Project Report Data-Driven HR Analytics for Attrition and Performance

7th July 2025

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Document Version History

Version Number	Effective Date of release	Details	Author
1.0	7 July 2025	Initial Creation	Sujuandy

1. Project Background

The project titled *"Data-Driven HR Analytics for Attrition and Performance"* focuses on leveraging Power BI to analyze HR-related data, providing actionable insights into employee attrition and performance patterns.

By transforming and modeling real-world HR data, the project aims to simulate a business environment where learners like me, can apply data modeling, DAX, and visualization skills to address real HR concerns.

The dashboards created will support HR departments in making data-informed decisions regarding workforce retention, employee engagement, and performance trends.

This comprehensive project involves multiple activities: data cleaning, calculated column and measure creation, relationship modeling, and designing dynamic and interactive dashboards. The visualizations cover KPIs, demographic trends, performance distribution, and attrition behavior—structured across Overview, Demographics, Performance Tracker, and Attrition pages. Each dashboard page is tailored to meet specific analytical objectives relevant to HR.

2. Project Objective

- Develop a Comprehensive HR Dashboard:

  Create an interactive Power BI report that visualizes employee attrition and performance metrics across various organizational dimensions.

- Apply Data Transformation and Modeling Skills:

  Cleanse, enrich, and model multiple HR-related datasets using Power Query and DAX formulas to create calculated columns and meaningful measures.

- Perform HR Data Analysis for Insight Generation:

  Analyze demographic, departmental, and job role data to identify trends, patterns, and outliers in employee behavior and attrition.

- Enable Dynamic Filtering and Drill-Down Capabilities:

  Integrate slicers and hierarchies to allow HR decision-makers to explore data across dimensions like Department, Gender, Job Role, and Tenure.

- Demonstrate Visualization Best Practices:

  Design user-friendly, visually appealing charts, KPIs, gauges, and combined visuals that align with storytelling principles and support HR decision-making.

3. Project Specifications

Tools Used:

- Power BI Desktop: For data import, transformation, modeling, DAX measures, and report visualization.

- Excel: As the source for raw datasets such as employee data, attrition rates, and satisfaction metrics.

- Technical Components:
    - Data Transformation: Using Power Query to cleanse and shape data (e.g., correcting data types, handling nulls, creating Age Bins).

    - Data Modeling: Establishing relationships between multiple tables (e.g., Employee Data, Education, Performance Rating) and optimizing model directionality.

    - Calculated Columns and Measures: Implemented using DAX, including metrics such as %Attrition, Active/Inactive Employees, Average Salary, and Age Categories.

    - Interactive Visualizations: KPI cards, bar/column charts, pie charts, line charts, gauges, and combo charts across different pages with slicers for interactivity.

    - Filtering: Slicers for Employee ID, Gender, Job Level, and Year to enable contextual analysis.

Approach:

- Import and Clean Data – from Excel into Power BI using Power Query.

- Create Calculated Columns – e.g., Age Bin, Tenure Group.

- Build Relationships and Hierarchies – connect and normalize multiple tables.

- Develop Measures and KPIs – using DAX to support analysis.

- Design Visual Pages – Overview, Demographics, Performance, and Attrition with appropriate charts and filters.

- Iterate Based on Feedback – during mentoring sessions to refine layout and usability.
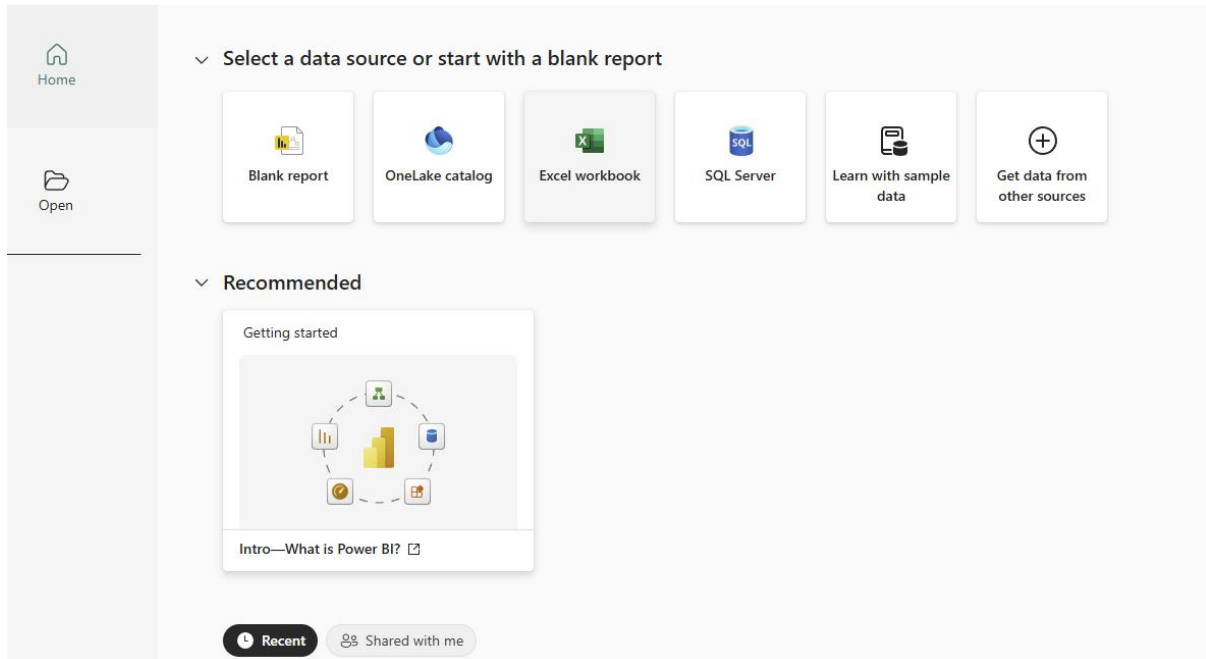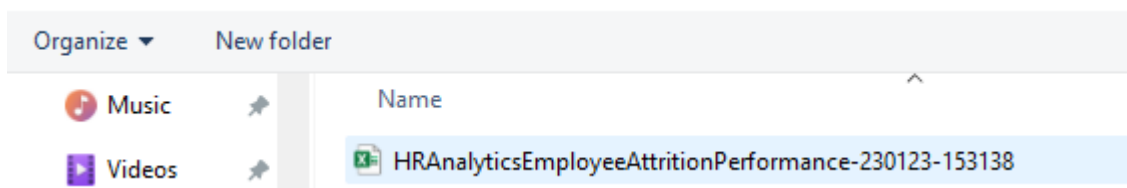
4. Project Tasks

4A. Activity 1

Please include screenshots 📷 and explanations in the provided space below.

1. Screenshots of Tables

Chose "Excel Workbook" data source

Select "HRAnalyticsEmployeeAttritionPerformance-230123-153138" data source.

Load tables "Education", "Attrition Rates", "Employee Data 2018 - 2019", "Job Involvement", "Performance Rating", "Satisfaction",and "WorkLifeBalance" into Power BI.

Navigator

Display Options ▾

- ▲ 📁 HRAnalyticsEmployeeAttritionPerformance-23...
  - ☐ Table1
  - ☑ Attrition Rates
  - ☐ Data Dictionary
  - ☑ Education
  - ☑ Employee Data 2018 - 2019
  - ☑ Job Involvement
  - ☑ PerformanceRating
  - ☑ Satisfaction
  - ☑ WorkLifeBalance
- ▲ 📁 Suggested Tables [1]
  - ☐ Table 1 (Attrition Rates)

