# Project name: Human Resources Dataset Analysis


**By:**

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|---|
| Abdel Nasser Abdel Moneim Mohamed Ouf |
| Ola Abdo Abdo Elbahrawy |
| mahmoud mohamed elsayed mohamed |
| Mohamed Abdelsamie Hassaan Mohamed |
| Amr Mohamed Abd Alhafeez Ogail |


**Project Overview:**

This project focuses on analyzing an HR dataset using **Microsoft Power BI** to uncover actionable insights that support data-driven decision-making in human resource management. The dashboard provides a comprehensive view of workforce metrics and employee dynamics across various departments and demographics.

**Project Objectives:**

1. **Analyze Employee Demographics**
   To understand workforce composition based on gender, age, education, department, and marital status.
2. **Monitor Attrition and Retention Rates**
   To identify patterns and causes of employee turnover and suggest strategies for retention.
3. **Evaluate Employee Performance and Satisfaction**
   To measure the impact of job satisfaction, work environment, and manager relationships on performance.
4. **Assess Salary Distribution and Promotion Patterns**
   To examine fairness and trends in salary increases and promotions across different demographics.
5. **Support Data-Driven HR Decision-Making**
   To provide interactive dashboards that enable HR managers to make informed, strategic decisions in real-time.

## Tools Used:

- **Microsoft Power BI** (DAX, Power Query, Interactive Dashboards)
- **Excel** (Data source and for initial data cleaning & transformation)
- **Data Modeling** (relationships, measures, calculated columns)

## ➢ Data Preparation and Cleaning:

This dataset is designed for **HR Analytics**, focusing on **employee performance, satisfaction, work-life balance, and attrition factors**. It consists of two primary tables:

1. **Employee Table**: Contains demographic, job-related, and tenure details for employees.
2. **PerformanceRating Table**: Captures periodic ratings, satisfaction levels, and work-life balance assessments for employees over time.

### 1. Employee Table

| Field Name | Data Type | Description |
|---|---|---|
| Age | Number | Age of the employee |
| Age Groups | Text | Age group category of the employee |
| Attrition | Text | Whether the employee left the company |
| BusinessTravel | Text | Frequency of business travel |
| Department | Text | Department in which the employee works |
| DistanceFromHome (KM) | Number | Distance from home to work in kilometers |
| DistanceFromHomeRange | Text | Categorized range of distance from home |
| Education | Number | Education level (e.g., 1: Below College, etc.) |
| EducationField | Text | Field of education (e.g., Life Sciences, Medical) |
| EducationID | Number | Identifier for education level |
| EmployeeID | Number | Unique identifier for each employee |
| Environment Satisfaction | Number | Level of satisfaction with the work environment |
| Ethnicity | Text | Ethnic background of the employee |
| Full Name | Text | Full name of the employee |
| Gender | Text | Gender of the employee |
| HireDate | Date | Date the employee was hired |
| Job Satisfaction | Number | Job satisfaction rating |
| JobRole | Text | Role or position held by the employee |
| Manager Rating | Number | Rating given by the manager |
| MaritalStatus | Text | Marital status of the employee |
| Overall Satisfaction | Number | Overall satisfaction score |
| OverTime | Text | Whether the employee works overtime |

| | | |
|---|---|---|
| Relationship Satisfaction | Number | Satisfaction with interpersonal relationships |
| Salary | Decimal | Monthly or annual salary |
| Self Rating | Number | Rating given by the employee about themselves |
| State | Text | State or region of residence |
| StockOptionLevel | Text | Description of stock option level |
| StockOptionLevelID | Number | Identifier for stock option level |
| Work-Life Balance | Number | Balance between work and personal life |
| YearsAtCompany | Number | Number of years the employee has been with the company |
| YearsInMostRecentRole | Number | Years in the most recent role |
| YearsSinceLastPromotion | Number | