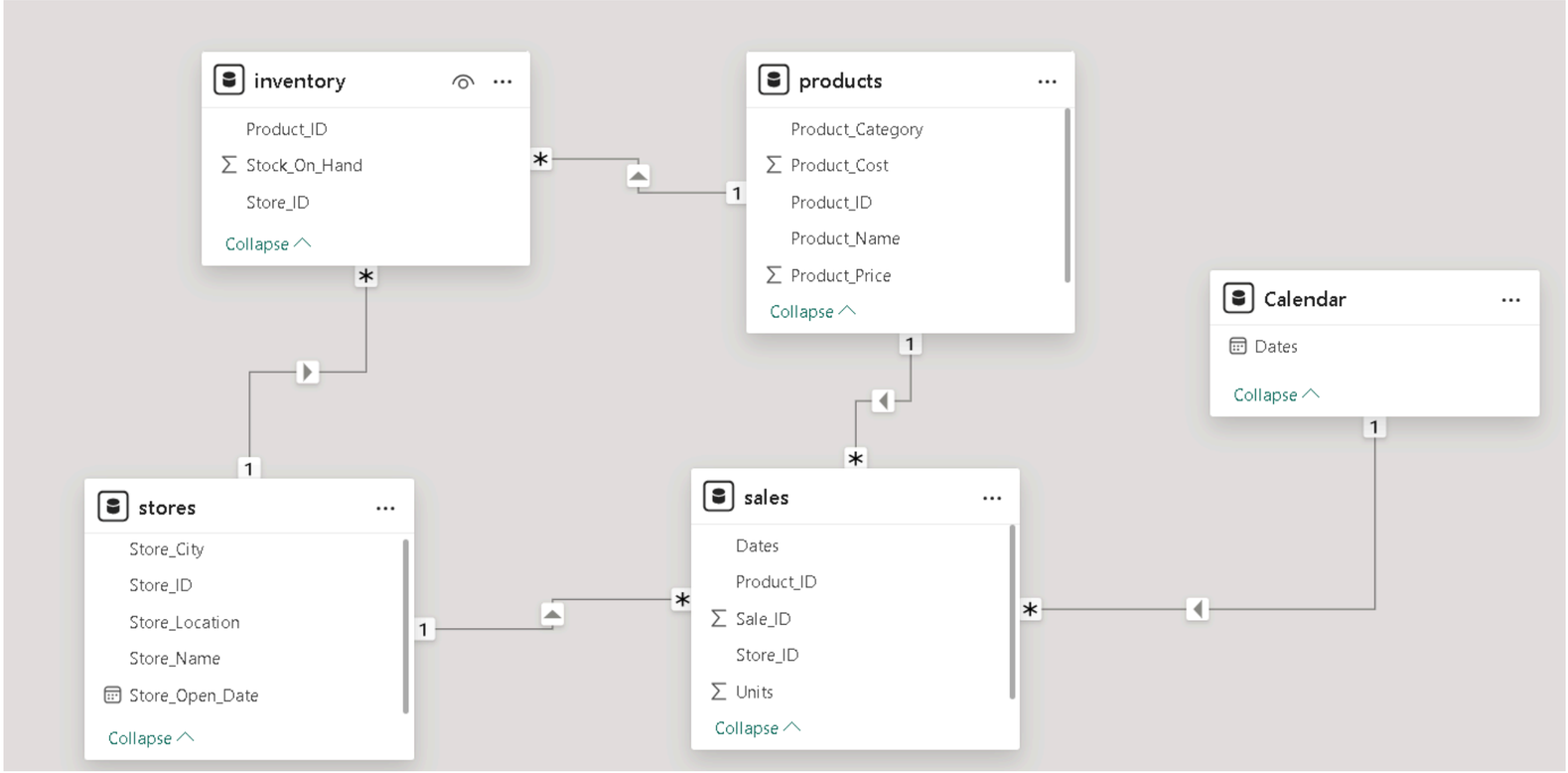
SQL PROJECT ON

STORES CHAIN WITH MULTIPLE LOCATIONS

10th August, 2024

Introduction

The data model represents an interconnected system for managing retail operations, with five key tables: Inventory, Products, Stores, Calender and Sales. Each table is linked through shared keys, enabling a comprehensive analysis of inventory levels, product details, store locations, and sales performance. The Products table provides information on product categories, costs, and pricing. The Inventory table tracks stock availability by store, while the Stores table details store-specific information, including city and location. The Sales table captures transactional data, including sales dates, product IDs, and units sold, allowing for in-depth sales analysis across different stores and products.



