Retail Product and Inventory Performance Analysis

Executive Summary:

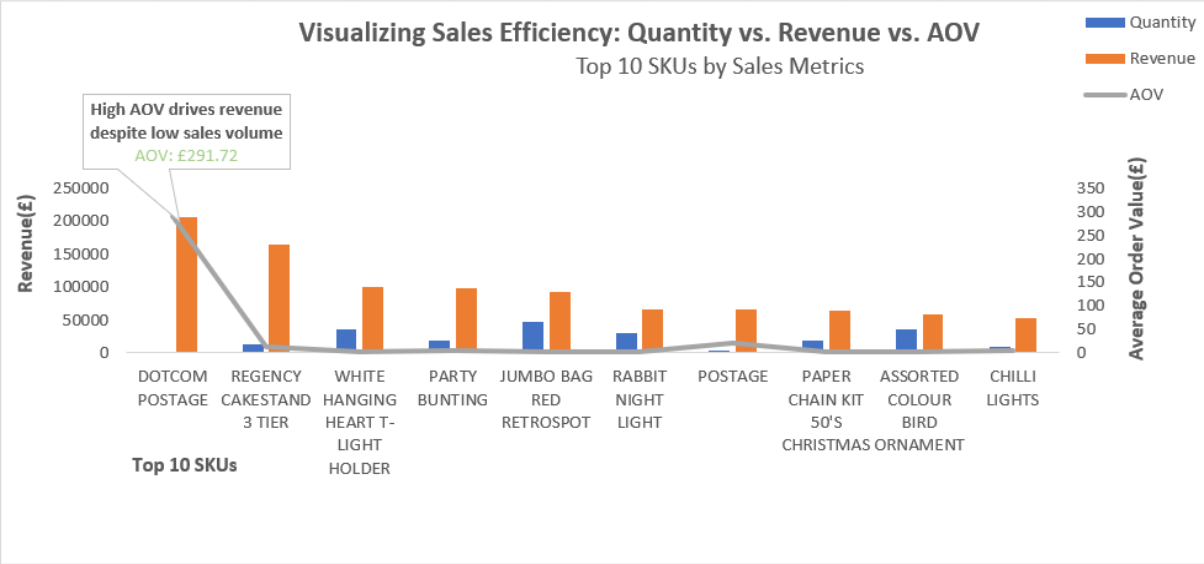
The UK Retail dataset contains transactional data from a UK-based online retailer between **2010 and 2011**. It **includes invoice details, product information, quantities, prices, and customer IDs**, allowing a detailed view of sales activity. The dataset captures both purchases and returns, making it valuable for identifying product performance and operational issues. Its time-stamped structure supports analysis of trends, seasonal patterns, and customer behaviour. Overall, it provides a strong foundation for generating insights that can guide data-driven decisions in retail strategy and planning.

Project Objective:

The objective of this project is to analyse the UK Retail dataset to evaluate **product performance and inventory-related insights**. This **includes identifying top-selling and highest-revenue products, detecting items with significant return rates, understanding monthly and seasonal sales patterns, and determining which stock codes generate the most profit**. The goal is to provide clear, data-driven insights that support better product management, inventory planning, and overall retail strategy.

Data Representations:

Visualizing Sales Efficiency Across Top SKUs



This visualization compares **Quantity Sold, Revenue, and Average Order Value (AOV)** across the top 10 SKUs. While most products rely on volume to drive revenue, DOTCOM POSTAGE stands out with an AOV of £291.72—demonstrating pricing efficiency despite low sales volume. This dual-axis chart highlights how strategic pricing can outperform raw quantity in revenue generation.

