

NORTHWIND TRADERS: SALES ANALYTICS

A Project Journey from Raw Data to Actionable Insights

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Project Objective & Details

Revolutionizing Data Interaction for Northwind Traders

The primary objective of this project was to create a visually appealing and user-friendly Power BI dashboard to effectively communicate key performance metrics for Northwind Traders.

The core aim was to move beyond static data and generate actionable insights into four key pillars of the business:

1. Sales Analysis: To understand revenue trends and sales patterns.
2. Customer Segmentation: To identify and understand key customer behaviors.
3. Inventory Trends: To monitor product performance and stock levels.
4. Employee Performance: To evaluate the contributions of the sales team.

Ultimately, this report is designed to empower all stakeholders—from sales managers to executive leadership—to make informed, data-driven decisions by facilitating data exploration through interactive visualizations and dynamic filters. The expected impact is to revolutionize how Northwind interacts with its data, enabling the company to drive its business forward and remain competitive.



A Strategy-First Approach: The MECE Framework

01

A project of this complexity necessitates a robust strategy before the application of any tools. The guiding philosophy for this entire endeavor was the MECE principle – which stands for Mutually Exclusive, Collectively Exhaustive.

02

This framework mandates the decomposition of a complex problem into smaller components that are non-overlapping (Mutually Exclusive) yet, in aggregate, fully address all facets of the problem (Collectively Exhaustive).

03

This principle was not merely a preliminary plan; it was the core methodology applied at every stage of the project, ensuring the analysis was structured, comprehensive, and methodologically sound."

Applying MECE to the Project Structure

Structuring the Analysis: The Four Pillars of the Business

The initial application of MECE was to the project's overall scope. I segmented the entire business analysis into four distinct, non-overlapping pillars:

1. Sales Performance: The "What" and "When" of sales.
2. Customer Analysis: The "Who" and "Where" of the customer base.
3. Supply Chain & Operations: The "From Where" and "How Efficiently."
4. HR & Employee Analysis: The "By Whom."

The Benefit: This structure provided a clear and logical roadmap for the entire project. It ensured a comprehensive analysis and directly informed the architecture of the final dashboard, with each page dedicated to one of these pillars."

Phase 1 - Data Transformation (Excel)

Step 1: Preparing the Foundation in Excel

01

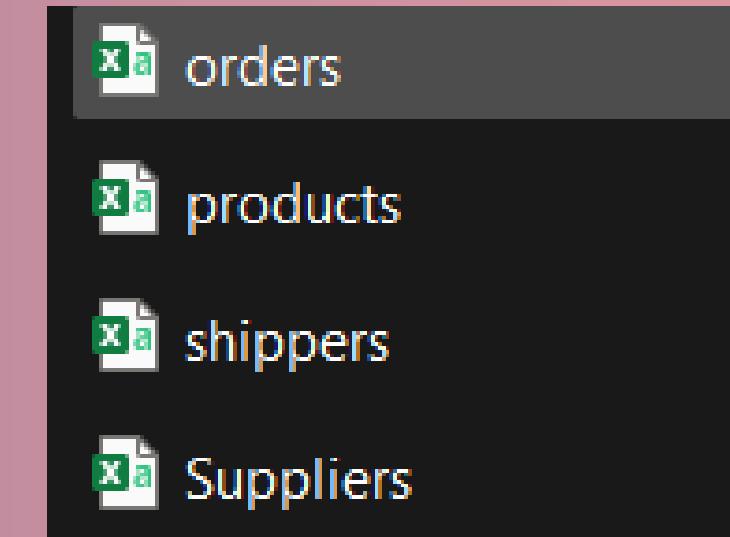
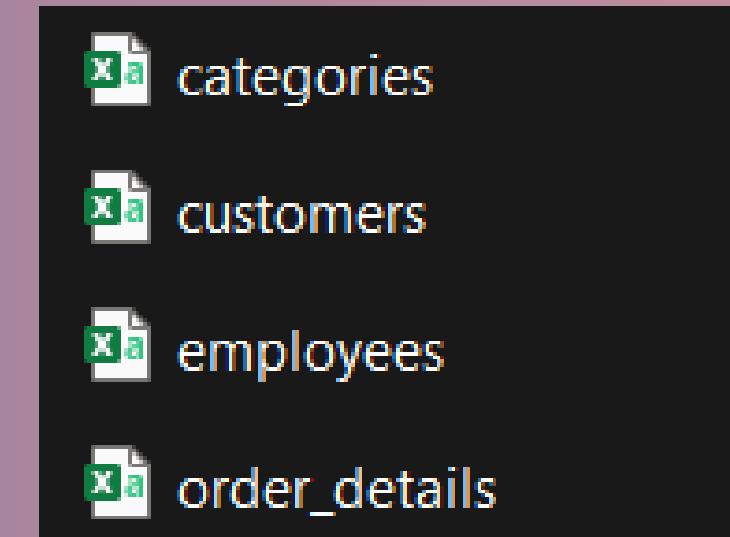
What We Did: The project began with the processing of eight raw CSV files. The initial data preparation phase was conducted using Microsoft Excel.

