Optimizing Inventory for Growth

- 🧠 Smart inventory = 😊 happier customers, fewer costs, and ✅ smoother operations.

T. T Inc

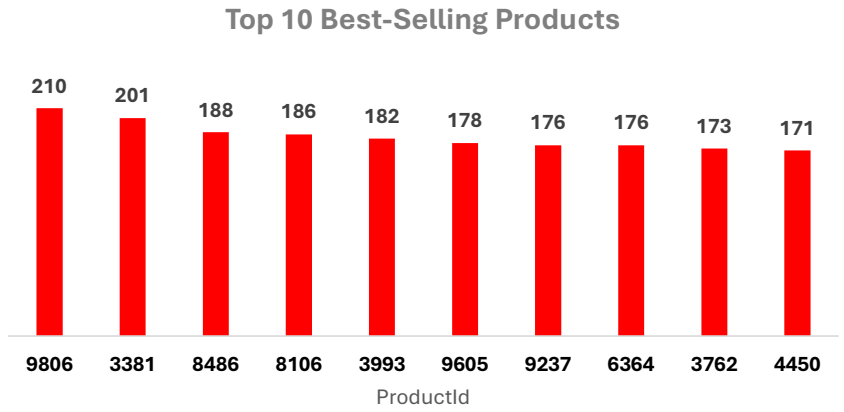
Innovating the Future of Technology

Inventory Optimization Challenges

- ⚖️ Optimize inventory (reduce over/understock)
- 😀 Ensure product availability
- 📊 Use data for smarter decisions

📊 Sales Performance: Best & Least-Selling Products

```sql
SELECT
  productid
 ,SUM(inventoryquantity) AS total_units_sold
FROM sales
GROUP BY productid
ORDER BY total_units_sold DESC;
```



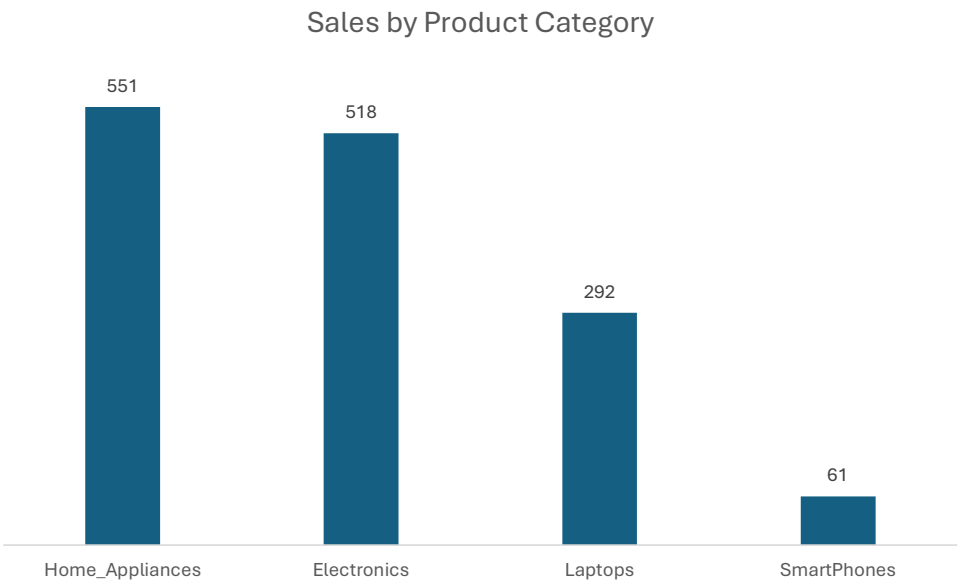
Key Insights:

🔼 **Top-Selling Products** 📈 →
Prioritize restocking

🔽 **Lowest-Selling Products** 📉 →
Evaluate promotions/discontinuation

🏆 Best-Selling Product Category

```sql
SELECT
  p.productcategory
 ,SUM(s.inventoryquantity) AS sales_volume
FROM product p
JOIN sales s
  ON p.productid = s.productid
WHERE sales_month = 11
AND sales_year = (SELECT
    MAX(sales_year)
  FROM sales)
GROUP BY p.productcategory
ORDER BY sales_volume DESC;
```



