




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

Key Insights:

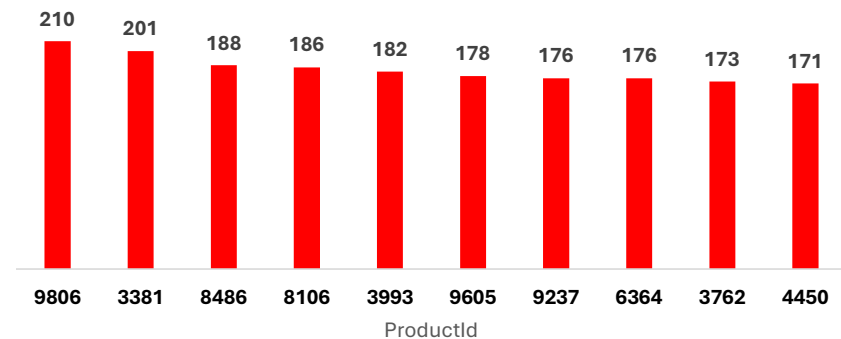
▲ **Top-Selling Products** →

Prioritize restocking

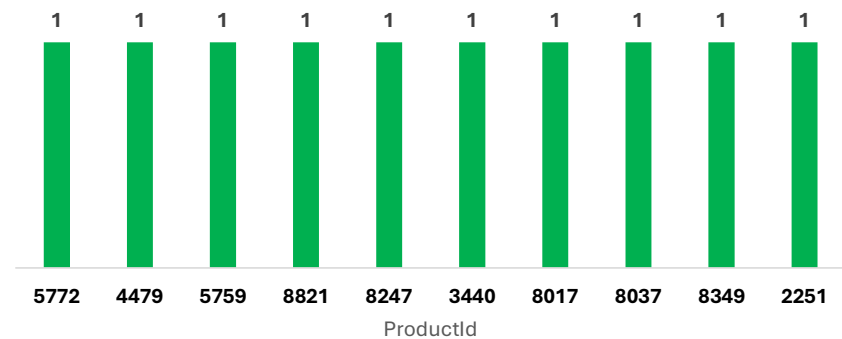
▼ **Lowest-Selling Products** →

Evaluate promotions/discontinuation

Top 10 Best-Selling Products



10 Least-Selling Products





Best-Selling Product Category

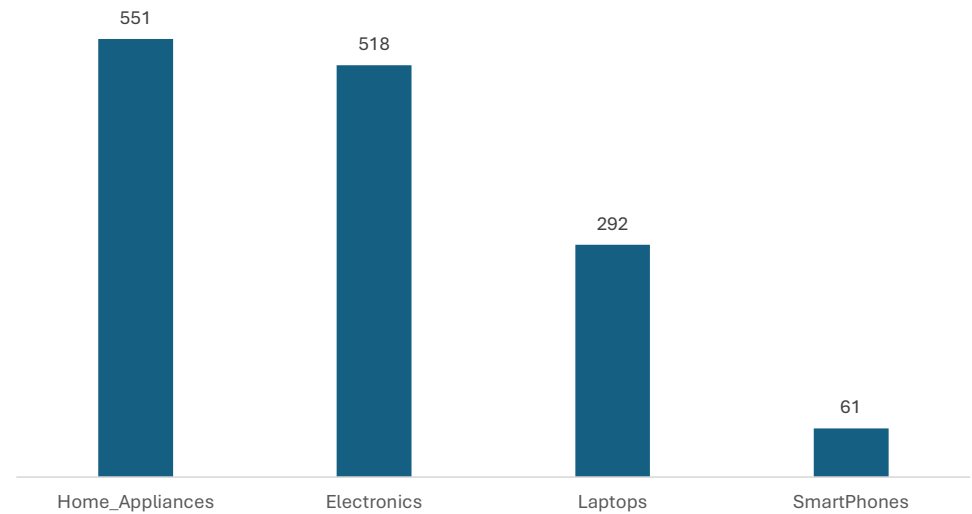
Key Insight:

📌 **Home Appliances** had the **highest sales volume**.

Recommendations:

- ◆ 📦 Stock more.
- ◆ 🧠 Study customer trends
- ◆ 💡 Promotions
- ◆ 🗣️ Track prices

Sales by Product Category



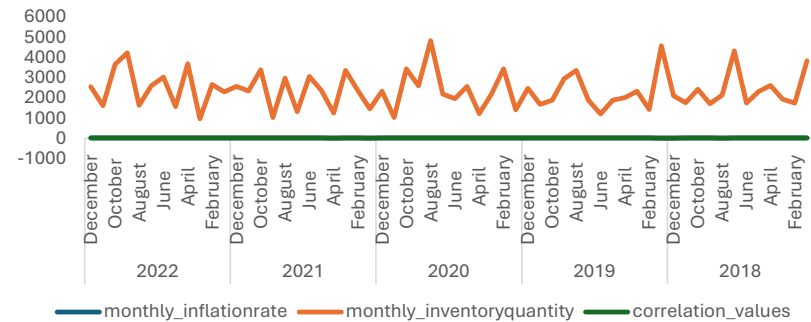


Economic Influence on Sales (Inflation & GDP)

