

International Sales and **Revenue Analysis of** **Multinational Store**

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Introduction

A multinational brand has its stores located in two continents, specifically in Germany, France, Canada and Mexico. The brand has different products in their stores, and each product belongs to a specific category and season, as well as related to a unique third-party manufacturer.

The raw data about international sales of the brand in each country is available separately as Excel .csv files in a folder. Further we also have 4 other Excel workbooks that act as database for company's structure of dates and yearly quarters, product details and IDs, geographical locations, and ZIP codes of company's stores and one workbook containing only links to flags of different countries where company operates.

Using Power BI and Business intelligence, I worked on providing different views of the international sales of the company relative to location/category/season/manufacturer of product(s), as well as tried to predict future trends of revenue using visualization tools of Power BI

Source Data and Type

As mentioned in the introduction, the excel workbooks were connected to Power BI where each workbook acting as a Table in the Data source. Further, the folder "International Sales" containing 4 .csv files was connected to Power BI using "Folder Connector" option. All .csv files have same number and type and name of columns in the folder.

Attached screenshot shows the imported data sources and Data Model :

Power Query Editor - POWER_BI - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Source Recent Sources Enter Data Data source settings Manage Parameters Refresh Advanced Editor Choose Columns Remove Columns Keep Rows Remove Rows Sort Split Column Group By Data Type: Date Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Text Analytics Vision Azure Machine Learning AI Insights

Queries [9]

Transform File from I... Helper Queries [3] Sample File Parameter1 (Sampl... Transform File Transform Sample File Other Queries [5] Date Location Products Flags InternationalSales

Table.AddColumn(#"Changed Type", "Week of Year", each Date.WeekOfYear([Date]), Int64.Type)

	Date	MonthNo	MonthName	MonthID	Month	Quarter
1	1/1/1999	1	Jan	199901	Jan-99	Q1
2	1/2/1999	1	Jan	199901	Jan-99	Q1
3	1/3/1999	1	Jan	199901	Jan-99	Q1
4	1/4/1999	1	Jan	199901	Jan-99	Q1
5	1/5/1999	1	Jan	199901	Jan-99	Q1
6	1/6/1999	1	Jan	199901	Jan-99	Q1
7	1/7/1999	1	Jan	199901	Jan-99	Q1
8	1/8/1999	1	Jan	199901	Jan-99	Q1
9	1/9/1999	1	Jan	199901	Jan-99	Q1
10	1/10/1999	1	Jan	199901	Jan-99	Q1
11	1/11/1999	1	Jan	199901	Jan-99	Q1
12	1/12/1999	1	Jan	199901	Jan-99	Q1
13	1/13/1999	1	Jan	199901	Jan-99	Q1
14	1/14/1999	1	Jan	199901	Jan-99	Q1
15	1/15/1999	1	Jan	199901	Jan-99	Q1
16	1/16/1999	1	Jan	199901	Jan-99	Q1
17	1/17/1999	1	Jan	199901	Jan-99	Q1
18	1/18/1999	1	Jan	199901	Jan-99	Q1
19	1/19/1999	1	Jan	199901	Jan-99	Q1
20	1/20/1999	1	Jan	199901	Jan-99	Q1
21	1/21/1999	1	Jan	199901	Jan-99	Q1
22	1/22/1999	1	Jan	199901	Jan-99	Q1
23	1/23/1999	1	Jan	199901	Jan-99	Q1