Agenda

01 Production Performance Analysis: Goal- Identify top-performing products based on total sales and profit.

02 Store Performance Analysis: Goal- Analyse sales performance for each store, including total revenue and profit margin.

03 Complex Monthly Sales Trend Analysis: Examine monthly sales trends, considering the rolling 3-month average and identifying months with significant growth or decline.

04 Cumulative Distribution of Profit Margin: Calculate the cumulative distribution of profit margin for each product category, consider where products are having profit

05 Store Inventory Turnover Analysis: Analyze the efficiency of inventory turnover for each store by calculating the Inventory Turnover Ratio.

Data Description

Table	Field	Description
Products	Product_ID	Product ID
Products	Product_Name	Product name
Products	Product_Category	Product Category
Products	Product_Cost	Product cost ($USD)
Products	Product_Price	Product retail price ($USD)
Inventory	Store_ID	Store ID
Inventory	Product_ID	Product ID
Inventory	Stock_On_Hand	Stock quantity of the product in the store (inventory)
Stores	Store_ID	Store ID
Stores	Store_Name	Store name
Stores	Store_City	City in Mexico where the store is located
Stores	Store_Location	Location in the city where the store is located
Stores	Store_Open_Date	Date when the store was opened
Sales	Sale_ID	Sale ID
Sales	Date	Date of the transaction
Sales	Store_ID	Store ID
Sales	Product_ID	Product ID
Sales	Units	Units sold
Calendar	Date	Calendar date

Production Performance Analysis

```sql
WITH CTE AS (
    SELECT
        Products.product_id,
        Products.Product_Name,
        (Products.Product_Price * Sales.Units) as REVENUE,
       (Sales.Units *(Products.Product_Price)-(Products.Product_Cost)) AS PROFIT
    FROM Products
    JOIN Sales ON Sales.Product_ID = Products.Product_ID
)
SELECT TOP 10
    Product_Name,
    SUM(REVENUE) AS 'TOTAL_SALES($)',
    SUM(PROFIT) AS 'TOTAL_PROFIT($)'
FROM CTE
GROUP BY
    Product_Name
ORDER BY
    'TOTAL_SALES($)' DESC, 'TOTAL_PROFIT($)' DESC;
```

Results | Messages

	Product_Name	TOTAL_SALES($)	TOTAL_PROFIT($)
1	Lego Bricks	2388882.63	708312.93
2	Colorbuds	1564476.32	1054290.20
3	Magic Sand	968962.02	419252.95
4	Action Figure	926748.42	442263.39
5	Rubik's Cube	912983.28	216716.31
6	Deck Of Cards	587397.66	315746.49
7	Splash Balls	541629.52	209573.11
8	Nerf Gun	530594.57	175196.66
9	Animal Figures	507766.11	185588.61
10	Dart Gun	505092.12	190918.15

The result shows the Top 10 products with high revenue and profit generation capability. A product like Lego Bricks is the highest revenue-generating and second highest profit-generating product. On the other hand, Colourbuds are the highest profit-generating and second highest revenue-generating products.

Store Performance Analysis

```sql
SELECT
    Stores.Store_ID,
    Stores.Store_name,
    SUM(Products.Product_Price * sales.Units) AS 'Total_Revenue_$',
    SUM(sales.Units *(Products.Product_Price-Products.Product_Cost)) AS 'Total_profit_$',
    ROUND(SUM(sales.Units *(Products.Product_Price-Products.Product_Cost))/SUM(Products.Product_Price * sales.Units) * 100,2) AS 'Profit_margin_%'
FROM
    Sales
    INNER JOIN Stores
    ON Stores.Store_ID = Sales.Store_ID
    INNER JOIN products
    ON Products.Product_ID = Sales.Product_ID
GROUP BY
    Stores.Store_ID,Stores.Store_name
ORDER BY
    'Total_Revenue_$' DESC, 'Profit_margin_%' DESC;
```

