VALUE-CHAIN PROJECT
DAT103: BUSINESS INTELLIGENCE & DATA ANALYTICS

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Introduction, Approach and Objective

This is a value chain project on a company's online business sales from 2017-2019. The aim of this project is to create a competitive advantage for the company by enhancing customer satisfaction and loyalty, increasing revenue and profits as well as optimizing inventory management. The realisation of these business outcomes will rely heavily on the action and decision plans, supported by data analysis. The datasets of the company's sales from 2017-2019 will be studied and analysed in order to determine areas of improvement aimed at creating a competitive advantage for the company.

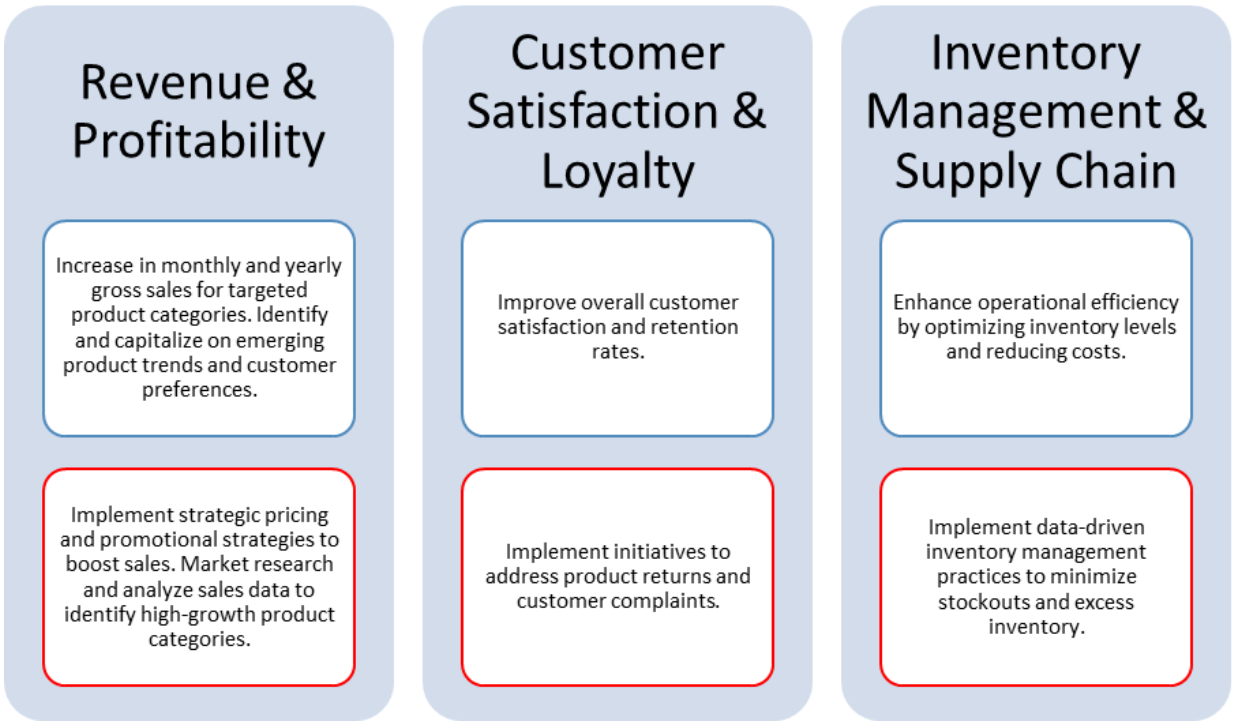
Here's quick overview of datasets:

business.retailsales.csv (referred to as Dataset1) consists of 1767 rows and 6 variables: Product Type, Net Quantity, Gross Sales, Discounts, Returns, Total Net Sales.

business.retailsales2.csv (referred to as Dataset2) consists of 36 rows and 9 variables: Month, Year, Total Order, Gross Sales, Discounts, Returns, Net Sales, Shipping, Total Sales