Key Insight:

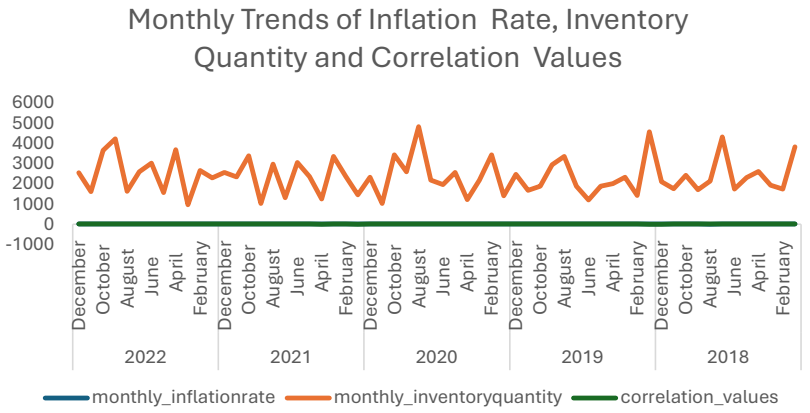
📌 **Home Appliances** had the **highest sales volume with a total of 551 products**.

Recommendations:

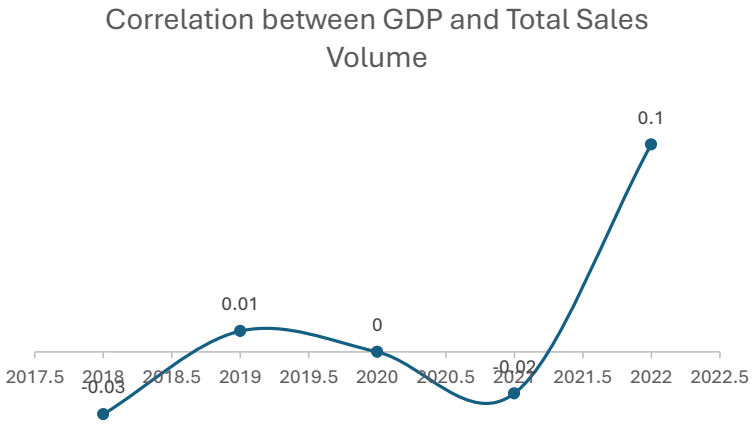
- 📦 Stock more on products under the home appliances category.
- 🧠 Study customer trends over the past year or some months in order to make better decisions
- 💡 Promotions should be continued for home appliances product category
- 🏷 Track prices

📊 Economic Influence on Sales (Inflation & GDP)

"Inflation & GDP had **minimal to weak correlation** with sales. Focus should remain on promotions and seasonality."



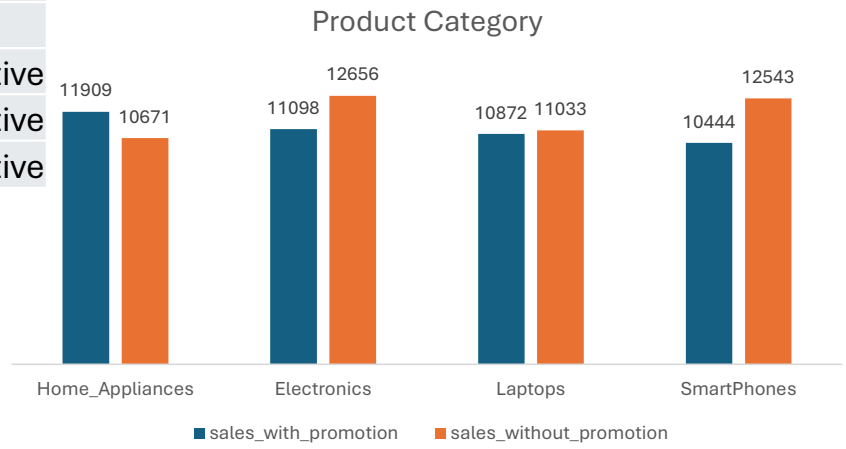
Factor	Impact on Sales	Action Plan
Inflation	Weak negative correlation	**Adjust pricing strategies**
GDP	Minimal effect	**Focus on promotions**



