Excel Data Analysis: Manipulation, Formulas and Functions

Project Title - **Ecommerce-Supply-Chain-Analysis-Dashboard-Creation-using-Excel**

1.**Preprocessing and Missing Data Handling**: Identify and address missing data in the datasets. Are there any patterns in the missing data that can be noted?

Summary:

Initial Data Quality:

- No missing values detected

Preprocessing Steps:

1. Date column formatting: Converted relevant columns to Date type
2. Data pruning: Removed unnecessary columns

Current Data Status:

- Clean and formatted dataset
- Ready for analysis

Key Benefits:

- Improved data accuracy and consistency
- Enhanced data usability for insights and decision-making
- Reduced risk of errors

Dataset is now prepared for in-depth analysis and insights extraction.

2. Date Analysis: Calculate the average shipping delay (difference between 'Days for shipping (real)' and 'Days for shipment (scheduled)') for each product category

Average Shipping Delay: Scheduled Days - Actual Days (Shipping Delay column)

Key Insight:
- Our shipping process is remarkably efficient, with an **average delay of only 1 day.**
- Indicating fast and reliable shipping, driving customer satisfaction and efficient logistics.

D2		fx	=C2-B2	
	A	B	C	D
1	Type	Days for shipping (real)	Days for shipment (scheduled)	Shipping Delay
2	TRANSFER	2	4	2
3	PAYMENT	5	4	-1
4	DEBIT	5	4	-1
5	PAYMENT	6	4	-2
6	TRANSFER	2	4	2
7	DEBIT	4	4	0
8	PAYMENT	3	4	1
9	DEBIT	5	4	-1
10	PAYMENT	4	4	0
11	PAYMENT	2	1	-1
12	PAYMENT	2	4	2
13	PAYMENT	5	2	-3
14	DEBIT	4	4	0
15	TRANSFER	6	2	-4
16	DEBIT	6	4	-2

Category	Average Shipping Delay
Accessories	-0.595839525
As Seen on TV!	-0.903225806
Baby	-0.5625
Baseball & Softball	-0.540425532
Basketball	-0.518518519
Books	-0.361581921
Boxing & MMA	-0.716763006
Cameras	-0.637614679
Camping & Hiking	-0.554319614
Cardio Equipment	-0.55320042
CDs	-0.278846154
Children's Clothing	-0.707112971
Cleats	-0.565108775
Computers	-0.516129032
Consumer Electronics	-0.784810127
Crafts	-0.788043478
DVDs	-0.408284024
Electronics	-0.571996818
Fishing	-0.58048708
Fitness Accessories	-0.483870968
Garden	-0.62745098
Girls' Apparel	-0.61790393

3. **Profit Margin Calculation**: Create a formula to calculate the profit margin for each order and categorise them as 'High', 'Medium', or 'Low'.

Formula used : **=IF(BA2 >= 20, "High", IF(BA2 >= 10, "Medium", "Low"))**

Formula Breakdown:
1. BA2 >= 20: Checks if Profit Margin (BA) is 20% or higher.
2. IF (true): Returns "High".
3. IF (false, second condition): Checks if Profit Margin (BA) is 10% or higher.
4. IF (second condition true): Returns "Medium".
5. IF (both conditions false): Returns "Low".

Key Insight:

- High-performing products/services (≥ 20% margin)
- Moderate-performing products/services (10-19% margin)
- Underperforming products/services (< 10% margin)

BB2		fx	=IF(BA2 >= 20, "High", IF(BA2 >= 10, "Medium", "Low"))		
	AW	AX	AY	AZ	BA	BB
1	Product Price	Shipping date	Shipping time	Shipping Mode	Profit Margin	Profit Margin Category
2	49.97999954	01-05-2016	11:56:00	Standard Class	36.30254604	High
3	164.3800049	14-11-2017	16:56:00	Standard Class	34.99817318	High
4	59.99000168	31-10-2016	02:13:00	Standard Class	10.00176436	Medium
5	129.9900055	27-02-2015	00:06:00	Standard Class	-2.904125437	Low
6	39.75	19-01-2018	13:30:00	Standard Class	31.30990362	High
7	299.980011	24-07-2016	13:34:00	Standard Class	-22.4998307	Low
8	249.9900055	24-08-2017	16:20:00	Standard Class	33.80135131	High
9	129.9900055	08-06-2015	21:40:00	Standard Class	-83.30050099	Low
10	119.9899979	29-07-2017	09:33:00	Standard Class	29.00089223	High
11	59.99000168	01-05-2015	07:11:00	First Class	10.00168398	Medium
12	399.980011	25-09-2017	07:00:00	Standard Class	-155.0002526	Low
13	129.9900055	28-07-2016	04:59:00	Second Class	43.00115188	High
14	50	04-10-2017	09:37:00	Standard Class	31.30208254	High
15	99.98999786	27-09-2016	03:29:00	Second Class	7.499206137	Low
16	59.99000168	09-02-2016	01:32:00	Standard Class	11.99866652	Medium
17	399.980011	04-04-2017	06:33:00	Standard Class	7.500457209	Low
18	299.980011	22-10-2015	07:18:00	Standard Class	-22.50170432	Low
19	199.9900055	07-11-2016	12:54:00	Second Class	37.50234261	High
20	199.9900055	11-06-2015	23:30:00	Same Day	49.00249922	High
21	129.9900055	15-09-2017	03:57:00	Same Day	18.00336128	Medium
22	39.99000168	22-07-2017	12:53:00	Standard Class	-80.00914876	Low
23	49.97999954	16-01-2016	03:19:00	Standard Class	38.99546383	High
24	50	04-10-2015	15:33:00	Second Class	30.01058267	High
25	129.9900055	10-05-2017	02:39:00	Standard Class	-20.00153773	Low
26	399.980011	05-10-2015	08:53:00	First Class	46.99984732	High
27	50	07-06-2017	06:38:00	Second Class	26.99823666	High
28	399.980011	15-06-2015	01:20:00	Standard Class	-6.700352214	Low
29	129.9900055	11-07-2016	18:50:00	Second Class	8.804171617	Low
30	31.98999977	02-12-2015	11:21:00	Same Day	21.00036751	High
31	59.99000168	03-12-2016	07:46:00	Standard Class	47.99964446	High
32	49.97999954	16-07-2016	12:32:00	Second Class	5.002000845	Low
33	199.9900055	05-12-2015	07:25:00	Standard Class	21.0977896	High
34	299.980011	28-03-2017	07:47:00	Second Class	25.00173528	High
35	129.9900055	27-03-2017	16:48:00	Same Day	45.00411971	High
36	59.99000168	08-05-2016	11:24:00	Standard Class	47.99770051	High