8 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED AT 10:28 PM

Query Settings

PROPERTIES

Name

Date

APPLIED STEPS

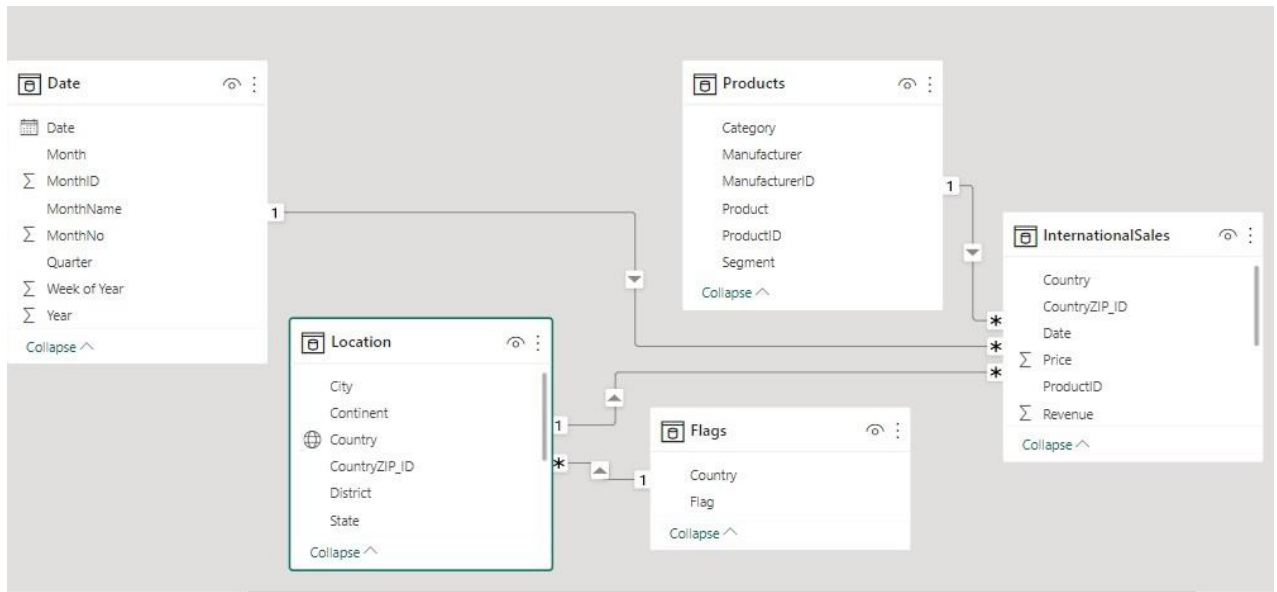
Source

Navigation

Promoted Headers

Changed Type

Inserted Week of Year



Data Transformation – ETL Jobs

Data transformation is a crucial part to prepare data for a realistic visualization. For that purpose, Power BI has its own ETL engine and Power Query feature to apply data transformations. In the screenshots below you can observe the ETL jobs applied to different columns in the right most column of each window. ETL jobs were applied to almost every table, but for reference I have attached only two screenshots here.

Queries [9]

Table.TransformColumnTypes(#"Added Custom",{"Price", type number})

	ProductID	Date	Zip	Units	Revenue	Country
1	202	5/29/2014	T6T	1	1443.6975	Canada
2	2122	6/3/2014	T6G	1	997.4475	Canada
3	927	6/4/2014	R2G	1	603.225	Canada
4	2224	8/18/2014	R3G	1	60.3225	Canada
5	443	8/18/2014	R3G	1	923.7375	Canada
6	548	8/14/2014	M4V	1	519.6975	Canada
7	426	8/4/2014	M4E	1	976.4475	Canada
8	506	10/24/2014	LSN	1	1296.6975	Canada
9	760	10/26/2014	R3G	1	165.3225	Canada
10	761	9/3/2014	LSN	1	191.5725	Canada
11	762	9/3/2014	LSN	1	191.5725	Canada
12	636	9/4/2014	MSX	1	881.9475	Canada
13	2055	9/4/2014	M6H	1	656.1975	Canada
14	2359	8/29/2014	R3V	1	477.6975	Canada
15	2368	8/29/2014	R3X	1	734.475	Canada
16	2412	8/29/2014	M4P	1	102.3225	Canada

