Product Return & Warranty Performance Report

This presentation summarizes the analysis of product returns, refund performance, vendor reliability, and warranty claim efficiency for a consumer electronics company.

Objective:

Identify key areas for improvement in product quality, vendor performance, and after-sales service efficiency.

Analysis Goals: Identifying Performance Bottlenecks

The primary goal of this project was to provide clear, data-driven insights into the performance of our products and vendors post-sale.

High Return Products

Identify products and categories with the highest return percentages.

Vendor Quality Issues

Pinpoint vendors with consistent product quality and reliability issues.

Warranty Claim Efficiency

Analyze warranty claim approval rates and service delays.

Overall After-Sales Performance

Evaluate overall refund and after-sales service performance metrics.

Tools and Technologies Utilized

A robust set of tools was employed for data handling, modeling, and visualization to ensure accurate and actionable reporting.

Data Cleaning	Microsoft Excel
Database	SQL Server
Visualization	Power BI Desktop
Data Modeling	Star Schema
Scripting Languages	SQL, DAX
Reporting	Power BI Interactive Dashboard (4 pages)

The analysis leveraged a dataset containing realistic, slightly dirty data to demonstrate comprehensive cleaning and data handling skills.

Data Preparation: Cleaning and Transformation

Initial data cleaning in Excel was followed by further transformation in SQL to ensure data integrity and consistency across all tables.

Excel Cleaning Steps

- Trim & Proper: Cleaned spaces and corrected capitalization (TRIM(), PROPER()).
- Removed Duplicates: Ensured unique Product_ID and Sale_ID records.
- Handle Missing Data: Replaced missing Customer_ID with “Unknown”; blank Refund_Amount set to o.
- Fix Dates: Standardized all date fields to YYYY-MM-DD.
- Standardize Columns: Unified naming conventions (Claim_Status, Return_Reason).
- Derived Columns: Added Return_Month, Claim_Month, and Is_Warranty_Claimed for trend analysis.

SQL Transformation

Further cleaning was performed using SQL scripts to maintain data integrity:

```
UPDATE Products
SET Product_Name = LTRIM(RTRIM(Product_Name));
UPDATE Returns
SET Refund_Amount = ABS(Refund_Amount);
UPDATE Warranty_Claims
SET Claim_Status = CASE
 WHEN LOWER(Claim_Status) LIKE 'approve%' THEN 'Approved'
 WHEN LOWER(Claim_Status) LIKE 'reject%' THEN 'Rejected'
 ELSE 'Pending'
END;
```

Data Model and DAX Measures

A Star Schema model was implemented in Power BI, ensuring clean data flow and avoiding complex many-to-many relationships. This structure supports robust KPI calculation using DAX.

Star Schema Model

The model structure connects dimension tables (Vendors, Products) to fact tables (Sales, Warranty_Claims, vw_Returns_Joined) using 1-to-many relationships and single-direction filters.

Key DAX Measures

Return Rate %

Calculated as: DIVIDE([Total Returns], [Total Sales], 0) * 100

Approval Rate %

Calculated as: DIVIDE([Approved Claims], [Total Warranty Claims], 0) * 100

Average Processing Days

Calculated as: AVERAGE(Warranty_Claims[Processing_Time_Days])

Executive Overview: Key Performance Indicators

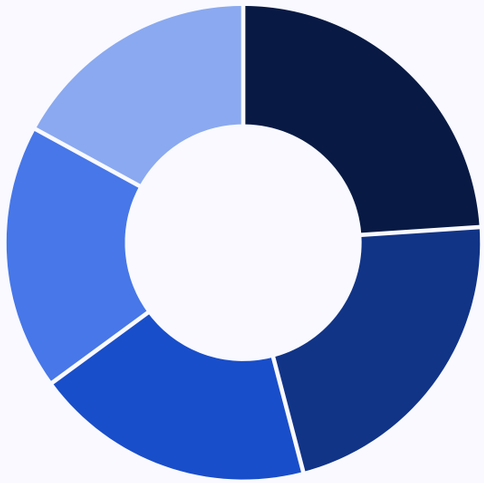
The Executive Overview page provides a high-level summary of overall after-sales performance, highlighting total volume and efficiency metrics.

