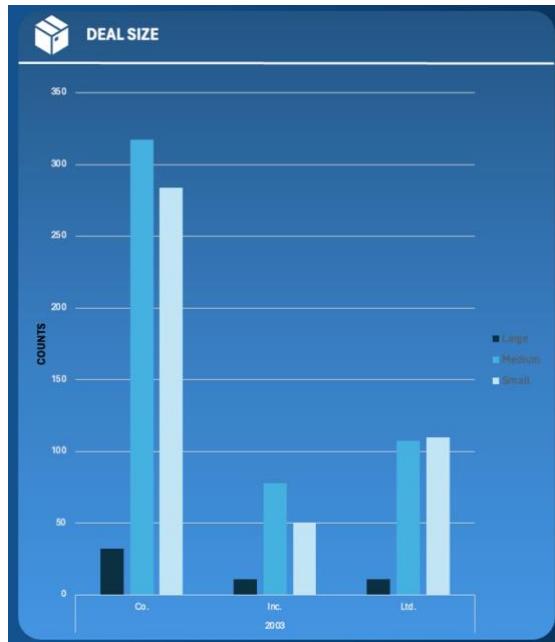


Figure 52.0 - Deal Size Dealt For Different Type Of Company With Year Filters Applied

2.3.2.6 Sales Analysis Among Different Territories

As shown in Figure 53.0, it represents the sales amount among different territories, and the bar chart was derived from the worksheet, CompanyType, as illustrated in Figure 54.0. CompanyType is a worksheet designed for use with Company Type Sales Analysis.

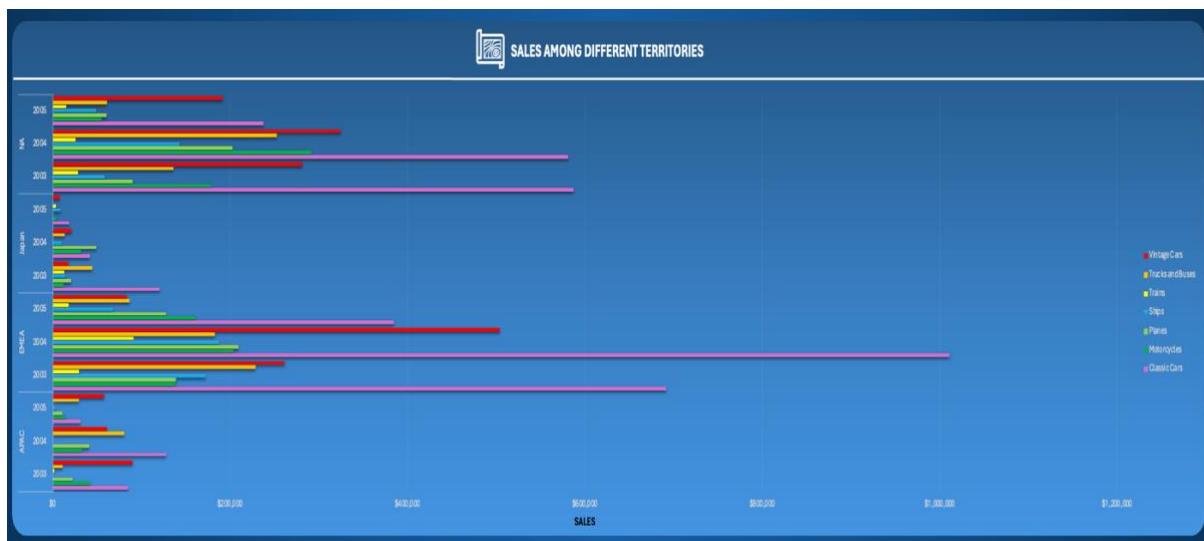


Figure 53.0 - Sales Analysis Among Different Territories Without Any Filters Applied

Total Sales For Different Product Categories Within 2003 to 2005 With Different Territory Analysis									
Sum of Sales	Column Labels	Classic Cars	Motorcycles	Planes	Ships	Trains	Trucks and Buses	Vintage Cars	Grand Total
Row Labels									
APAC	2003	244758	89969	74854	4160	1681	121848	208852	746122
	2004	85389	42353	22347		1681	11298	90067	253134
	2005	127960	33124	41425	1089		80634	61076	345308
EMEA	2003	31410	14492	11082	3070		29917	57709	147680
	2004	2086995	503097	476123	427265	138506	498306	848981	4979272
	2005	181601	48774	70084	33016	16802	57848	47049	455173
Japan	2003	120696	12639	20907	14156	13279	44498	17599	243773
	2004	42071	31959	49177	10453		13349	21471	168479
	2005	18835	4176		8407	3524		7979	42921
NA	2003	1406261	524549	353943	249997	69254	449788	798269	3852061
	2004	587428	178109	90016	58238	28304	135936	281727	1359757
	2005	581043	291421	202942	142904	25551	252572	324815	1821247
Grand Total		3919616	1166388	975004	714437	226243	1127790	1903151	10032629

