Product Creation Data Analyst Intern

Case Study Results

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01

Anomaly detection

Find and handle anomalies in the data

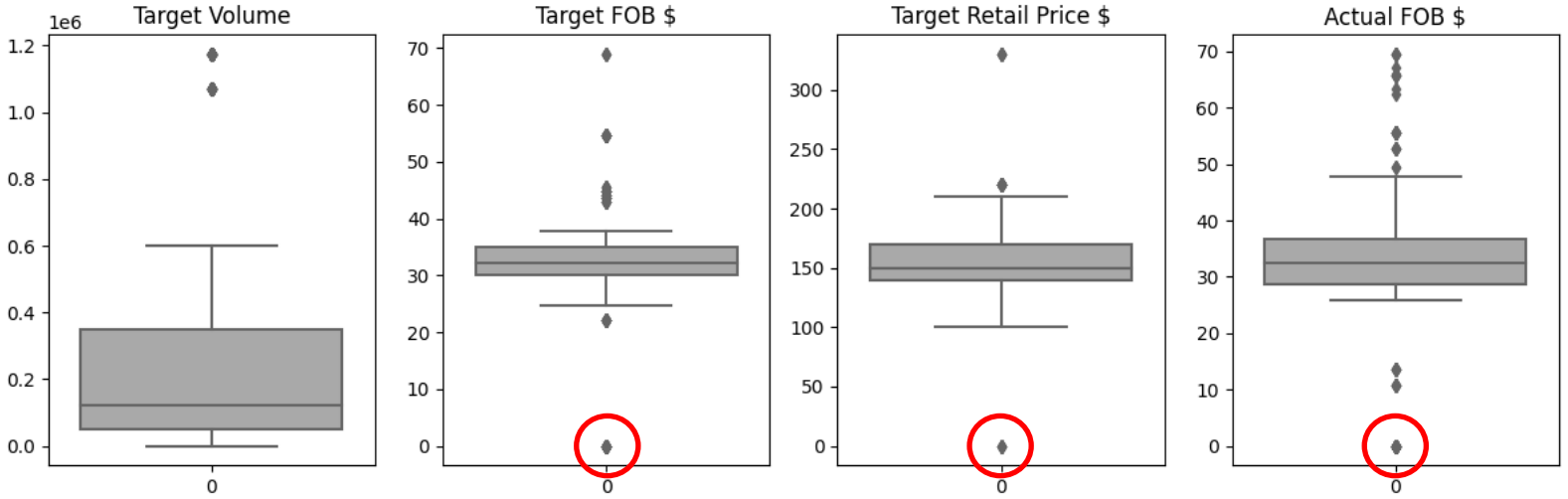
Data set overview

```
Data columns (total 18 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   Season                 933 non-null    object
 1   Gender                 933 non-null    object
 2   Style Name             933 non-null    object
 3   Unique ID              933 non-null    object
 4   Target Volume          933 non-null    int64
 5   Target FOB $           933 non-null    float64
 6   Target Retail Price $  933 non-null    int64
 7   Style Update           911 non-null    object
 8   Vertical               933 non-null    object
 9   Color Update           932 non-null    object
 10  Factory                933 non-null    object
 11  UPPER Cost             933 non-null    float64
 12  Other Cost             933 non-null    float64
 13  BOTTOM Cost            933 non-null    float64
 14  LABOR Cost             933 non-null    float64
 15  OVERHEAD Cost          933 non-null    float64
 16  Tooling Cost           933 non-null    float64
 17  Actual FOB $           933 non-null    float64
```

Data set properties

- 18 dimensions
- Categorial and numerical data
- Some columns have null values

Quantitative data distribution



Anomaly analysis findings

Target volume

- There are some large values, but this might indicate that some shoes are sold in high volume.

Target FOB $

- Some values are large (the Target FOB $ is 68.9), but it's not necessarily an anomaly, since it's likely that it is a premium (Cloud Maxi)
- The 22.1 value is from a Kid's shoe so it's not an outlier
- There are some 0 values in this column, although there shouldn't be any 0 values in this column

Actual FOB $

- It seems odd that a lot of the values are higher than the target values. This might indicate that the costs are higher than expected.
- There are some 0 values, which is not possible (no shoes can be produced for free)
- Some odd values come from the Cloud Amazing shoe (Man/Women) where there are only Other Costs which is strange
    - But most of the time it's a Carry Over, which might introduce fewer costs
    - And for each of these shoes there is a corresponding shoe that has "regular values"
    - All of these outliers come from the same factory (factory 2) which might give a hint as, why the behaviour exists

