Power BI Project for Restaurant Food Chain optimization

Project Title:
Power BI Dashboard for Inventory Optimization in a Global Food Chain

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Objective:

The main objective of this project is to create a Power BI dashboard that helps a global food chain manage its inventory more effectively. This includes optimizing stock levels, forecasting demand, managing supply chain inefficiencies, and reducing waste. By using data visualization and advanced analytics, the dashboard will help stakeholders across regions and locations make informed decisions on inventory, reduce operational costs, and ensure that product availability aligns with customer demand.

Scope of the Project:

Key Areas of Analysis:

1. **Real-Time Inventory Tracking:**

   o Track stock levels of perishable and non-perishable items across various restaurants, warehouses, and regional distribution centers.

   o Identify fast-moving and slow-moving products, ensuring efficient stock rotation.

2. **Demand Forecasting:**

   o Predict future demand based on sales history, seasonal trends, and promotional activities.

   o Identify which products will be in demand at specific locations (e.g., **Cheese Pizza**, **Vegan Burgers**, **Fried Plant meat**, etc.) based on historical data and promotional calendar.

3. **Supply Chain Optimization:**

   o Monitor supply chain operations, from supplier lead times to delivery schedules.

   o Recommend optimal quantities for purchase orders to avoid stockouts and reduce waste.

4. **Inventory Turnover and Waste Reduction:**

   o Evaluate turnover rates and the potential for food spoilage, especially in perishable products like **Vegetables**, **Dairy**, and **Meat**.

   o Analyze food waste by location and identify items that need better inventory management practices.

5. **Cost Optimization:**

o   Assess inventory costs including storage, spoilage, and transportation.

o   Analyze the total cost of holding stock at different locations, comparing them against operational budgets and sales performance.

Data Sources:

1. **Inventory Management System:**

   o   Real-time data on stock levels, product categories, restaurant inventory, and location-specific inventories.

2. **Sales Data:**

   o   Historical sales data showing product popularity by region, season, and promotion.

3. **Supplier Data:**

   o   Supplier delivery schedules, lead times, and minimum order quantities.

4. **Financial Data:**

   o   Breakdown of inventory holding costs, ordering costs, food waste costs, and cost per unit for various ingredients and products.

5. **External Data:**

   o   Weather data, holidays, and promotional calendar that can affect food sales.

Dashboard Features

1. Real-Time Inventory Tracking

- **Visualizations:**

  o   **Stock Levels by Location:** A bar chart showing inventory levels for different products like **Frozen Fries**, **Cheese**, and **Tomato Sauce** in warehouses and restaurants. For example, **Restaurant 1** might have **500 units** of **Frozen Fries**, while **Warehouse 1** has **2,000 units** of the same product.

  o   **Stockage and Expiry Tracker for Perishable Goods:** A stacked column chart that tracks perishable items' expiry dates. For example, **Dairy** products such as **Milk** might have a shelf life of **7 days** in certain regions. The dashboard can show which items are near expiration and need immediate sale or redistribution.

  o   **Inventory Heatmap:** A heatmap that highlights which products are overstocked (in red) and understocked (in green). For example, **Vegetables** could be overstocked in **Restaurant 3**, but understocked in **Restaurant 4** due to unexpected demand spikes.

- **Insights Provided:**

- Quick identification of regions or locations with inventory imbalances, especially important for perishable goods.

- Early warning system for products approaching expiry and the need for timely restocking or redistribution.

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2. Demand Forecasting

- **Visualizations:**

  - **Historical Sales Trends Line Chart:** A line graph showing how products like **Vegan Burgers**, **Fries**, and **Pasta** performed over the last 12 months. This chart highlights sales spikes during holidays or specific promotions (e.g., **Christmas Special** or **Summer BBQ Promotion**).

  - **Seasonal Demand Heatmap:** A heatmap showing products that peak in demand at different times of the year. For instance, **Ice Cream** might see higher demand during the summer months, while **Hot Soups** might see an increase in winter months.

  - **Demand Forecasting with Predictive Analytics:** A predictive trend line for high-demand products in the upcoming months. For example, forecasting that **Vegetarian Pizza** will experience a **15% increase in demand** in **July** due to the launch of a new plant-based menu.

- **Insights Provided:**

  - Accurate future demand predictions, allowing the food chain to adjust orders and inventory levels accordingly.

  - Insights into peak demand seasons for specific products, enabling better planning for special promotions.

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3. Supply Chain Optimization

- **Visualizations:**

  - **Supplier Lead Time and Delivery Status:** A table displaying the lead times and delivery performance of key suppliers. For example, **Supplier A** might deliver **Tomatoes** in 3 days, while **Supplier B** may have a longer delivery time of **7 days.**

  - **Replenishment Orders Chart:** A chart tracking the quantity of replenishment orders placed for different products like **Frozen Plant meat** and **Cheese Slices**, showing whether orders are fulfilled on time or delayed.

  - **Optimized Reorder Point Analysis:** A KPI displaying products that are approaching reorder points based on forecasted demand and supply chain constraints. For instance, **Frozen Fries** may need to be reordered in **2 days** for **Restaurant 1**.

- **Insights Provided:**

- Real-time tracking of supplier performance and delivery times.

- Enhanced visibility into the supply chain to avoid delays and ensure timely product availability.

- Alerts on when to reorder products to maintain optimal stock levels, ensuring products are available when needed.