Figure 54.0 - Snippet For Sales Analysis Among Different Territories

As shown in Figure 55.0, after selecting year 2003, product category “Classic Cars” and “Vintage Cars”, and Territory “APAC” and “EMEA”, the sales amount among different territories displayed in the chart will change accordingly based on the filters applied.

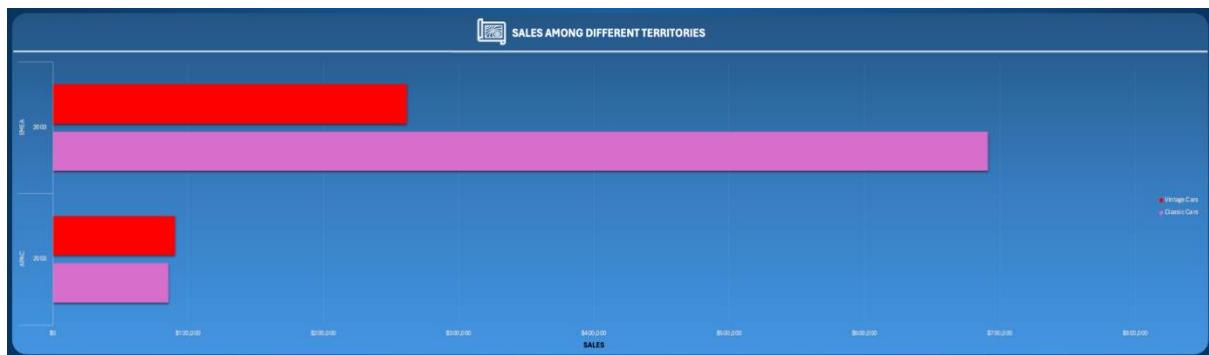


Figure 55.0 - Sales Analysis Among Different Territories With Year, Product Category, and Territory Filters Applied

2.4 Research methods selection

Research methods comprise a wide range of organised techniques and strategies used to collect information or proof, with the ultimate objective of promoting more in-depth understanding and enlightening analysis of a given topic. These approaches function as helpful frameworks that direct the gathering and analysis of data with the ultimate goal of revealing new information or developing a more thorough comprehension of the studied field (Tech, 2023). There are two types of research methods:

Quantitative research methods which utilizes statistical and computational techniques, this analytical approach quantifies, measures, and examines different facets of the data to enable researchers to draw insightful conclusions. In order to test hypotheses, find correlations, and extrapolate results to a broader population, quantitative data analysis is frequently

employed. This approach allows for a more thorough comprehension of the underlying patterns and behaviours present in the dataset (Lakshman, 2000).

1. Quantitative research methods which include:

- a. Surveys
- b. Questionnaires
- c. Tests
- d. Databases
- e. Experiments

Qualitative research methods involve the investigation of non-numerical data with the goal of revealing underlying themes and meanings. With its rich, descriptive insights into a particular research subject, it provides a deeper understanding of subjective interpretations, complex phenomena and human interaction.

2. Qualitative research methods:

- a. Interviews
- b. Observations
- c. Focus Group

Acquiring the data from Kaggle constitutes a form of Secondary Data Analysis (SDA), which involves using information derived from previously gathered primary data sources such as books, surveys, journals, and more. Given that our data predominantly involves statistical information, it falls within the realm of Quantitative Research methods (Wickham, 2019).

2.4.1 Justification for method choice

SDA was used in this project due to the various advantages it provides. Although it is not directly under Quantitative or Qualitative research, it provides benefits such as; Reducing the time taken in collecting data, Convenience of utilizing existing data, Cheaper in comparison to primary data collection and more. Due to these factors, we decided that SDA would be the more convenient and time-efficient option in comparison to other research methods.

