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Natalie has stated the goal of increasing profits by 10% this year. This can be solved by increasing the price of certain products by about 5 - 10%. We present our analysis of Office Solutions' main categories along with its sales and profit.

First, we honed in on categories. It consisted of Technology, Office Supplies, and Furniture, and we looked at their respective sales and profit across four years from 2017 to 2020. In terms of sales, all categories held a proportionate amount of overall sales. technology had the highest across 2017 to 2019 while in 2020 furniture topped sales by just 7,737 products over technology. Profit told a different story as it was headed by technology for 2017, 2018, and 2020 while Office Solutions topped profit in 2019. In 2020, furniture, where it topped sales, ended last in profit making only \$3,015 compared to technology and office supplies' \$33,504 and \$25,100 respectively.

Looking into the categories further, we presented the sales and profit of each category visually. **Figure 1** shows the sales of all categories from 2017 to 2020. All categories were fairly close every year. But when it comes to profit, we can see in **Figure 2** that furniture made just a fraction of profit when compared to office supplies and technology.

With this in mind, we examined furniture products specifically. Since we already knew that the sales of furniture were on par with the other two categories, we looked at the products which had the highest sales along with the products with the lowest profit. The top three sold products from the furniture category included HON 5400 Series Task Chairs, Riverside Palais Royal Lawyers Bookcase, Royale Cherry Finish, and Bretford Rectangular Conference Table Tops (**Figure 3**). All three were unprofitable. The lowest profitable products were Balt Solid Wood Round Tables, Bush Advantage Collection Racetrack Conference Table, and Chromcraft Bull-Nose Wood Oval Conference Tables & Bases (**Figure 4**).

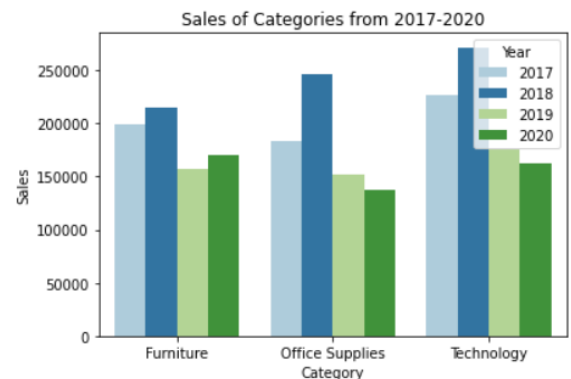


Figure 1: Category Sales from 2017- 2020

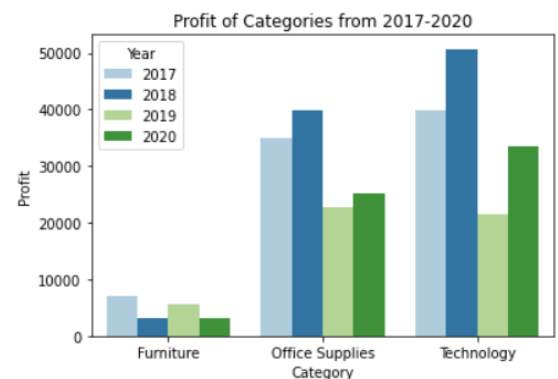


Figure 2: Category Profit from 2017 - 2020

Product Name	Discount	Profit	Sales
HON 5400 Series Task Chairs for Big and Tall	0.20	0.00	21870.58
Riverside Palais Royal Lawyers Bookcase, Royal...	0.23	-669.54	15610.97
Bretford Rectangular Conference Table Tops	0.25	-327.23	12995.29

Figure 3: Top Selling Furniture Products

Product Name	Discount	Profit	Sales
Balt Solid Wood Round Tables	0.20	-1201.06	6518.75
Bush Advantage Collection Racetrack Conference...	0.35	-1934.40	9544.72
Chromcraft Bull-Nose Wood Oval Conference Tabl...	0.28	-2876.12	9917.64

Figure 4: Lowest Profit Furniture Products

Finally, we analyzed the discount percentage on these products. For the highest-selling furniture products, all were between 0.1 and 0.2 inclusively (**Figure 3**). The least profitable products had discount percentages greater than or equal to 0.2 (**Figure 4**).

