# Inventory Optimization for T.T INC

By

Oluwasanmi Adeola Adesina

Software used:

Postgres Sql

# A case study on T.T Inc

**Objectives**

Optimize inventory levels to minimize overstock and understock situations.

Understanding seasonal trend of sales for different products.

Improve customer satisfaction by ensuring product availability.

# Tasks 1: What is the total number of units sold per product SKU?

Using the command;

  select productid, sum(inventoryquantity) as total_units_sold

  from salesgroup by productid

  order by total_units_sold desc;

I able to deduct that the product with highest number of units sold was **9806**



Also using the command;

  select sum(s.inventoryquantity) as total_overall_qty

  from sales sjoin product p on s.productid = p.productid

  join factors f on s.salesdate = f.salesdate;

I was able to deduct that the total overall quantity sold was **169178**

## Tasks 2: Which product category had the highest sales volume last month?

Using the command;

```
select p.productcategory, sum(s.inventoryquantity) as Sales_volume

from sales s

join product p on s.productid = p.productid

where s.sales_year = '2022' and s.sales_month = '11'

group by p.productcategoryorder by Sales_volume desc;
```

**Insight:**

I able to deduct that the product category with highest sales volume last month was

**Home Appliances** with a sales volume of **551** and **Smartphone** was the lowest with **61**

indicating weak performance relative to other categories.

**Recommendations:**

1. **Boost Smartphone Sales**: Reevaluate promotion or marketing strategy for Smartphones.

2. **Capitalize on Home Appliances**: Focus marketing efforts on this high-performing category.

3. **Improve Laptop Positioning**: Strengthen promotions or product differentiation to boost sales.

4. **Enhance Electronics**: Leverage its consistent performance with targeted offers or new product features.

5. **Analyze Trends**: Investigate why Smartphones are lagging behind and make strategic adjustments.

Data Output    Messages    Notifications

| | productcategory<br>text | sales_volume<br>bigint |
|---|---|---|
| 1 | Home_Appliances | 551 |
| 2 | Electronics | 518 |
| 3 | Laptops | 292 |
| 4 | SmartPhones | 61 |

# Tasks 3: How does the inflation rate correlate with sales volume for a specific month?

Using the command;

> select s.sales_month, s.sales_year, round(avg(f.inflationrate),1) as avg_inflation, sum(s.inventoryquantity) as Sales_Volume
>
> from sales s
>
> join factors f on s.salesdate = f.salesdategroup by s.sales_year, s.sales_month
>
> order by s.sales_year desc, s.sales_month desc;

**Insights:**

I was able to deduct that there is a very weak and almost no positive correlation,

suggesting that changes in inflation rate have little to no impact on the sales volume

for the specific months provided in the dataset.

**Recommendations:**

1. **Focus on Demand**: Base stocking on demand trends, not inflation.
2. **Efficient Turnover**: Optimize inventory to reduce excess stock.
3. **Diversify Products**: Offer varied products to balance sales fluctuations.
4. **Monitor Costs**: Control stocking costs independently of inflation.
5. **Adapt Quickly**: Stay flexible to adjust stock levels as market changes.

Output   Messages   Notifications

| sales_month integer | sales_year integer | avg_inflation numeric | sales_volume bigint |
|---|---|---|---|
| 12 | 2022 | 3.0 | 2539 |
| 11 | 2022 | 3.1 | 1603 |
| 10 | 2022 | 2.9 | 3649 |
| 9 | 2022 | 3.0 | 4219 |
| 8 | 2022 | 3.6 | 1619 |
| 7 | 2022 | 2.6 | 2589 |
| 6 | 2022 | 2.8 | 3020 |
| 5 | 2022 | 2.8 | 1565 |
| 4 | 2022 | 3.1 | 3683 |
| 3 | 2022 | 2.8 | 962 |
| 2 | 2022 | 3.4 | 2644 |
| 1 | 2022 | 3.3 | 2284 |

al rows: 60 of 60    Query complete 00:00:00.315

## Tasks 4: What is the correlation between the inflation rate and sales quantity for all products combined on a monthly basis over the last year?

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| | sales_year | sales_month | avg_inflation | sales_quantity | | |
| | 2021 | 12 | 3 | 2562 | | |
| | 2021 | 11 | 2.9 | 2334 | | |
| | 2021 | 10 | 3 | 3372 | | |
| | 2021 | 9 | 3.1 | 1013 | | |
| | 2021 | 8 | 3.2 | 2965 | | |
| | 2021 | 7 | 3.1 | 1305 | | |
| | 2021 | 6 | 3 | 3044 | | |
| | 2021 | 5 | 3.3 | 2355 | | |
| | 2021 | 4 | 2.9 | 1247 | | |
| | 2021 | 3 | 3.1 | 3346 | | |
| | 2021 | 2 | 3.1 | 2357 | | |
| | 2021 | 1 | 2.7 | 1449 | | |
| | | | | | | |
| | | | | | | |
| | | | CORR | 0.28 | | |