3.0 Discussion

3.1 Key findings

In this section, multiple discussion will be carry out since as highlighted in section 1.2, the study aims to provide stakeholders with data-driven insights that can help guide decision-making processes, optimise resource allocation, and contribute to the overall performance of retail operations.

3.1.1 Total Sales Amount

Table 1.0 - Total Sales Amount

Year	Total Sales	Average Profit Per Month
2003	\$3,516,980	2.9% / Month
2004	\$4,724,163	3.9% / Month
2005 (Only 5 Months Data Available)	\$1,791,487	3.6% / Month

As shown in Table 1.0, 2004 had the highest profit when compared to 2003 and 2005. As a result, the year 2003 and 2004 will be explored, but not 2005 because just 5 months of data are available, and if we take 2005 into consideration, it may influence our data quality and analysed results due to the absence of remaining months data for the year 2005.

3.1.1.1 Monthly Sales For 2003 and 2004

Table 2.0 - Monthly Sales For 2003 and 2004

Month	Year	
	2003	2004
January	\$129,753	\$316,577
February	\$140,836	\$311,419
March	\$174,504	\$205,733
April	\$201,609	\$206,148
May	\$192,673	\$273,438
June	\$168,082	\$286,674
July	\$187,731	\$327,144
August	\$197,809	\$461,501
September	\$263,973	\$320,750
October	\$568,290	\$552,924
November	\$1,029,837	\$1,089,048
December	\$261,876	\$372,802

As shown in Table 2.0, the month November generated the maximum profit in 2003 and 2004, followed by October. Hence, in section 3.1.1.2 will examine which product categories generate the most profit in the month of November and October.

3.1.1.2 Monthly Sales For Different Product Category In 2003 and 2004

Table 3.0 - Monthly Sales For Different Product Category In 2003 and 2004

Product Category	Year			
	2003		2004	
	October	November	October	November
Classic Cars	\$241,145	\$452,924	\$223,856	\$372,231
Motorcycles	\$64,235	\$109,345	\$39,413	\$151,711
Planes	\$69,180	\$54,133	\$37,596	\$121,130
Ships	\$35,980	\$79,174	\$43,811	\$63,900
Trains	\$10,233	\$22,523	\$15,183	\$22,271
Truck and Buses	\$46,912	\$127,062	\$76,901	\$123,811
Vintage Cars	\$100,603	\$184,673	\$116,160	\$233,990

As shown in Table 3.0, Classic Cars, followed by Vintage Cars, generated the maximum profit in November, followed by October in 2003 and 2004. Furthermore, Trains had the lowest profit margin. Hence, in section 3.1.1.3 will examine which country contributes the greatest and least profit.

3.1.1.3 Total Sales For Different Countries

Table 4.0 - Total Sales For Different Countries

Country	Total Sales
Australia	\$630,623
Austria	\$202,063
Belgium	\$108,413
Canada	\$224,079
Denmark	\$245,637
Finland	\$329,582
France	\$1,110,917
Germany	\$220,472
Ireland	\$57,756
Italy	\$374,674
Japan	\$188,168
Norway	\$307,464
Philippines	\$94,016
Singapore	\$288,488
Spain	\$1,215,687
Sweden	\$210,014
Switzerland	\$117,714
UK	\$478,880
USA	\$3,627,983

As shown in Table 4.0, USA generates the most profit, followed by Spain and France, while Ireland earns the least profit, followed by Philippines and Switzerland.

3.1.2 Total Sales Amount From Different Type Of Company

The following section will look at three sorts of companies: Co., Inc., and Ltd. Co. is an abbreviation for company, a catchall phrase for an association of people working together in a commercial or industrial enterprise, such as limited liability company. Inc. is the abbreviation for incorporated which is a separate legal entity from the person or people forming it. When a company is incorporated, it means it has gone through a legal process to become a distinct entity with its own rights and liabilities. Lastly, Ltd. is an abbreviation for limited companies which is used mostly in European countries and Canada. The term “limited” implies that the liability of the company’s owners or shareholders is limited to the amount invested, providing a level of financial protection for individual investors.

Table 5.0 - Total Sales Amount From Different Type Of Company

Company Type	Total Sales
Co.	\$665,919,4
Inc.	\$143,192,1
Ltd.	\$194,151,4

As shown in Table 5.0, Co. generates the most while Inc. earns the least profit. Hence, in section 3.1.2.1 will examine monthly sales among different type of company for year 2003 and 2004.