Query Settings

PROPERTIES

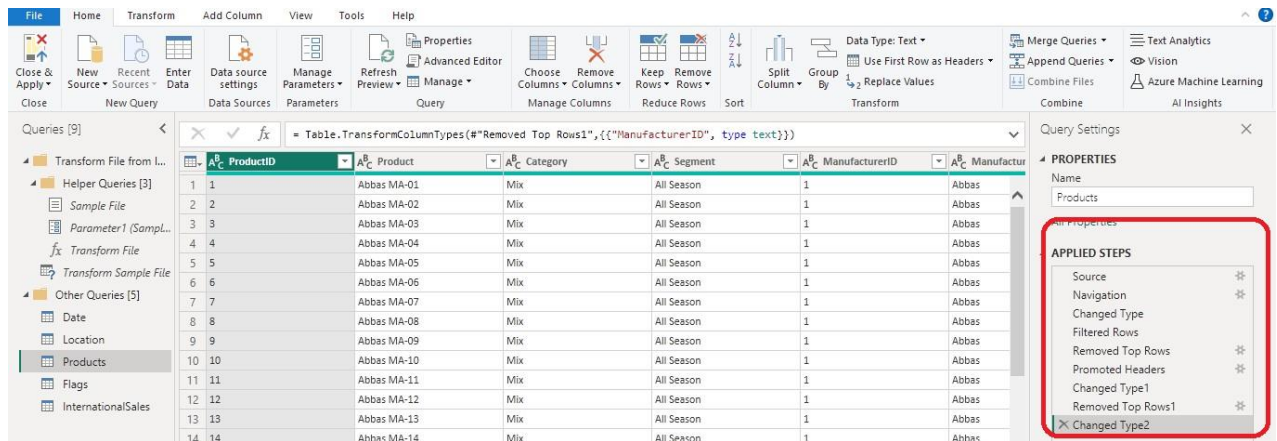
Name

InternationalSales

ETL Jobs

APPLIED STEPS

- Source
- Filtered Hidden Files1
- Invoke Custom Function1
- Renamed Columns1
- Removed Other Columns1
- Expanded Table Column1
- Changed Type
- Removed Columns
- Inserted Merged Column
- Added Custom
- Changed Type1



Power Query Scripts

The Power Query script for the “International Sales” data transformation is as follows :

