

E-Commerce Sales Analysis

Dzikri Nur Rochim

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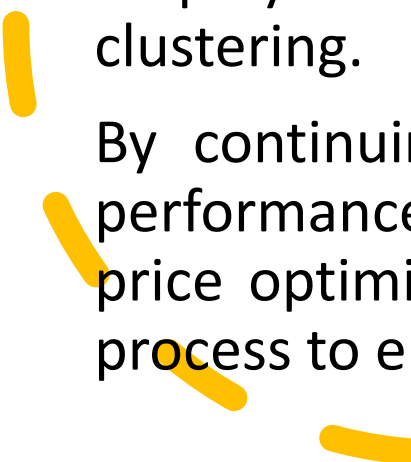
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Background of Project

This data is sourced from the Kaggle website. The dataset covers a sales period of 4 years, from 2011 to 2014. The data encompasses 22 columns with 9994 rows, focusing on sales transactions for furniture, office supplies, and technology products. There are 219,868 entries with key columns including order ID, product name, category, customer name, quantity, sales, and profit. The objective of this data analysis is to enhance sales and customer satisfaction. Analysis techniques employed will involve data visualization, descriptive statistics, regression, and clustering.

By continuing this data analysis, it is expected to gain insights into product performance, customer segmentation, and factors influencing sales, allowing for price optimization. The data used is ensured to have undergone a data cleaning process to ensure valid and accountable analysis results.



Business Questions

Here are a few potential smart method questions for analyzing the sales data:

1. Which products had the highest total sales revenue?
2. Which customers spent the most on furniture?
3. Which product categories had the lowest average discount percent?
4. Which regions had the highest total sales for Technology?
5. What was the best selling product?
6. What product categories make up the largest percentage of overall revenue?
7. Which products have the highest profit margins?
8. Which customers have the highest lifetime value?
9. How do sales and profits vary by region?
10. How do sales fluctuate seasonally?

Analysis Approach

Q.1 Which products had the highest total sales revenue?

1. Using Excel to filter the columns to be used
Creating a pivot table to facilitate finding answers to the questions
2. The rows column is filled with the category column, and the values column is filled with the sales column, calculated as the sum of sales
3. After that, the values are sorted from largest to smallest, and the highest sales value based on the product is obtained.

Analysis Approach

Q.2 Which customers spent the most on furniture?

1. In the Columns area, fill it with the category column, the Rows area is filled with the Rows ID column, and the Values area is filled with the Sales column displayed as the Sum of Sales. Then, simply sort the Furniture column with a descending filter by the sum of sales.
2. The result is obtaining the customer ID with the highest spending for furniture products.

Analysis Approach

Q.3 Which product categories had the lowest average discount percent?

1. Creating a pivot table with the rows section filled with categories, the columns section as values, and the values section filled with 2 data columns, namely discount and sales. Formatting the discount column as the average discount and the sales column as sum of sales.

2. Then, you will obtain a table of category vs average of discount and sum of sales. Perform a filter with `More Sort Options` >> `ascending (A to Z) by` >> choose the average of discount column.

Analysis Approach

Q.4 Which regions had the highest total sales for Technology?

1. In the Rows area, fill it with the category column and Region, and the Values area is filled with the Sales column displayed as the Sum of Sales. Then, simply click on 'More Sort Options,' choose 'Descending (Z to A) by sum of sales' to sort the category rows from highest to lowest sum of sales.

