

# Inventory Analytics Report:

## The problem

In this case study, you will use a dataset from a company called WarmeHands Incorporated. The task is to analyse the inventory data and give some insights into which would be the best items for renewing or increasing inventory. Inventory analysis is a management technique that can help you optimize inventory control. For instance, it can help you reduce storage expenses, item costs, and unused goods and to increase profit. There are many ways to do inventory analysis, but for this case study a basic approach will be used.

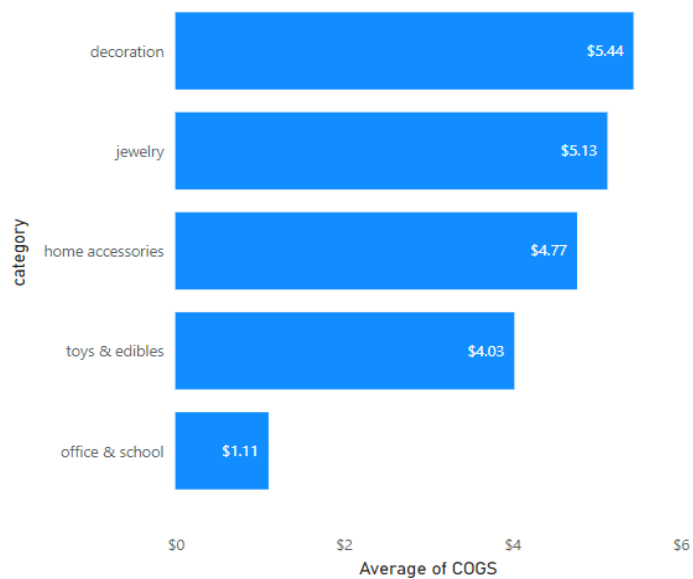
## Analytical Approach

After some initial cleaning tasks, we will be creating some metrics. First, we will start calculating the cost of goods sold (COGS) to get an initial insight and make way for the future calculations. COGS is the sum of costs for manufacturing or acquisition of items excluding selling, delivery of goods and marketing.

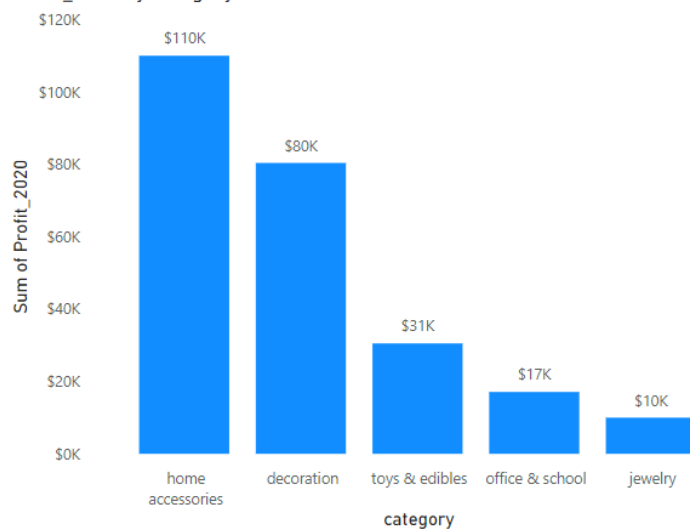
Next our task is to explore initial revenue and profit values obtained from sales in 2020.

1. **Revenue\_2020:** This metric represents the total income generated from sales during the year 2020. It is calculated by multiplying the number of units sold in 2020 by their respective retail price. Revenue\_2020 indicates the overall financial performance of the company in terms of sales volume and pricing strategy for the specified period.
2. **Profit\_2020:** This metric signifies the net earnings gained from sales activities in the year 2020 after accounting for the cost of goods sold (COGS). It is calculated by deducting the total cost of goods sold from the total revenue generated. Profit\_2020 provides insights into the profitability of the company's operations during the specified timeframe, considering both sales revenue and the associated costs of production or procurement.

Average of COGS by category



Profit\_2020 by category



- Decoration stood out with the highest average COGS at \$5.44, reflecting the relatively higher production or procurement expenses associated with this category.
- This figure represents a substantial 391.11% increase compared to the category with the lowest average COGS, office & school, which recorded \$1.108.
- The significant disparity in average COGS between decoration and office & school underscores the varying cost dynamics across product categories.
- Home accessories emerged as the most profitable category with a sum of profit totalling \$110,007.48. Notably, home accessories accounted for a

substantial portion of the total profit at 44.36%, indicating its strong contribution to the company's financial performance.

### **Preliminary insights**

There are 104 items within five categories, for which decoration and jewelry categories have the highest average costs of goods sold per item of around five dollars. Home and accessories had the largest profit in 2020, reaching an amount of up to \$110,000. Finally, the item "Grow a flytrap or sunflower" is a top seller with more than 16,000 items sold. To further investigate the data, we will use more elaborate calculations and methods for inventory analysis like calculating the average inventory and inventory turnover metrics and performing ABC analysis.