WorkLifeBalance

WorkLifeBalance ID	WorkLifeBalance Level
1	Bad
2	Good
3	Better
4	Best

Load   Transform Data   Cancel

2. Data Cleaning

Select "Transform Data" & Power Query Editor comes up, now we can perform data validation/checking for data cleaning.
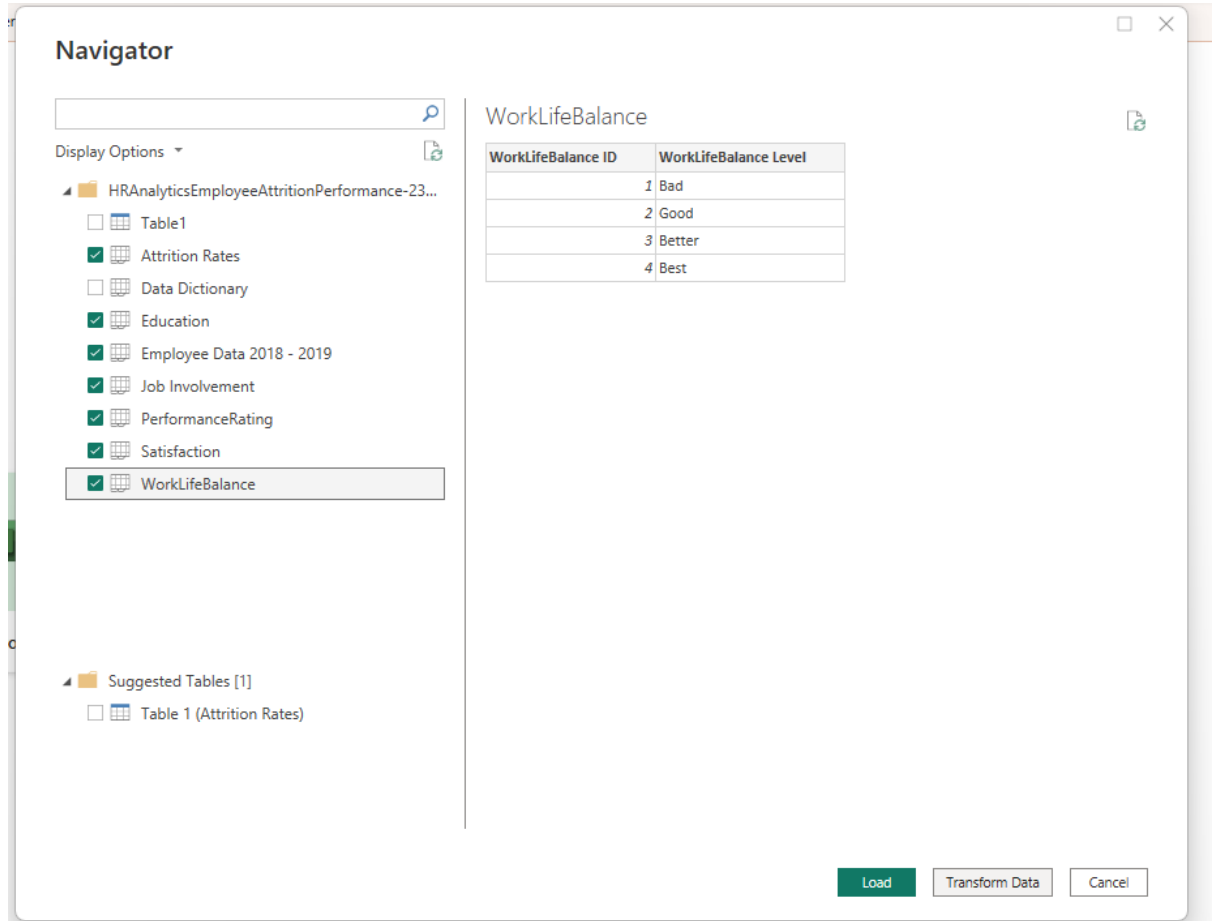
Power Query Editor, helps me to review and profile the data. It also helps me determine how to clean and transform the data.
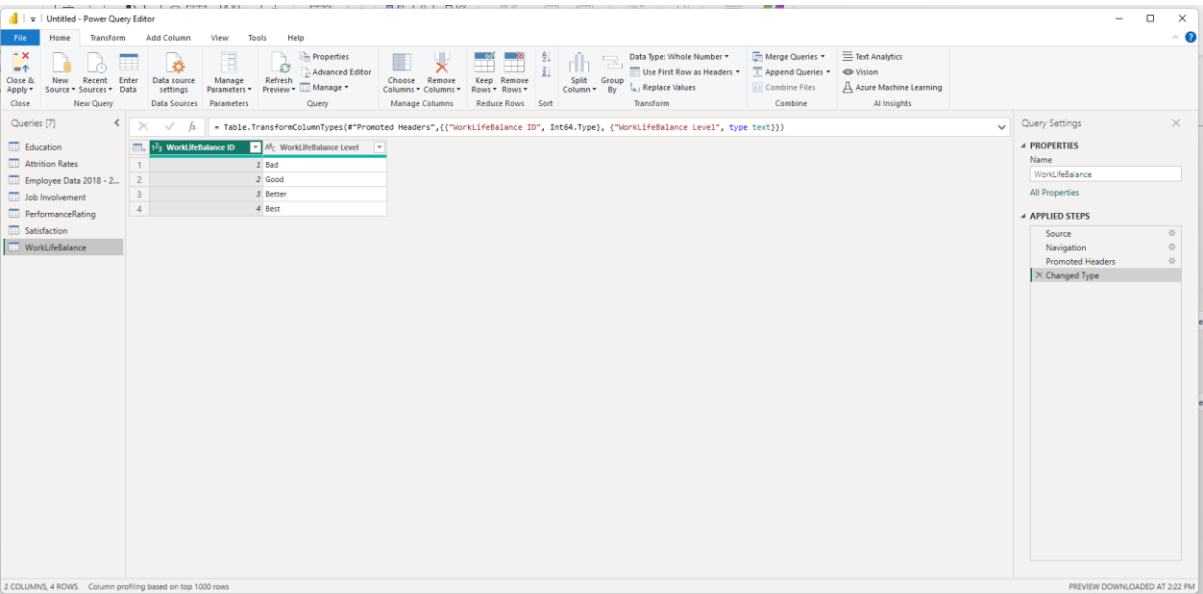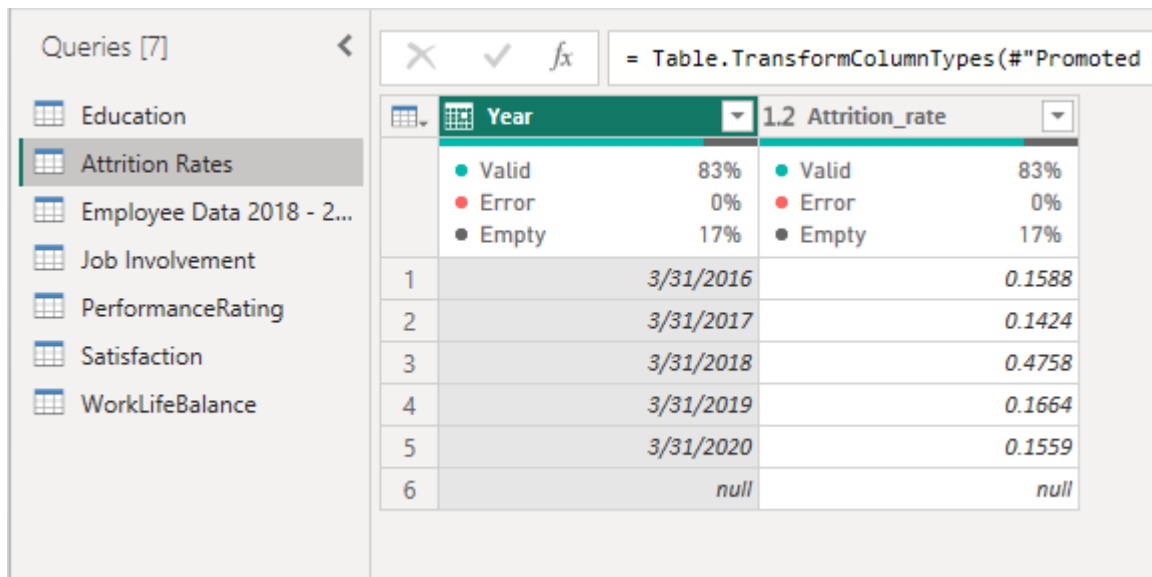
In the View ribbon tab, I selected "Column quality" from "Data Preview" group. This helps me to easily determine valid, error or empty values found in columns.

Table "Education" is clean.

Found null values in "Attrition Rates" table.

I decided to remove the row with "null" values since the row has no analytical value, using "Remove Rows" > "Remove Blank Rows" under Home ribbon tab and Reduce Rows group.
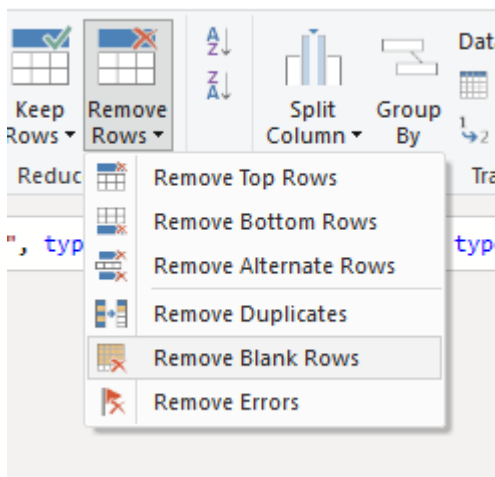
Now Attrition Rate table is cleaned.

The "Employee Data 2018 – 2019" table 999+ columns.

		Attrition Rates			100%	● Valid	100%
		Employee Data 2018 - 2...			0%	● Error	0%
		Job Involvement			0%	● Empty	0%
		PerformanceRating		1	8		3/31/2019
		Satisfaction		2	10		3/31/2019
		WorkLifeBalance		3	7		3/31/2019
				4	8		3/31/2019
				5	6		3/31/2019
				6	8		3/31/2019
				7	17		3/31/2019
				8	6		3/31/2019
				9	10		3/31/2019
				10	10		3/31/2019
				11	5		3/31/2019
				12	3		3/31/2019
				13	6		3/31/2019
				14	10		3/31/2019
				15	7		3/31/2019
				16	31		3/31/2019
				17	6		3/31/2019
				18	1		3/31/2019
				19	13		3/31/2019
				20	0		3/31/2019
				21	5		3/31/2019
				22	8		3/31/2019
				23	26		3/31/2019
				24	10		3/31/2019
				25	24		3/31/2019
				26			

999+ COLUMNS, 999+ ROWS   Column profiling based on top 1000 rows

123 Relationship Satisfaction	ABC 123 Column30	ABC 123 Column31	ABC 123 Column32	ABC 123 Column33
00% ● Valid 100%	● Valid 0%	● Valid 0%	● Valid 0%	● Valid
0% ● Error 0%	● Error 0%	● Error 0%	● Error 0%	● Error
0% ● Empty 0%	● Empty 100%	● Empty 100%	● Empty 100%	● Empty
3	1	null	null	null
4	4	null	null	null
3	2	null	null	null
3	3	null	null	null
3	4	null	null	null

Select all unwanted columns that contains no data (100% empty), and remove them.
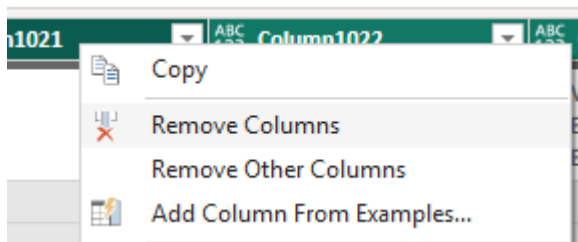
Observed that the table has blank rows. So, I selected "remove blank rows":
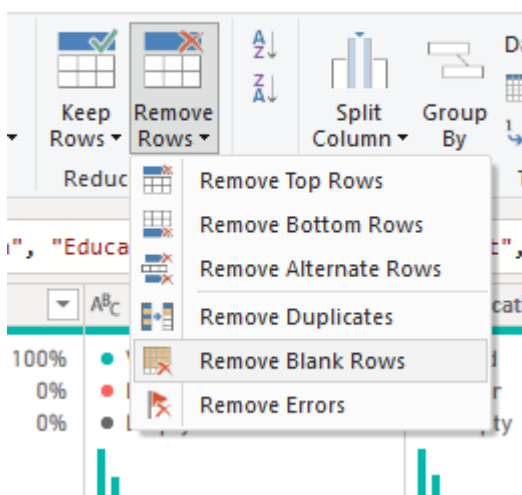
Now Table "Employee Data 2018 – 2019" is clean