3.1.2.1 Monthly Sales Among Different Type Of Company For 2003 and 2004

Table 6.0 - Monthly Sales Among Different Type Of Company For 2003 and 2004

Month	Year					
	2003			2004		
	Co.	Inc.	Ltd.	Co.	Inc.	Ltd.
January	\$122,890	\$6,864	\$0	\$259,215	\$0	\$57,362
February	\$115,052	\$25,784	\$0	\$244,869	\$0	\$66,551
March	\$134,708	\$27,399	\$12,399	\$148,089	\$8,722	\$48,923
April	\$133,175	\$24,777	\$43,657	\$123,242	\$51,604	\$31,303
May	\$131,600	\$0	\$61,073	\$163,120	\$110,318	\$0
June	\$92,343	\$75,740	\$0	\$166,207	\$44,131	\$76,337
July	\$86,420	\$42,032	\$59,281	\$208,175	\$65,512	\$53,456
August	\$88,983	\$0	\$108,827	\$250,172	\$44,781	\$166,548
September	\$65,968	\$72,494	\$125,511	\$273,302	\$47,449	\$0
October	\$351,935	\$87,590	\$128,766	\$393,460	\$27,445	\$132,018
November	\$680,034	\$108,676	\$241,128	\$725,560	\$264,657	\$98,831
December	\$197,560	\$64,316	\$0	\$277,416	\$53,235	\$42,152

As shown in Table 6.0, the tendency for sales is highest during the month of November, with Co. generating the most, followed by Ltd. and Inc. in 2003. For the year 2004, Co.

generated the most, followed by Inc. and Ltd. In addition, in 2003, the least profit was created by Co. in the month of September, Inc. in the months of May and August, and Ltd. in the months of January, February, and June. In 2004, the least profit was earned for Co. in April, Inc. in January and February, and Ltd. in May and September. Hence, in section 3.1.2.2 will examine which product categories have the most quantity sold.

3.1.2.2 Quantity Sold Among Different Company For Different Product Category

Table 7.0 - Quantity Sold Among Different Company For Different Product Category

Product Category	Year					
	2003			2004		
	Co.	Inc.	Ltd.	Co.	Inc.	Ltd.
Classic Cars	7392	2151	2930	9944	2220	3254
Motorcycles	2831	465	443	3758	1677	255
Planes	2339	327	330	4296	595	633
Ships	1999	90	755	2822	616	499
Trains	495	156	349	977	217	109
Truck and Buses	2430	870	756	3008	888	1106
Vintage Cars	4498	809	2197	7761	633	1556

As shown in Table 7.0, Classic Cars sold the most units among the three types of companies. Furthermore, trains were the least sold for Co. in 2003, followed by ships for Inc. and planes for Ltd. Trains were the least popular product sold by Co., Inc., and Ltd. in 2004. So, as shown in Table 3.0, trains yield the least profit. Hence, in section 3.1.2.3 will examine which product categories sell the most in four different territories: APAC (Asia-Pacific), EMEA (Europe, Middle East, Africa), Japan, and NA (North America).

3.1.2.3 Total Sales Among Different Territories For Different Product Category

Table 8.0 - Total Sales Among Different Territories For Different Product Category

Product Category	Year							
	2003				2004			
	APAC	EMEA	Japan	NA	APAC	EMEA	Japan	NA
Classic Cars	\$85,389	\$69,1273	\$120,696	\$587,428	\$127,960	\$101,1184	\$42,071	\$581,043
Motorcycles	\$42,353	\$137,795	\$12,639	\$178,109	\$33,124	\$204,042	\$31,959	\$291,421
Planes	\$22,347	\$138,987	\$20,907	\$90,016	\$41,425	\$209,128	\$49,177	\$202,942
Ships	\$0	\$172,428	\$14,156	\$58,238	\$1,089	\$186,992	\$10,453	\$142,904
Trains	\$1,681	\$29,538	\$13,279	\$28,304	\$0	\$90,973	\$0	\$25,551
Truck and Buses	\$11,298	\$228,699	\$44,498	\$135,936	\$80,634	\$182,748	\$13,349	\$252,572
Vintage Cars	\$90,067	\$261,595	\$17,599	\$281,727	\$61,076	\$504,062	\$21,471	\$324,815

As shown in Table 8.0, the Classic Cars product category earned the most profit in the territories of APAC, Japan, and NA in 2003, and again in 2004, it earned the most profit in the territories of APAC and NA. So, beneficial insights can be supplied from this visualization such as producing more Classic Cars for sale in APAC and NA territories. On the other hand, it is work noting that the Vintage Cars product category earns the biggest profit in the EMEA region in year 2003 and 2004. Furthermore, in year 2003 and 2004, Trains had the lowest profit margin among territories. As a result, section 4.0 will be a summary of the insights visualized that could achieve the project's aims and importance as indicated in section 1.2.