Results | Messages

	Store_ID	Store_name	Total_Revenue_$	Total_profit_$	Profit_margin_%
1	31	Toys Ciudad de Mexico 2	554553.43	169856.00	30.630000
2	30	Toys Guadalajara 3	449354.91	121571.00	27.050000
3	9	Toys Ciudad de Mexico 1	433556.21	111296.00	25.670000
4	17	Toys Toluca 1	411157.32	104612.00	25.440000
5	7	Toys Monterrey 2	372998.82	106783.00	28.630000
6	46	Toys Guadalajara 4	348466.64	102178.00	29.320000
7	42	Toys Hermosillo 3	344846.64	98825.00	28.660000
8	39	Toys Xalapa 2	344307.04	88637.00	25.740000
9	37	Toys Ciudad de Mexico 3	337424.66	94021.00	27.860000
10	4	Toys Saltillo 1	330408.90	94252.00	28.530000
11	47	Toys Monterrey 4	325073.50	79339.00	24.410000
12	45	Toys Ciudad de Mexico 4	323957.71	90385.00	27.900000
13	41	Toys Hermosillo 2	323427.02	87995.00	27.210000
14	14	Toys Guanajuato 1	313916.60	88002.00	28.030000
15	10	Toys Campeche 1	311786.44	88248.00	28.300000
16	25	Toys Ciudad Victoria 1	294803.99	83088.00	28.180000
17	6	Toys Mexicali 1	294019.42	97206.00	33.060000
18	13	Toys Mexicali 2	292156.43	77842.00	26.640000
19	33	Toys Monterrey 3	285814.24	86622.00	30.310000
20	28	Toys Puebla 2	282616.87	75082.00	26.570000
21	22	Toys Guanajuato 2	278926.67	79550.00	28.520000
22	2	Toys Monterrey 1	277959.14	73985.00	26.620000
23	21	Toys Santiago 1	277598.14	72922.00	26.270000
24	50	Toys Guanajuato 3	276212.56	67495.00	24.440000
25	36	Toys Morelia 1	273060.05	90484.00	33.140000
26	38	Toys Chihuahua 2	268704.74	77263.00	28.750000
27	44	Toys Puebla 3	267559.55	78670.00	29.400000
28	29	Toys Xalapa 1	265812.73	75083.00	28.250000
29	16	Toys San Luis Potosi 1	263389.65	68880.00	26.150000
30	3	Toys Guadalajara 2	262435.02	75752.00	28.870000
31	1	Toys Guadalajara 1	261842.89	69429.00	26.520000
32	12	Toys Chetumal 1	258919.35	67940.00	26.240000

The result has shown the store performance analysis where the total revenue, total profit along with profit margin of each store have been calculated. From the analysis, it has been depicted that Toys Ciudad de Mexico 2 store has generated the highest revenue and highest profit margin.

Complex Monthly Sales Trend Analysis

The result section gives an idea about complex monthly sales trend analysis. In the month of April 2022, the company had significant growth in their sales. On the other, in the same year in the month of July, the company faced a significant declinein its sales trend.

```sql
WITH MonthlySales AS (
    SELECT
        YEAR(s.Dates) AS year,
        MONTH(s.Dates) AS month,
        SUM(s.Units * p.Product_Price) AS total_sales
    FROM
        sales s
    JOIN
        products p ON s.Product_ID = p.product_id
    GROUP BY
        YEAR(s.Dates), MONTH(s.Dates)
),
RollingAverage AS (
    SELECT
        year,
        month,
        total_sales,
        ROUND(AVG(total_sales) OVER (ORDER BY year, month ROWS BETWEEN 2 PRECEDING AND CURRENT ROW), 2) AS rolling_3_month_avg
    FROM
        MonthlySales
),
SalesWithTrend AS (
    SELECT
        year,
        month,
        total_sales,
        rolling_3_month_avg,
        CASE
            WHEN total_sales > rolling_3_month_avg * 1.1 THEN 'Significant Growth'
            WHEN total_sales < rolling_3_month_avg * 0.9 THEN 'Significant Decline'
            ELSE 'Stable'
        END AS trend
    FROM
        RollingAverage
)
SELECT
    year,
    month,
    total_sales,
    rolling_3_month_avg,
    trend
FROM
    SalesWithTrend
ORDER BY
    year, month;
```