Formula bar: `=ROUND(CORREL(C2:C13,D2:D13), 2)`

Using the command;

```
select s.sales_year, s.sales_month, round(avg(f.inflationrate),1) as avg_inflation,

sum(s.inventoryquantity) as sales_quantityfrom sales s

join factors f on s.salesdate = f.salesdate

where s.sales_year = '2021'

group by s.sales_year, s.sales_month

order by s.sales_month desc;
```

**Insights:**

Using the **correl** function in excel I deducted that there is a correlation of 0.28

which indicates a weak relationship between inflation rate and sales quantity

**Recommendations**

1. **Demand Forecasting**: Focus on historical sales data to predict stock needs.

2. **Diversify Suppliers**: Ensure flexible supply chains to manage cost fluctuations.

3. **Optimize Inventory**: Use just-in-time or lean inventory practices to avoid overstocking.

4. **Monitor Market Trends**: Track consumer behavior and market shifts, not just inflation.

5. **Agile Stocking**: Implement adaptive stocking strategies to respond to real-time demand changes.

# Tasks 5: Did promotions significantly impact the sales quantity of products?

Using the command;

```
select p.productcategory, round(avg(s.inventoryquantity)) as avg_sales_quantity, p.promotions

from sales s

join product p on s.productid = p.productid

where p.promotions = 'No'group by p.productcategory, p.promotions

union all

select p.productcategory, round(avg(s.inventoryquantity)) as avg_sales_quantity, p.promotions

from sales s

join product p on s.productid = p.productid

where p.promotions = 'Yes'group by p.productcategory, p.promotions;
```

**Insights:**

I was able to deduct that promotions did not significantly impact sales quantity of products

**Recommendations:**

1. **Refine Targeting**: Focus on the right audience for better impact.

2. **Optimize Channels**: Invest in the most effective promotional platforms.

3. **Enhance Offers**: Make promotions more attractive or valuable.

4. **A/B Test Strategies**: Experiment with different promotions to find what works.

5. **Measure ROI**: Continuously track and optimize based on performance.

Data Output | Messages | Notifications

| productcategory text | avg_sales_quantity numeric | promotions text |
|---|---|---|
| Home_Appliances | 50 | No |
| Electronics | 54 | No |
| SmartPhones | 53 | No |
| Laptops | 51 | No |
| Home_Appliances | 54 | Yes |
| Electronics | 52 | Yes |
| SmartPhones | 49 | Yes |
| Laptops | 50 | Yes |

# Tasks 6: What is the average sales quantity per product category?

Using the command;

> select p.productcategory, round(avg(s.inventoryquantity)) as avg_sales_qty
>
> from sales s
>
> join product p on s.productid = p.productid
>
> group by p.productcategory
>
> order by avg_sales_qty desc;

**Insights:**

I was able to deduct that Electronics has the highest sales quantity at 53 and

Laptops has the lowest at 50 and there is no indication on KPI here

**Recommendations:**

1. **Targeted Promotions**: Focus on specific customer segments.

2. **Improve Product Mix**: Offer high-demand and complementary products.

3. **Enhance Marketing**: Use data-driven campaigns to boost visibility.

4. **Optimize Pricing**: Implement competitive pricing strategies.

5. **Boost Customer Retention**: Use loyalty programs to increase repeat sales.

## Data Output    Messages    Notifications

| | productcategory text | avg_sales_qty numeric |
|---|---|---|
| 1 | Electronics | 53 |
| 2 | Home_Appliances | 52 |
| 3 | SmartPhones | 51 |
| 4 | Laptops | 50 |

# Tasks 7: How does the GDP affect the total sales volume?

Using the command;

```
select s.sales_year, sum(f.gdp) as Total_gdp, sum(s.inventoryquantity) as total_sales_volume

from sales s

join factors f on s.salesdate = f.salesdate

group by s.sales_year

order by s.sales_year desc;
```

## Insights:

It was deducted that there is a 0.7 correlation between GDP and sales volume, this means that sales volume rises when GDP grows, and the business is sensitive to economic growth

2022 has the highest GDP which correlates with a high sales volume and 2021 has the lowest

## Recommendations:

1. **Monitor GDP**: Align sales strategies with economic growth trends.

2. **Forecast Demand**: Use GDP trends for accurate sales projections.

3. **Diversify Products**: Reduce reliance on GDP-sensitive products.

4. **Invest in Growth**: Expand during economic booms to maximize sales.

5. **Prepare for Downturns**: Build resilience for periods of slow GDP growth.