Target Retail Price $

- Some values are large (target retail price is 330), but it's not an anomaly, since it's likely that it is a premium shoe (Cloud Maxi)
- There are some 0 values, where there shouldn't be any

Consequences

- Removal of all data points where the following columns have 0 values
  - Target FOB $
  - Target Retail Price $
  - Actual FOB $
- Categorial ”None” values can be handled by the group by functions that are being used in the analysis, therefore these data points are kept in the data set

```
Number of data points before anomaly removal: 933
Number of data points after anomaly removal: 872
```

01

Cost analysis

Break down by vertical and factory

Factory	UPPER Cost	Other Cost	BOTTOM Cost	LABOR Cost	OVERHEAD Cost	Tooling Cost	Actual FOB $
Factory 1	8.75	5.60	8.43	5.92	4.53	0.04	33.27
Factory 2	7.56	5.26	8.15	6.21	5.67	0.18	33.03
Factory 3	9.71	7.41	7.63	4.16	3.44	0.01	32.35
Factory 4	9.34	4.69	8.48	5.30	4.59	0.22	32.62
Factory 5	14.40	7.09	9.45	5.11	4.06	0.02	40.12

Factory break down

Vertical	UPPER Cost	Other Cost	BOTTOM Cost	LABOR Cost	OVERHEAD Cost	Tooling Cost	Actual FOB $
Performance All Day	8.99	5.50	7.90	5.26	4.44	0.11	32.19
Performance Outdoor	16.19	7.64	11.61	6.24	3.80	0.05	45.53
Performance Running	9.74	5.95	8.66	5.33	4.46	0.06	34.20

Vertical break down

Other information to understand costs

The cost breakdown already tells a lot how much it costs to produce a specific product and makes it easy to compare the costs between different products. However, in my opinion there could be additional costs that could have an impact on the results of the analysis:

- Material Cost: Additional costs to the upper and bottom part of the shoe, like laces or materials for the shoes
- Packing Costs: All the costs associated with packing of the sneakers to present and protect the product (May include items such as boxes, labels etc.).
- Shipping costs: Costs that account for the transportation and logistics expenses to move the products from the factories to the destination. This might include freight charges or custom duties
- Marketing costs: These are expenses that are related to the promotion and advertising of a product. It may include costs for campaigns, influencers or other marketing activities
- Warranty: Some sneaker might break easier than other and may introduce additional costs to replace the product.

Some of these costs might be included in the Other Costs column, in that case it would be helpful if there would be a more specific break down of this column

02

Margin analysis

Target and actual margin

Margin analysis for different On products

Click on the link above the get the results

Lowest and highest margin

	Style Name	Target Margin per Piece	Actual Margin per Piece
Highest	Cloud Maxi	261.10	263.50
Lowest	Cloudinsane	77.90	74.11

Lowest and highest margin

	Style Name	Target Margin	Actual Margin
Highest	Cloudinfinity	120712001.19	120079403.88
Lowest	Superclouds	939233.33	924275.67

Lowest and highest margin taking target volume into account

Season SS23 margin break down

	Style Name	Target Margin per Piece	Actual Margin per Piece
Highest	Cloud Maxi	261.10	263.50
Lowest	Cloudinsane	77.90	74.11

Lowest and highest margin

	Style Name	Target Margin	Actual Margin
Highest	Cloudinfinity	120593212.42	119739354.39
Lowest	Superclouds	940475.00	922213.50

Lowest and highest margin taking target volume into account

Season FW23 margin break down

	Style Name	Target Margin per Piece	Actual Margin per Piece
Highest	Cloud Maxi	261.10	266.53
Lowest	Cloudcrazy	85.30	82.93

Lowest and highest margin

	Style Name	Target Margin	Actual Margin
Highest	Cloudinfinity	120819990.97	120388539.79
Lowest	Superclouds	936750.00	928400.00

Lowest and highest margin taking target volume into account

03

Implications

Putting the results into context

Steps to increase the margin

1)

Gender	Target Margin Per Piece	Actual Margin Per Piece
Kids	80.366667	76.720000
Men	123.768637	122.394361
Women	122.263342	121.919595
Youth	88.227273	85.304545

When you look at the margin Women's and Men’s shoes have the highest margin. The costs however are similar to the other gender values (Kids, Youth). Therefore On could focus more on the Men’s and Women’s shoes section and reduce the Kids and Youth section products or raise the price in those two sections.