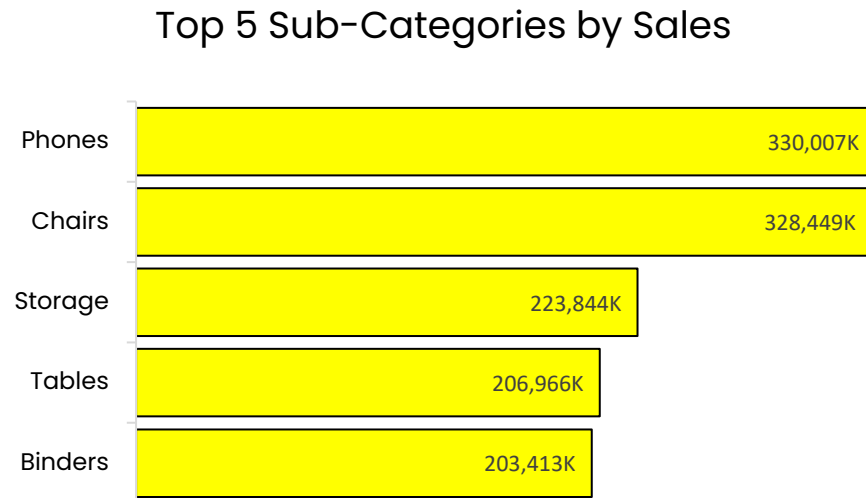
Analysis Approach

Q.5 What was the best selling product?

1. What should be noted is that the term 'best-selling product' can refer to either the quantity of items sold or the high revenue generated.
2. In the Columns section, you'll want to input values. For the Rows section, go ahead and populate it with the 'Product Name' column. Now, in the Values section, include three columns: quantity, price, and sales. Make sure these three columns are set in the sum format, and you can name them 'Sum of Quantity,' 'Sum of Price,' and 'Sum of Sales.'
3. We filter using 'value filters,' select 'top 10' to choose the top 10 products. In the 'top 10 items by' section, choose 'sum of sales' to determine the top 10 sales products or choose 'sum of quantity' based on the quantity of items sold. Then, sort using 'more sort options' > 'descending (Z to A) by' > select 'sum of sales' or 'sum of quantity.' This refers to best-selling by quantity or sales.

