

# Profitability Analysis and Recovery Initiative

## The Problem

"Our company is growing revenue, but profits are shrinking. Leadership wants to identify what's causing this profit leakage and take corrective action. Which products, regions, or discounts are hurting us—and how can we fix it?"

## Business Problem Framing

"Revenue is growing, but profits are not. The company suspects some products, regions, or discount policies may be causing losses. The task is to uncover the reasons for shrinking profit and recommend fixes."

**This project investigates the root causes of this profit leak and provides data-backed recommendations to reverse the trend.**

## The Data

Download the dataset:  [Superstore Dataset](#)

## Metadata

Column	Description
Row ID	Unique ID for each row
Order ID	Unique Order ID for each Customer
Order Date	Order Date of the product
Ship Date	Shipping Date of the Product
Ship Mode	Shipping Mode specified by the Customer
Customer ID	Unique ID to identify each Customer
Customer Name	Name of the Customer
Segment	The segment where the Customer belongs
Country	Country of residence of the Customer
City	City of residence of of the Customer
State	State of residence of the Customer

Column	Description
Postal Code	Postal Code of every Customer
Region	Region where the Customer belong
Product ID	Unique ID of the Product
Category	Category of the product ordered
Sub-Category	Sub-Category of the product ordered
Product Name	Name of the Product
Sales	Sales of the Product
Quantity	Quantity of the Product
Discount	Discount provided
Profit	Profit/Loss incurred

## Data Exploration and Hypothesis Building

- Import into Excel
- Use one worksheet named **Raw\_Data**

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	State	Postal Code	Region	Product ID	Category	Sub-Category
1	CA-2016-152156	11/8/2016	11/11/2016	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-BO-10001798	Furniture	Box
2	CA-2016-152156	11/8/2016	11/11/2016	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-CH-10000454	Furniture	Ch
3	CA-2016-138688	6/12/2016	6/16/2016	Second Class	DV-13045	Darrin Van Huff	Corporate	United States	Los Angeles	California	90036	West	OFF-LA-10000240	Office Supplies	Lat
4	US-2015-108966	10/11/2015	10/18/2015	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	Florida	33311	South	FUR-TA-10000577	Furniture	Tal
5	US-2015-108966	10/11/2015	10/18/2015	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	Florida	33311	South	OFF-ST-10000760	Office Supplies	Stc
6	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-FU-10001487	Furniture	Fur
7	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-AR-10002833	Office Supplies	Art
8	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	TEC-PH-10002275	Technology	Ph
9	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-BI-10003910	Office Supplies	Bin
10	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-AP-10002892	Office Supplies	Ap
11	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	TEC-PH-10002033	Technology	Ph
12	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-TA-10001539	Furniture	Tal
13	CA-2014-115812	6/9/2014	6/14/2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-BI-10003910	Office Supplies	Bin
14	CA-2017-114412	4/15/2017	4/20/2017	Standard Class	AA-10480	Andrew Allen	Consumer	United States	Concord	North Carolina	28027	South	OFF-PA-10002365	Office Supplies	Pag
15	CA-2016-161389	12/5/2016	12/10/2016	Standard Class	IM-15070	Irene Maddox	Consumer	United States	Seattle	Washington	98103	West	OFF-BI-10003656	Office Supplies	Bin
16	US-2015-118983	11/22/2015	11/26/2015	Standard Class	HP-14815	Harold Pawlan	Home Office	United States	Fort Worth	Texas	76106	Central	OFF-AP-10002311	Office Supplies	Ap
17	US-2015-118983	11/22/2015	11/26/2015	Standard Class	HP-14815	Harold Pawlan	Home Office	United States	Fort Worth	Texas	76106	Central	OFF-BI-10000756	Office Supplies	Bin
18	CA-2014-105893	11/11/2014	11/18/2014	Standard Class	PK-19075	Pete Kriz	Consumer	United States	Madison	Wisconsin	53711	Central	OFF-ST-10004186	Office Supplies	Stc
19	CA-2014-167164	5/13/2014	5/15/2014	Second Class	AG-10270	Alejandro Grove	Consumer	United States	West Jordan	Utah	84084	West	OFF-ST-10000107	Office Supplies	Stc
20	CA-2014-143336	8/27/2014	9/1/2014	Second Class	ZD-21925	Zuschuss Donatelli	Consumer	United States	San Francisco	California	94109	West	OFF-AR-10003056	Office Supplies	Art
21	CA-2014-143336	8/27/2014	9/1/2014	Second Class	ZD-21925	Zuschuss Donatelli	Consumer	United States	San Francisco	California	94109	West	TEC-PH-10001949	Technology	Ph
22	CA-2014-143336	8/27/2014	9/1/2014	Second Class	ZD-21925	Zuschuss Donatelli	Consumer	United States	San Francisco	California	94109	West	OFF-BI-10002215	Office Supplies	Bin
23	CA-2016-137330	12/9/2016	12/13/2016	Standard Class	KB-16585	Ken Black	Corporate	United States	Fremont	Nebraska	68025	Central	OFF-AR-10000246	Office Supplies	Art
24	CA-2016-137330	12/9/2016	12/13/2016	Standard Class	KB-16585	Ken Black	Corporate	United States	Fremont	Nebraska	68025	Central	OFF-AP-10001492	Office Supplies	Ap
25	US-2017-156909	7/16/2017	7/18/2017	Second Class	SF-20065	Sandra Flanagan	Consumer	United States	Philadelphia	Pennsylvania	19140	East	FUR-CH-10002774	Furniture	Ch
26	US-2015-106320	9/25/2015	9/30/2015	Standard Class	EB-13870	Emily Burns	Consumer	United States	Orem	Utah	84057	West	FUR-TA-10000577	Furniture	Tal
27	CA-2016-121755	1/16/2016	1/20/2016	Second Class	EH-13945	Eric Hoffmann	Consumer	United States	Los Angeles	California	90049	West	OFF-BI-10001634	Office Supplies	Bin
28	CA-2016-121755	1/16/2016	1/20/2016	Second Class	EH-13945	Eric Hoffmann	Consumer	United States	Los Angeles	California	90049	West	TEC-AC-10003027	Technology	Acc
29	US-2015-150630	9/17/2015	9/21/2015	Standard Class	TB-21520	Tracy Blumstein	Consumer	United States	Philadelphia	Pennsylvania	19140	East	FUR-BO-10004834	Furniture	Bo