### **Average inventory and turnover**

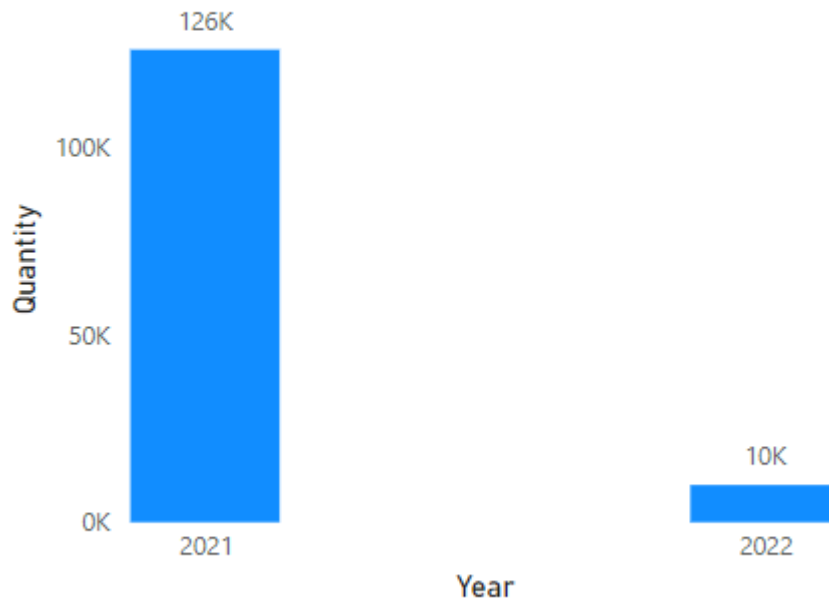
The average value of inventory is often used to know the value of an item during a specific period that accounts for seasonal fluctuations. It is calculated as the average of the total cost at the start and end of a particular period. Inventory turnover is an efficiency ratio that shows how often a company uses its supply of goods during a given period. It can be calculated by dividing COGS over the average value of inventory.

### **ABC analysis**

ABC analysis is a technique that helps you prioritize inventory management by classifying your items into three categories: A, B, and C. You can do ABC analysis in four steps. First, you need information on the revenue of your items; then, you calculate the percentage they represent from the total revenue. Once you have the percentages, you must sort the column in descending order to allow the computation of a cumulative increase. Finally, you classify the items according to a rule of how much they cover of total revenue. A items will cover up to seventy percent of total revenue, B items will cover the following twenty percent, and C items will represent the remaining percentage.

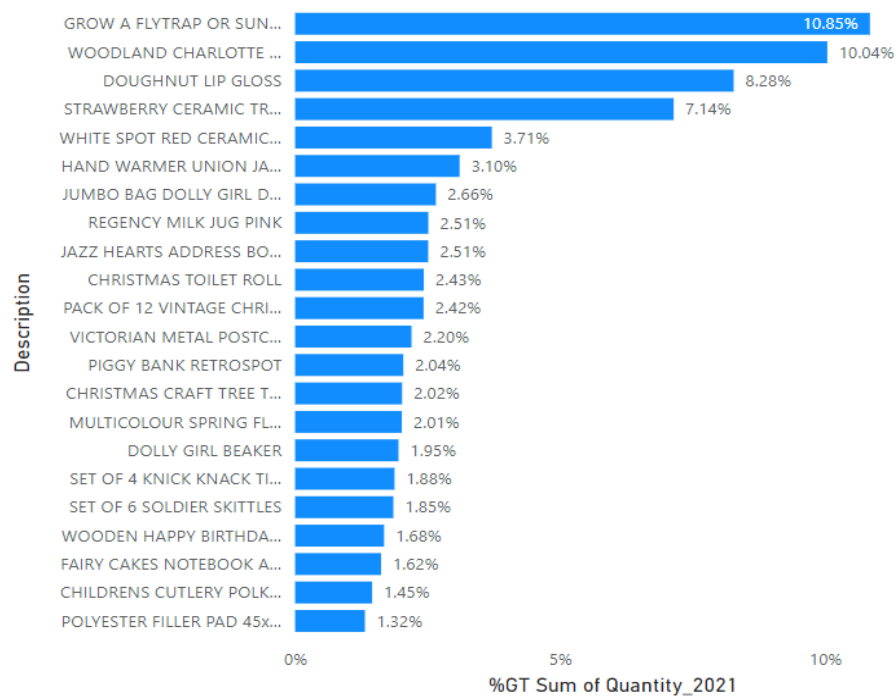
We will be calculating the total number of items sold in 2021 and 2022 for each item.

## Quantity by Year



Quantity for 2021 (125860) was higher than 2022 (9927). 2021 accounted for 92.69% of Quantity. 2021 had 125860 Quantity and 2022 had 9927.