Key Findings

1. Which products had the highest total sales revenue?

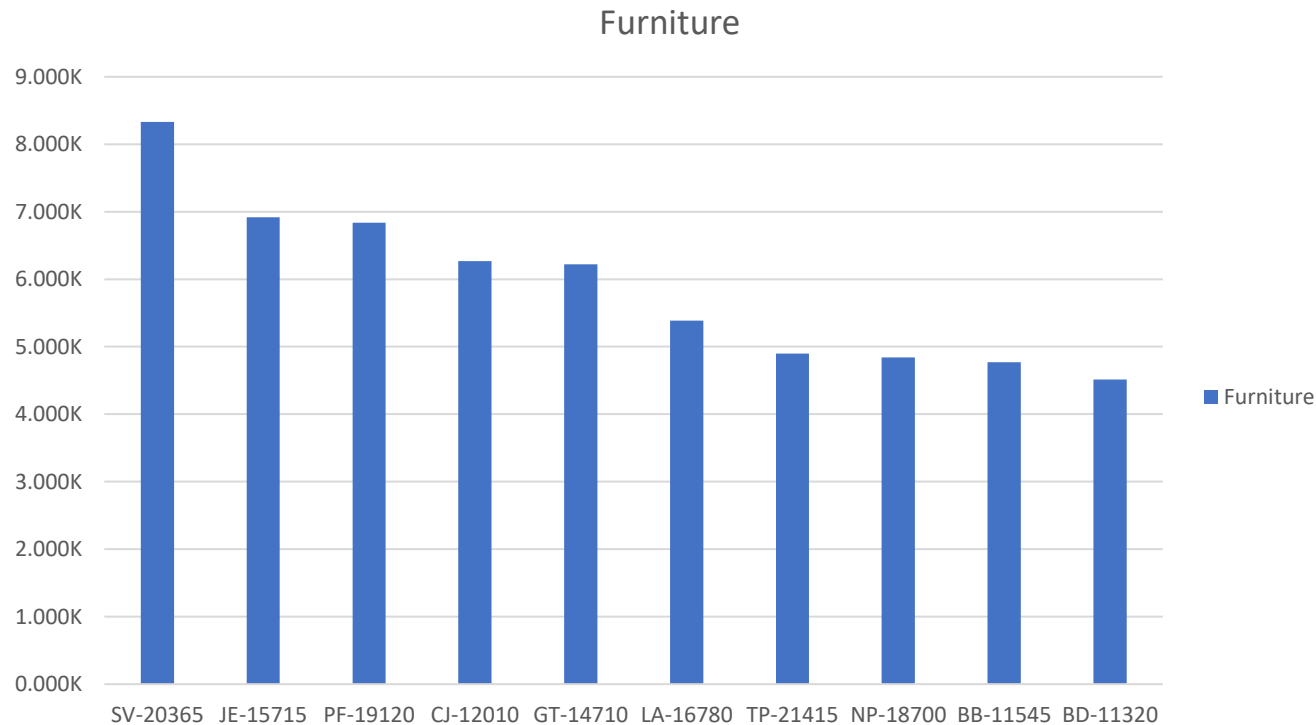


Gambar 1. Bar chart yang menampilkan category vs sales

Dari Gambar 1 yang memperlihatkan produk /sub kategori terhadap sales didapatkan penjualan tertinggi oleh produk phones dengan total sales mencapai 330an ribu usd. Diikuti penjualan produk chairs di urutan kedua dengan total sales mencapai 328an ribu usd.

Key Findings

2. Which customers spent the most on furniture?

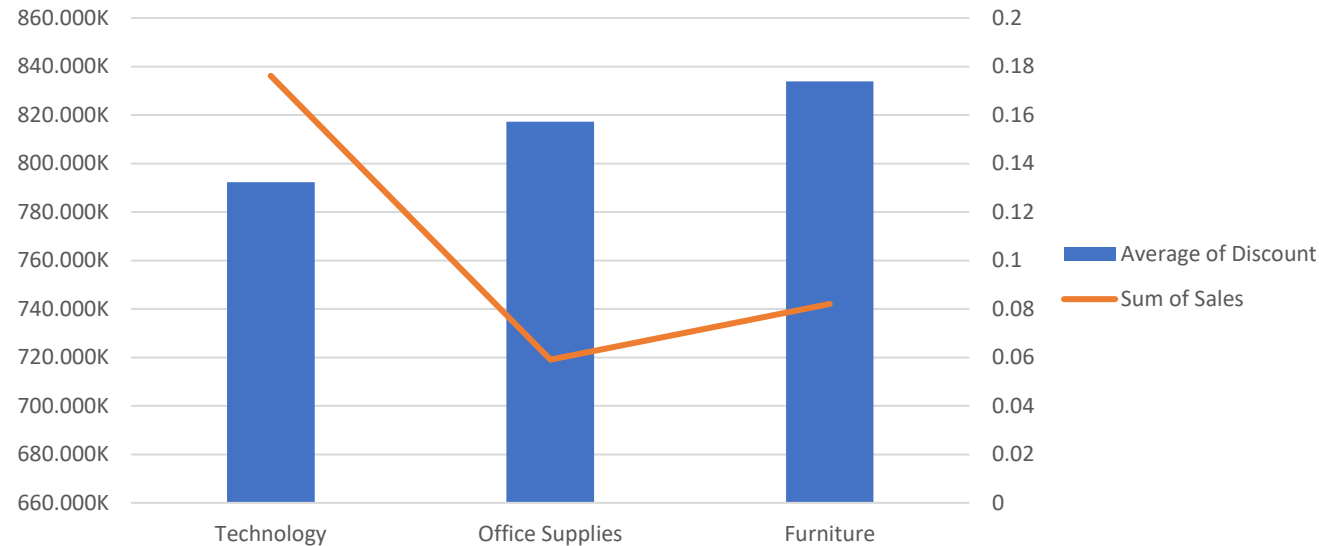


Gambar 2. column chart yang menampilkan sales vs customer id

Pada Gambar 2 menunjukkan jumlah uang yang dikeluarkan (spent) terhadap customer id. Dapat dilihat bahwa customer id SV-20365 mengeluarkan uang paling banyak (spent) sejumlah 8,3an ribu usd. Kemudian diikuti dengan spent 6,9an ribu usd yang dikeluarkan oleh customer id JE-15715.