4. **Customer Geographic Analysis**: Analyze the distribution of customers across different cities and countries.

Used **Pivot Table** to Analyse Total Customers by Countries and Cities

Countries and Cities ▾	Total Customers
EE. UU.	42908
Puerto Rico	27092
Aguadilla	17
Arecibo	50
Bayamon	111
Caguas	26084
Canovanas	20
Carolina	57
Cayey	17
Guayama	53
Guaynabo	35
Humacao	88
Juana Diaz	35
Manati	69
Mayaguez	43
Ponce	7
Rio Grande	54
San Juan	142
San Sebastian	43
Toa Alta	11
Toa Baja	20
Trujillo Alto	43
Vega Baja	58
Yauco	35
Grand Total	70000

5. **Sales Trend Analysis**: Analyse monthly sales trends over the years and identify peak sales months.

   Used **Pivot Table** for calculating Total Orders by Month

   Key Insight :
   - January receives maximum orders in all years followed by other Months with slight decline.

Month	Total Orders
Jan	7027
Feb	5731
Mar	6210
Apr	6015
May	6224
Jun	5779
Jul	6167
Aug	6064
Sep	5968
Oct	5042
Nov	4819
Dec	4954
Grand Total	**70000**

TOTAL ORDER BY MONTH

Total Orders

order date ▼

6. **Top 5 products:** Identify the top 5 products with the highest sales.

   Used **Pivot table** to find Top 5 Products by Total sale.

Product Name	Total Sale
Perfect Fitness Perfect Rip Deck	9592
Nike Men's CJ Elite 2 TD Football Cleat	8553
Nike Men's Dri-FIT Victory Golf Polo	8085
O'Brien Men's Neoprene Life Vest	7506
Field & Stream Sportsman 16 Gun Fire Safe	6734
Grand Total	**40470**

7. **Advanced Filtering for High-Risk Deliveries**: Use advanced filtering to identify orders with a high risk of late delivery and high sales value.

Formula Used : **=IF(AND(AN2>1000,H2=1),"High","Low")**

 Formula Breakdown:
1. AN2>1000: Checks if Order Item Total (AN) exceeds $1000.
2. H2=1: Checks if Late Delivery Risk (H) is High (1).
3. AND: Both conditions must be true.
4. IF: If true, returns "High", otherwise returns "Low".

Key Insights:

Orders with high value (> $1000) and late delivery risk (coded 1) are categorised as "High" risk, indicating:

- Potential **revenue impact due to delayed deliveries**
- **Prioritisation needed for timely fulfilment** of high-value orders

	BD2			f_x	=IF(AND(AN2>1000,H2=1),"High","Low")

	AZ	BA	BB	BC	BD
1	Shipping Mode	Profit Margin	Profit Margin Category	processing time	High Risk Deliveries
2	Standard Class	36.30254604	High	2	Low
3	Standard Class	34.99817318	High	5	Low
4	Standard Class	10.00176436	Medium	5	Low
5	Standard Class	-2.904125437	Low	6	Low
6	Standard Class	31.30990362	High	2	Low
7	Standard Class	-22.4998307	Low	4	Low
8	Standard Class	33.80135131	High	3	Low
9	Standard Class	-83.30050099	Low	5	Low
10	Standard Class	29.00089223	High	4	Low
11	First Class	10.00168398	Medium	2	Low
12	Standard Class	-155.0002526	Low	2	Low
13	Second Class	43.00115188	High	5	Low
14	Standard Class	31.30208254	High	4	Low
15	Second Class	7.499206137	Low	6	Low
16	Standard Class	11.99866652	Medium	6	Low
17	Standard Class	7.500457209	Low	4	Low
18	Standard Class	-22.50170432	Low	4	Low
19	Second Class	37.50234261	High	5	Low

8. **Data Range for Sales Analysis**: Create named ranges for different product categories and use them to calculate total sales for each category.

Used **Pivot table** for finding total sales across each Category

Key Insight :
- **Fishing , cleats and Camping and Hiking** category have the highest sales

Category	Total Sales
Accessories	49380.2396
As Seen on TV!	9199.079979
Baby	4726.400146
Baseball & Softball	35783.16093
Basketball	9499.729735
Books	5501.159986
Boxing & MMA	35307.79038
Cameras	98544.72185
Camping & Hiking	1618092.179
Cardio Equipment	1414069.469
CDs	1174.159996
Children's Clothing	85346.90146
Cleats	1733591.668
Computers	232500
Consumer Electronics	39955.04077
Crafts	84912.32202
DVDs	27780.22083
Electronics	147635.2111
Fishing	2693465.394
Fitness Accessories	14501.34022
Garden	108646.3235

Total Sales By Category

9. **Order Processing Efficiency**: Calculate the average processing time for orders (from order date to shipping date) and identify the department with the best performance.