02

MECE Was Applied: Each file was treated as a discrete, 'mutually exclusive' task to ensure focused and accurate cleaning. The most critical transformation was the creation of a **Revenue** column in the **order_details** file.

03

Its Benefits: By isolating and pre-calculating this core metric at the outset, we optimized the entire downstream process. This is a prime example of MECE thinking. The benefit was a significant improvement in the performance and simplicity of all subsequent SQL queries, which reduced processing time and minimized the potential for errors."



Phase 2 - Exploratory Data Analysis (MySQL)

Step 2: Uncovering Deep Insights with SQL

01

What We Did: Following the data preparation phase, the cleaned files were loaded into a MySQL database. I then executed a series of complex SQL queries to address the 15 predefined Exploratory Data Analysis (EDA) questions.

02

How MECE Was Applied: The 15 EDA questions were categorized into our four established pillars. This methodology allowed for a systematic and focused exploration of the data, tackling one domain at a time—from customer demographics to sales trends—ensuring the analysis was 'collectively exhaustive.'

03

Why It's Important & Its Benefits: This structured approach prevented a random or haphazard querying process. It allowed us to build a coherent narrative about the business, where each insight became a crucial building block for the final dashboard design."

File Edit View Query Database Server Tools Scripting Help

Navigator

SCHEMAS

Filter objects

- acciojob
- ajclass
- learning_sql
- sales_analysis**
 - Tables
 - categories
 - customers
 - employees
 - order_details
 - orders
 - products
 - shippers
 - suppliers
 - Views
 - Stored Procedures
 - Functions
- sales_analysis_project
- sql_class
- sys

Administration Schemas

Information

No object selected

Object Info Session

sql x

189 /* 7.What trends can we observe in hire dates across employee titles? *

190 • SELECT

191 YEAR(STR_TO_DATE(HireDate, '%Y-%m-%d')) AS HireYear,

192 Title,

193 COUNT(EmployeeID) AS NumberOfHires

194 FROM employees

195 GROUP BY YEAR(STR_TO_DATE(HireDate, '%Y-%m-%d')), Title

196 ORDER BY HireYear, Title;

197

Result Grid | Filter Rows: Export: Wrap Cell Content:

HireYear	Title	NumberOfHires
2001	Sales Representative	2
2002	Sales Representative	1
2003	Sales Representative	1
2005	Inside Sales Coordinator	1
2014	Vice President, Sales	1
2015	Sales Representative	1
2017	Sales Manager	1

Result 1 x

Output

Action Output

#	Time	Action	Message
3	15:43:16	USE sales_analysis	0 row(s) affected
4	15:43:27	SELECT YEAR(STR_TO_DATE(HireDate, '%Y-%m-%d')) AS HireYear, Title, COUNT(...)	8 row(s) returned