Key Findings

3. Which product categories had the lowest average discount percent?



Gambar 3. Combo chart yang menampilkan sales vs customer id

Pada Gambar 3 menunjukkan bar chart untuk rata-rata discount untuk masing-masing kategori produk ditambah dengan sales pada setiap kategori produk yang divisualkan dengan line chart. Dapat dilihat bahwa kategori produk Technology memiliki rata-rata diskon terendah dengan nilai 13,2% persen diikuti kategori Office Supplies dengan nilai 15,7% dan diskon tertinggi dimiliki oleh kategori produk Furniture dengan nilai 17,4%. Uniknya, kategori produk technology dengan diskon terendah memberikan pendapatan sales tertinggi dibandingkan 2 kategori lain, yang seharusnya kategori produk dengan diskon tertinggi akan menghasilkan sales terendah ternyata lebih tinggi ketimbang office supplies.

Key Findings

4. Which regions/state had the highest total sales for Technology?

Tabel 1. Tabel berisi kolom Category dan Sales.

Category	Sales
Office Supplies	719.047K
Central	167.026K
East	205.516K
South	125.651K
West	220.853K
Furniture	742.000K
Central	163.797K
East	208.291K
South	117.299K
West	252.613K
Technology	836.154K
Central	170.416K
East	264.974K
South	148.772K
West	251.992K
Grand Total	2,297.201K

Tabel 1 merupakan table yang berisi kolom sales dan baris kategori dan region. Untuk kategori dengan pendapatan tertinggi adalah teknologi yang berkontribusi sebesar 836,1k usd menyumbang 36%an dari total sales. Daerah dengan sales tertinggi pada kategori teknologi adalah bagian barat dengan total sales mencapai 251,9k usd. Kemudian disusul bagian timur dengan sales mencapai 264,9k usd. Dan daerah Selatan menjadi daerah terendah untuk penjualan dengan nilai penjualan hanya 148,7k usd.

Key Findings

5. What was the best selling product? Bisa dari kuantitas/ total sales

Table 2. Table Penjualan berisi kolom Nama produk/items, Kuantitas, Harga, dan Sales diurutkan dengan kuantitas tertinggi

Items	Quantity	Price	Sales
Staples	876	8.000228311	7008.2
KI Adjustable-Height Table	74	61.52217568	4552.641
Storex Dura Pro Binders	71	3.923746479	278.586
Avery Non-Stick Binders	71	3.060788732	217.316
GBC Premium Transparent Covers with Diagonal Lined Pattern	67	11.64859701	780.456
Situations Contoured Folding Chairs, 4/Set	64	56.89490625	3641.274
Chromcraft Round Conference Tables	61	134.5747377	8209.059
Eldon Wave Desk Accessories	61	4.372622951	266.73
Wilson Jones Turn Tabs Binder Tool for Ring Binders	59	3.594576271	212.08
Global Wood Trimmed Manager's Task Chair, Khaki	59	70.62515254	4166.884
Grand Total	1463	20.05005195	29333.226

Tabel 2 menunjukkan produk penjualan terbaik secara kuantitas. Terlihat bahwa produk staples menjadi penjualan pertama dengan kuantitas 876. disusul dengan KI Adjustable-Height Table dengan kuantitas 74.

10 produk penjualan terbaik dengan total kuantitas terjual mencapai 1463. Berkontribusi 14,6% dari total produk yang terjual.

Table 3. Table Penjualan berisi kolom Nama produk/items, Kuantitas, Harga, dan Sales diurutkan dengan sales tertinggi.