Table "Job Involvement" is clean

Table "Performance Rating" is clean

Table "Satisfaction" is clean

Table "WorkLifeBalance" is clean

Selected "Column distribution" and "Column Profile" options, to check if there are any possible redundant data, looks like there is none.
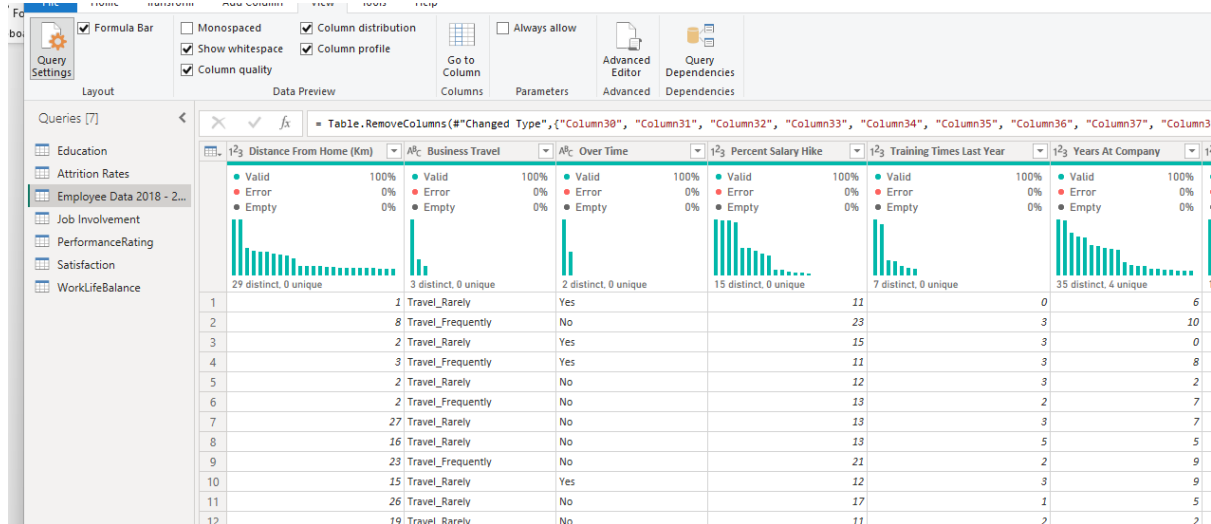
3. Data Transformations Applied

Satisfied with the data now, I applied data transformation.
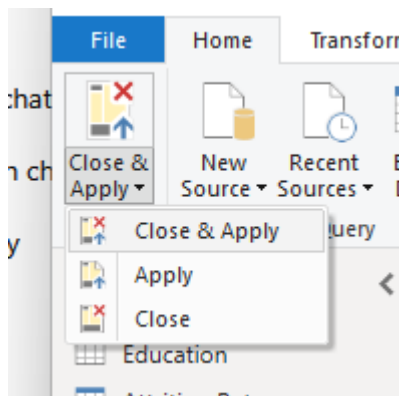
Once Data Transformation is complete, I performed a quick check to confirm that the rows with null values in "Attrition Rates" table have been removed. All good.

Year	Attrition_rate
Thursday, March 31, 2016	0.1588
Friday, March 31, 2017	0.1424
Saturday, March 31, 2018	0.4758
Sunday, March 31, 2019	0.1664
Tuesday, March 31, 2020	0.1559

4. Created Columns and Measures

Create a "Measures" table

Attrition measure:

```
1 %Attrition = DIVIDE([InactiveEmployees],[TotalEmployees]) * 100
```

Active Employees measure:

```
1 ActiveEmployees = CALCULATE([TotalEmployees],FILTER('Employee Data 2018 - 2019','Employee Data 2018 - 2019'[Attrition]="No"))
```

Inactive Employees measure:

Structure	Formatting	Properties	Calculations	

```
1  InactiveEmployees = CALCULATE([TotalEmployees],FILTER('Employee Data 2018 - 2019','Employee Data 2018 - 2019'[Attrition]="Yes"))
```

Total employees measure:

Structure	Formatting	Properties

```
1  TotalEmployees = DISTINCTCOUNTNOBLANK('Employee Data 2018 - 2019'[Name])
```

Performed a quick check that the measures are correct using card, and cross reference with xls using pivot table.
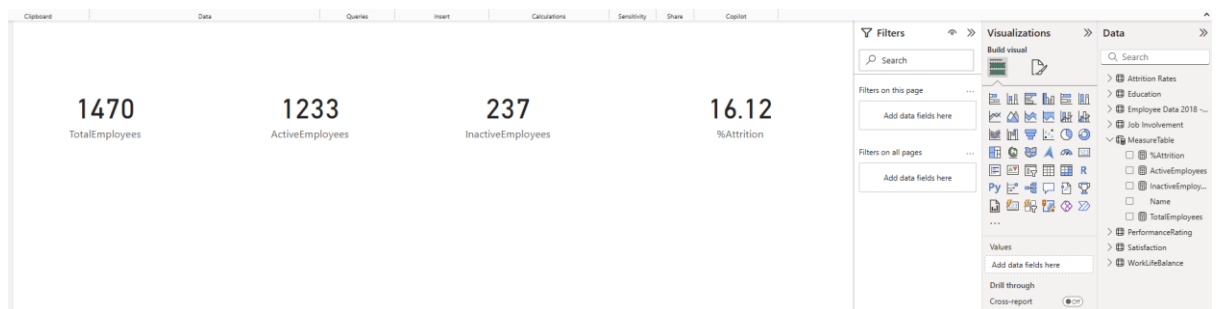
4B Activity 2

Please include screenshots 📷 and explanations in the provided space below.

1. Data Model

Check Data model:
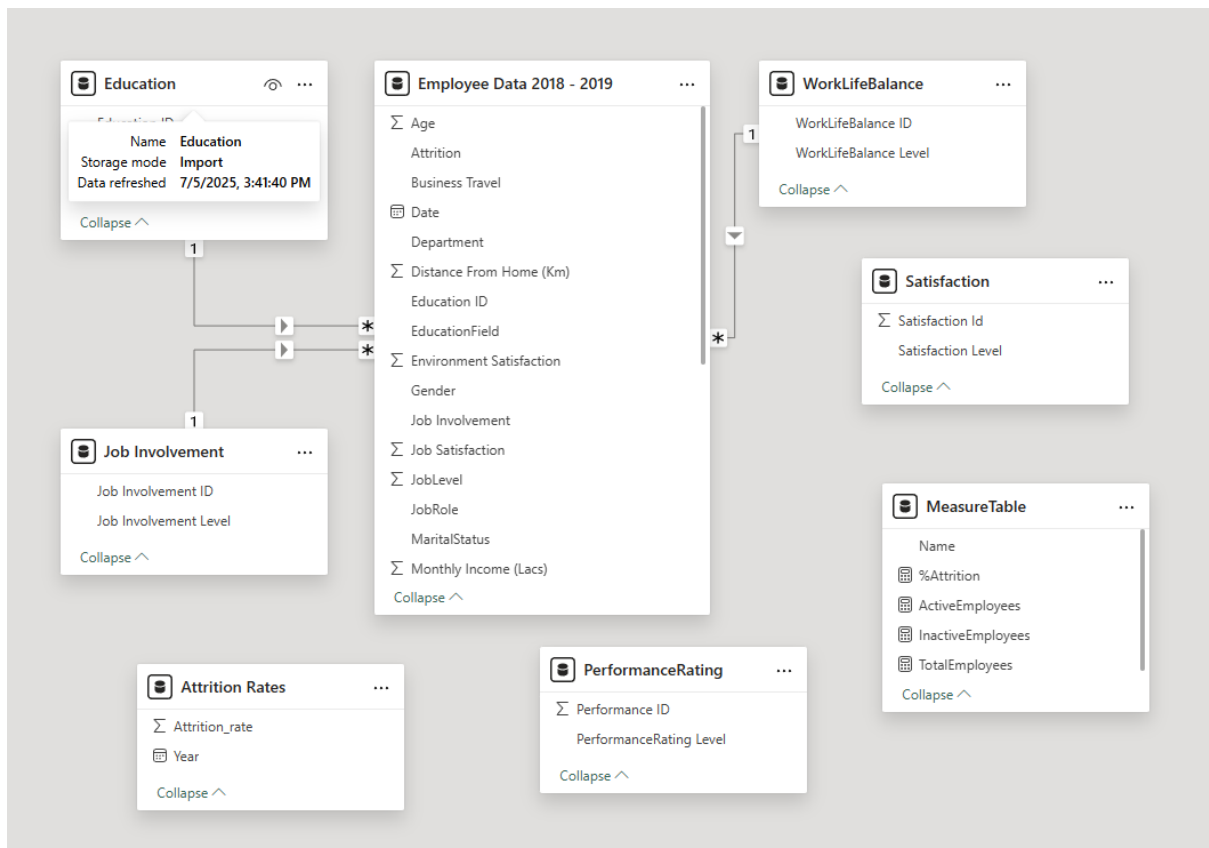
2. Data Relationships

Rename "Education" to "Education ID" for consistency in "Employee Data 2018-2019" table. This matches the "Education" table naming convention, for consistency.

"Education" to "Employee Data" on "Education" done:

"Job Involvement" (renamed to Job Involvement ID) to "Employee Data" on "Job Involvement ID" done:

"Performance Rating"(renamed to Performance Rating ID) to "Employee Data" on "Performance ID" (renamed to Performance Rating ID) done:

"Satisfaction" (renamed to Job Satisfaction ID) to "Employee Data" on "Satisfaction Id" (renamed to Job Satisfaction ID) done:

"WorkLifeBalance" (renamed to WorkLifeBalance ID) to "Employee Data" on "WorkLifeBalance ID" done:

Completed Relationship:

Relationships between tables are crucial for building accurate, interactive, and scalable reports. They allow the data model to function like a relational database, enabling us to analyze and visualize data from multiple tables seamlessly.
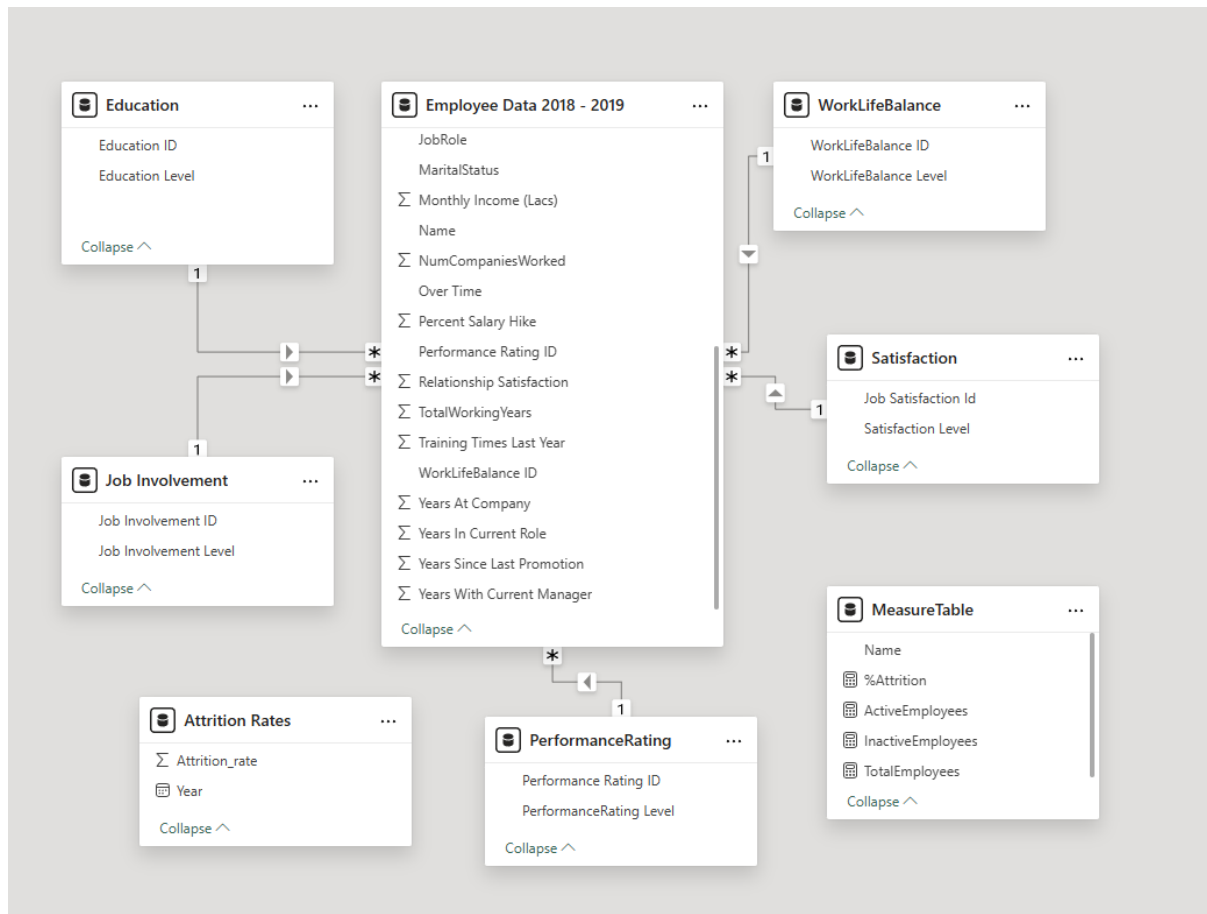
3. Created Hierarchies

Hierarchies are useful in report view for the following:

- Slicers for multi-level filtering
- Bar/Column charts for drill-down/roll-up
- Matrix visuals for hierarchical reporting

Created a Department Hierarchy, and renamed it to "Job", then include "Department" , "JobRole" & "JobLevel" into the "Job" hierarchy.
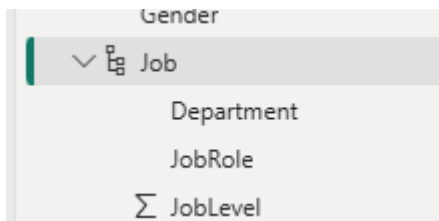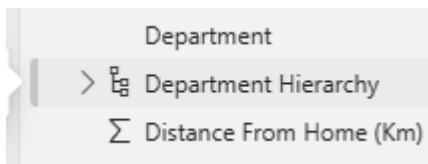
Date Hierarchy is created:

Tenure hierarchy is created:
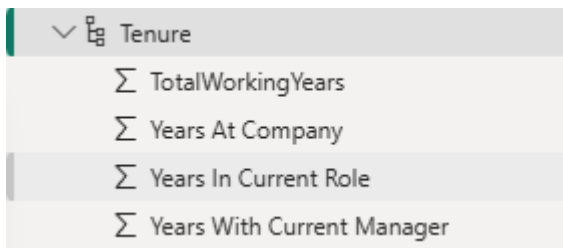
Engagement hierarchy is created:
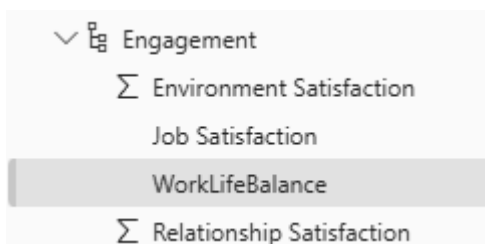
Engagement hierarchy is created:
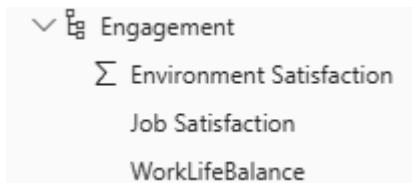
Education hierarchy is created:
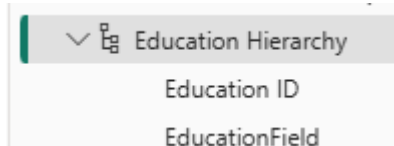
Compensation metrics hierarchy is created:
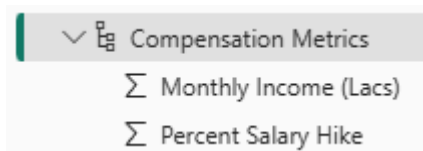
Optimize Model: I have created a DateTable and created relationships with" Employee Data 2018-2019" as well as "Attrition Rates" table.
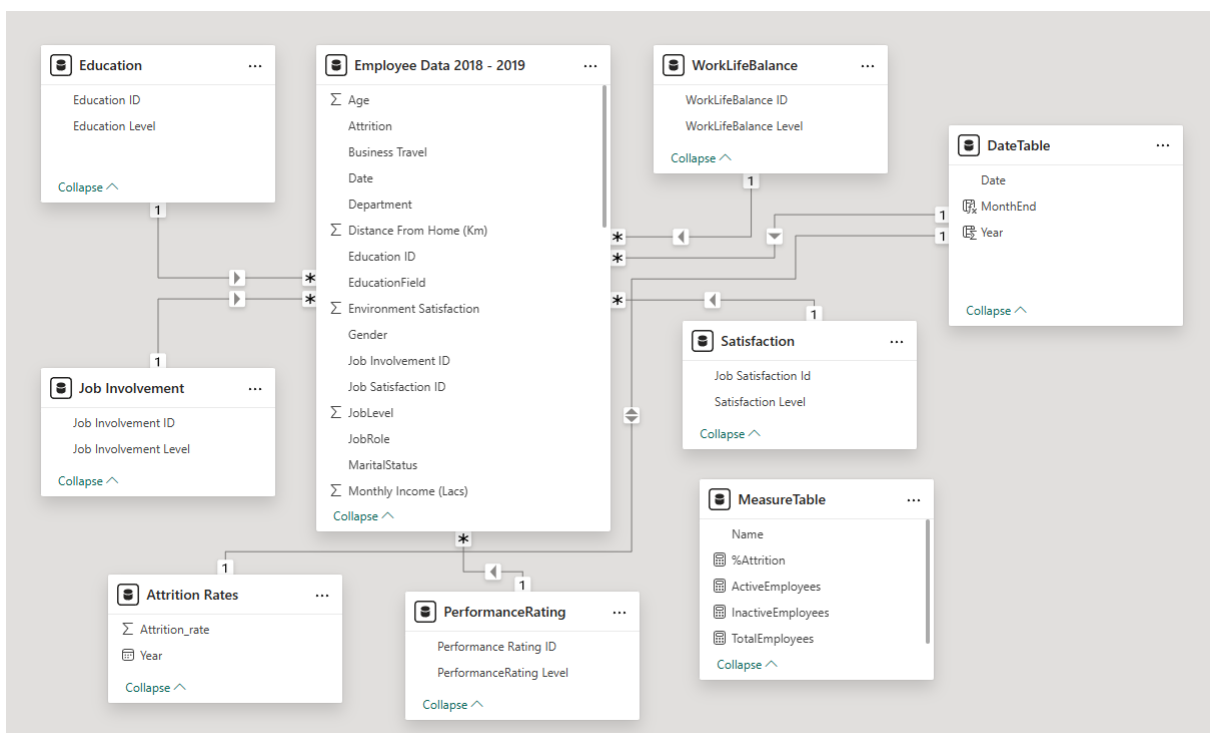
4C Activity 3

Please include screenshots [📷] and explanations in the provided space below.

1. KPI Cards

   Added cards and use measures created earlier for the KPI cards

   Example of the default card

   1233
   ActiveEmployees

   ,

   I decided to make some changes to the format. I decided to make use of the Title in General Tab of Visual formatting.
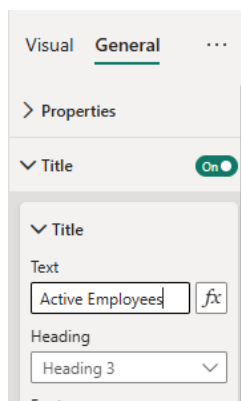
, and turn off Category label.

,
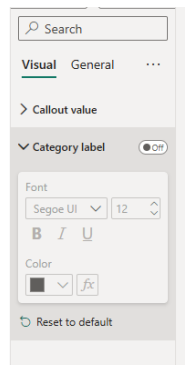
it gives a cleaner look

I find that now the KPI cards has clear and user friendly titles, evenly spaced with bold numbers standing out providing emphasis to the report, cards have matching sizes, alignment and background. Lastly, visually there is balance.

I made changes to the format
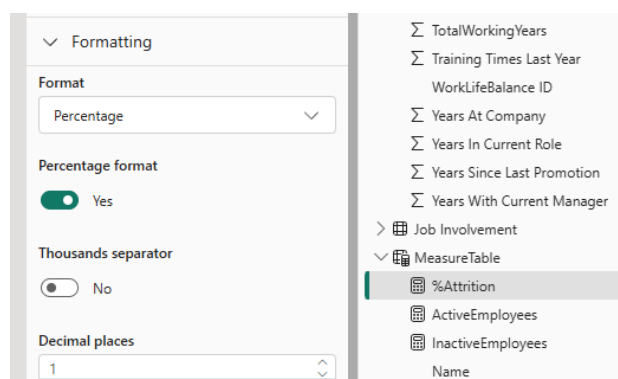
Reducing it to 1 decimal place.

Attrition %

16.1%
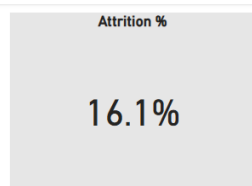
2. Bar Chart

Bar chart created, decided to rename title to "Attrition Rate by Year" to simplify it. I have decided to use average attrition rate by adding another measure in the "Measure Table". I have also made formatting change in model view, for the "average attrition rate" measure format to percentage, 1 decimal place.