To calculate processing time, I subtracted the Order Date from the Shipping Date.

Processing Time = Shipping Date - Order Date

Average processing time for each category was calculated using a Pivot Table.

Key Insight:
 Average processing time across all categories is remarkably efficient, ranging from **3 to 4 days.**

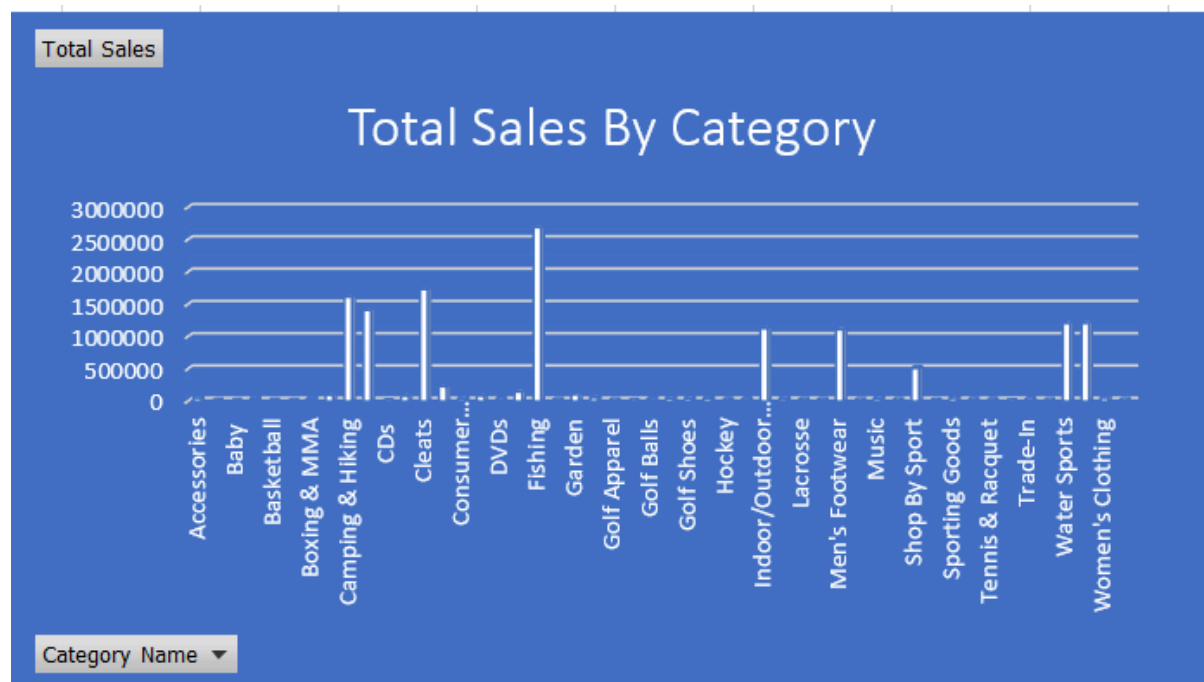|	AZ	BA	BB	BC	BD
	Shipping Mode	Profit Margin	Profit Margin Category	processing time	High Risk Deliveries
2	Standard Class	36.30254604	High	2	Low
3	Standard Class	34.99817318	High	5	Low
4	Standard Class	10.00176436	Medium	5	Low
5	Standard Class	-2.904125437	Low	6	Low
6	Standard Class	31.30990362	High	2	Low
7	Standard Class	-22.4998307	Low	4	Low
8	Standard Class	33.80135131	High	3	Low
9	Standard Class	-83.30050099	Low	5	Low
10	Standard Class	29.00089223	High	4	Low
11	First Class	10.00168398	Medium	2	Low
12	Standard Class	-155.0002526	Low	2	Low
13	Second Class	43.00115188	High	5	Low
14	Standard Class	31.30208254	High	4	Low
15	Second Class	7.499206137	Low	6	Low
16	Standard Class	11.99866652	Medium	6	Low
17	Standard Class	7.500457209	Low	4	Low
18	Standard Class	-22.50170432	Low	4	Low
19	Second Class	37.50234261	High	5	Low
20	Same Day	49.00249922	High	0	Low
21	Same Day	18.00336128	Medium	1	Low
22	Standard Class	-80.00914876	Low	4	Low
23	Standard Class	38.99546383	High	4	Low
24	Second Class	30.01058267	High	3	Low
25	Standard Class	-20.00153773	Low	4	Low

The formula bar shows: BC2 = `=([@[Shipping date]]-[@[order date]])`

Row Labels	Average of processing time
Apparel	3
Book Shop	3
Discs Shop	4
Fan Shop	4
Fitness	4
Footwear	4
Golf	3
Health and Beauty	3
Outdoors	4
Pet Shop	3
Technology	4
Grand Total	**4**

10. **Customer Loyalty Assessment**: Assess customer loyalty by calculating the average number of orders per customer.

Used **Pivot Table** to calculate:
1. Count of Orders by Customer ID
2. Average Order Value using AVERAGE formula on Total Orders

Key Insights :

- Customers purchasing more than the average order value are identified as **Loyal Customers**

	Average Order value	
	9.215983	

Customer ID	Total Orders
2	4
3	7
4	9
5	2
6	7
7	8
8	8
9	7
10	2
11	7
12	11
13	4
14	6
15	2
16	6
17	7
18	5
19	9
20	2
21	7

11. **Delivery Status Breakdown by Market**: Use a pivot table to analyse the breakdown of delivery status (e.g., on time, late) by market regions.

Used **Pivot Table** to calculate LATE(1) , NOT LATE(0) delivery Status.