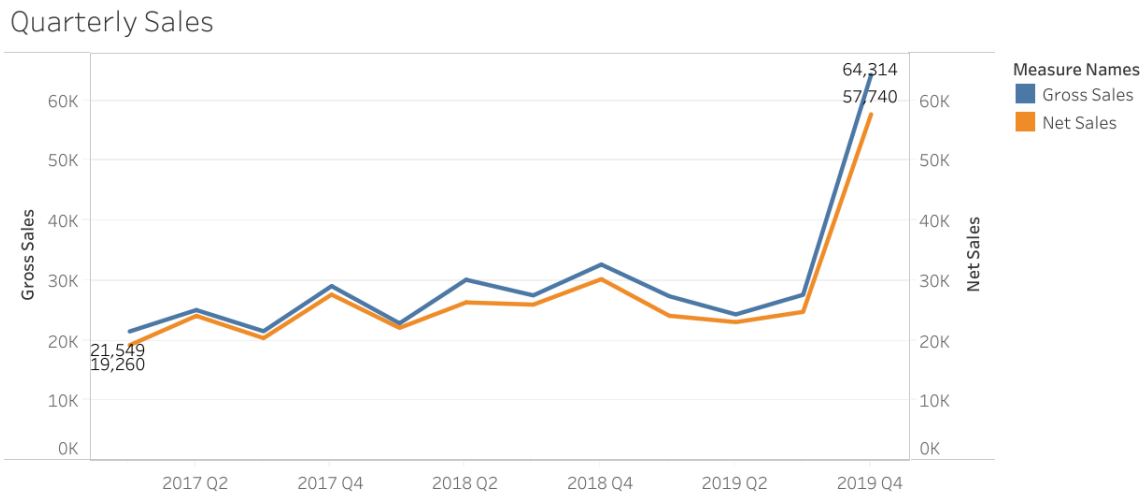
Customer Satisfaction Score.xls consists of 100 rows and 5 variables: customer_id, is_new_customer, satisfaction_score, product_returned

Overview - Business Outcomes Descriptions and Actions



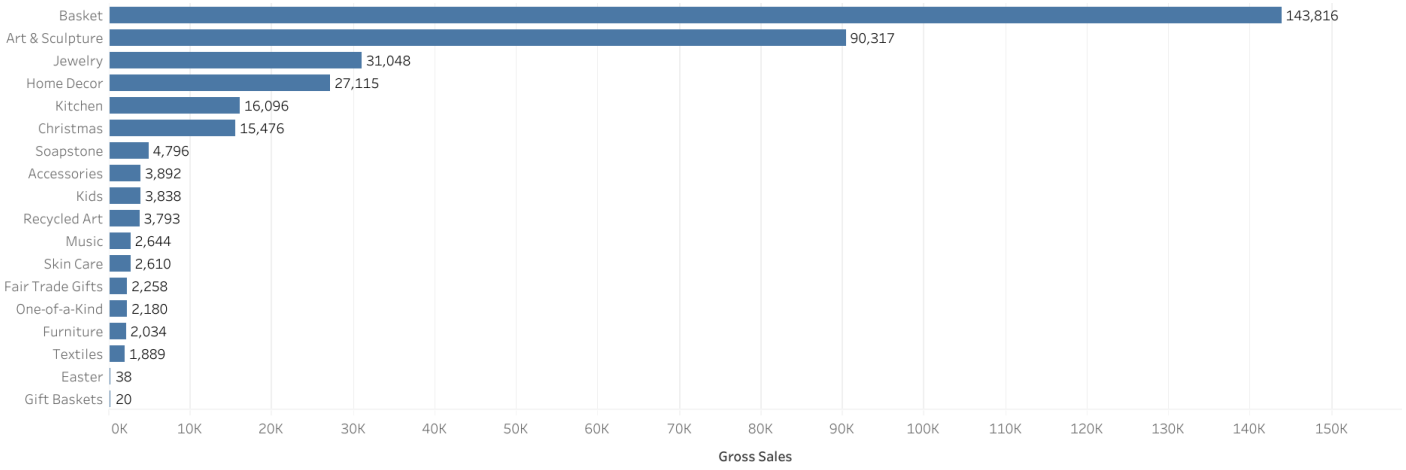
Business Outcome 1: Increase in Revenue and Profitability

The business will aim to achieve a steady increase in monthly and yearly gross sales for targeted product categories.