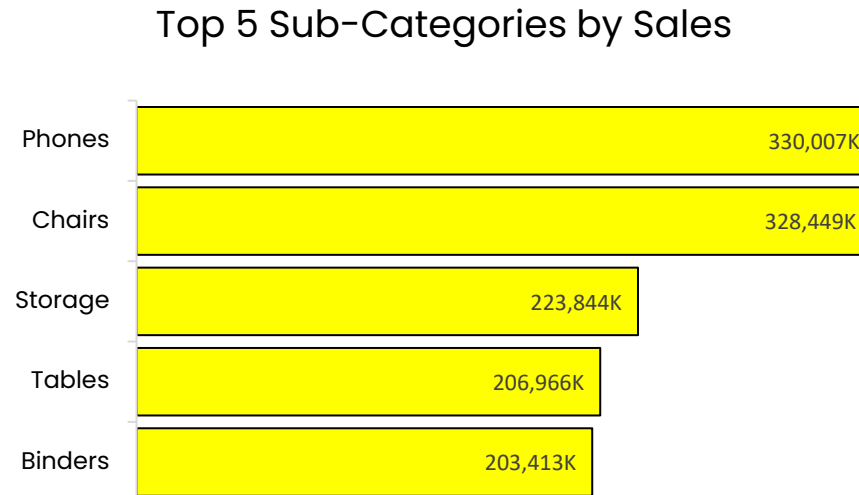
Items	Quantity	Price	Sales
Canon imageCLASS 2200 Advanced Copier	20	3079.9912	61599.824
Fellowes PB500 Electric Punch Plastic Comb Binding Machine with Manual Bind	31	885.5930323	27453.384
Cisco TelePresence System EX90 Videoconferencing Unit	6	3773.08	22638.48
HON 5400 Series Task Chairs for Big and Tall	39	560.784	21870.576
GBC DocuBind TL300 Electric Binding System	37	535.7697027	19823.479
GBC Ibimaster 500 Manual ProClick Binding System	48	396.34375	19024.5
Hewlett Packard LaserJet 3310 Copier	38	495.7812105	18839.686
HP Designjet T520 Inkjet Large Format Printer - 24" Color	12	1531.24125	18374.895
GBC DocuBind P400 Electric Binding System	27	665.3728889	17965.068
High Speed Automatic Electric Letter Opener	11	1548.210182	17030.312
Grand Total	269	909.3687881	244620.204

Tabel 3 menunjukkan produk penjualan terbaik secara Sales. Terlihat bahwa produk Canon imageCLASS 2200 Advanced Copier dengan sales 61,5K usd. Selanjutnya Fellowes PB500 Electric Punch Plastic Comb Binding Machine with Manual Bind dengan total sales mencapai 27,4k usd .

10 produk penjualan terbaik dengan total sales 244,62k usd. Menyumbang 10%an total sales selama 2011 hingga 2014.