Initial insights show a significant 30% return rate and a low claim approval rate, suggesting immediate areas for management focus.

Return Analysis: Products and Reasons

Detailed analysis reveals which product categories drive the highest returns and the average financial impact of these returns.

Top Return Categories



Dishwasher
Washing Machine
Microwave
Refrigerator
Air Conditioner

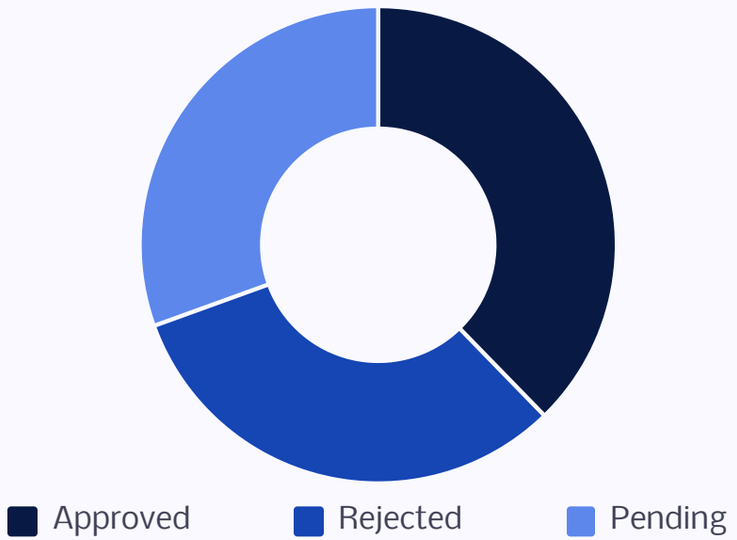
Key Insights

- Highest returns come from **Dishwasher (24%)** and **Washing Machine (22%)** categories.
- Average refund value is **₹27,730** per returned item.
- Return peaks occur in **April (35)** and **August (34)**.
- Top returning products include Dryease 1.5T (35% return rate) and Coolbreeze 260L (35% return rate).

Warranty Claim Efficiency and Bottlenecks

The warranty insights page focuses on claim status, processing times, and seasonal trends, revealing a low approval rate and high volume during holiday sales.

Claim Status Breakdown



Performance Metrics

1

Low Approval Rate

Claim Approval Rate is 37.75%, indicating significant scope for operational improvement in claim processing.