## Distribution of Items by Quantity Percentage of Total in 2021



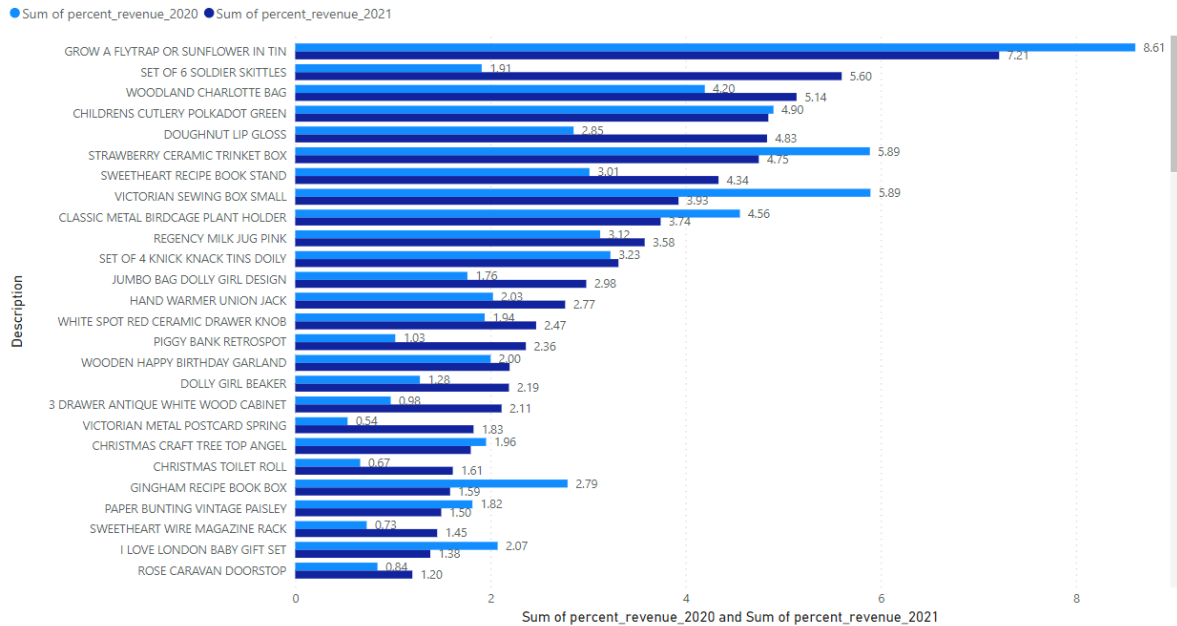
“Grow a Flytrap or Sunflower in Tin” is the most sold item of 2021 , and it accounts for the 10.85 % of total amount of inventory.

The company wants to know how often they sold their products during 2021. Our task is to analyse this issue using Inventory Turnover. For that we have added a column 2021Endstock that shows the inventory stock at the end of 2021. This will be calculated using the difference between the quantity of item sold at start of 2021 and the quantity of items sold for the same year. Next we will be calculating the average value of inventory. Average inventory can be calculated by summing the total item costs at the start of 2021 with the total cost at the end of 2021 and dividing the result by two. A higher average inventory may indicate a higher investment in inventory, potentially tying up more capital, while a lower average inventory suggests efficient inventory management practices.

Next is calculating the Inventory Turnover. **Inventory Turnover** measures the efficiency with which a company manages its inventory by assessing how quickly inventory is sold and replaced within a given period, in this case, 2021. It is calculated by dividing the cost of goods sold (COGS) by the average inventory level. A higher inventory turnover ratio indicates that the company is selling its inventory quickly relative to its average inventory level, which is generally viewed as favourable. Conversely, a lower inventory turnover ratio may indicate overstocking, slow sales, or inefficient inventory management practices, which could tie up capital and lead to increased carrying costs.

Next task is to compare the performances of 2020 and 2021. We need to compute the revenue and its percentage of the grand total for each item. So we have calculated revenue in 2021 and the percentage of total revenue attribute to each item in years 2020 and 2021 respectively. ie the percent should be the revenue of each item divided by the total revenue of the year.