Recommendations

1. Which products had the highest total sales revenue?

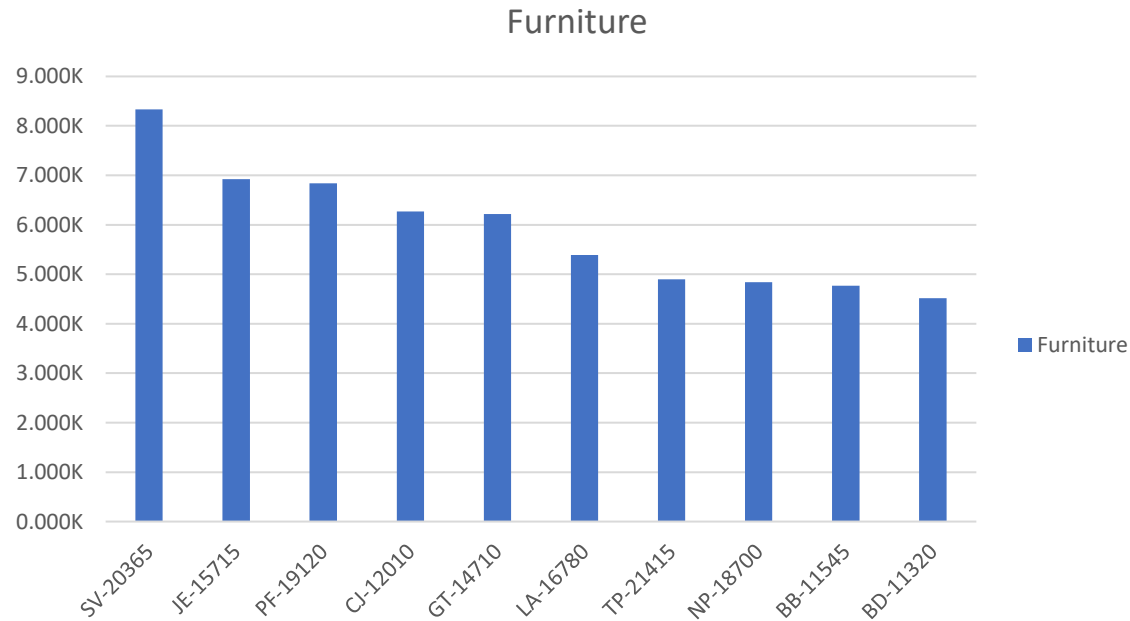


Gambar 1. Bar chart yang menampilkan category vs sales

Recommendation: Kita dapat focus terhadap 2 sub-kategori dengan penjualan terbaik, yaitu telepon dan kursi. Mempertimbangkan hal itu, terdapat 2 actionable things, yaitu invest iklan dan promoting kedua sub-kategori produk tersebut. Yang kedua adalah tetap melakukan promosi seperti biasa dan expanding promoting and marketing untuk sub-kategori dengan penjualan terendah untuk meningkatkan daya beli produk.