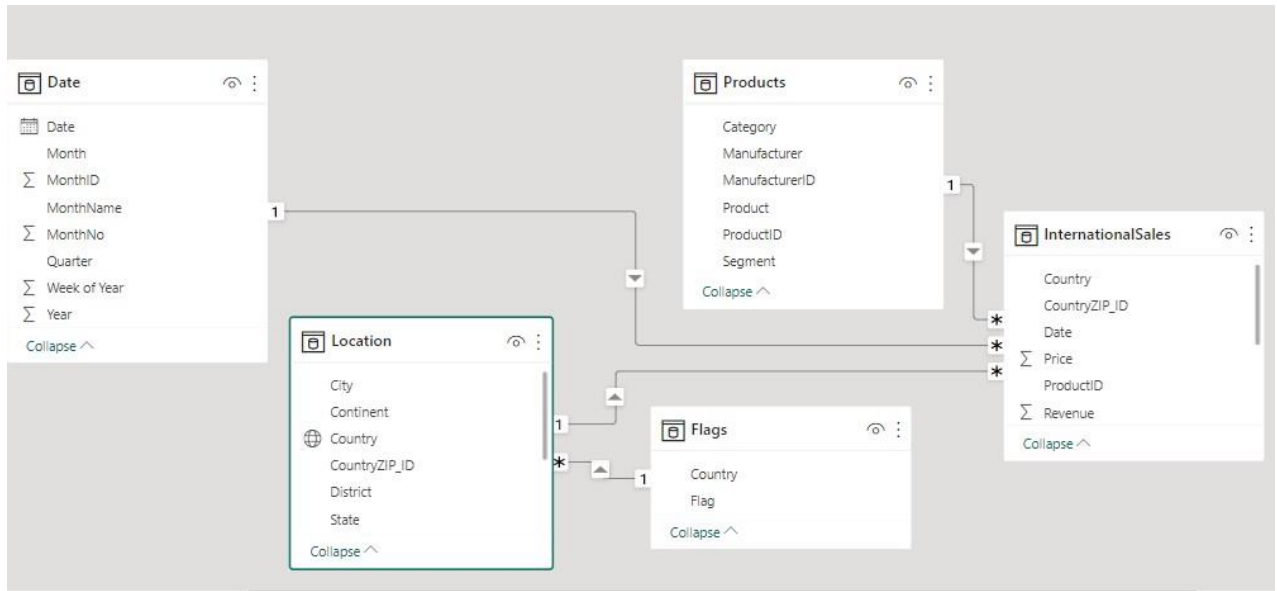
```
let
    Source = Folder.Files("C:\Users\Wel\Desktop\Power_BI\Complex - VanArsdel\InternationalSales"),
    #"Filtered Hidden Files1" = Table.SelectRows(Source, each [Attributes][Hidden]? <> true),
    #"Invoke Custom Function1" = Table.AddColumn(#"Filtered Hidden Files1", "Transform File", each #"Transform File"([Content])),
    #"Renamed Columns1" = Table.RenameColumns(#"Invoke Custom Function1", {"Name", "Source.Name"}),
    #"Removed Other Columns1" = Table.SelectColumns(#"Renamed Columns1", {"Source.Name", "Transform File"}),
    #"Expanded Table Column1" = Table.ExpandTableColumn(#"Removed Other Columns1", "Transform File", Table.ColumnNames(#"Transform File"("#Sample File"))),
    #"Changed Type" = Table.TransformColumnTypes(#"Expanded Table Column1",{{"Source.Name", type text}, {"ProductID", type text}, {"Date", type date}, {"Zip", type text}, {"Units", Int64.Type}, {"Revenue", type number}, {"Country", type text}}),
    #"Removed Columns" = Table.RemoveColumns(#"Changed Type",{"Source.Name"}),
    #"Inserted Merged Column" = Table.AddColumn(#"Removed Columns", "CountryZIP_ID", each Text.Combine([Country], [Zip]), type text),
    #"Added Custom" = Table.AddColumn(#"Inserted Merged Column", "Price", each [Revenue]/[Units]),
    #"Changed Type1" = Table.TransformColumnTypes(#"Added Custom",{{"Price", type number}})
in
    #"Changed Type1"
```

Another example for “Location” table:

```
let
    Source = Excel.Workbook(File.Contents("C:\Users\Wel\Desktop\Power_BI\Complex - VanArsdel\bi_geo.xlsx"), null, true),
    Table1_Table = Source[Item="Table1",Kind="Table"][Data],
    #"Changed Type" = Table.TransformColumnTypes(Table1_Table,{{"Zip", type text}, {"City", type text}, {"State", type text}, {"Region", type any}, {"District", type text}}, {"Country", type text}},
    #"Removed Columns" = Table.RemoveColumns(#"Changed Type",{"Region"}),
    #"Added Conditional Column" = Table.AddColumn(#"Removed Columns", "Continent", each if [Country] = "France" then "Europe" else null),
    #"Removed Columns1" = Table.RemoveColumns(#"Added Conditional Column",{"Continent"}),
    #"Added Conditional Column1" = Table.AddColumn(#"Removed Columns1", "Continent", each if [Country] = "France" then "Europe" else if [Country] = "Germany" then "Europe" else "Americas"),
    #"Filtered Rows" = Table.SelectRows(#"Added Conditional Column1", each true),
    #"Changed Type1" = Table.TransformColumnTypes(#"Filtered Rows",{{"Continent", type text}}),
    #"Inserted Merged Column" = Table.AddColumn(#"Changed Type1", "CountryZIP_ID", each Text.Combine([Country], [Zip]), "", type text)
in
    #"Inserted Merged Column"
```

Data Visualization

After Data Transformation, the next step is to check the data model automatically created by Power BI and making necessary adjustments accordingly. It is recommended to avoid Many-to-Many relations in data model. We try to keep maximum one link between two tables. It is better to connect tables in a hierarchical way to avoid duplicate/ double links.