Key Insight:

- Europe Market has the **Highest on time(0)** but **Second highest late(1) delivery** as well.
- LATAM Market has the **Second highest on time(0)** but **highest late(1) delivery** as well.

Late count	Column Labels		
Market Regions	0	1	Grand Total
Africa	2059	2462	4521
Europe	8560	10724	19284
LATAM	9230	10775	20005
Pacific Asia	7251	8860	16111
USCA	4558	5521	10079
Grand Total	31658	38342	70000

12. **Peak Traffic Time Analysis**: Determine the peak hours of website traffic and which products are most viewed during these times.

Used **Pivot Table** to count visits by particular hour also breakdown into each products view

Top viewed hours: 21, 20, 22, 19, 18 (night hours)
Lowest viewed hours: 4, 5, 3, 0, 1, 2 (early morning hours)

Key Insight:

- Website **views peak at night** (8 PM - 12 AM) and **decline during early morning hours.**

	A	B	C	D	E	F
1	Hours	Total Visits	adidas Brazuca 2017 Official Match Ball	adidas Kids' F5 Messi FG Soccer Cleat	adidas Kids' RG III Mid Football Cleat	adidas Men's Germany Black Crest Away Tee
2	21	3912	53	40	244	86
3	20	3890	66	54	227	55
4	22	3835	46	43	210	74
5	19	3589	50	48	189	66
6	23	3514	38	48	201	51
7	18	3341	37	38	217	54
8	11	3171	49	35	192	64
9	12	3167	46	39	187	48
10	10	3128	41	42	149	51
11	17	3126	42	47	166	63
12	16	3064	53	45	186	54
13	13	3003	29	44	158	41
14	7	2970	43	35	152	53
15	15	2970	42	39	169	38
16	8	2934	36	37	170	42
17	9	2918	47	40	172	55
18	6	2887	45	30	148	51
19	14	2831	41	51	154	47
20	4	304	5	3	13	3
21	5	295	2	4	14	3
22	3	287	2	2	21	3
23	0	279	3	2	13	6
24	1	275	2	2	12	4
25	2	262	6	2	23	2
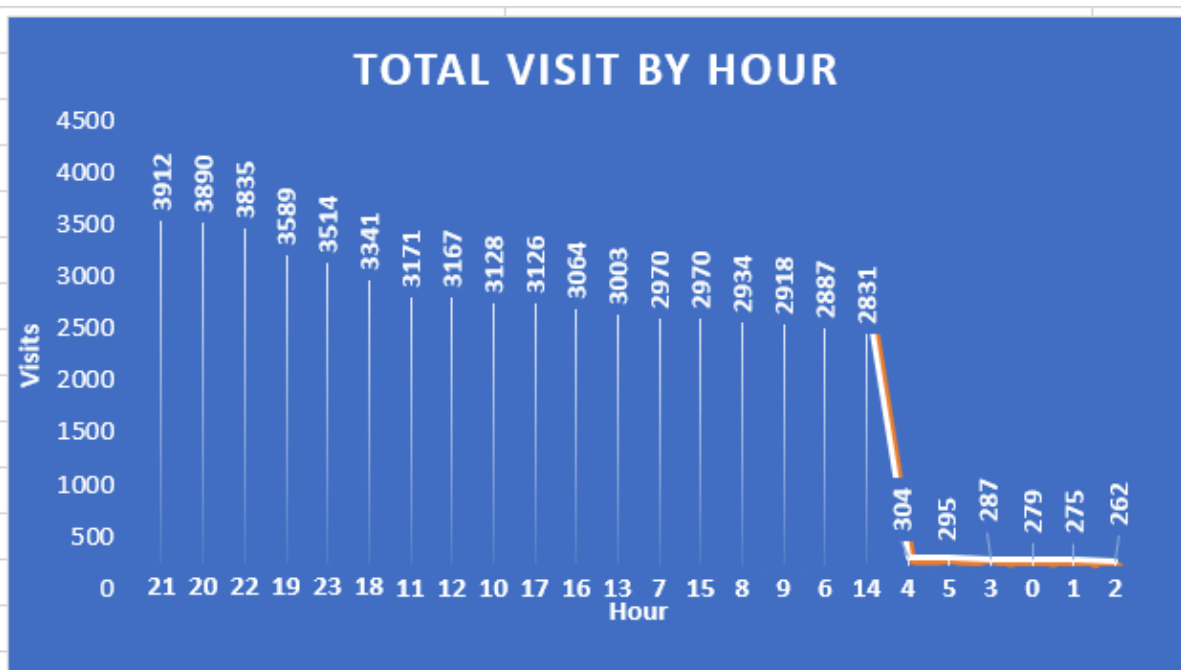
13. **Category Popularity by Month: Use pivot tables to analyse which product categories are most popular in each month.**

Used **Pivot Table** to count which category is popular in each month.

Month > Category	Category Rank
⊞ Jan	
⊟ Feb	
Cleats	1
Men's Footwear	2
Women's Apparel	3
Indoor/Outdoor Games	4
Fishing	5
Water Sports	6
Camping & Hiking	7
Cardio Equipment	8
Shop By Sport	9
Electronics	10
Accessories	11
Golf Balls	12
Girls' Apparel	13
Trade-In	14
Golf Gloves	15
Hockey	16
Golf Shoes	17
Baseball & Softball	18
Lacrosse	19
Boxing & MMA	20
Tennis & Racquet	20
Hunting & Shooting	21
Fitness Accessories	21
Golf Apparel	22
⊞ Mar	
⊞ Apr	
⊞ May	
⊞ Jun	
⊞ Jul	
⊞ Aug	
Sep	
Oct	

14. **User Engagement Analysis:** Calculate the average number of product views per IP address to assess user engagement.