- Create a copy named **Cleaned Data**
- Make sure column headers are clean (remove trailing spaces)

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11	CA-2014-115812	09-06-2014	14-06-2014	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	TEC-PH-10002033	Technology	Ph
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- Scan Columns Focus on:
  - Order Date , Region , Category , Sub-Category
  - Sales , Discount , Profit , Quantity , Ship Mode
- Add Calculated Fields (Optional)
  - Profit Margin = Profit / Sales
  - Unit Price = Sales / Quantity
- Question: Where could profit be leaking?
  - Too many discounts?
  - Product returns?
  - Certain regions?
  - Costly shipping modes?
  - Low-margin product categories?
- Use Pivot Tables to explore:
  - Profit by Region, Category, and Sub-Category → Any consistent losses?
  - Profit vs. Discount → Are high discounts hurting?
  - Product Categories/Sub-Categories → Which are least profitable?
  - Sales vs. Profit trend over time

## Discount vs Profit

*Are heavy discounts leading to more sales and profit, or actually causing margin erosion? What's the optimal discount range for different product categories?*

Row Labels	Sum of Profit
0%	\$ 3,20,987.60
10%	\$ 9,029.18
15%	\$ 1,418.99
20%	\$ 90,337.31
30%	\$ -10,369.28
32%	\$ -2,391.14
40%	\$ -23,057.05
45%	\$ -2,493.11
50%	\$ -20,506.43
60%	\$ -5,944.66
70%	\$ -40,075.36
80%	\$ -30,539.04
<b>Grand Total</b>	<b>286397.0217</b>