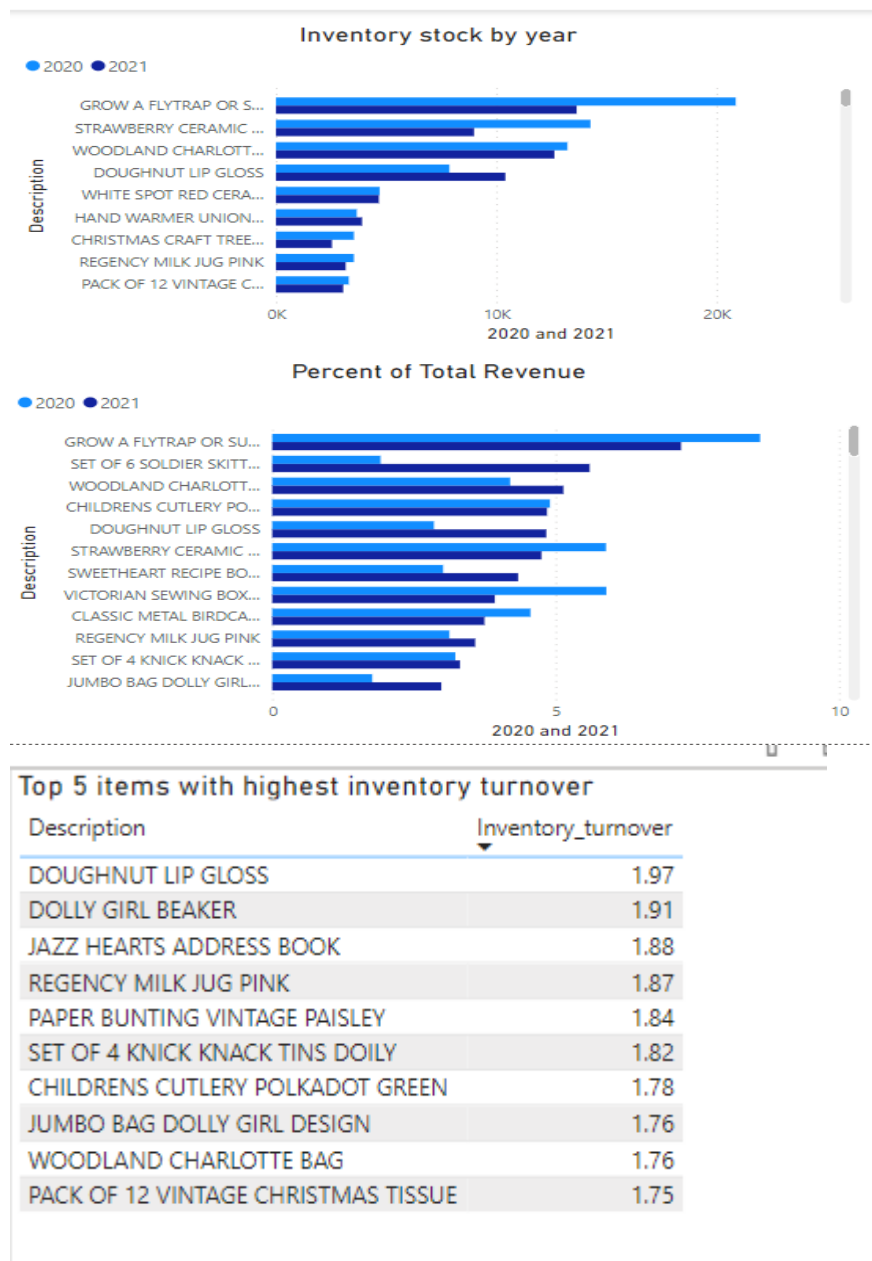
Comparison of Product Revenue Percentage: 2020 vs. 2021



Among the top 10 items with high percent of total revenue , “The Set of 6 Soldier Skittles” seemed to have grown massive in sales where the revenue percentage in 2021 were 3.69 higher than that of 2020. “GROW A FLYTRAP OR SUNFLOWER IN TIN” accounted for highest percentage revenue of 8.61% in 2020. PINK CRYSTAL GUITAR PHONE CHARM, accounts for the percent revenue in 2020.

Next task is to give an idea to the client which are the most important items sold. For this purpose we implement ABC analysis technique. We have calculate the cumulative increase in revenue over the sorted percentage revenue of 2021 in descending order. Then we classified the cumulative revenue up to 70% as A[High value], from 70 to 90 as B[medium value] and from 90 onwards as C(low value).