**Data Output**  Messages  Notifications

| | sales_year integer | total_gdp numeric | total_sales_volume bigint |
|---|---|---|---|
| 1 | 2022 | 11784921.53 | 30376 |
| 2 | 2021 | 10437239.33 | 27349 |
| 3 | 2020 | 10809156.99 | 29068 |
| 4 | 2019 | 10959585.47 | 27529 |
| 5 | 2018 | 11720114.38 | 28494 |

D9    =ROUND(CORREL(B2:B6,C2:C6), 1)

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | sales_year | total_gdp | total_sales_volume | | | |
| 2 | 2022 | 11784921.53 | 30376 | | | |
| 3 | 2020 | 10809156.99 | 29068 | | | |
| 4 | 2018 | 11720114.38 | 28494 | | | |
| 5 | 2019 | 10959585.47 | 27529 | | | |
| 6 | 2021 | 10437239.33 | 27349 | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | CORR | 0.7 | | |
| 10 | | | | | | |
| 11 | | | | | | |

## Tasks 8: What are the top 10 best-selling product SKUs?

| | productid<br>numeric | top_sales<br>bigint |
|---|---|---|
| 1 | 9806 | 210 |
| 2 | 3381 | 201 |
| 3 | 8486 | 188 |
| 4 | 8106 | 186 |
| 5 | 3993 | 182 |
| 6 | 9605 | 178 |
| 7 | 9237 | 176 |
| 8 | 6364 | 176 |
| 9 | 3762 | 173 |
| 10 | 4450 | 171 |

Using the command;

select productid, sum(inventoryquantity) as top_sales

from sales

group by productid

order by top_sales desc

limit 10;

**Insights:**

It was deducted that product 9806 tops the chart with 210 sales units

# Tasks 9: How do seasonal factors influence sales quantities for different product categories?

Using the command;

```
select p.productcategory, round(avg(f.seasonalfactor),4) as avg_seasonal_factors,

sum(s.inventoryquantity) as sales_quantities

from sales s

join factors f on s.salesdate = f.salesdate

join product p on s.productid = p.productid

group by p.productcategory

order by avg_seasonal_factors;
```



**Data Output**   Messages   Notifications

| | productcategory text | avg_seasonal_factors numeric | sales_quantities bigint |
|---|---|---|---|
| 1 | Electronics | 0.9983 | 44935 |
| 2 | SmartPhones | 1.0032 | 41601 |
| 3 | Laptops | 1.0048 | 40439 |
| 4 | Home_Appliances | 1.0076 | 42203 |

## Insights:

- **Home Appliances** seem to experience slightly more seasonality compared

to Electronics, Smartphones, and Laptops.

- Seasonal factors do not appear to be the primary driver of large fluctuations in sales,

indicating that sales in these categories are fairly steady throughout the year.

## Recommendations:

1. **Focus on Consistency**: Maintain stable sales efforts year-round.

2. **Boost Promotions**: Slightly increase marketing for Home Appliances during peak seasons.

3. **Diversify Strategies**: Target steady sales categories like Electronics and Smartphones.

4. **Monitor Trends**: Track subtle seasonal shifts for optimized stock levels.

5. **Limit Seasonal Spending**: Avoid heavy seasonal campaigns due to minimal impact.



C8     =ROUND(CORREL(B2:B5,C2:C5),1)

| A | B | C | D | E |
|---|---|---|---|---|
| productcategory | avg_seasonal_factors | sales_quantities | | |
| Electronics | 0.9983 | 44935 | | |
| SmartPhones | 1.0032 | 41601 | | |
| Laptops | 1.0048 | 40439 | | |
| Home_Appliances | 1.0076 | 42203 | | |
| | | | | |
| | CORR | -0.7 | | |

# Tasks 10: What is the average sales quantity per product category and how many products within each category were part of a promotion

Using the command;

```
select p.productcategory, round(avg(s.inventoryquantity)) as avg_sales_qty,

count (case when p.promotions = 'Yes' then 1 end) as promotion_count

from sales s

join product p on s.productid = p.productid

group by p.productcategory

order by avg_sales_qty desc;
```

### Data Output | Messages | Notifications

| | productcategory<br>text | avg_sales_qty<br>numeric | promotion_count<br>bigint |
|---|---|---|---|
| 1 | Electronics | 53 | 212 |
| 2 | Home_Appliances | 52 | 220 |
| 3 | SmartPhones | 51 | 212 |
| 4 | Laptops | 50 | 219 |

## Insights:

• Home Appliances seems to have the highest number of promotions of 220.

• It can be deducted that Home Appliances relies heavily on seasonal promotion which is beneficial in the long run has it helps generate high sales volume.

• Electronics and smartphones are performing well without excessive promotion.

## Recommendations:

1. **Reduce Promotions**: Lower promotion frequency for Electronics and Smartphones.

2. **Optimize Strategy**: Improve promotional targeting for Laptops.

3. **Focus on Value**: Highlight product features over discounts for Home Appliances.

4. **Analyze ROI**: Evaluate promotion effectiveness by product category.

5. **Leverage High Performers**: Prioritize Electronics and Smartphones in marketing efforts.