In my data model, the “InternationalSales” table inherits attributes of all other tables but the “Flag” table is connected indirectly through the “Location” table.

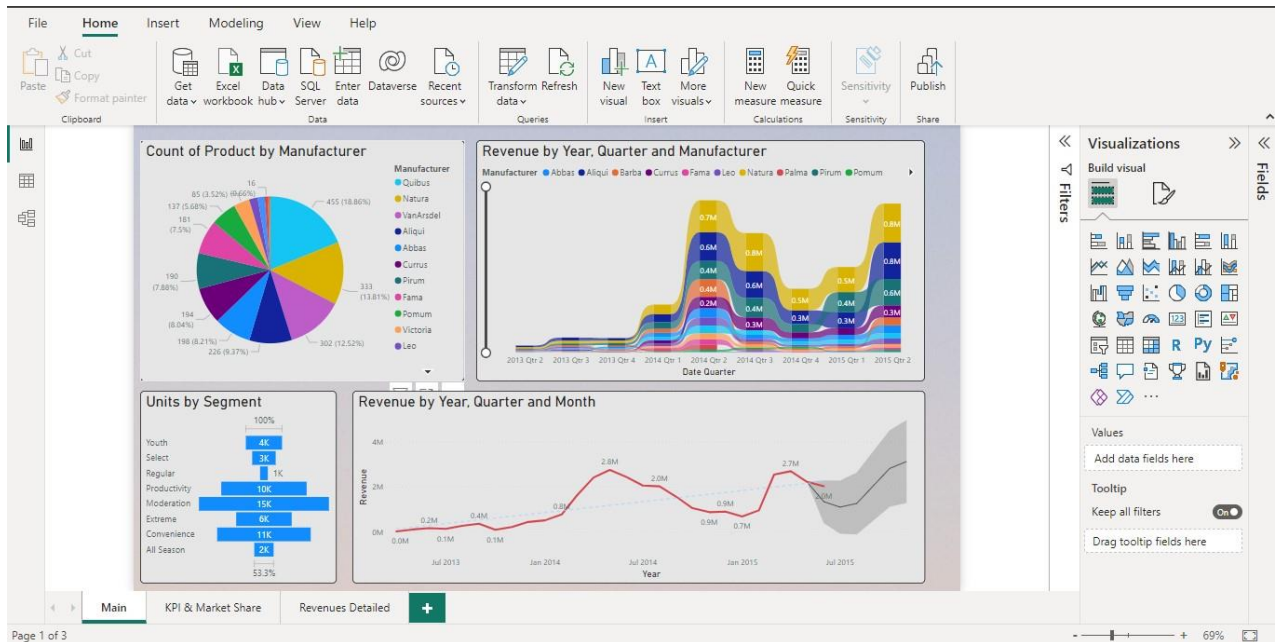
Reports Pages and Visualisation Blocks

There are 3 report pages each having different visualisation blocks in different data vies and perspectives.