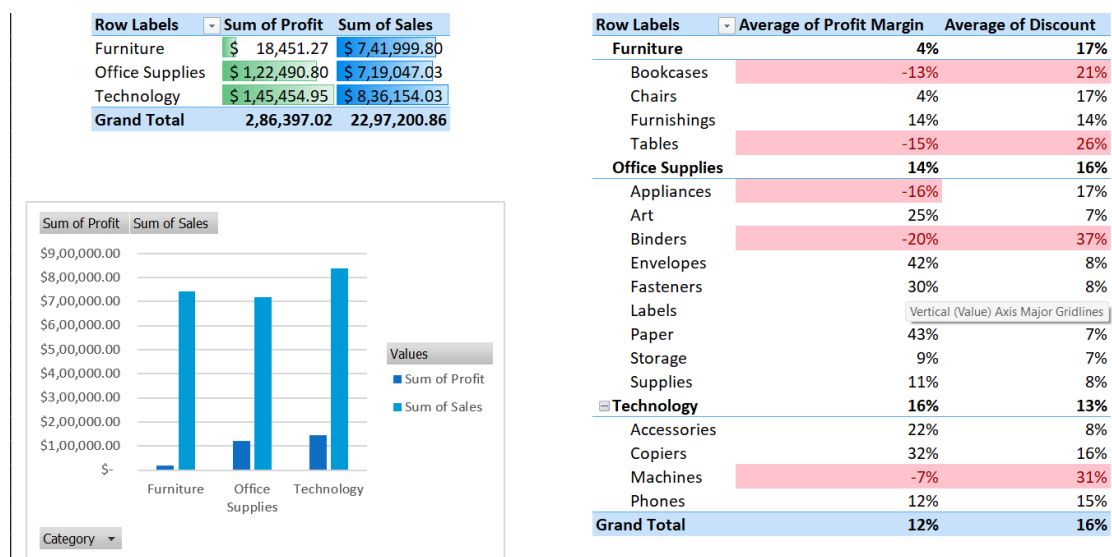




Any discount above 20% leads to negative profit.

- Sub-categories with average discount > 0.20:
  - Furniture (Bookcases, Tables), Office Supplies (Binders), Technology (Machines)
- These same sub-categories have negative or near-zero profit or negative profit margin.

## Category vs Profit



- Furniture(Bookcase, Tables), Office Supplies(Supplies) have neg profit
- Furniture(Bookcase, Tables), Office Supplies(Appliances, Binders), technology(machines) have neg profit margin
- Furniture(Bookcase, Tables), Office Supplies(Binders), technology(machines) have avg dicount > 0.20
- Furniture(Bookcase, Tables), Office Supplies(Supplies), technology(machines) have neg cumulative profit by product

- Furniture(Bookcase, Tables), technology(machines) have neg profit on first day shipment
- Furniture(Tables) have neg profit on second day shipment
- Furniture(Bookcase, Tables),Office Supplies(Supplies) have neg profit on standard class shipment

## Product vs Profit

*Which products and sub-categories generate the most revenue and profit, and which consistently underperform? How should the store adjust its product mix?*

Row Labels	Sum of Cumulative Profit by Product
Bevis Oval Conference Table, Walnut	
Furniture	
Tables	\$ -6,848.12
Bush Advantage Collection Racetrack Conference Table	
Furniture	
Tables	\$ -13,540.78
Chromcraft Bull-Nose Wood Oval Conference Tables & Bases	
Furniture	
Tables	\$ -14,380.58
Cubify CubeX 3D Printer Double Head Print	
Technology	
Machines	\$ -26,639.91
GBC DocuBind P400 Electric Binding System	
Office Supplies	
Binders	\$ -11,269.00
Global High-Back Leather Tilter, Burgundy	
Furniture	
Chairs	\$ -6,646.38
Global Wood Trimmed Manager's Task Chair, Khaki	
Furniture	
Chairs	\$ -7,043.67
Lexmark MX611dhe Monochrome Laser Printer	
Technology	
Machines	\$ -18,350.80
Martin Yale Chadless Opener Electric Letter Opener	
Office Supplies	
Supplies	\$ -7,795.10
O'Sullivan 4-Shelf Bookcase in Odessa Pine	
Furniture	
Bookcases	\$ -6,925.69
<b>Grand Total</b>	<b>\$ -1,19,349.12</b>