📊 Promotions Impact on Sales

```sql
SELECT
    p.productcategory,
    SUM(CASE WHEN p.promotions = 'Yes' THEN s.inventoryquantity ELSE 0 END) AS sales_with_promotion,
    SUM(CASE WHEN p.promotions = 'No' THEN s.inventoryquantity ELSE 0 END) AS sales_without_promotion
FROM product p
JOIN sales s
    ON p.productid = s.productid
GROUP BY p.productcategory
ORDER BY sales_with_promotion DESC;
```

Category	Sales_with_Promotion	Sales_without_Promotion	Impact
Home_Appliances	✅ Higher Sales	📉 Lower Sales	Effective
Electronics	📉 Lower Sales	✅ Higher Sales	Not Effective
Laptops	📉 Lower Sales	✅ Higher Sales	Not Effective
SmartPhones	📉 Lower Sales	✅ Higher Sales	Not Effective



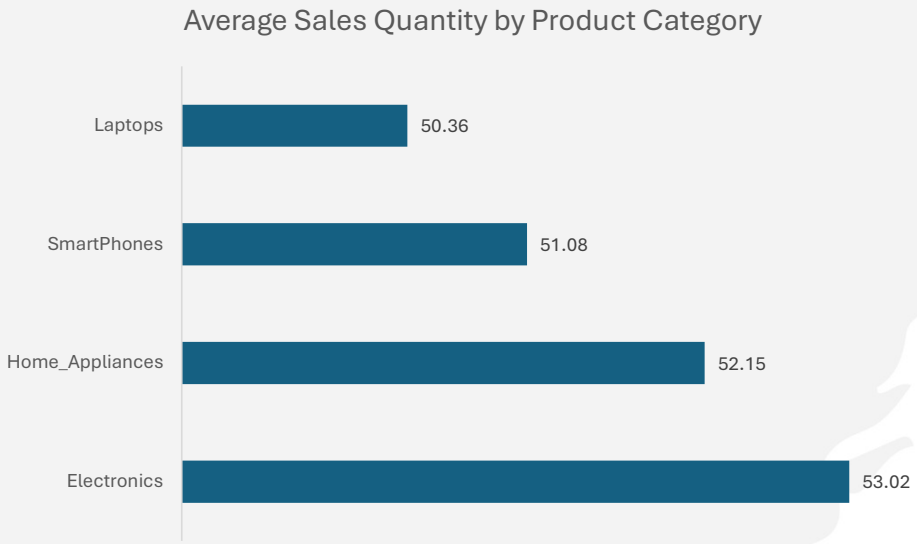
Recommendations:

- 🎯 Targeted Promotions → Improve underperforming products.
- 🧑‍🤝‍🧑 Customer Behavior → Track promotion effectiveness.
- 🔬 A/B Testing → Optimize discount strategies.
- 💲 Dynamic Pricing → Adjust based on demand shifts.

📊 Average Sales Quantity per Category

```sql
SELECT p.productcategory, ROUND(AVG(s.inventoryquantity),2) AS avg_sales_quantity
FROM product p
JOIN sales s
ON p.productid = s.productid
GROUP BY p.productcategory
ORDER BY avg_sales_quantity DESC;
```

Key Insights:



Recommendations:

✅ Higher demand for **Electronics** → Stock prioritization.

✅ Close sales figures → **Cross-category promotions**.