In the first page:

- There is a pi chart showing count of products for each manufacturer
- A ribbon chart showing revenue trends of manufacturers by year or per quarter of year
- funnel charts

- A line chart showing revenue by year as well showing future predictions of the revenue using trend and seasonality concepts



Page 2 makes use of KPIs and measures calculated for “InternationalSales” table in order to calculate Market Share and Target value as shown below :

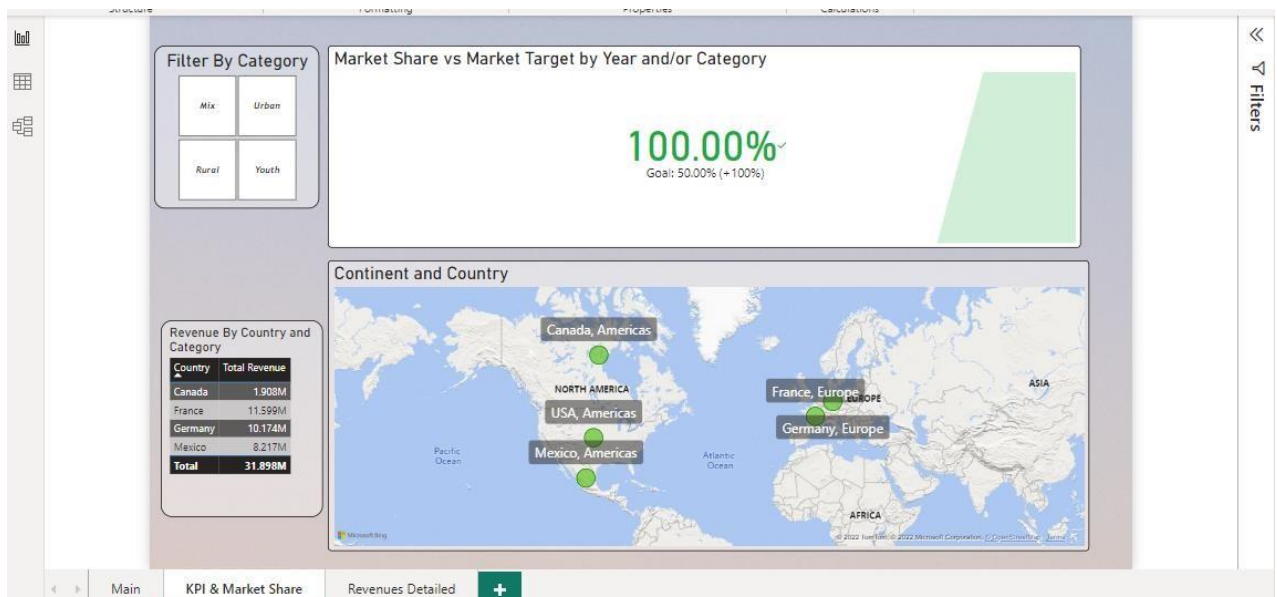
All_Revenue = Calculate(SUM(InternationalSales[Revenue]), ALL(Products[Category]))

Market_Share = DIVIDE([Total Revenue],[All_Revenue],0)

Total Revenue = Sum(InternationalSales[Revenue])

