**Data Visualization**

1. **1st KPI  (Old Version)**
2. **The trend of total number of orders**
3. Columns: Year (Order Date)
4. Rows:
5. Marks: CNTD Order number
6. **Average orders per customer**
7. Columns:
8. Rows: Year (Order Date), CNTD Order number & CNTD Customer number
9. Marks: AGG Calculation
10. **Revenue earned on the orders**
11. Columns: SUM (sales amount)
12. Rows: Year (Order Date), AGG (Total orders)
13. Marks: sum (sales amount)
14. **1st KPI (Updated)**
15. **The trend of total number of orders**
16. Columns:
17. Rows:
18. Marks: AGG (Total Orders) Text
19. Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Action (Year (Order Date))
20. **The Total Customers**
21. Columns:
22. Rows:
23. Marks: AGG (Total Customers) Text
24. Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Action (Year (Order Date))
25. **Average orders per customer**
26. Columns:
27. Rows
28. Marks: AGG (Average Orders per Customer) Text
29. Filters: Year (Order Date), Action (Customer Province1, Vendor Country)
30. **The trend of Orders**
    * + 1. Columns: Sum (Order Date)
        2. Rows:  Year (Order Date), AGG (Total Orders), AGG (Total Customers), AGG (Average Orders Per Customers)
        3. Marks: Sum (Sales Amount) Text.
        4. Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Action (Year (Order Date))
31. **The trend of Returned Orders**
32. Columns: Sum (Order Date)
33. Rows:  Year (Order Date), SUM (Order Quantity)
34. Marks: Sum (Sales Amount) Text.
35. Filters: Year (Order Date), Action (Year (Order Date)), Item Description, Order Quantity Defintion.
36. **The Shipping Status**
37. Columns:
38. Rows:  Year (Order Date), SUM (Order Quantity), SUM (Shipped Quantity), SUM (Discrepancies)
39. Marks: Sum (Discrepancies) Text
40. Filters: Year (Order Date)
41. **Top Items Shipping Discrepancies**
42. Columns:
43. Rows:  Year (Order Date), Item Description (Ascending), SUM (Discrepancies)
44. Marks:
45. Filters: Year (Order Date), Item Description, SUM (Discrepancies), Index ()
46. **2nd KPI (Sales amount – to define the revenue / profitability)**
47. **Top sales performers by items**
48. Columns: SUM (Sales amount)
49. Rows: Index, Item description (descending by sales amount)
50. Marks: SUM (sales amount) text.
51. Filters: Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Index
52. **Top sales performers by customers**
53. Columns: SUM (Sales amount)
54. Rows: Index, Customer Number (descending by sales amount)
55. Marks: SUM (Sales amount) text
56. Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Index, Customer Province1
57. **Top sales performers by orders (order month) - need to brainstorm on how to do this**
58. Columns:  MONTH (Order Date)
59. Rows:  SUM (Sales Amount)
60. Marks: YEAR (Order Date) color, AGG (Total Orders) detail, AGG (Total Customers) detail, AGG (Average Ordes Per Customer] detail, SUM (Sales Amount) detail.
61. Filters: Year (Order Date), Action (Customer Province1, Vendor Country)
62. **Top sales performers by regions**
63. Columns: Longitude
64. Rows: Latitude
65. Marks: SUM (sales amount) color, SUM (sales amount) text, Customer province text, Vendor country detail
66. Filter: Latitude, Longitude, YEAR (order date), Action (Customer Province1, Vendor Country),
67. **Top sales performers by brands (assuming Vendors)**
68. Columns: SUM (Sales amount)
69. Rows: Index, Vendor Name (descending by sales amount)
70. Marks: SUM (Sales amount) Text
71. Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Index, Customer Province, Action (YEAR(Order Date))
72. **Top sales performers by customers (assuming company)**
73. Columns:
74. Rows:
75. Marks: Company Name color, SUM (sales amount) Angle, SUM (sales amount) Size, SUM (sales amount) Text, Company Name Text.
76. Filters: Year (Order Date), Action (Customer Province1, Vendor Country), Action (YEAR(Order Date))

Notes: large scale company is a group, it has 3 brands / companies / subsidiaries. Need to update the customers assumption.