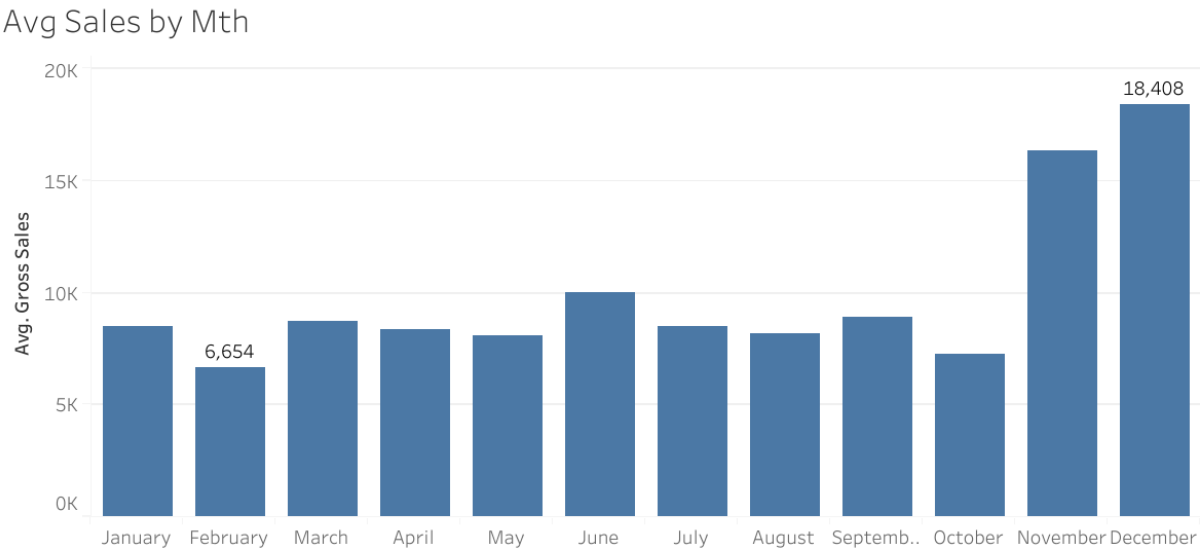


We see year-on-year sales increase for gross sales (16%) and net sales (14%) from 2017 to 2018 and a boost for 2019 of 27% and 24% for gross and net sales respectively. A sharp increase in sales from Q3 to Q4 2019 is likely caused by the pandemic, from customers switching from shopping at brick and mortar to online stores.

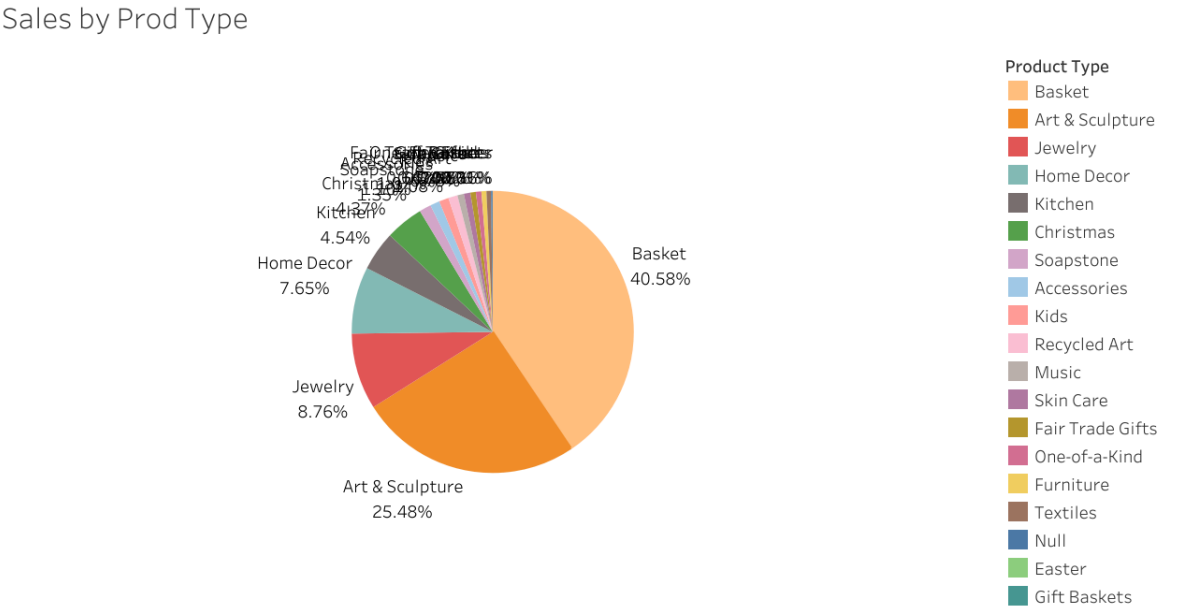
Action plan will be to implement strategic pricing and promotional strategies to boost sales, conduct market research and analyze sales data to identify high-growth product categories. The business will determine optimal discount levels and promotions based on historical data and customer behaviour.