Phase 3 - Validating Insights in Excel

Step 3: Rapid Prototyping & Insight Validation in Excel

- 01** What We Did: After executing each SQL query, I performed an essential intermediate step. I pasted the raw output from MySQL directly into Excel. For each of the 15 questions, I then created quick, focused visuals using Pivot Tables and Charts.
- 02** How MECE Was Applied: This step is a practical application of the MECE principle at the micro-level. Each Excel sheet became a 'mutually exclusive' container for a single, isolated insight. This allowed me to validate the answer to one question at a time, ensuring each piece of the analysis was correct and told a clear story on its own.
- 03** Why It's Important & Its Benefits: This is a critical quality assurance and rapid prototyping phase. Before investing time in designing a polished Power BI visual, I could quickly generate a simple chart in Excel to confirm that the data was logical and the insight was sound. This process de-risked the final dashboarding stage and helped refine the analytical narrative."

A B C D E F G H I J K L M N O P Q R S T U

7. What trends can we observe in hire dates across employee titles?

```
SELECT
    YEAR(STR_TO_DATE(HireDate, '%Y-%m-%d')) AS HireYear,
    Title,
    COUNT(EmployeeID) AS NumberOfHires
FROM employees
GROUP BY YEAR(STR_TO_DATE(HireDate, '%Y-%m-%d')), Title
ORDER BY HireYear, Title;
```

Insights from it:

Company Growth Phases: This query will reveal the company's hiring history. You will likely see an initial hiring push in 1992 and 1993, where most of the core sales team was established.

Role Evolution: The trend shows when different roles were created. The initial hires were leadership (Vice President, Sales) and the main workforce (Sales Representative), while the Sales Manager role was filled later in 1993.

Hiring Stabilization: The output will show that hiring dropped off after 1994. This indicates that the company quickly built its foundational team and has had low turnover since, suggesting a stable workforce.

HireYear	Title	NumberOfHires
2001	Sales Representer	2
2002	Sales Representer	1
2003	Sales Representer	1
2005	Inside Sales Co	1
2014	Vice President,	1
2015	Sales Representer	1
2017	Sales Manager	1
2017	Sales Representer	1

Years	NumberOf_Hires
2001	2
2002	1
2003	1
2005	1
2014	1
2015	1
2017	2

< > Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 RFM ANALYSIS ... + : ← →

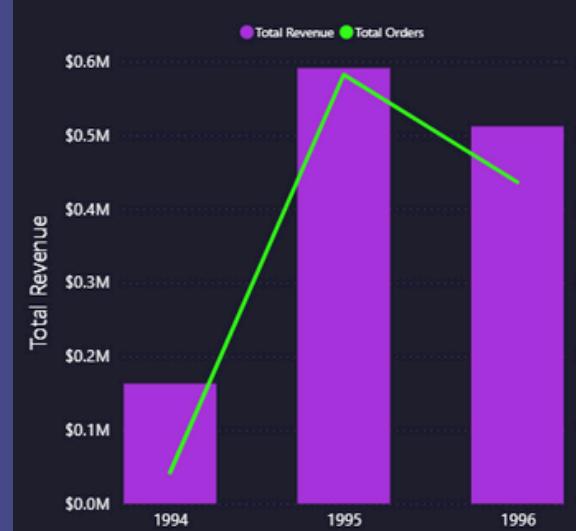
Phase 4 - Telling the Story with Power BI