Row Labels	Average of Profit Margin
3.6 Cubic Foot Counter Height Office Refrigerator	
Office Supplies	
Appliances	-1.48
Acco 6 Outlet Guardian Basic Surge Suppressor	
Office Supplies	
Appliances	-1.16
Acco 6 Outlet Guardian Premium Plus Surge Suppressor	
Office Supplies	
Appliances	-1.11
Bush Westfield Collection Bookcases, Dark Cherry Finish, Fully Assembled	
Furniture	
Bookcases	-2.1
Eureka Disposable Bags for Sanitaire Vibra Groomer I Upright Vac	
Office Supplies	
Appliances	-2.75
Euro Pro Shark Stick Mini Vacuum	
Office Supplies	
Appliances	-1.77
Hoover Commercial Lightweight Upright Vacuum	
Office Supplies	
Appliances	-1.31
Kensington 6 Outlet SmartSocket Surge Protector	
Office Supplies	
Appliances	-1.24
Okidata B401 Printer	
Technology	
Printers	-1.4
Zebra GK420t Direct Thermal/Thermal Transfer Printer	
Technology	
Printers	-1.33
<b>Grand Total</b>	<b>-1.44</b>

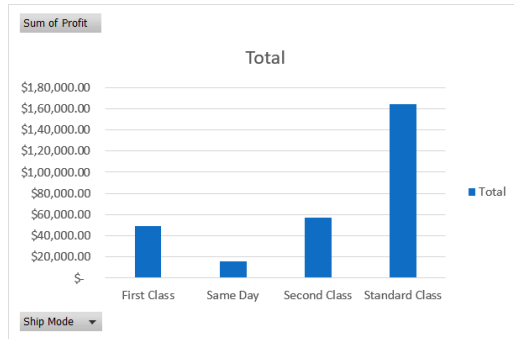
Chart Area [ue] Axis Major Gridlines

- Top 10 loss-making products = mostly Furniture and Machines.
- Office Supplies (Appliances, Binders) dominate the lowest profit margin list.
- Low unit price products (mostly Office Supplies) may not justify handling and shipping cost.

## Shipment vs Profit

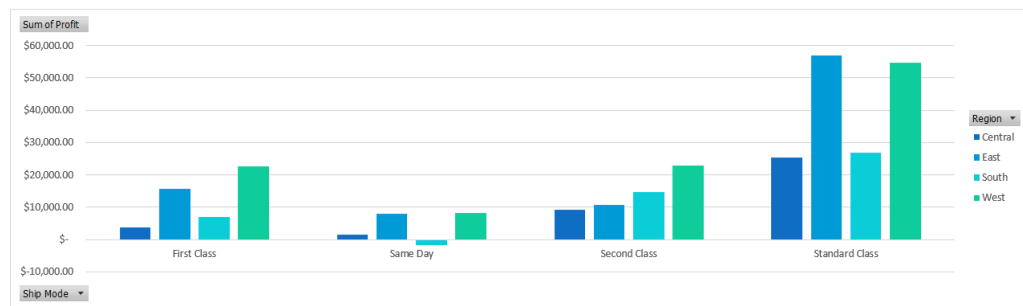
*How does shipping mode impact delivery time, customer satisfaction, and profitability? Are faster shipping modes causing losses due to higher costs or smaller margins?*

Row Labels	Sum of Profit
First Class	\$ 48,969.84
Same Day	\$ 15,891.76
Second Class	\$ 57,446.64
Standard Class	\$ 1,64,088.79
<b>Grand Total</b>	<b>\$ 2,86,397.02</b>