Used **Pivot Table** to count views by IP address

Key Insights:

- **138.21.216.113 has the most views (78)**
- **IP address 138.21.216.113 is the most active,** accounting for the highest number of views
- **Average views: 18**

IP Address	Total Views		Average Views
1.100.203.104	2		18.3003663
1.101.225.249	58		
1.111.125.242	3		
1.121.38.89	43		
1.137.124.138	30		
1.154.141.197	4		
1.18.156.107	3		
1.205.170.45	4		
1.22.133.11	5		
1.238.110.85	5		
1.248.178.55	17		
1.48.199.63	6		
1.81.213.29	7		
1.87.48.248	40		
10.116.91.154	6		
10.118.162.230	33		

15. **Departmental Traffic Analysis:** Analyse which department's products are most frequently accessed using COUNTIF and SUMIF functions.

Top 3 Departments:

1. **Fan Shop (highest)**
2. Apparel
3. Golf

Key Insights:
- Fan Shop products most popular
- Apparel & Golf show high engagement
- **Lower-access departments need marketing optimization**

	A	B	C	D
D2			fx	=COUNTIF(A:A,C2)
1	Department Name	Product Name	Department Name	Product Access Count
2	Fan Shop	O'Brien Men's Neoprene Life Vest	Fan Shop	26046
3	Discs Shop	DVDs	Discs Shop	771
4	Apparel	Perfect Fitness Perfect Rip Deck	Apparel	18988
5	Apparel	Nike Men's CJ Elite 2 TD Football Cleat	Outdoors	3758
6	Discs Shop	Fighting video games	Golf	12824
7	Fan Shop	Diamondback Women's Serene Classic Comfort Bi	Footwear	5591
8	Outdoors	Garmin Approach S3 Golf GPS Watch	Fitness	957
9	Apparel	Nike Men's CJ Elite 2 TD Football Cleat	Health and Beauty	157
10	Outdoors	Cleveland Golf Women's 588 RTX CB Satin Chrom	Pet Shop	200
11	Apparel	Perfect Fitness Perfect Rip Deck	Technology	531
12	Fan Shop	Field & Stream Sportsman 16 Gun Fire Safe	Book Shop	177
13	Apparel	Nike Men's CJ Elite 2 TD Football Cleat		
14	Golf	Nike Men's Dri-FIT Victory Golf Polo		
15	Footwear	Nike Men's Free 5.0+ Running Shoe		
16	Apparel	Perfect Fitness Perfect Rip Deck		
17	Fan Shop	Field & Stream Sportsman 16 Gun Fire Safe		
18	Fan Shop	Diamondback Women's Serene Classic Comfort Bi		
19	Fan Shop	Pelican Sunstream 100 Kayak		
20	Fan Shop	Pelican Sunstream 100 Kayak		
21	Apparel	Nike Men's CJ Elite 2 TD Football Cleat		
22	Golf	Under Armour Girls' Toddler Spine Surge Runni		
23	Fan Shop	O'Brien Men's Neoprene Life Vest		

Product Access count by Department
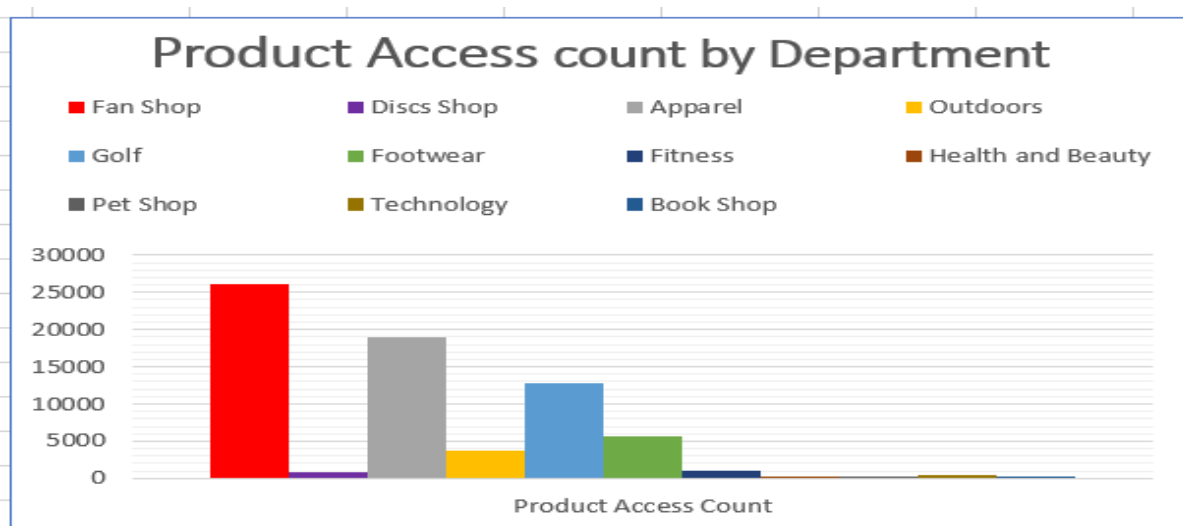
16. **Most Visited URLs: Identify and rank the most frequently visited URLs in the dataset.**

Formula: RANK.EQ(C2, C:C, 0)

Breakdown:

1. C2: Starting cell
2. C:C: URL Count column
3. 0: Descending order (highest count first)

Effect:

Ranks URLs by count in descending order, with:

1. Most frequent URL = Rank 1
2. Next frequent URL = Rank 2 …. And so on.

	D2	fx	=RANK.EQ(C2,C:C,0)		
	A		B	C	D
1	URL		Unique URL	URL Count	RANK
2	/department/apparel/category/cleats/produc		/department/apparel/category/cleats/product/Perfect%20Fitness%20Perfect%20Rip%20Deck	2614	1
3	/department/apparel/category/men's%20foo		/department/apparel/category/featured%20shops/product/adidas%20Kids'%20RG%20III%20Mid%20Football%20Cleat	2436	2
4	/department/fan%20shop/category/water%2		/department/golf/category/women's%20apparel/product/Nike%20Men's%20Dri-FIT%20Victory%20Golf%20Polo	2327	3
5	/department/outdoors/category/golf%20bags		/department/apparel/category/men's%20footwear/product/Nike%20Men's%20CJ%20Elite%202%20TD%20Football%20Cleat	2265	4
6	/department/fitness/category/tennis%20&%2		/department/fan%20shop/category/water%20sports/product/Pelican%20Sunstream%20100%20Kayak	1556	5
7	/department/footwear/category/boxing%208		/department/fan%20shop/category/indoor/outdoor%20games/product/O'Brien%20Men's%20Neoprene%20Life%20Vest	1466	6
8	/department/footwear/category/boxing%208		/department/fan%20shop/category/camping%20&%20hiking/product/Diamondback%20Women's%20Serene%20Classic%20Comfort%20Bi	1396	7
9	/department/fan%20shop/category/fishing/pi		/department/fan%20shop/category/fishing/product/Field%20&%20Stream%20Sportsman%2016%20Gun%20Fire%20Safe	1334	8
10	/department/footwear/category/as%20seen%		/department/footwear/category/fitness%20accessories/product/Under%20Armour%20Hustle%20Storm%20Medium%20Duffle%20Bag	1270	9
11	/department/footwear/category/cardio%20e		/department/footwear/category/cardio%20equipment/product/Nike%20Men's%20Free%205.0+%20Running%20Shoe	1247	10
12	/department/footwear/category/strength%2(		/department/footwear/category/as%20seen%20on%20%20tv!/product/Nike%20Men's%20Free%20TR%205.0%20TB%20Training%20Shoe	1227	11
13	/department/golf/category/shop%20by%20sp		/department/golf/category/shop%20by%20sport/product/Columbia%20Men's%20PFG%20Anchor%20Tough%20T-Shirt	1202	12
14	/department/fitness/category/soccer/produc		/department/fitness/category/tennis%20&%20racquet/product/Nike%20Men's%20Comfort%202%20Slide	1177	13
15	/department/apparel/category/cleats/produc		/department/fitness/category/soccer/product/Nike%20Men's%20Fingertrap%20Max%20Training%20Shoe	1142	14
16	/department/apparel/category/cleats/produc		/department/fitness/category/lacrosse/product/Under%20Armour%20Men's%20Tech%20II%20T-Shirt	1128	15
17	/department/golf/category/shop%20by%20sp		/department/golf/category/shop%20by%20sport/product/Under%20Armour%20Girls'%20Toddler%20Spine%20Surge%20Runni	1114	16
18	/department/outdoors/category/electronics/		/department/apparel/category/featured%20shops/product/adidas%20Kids'%20RG%20III%20Mid%20Football%20Cleat/add_to_cart	951	17
19	/department/fan%20shop/category/fishing/pi		/department/apparel/category/cleats/product/Perfect%20Fitness%20Perfect%20Rip%20Deck/add_to_cart	933	18
20	/department/golf/category/women's%20appa		/department/golf/category/women's%20apparel/product/Nike%20Men's%20Dri-FIT%20Victory%20Golf%20Polo/add_to_cart	906	19
21	/department/apparel/category/cleats/produc		/department/apparel/category/men's%20footwear/product/Nike%20Men's%20CJ%20Elite%202%20TD%20Football%20Cleat/add_to_cart	893	20
22	/department/outdoors/category/accessories/		/department/golf/category/girls'%20apparel/product/adidas%20Youth%20Germany%20Black/Red%20Away%20Match%20Soc	775	21
23	/department/footwear/category/electronics/		/department/fan%20shop/category/hunting%20&%20shooting/product/The%20North%20Face%20Women's%20Recon%20Backpack	761	22
24	/department/footwear/category/fitness%20a		/department/golf/category/girls'%20apparel/product/adidas%20Men's%20Germany%20Black%20Crest%20Away%20Tee	726	23
25	/department/apparel/category/featured%20s		/department/golf/category/girls'%20apparel/product/TYR%20Boys'%20Team%20Digi%20Jammer	706	24

17. **Product Interest vs. Sales Performance Analysis:** Compare the frequency of product views from the Access Logs dataset with the sales data .Determine if higher online views correlate with higher sales.

Key Insights:
1. **Higher views correlate with higher sales**, indicating a strong positive relationship between online engagement and conversions.
2. **Increased visibility drives sales growth.**
3. **Online presence directly impacts revenue.**
4. **Effective digital marketing strategies can boost sales.**