2

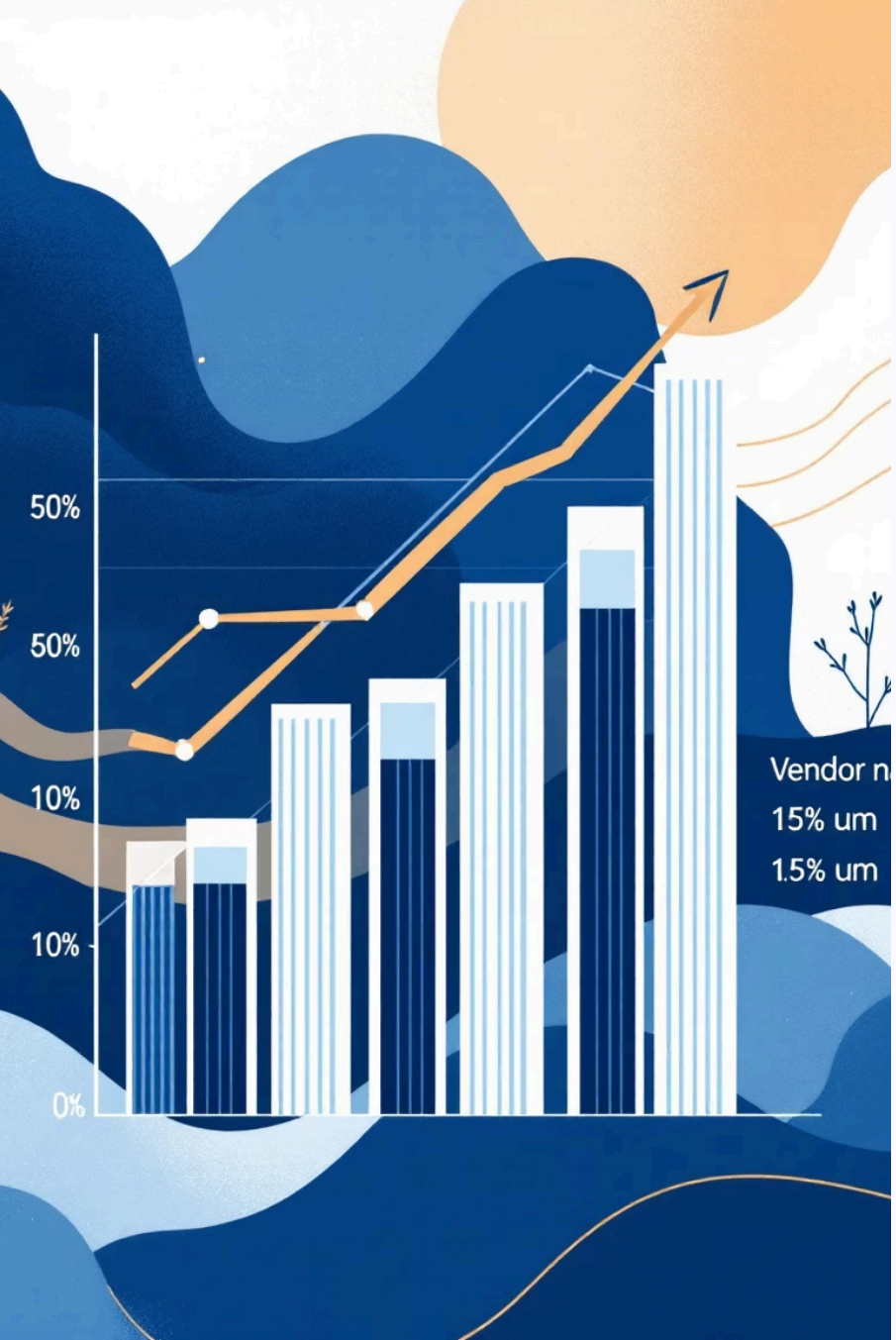
Processing Time

Average processing time is 11 days, with minimal variation across product categories.

3

Seasonal Peaks

Most claims are filed in October, November and December, likely due to the holiday sale spike.



Vendor Performance Overview

Vendor analysis links supplier quality to after-sales performance, identifying specific partners contributing to high return rates.

Highest Return Vendor

Vendor WashWorld Ltd recorded the highest return rate at **37%**, closely followed by FreshTech Supplies (36%).

Rating vs. Performance

Despite an average vendor rating of 4.10, some vendors exhibit poor after-sales performance, suggesting a disconnect between initial rating and long-term quality.

Financial Impact

Refund values average around ₹27.7K per product return, emphasizing the financial cost of poor vendor quality.

Summary of Key Insights and Business Impact

This analysis provides clear visibility into financial losses, vendor issues, and efficiency bottlenecks, enabling actionable measures for improvement.

Product Quality Review

Focus on top-return items (Dishwashers, Washing Machines) to reduce the 30% return rate.

Vendor Re-evaluation

Re-evaluate WashWorld Ltd and FreshTech Supplies based on their high return percentages.

Streamlined Warranty

Improve the low 37.75% approval rate and address the 11-day average processing time.

Customer Experience

Address top return reasons: Defective Item, Late Delivery, and Wrong Product.

Deliverables include the cleaned Excel/SQL data, the 4-page Power BI dashboard, and all DAX measures for ongoing monitoring.