Results | Messages

	year	month	total_sales	rolling_3_month_avg	trend
1	2022	1	542554.91	542554.910000	Stable
2	2022	2	541351.65	541953.280000	Stable
3	2022	3	589485.19	557797.250000	Stable
4	2022	4	681072.98	603969.940000	Significant Growth
5	2022	5	672369.90	647642.690000	Stable
6	2022	6	661980.22	671807.700000	Stable
7	2022	7	556034.23	630128.120000	Significant Decli...
8	2022	8	489422.73	569145.730000	Significant Decli...
9	2022	9	585844.04	543767.000000	Stable
10	2022	10	623874.39	566380.390000	Significant Growth
11	2022	11	661304.15	623674.190000	Stable
12	2022	12	877203.69	720794.080000	Significant Growth
13	2023	1	747196.22	761901.350000	Stable
14	2023	2	722632.19	782344.030000	Stable
15	2023	3	883515.64	784448.020000	Significant Growth
16	2023	4	827691.07	811279.630000	Stable
17	2023	5	825319.49	845508.730000	Stable
18	2023	6	808299.25	820436.600000	Stable
19	2023	7	828348.86	820655.870000	Stable
20	2023	8	660877.07	765841.730000	Significant Decli...
21	2023	9	658194.48	715806.800000	Stable

Cumulative Distribution of Profit Margin

Products with higher cumulative distribution values, such as those in the Electronics category, are performing better compared to others. This highlights their importance and potential as key revenue drivers. Cumulative distribution shows that categories like Electronics and Games have higher performance thresholds, indicating their stronger financial metrics compared to Sports & Outdoors, Arts & Crafts, and Toys. By analyzing cumulative distribution, businesses can strategically focus on products or categories with high values to maximize profit and enhance overall performance. This data helps prioritize efforts on high-performing items.

```sql
WITH ProductProfits AS (
    SELECT
        p.Product_Category AS category,
        p.product_id AS product_id,
        (SUM(s.Units * p.Product_Price) - SUM(s.Units * p.Product_Cost)) AS profit,
        ROUND((SUM(s.Units * p.Product_Price) - SUM(s.Units * p.Product_Cost)) / SUM(s.Units * p.Product_Price) * 100,2) AS profit_margin
    FROM
        sales s
    JOIN
        products p ON s.Product_ID = p.product_id
    GROUP BY
        p.Product_Category, p.product_id
    HAVING
        (SUM(s.Units * p.Product_Price) - SUM(s.Units * p.Product_Cost)) / SUM(s.Units * p.Product_Price) * 100 > 0
),
CumulativeDistribution AS (
    SELECT
        category,
        product_id,
        profit,
        profit_margin,
        PERCENT_RANK() OVER (PARTITION BY category ORDER BY profit_margin) AS cum_dist
    FROM
        ProductProfits
)
SELECT
    category,
    product_id,
    profit,
    profit_margin,
    cum_dist
FROM
    CumulativeDistribution
ORDER BY
    profit_margin DESC, cum_dist DESC;
```