1. **2nd KPI (Order quantity – to define the demand)**
2. **Top sales performers by product**
3. Columns: SUM (order quantity)
4. Rows: Item description (descending by sales amount)
5. Marks: SUM (order quantity) text, SUM (Sales Amount) Detail
6. Filters: index, products – to sort, YEAR (order date), Action (Customer Province1, Vendor Country),
7. **Top sales performers by customers**
8. Columns:
9. Rows:
10. Marks:
11. **Top sales performers by orders**
12. Columns:
13. Rows:
14. Marks:
15. **Top sales performers by regions**
16. Columns:
17. Rows:
18. Marks:
19. **Top sales performers by brands**
20. Columns:
21. Rows:
22. Marks:

1. **3rd KPI**
2. **Year-over-year sales growth** (need to figure out how to do the sales amount difference) by % growth
3. Columns:  Sales Amount Different
4. Rows:  YEAR (Order Date), QUARTER (Order Date), MONTH (Order Date), SUM (Sales Amount), Sales Amount in Previous Year), Sales Amount Difference
5. Marks:  Color Flag Color, Sales Amount Text.
6. Filters: YEAR (Order Date), Sales Amount in Previous Year, Action (Customer Province1, Vendor Country), Action (Year (Order Date))
7. **Inventory value in hand – not available**
8. Columns:
9. Rows:
10. Marks:

Notes: inventory status

A = available

E= expired

G=

J=

M=

P=

R=

1. Cost of goods sold – not available. Need to figure out how to do this
2. Columns:
3. Rows:
4. Marks:

Include inventory status in the recommendation to refine the data processing standards in the future. For now, this data is not available hence inventory value in hand is not answerable.

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| **METRICS** | **VARIABLES** | **GRAPH/CHART/TABLES** | **REASON** |
| The Trend of Total Number of Orders | * **Marks:** AGG (Total Orders) - Text. * **Filters:** Year (Order Date), Customer Province. |  | * When choosing each year, stakeholders would immediately see an overview of the total number of orders quickly. |
| The Total Customers | * **Marks:** AGG (Total Customers) – Text. * **Filters:** Year (Order Date), Customer Province. |  | * When choosing each year, stakeholders would immediately see an overview of the total number of customers quickly. |
| Average Orders Per Customer | * **Marks:** AGG (Average Orders Per Customer) – Text. * **Filters:** Year (Order Date), Customer Province. |  | * When choosing each year, stakeholders would immediately see an overview of the average orders per customer quickly. |
| Revenue Earned On The Orders | * **Marks:** SUM (Sales Amount) – Text. * **Filters:** Year (Order Date), Customer Province. |  | * When choosing each year, stakeholders would immediately see an overview of the revenue earned on orders quickly. |
| The Trend of Orders | * **Columns:** SUM (Sales Amount). * **Rows:** YEAR (Order Date), AGG (Total Orders), AGG (Total Customers), AGG (Average Orders Per Customer). * **Marks:** YEAR (Order Date) - Color, SUM (Sales Amount) – Text. * **Filters:** Year (Order Date), Customer Province. |  | * Combining between table and horizontal bar graph from 2018 to 2020 to see the change the trend of orders in the retail industry from 2018 to 2020. |
| The Trend of Returned Orders | * **Columns:** SUM (Sales Amount) * **Rows:** YEAR (Order Date), SUM (Order Quantity), Order Quantity Definition * **Marks:** YEAR (Order Date), SUM (Sales Amount) * **Filters:** Year (Order Date), Customer Province. |  | * Similarly, combining between table and horizontal bar graph from 2018 to 2020 to see the trend of returned orders in the retail industry from 2018 to 2020. |
| The Shipping Status | * **Rows:** YEAR (Order Date), SUM (Order Quantity), SUM (Shipped Quantity), SUM (Discrepancies). * **Marks:** SUM (Discrepancies) – Text * **Filters:** Year (Order Date), Customer Province. |  | * Our group want to look at how the lacking discrepancies in each year over 3 years, we use a table calculation. |
| The Stock Status | * **Rows:** YEAR (Order Date), Item Description, SUM (Discrepancies). * **Filters:** Year (Order Date), Item Description, SUM (Discrepancies), Index, Customer Province |  | * Instead of using bar graph to find top N items have the number of lacking shipped quantity. We want to have an overview top lacking items throughout 3 years and comparing; therefore, we a table |
| Year Over Year Growth | * **Columns:** SUM (Sales Amount) * **Rows:** YEAR (Order Date), QUARTER (Order Date), MONTH (Order Date), SUM (Sales Amount), Sales Amount in Previous Year, Sales Amount Difference * **Marks:** SUM (Sales Amount) * **Filters:** Year (Order Date), Customer Province, Sales Amount |  | * Using a horizontal bar graph and two different colours (Blue showed increasing in the sales amount and Pink illustrated decreasing in the sales amount) so that stakeholders see clearly the change each quarter. |