Product Name	Total Sales	Total Views
Perfect Fitness Perfect Rip Deck	28823	3547
Nike Men's Dri-FIT Victory Golf Polo	24173	3233
Nike Men's CJ Elite 2 TD Football Cleat	8553	3158
Pelican Sunstream 100 Kayak	6015	2169
O'Brien Men's Neoprene Life Vest	22598	2067
Diamondback Women's Serene Classic Comfort Bi	5394	1959
Field & Stream Sportsman 16 Gun Fire Safe	6734	1872
Under Armour Hustle Storm Medium Duffle Bag	363	1776
Nike Men's Free TR 5.0 TB Training Shoe	92	1708
Nike Men's Comfort 2 Slide	403	1700
Columbia Men's PFG Anchor Tough T-Shirt	387	1693
Nike Men's Free 5.0+ Running Shoe	14053	1689
Under Armour Girls' Toddler Spine Surge Runni	12434	1623
Nike Men's Fingertrap Max Training Shoe	21	1604
Under Armour Men's Tech II T-Shirt	349	1569
adidas Youth Germany Black/Red Away Match Soc	403	1103
The North Face Women's Recon Backpack	59	1054
TYR Boys' Team Digi Jammer	300	1015
adidas Men's Germany Black Crest Away Tee	347	1014
insta-bed Neverflat Air Mattress	22	989
Ogio Race Golf Shoes	25	961
Stiga Master Series ST3100 Competition Indoor	9	952
Yakima DoubleDown Ace Hitch Mount 4-Bike Rack	24	874
Diamondback Boys' Insight 24 Performance Hybr	9	838
Nike Women's Free 5.0 TR FIT PRT 4 Training S	93	808
Nike Dri-FIT Crew Sock 6 Pack	343	802

Sales and Views Correlation
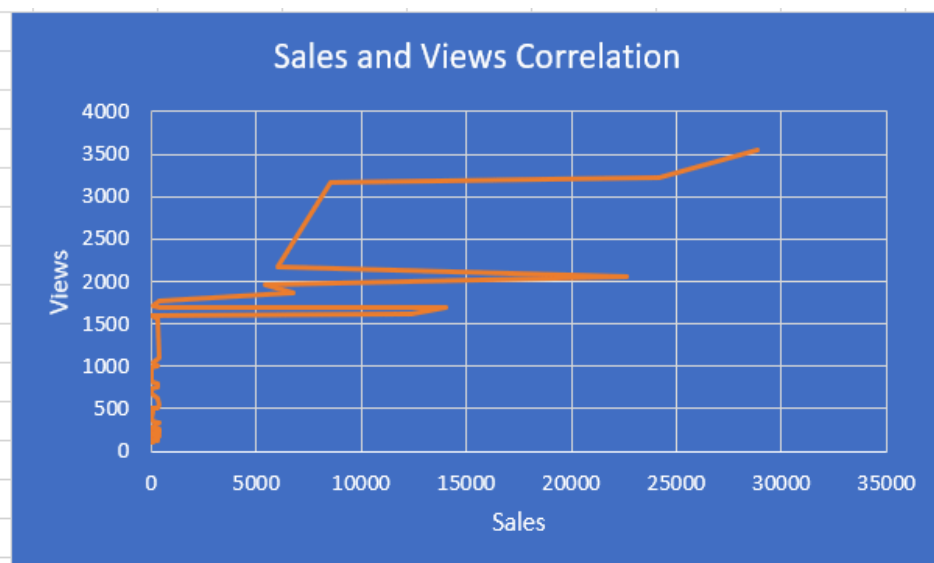
18. **Customer Geographic Interest Analysis:** Match the customer cities from the Supply Chain dataset with IP addresses from the Access Logs dataset (approximate analysis due to the nature of IP geolocation). Analyse which cities show the most online engagement compared to actual sales.

Columns:

1. Total Visits on Site: **Count of city visits (online engagement).**
2. Total Sales: **Sum of sales (actual conversions).**

Key Insights:

1. Top 3 Engaged Cities: **Columbus , Seattle and London .**
**2.** Top 3 Sales-Generating Cities: **Santo Domingo , New York City and Teguigalpa**

City	Total Visits on Site	Total Sales
Santo Domingo	40	873
New York City	448	855
Tegucigalpa	0	706
Los Angeles	86	702
Managua	0	632
Mexico City	101	585
Manila	71	545
Philadelphia	34	544
San Francisco	112	494
San Salvador	0	459
London	966	439
Viena	0	410
Seattle	1202	393
Buenos Aires	233	393
Berlín	0	385
Yakarta	0	367
Lagos	25	358
Bangkok	132	350
Sydney	306	334
Houston	237	333
Chicago	379	333
Paris	273	327
Panama City	60	325
San Pedro Sula	0	323
São Paulo	315	302
Mixco	0	300
Madrid	235	299
Melbourne	345	299
Estambul	0	299
León	0	280

19. **Time Series Analysis of Product Interest and Sales:** Compare the monthly trends in product views from the Access Logs dataset with the monthly sales trends of those products in the Supply Chain dataset. Identify any lag or lead relationship between interest and sales.

- **Sales:**
  - Highest in **January**
  - Lowest in **December**
  - Stable growth throughout the year

- **Views:**
  - Intermittent 0-view months (potential technical issues/company factors)
  - No clear correlation with sales

- **Key Insights:**
  - **Investigate 0-view months**
  - Optimise sales strategies for Jan/Dec

- **Recommendations:**
  - **Address technical issues**

Month	Total Sales		Month	Total Views
Jan	1356698.126		Jan	10778
Feb	1149369.672		Sep	17357
Mar	1211728.333		Oct	10748
Apr	1189907.033		Nov	10282
May	1249485.245		Dec	10787
Jun	1164329.323		**Grand Total**	**59952**
Jul	1233111.014			
Aug	1223201.764			
Sep	1221876.272			
Oct	1209866.69			
Nov	1040552.561			
Dec	1011902.019			
Grand Total	**14262028.05**			