Description	Revenue_2021	percent_revenue_2021	ABC_class
3 DRAWER ANTIQUE WHITE WOOD CABINET	\$9,883.44	2.11	A [High Value]
CHILDRENS CUTLERY POLKADOT GREEN	\$22,661.31	4.85	A [High Value]
CLASSIC METAL BIRDCAGE PLANT HOLDER	\$17,503.16	3.74	A [High Value]
DOLLY GIRL BEAKER	\$10,237.35	2.19	A [High Value]
DOUGHNUT LIP GLOSS	\$22,600.55	4.83	A [High Value]
GROW A FLYTRAP OR SUNFLOWER IN TIN	\$33,717.97	7.21	A [High Value]
HAND WARMER UNION JACK	\$12,928.86	2.77	A [High Value]
JUMBO BAG DOLLY GIRL DESIGN	\$13,940.31	2.98	A [High Value]
PIGGY BANK RETROSPOT	\$11,046.70	2.36	A [High Value]
REGENCY MILK JUG PINK	\$16,737.56	3.58	A [High Value]
SET OF 4 KNICK KNACK TINS DOILY	\$15,481.60	3.31	A [High Value]
SET OF 6 SOLDIER SKITTLES	\$26,176.26	5.60	A [High Value]
STRAWBERRY CERAMIC TRINKET BOX	\$22,205.30	4.75	A [High Value]
SWEETHEART RECIPE BOOK STAND	\$20,275.92	4.34	A [High Value]
VICTORIAN SEWING BOX SMALL	\$18,360.40	3.93	A [High Value]
WHITE SPOT RED CERAMIC DRAWER KNOB	\$11,539.84	2.47	A [High Value]
WOODEN HAPPY BIRTHDAY GARLAND	\$10,269.18	2.20	A [High Value]
WOODLAND CHARLOTTE BAG	\$24,014.10	5.14	A [High Value]
ASSORTED TOFFEE CHOCOLATE	\$3,375.50	0.72	B [Medium Value]
CHRISTMAS CRAFT TREE TOP ANGEL	\$8,407.40	1.80	B [Medium Value]
CHRISTMAS TOILET ROLL	\$7,548.32	1.61	B [Medium Value]
DOILEY STORAGE TIN	\$5,229.32	1.12	B [Medium Value]
GINGHAM RECIPE BOOK BOX	\$7,418.72	1.59	B [Medium Value]
I LOVE LONDON BABY GIFT SET	\$6,469.80	1.38	B [Medium Value]
JIGSAW TREE WITH BIRDHOUSE	\$5,062.32	1.08	B [Medium Value]
MA CAMPAGNE CUTLERY BOX	\$3,310.56	0.71	B [Medium Value]
PACK OF 12 VINTAGE CHRISTMAS TISSUE	\$3,813.75	0.82	B [Medium Value]
<b>Total</b>	<b>\$4,67,486.81</b>	<b>100.00</b>	



- “Doughnut lip gloss” has shown quite a large increase in sales from 2020 to 2021 compared with others and also the one with the highest inventory turnover meaning that it is ordered way more than the average. High-value items, classified as “A [High Value],” account for a significant portion of the total revenue in 2021. There is a wide range of revenue generated by individual items, with some high-performing items contributing significantly more to the total revenue compared to others. Certain high-value items, such as “GROW A FLYTRAP OR SUNFLOWER IN TIN”(7.21% of total revenue) and “SET OF 6 SOLDIER SKITTLES,” (5.6%)and “WOODLAND CHARLOTTE BAG”(5.14%) stand out as top revenue generators, indicating strong customer demand or effective pricing strategies. “CHRISTMAS CRAFT TREE TOP ANGEL (1.80%) “PAPER BUNTING VINTAGE PAISLEY” (1.50%) “VICTORIAN METAL POSTCARD SPRING” are the top 3 contributors to the



revenue from the B class. we can consider discontinuing items that fall into Class C [Low Value] and have relatively low revenue.

Here are some candidates for discontinuation:

- BLACK MEDIUM GLASS CAKE STAND - Revenue: \$101.83 (0.02% of total revenue)
- BLUE WIRE SPIRAL CANDLE HOLDER - Revenue: \$67.62 (0.01% of total revenue)
- FRENCH BLUE METAL DOOR SIGN 2 - Revenue: \$792.37 (0.17% of total revenue)
- GREEN DROP EARRINGS W BEAD CLUSTER - Revenue: \$59.29 (0.01% of total revenue)
- MOROCCAN BEATEN METAL DISH LARGE - Revenue: \$168.12 (0.04% of total revenue)

These items have relatively low revenue contributions and may not justify the costs associated with their maintenance, storage, and marketing.

Discontinuing them could help streamline the product assortment and allocate resources more efficiently toward higher-performing items. However, it's essential to consider factors such as customer demand, seasonality, and potential impact on overall product mix before making any final decisions on discontinuation.

Preliminary analysis summary:

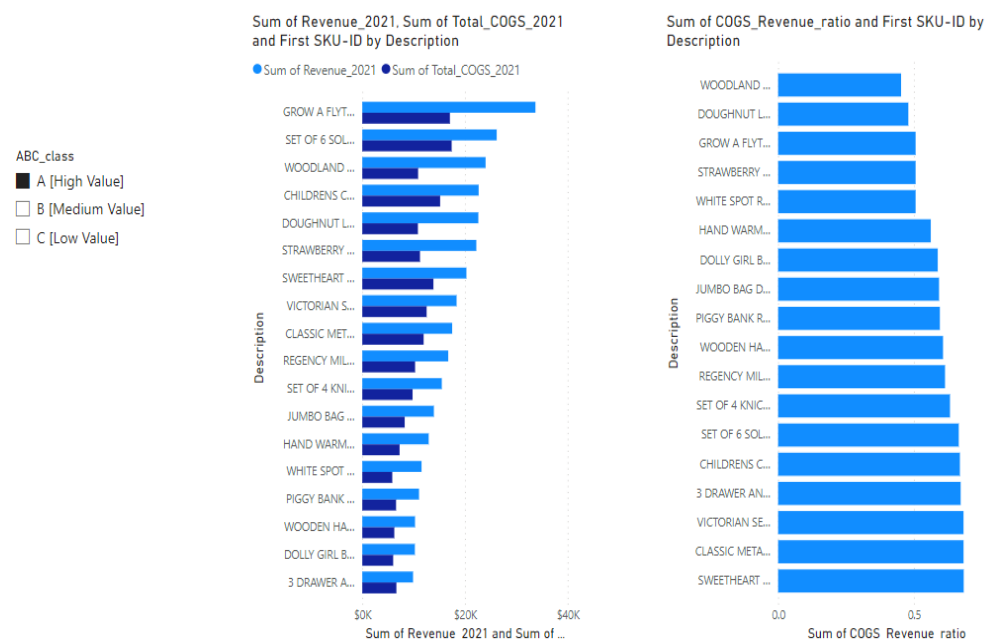
First, let's recall what you have found so far with your analysis. You have found that the item "Grow a flytrap" has more sales, but the inventory turnover shows that "Doughnut lip gloss" sells faster. When comparing 2020 and 2021, we saw that the "Set of 6 soldier skittles" increased more in sales. And finally, the ABC analysis shows that besides their differences, all three items belong to class A, a small group that covers up to seventy percent of total revenue.