**Figure 9: *The Detailed Information of Each Metric in Dashboard 1***

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| **METRICS** | **VARIABLES** | **GRAPH/CHART/TABLES** | **REASON** |
| Top Sales Performers By Region | * **Columns:** Longitude (generated). * **Rows:** Latitude (generated). * **Marks:** Customer Province – Color, Vendor Country – Text, Customer Province – Text, SUM (Sales Amount \_ - Text. * **Filters:** Year (Order Date), Customer Province, Sales Amount, Latitude (generated), Longitude (generated). |  | * Using the spatial chart can precise locations and geographical patterns in our data. |
| Top Sales Performers By Companies | * **Rows:** SUM (Zero), SUM (Zero). * **Marks:** Company Name – Color, SUM (Sales Amount) – Angle, SUM (Sales Amount)- Detail, Company Name - Text, SUM (Sales Amount) – Test. * **Filters:** Year (Order Date), Customer Province. |  | * Using the doughnut chart because stakeholders usually focus on reading the length of arcs rather than comparing the proportions between slices. Also, it is more space-efficient than pie charts because the blank space inside could be used to total sales |
| Top Sales Performers By Items (Revenue) | * **Columns:** Item Description. * **Rows:** SUM (Sales Amount) * **Marks:** YEAR (Order Date) – Color, AGG (Total Orders) – Detail, SUM (Sales Amount) – Text. * **Filters:** Year (Order Date), Customer Province, Sales Amount, Index |  | * Using the vertical bar graph, stakeholders can see easily which items (revenue) are the most common. |
| Top Sales Performers By Items (Quantity) | * **Columns:** SUM (Order Quantity) * **Rows:** Index, Item Description * **Marks:** SUM (Sales Amount**)** – Color, SUM (Sales Amount) – Detail, SUM (Order Quantity) - Detail * **Filters:** Year (Order Date), Customer Province, Sales Amount, Index |  | * By changing from a vertical bar graph to a horizontal bar graph, stakeholders can see easily which items (quantity) are the highest or most common |
| Top Sales Performers By Customers | * **Columns:** SUM (Order Quantity). * **Rows:** Index, Customer Number. * **Marks:** SUM (Sales Amount) – Color, SUM (Order Quantity) – Text. * **Filters:** Year (Order Date), Customer Province, Sales Amount, Index. |  | * Likewise, using the horizontal bar graph, stakeholders can see easily which customers are the highest sales orders. |
| Top Sales Performers By Vendors | * **Columns:** Vendor Name * **Rows:** SUM (Sales Amount) * **Marks:** SUM (Sales Amount) – Color, SUM (Order Quantity) – Text. * **Filters:** Year (Order Date), Customer Province, Sales Amount, Index. |  | * Similar to top sales performers by items (revenue), using the vertical bar graph, stakeholders can see easily which vendors are the highest sales amount. |
| Top Sales Performers By Orders | * **Columns:** MONTH (Order Date) * **Rows:** SUM (Sales Amount) * **Marks:** YEAR (Order Date) – Color, AGG (Total Orders) – Detail, AGG (Total Customers) – Detail, AGG (Average Orders Per Customer) – Detail, SUM (Sales Amount) – Detail * **Filters:** Year (Order Date), Customer Province. |  | * Showing the change trend on a yearly basis or comparing to 3 years, line chart is a simple way and useful to understand data. |
| Warehouse | * **Rows:** Warehouse Name. * **Marks:** CNTD (Order Number) – Color, CNTD (Order Number) - Text * **Filters:** Year (Order Date), Customer Province. |  | * We have got 7 warehouses in the North America retail industry, using a table can see easily an overview picture the total orders and simultaneously find out which warehouse had the highest number of orders |