Row Labels	Sum of Profit	Average of Profit Margin
<b>First Class</b>	<b>\$ 48,969.84</b>	<b>0.12</b>
Central	\$ 3,707.27	-0.12
East	\$ 15,732.01	0.15
South	\$ 6,892.39	0.16
West	\$ 22,638.17	0.20
<b>Same Day</b>	<b>\$ 15,891.76</b>	<b>0.14</b>
Central	\$ 1,531.88	-0.05
East	\$ 7,980.27	0.14
South	\$ -1,762.34	0.19
West	\$ 8,141.95	0.24
<b>Second Class</b>	<b>\$ 57,446.64</b>	<b>0.15</b>
Central	\$ 9,114.83	-0.05
East	\$ 10,787.29	0.18
South	\$ 14,667.15	0.21
West	\$ 22,877.36	0.24
<b>Standard Class</b>	<b>\$ 1,64,088.79</b>	<b>0.11</b>
Central	\$ 25,352.38	-0.12
East	\$ 57,023.21	0.17
South	\$ 26,952.23	0.14
West	\$ 54,760.97	0.22
<b>Grand Total</b>	<b>\$ 2,86,397.02</b>	<b>0.12</b>

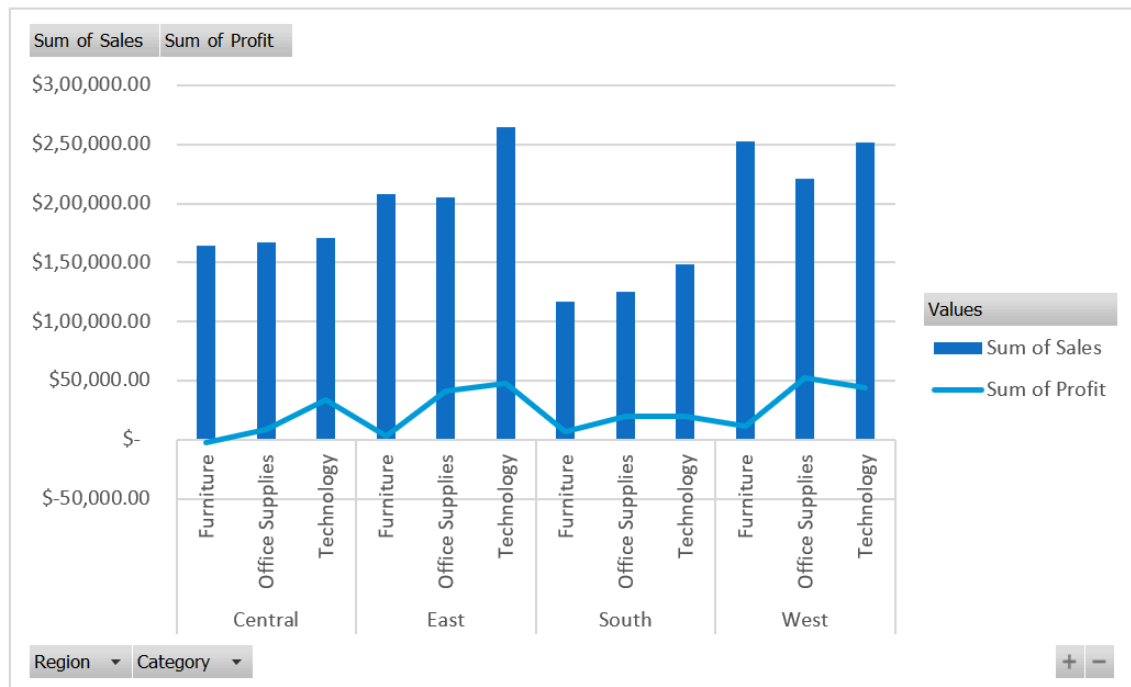
Sum of Profit	Column Labels					
Row Labels	Central	East	South	West	Grand Total	
First Class	\$ 3,707.27	\$ 15,732.01	\$ 6,892.39	\$ 22,638.17	\$ 48,969.84	
Same Day	\$ 1,531.88	\$ 7,980.27	\$ -1,762.34	\$ 8,141.95	\$ 15,891.76	
Second Class	\$ 9,114.83	\$ 10,787.29	\$ 14,667.15	\$ 22,877.36	\$ 57,446.64	
Standard Class	\$ 25,352.38	\$ 57,023.21	\$ 26,952.23	\$ 54,760.97	\$ 1,64,088.79	
<b>Grand Total</b>	<b>\$ 39,706.36</b>	<b>\$ 91,522.78</b>	<b>\$ 46,749.43</b>	<b>\$ 1,08,418.45</b>	<b>\$ 2,86,397.02</b>	