The Management team said they wanted to know what items would be best for renewing or increasing inventory while also having an idea of the influence of the categories and countries. So we will have to make sure these business requests are considered.

### **Smart purchasing:**

The client wants to know when purchasing new stock if there is a relation between the COGS, the amount of sales and revenue. Task is to use the best category and COGS to revenue ratio to guide the logistics department when purchasing new stock. We need a total amount to compare COGS. We will be getting total cogs amount by multiplying the quantity with COGS. Next will be

creating a COGS metric which determines a proportion of total COGS over the revenue for 2021.

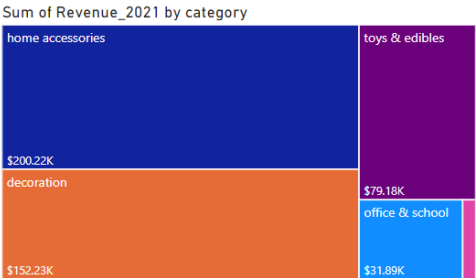
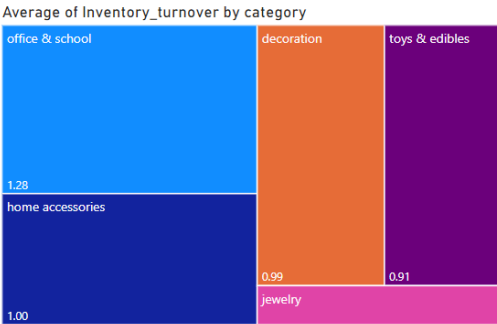
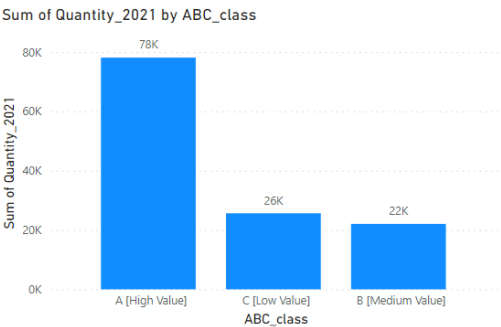


Description	Sum of COGS_Revenue_ratio	First SKU-ID
WOODLAND CHARLOTTE BAG	0.45	20719
DOUGHNUT LIP GLOSS	0.48	23077
GROW A FLYTRAP OR SUNFLOWER IN TIN	0.51	22693
STRAWBERRY CERAMIC TRINKET BOX	0.51	21232
WHITE SPOT RED CERAMIC DRAWER KNOB	0.51	21672
HAND WARMER UNION JACK	0.56	22633
DOLLY GIRL BEAKER	0.59	23345
JUMBO BAG DOLLY GIRL DESIGN	0.59	22663
PIGGY BANK RETROSPOT	0.60	22637
WOODEN HAPPY BIRTHDAY GARLAND	0.61	21380
REGENCY MILK JUG PINK	0.61	23175
SET OF 4 KNICK KNACK TINS DOILY	0.63	23240
SET OF 6 SOLDIER SKITTLES	0.66	22619
CHILDRENS CUTLERY POLKADOT GREEN	0.67	84997a
3 DRAWER ANTIQUE WHITE WOOD CABINET	0.67	82486
VICTORIAN SEWING BOX SMALL	0.68	21259
CLASSIC METAL BIRDCAGE PLANT HOLDER	0.68	21340
SWEETHEART RECIPE BOOK STAND	0.68	22795
<b>Total</b>	<b>10.70</b>	<b>20719</b>

A low COGS to revenue ratio indicates that the item generates more profit since it has low cost compared to its selling price. This insight can help the company to increase the inventory stock on “Woodland Charlotte Bag” to increase its profit.