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2)

Factory	UPPER Cost	Other Cost	BOTTOM Cost	LABOR Cost	OVERHEAD Cost	Tooling Cost	Actual FOB $
Factory 1	8.745017	5.604742	8.433814	5.924605	4.530137	0.038041	33.274089
Factory 2	7.558571	5.260952	8.148889	6.211429	5.668889	0.181429	33.029048
Factory 3	9.707820	7.413008	7.626466	4.162180	3.435263	0.006767	32.350752
Factory 4	9.343373	4.688675	8.483655	5.297992	4.594016	0.217229	32.622329
Factory 5	14.400588	7.089706	9.451250	5.108309	4.057868	0.016103	40.121544

Factory	Target Margin Per Piece	Actual Margin Per Piece
Factory 1	119.383488	118.237938
Factory 2	132.291111	135.542381
Factory 3	117.472331	116.972556
Factory 4	118.006494	116.735100
Factory 5	134.834625	132.451985

Factory 2 has the lowest costs from all the factory, which might indicate that more products should be produced at this factory, especially since the margin at those places is high is well. This tells us that at this factory more shoes with high margin can be produced with low costs.

Steps to increase the margin

3)

Vertical	Target Margin Per Piece	Actual Margin Per Piece
Performance All Day	117.174304	116.812734
Performance Outdoor	141.230130	137.327922
Performance Running	125.966912	124.694706

Since Outdoor shoes can be sold with higher margins, On could consider to more extend this branch of it’s shoes

Other relevant overview to understand the business

Style Update	Target Margin Per Piece	Actual Margin Per Piece
CO - Carry Over	121.513034	120.528162
NM - New Material	125.680000	128.317500
NU - New Upper	124.575417	124.875000
TN - Totally New	125.827179	123.670385

When you look more closely at the different style updates it seems odd that 'Carry Over' introduces the highest average costs (Actual FOB $). Intuitively you would expect that using new materials, new upper parts and creating a totally new shoe would introduce higher costs. Maybe this is something that needs to be looked at.

Style Update	UPPER Cost	Other Cost	BOTTOM Cost	LABOR Cost	OVERHEAD Cost	Tooling Cost	Actual FOB $
CO - Carry Over	9.596405	5.997595	8.410311	5.376635	4.410500	0.087932	33.877243
NM - New Material	8.400000	5.102500	7.822500	5.965000	4.370000	0.020000	31.682500
NU - New Upper	11.749583	4.320000	8.326250	5.588750	4.636250	0.087917	34.708333
TN - Totally New	12.279231	4.672436	9.439872	5.153590	4.182051	0.091538	35.816795
NaN	8.581818	6.039091	7.154091	5.470000	4.176364	0.236364	31.654545

04

KPI’s

Understand performance using with KPI’s

On KPI’s to track performance

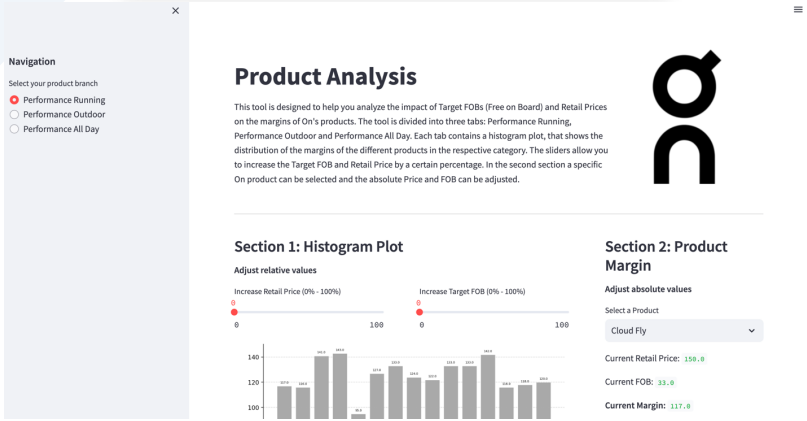
To better track the performance of the product creation team I propose the following three KPIs:

- Actual Volume: With this KPI the actual number of units sold could be measured. This would give the information how much a shoe in a specific season and gender category is sold. It also provides insights into the popularity and demand for different styles among customers. By comparing the actual volume to the target volume, the management can also assess the performance and success of their sales efforts.

- Variance of costs (Actual FOB): This can be used to track the variance between the actual FOB and the target FOB for each product. It can be calculated by subtracting the Target FOB from the Actual FOB for each product. This KPI provides insights into the accuracy of cost estimations and can help identify potential areas for improvement in cost forecasting and negotiation with suppliers.

- Return on Investment (ROI): ROI measures the return or profit generated relative to the investment made. In the context of this data set, the ROI could be calculated by comparing the revenue generated by each style against (which would be the retail price times the actual volume) the associated investment in terms of production costs and marketing expenses. It could help assess the financial performance and effectiveness of resource allocation.

Tool



To run tool see github readme file

Thank You

If there are any questions, please feel free to ask:

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