Recommendations

2. Which customers spent the most on furniture?

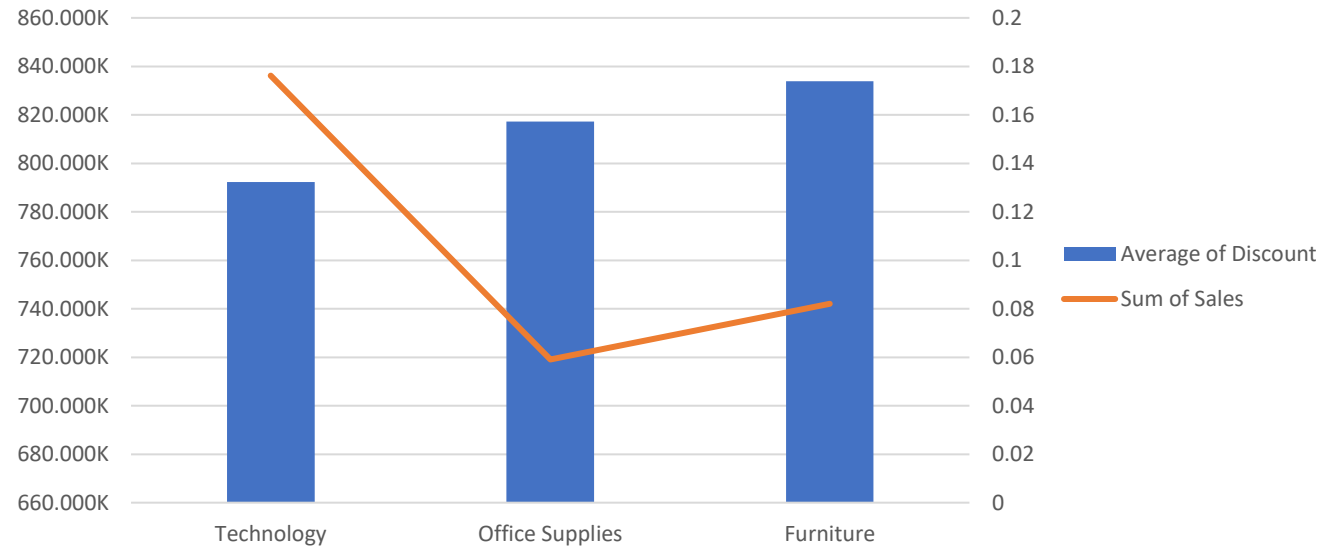


Gambar 2. column chart yang menampilkan sales vs customer id

Recommendation: Consider creating personalized loyalty programs or incentives for high-spending customers like SV-20365 and JE-15715. Rewarding their loyalty with exclusive benefits can encourage them to continue their high spending. Create targeted marketing campaigns specifically designed to attract and retain customers with similar profiles to SV-20365 and JE-15715. These campaigns can focus on the products or services that resonate with this customer segment.

Recommendations

3. Which product categories had the lowest average discount percent?



Gambar 3. Combo chart yang menampilkan sales vs customer id

Since the Technology category has the lowest average discount but the highest sales, the company should focus more marketing and promotions on this category to drive even higher sales. Technology products tend to have high demand, so they can still sell well even with lower discounts. For the Furniture category which has the highest average discount but lower sales than Technology, the company could consider decreasing the discounts a bit. Furniture is more elastic in demand, so reducing discounts may optimize profitability without too much reduction in sales volume. For Office Supplies, the average discount is in the middle but it has the lowest sales. The company could increase discounts here to drive higher sales volume, or revamp the product offerings to focus on faster-selling office items. Beyond discounts, the company can also boost sales through marketing campaigns, loyalty programs, bundle deals, and offering value-added services. A comprehensive strategy is needed to optimize sales and profits.

Recommendations

4. Which regions/state had the highest total sales for Technology?

Tabel 1. Tabel berisi kolom Category dan Sales.

Category	Sales
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Recommendation: Focus marketing and promotions for Office Supplies more in the West region, since it has the highest sales for this category. Central region has the lowest Office Supplies sales, so the company could consider reducing inventory/selection here. For Furniture, the West region again has significantly higher sales. Additional marketing, competitive pricing, and maintaining good inventory levels could further boost Furniture sales in the West. For Technology, sales are more evenly distributed by region, with East having the highest share. The company should ensure Technology products are well-stocked across regions to align with demand. Consider running regional promotions or discounts periodically for categories that are underperforming in certain regions relative to their category potential. This can help boost sales.

Key Findings

5. What was the best selling product? Bisa dari kuantitas/ total sales

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Recommendation: Focus marketing and promotions on the top selling products like Staples, Canon copiers, and Fellowes binding machines to drive more sales of already popular items. Analyze what is making lower selling products less successful and identify opportunities to boost their sales through pricing adjustments, bundling, and targeted promotions. For lower volume but higher priced products like the video conferencing system, explore opportunities to drive business sales and partnerships to increase volumes. Assess inventory levels regularly and ensure top products are well-stocked to align with demand. Avoid overstocking of slower items.

Conclusion

The analysis of the e-commerce sales data from 2011 to 2014 provides valuable insights into product performance, customer segments, and sales trends. The top selling sub-categories are phones and chairs, indicating strong demand in those product lines. Customers like SV-20365 and JE-15715 have high lifetime value and spending levels, presenting opportunities for personalized loyalty programs.

Technology has the lowest average discount but the highest sales volume, so discounts could potentially be decreased without reducing demand. Meanwhile, sales of Office Supplies lag the other categories, so expanded promotions and discounts may help improve performance. Geographically, the West region leads sales for Office Supplies and Furniture, while demand for Technology is more uniform across regions.

At the product level, office staples, Canon copiers, and Fellowes binding machines are the top sellers based on quantity and revenue. Maintaining availability of leading products can help match supply to high demand. Slow moving items may require pricing adjustments or bundling strategies to increase sales.

Overall, the analysis reveals areas where targeted marketing, competitive pricing, inventory optimization, and customer loyalty programs could boost revenues. By leveraging data-driven insights on product, customer, and geographic performance, the company can refine its e-commerce strategy to maximize sales growth and profitability.