Visualizing the Final Narrative in Power BI

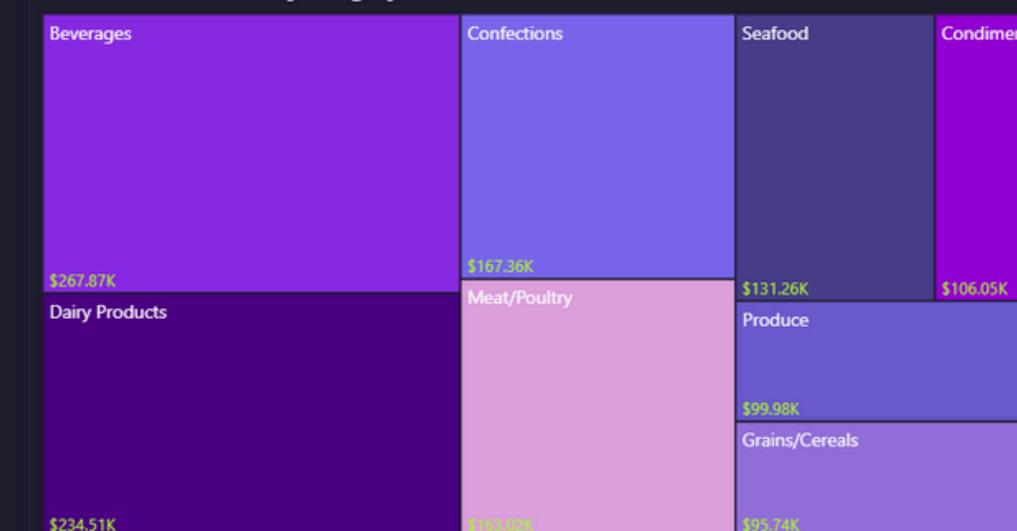
- 01** What We Did: With our insights validated, the final phase was to construct the interactive dashboard in Power BI.
- 02** How MECE Was Applied: The architecture of the final dashboard is a direct reflection of our original four-pillar framework. I created a separate, dedicated page for each analytical domain: an Executive Summary, a Customer deep-dive, a Sales analysis, and so on. Each page functions as a self-contained, 'mutually exclusive' yet 'collectively exhaustive' view of its topic.
- 03** Why It's Important & Its Benefits: This design makes the final report exceptionally user-friendly. A stakeholder can navigate directly to the page relevant to them and find all the information they need, without being encumbered by unrelated data. This structure ensures the right insights are delivered to the right audience with maximum clarity."

Sales & Order Performance Dashboard

Total Revenue and Order Trend Over Time



Revenue Contribution by Category



Distribution of Order Values



Top 10 Products by Revenue



HR & Employee Dashboard

Employee Count by Job Title



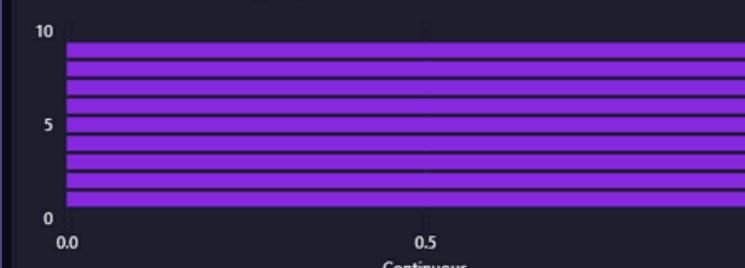
Employee Distribution by Country



Company Reporting Structure

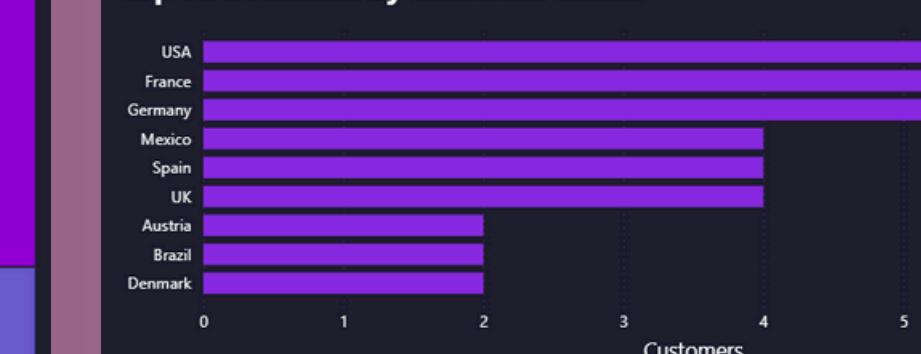
HierarchyPath	First Title
2	Vice President, Sales
2 1	Sales Representative
2 3	Sales Representative
2 4	Sales Representative
2 5	Sales Manager
2 5 6	Sales Representative
2 5 7	Sales Representative
2 5 9	Sales Representative
2 8	Inside Sales Coordinator
Total	Inside Sales Coordinator