4.0 Summary

4.1 Summary of key findings

This section will evaluate the summary of important results that could increase profit through better asset allocation and decision-making. Refer to the appendix for the summary of analysis design.

4.1.1 Summary of sales trend from 2003 to 2004 with most profit earned

As indicated in Figures 56.0 – 58.0, we can conclude that the majority of sales in 2003 came from the month of November, with classic cars and vintage cars being the top two most profitable products sold. Furthermore, Co. was the type of firm that generated the greatest sales in November. Finally, the top two product categories, classic vehicles and vintage cars, have the highest sales in EMEA and NA.

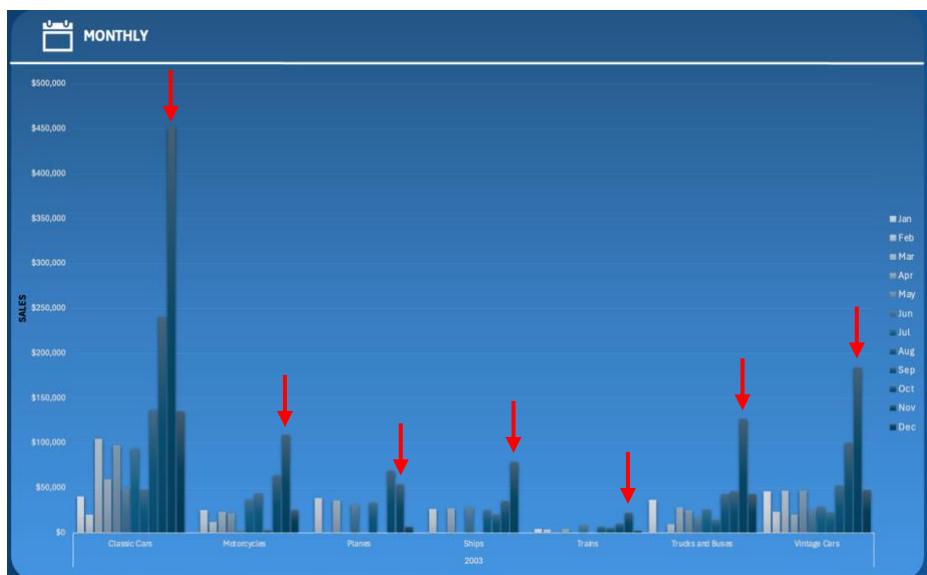


Figure 56.0 - Different Product Categories Monthly Trend Analysis For 2003

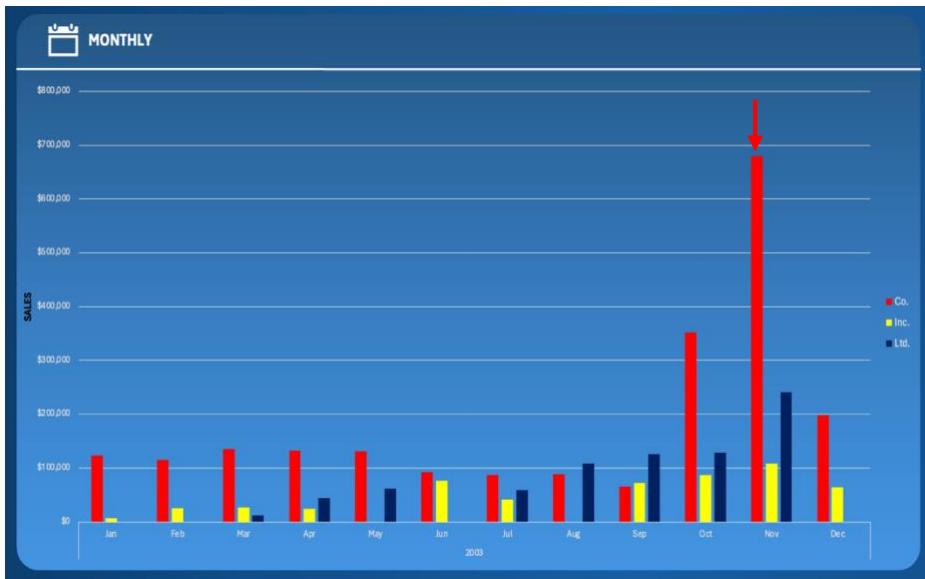


Figure 57.0 - Different Company Type Monthly Trend Analysis For 2003



Figure 58.0 - Different Territories Sales Analysis For 2003

As indicated in Figures 59.0 – 61.0, we can conclude that the majority of sales in 2004 came from the month of November, with classic cars and vintage cars being the top two most profitable products sold. Furthermore, Co. was the type of firm that generated the greatest sales in November. Finally, the top two product categories, classic vehicles and vintage cars, have the highest sales in EMEA and NA.