Further analysis of product sales by month will help in planning and gauging effectiveness of seasonal marketing campaigns. These data is available in transactional reports.



We determined there is a seasonality in sales during the year. Holiday period between November and December contributes most to overall yearly sales. On average, February is the lowest performing sales month.

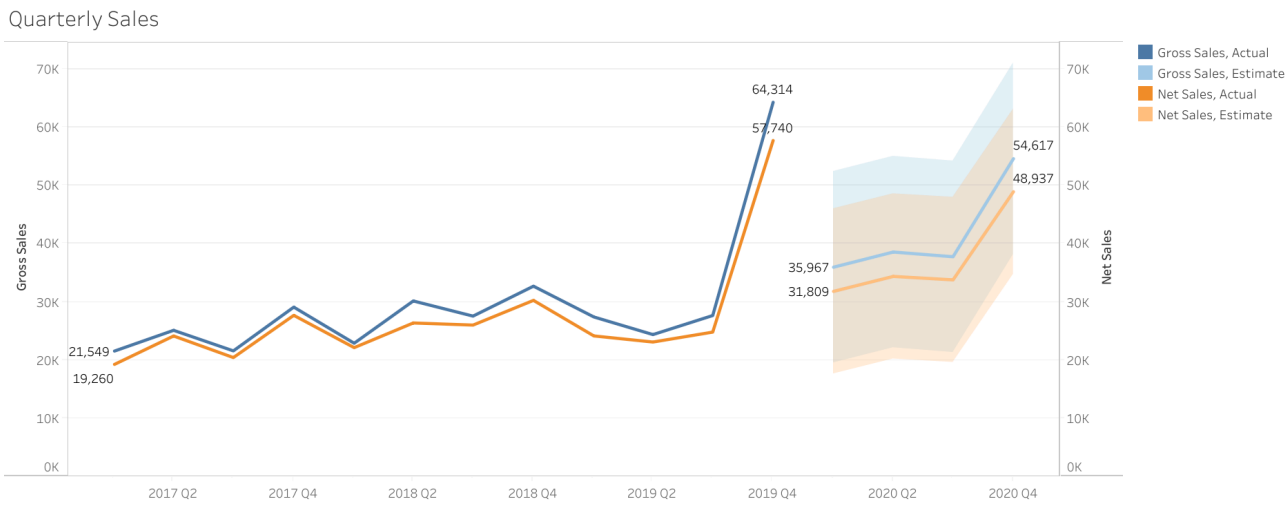


The highest selling product by a wide margin is basket (40.58%). It's interesting to see that the top 6 selling products out of 18, makeup over 90% of sales. From the chart above, it’s clear there is a lack of focus in product offerings. This ties in with inventory management, which will be part of the analysis as well.

What are our growth opportunities? How do we stand out from our competitors from a market visibility standpoint? This can be achieved by analyzing sales performance by product type and geographical region to identify growth opportunities. Market research data and historical sales trends will be used to identify emerging customer preferences and their demand for new products.

Gross Sales and Net Sales Quarterly Forecast

business.retailsales2 Quarter of Mmm-Yy	Abc business.retailsales2 Forecast indicator	Abc business.retailsales2 Measure Names	business.retailsale... Gross Sales	business.retailsale... Net Sales
2020 Q4	Estimate	Net Sales	*Null*	48,936.51
2020 Q3	Estimate	Net Sales	*Null*	33,787.04
2020 Q2	Estimate	Net Sales	*Null*	34,379.07
2020 Q1	Estimate	Net Sales	*Null*	31,808.93
2020 Q4	Estimate	Gross Sales	54,616.70	*Null*
2020 Q3	Estimate	Gross Sales	37,761.95	*Null*
2020 Q2	Estimate	Gross Sales	38,572.61	*Null*
2020 Q1	Estimate	Gross Sales	35,966.67	*Null*



Business Outcome 2: Enhanced Customer Satisfaction and Loyalty

The business will enhance customer satisfaction by encompassing customer needs, observing how the customers use products and creating a holistic visualization of how the products add value to customers in order to better satisfy and meet customer needs.