Sales Metrics Breakdown: Top 10 SKUs

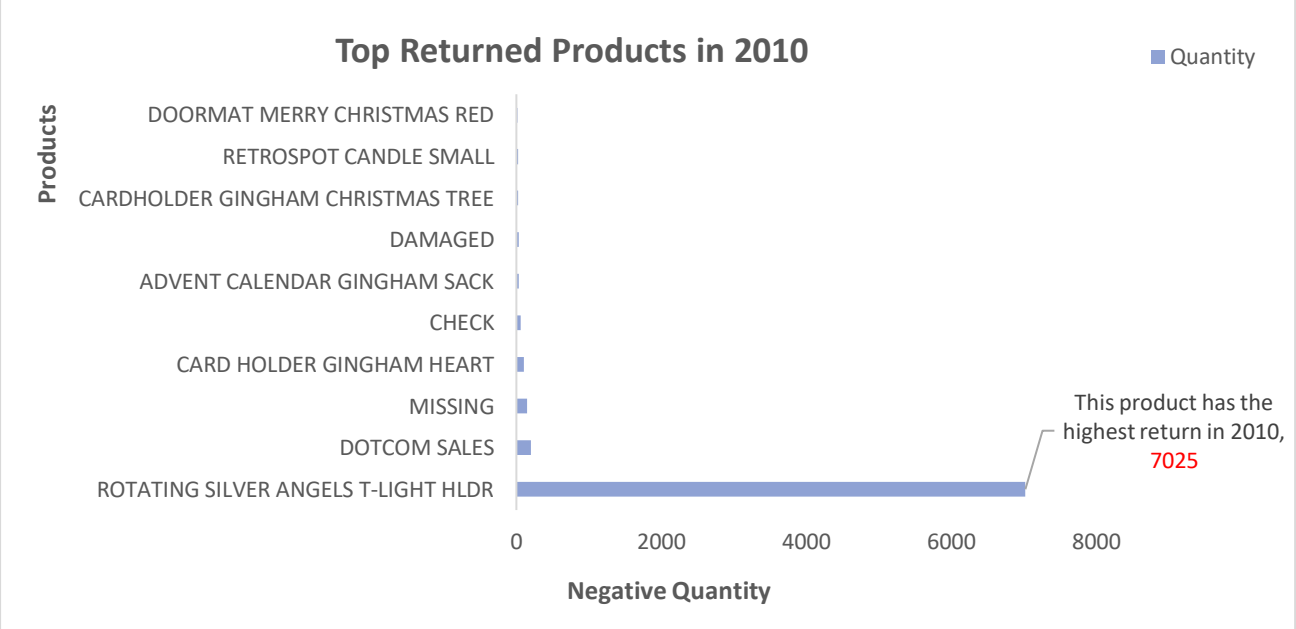
Product	Quantity	Revenue	AOV
DOTCOM POSTAGE	707	206245.48	291.7192
REGENCY CAKESTAND 3 TIER	13033	164762.19	12.64192
WHITE HANGING HEART T-LIGHT HOLDER	35317	99668.47	2.82211
PARTY BUNTING	18022	98302.98	5.45461
JUMBO BAG RED RETROSPOT	47363	92356.03	1.949962
RABBIT NIGHT LIGHT	30680	66756.59	2.175899
POSTAGE	3003	66230.64	22.05483
PAPER CHAIN KIT 50'S CHRISTMAS	18902	63791.94	3.374878
ASSORTED COLOUR BIRD ORNAMENT	36381	58959.73	1.620619
CHILLI LIGHTS	10229	53768.06	5.256434

This table highlights how strategic pricing (AOV) can drive revenue independently of quantity sold. **DOTCOM POSTAGE** leads with an AOV of £291.72.