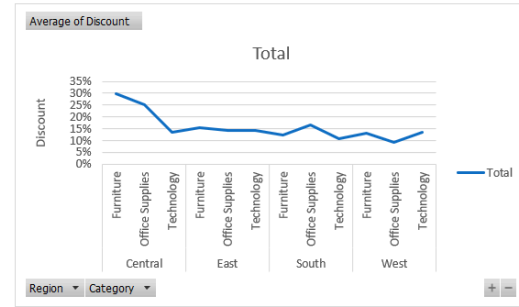
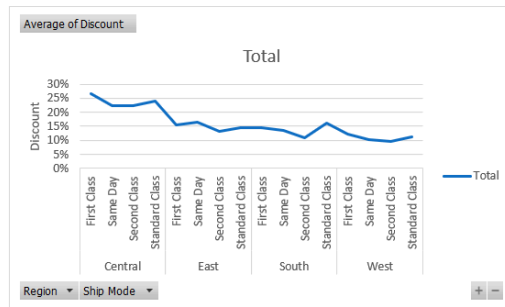


- Same-Day Shipping in the South and Central Regions (especially for Furniture and Technology) has negative profit.
- First and Second-Class shipping in the Central Region causes losses in Furniture.
- Standard Class shipping also unprofitable for certain categories in multiple regions.

## Region vs Profit

Row Labels	Sum of Sales	Sum of Profit
<b>Central</b>	<b>\$ 5,01,239.89</b>	<b>\$ 39,706.36</b>
Furniture	\$ 1,63,797.16	\$ -2,871.05
Office Supplies	\$ 1,67,026.42	\$ 8,879.98
Technology	\$ 1,70,416.31	\$ 33,697.43
<b>East</b>	<b>\$ 6,78,781.24</b>	<b>\$ 91,522.78</b>
Furniture	\$ 2,08,291.20	\$ 3,046.17
Office Supplies	\$ 2,05,516.06	\$ 41,014.58
Technology	\$ 2,64,973.98	\$ 47,462.04
<b>South</b>	<b>\$ 3,91,721.91</b>	<b>\$ 46,749.43</b>
Furniture	\$ 1,17,298.68	\$ 6,771.21
Office Supplies	\$ 1,25,651.31	\$ 19,986.39
Technology	\$ 1,48,771.91	\$ 19,991.83
<b>West</b>	<b>\$ 7,25,457.82</b>	<b>\$ 1,08,418.45</b>
Furniture	\$ 2,52,612.74	\$ 11,504.95
Office Supplies	\$ 2,20,853.25	\$ 52,609.85
Technology	\$ 2,51,991.83	\$ 44,303.65
<b>Grand Total</b>	<b>\$ 22,97,200.86</b>	<b>\$ 2,86,397.02</b>





- Central Region: High-risk across all categories and shipping modes. States: Illinois, Texas.
- Other red-flag states: Ohio, Pennsylvania, Florida, North Carolina, Tennessee, Arizona, Colorado, Oregon.
- Even in regions like Central, some states (e.g., Illinois) exhibit significant net losses, suggesting that regional averages may hide deeper state-level issues.

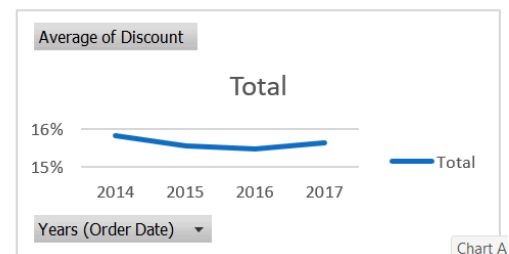
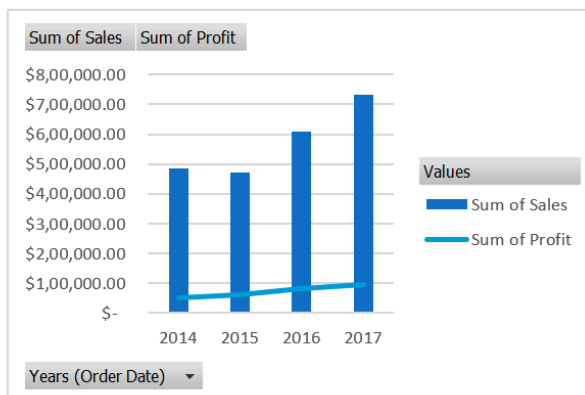
## Miscellaneous