We will prioritize customer satisfaction by meeting customer needs and improving retention rates.

Measures will be put in place to address customer complaints and product returns.

Historical sales data will be used to determine categories with high return rates, and we will diagnose problem areas and implement corrective measures.

What measures is the business taking to retain customers? Are return rates improving with new customers? We will conduct customer surveys to identify problem areas and rooms for improvement. Create a reward program for long standing and loyal customers.

Descriptive analytics will be used to visualize customer satisfaction trends over a period of time.

Customer Satisfaction Score

Customer feedback will be used to identify problem areas, and products that need enhancement in order to meet customer needs. Customers will be given incentive for responding.

Survey Questions Sample

1. How long (in years) have you been using our products?

2. How likely are you to recommend our products?

3. On a scale of 1 to 5, how satisfied are you with our products?

4. On a scale of 1 to 5, how satisfied are you with our customer service in resolving your issues?

5. Please rate your overall satisfaction with us (company).

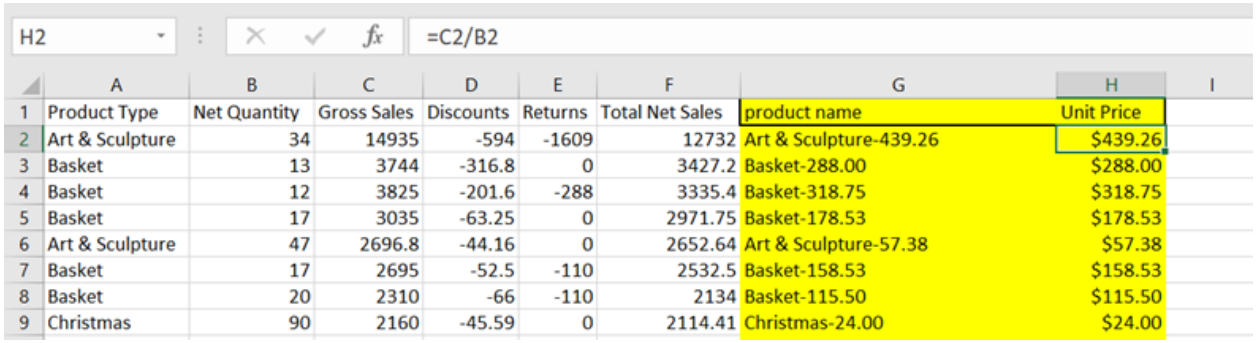
Business Outcome 3: Optimized Inventory Management and Supply Chain Efficiency

This business outcome focuses on enhancing operational efficiency by optimizing inventory levels and reducing costs. This will in return increase the profitability of the business.

We must implement a data driven system of inventory management so that we don't run out of stock for high selling products and do not keep too much of stock for low selling products.

By using analytics and forecasting, we will determine an optimal reorder quantity for various high selling products. We will recommend the business to give steep discounts on low selling inventory to empty the stock on that product and then discontinue them. We will also investigate the returned products to optimize their inventory as well.

As we do not have any information on cost of goods and product name, we did further analysis breakdown of the group by price to create product name and unit price for all the products. Then to determine the high selling products and their optimal order quantity and how often it should be restocked we used pivot tables and charts.



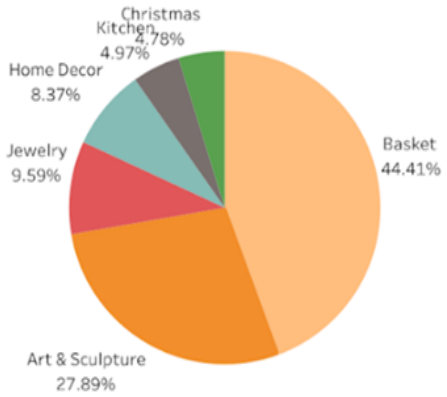
H2 | =C2/B2

	A	B	C	D	E	F	G	H	I
1	Product Type	Net Quantity	Gross Sales	Discounts	Returns	Total Net Sales	product name	Unit Price	
2	Art & Sculpture	34	14935	-594	-1609	12732	Art & Sculpture-439.26	$439.26	
3	Basket	13	3744	-316.8	0	3427.2	Basket-288.00	$288.00	
4	Basket	12	3825	-201.6	-288	3335.4	Basket-318.75	$318.75	
5	Basket	17	3035	-63.25	0	2971.75	Basket-178.53	$178.53	
6	Art & Sculpture	47	2696.8	-44.16	0	2652.64	Art & Sculpture-57.38	$57.38	
7	Basket	17	2695	-52.5	-110	2532.5	Basket-158.53	$158.53	
8	Basket	20	2310	-66	-110	2134	Basket-115.50	$115.50	
9	Christmas	90	2160	-45.59	0	2114.41	Christmas-24.00	$24.00	