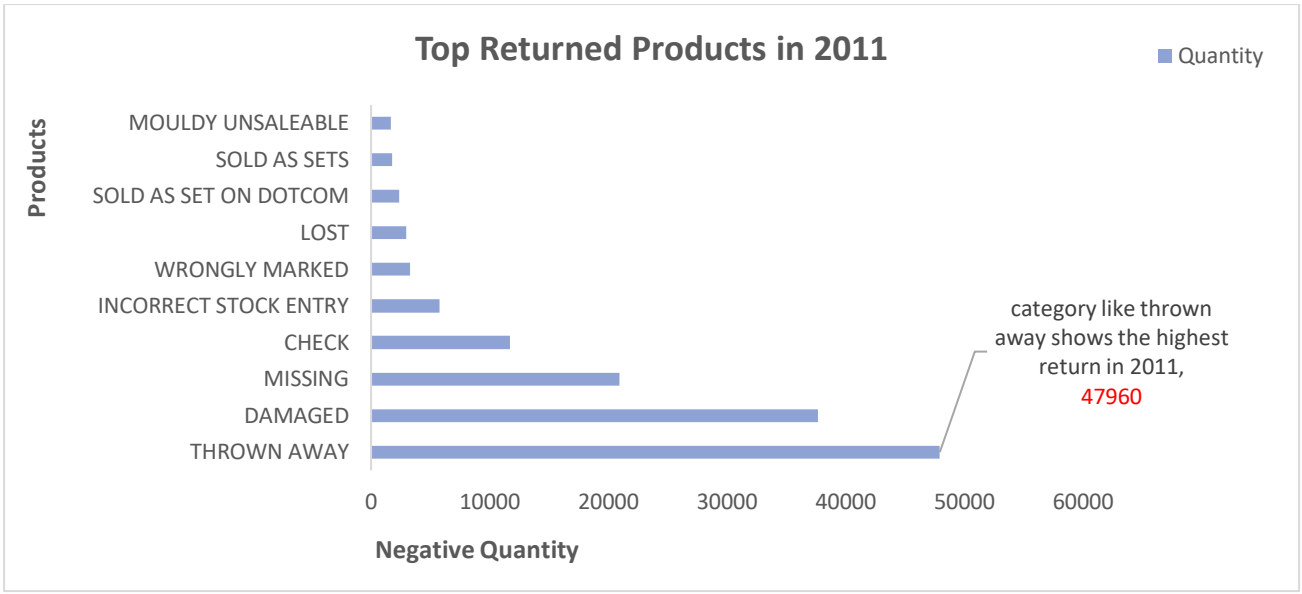
Top Performers (2010 and 2011):

Summary of True Performers(2010-2011)
Product Description
WHITE HANGING HEART-TLIGHT HOLDER – Strong in both years, both metrics.
PACK OF 72 RETROSPOT CAKE CASES – High volume and solid revenue.
JUMBO BAG RED RETROSPOT – Big jump in quantity and revenue in 2011.
REGENCY CAKESTAND 3 TIER – Highest revenue generator across both years.
DOTCOM POSTAGE – Top revenue item, though not a physical product.

Products with High return rates:

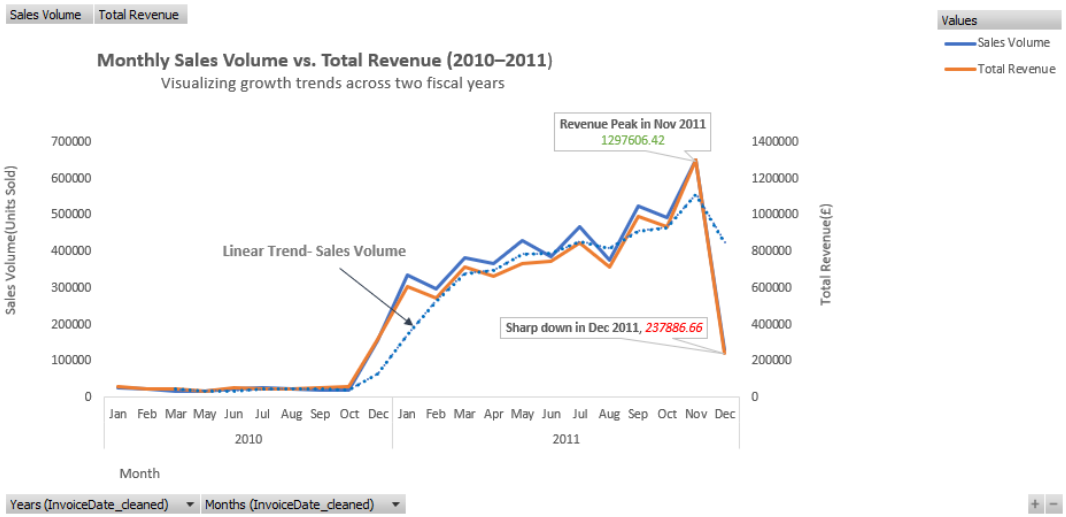


This chart highlights the products with the **highest return quantities in 2010**, based on negative transaction values. **"ROTATING SILVER ANGELS T-LIGHT HLDR"** stands out significantly, recording 7,025 units returned—far higher than any other product that year. Other items show comparatively minimal return levels, indicating that returns were concentrated in a small number of products. This visualization helps identify potential quality issues, customer dissatisfaction, or fulfilment problems associated with specific SKUs.