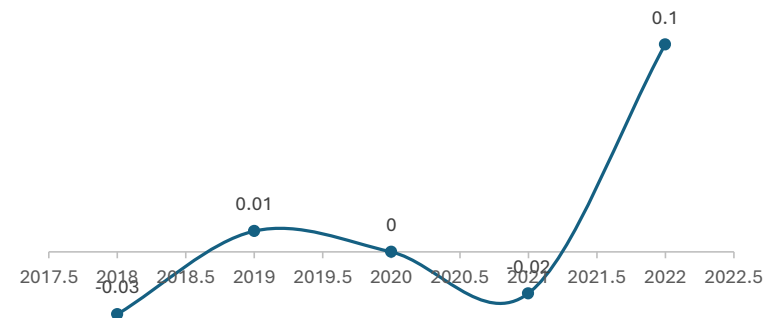
“Inflation & GDP had **minimal to weak correlation** with sales. Focus should remain on promotions and seasonality.”

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

Monthly Trends of Inflation Rate, Inventory Quantity and Correlation Values



Correlation between GDP and Total Sales Volume





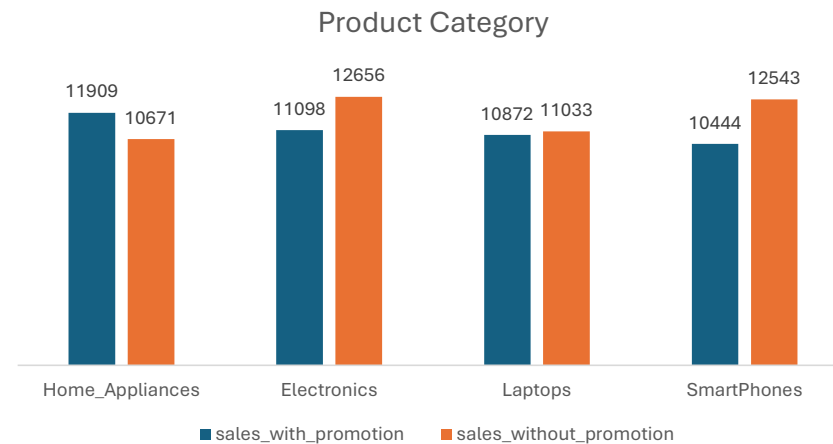
Promotions Impact on Sales

Key Insights:

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.

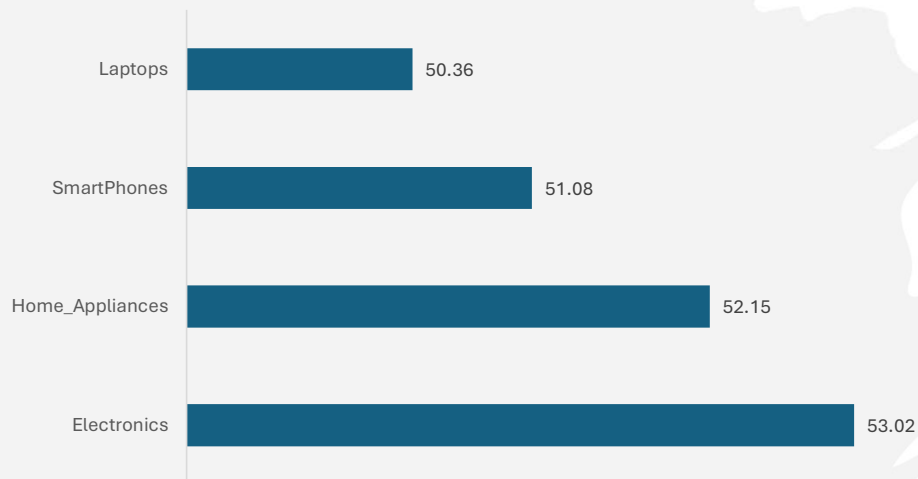




Average Sales Quantity per Category

Key Insights:

Average Sales Quantity by Product Category



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:

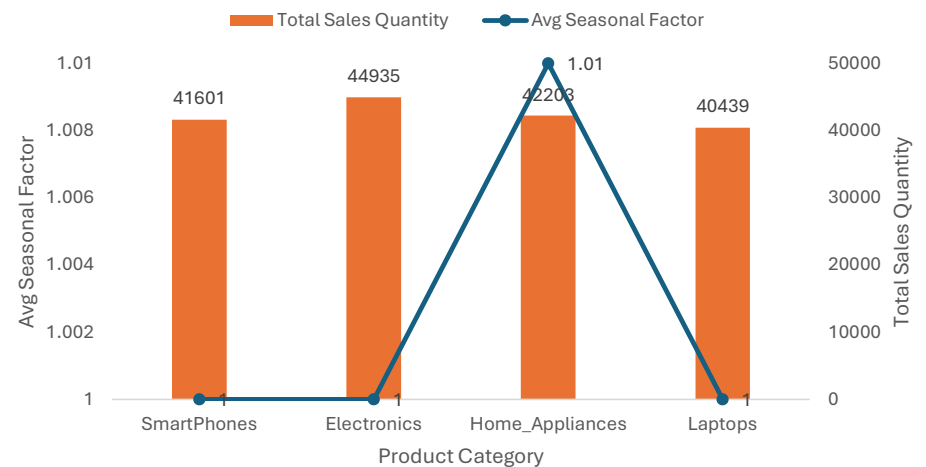
◆ **Prioritize high-demand categories** (Electronics) in stock planning.

◆ **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.

Seasonal Factor vs. Total Sales Quantity per Category





Average Sales & Promotions Impact

Key Insights:





- **Home Appliances:** Highest average sales & most promotions
- **Smartphones:** Lower avg. despite promotions

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.

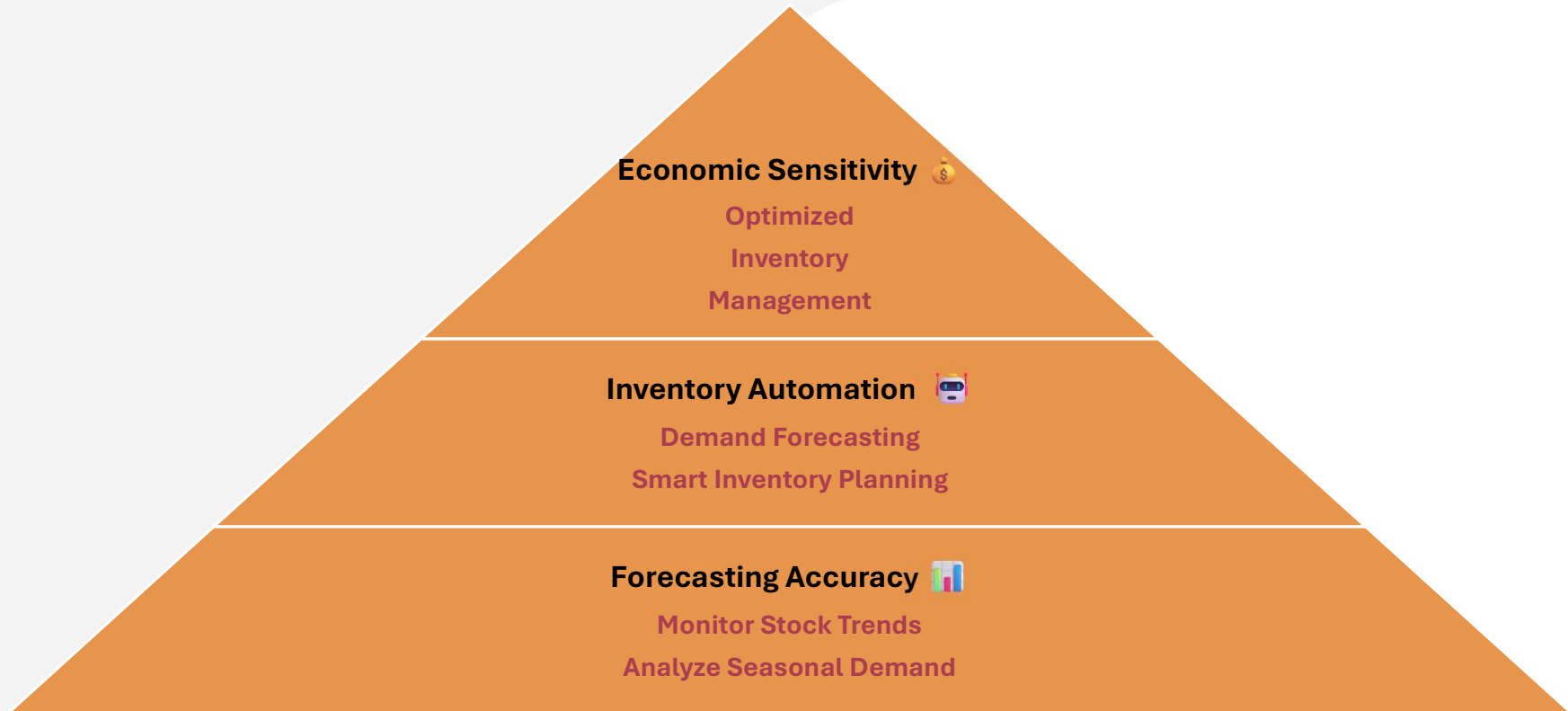
Data-Driven Inventory Insights

 **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

```
/* 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;
```

```
/* 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;
```

```
/* 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;
```

/* 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;
```


/*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
```