Attrition Rate by Year
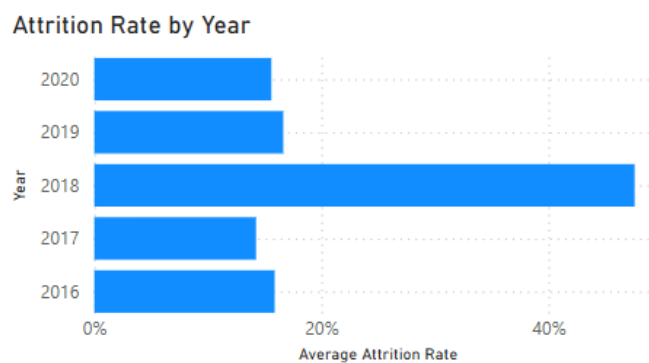
I have also removed the gridlines and turned on "Data Labels" for ease of viewing

Attrition Rate by Year
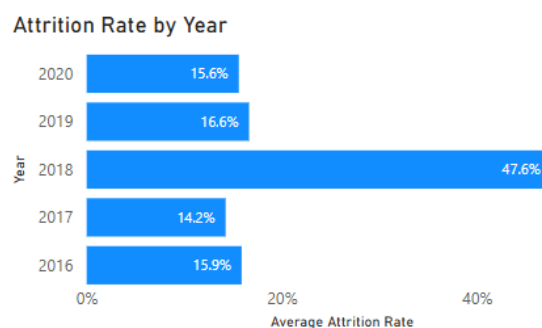
3. Stacked Bar Chart

Selected stacked bar chart from visualization, and dragged "Department" to Y-axis, "ActiveEmployees" to X-Axis, and "JobRole" to Legend.

I turned on Data Label from format pane, and changed the title to something more reader-friendly "Distribution of Active Employees by Department and Job Role".
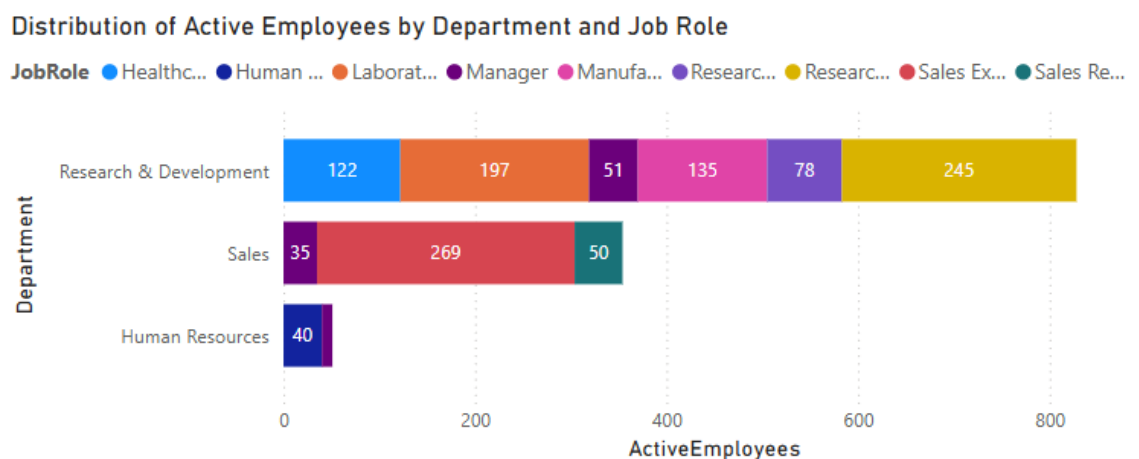
This is the "Overview" page after some fine-tuning:

Company-wide Employee Overview

Total Employees	Active Employees	Inactive Employees	Attrition %
1470	1233	237	16.1%

Attrition Rate by Year

- 2020: 15.6%
- 2019: 16.6%
- 2018: 47.6%
- 2017: 14.2%
- 2016: 15.9%

Average Attrition Rate

Distribution of Active Employees by Department and Job Role

Job Role ● Health Rep ● HR ● Lab Tech ● Manager ● Mfg Dir ● Res Dir ● Res Sci ● Sales Exec

- Research & Development: 122, 197, 51, 135, 78, 245
- Sales: 269, 50
- Human Resources: 40

ActiveEmployees

Overview | Demographics | Performance Tracker | Attrition

4D. Activity 4

Please include screenshots 📷 **and explanations in the provided space below.**

1. KPI Cards for Demographics Page.

   I created a new measures in "Measure table"; "YoungestEmployeeAge" and "OldestEmployeeAge":

   Then, I created KPI cards by copy/pasting visuals from the "Overview" tab, and editing the visuals.

2. Bar Chart.

Created a new column (with DAX) for AgeBin

```
1  AgeBin =
2  SWITCH(
3      TRUE(),
4      'Employee Data 2018 - 2019'[Age] < 20, "Below 20",
5      'Employee Data 2018 - 2019'[Age] >= 20 && 'Employee Data 2018 - 2019'[Age] <= 29, "20 - 29",
6      'Employee Data 2018 - 2019'[Age] >= 30 && 'Employee Data 2018 - 2019'[Age] <= 39, "30 - 39",
7      'Employee Data 2018 - 2019'[Age] >= 40 && 'Employee Data 2018 - 2019'[Age] <= 49, "40 - 49",
8      'Employee Data 2018 - 2019'[Age] >= 50, "50 and above",
9      "Unknown"
10 )
```


Employees by Age groups
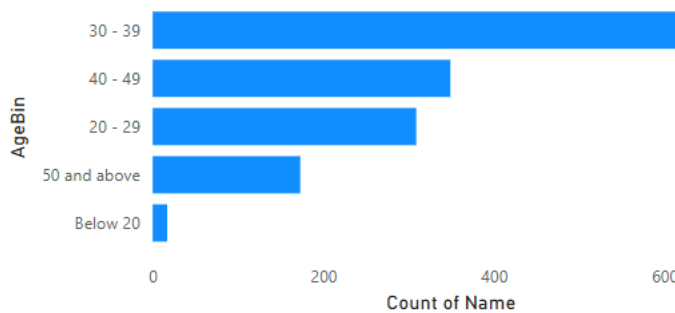
3. Pie Chart.

Created a pie chart for "Employees by MaritalStatus".

Employees by MaritalStatus
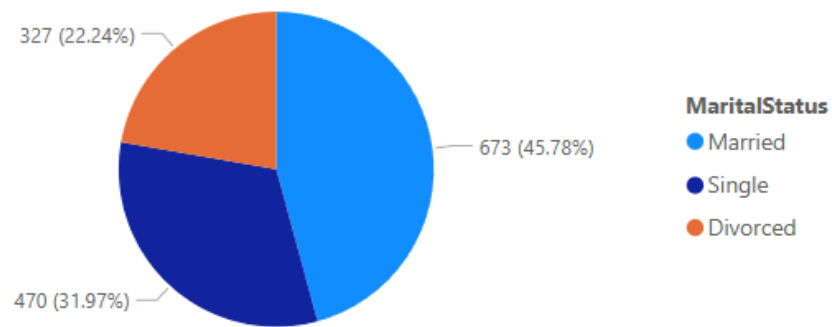
4. Combined Chart.

Constructed a combined bar and line chart for "Employees Average Salary by AgeBin, Department, and JobRole". The challenge I encountered is I am not able to combine both Department and Job Role into a single chart, hence I have decided to create a "view by" table that allows me to toggle between the two in the same page. I have also decided to edit the chart titles, Y-axis and X-axis titles, as well as show the currency label.

Department	JobRole

Avg Salary & Employee Count by AgeBin and Department/ Job Role

(use slicer to toggle between Department and Job Role)

Department ● Human Resources ● Research & Development ● Sales ● Average of Monthly Income (Lacs)
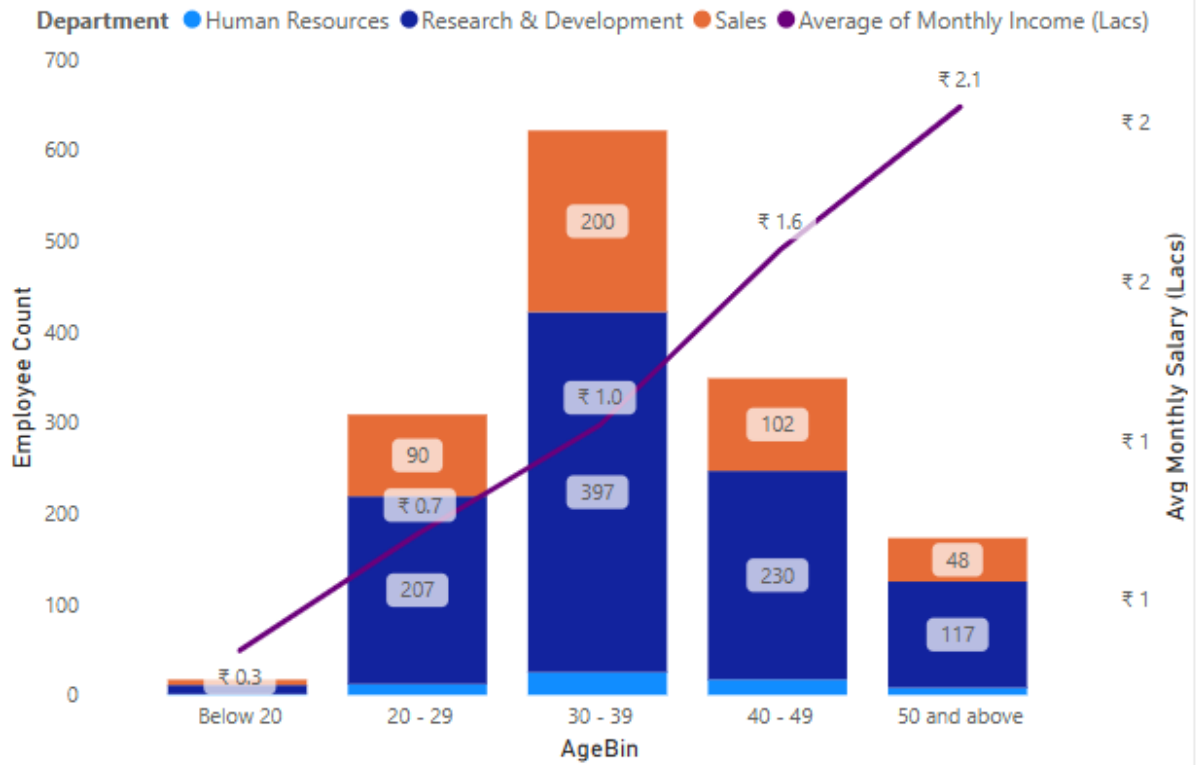
This is the "Demographics" page after some fine-tuning:
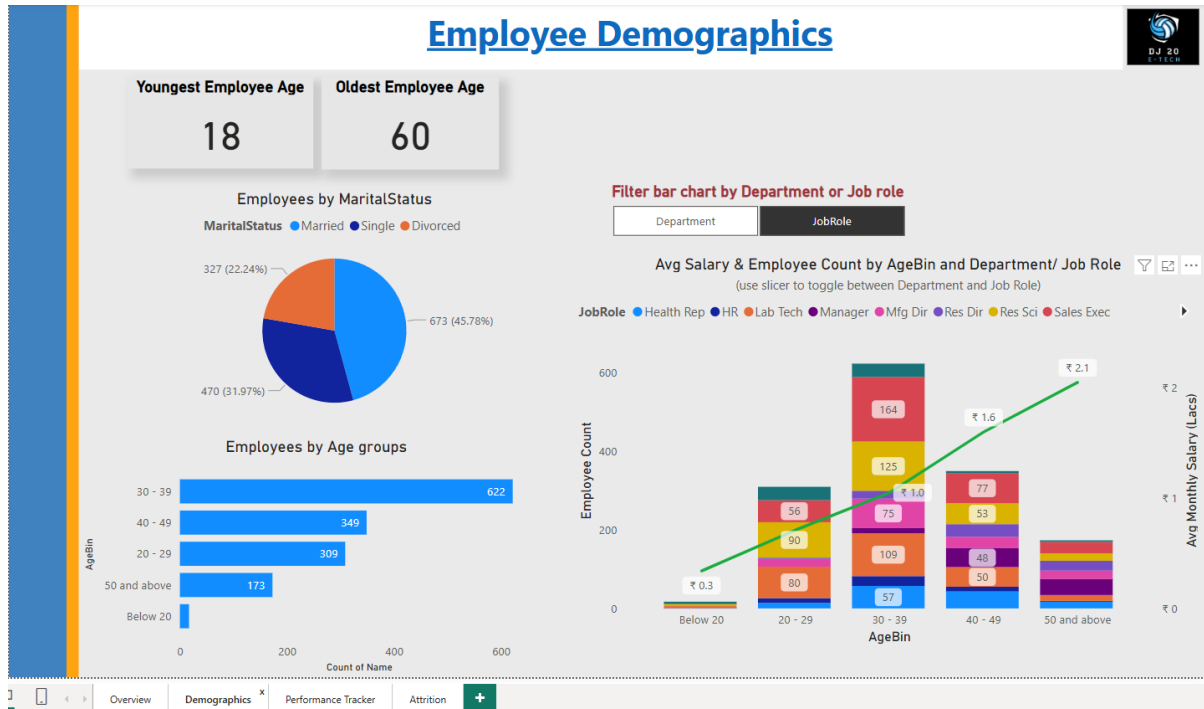
4E. Activity 5