This chart presents the products and categories with the **highest return quantities in 2011**, based on negative transaction values. The "**THROWN AWAY"** category shows an exceptionally high return volume of 47,960 units, far surpassing all other types of returns. Other notable categories include **"DAMAGED," "MISSING,"** and **"CHECK,"** which also represent significant return activity. These patterns suggest operational issues such as product damage, stock discrepancies, or disposal-related losses, highlighting areas that may require process improvement or quality control review.

Monthly & Seasonal Patterns in Product Sales:



Row Labels	Sales Volume	Total Revenue
2010		
Jan	26814	58635.56
Feb	21023	46207.28
Mar	14830	45620.46
May	16395	31383.95
Jun	21419	53860.18
Jul	24995	45059.05
Aug	22741	44189.84
Sep	18431	52532.13
Oct	20297	57404.91
Dec	155283	314063.66
2010 Total	342228	748957.02
2011		
Jan	335402	607748.11
Feb	297326	542511.54
Mar	381069	712059.51
Apr	366642	660149.571
May	429905	733769.32
Jun	384270	745252.34
Jul	466065	843891.231
Aug	374744	715632.72
Sep	525596	992555.452
Oct	492186	931852.16
Nov	651807	1297606.42
Dec	129210	237886.66
2011 Total	4834222	9020915.034
Grand Total	5176450	9769872.054

In December 2010, there is a spike in revenue due to purchasing products in a larger volume.

In November 2011, Quantity plays a major role in increasing revenue of a firm because we can see there's a gradual decrease in quantity due to that we are facing a asharp down in revenue .

This chart illustrates monthly sales volume and revenue trends from 2010 to 2011, revealing clear seasonal patterns and year-over-year growth. Both sales and revenue show a **sharp rise beginning in late 2010**, followed by steady **monthly increases throughout 2011**. A **significant peak occurs in November 2011, driven by strong pre-holiday demand, while December shows a sharp decline as post-holiday returns and reduced purchasing activity take effect.** Overall, the visualization highlights strong seasonality, with sales building toward year-end and consistent alignment between volume and revenue trends.

Profit Contribution by Stock Code:

Row Labels	Sum of Estimated_profit	Count of Estimated_profit_margin
85123A	14977.047	2380
22423	24714.3285	2203
85099B	13853.4045	2159
47566	14745.447	1727
20725	5278.0965	1639
84879	8843.9595	1502
22720	5612.016	1477
22197	7648.1205	1476
21212	3158.958	1385
20727	3332.8515	1350
22383	3347.796	1348
22457	4199.304	1280
23203	6148.707	1267
POST	9934.596	1256
22386	6242.949	1251
22469	4784.9775	1239
22960	5417.4135	1229

Stockcode DOT has the highest profit when compared to other products

This table highlights the stock codes that generated the highest estimated profit. Among all products, **Stock Code 85123A** shows the **highest total estimated profit**, indicating it is one of the most valuable contributors to overall profitability. The table helps identify which products consistently deliver strong margins and can guide decisions on inventory focus, pricing, or promotional strategies.

Recommendations:

Based on the analysis of product performance, return patterns, seasonal demand, and profit-generating stock codes, the following recommendations are proposed to improve inventory management, sales strategy, and operational efficiency:

- The highest-selling items (e.g., **T-Light Holders, Retrospot Cake Cases, Jumbo Bags)** should be prioritized in stock planning. Increasing inventory during high-demand periods, promoting these products more prominently, and introducing product variations can significantly boost revenue. Small, strategic price adjustments could also be applied without harming demand.

- Products with high return volumes—particularly those marked as ***DAMAGED*****,** ***MISSING*****, or** ***THROWN AWAY***—require closer examination. **Improvements in packaging quality, warehouse handling, and supplier quality checks** can reduce losses. For consistently problematic items, discontinuation or redesign may be necessary.

- Sales trends reveal strong seasonality, with **demand rising from September and peaking sharply in November.** To capitalize on this, inventory replenishment, marketing campaigns, and workforce allocation should be scheduled in advance. Implementing **holiday bundles and optimizing stock levels** can prevent December shortages.

- Stock codes such as **DOT**, which generate the highest profit, should receive focused attention in **procurement and promotions**. Expanding similar product lines and applying dynamic pricing strategies can further increase profitability while reducing reliance on low-margin items.

- Better forecasting models, return reason tracking, and warehouse accuracy checks can enhance overall efficiency. This ensures that the business responds quickly to **changing demand, minimizes waste, and allocates resources** more effectively.