Results | Messages

	category	product...	profit	profit_mar...	cum_dist
1	Games	16	91378.00	70.070000	1
2	Sports & Outdoors	20	42352.00	64.030000	1
3	Art & Crafts	28	29106.00	63.690000	1
4	Toys	29	60368.00	55.030000	1
5	Electronics	6	834944.00	53.370000	1
6	Art & Crafts	3	183326.00	50.130000	0.857142857142857
7	Games	35	10840.00	50.060000	0.857142857142857
8	Toys	23	43025.00	50.050000	0.875
9	Art & Crafts	11	121680.00	47.640000	0.714285714285714
10	Games	14	187590.00	45.500000	0.714285714285714
11	Games	8	252102.00	42.920000	0.571428571428571
12	Toys	1	347748.00	37.520000	0.75
13	Art & Crafts	25	103128.00	33.440000	0.571428571428571
14	Toys	15	45318.00	33.390000	0.625
15	Sports & Outdoors	21	100812.00	30.030000	0.833333333333333
16	Art & Crafts	17	146598.00	30.020000	0.428571428571429
17	Games	22	20310.00	30.020000	0.428571428571429
18	Electronics	13	107748.00	28.590000	0.5
19	Toys	10	116048.00	26.680000	0.5
20	Sports & Outdoors	7	126352.00	25.020000	0.5
21	Sports & Outdoors	12	22860.00	25.020000	0.5
22	Sports & Outdoors	24	132715.00	25.010000	0.333333333333333
23	Toys	2	117267.00	23.090000	0.375
24	Games	4	11487.00	23.090000	0.285714285714286
25	Art & Crafts	27	23128.00	20.040000	0.285714285714286
26	Games	5	8942.00	20.020000	0.142857142857143
27	Sports & Outdoors	32	20379.00	20.010000	0.166666666666667
28	Electronics	34	58745.00	19.240000	0
29	Art & Crafts	26	25192.00	16.010000	0.142857142857143
30	Toys	33	12832.00	15.400000	0.25
31	Art & Crafts	19	121196.00	12.510000	0
32	Toys	18	298685.00	12.500000	0.125

Store Inventory Turnover Analysis

The Store ID “14 has” the highest Inventory Turnover Ratio which signifies that inventory is being sold and replenished quickly. It reflects that the company is effectively managing its inventory and responding well to market demand.

```sql
WITH COGS AS (
    SELECT
        s.Store_ID,
        SUM(s.Units * p.Product_Cost) AS cogs
    FROM
        sales s
    JOIN
        products p ON s.Product_ID = p.product_id
    GROUP BY
        s.Store_ID
),
AverageInventory AS (
    SELECT
        i.Store_ID,
        AVG(i.Stock_On_Hand * p.Product_Cost) AS avg_inventory
    FROM
        inventory i
    JOIN
        products p ON i.Product_ID = p.product_id
    GROUP BY
        i.Store_ID
)
SELECT
    c.Store_ID,
    c.cogs,
    a.avg_inventory,
    CASE
        WHEN a.avg_inventory = 0 THEN 0
        ELSE ROUND(c.cogs / a.avg_inventory, 2)
    END AS inventory_turnover_ratio
FROM
    COGS c
JOIN
    AverageInventory a ON c.Store_ID = a.Store_ID
ORDER BY
    inventory_turnover_ratio DESC;
```

Results | Messages

	Store_ID	cogs	avg_invent...	inventory_turnover_ratio
1	14	225914.60	114.080344	1980.310000
2	4	236156.90	121.989428	1935.880000
3	9	322260.21	168.091714	1917.170000
4	30	327783.91	203.860689	1607.880000
5	7	266215.82	170.297714	1563.240000
6	37	243403.66	173.189714	1405.420000
7	39	255670.04	181.964827	1405.050000
8	28	207534.87	150.062068	1382.990000
9	1	192413.89	139.524857	1379.070000
10	33	199192.24	149.703142	1330.580000
11	19	182591.87	138.058285	1322.570000
12	17	306545.32	238.549655	1285.040000
13	31	384697.43	307.512068	1251.000000
14	47	245734.50	199.305517	1232.950000
15	45	233572.71	189.775517	1230.780000
16	8	173687.15	144.100571	1205.320000
17	10	223538.44	186.155142	1200.820000
18	29	190729.73	159.781034	1193.690000
19	36	182578.05	154.646285	1180.600000
20	20	170823.04	148.248275	1152.280000
21	22	199376.67	174.774857	1140.760000
22	25	211715.99	186.053103	1137.930000
23	42	246021.64	219.041142	1123.180000
24	41	235432.02	211.707142	1112.060000
25	16	194509.65	175.776571	1106.570000
26	46	246288.64	224.913793	1095.040000
27	21	204676.14	187.108965	1093.890000
28	50	208717.56	196.731142	1060.930000
29	6	196813.42	185.691714	1059.890000
30	13	214314.43	203.364482	1053.840000
31	12	190979.35	187.155428	1020.430000

Thank You

10th August, 2024