Grocery Inventory Management Analysis

Power BI Project Report

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https://github.com/KumarBoste/Grocery_Inventory_Management_Analysis

Abstract

Effective inventory management is a critical factor in the success of grocery retail operations, directly impacting product availability, customer satisfaction, and operational costs. This project, Grocery Inventory Management Analysis, focuses on analyzing and visualizing inventory data using Power BI to provide actionable insights for optimizing stock control and replenishment strategies.

The dashboard integrates key inventory metrics such as total stock quantity, total stock value, products below reorder level, and inventory turnover ratio to evaluate overall inventory health. Through monthly and quarterly trend analysis, category-wise stock comparison, and product-level reorder status monitoring, the project identifies potential risks of stockouts and overstocking. Statistical techniques including aggregation, time-series analysis, and threshold-based classification are applied to support data-driven decision-making.

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1. Project Objective

The objective of this project is to analyze grocery inventory data to monitor stock levels, optimize reorder decisions, reduce stockouts and overstocking, and improve inventory turnover efficiency.
This dashboard provides actionable insights for inventory managers to ensure product availability while minimizing holding costs.

Key Goals:

- Track total stock quantity and value
- Identify products below reorder levels
- Analyze inventory trends over time
- Evaluate category-wise stock distribution
- Monitor inventory status (Active, Backordered, Discontinued)
- Improve inventory turnover ratio

2. Problem Definition & Business Questions

Grocery businesses face frequent challenges such as stock shortages, excess inventory, poor demand forecasting, and inefficient replenishment cycles.
This project aims to address these challenges by answering the following business questions:

Key Business Questions:

1. How does total stock fluctuate month-wise and quarter-wise?
2. Which product categories are most at risk of falling below reorder levels?
3. How many products currently require immediate reordering?
4. What proportion of inventory is Active, Backordered, or Discontinued?
5. Which specific products are in safety stock vs. need reorder status?
6. Is the inventory turnover ratio indicating efficient stock movement?
7. Are there seasonal patterns affecting inventory levels?

3. Statistical Analysis

The following statistical measures and KPIs were used to support data-driven decision-making:

Key Metrics:

- Total Stock Quantity: 21,229 units
- Total Stock Value: 126.31K
- Products Below Reorder Level: 186
- Average Inventory Turnover Ratio: 51.11

Analytical Techniques:

- Aggregation (SUM, COUNT)
- Time-series trend analysis (Monthly & Quarterly)
- Category-wise comparative analysis
- Ratio analysis (Turnover ratio)
- Threshold-based classification (Reorder vs Safety Stock)

These statistics help in identifying inventory risk areas and performance efficiency.

4. Data Visualization & Insights

4.1 KPI Cards (Top Summary)

- High stock quantity and value indicate strong inventory capacity.
- 186 products below reorder level highlight urgent replenishment needs.
- A turnover ratio of 51.11 suggests relatively fast inventory movement but requires category-level optimization.

4.2 Total Stock by Month

Insight:

- Inventory levels fluctuate across months, indicating seasonal demand patterns.
- Certain months show stock dipping close to or below reorder levels, increasing stockout risk.

Business Impact:

- Helps plan seasonal procurement strategies.
- Prevents shortages during peak demand periods.

4.3 Total Stock by Category

Insight:

- Fruits & Vegetables and Dairy hold the highest stock quantities.
- Categories like Seafood, Oils & Fats, and Bakery are closer to reorder thresholds.

Business Impact:

- Enables category-specific inventory planning.
- Reduces waste in perishable categories.

4.4 Stock by Status (Donut Chart)

- Active: 37.17%
- Backordered: 32.75%
- Discontinued: 30.08%

Insight:

- A significant portion of products is backordered, indicating supply chain gaps.
- High discontinued share suggests catalog rationalization opportunities.

4.5 Stock Level Status Table

Insight:

- Products like Haddock, Tilapia, Trout, Tuna, Avocado Oil are below reorder levels.
- Visual indicators (green/red) simplify reorder prioritization.

Business Impact:

- Enables product-level decision-making.
- Improves supplier coordination and replenishment speed.

5. Best Solutions & Recommendations

1. Automated Reorder Alerts
    - Trigger alerts when stock falls below reorder levels.
2. Category-Based Inventory Strategy
    - Maintain higher buffer stock for fast-moving and perishable items.
3. Supplier Performance Optimization
    - Address backordered products by renegotiating supplier SLAs.
4. Seasonal Demand Forecasting
    - Increase stock in high-demand months based on historical trends.
5. Discontinued Product Review
    - Reduce storage costs by clearing obsolete inventory.
6. Turnover Ratio Optimization
    - Balance stock levels to avoid overstock while maintaining availability.

6. Conclusion

The Grocery Inventory Management Analysis dashboard provides a comprehensive, real-time view of inventory health across products and categories.
By integrating KPIs, trend analysis, category insights, and reorder indicators, the dashboard enables data-driven inventory decisions.

Key Outcomes:

- Reduced risk of stockouts
- Improved replenishment planning
- Enhanced inventory turnover efficiency
- Better visibility into product-level stock status

This project demonstrates how Power BI can transform raw inventory data into actionable business intelligence, supporting operational efficiency and cost optimization in the grocery retail sector.