# Inspecting Categories:

Now we will evaluate metrics in different categories. We will display the categories by revenue and inventory turnover to evaluate which category is less important to the client in redefining new items.



category	Average of Inventory_turnover
decoration	0.99
home accessories	1.00
jewelry	0.29
office & school	1.28
toys & edibles	0.91
<b>Total</b>	<b>0.94</b>

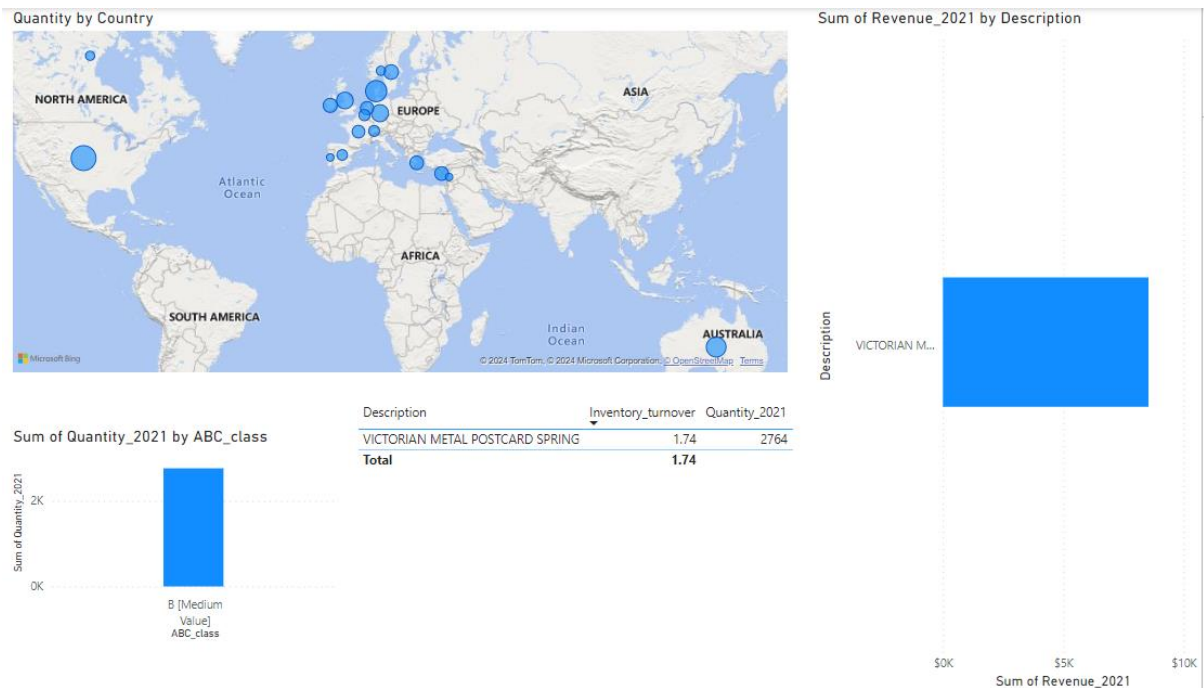
category	Sum of Revenue_2021
home accessories	\$2,00,219.44
decoration	\$1,52,229.83
toys & edibles	\$79,184.32
office & school	\$31,885.75
jewelry	\$3,967.47
<b>Total</b>	<b>\$4,67,486.81</b>

category	ABC_class
decoration	A [High Value]
decoration	B [Medium Value]
decoration	C [Low Value]
home accessories	A [High Value]
home accessories	B [Medium Value]
home accessories	C [Low Value]
jewelry	C [Low Value]
office & school	B [Medium Value]
office & school	C [Low Value]
toys & edibles	A [High Value]
toys & edibles	B [Medium Value]
toys & edibles	C [Low Value]

From the above visuals, we can infer that jewelry contributes to the lowest revenue in 2021 and also it has no representation in High Value/Medium Value items. So its recommended to reconsider this category.

## Control Decisions:

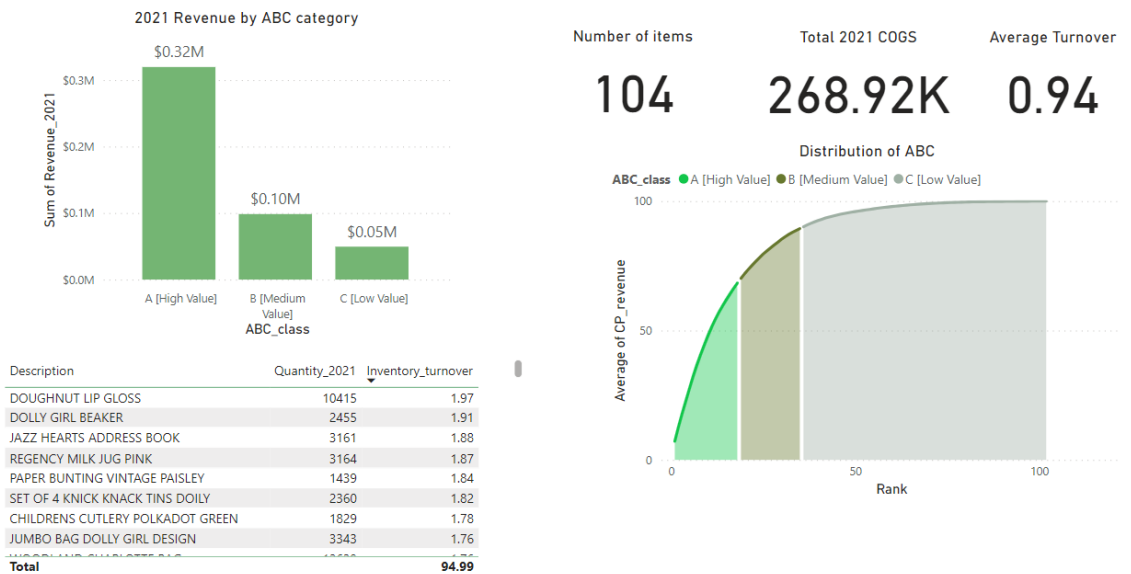
Next task is to find an interesting information on a medium class item and identify its top buyer country.