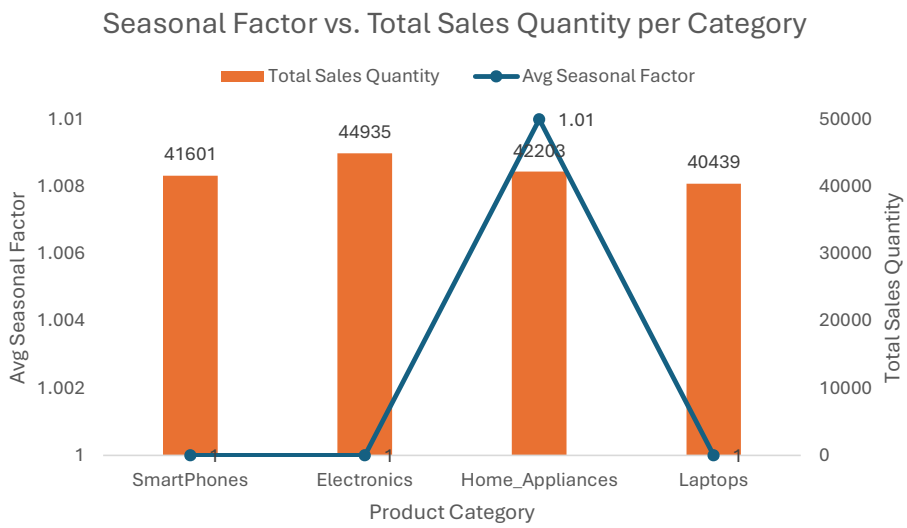
✅ **Balance inventory** based on demand trends.

📊 Seasonal Factors Impact

Key Insights:
✅ **Minimal seasonal impact—electronics lead in year-round demand**.

📊 **Laptops** & **Smartphones need non-seasonal growth strategies**.

✅ **Home Appliances Show Slight Seasonality:** With a **seasonal factor of 1.01**, Home Appliances may have some seasonal variation but remain relatively stable.



📌 **Recommendations for Inventory Management:**
🔹 **Prioritize high-demand categories** (Electronics) in stock planning.

🔹 **Monitor Home Appliances** for seasonal fluctuations and adjust inventory accordingly.

🔹 **Analyze external demand drivers** (e.g., pricing strategies, promotions) for Laptops & Smartphones.

🔹 **Shift focus from seasonality to demand forecasting** for better inventory optimization.

📊 Average Sales & Promotions Impact

```sql
SELECT p.productcategory, ROUND(AVG(s.inventoryquantity),2) AS avg_sales_quantity,  COUNT(s.productid) AS product_count
FROM product p
JOIN sales s
ON p.productid = s.productid
WHERE p.promotions = 'Yes'
GROUP BY p.productcategory
```

Key Insights:

• Home Appliances: Highest average sales (54.13) & most promotions (220 count)

• Smartphones: Lower avg. (49.26) despite promotions (212 count)

Recommendations:

✅ **Increase targeted promotions** for lower-selling categories (e.g., Smartphones & Laptops).

✅ **Analyze product-level performance** to determine which promotions drive the highest sales lift.

✅ **Optimize inventory levels** for high-performing categories to prevent stockouts.

Product Category	Avg_Sales_Quantity	Promotion_Count
Home_Appliances	54.13	220
Electronics	52.35	212
SmartPhones	49.26	212
Laptops	49.64	219

Barriers to Effective Inventory Management

- 🔄 **Demand Uncertainty** – Fluctuating customer demand.
- 🗓️ **Seasonality Effects** – Some categories impacted by seasonality.
- 📉 **Economic Factors** – Inflation affects pricing.
- 🎯 **Promotion Effectiveness** – Some promotions work, others don't.