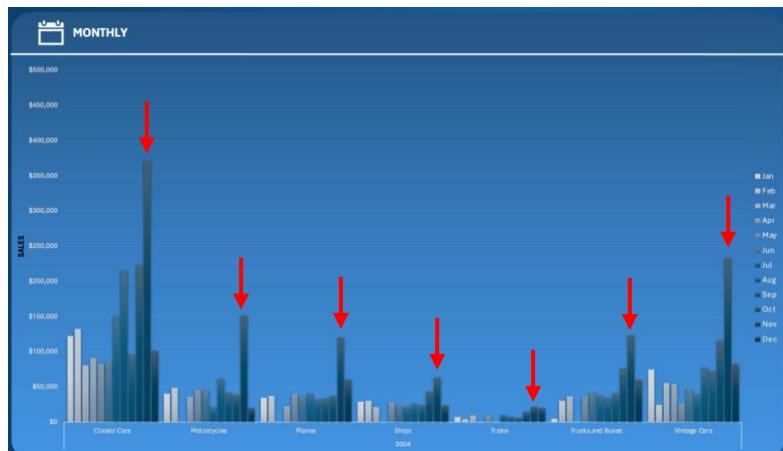


Figure 59.0 - Different Product Categories Monthly Trend Analysis For 2004

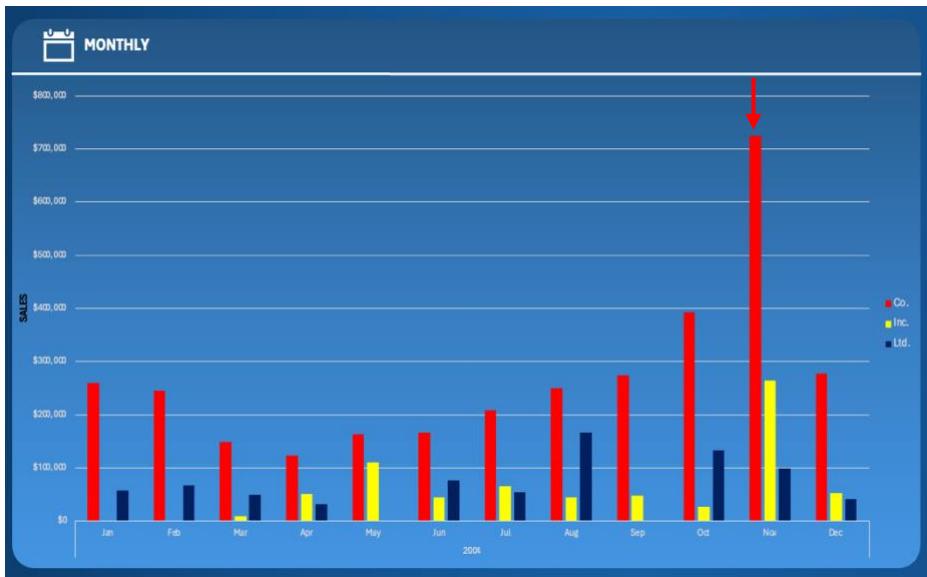


Figure 60.0 - Different Company Type Monthly Trend Analysis For 2004

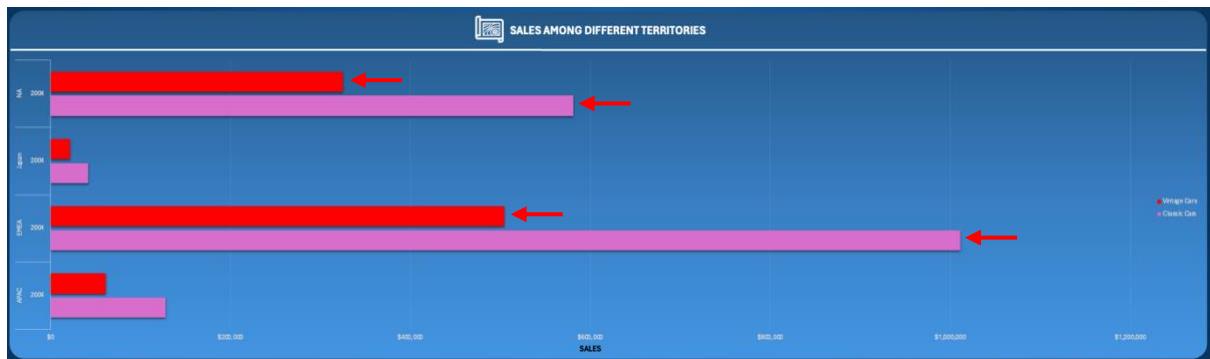


Figure 61.0 - Different Territories Sales Analysis For 2004

Based on the sales trends in 2003 and 2004, the organization might target more classic and vintage cars in November and October and across EMEA and NA territories to maximize profits.

4.1.2 Summary of sales trend from 2003 to 2004 with least profit earned

As indicated in Figures 62.0 – 63.0, the product category that generated the fewest sales in 2003 was trains and ships. Finally, trains and ships are the two product categories with the lowest sales in APAC and Japan.



Figure 62.0 - Total Sales For Different Product Category In 2003

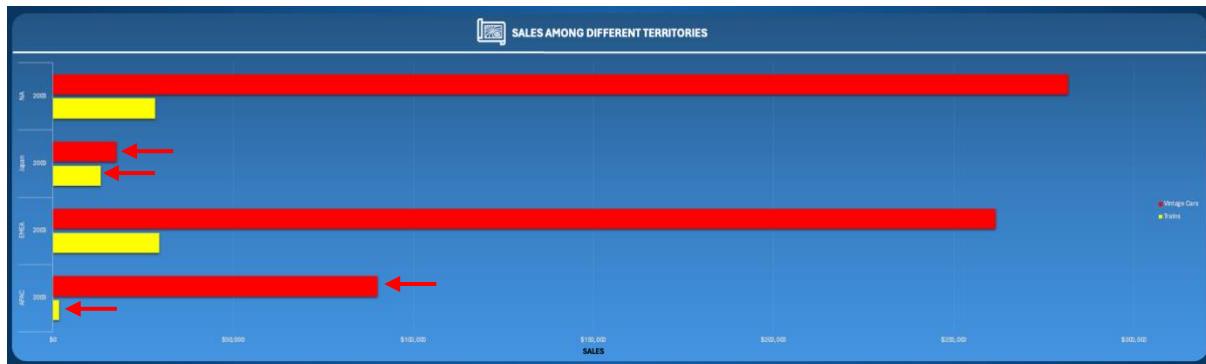


Figure 63.0 - Different Territories Sales Analysis For 2003

As indicated in Figures 64.0 – 65.0, the product category that generated the fewest sales in 2004 was trains and ships. Finally, trains and ships are the two product categories with the lowest sales in APAC and Japan



Figure 64.0 - Total Sales For Different Product Category In 2004



Figure 65.0 - Different Territories Sales Analysis For 2004

Based on the sales trends in 2003 and 2004, the organization should target less trains and ships across APAC and Japan territories to reduce profit losses due to overproduction.

4.2 Strengths and limitations of this study

Strengths

- Comprehensive dataset
 - The study draws on a diverse and extensive dataset of 25 variables that span many elements of retail operations, such as product sales, demographic information, etc. This abundance of data enables for a more extensive and sophisticated study.

- Practical application
 - The study aims to give actionable insights for stakeholders with an emphasis on practical application. This is consistent with the requirements of retail operations, where data-driven decision-making is critical.

Limitations

- Data source reliability
 - The analysis is based on a dataset from Kaggle. While Kaggle is a renowned dataset platform, the source and collection techniques may have an impact on the data's trustworthiness and representativeness. It is critical to be aware of possible biases or limits in the original data.
- Scope of variables
 - Although the dataset is vast, it may not include all significant characteristics that could affect retail operations. Certain aspects critical to understanding market dynamics or customer behavior may be overlooked, reducing the study's comprehensiveness.