Recommendation: Based on the analysis above, we recommend Office Solution focus on the furniture category by reducing the discount percentage of its higher-selling products and potentially dropping some of the lowest profit furniture items as they are highly unprofitable despite a larger discount rate.

https://colab.research.google.com/drive/1fihy-_Jvf9o2RUQDZHZN3BTqFf3Wiw0g?usp=sharing

Jeremy Reyes

Individual Recommendation Report

Goal: Provide a recommendation tackling the least performing sub-category to increase profits by 10% this year

Based on our findings from your company's sales data, we have composed a solution to increase profits by 10% this year. To follow through with this, we have looked into the underperforming sub-categories. Our high-level analysis revealed differences in profit and sales and shows that the Tables sub-category returns the lowest profit (\$-17725.4811), but ranks fourth in the number of sales (\$206965.5320) produced within the past four years. Through analyzing, I have decided to look more closely into the Tables sub-category, starting with looking closely at the individual profit and sales within each region. As can be seen in Figure 1, it represents the profit and sales of every sub-category, with Tables being the most unprofitable, while being high in sales. Looking into the regional differences of Tables, regions perform substantially better such as the West collectively having sales of (\$84754.562) and profits of (\$1482.6073). However, this is not the case for all regions such as the East which collectively has sales of (\$39139.807) and profits of (\$-11025.3801). Looking at our data analysis, we found this to be concerning in terms of profit and decided that tackling the regional differences in tables was the best solution to increase this.

Investigating the Yearly/Region regional differences in Tables further, we have found a huge discrepancy within the discounts given for each region. As seen in Figure 2, we have identified the top 5 least profitable regions by year, with each of them returning negative values. As seen in Figure 3, we identified the top 5 most profitable in terms of year and region. To understand exactly why these are unprofitable and or profitable, I calculated their average discount rates. Interestingly enough I found a common trend between the two discount rates. All the regions above a 25% discount have a negative profit. As for the regions at or below the 25% margin, they appear to perform great, returning positive values. This certainly indicates that the discount rate of around 25% is an underlying cause of Tables profitability. Going back to the beginning of the report, we can now clearly see why the West performs substantially better than the East. With the average discount rate across all sales of Tables to be 26%, this is certainly a reason why the Tables sub-category is underperforming, despite the high sales.

Next, I then investigated the monthly sales and discounts rates of the Tables sub-category collectively, separating the individual sales by each Month. As seen in Figure 4, we have effectively found November/December to produce the highest Sales, and for February to produce the lowest Sales. Surprisingly, we have found November/December's discount rates to come out to have an average of 25% or less. Now as for February this is the total opposite, it came out to have the lowest Sales, despite having the high discount rate of 30%. This table further reveals that higher discount rates do not lead to higher Sales in this sub-category case, suggesting we should limit the rate to about 25% to effectively increase sales.

Recommendation: With uncovering evidence that leads to prove high discounts lead to a negative impact on profits and significantly lower sales within the least performing sub-category, I recommend Office Solutions put a restriction of about 25% of all sales to increase profits by at least 10% within the year.

<https://colab.research.google.com/drive/1TaG0-jB-Za6VjellSepNBQ58sNwUuWNM?usp=sharing>

	Profit	Sales
Sub-Category		
Tables	-17725.4811	206965.5320
Bookcases	-3472.5560	114879.9963
Supplies	-1189.0995	46673.5380
Fasteners	949.5182	3024.2800
Machines	3384.7569	189238.6310
Labels	5546.2540	12486.3120
Art	6527.7870	27118.7920
Envelopes	6964.1767	16476.4020
Furnishings	13059.1436	91705.1640
Appliances	18138.0054	107532.1610
Storage	21278.8264	223843.6080
Chairs	26590.1663	328449.1030
Binders	30221.7633	203412.7330
Paper	34053.5693	78479.2060
Accessories	41936.6357	167380.3180
Phones	44515.7306	330007.0540
Copiers	55617.8249	149528.0300

Figure 1: Sub-Category Profits and Sales

		Profit	Discount
Year	Region		
2018	South	-3598.8946	0.270588
2019	East	-3537.8375	0.380000
2018	East	-2904.9002	0.373913
2017	East	-2306.7783	0.368182
2020	East	-2275.8641	0.373333

Figure 2: Top 5 least performing Profit/Discounts by Year and Region

Year	Region	Profit	Discount
2020	West	1202.5326	0.166667
2019	South	1107.9902	0.113636
	West	730.1356	0.208000
2018	West	525.9467	0.178947
2017	Central	292.6211	0.205882