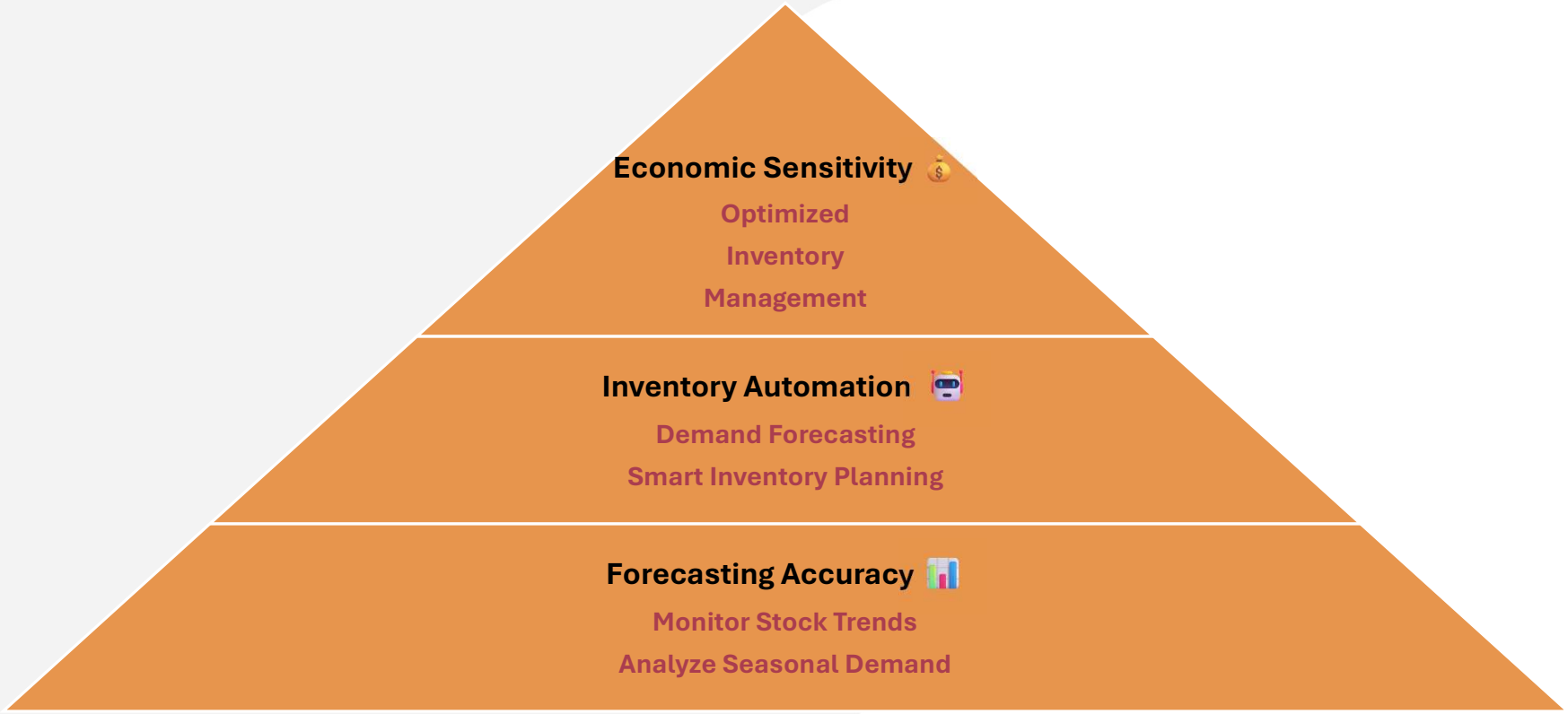
Data-Driven Inventory Insights

🏆 Top-Selling → Restock First

📉 Low Sales → Evaluate Promotions

📊 Restocking Decisions → Based on Demand Trends

Data-Backed Optimization Strategies



- This strategy pyramid highlights the structured approach to inventory optimization, focusing on forecasting, automation, and economic sensitivity

Path to Inventory Efficiency

- ✅ **Better stock levels** → Fewer shortages
- ✅ **Smarter promotions** → Higher profits.
- ✅ **Proactive planning** → Meet demand shifts.
- ✅ **Continuous monitoring** → Smarter decisions.