Please include screenshots 📷 **and explanations in the provided space below.**

1. Filter Slicers.

Implemented slicers for filtering based on "EmployeeID". The table does not have EmployeeID, so I used the column "Name" from the "Employee Data 2018 – 2019" table. I have also enabled

search for easier filtering if needed.
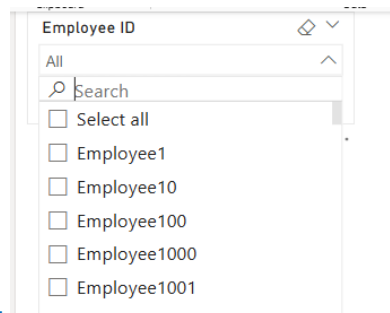
2. Bar Chart

I developed bar charts to show counts or max values for "Education", "Job Satisfaction", "Job Involvement", "Relationship Satisfaction", "Performance Rating", "Work Life Balance", and "Environment Satisfaction".

Employees by Job Satisfaction Level
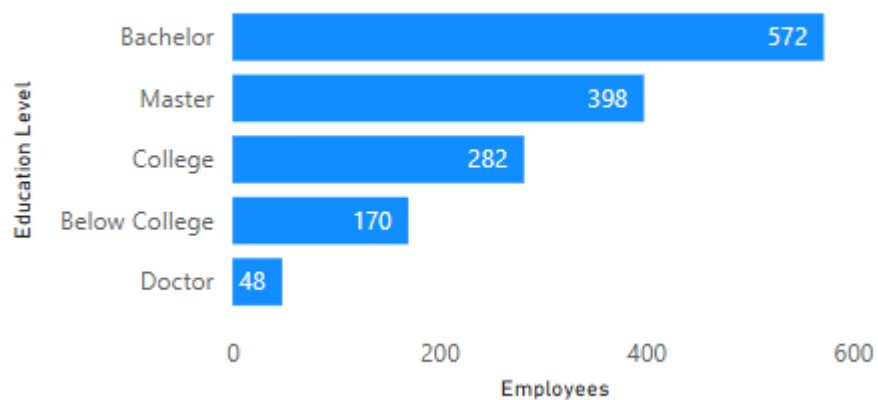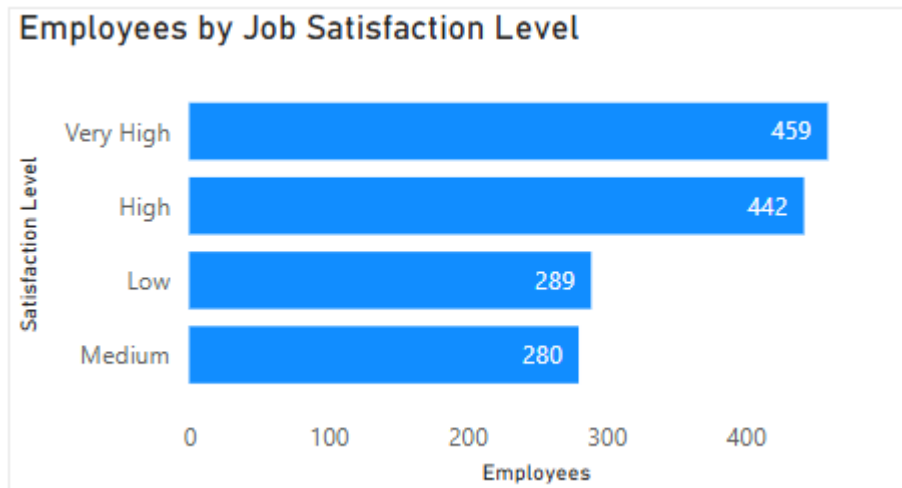
I created new columns to show labels for levels for Relationship Satisfaction, Work Life Balance, and Employment satisfaction, like this (as an example)

```
1  RelationshipSatisfactionLabel =
2  SWITCH(
3      [Relationship Satisfaction],
4      1, "Low",
5      2, "Medium",
6      3, "High",
7      4, "Very High",
8      "Unknown"
9  )
10
```

These are the bar charts created

3. Gauges

I created a new measure to show Average Performance rating, and had the same done for Average WorkLifeBalance rating.

```
1 Avg Performance Rating = AVERAGE('Employee Data 2018 - 2019'[Performance Rating ID])
```

Now I can use Average Performance rating measure to create my gauge for Performance rating. I decided to add a mock-up target of "4.0" to make it more realistic.

Performance Rating
(Average, Target 4.0)

4.0

3.15

0   5
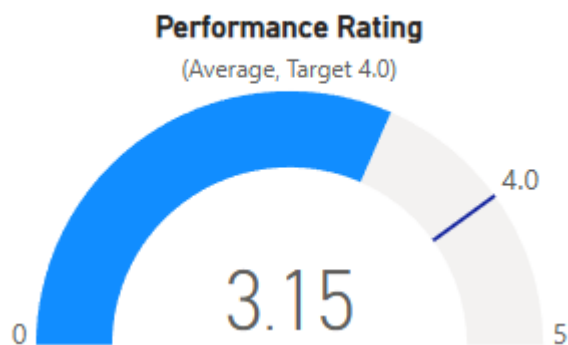
Here is the gauge for Work Life Balance rating.

Work Life Balance Rating
(Average, Target 4.0)

4.0

2.76

0   5
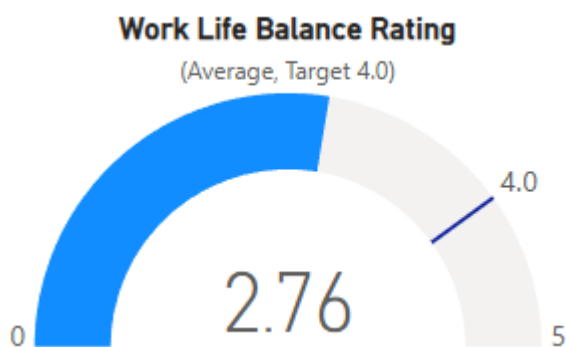
This is the "Performance Tracker" page after some fine-tuning:
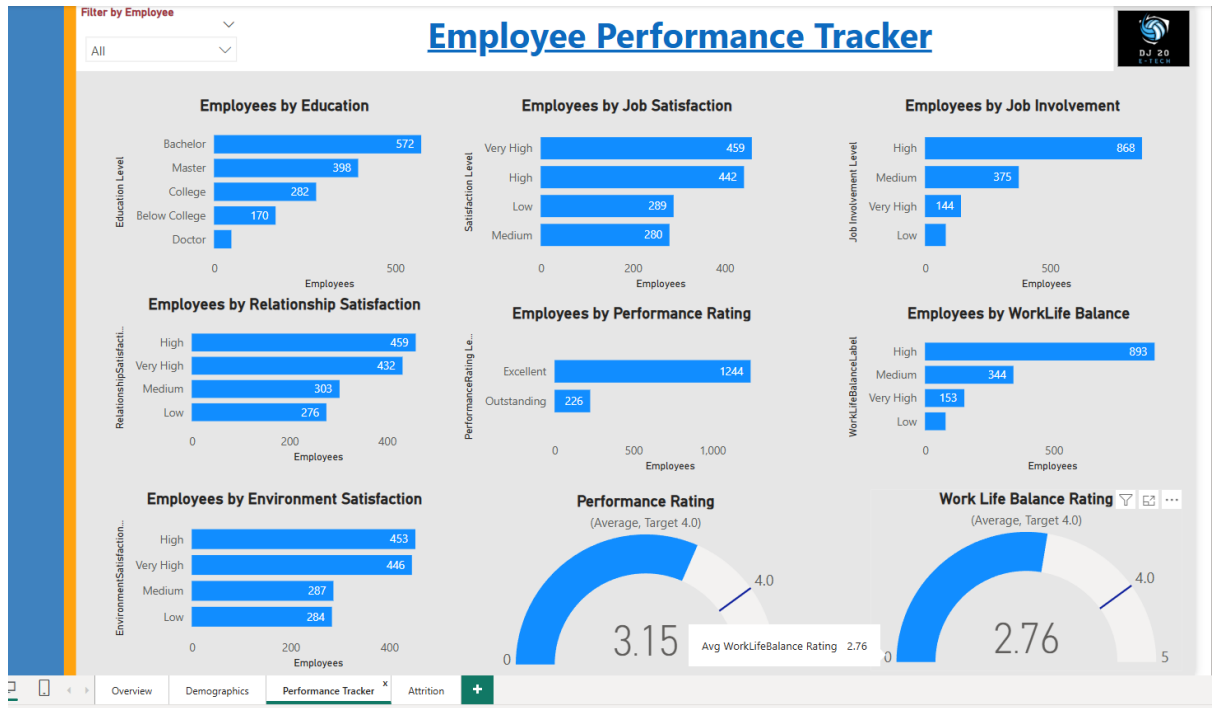
4. Line and Bar Charts for Attrition Page