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4. Inventory Turnover and Waste Reduction

- **Visualizations:**

  - **Inventory Turnover Rate by Product:** A bar chart displaying the turnover rate of key ingredients. For example, **Frozen Fish Fillets** might have a turnover rate of **4 times per month,** while **Fresh Herbs** may have a lower turnover rate, leading to potential spoilage.

  - **Food Waste Dashboard:** A pie chart that breaks down food waste by product type, showing how much food is wasted per restaurant. For instance, **Salads** might have the highest wastage due to limited shelf life.

  - **Spoilage Rate by Region/Location:** A line graph showing spoilage rates in different locations. For example, **Restaurant 3** may have **10% spoilage** for **Fresh Vegetables** while **Restaurant 1** has only **2%**.

- **Insights Provided:**

  - Ability to identify slow-moving products and optimize stock levels to prevent food waste.

  - Pinpoint areas where spoilage occurs most frequently and suggest improvements for handling, storage, and distribution.

  - Inform purchasing teams about food items that have a higher tendency for waste, suggesting changes in ordering practices.

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5. Cost Optimization

- **Visualizations:**

  - **Cost of Goods Sold (COGS) by Product:** A bar chart showing the COGS for each major product, such as **Cheese Pizza**, **French Fries**, and **Plant meat Wings**. For instance, **Plant meat Wings** might have a higher cost due to supplier pricing and transportation fees, whereas **Burgers** could have a lower cost per unit.

  - **Inventory Holding Cost by Location:** A pie chart that highlights the cost of holding inventory at different locations. For instance, **Warehouse A** may have a higher cost due to higher storage fees or less efficient inventory management.

  - **Cost Savings Analysis:** A comparison chart that shows potential savings if food waste can be reduced by 10%. For example, reducing **food waste in Restaurant 4** by just **5%** can save the chain **$20,000** annually.

- **Insights Provided:**
  - o Clear breakdown of costs, allowing teams to pinpoint areas where they can save money, such as reducing transportation costs or improving inventory handling practices.
  - o Recommendations to reduce food waste and optimize inventory, leading to cost savings.
  - o Ability to assess the cost-effectiveness of various suppliers and product pricing.

Implementation Process

1. **Requirement Analysis:**
   - o Define key metrics and KPIs for inventory, sales, supply chain management, and food waste reduction.
   - o Collect relevant data from inventory systems, sales platforms, and suppliers.

2. **Data Integration:**
   - o Connect Power BI to the necessary data sources for real-time data on sales, inventory, and supplier performance.
   - o Cleanse and transform the data to ensure it is accurate and actionable.

3. **Dashboard Design:**
   - o Design an intuitive user interface with clear visualizations and interactive features (e.g., slicers, filters).
   - o Ensure the dashboard provides actionable insights that are easy to interpret.

4. **Testing and Validation:**
   - o Test the dashboard with a small group of users to ensure its functionality, accuracy, and usability.
   - o Collect feedback and adjust the dashboard as needed.

5. **Deployment:**
   - o Deploy the dashboard on Power BI Service for access by different stakeholders (warehouse managers, supply chain coordinators, and restaurant managers).
   - o Ensure mobile compatibility for managers who need to access data while on the move.

6. **Training and Documentation:**
   - o Provide training sessions for users on how to utilize the dashboard for decision-making.

o   Create detailed documentation to support ongoing use and troubleshooting.

Recommendation Report for Inventory Optimization

1. Adjust Stock Levels Based on Seasonal Demand:

- **Recommendation:** Leverage demand forecasting tools to adjust stock levels ahead of peak seasons (e.g., **Holiday Specials** or **Summer Promotions**).

- **Reason:** Ensures that high-demand products like **Ice Cream** and **BBQ Sauces** are available in the right quantities to meet customer demand.

- **Action Plan:** Monitor forecast data and place orders for seasonal products early to avoid stockouts.

2. Reduce Food Waste by Managing Perishable Goods Better:

- **Recommendation:** Improve stock rotation practices (First In, First Out - FIFO) and better manage the shelf life of perishable goods.

- **Reason:** Minimizing food waste will significantly lower costs and increase overall profitability.

- **Action Plan:** Implement automated alerts for products nearing expiry and reduce over-ordering of fast-perishable items like **Salads** and **Herbs**.

3. Strengthen Supplier Relationships and Delivery Schedules:

- **Recommendation:** Work closely with suppliers to ensure timely and efficient deliveries, especially for critical ingredients like **Dairy** and **Frozen Goods**.

- **Reason:** Delayed deliveries can lead to stockouts, especially for perishable products.

- **Action Plan:** Track supplier performance and prioritize those with reliable delivery schedules for time-sensitive products.

4. Optimize Inventory Across Locations:

- **Recommendation:** Use real-time data to optimize stock levels across all locations to avoid understocking or overstocking.

- **Reason:** Balances the supply and demand for products like **French Fries**, ensuring they are distributed efficiently across restaurants.

- **Action Plan:** Utilize Power BI's inventory heatmaps and reorder point indicators to streamline stock movement between warehouses and restaurants.

Expected Outcomes:

1. Improved stock management and reduced stockouts.

2. Higher inventory turnover, especially for fast-moving food items.

3. Reduced waste and spoilage, leading to cost savings.

4. Better supplier relationships and more reliable deliveries.

5. Enhanced operational efficiency, reducing overall inventory costs.

By implementing this Power BI dashboard for inventory optimization, the global food chain can ensure better management of its stock levels, minimize waste, reduce costs, and ensure that its locations always have the right products to meet customer demand.