Distribution of Employee Tenure



Customer Analysis Dashboard

Top 10 Countries by Customer Count



Revenue by Country



Customer Distribution by Country and Contact Title



Supply Chain & Operations Dashboard

Average Shipping Duration by Country



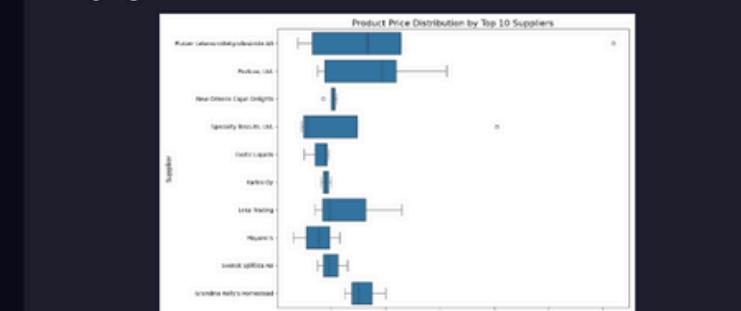
Geographical Distribution of Suppliers



Top 10 Suppliers by Product Count



CompanyName and UnitPrice



These are the key measures I have used across all analysis sheets to make the task optimized and concise.

The screenshot shows a Power BI desktop interface with a dark theme. At the top is the ribbon menu with tabs: File, Home (selected), Insert, Modeling, View, Optimize, and Help. Below the ribbon are several toolbars: Clipboard, Data, Queries, Insert, Calculations, Sensitivity, Share, and Copilot. The main area displays a dashboard with four cards:

- Total Revenue: \$1.27M
- AVG_Order Value: \$1.53K
- Total Orders: 830
- Total Customers: 89

Below the dashboard, there is a large dark rectangular area containing the text: "These are the key measures I have used across all analysis sheets to make the task optimized and concise." At the bottom of the screen, the ribbon menu is repeated, along with a list of open reports: "Northwind Traders - Sales Performance Das...", "Executive summary" (selected), "Customer Analysis (Q1,Q3)", "Sales & Order Performance (Q1,2,4,5,10,11,...)", and "Supply Cha".

The screenshot shows a list of key measures in a Power BI context. The title is "Keymeasures". The list includes the following items:

- Avg Shipping Duration
- AVG_Order Value
- Total Customers
- Total Orders
- Total Revenue

Each item has a checkbox icon and a small icon representing the measure type (calculator).

The screenshot shows the Power BI ribbon menu at the bottom of the screen, identical to the one in the main dashboard. It includes icons for report view, canvas view, back, forward, and a list of open reports: "Northwind Traders - Sales Performance Das...", "Executive summary" (selected), "Customer Analysis (Q1,Q3)", "Sales & Order Performance (Q1,2,4,5,10,11,...)", and "Supply Cha".

DASHBOARD INSIGHTS: CUSTOMER & SALES DYNAMICS

Key Findings: The External View - Customers and Sales

- 01** The dashboards yielded several critical external insights:
 - Customer Analysis: Our customers are primarily other businesses, with 'Owners' and 'Sales Representatives' as the most common roles. Geographically, the business is heavily concentrated in the **USA** and **Germany**.
 - Sales Performance: There is a distinct seasonal pattern, with sales consistently peaking in the fourth quarter. Furthermore, **Beverages** and **Dairy Products** were identified as the highest-performing categories.
- 02** The Benefit: These are strategic directives. This intelligence informs where to focus marketing expenditure and how to optimize inventory for seasonal demand."