Created a measure for Attrition Count

```
1 Avg Performance Rating = AVERAGE('Employee Data 2018 - 2019'[Performance Rating ID])
```

Created line chart to show Attrition by Tenure:
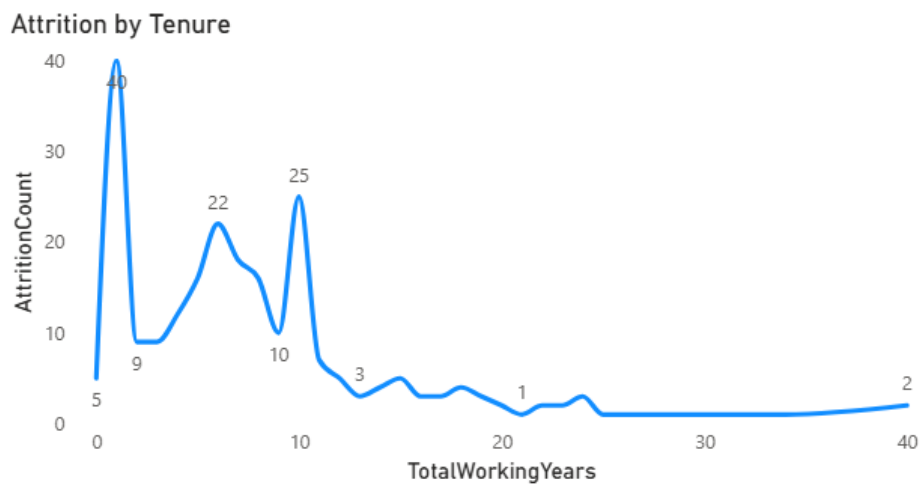
Selected clustered bar charts for "Attrition by Department and Job Role", however, I realized that the bar charts are too thin and hard to view.
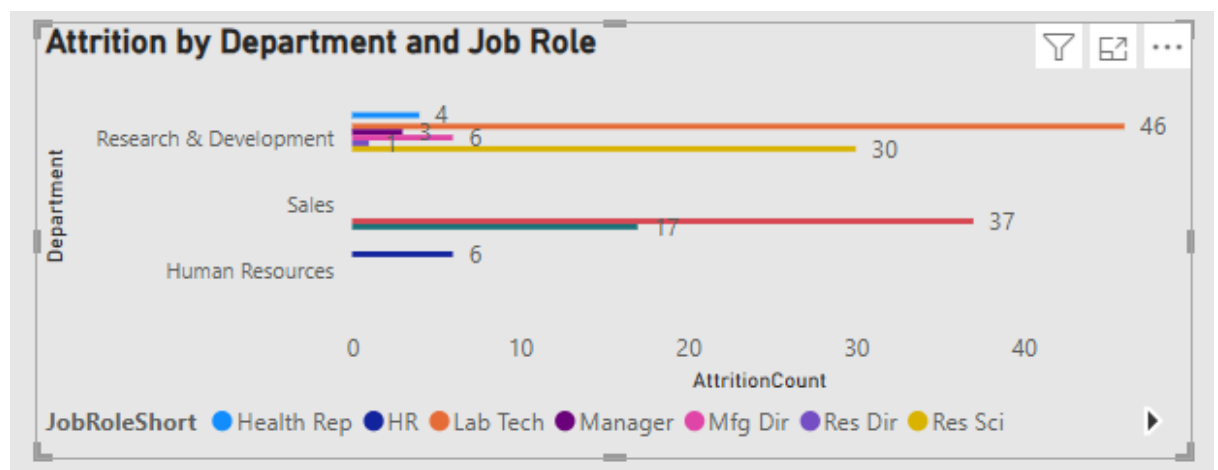
So, I decided to use clustered column charts instead, this is clearer visually.
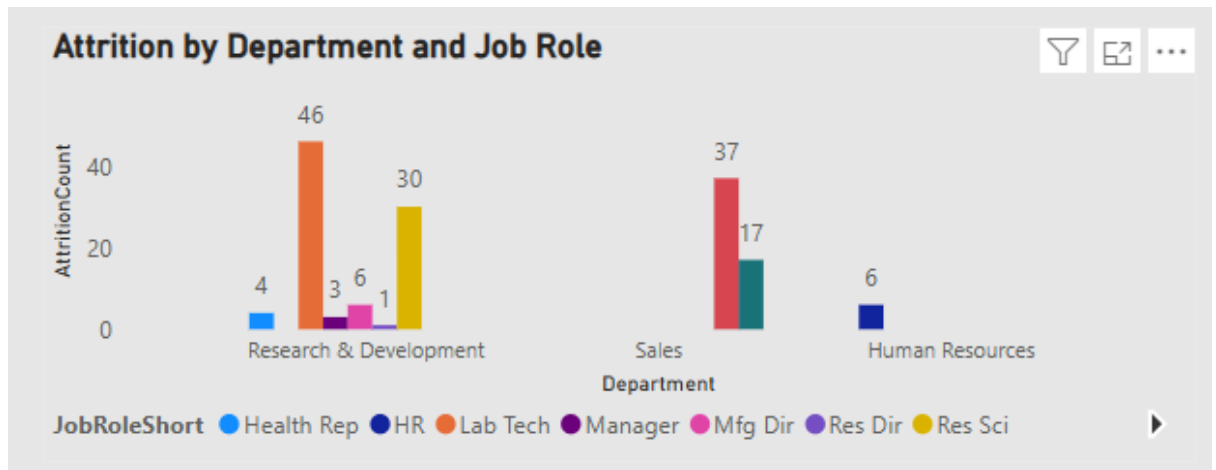
The travel frequency labels of "Travel_Rarely" for example is not easily understood, hence I decided to create a new column, and switch the Business Travel labels to something more intuitive, for example "Rarely Travels".

```
1  Travel Label =
2  SWITCH(
3      'Employee Data 2018 - 2019'[Business Travel],
4      "Travel_Rarely", "Rarely Travels",
5      "Travel_Frequently", "Frequently Travels",
6      "Non-Travel", "Does Not Travel",
7      "Unknown"
8  )
9
```

Here is the created bar chart to show Attrition by Travel Frequency;
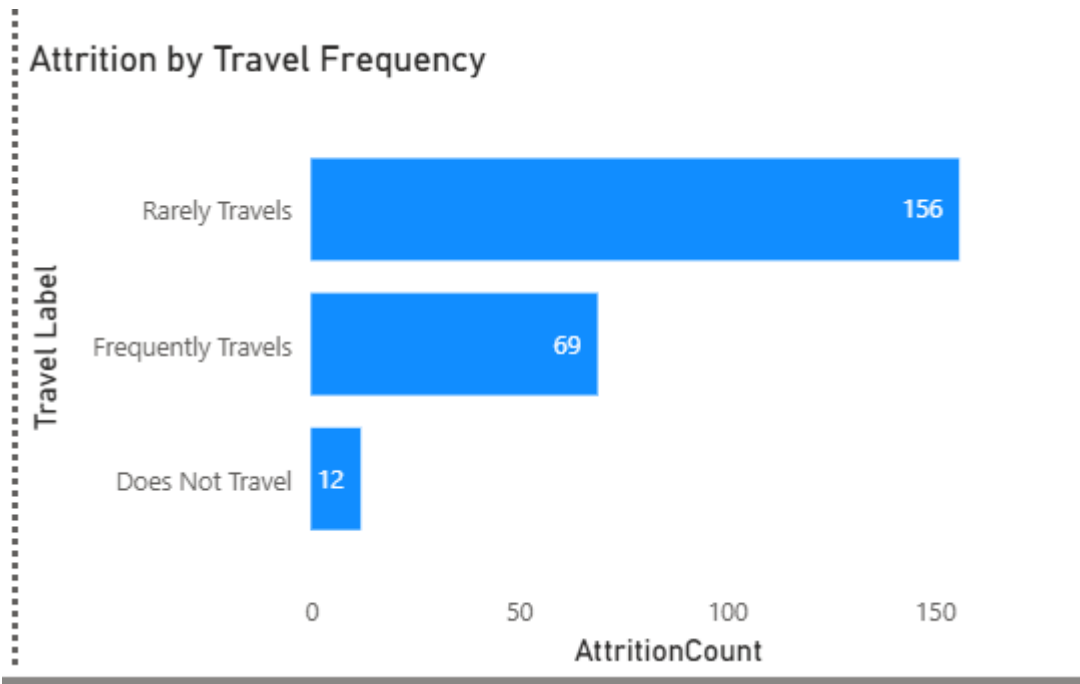
The bar chart for Attrition by Years at Current Role needs to be better presented, hence I created groupings for a more intuitive presentation. This was an earlier version of the chart:
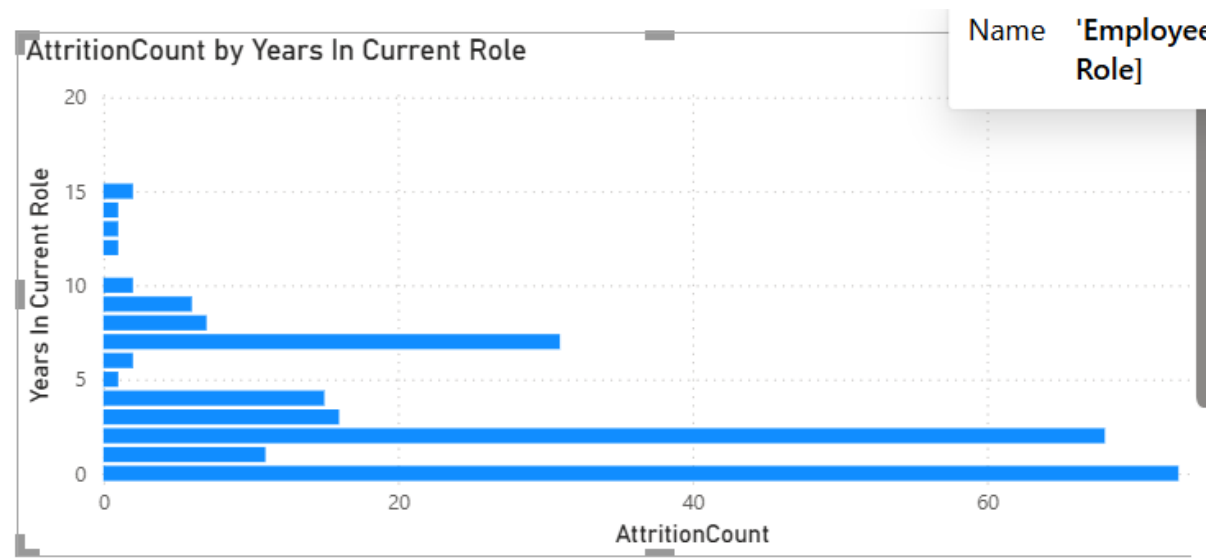
New column 'YearsInCurrentRoleGroup" created:

```
1  YearsInCurrentRoleGroup =
2  SWITCH(TRUE(),
3      'Employee Data 2018 - 2019'[Years In Current Role]] <= 1, "New Joiners",
4      'Employee Data 2018 - 2019'[Years In Current Role]] <= 3, "Early Tenure",
5      'Employee Data 2018 - 2019'[Years In Current Role]] <= 6, "Mid Tenure",
6      'Employee Data 2018 - 2019'[Years In Current Role]] <= 10, "Established",
7      "Long Term"
8  )
9
```