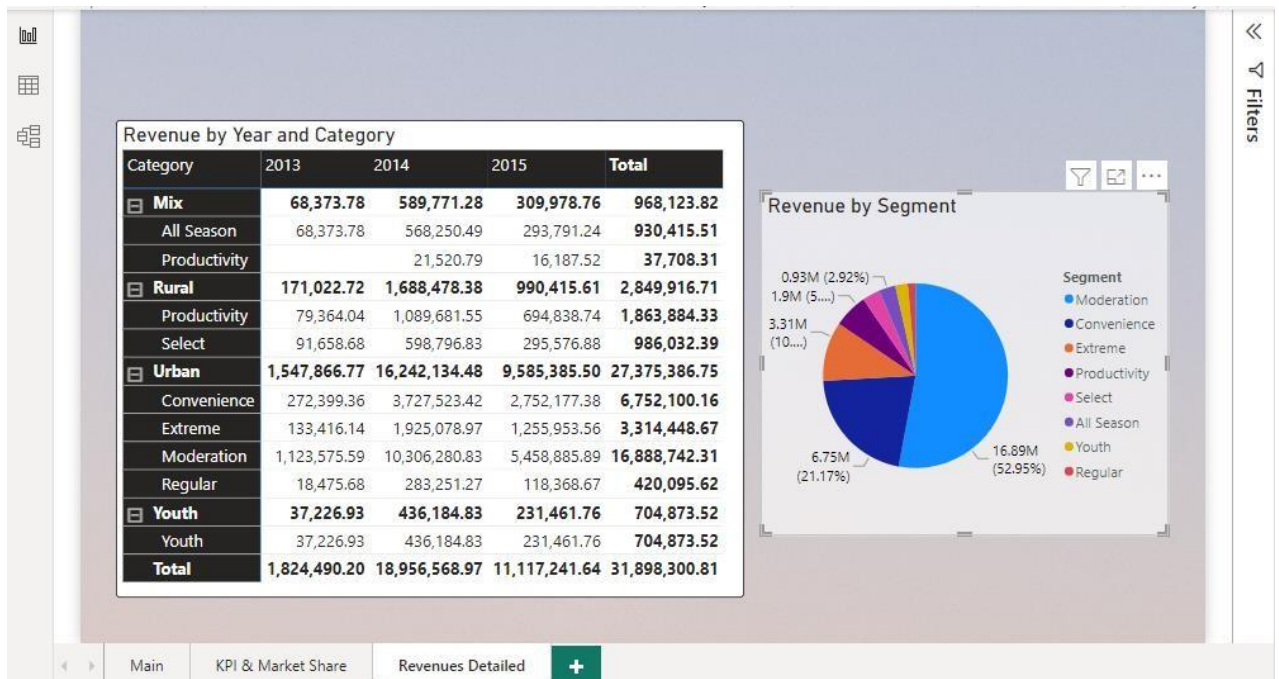
MS_Target = 0.5

- A KPI visualization which uses the above calculated measures to show market share by using category slicer and can also be changed by choosing a geographical area on the map
- A map showing the store locations as well as respective location revenues in an adjacent column



Page 3 contains:

- Revenue By Year, Category and Segment Matrix tool
- A Pie chart separately depicting Revenue by Segments over all the past years in data source

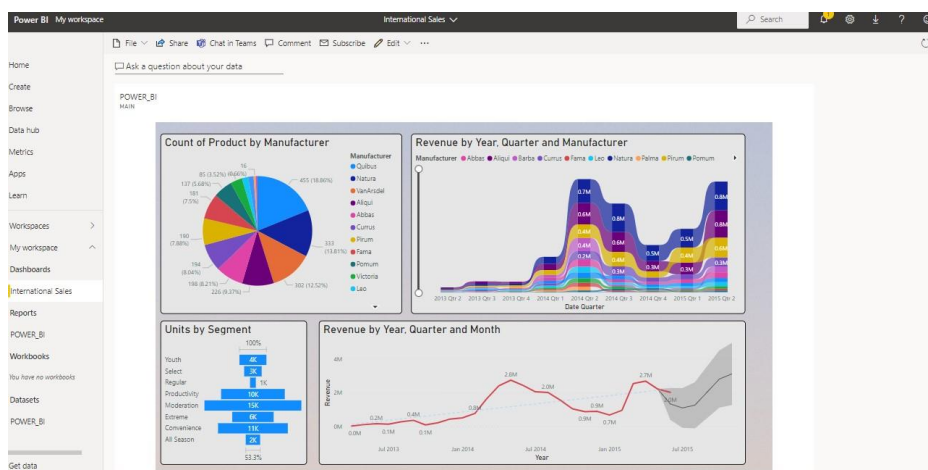


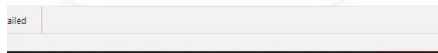
All the tools in the above reports are compatible with dynamic filtering and drill down features.

Final Location

The report is finally published on Microsoft Power BI cloud using BME university account. I have created a dashboard over there as well.