Appendix
SQL Queries

```sql
/* a) What is the total number of units sold per product SKU? */
SELECT
  productid
 ,SUM(inventoryquantity) AS total_units_sold
FROM sales
GROUP BY productid
ORDER BY total_units_sold DESC;
```

```sql
/* b) Which product category had the highest sales volume last month? */
SELECT
  p.productcategory
 ,SUM(s.inventoryquantity) AS sales_volume
FROM product p
JOIN sales s
  ON p.productid = s.productid
WHERE sales_month = 11
AND sales_year = (SELECT
    MAX(sales_year)
  FROM sales)
GROUP BY p.productcategory
ORDER BY sales_volume DESC
LIMIT 1;
```

```sql
/* c) How does the inflation rate correlate with sales volume? */
SELECT
    s.sales_year,
    s.sales_month,
    TO_CHAR(DATE_TRUNC('month', s.salesdate), 'Month') AS month_name,
    ROUND(AVG(f.inflationrate), 2) AS monthly_inflationrate,
    ROUND(SUM(s.inventoryquantity),2) AS monthly_inventoryquantity,
    ROUND(CORR(f.inflationrate, s.inventoryquantity)::NUMERIC, 2) AS correlation_values -- Corrected correlation calculation
FROM factors f
JOIN sales s
    ON f.salesdate = s.salesdate
GROUP BY s.sales_year, s.sales_month, month_name
ORDER BY s.sales_year DESC, s.sales_month DESC;
```

```sql
/* d) What is the correlation between the inflation rate and sales quantity for all products combined on a monthly basis over the last year?
solution  to this was covered in c).*/

/*e) Did promotions significantly impact the sales quantity of products?*/
SELECT
    p.productcategory,
    SUM(CASE WHEN p.promotions = 'Yes' THEN s.inventoryquantity ELSE 0 END) AS sales_with_promotion,
    SUM(CASE WHEN p.promotions = 'No' THEN s.inventoryquantity ELSE 0 END) AS sales_without_promotion
FROM product p
JOIN sales s
    ON p.productid = s.productid
GROUP BY p.productcategory
ORDER BY sales_with_promotion DESC;

/*f) What is the average sales quantity per product category?*/
SELECT p.productcategory, ROUND(AVG(s.inventoryquantity),2) AS avg_sales_quantity
FROM product p
JOIN sales s
ON p.productid = s.productid
GROUP BY p.productcategory
ORDER BY avg_sales_quantity DESC;

/*g) How does the GDP affect the total sales volume?*/
SELECT
  s.sales_year
 ,ROUND(CORR(f.gdp, s.inventoryquantity)::NUMERIC, 2) AS correlation_value
FROM factors f
JOIN sales s
  ON f.salesdate = s.salesdate
GROUP BY s.sales_year
ORDER BY s.sales_year DESC;
```

```sql
/*i) How do seasonal factors influence sales quantities for different product categories?*/
SELECT
    p.productcategory,
    ROUND(AVG(f.seasonalfactor), 2) AS avg_seasonal_factor,
    ROUND(SUM(s.inventoryquantity), 2) AS total_sales_quantity,
    ROUND(CORR(f.seasonalfactor, s.inventoryquantity)::NUMERIC, 2) AS correlation_value
FROM factors f
JOIN sales s
    ON f.salesdate = s.salesdate
JOIN product p
    ON s.productid = p.productid
GROUP BY p.productcategory
ORDER BY correlation_value DESC;

/*j) What is the average sales quantity per product category, and how many products within each category were part of a promotion?*/
SELECT p.productcategory, ROUND(AVG(s.inventoryquantity),2) AS avg_sales_quantity,  COUNT(s.productid) AS product_count
FROM product p
JOIN sales s
ON p.productid = s.productid
WHERE p.promotions = 'Yes'
GROUP BY p.productcategory
```