Row Labels	Sum of Profit
3	\$ 57,015.53
5	\$ 49,516.59
4	\$ 44,223.39
2	\$ 38,448.41
7	\$ 34,286.97
9	\$ 17,687.89
8	\$ 10,856.80
6	\$ 10,325.47
1	\$ 7,440.48
13	\$ 6,348.90
11	\$ 4,293.37
14	\$ 2,724.00
10	\$ 2,044.16
12	\$ 1,185.07
<b>Grand Total</b>	<b>\$ 2,86,397.02</b>

Row Labels	Sum of Sales	Sum of Profit	Average of Profit Margin	Average of Discount
<b>Consumer</b>	<b>\$ 11,61,401.34</b>	<b>\$ 1,34,119.21</b>		<b>16%</b>
Furniture	\$ 3,91,049.31	\$ 6,991.08	0.03	18%
Office Supplies	\$ 3,63,952.14	\$ 56,330.32	0.13	16%
Technology	\$ 4,06,399.90	\$ 70,797.81	0.15	13%
<b>Corporate</b>	<b>\$ 7,06,146.37</b>	<b>\$ 91,979.13</b>	<b>0.12</b>	<b>16%</b>
Furniture	\$ 2,29,019.79	\$ 7,584.82	0.05	17%
Office Supplies	\$ 2,30,676.46	\$ 40,227.32	0.14	16%
Technology	\$ 2,46,450.12	\$ 44,167.00	0.16	13%
<b>Home Office</b>	<b>\$ 4,29,653.15</b>	<b>\$ 60,298.68</b>	<b>0.14</b>	<b>15%</b>
Furniture	\$ 1,21,930.70	\$ 3,875.38	0.05	17%
Office Supplies	\$ 1,24,418.43	\$ 25,933.16	0.17	15%
Technology	\$ 1,83,304.02	\$ 30,490.14	0.17	13%
<b>Grand Total</b>	<b>\$ 22,97,200.86</b>	<b>\$ 2,86,397.02</b>	<b>0.12</b>	<b>16%</b>

Row Label	Sum of Sales	Sum of Profit
2014	\$ 4,84,247.50	\$ 49,543.97
2015	\$ 4,70,532.51	\$ 61,618.60
2016	\$ 6,09,205.60	\$ 81,795.17
2017	\$ 7,33,215.26	\$ 93,439.27
<b>Grand Total</b>	<b>\$ 22,97,200.86</b>	<b>\$ 2,86,397.02</b>

Row Labels	Average of Discount
2014	16%
2015	16%
2016	15%
2017	16%
<b>Grand Total</b>	<b>16%</b>