Figure 3: Top 5 Best Performing Profit/Discounts by Year and Region

	Sales	Discount
Month		
1	10952.0920	0.269231
2	4217.6830	0.300000
3	16912.9870	0.250000
4	9913.1560	0.272500
5	9288.2910	0.244118
6	16404.9930	0.250000
7	10162.6260	0.257895
8	16889.1020	0.278571
9	19625.9320	0.260294
10	20222.9365	0.291026
11	33182.4755	0.237209
12	39193.2580	0.255208

Figure 4: Sales and Discount by Month

Nasratullah Hotaki

Goal: Increase company profits by at least 5% by increasing discounts on the most profitable products and decreasing the discounts on the most sold products with negative profit.

As shown in the Data on the right we looked into the most profitable products that were sold as some of them were also one of the top ten most sold products by the company as well. We have also implemented a profit margin column which brings in the profit margin for each of the products that are sold.

The products shown are the most profitable and have profit margins that range from 21%-49%. Many of the products that have high-profit margins do not seem to have any discount given to them. For example, products such as the “Zebra Thermal Label Printer” or the “Ativa Mirco-Cut Shredder” have a high-profit margin of 48% and 49%.

Most Profitable Products				

	Profit	Sales	Discount	Margin(%)
Product Name				
Canon imageCLASS 2200 Advanced Copier	25199.93	61599.82	0.6	40.91
Fellowes PB500 Electric Punch Plastic Comb Binding Machine with Manual Bind	7753.04	27453.38	2.4	28.24
Hewlett Packard LaserJet 3310 Copier	6983.88	18839.69	1.6	37.07
Canon PC1060 Personal Laser Copier	4570.93	11619.83	0.6	39.34
HP DesignJet T520 Inkjet Large Format Printer - 24" Color	4094.98	18374.90	0.5	22.29
Ativa V4110MDD Micro-Cut Shredder	3772.95	7699.89	0.0	49.00
3D Systems Cube Printer, 2nd Generation, Magenta	3717.97	14299.89	0.0	26.00
Plantronics Savi W720 Multi-Device Wireless Headset System	3696.28	9367.29	0.4	39.46
Ibico EPK-21 Electric Binding System	3345.28	15875.92	1.0	21.07
Zebra ZM400 Thermal Label Printer	3343.54	6965.70	0.0	48.00

Most Sold Products with Negative Profit				

	Profit	Sales	Discount	Margin(%)
Product Name				
Cisco TelePresence System EX90 Videoconferencing Unit	-1811.08	22638.48	0.50	-8.00
GBC DocuBind P400 Electric Binding System	-1878.17	17965.07	2.70	-10.45
High Speed Automatic Electric Letter Opener	-262.00	17030.31	0.20	-1.54
Lexmark MX611dhe Monochrome Laser Printer	-4589.97	16829.90	1.60	-27.27
Martin Yale Chadless Opener Electric Letter Opener	-1299.18	16656.20	0.60	-7.80
Riverside Palais Royal Lawyers Bookcase, Royale Cherry Finish	-669.54	15610.97	1.17	-4.29
Bretford Rectangular Conference Table Tops	-327.23	12995.29	2.95	-2.52
Cubify CubeX 3D Printer Double Head Print	-8879.97	11099.96	1.60	-80.00
Chromcraft Bull-Nose Wood Oval Conference Tables & Bases	-2876.12	9917.64	1.40	-29.00
Bush Advantage Collection Racetrack Conference Table	-1934.40	9544.72	2.45	-20.27

The Data on the left shows the most sold products but has a return of a negative profit. We have also added a profit margin column here to show the percentage of return. Products with the most negative return, also show having higher discount rates with the highest discount being at 2.95.

Products such as the “Cubify CubeX 3D Printer Double Head Printer” have a return of negative 80% with a discount rate of 1.60, and the product “Chromcraft Bull-Nose Wood Oval Conference Tables & Bases” has a return of negative 29% with a discount of 1.40

Recommendation

Based on our analysis since some of the products have no discounts we believe by having a discount rate of at least 0.5-1.0 on the most profitable products will likely increase sales on products with the proper discount adversity. With the unprofitable products, I think reducing the discount by at least 0.75-1.00 on most highly discounted products will bring a better flow of profit as some of the negative profit products have the highest sales.

Code: <https://colab.research.google.com/drive/1Uot4iZ2vcowidznpN3U4YbdOL0gVDhHC?usp=sharing>