Created bar chart for Attrition by Years at Current Role:

Attrition by Years at Current Role

Years in Current Role Group	AttritionCount
Early Tenure (2–3 yrs)	84
New Joiners (0–1 yrs)	84
Established (7–10 yrs)	46
Mid Tenure(4–6 yrs)	18
Long Term (>10 yrs)	5
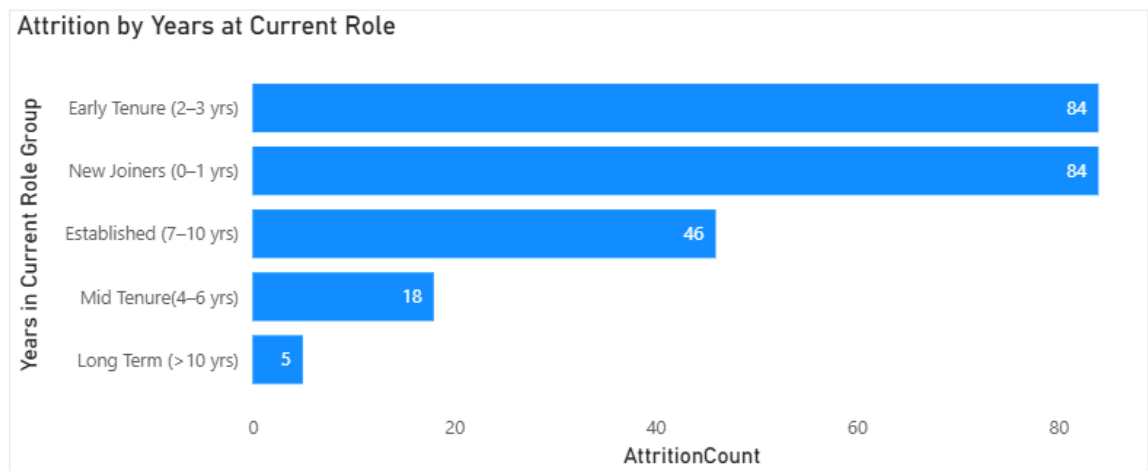
This is the Attrition page after some fine-tuning:
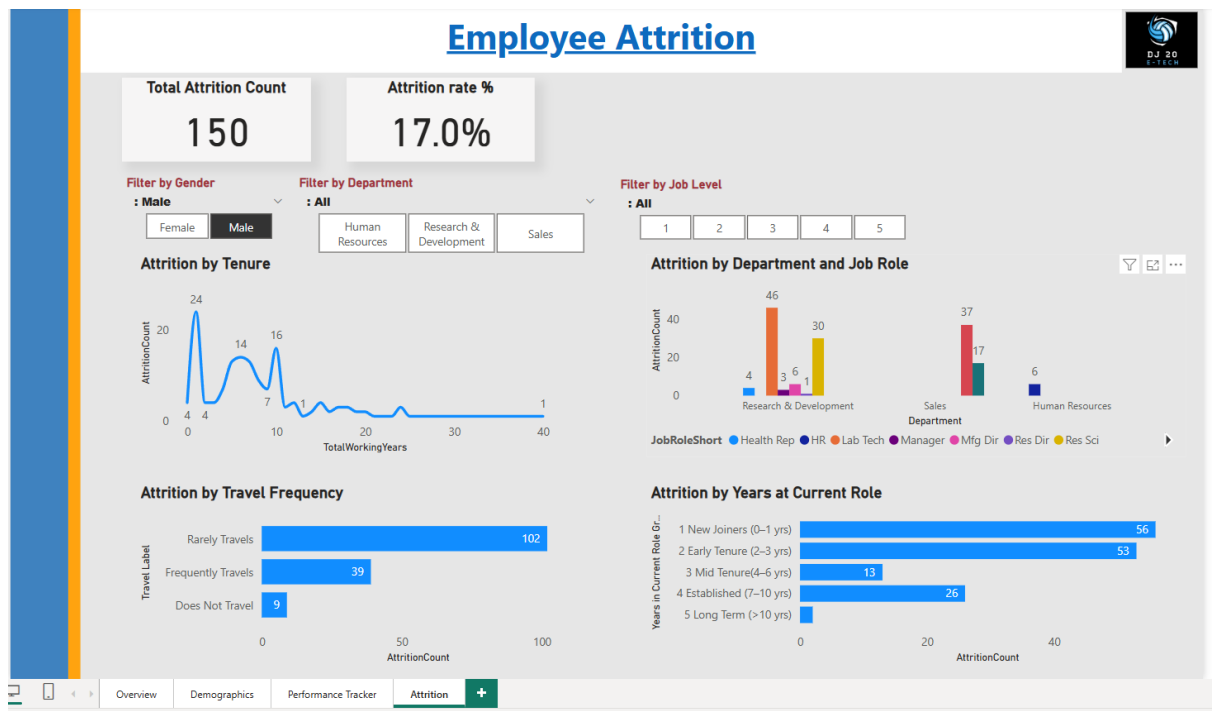
Insights from the analysis:

The analysis revealed several key trends related to employee attrition and performance across the organization:

1. One of the most significant findings was that **departments such as Sales and Research & Development experienced higher attrition rates** compared to others.
    a. By visualizing attrition rates over the years, we observed notable fluctuations, prompting the need to further investigate organizational or external factors influencing these changes.
    b. Additionally, **employees with shorter tenure—particularly those under two years—were found to be more prone to leaving**, suggesting that early engagement and onboarding processes are critical areas for improvement.
2. Another insightful dimension explored was employee performance.
    a. Using KPI cards and gauge charts, the average performance rating across the organization was found to be below the benchmark target of 4.0.
    b. Notably, **employees with higher job satisfaction and work-life balance scores generally achieved better performance ratings**, reinforcing the importance of investing in employee well-being and satisfaction initiatives.
    c. Conversely, **low levels of job involvement and relationship satisfaction were common among those who eventually left the company**, underlining their predictive value in attrition behavior.
3. The demographic analysis brought to light that **the workforce is largely concentrated in the 25–35 age bracket**, with a near-even gender distribution in some departments.
4. **Attrition by age group suggested that younger employees are more likely to leave**, possibly due to greater mobility or unmet career expectations.
5. Furthermore, **business travel frequency showed a correlation with attrition**, where employees who travel frequently or not at all were more likely to leave, hinting at the need for balance and clarity in travel-related expectations.
6. From a compensation perspective, the average salary varied widely across departments and job roles. A combined chart showing average salary by age bin and job level indicated that **some roles may be undercompensated relative to their peers**, which could contribute to voluntary turnover. These insights suggest the importance of regular compensation benchmarking and aligning reward structures with both market data and employee contributions.

Overall, this analysis equips HR stakeholders with a powerful tool to **proactively identify at-risk employee segments, understand drivers of attrition, and align workforce strategies** with data-driven evidence. The integration of slicers and hierarchies in the dashboards also empowers users to drill down into specific demographics, departments, or time periods, enabling **informed and responsive HR decision-making**.

An executive presentation on key takeaways and next steps:

Insights	Recommended improvements
Sales and Research & Development experienced higher attrition rates	Investigate organizational or external factors influencing high attrition rates in these departments
Low levels of job involvement and relationship satisfaction were common among those who eventually left the company	Invest in employee well-being and satisfaction initiatives
Average performance rating across the organization was found to be below the benchmark target of 4.0	Invest in employee well-being and satisfaction initiatives
Employees with shorter tenure, particularly those under two years, were found to be more prone to leaving	Early engagement and onboarding processes are critical areas for improvement
Attrition by age group suggested that younger employees are more likely to leave	Investigate if it is due to unmet career expectations, and explore job re-design
Business travel frequency showed a correlation with attrition	Need for balance and clarity in travel-related expectations.
Some roles may be undercompensated relative to their peers	Need for regular compensation benchmarking and aligning reward structures with both market data and employee contributions

Important Lessons Learned throughout this project:

Through this project, I gained valuable hands-on experience in transforming raw HR data into meaningful, actionable insights using Power BI.

One of the key lessons I learned was the importance of thorough data cleaning and preparation; handling null values, standardizing column names, and removing irrelevant data were foundational to accurate modeling.

I also realized the significance of establishing proper relationships and hierarchies in the data model, which directly impacted the functionality and interactivity of my dashboards. Creating calculated columns and DAX measures taught me how to derive new insights and build KPIs that align with business goals.

Furthermore, designing user-friendly and visually appealing reports helped me appreciate the principles of data storytelling and user-centric design. Lastly, incorporating slicers, bookmarks, and navigation enhanced the dynamic nature of the report, giving end-users the flexibility to explore data across different perspectives. Overall, this project has deepened my understanding of the full data visualization lifecycle and its practical application in solving real-world HR challenges.