  - **Analyse marketing strategies**

TOTAL VIEWS BY MONTH

TOTAL SALES BY MONTH
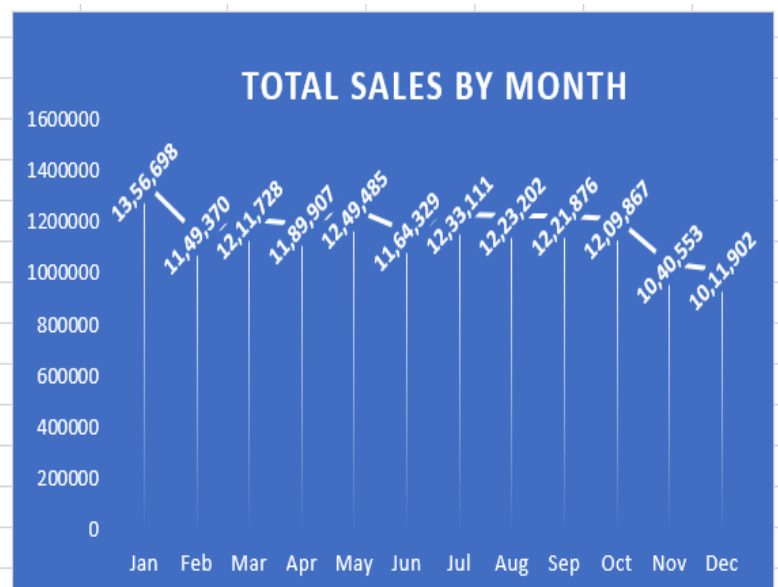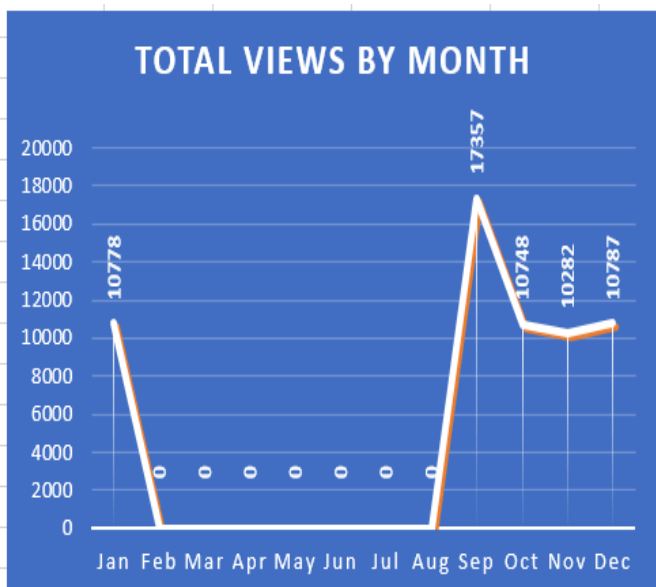
20. **Complex Category Profit Margin Analysis with Conditional Logic:** Develop an advanced formula to calculate the category profit margin for each order, factoring in different variables such as product category, shipping mode, and delivery status. For instance, adjust the profit margin calculation based on whether the delivery was late or on time, and whether the shipping mode was standard or express.

Category Profit Margin - This column calculates the profit margin % for each order, considering factors like: Product Category, Shipping Mode(Standard/Express), Delivery status (On-time/Late)

Formula: =IF(C2<>0, ((D2 / C2) * 100) * (1 + IF(E2="First", 0.05, 0) + IF(B2=1, -0.1, 0)), 0)

Breakdown:
1. **IF(C2<>0: Avoid division by zero.**
2. **(D2 / C2) * 100: Calculate profit margin percentage.**
3. **IF(E2="First", 0.05, 0): Add 5% bonus for "First" shipping mode.**
4. **IF(B2=1, -0.1, 0): Subtract 10% penalty for late delivery (B2=1).**

Key Insights:
- Top Profitable Categories: **Toys, CDs, Sports, Fitness , etc have an impressive ~50% profit margin.**
- Shipping Mode Impact: **Standard mode is most popular,** followed by Second, First, and Same-Day, influencing profit margins.
- Delivery Timeliness: **Not Late (0) deliveries drive top profitability,** emphasising the importance of timely shipping.

Standard Class	41802
Second Class	13705
First Class	10665
Same Day	3828

F2 =IF(C2<>0,
((D2 / C2) * 100) *
(1 + IF(E2="First", 0.05, 0) + IF(B2=1, -0.1, 0)),
0)

	A	B	C	D	E	F
1	Category Name	Late_delivery_risk	Order Item Total	Order Profit Per Order	Shipping Mode	Category_Profit_Margins %
2	Toys	0	11.18999958	5.599999905	Standard Class	50.04468378
3	CDs	0	11.28999996	5.650000095	Standard Class	50.044288
4	Shop By Sport	0	32.79000092	16.39999962	Standard Class	50.01524599
5	Fitness Accessories	0	34.99000168	17.5	Standard Class	50.0142874
6	Shop By Sport	0	39.59000015	19.79999924	Standard Class	50.01262734
7	Girls' Apparel	0	39.99000168	20	Standard Class	50.01250102
8	Women's Apparel	0	47.25	23.62999916	Second Class	50.01058023
9	Cleats	0	47.99000168	24	Standard Class	50.01041709
10	Cleats	0	50.99000168	25.5	Standard Class	50.0098042
11	Cleats	0	52.18999863	26.10000038	Second Class	50.00958242
12	Cleats	0	53.99000168	27	Standard Class	50.00925942
13	Cleats	0	53.99000168	27	Standard Class	50.00925942
14	Cleats	0	54.59000015	27.29999924	Standard Class	50.00915766
15	Cleats	0	55.79000092	27.89999962	Standard Class	50.00896067
16	Cleats	0	56.68999863	28.35000038	Standard Class	50.00882178
17	Cleats	0	56.68999863	28.35000038	Standard Class	50.00882178
18	Cleats	0	56.99000168	28.5	Standard Class	50.00877199
19	Cleats	0	56.99000168	28.5	Standard Class	50.00877199
20	Cleats	0	59.38999939	29.70000076	Standard Class	50.00842072
21	Cleats	0	59.38999939	29.70000076	Standard Class	50.00842072