Victorian metal postcard spring has a high inventory turnover for having such a small revenue. The number of units ordered is also low. Perhaps this item could have had better success with more inventory at its disposal. Denmark makes most of the orders for this item.

**Management solutions**

We need to explain the ABC classes better while creating an impact to show how much revenue good items cover. Our task is to create a dashboard containing information about revenue, COGS and graphical representation of how much the classes cover total revenue.



From the visuals, we can infer that class A and class B items have similar turn over which means they sell almost equally fast, but class A items have large amount of stock that results in big revenue. So it would be good to consider increasing class B item's stock since class A items have 3 times more stock and have a slightly closer average turnover rate.

## Summary:

### Approach Used:

The inventory analytics report for WarmeHands Incorporated begins with an initial data cleaning phase followed by the calculation of key metrics such as Cost of Goods Sold (COGS), Revenue\_2020, and Profit\_2020. These metrics provide insights into the financial performance of the company in 2020.

Further analysis involves exploring average COGS per item, revenue, and profit by category, highlighting significant variations between categories. Preliminary insights reveal the top-selling items, such as "Grow a Flytrap or Sunflower," and the most profitable categories, like Home Accessories.

The report then delves into more detailed calculations, including average inventory, inventory turnover, and ABC analysis. Average inventory and turnover metrics provide insights into inventory management efficiency, while ABC analysis classifies items based on their revenue contribution.

A comparison between 2020 and 2021 performances reveals shifts in revenue percentages for top-selling items, such as "The Set of 6 Soldier Skittles," indicating changes in consumer preferences or market conditions.

The ABC analysis suggests discontinuing low-value items to streamline the product assortment and allocate resources more efficiently. Additionally,

insights from COGS to revenue ratio analysis help guide purchasing decisions, recommending increasing inventory for high-profit items like "Woodland Charlotte Bag."

### **Insights:**

1. **Item Performance:** "Grow a Flytrap or Sunflower" emerges as the top-selling item in 2021, while "Doughnut Lip Gloss" exhibits the highest inventory turnover, indicating rapid sales.
2. **Year-on-Year Performance:** The comparison between 2020 and 2021 performances reveals shifts in revenue percentages for top-selling items, indicating changing consumer preferences.
3. **ABC Analysis:** Class A items contribute significantly more to total revenue compared to other classes, suggesting the importance of focusing on high-value items for inventory management.
4. **Category Analysis:** Jewelry category contributes the lowest revenue in 2021 and is absent from high-value or medium-value items, suggesting a need for reconsideration.
5. **Control Decisions:** Items like "Victorian Metal Postcard Spring" exhibit high inventory turnover but low revenue, indicating potential for increased sales with better inventory management.

### **Conclusion and Recommendations:**

The inventory analytics report provides valuable insights into WarmeHands Incorporated's inventory management and performance. Based on the analysis:

1. **Recommendation for Inventory Management:** Prioritize high-value items identified through ABC analysis for inventory management. Streamline inventory by discontinuing low-value items to optimize resources.
2. **Purchasing Decisions:** Utilize insights from COGS to revenue ratio analysis to guide purchasing decisions. Increase inventory for high-profit items like "Woodland Charlotte Bag" to capitalize on profitability.
3. **Category Assessment:** Consider reassessing the jewelry category due to its low revenue contribution and absence from high-value items.
4. **Optimizing Medium-Value Items:** Identify medium-value items with potential for increased sales, such as "Victorian Metal Postcard Spring," and focus on markets like Denmark where demand is high.
5. **Dashboard Creation:** Develop a dashboard showcasing revenue, COGS, and ABC class distributions to facilitate informed decision-making and visualize the impact of inventory management strategies.

Overall, by implementing these recommendations and leveraging insights from the inventory analytics report, WarmeHands Incorporated can enhance

its inventory management practices, optimize profitability, and stay competitive in the market.