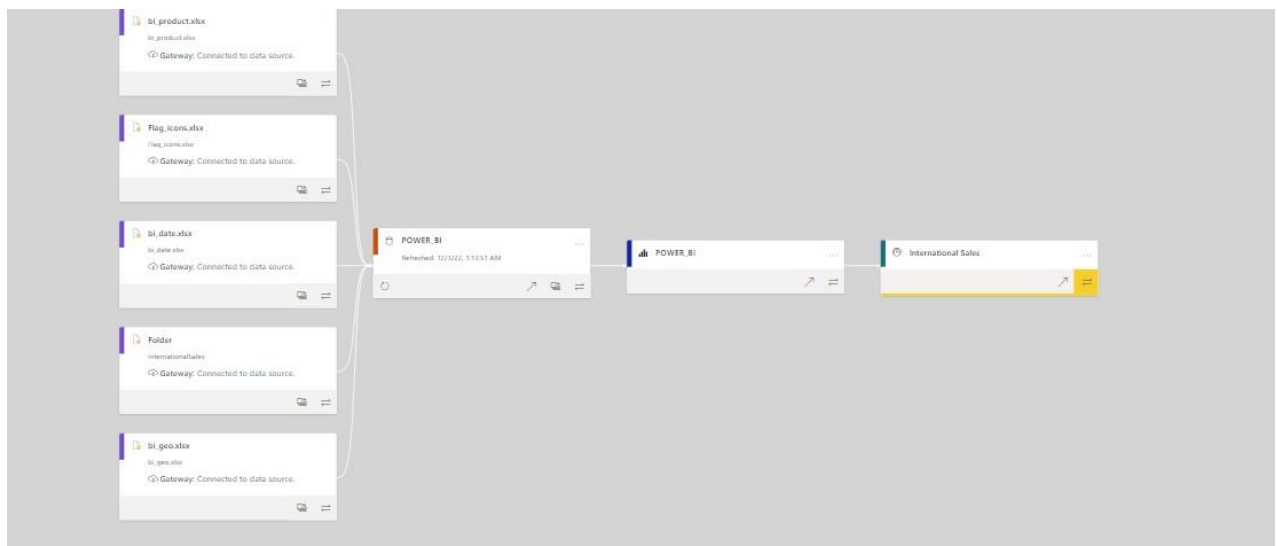
Dashboard





Mobile Layout is also configured.

Lineage View

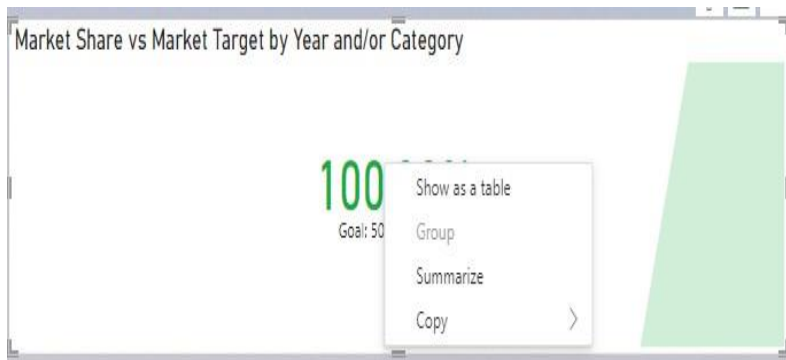


Special Functions Used

- Future Revenue Prediction



- KPIs , Calculated Measures



All_Revenue = Calculate(SUM(InternationalSales[Revenue]), ALL(Products[Category]))

Market_Share = DIVIDE([Total Revenue],[All_Revenue],0)

Total Revenue = Sum(InternationalSales[Revenue])

MS_Target = 0.5

- Contract Hierarchy (For Maps visualisation)



Conclusion

I found Microsoft Power BI, a platform with efficient, attractive and high degree creative visualisation tools as well as Data transformation and ETL features especially the availability of Machine learning and python tools.