DASHBOARD INSIGHTS: OPERATIONS & INTERNAL PERFORMANCE

Key Findings: The Internal View - Operations and People

01

Looking internally, the dashboards revealed:

- Supply Chain & Operations: Our supply chain is geographically concentrated in specific regions like Europe and the USA, which is a **potential risk**. We also identified key suppliers who are specialists in critical categories.
- HR & Employee Analysis: The data confirms we are a sales-driven organization with a stable and experienced team, operating from dual hubs in **Seattle and London**.

02

The Benefit: These insights highlight areas for operational improvement, such as diversifying the supply chain to reduce risk, and confirm the strength of our experienced sales team."

EXTRA ANALYSIS - RFM SEGMENTATION IN EXCEL

Going Beyond: Actionable Customer Segmentation with RFM

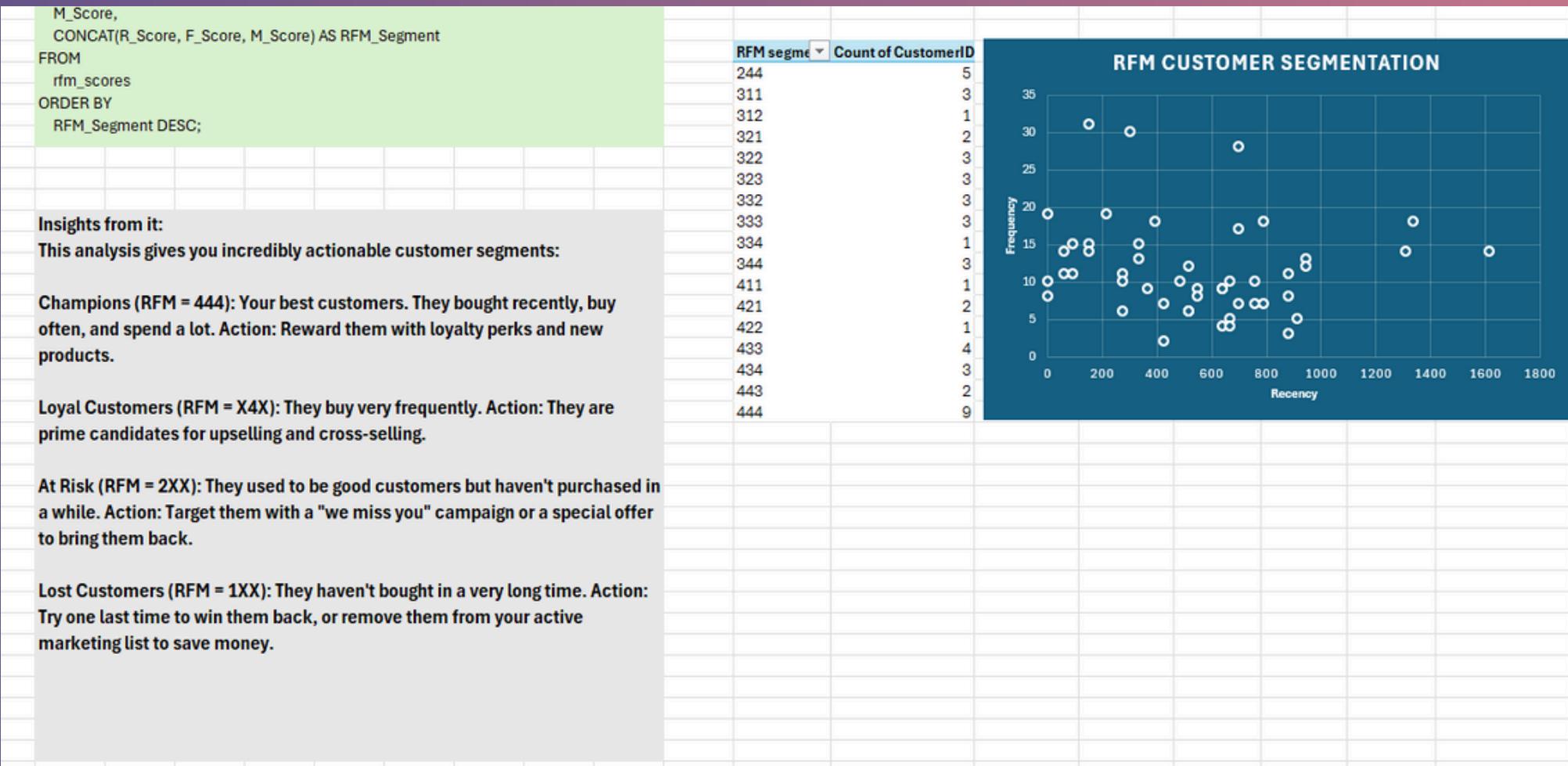
01

- What We Did: To deliver additional value, I conducted a bonus RFM analysis, a standard industry technique that segments customers based on their Recency, Frequency, and Monetary behavior.
- How MECE Was Applied: The RFM model is, in itself, a MECE framework. It segments the entire customer base into distinct, non-overlapping groups like 'Champions,' 'At Risk,' and 'Lost Customers.'

02

Why It's Important & Its Benefits: This elevates the analysis from descriptive reporting to predictive strategy. The marketing team can now execute hyper-targeted campaigns: reward the 'Champions,' re-engage the 'At Risk' customers, and cease spending on those who are 'Lost'."

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	16 -- RFM ANALYSIS (Recency, Frequency, Monetary) for Customers																		
2																			
3	Recency: How recently did they buy? (More recent = better)																		
4																			
5	Frequency: How often do they buy? (More frequent = better)																		
6																			
7	Monetary: How much money do they spend? (More money = better)																		