Then we used Tableau to visualise which category of product is making the most number of sales and pivot tables to determine specific products in that product category that have the most amount of sales.

If the number of returns for a product is high, there is a chance that the product is not of good quality. There should be a stock inspection for existing inventory of such product and if not found of acceptable quality, the product should be returned back to the vendor commonly referred as Return To Vendor(RTV). The next batch of such product should be inspected thoroughly when received before selling them.

Product quantity breakdown by category



Using prescriptive analysis to optimize supply chain and inventory management, we have decided to reduce the inventory of products with exceptionally low sales volume (i.e. only two or less of product was sold in the last three years) and then discontinue them.

High selling products

product name	Sum of count prd	Sum of Total Net Sales
Jewelry-28.00	2025	4861.7
Basket-175.00	1764	15286.26
Basket-185.00	1681	8917
Basket-110.00	1444	12708.4
Basket-48.00	1369	3468.83
Basket-145.00	1089	5229.5
Art & Sculpture-18.00	729	2825.72
Kitchen-28.00	576	2007.59
Kitchen-18.00	529	1008
Jewelry-48.00	529	8603.31
Jewelry-34.00	484	1764.8
Basket-68.00	441	2449.8
Basket-44.00	441	2324.11
Art & Sculpture-38.00	400	2099
Christmas-18.00	400	2075.78
Basket-125.00	400	3631.25
Basket-116.00	400	5069.2
Basket-58.00	361	1909.2
Basket-28.00	361	1087.48
Art & Sculpture-22.00	361	1675.01

Analyzing all the products, we found that products like jewelry and baskets are sold in very high quantities. Despite that, the jewellery category does not have too much share of gross sales.Increasing the sales price of such a high moving product will result in higher revenue.

Low selling products

product name	Sum of count prd	Sum of Total Net Sales
Basket-128.00	1	128
Accessories-18.88	1	458
Basket-146.11	1	1257.5
Basket-146.67	1	330
Fair Trade Gifts-25.41	1	412.4
Basket-147.86	1	782
Accessories-30.00	1	81
Basket-150.00	1	450
Accessories-34.00	1	34
Basket-155.00	1	155
Accessories-44.80	1	134.4
Basket-158.53	1	2532.5
Art & Sculpture-100.67	1	278.6
Basket-17.00	1	28.8
Art & Sculpture-112.00	1	89.6
Basket-178.53	1	2971.75
Art & Sculpture-115.00	1	115
Basket-188.00	1	564
Art & Sculpture-122.00	1	244
Basket-20.00	1	55
Art & Sculpture-127.60	1	625.6
Basket-204.17	1	1015
Art & Sculpture-141.25	1	565
Basket-210.00	1	210
Art & Sculpture-145.00	1	145
Basket-257.50	1	1030
Art & Sculpture-148.00	1	296
Basket-28.33	1	158.4
Art & Sculpture-15.20	1	74
Basket-28.67	1	77.57
Art & Sculpture-156.00	1	124.8
Basket-29.00	1	52
Art & Sculpture-162.00	1	307.8
Basket-290.00	1	58
Art & Sculpture-168.00	1	336
Basket-293.40	1	1409.4
Art & Sculpture-18.53	1	269.29
Basket-30.00	1	90
Art & Sculpture-20.00	1	40
Basket-307.50	1	410
Art & Sculpture-21.00	1	42
Basket-31.00	1	59.2
Art & Sculpture-22.75	1	86.3
Basket-310.00	1	310

Offering lower selling inventory as free gifts with purchase of certain price value will also result in better inventory management.

We are using the historical sales data and inventory data to forecast the demand of products and also to optimize the procurement.

References & Appendix

https://www.kaggle.com/datasets/tylermorse/retail-business-sales-20172019?select=business.retailsales2.csv