4.3 Discussion of unexpected findings

Figure 66.0 shows that in 2003, it had an average of 2.9% each month, whereas in 2004, it had an average of 3.9%. However, for the year 2005, with only 5 months of statistics available, it attained a monthly average of 3.6%. So, if the organization is inspired by sections 4.1.1 and 4.1.2, it is possible that the profit earned in 2005 will outperform 2004.

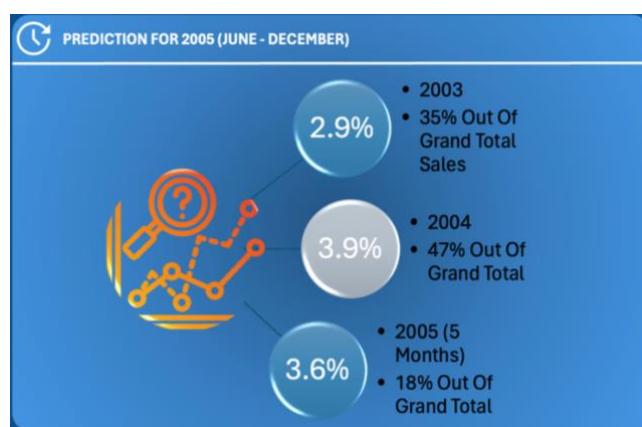


Figure 66.0 - Prediction For Year 2005 Profit

Figure 67.0 shows that the R square, or coefficient of determination, that reflects the proportion of the variance in the dependent variable that is foreseeable from the independent variable in a regression model, has the value of 0.0405, which is near to zero. It implies that the model's independent variable, sales, does not adequately explain the variability in the dependent variable, the discount rate, which is derived using the formula $=(\text{MSRP} - \text{Price Each}) / \text{MSRP} * 100$, as shown in Figure 68.0. Finally, we can conclude that discount rates have no association with sales.

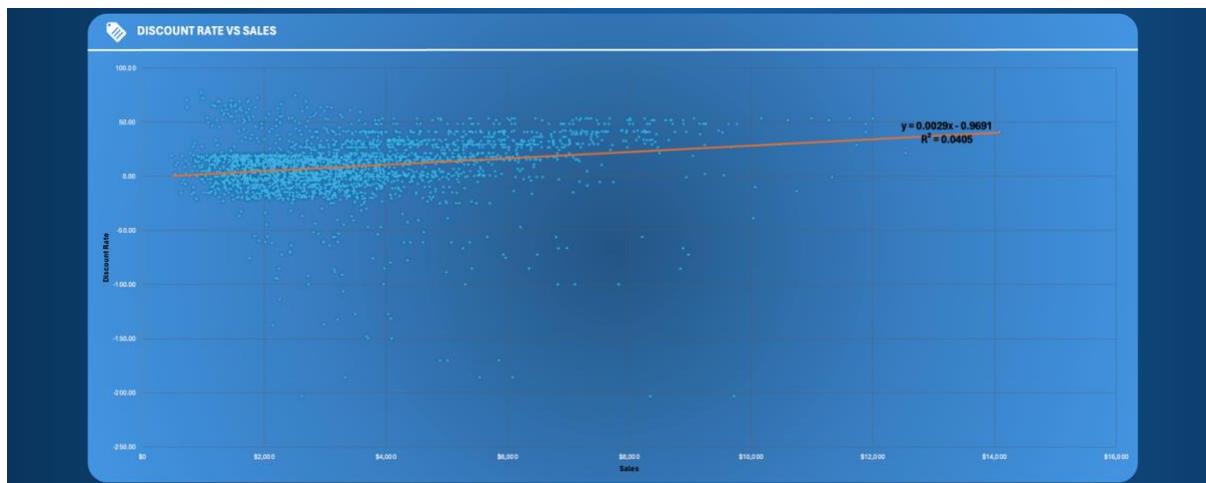


Figure 67.0 - Relationship Between Discount Rate and Sales

C5	A	B	C	D	E	F	G	H	I	J
1	Discount Rate Analysis									
2										
3										
4	Price Each	MSRP	Discount Rate	Sales						
5	95.7	95	-0.74	2871						
6	81.35	95	14.37	2765.9						
7	94.74	95	0.27	3884.34						
8	83.26	95	12.36	3746.7						

Figure 68.0 - Snippet For Discount Rates and Sales Analysis

5.0 References

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6.0 Appendix