8																			
9	By scoring each customer on these three factors, we can create																		
10	powerful segments like "Champions," "Loyal Customers," "At Risk,"																		
11	and "Lost Customers." This is a very professional analysis that																		
12	provides direct, actionable insights.																		
13																			
14																			
15																			
16																			
17																			
18	WITH rfm_values AS (
19	SELECT																		
20	o.CustomerID,																		
21	DATEDIFF((SELECT MAX(STR_TO_DATE(OrderDate, '%Y-%m-%d')) FROM orders),																		
22	MAX(STR_TO_DATE(o.OrderDate, '%Y-%m-%d'))) AS Recency,																		
23	COUNT(DISTINCT o.OrderID) AS Frequency,																		
24	SUM(od.Revenue) AS Monetary																		
25	FROM																		
26	orders o																		
27	JOIN																		
28	order_details od ON o.OrderID = od.OrderID																		
29	GROUP BY																		
30	o.CustomerID																		
31),																		
32	rfm_scores AS (
33	SELECT																		
34	CustomerID,																		
35	Recency,																		
36	Frequency,																		
37	Monetary,																		



Conclusion & Recommendations

Conclusion: From Disparate Data to Cohesive Strategy

- 01** In conclusion, this project represents a complete journey through the data analysis lifecycle. Guided at every stage by the MECE principle, we successfully transformed a collection of raw data files into a powerful, interactive business intelligence tool. The primary benefit is that Northwind Traders now possesses a 360-degree view of their business, enabling a shift to proactive, data-driven strategy.

- 02** Based on our findings, my key recommendations are to Northwind traders :
 1. Intensify Focus on High-Value Markets
 2. Implement a Targeted Loyalty Program
 3. Optimize Inventory for Seasonality
 4. Diversify the Supply Chain"



Thank You