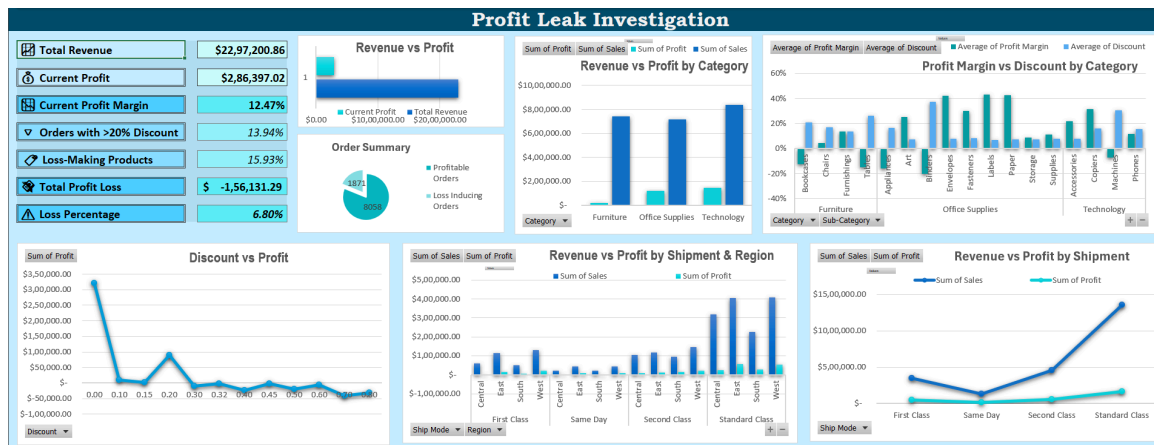


- Profit in descending order by quant is: 3, 5, 4, 2, 7, 9, 8, 6, 1, 13, 11, 14, 10, 12



- Quantities 3 to 5 tend to generate highest cumulative profit. Lower/higher quantities don't perform as well.
- The products having lowest unit price are from
  - OfficeSup x8
  - Tech x2

## Dashboard



## Insight and Recovery Plan

The data shows profits are actually growing, not shrinking - from 49K in 2014 to 93K in 2017. However, profit margins peaked in 2016 at 13.43% and dropped to 12.74% in 2017, indicating efficiency issues despite revenue growth.

### Key Findings:

- 18.7% of orders are unprofitable, causing \$156K in losses
- High discounts ( 50%+ ) are the biggest profit killer, losing \$97K
- Technology products like 3D printers are major loss leaders
- Furniture category has the lowest profitability at only \$18K
- No discount orders have 29.5% profit margin vs negative margins at high discounts
- Revenue is growing but profits are being eroded by excessive discounting and unprofitable product mix.

The insights show revenue growth masking a profit crisis - \$156K lost from excessive discounting and poor product mix.

### The key profit issues:

- Orders with losses: 1871 out of 9994 ( 18.7% )
- Total losses: \$-156131.29

- High discount orders (50%+): 922 orders
- High discount total loss: **-\$97065.48**

### Key Solutions:

- Cap all discounts at **15%** maximum
- Discontinue/reprice the top 10 loss-making products
- Implement state-specific pricing for unprofitable regions
- Restrict premium shipping on low-margin furniture/tech items
- This could recover **\$147K** annually and boost profit margins from 12.5% to **18.9%** .

Key Insights	Findings	Root Causes	Solutions	Expected Impact
Revenue Growth vs Profit Decline	Revenue up but profit margins declining from 16% to 12.5%	Aggressive discounting without margin protection	Cap discounts at 15%-20% maximum	Immediate margin recovery to 18.9%
Discount Impact	Discounts >20% cause negative profits; 922 orders lose \$97K	No discount caps or approval thresholds	Discontinue/reprice top 10 loss products	\$97K annual recovery from discount control
Product Portfolio Issues	Top 10 loss products: Furniture Tables, Tech Machines, Binders	Loss-leader products not identified/managed	Implement state-specific pricing	\$30K savings from product optimization
Regional Performance Gaps	IL, TX, OH, PA, FL, NC consistently unprofitable states	No regional pricing strategy	Restrict premium shipping on low-margin items	\$15K gain from regional pricing strategy
Shipping Cost Problems	Same-day/first-class shipping unprofitable for furniture	Shipping costs not factored into pricing	Focus sales on high-margin office supplies	\$5K savings + 20% category margin boost

### Profit Recovery Potential

- Current Annual Profit: **\$286397.0**
- Potential Recovery: **\$147065.0**
- Projected Profit: **\$433462.0**

- Margin Improvement: +6.4% (12.5% → 18.9%)

The analysis shows a clear path to recover \$147K annually through five targeted solutions. The discount cap alone delivers \$97K in immediate impact with minimal risk, while product discontinuation adds another \$30K.

Regional pricing carries higher implementation complexity but significant upside.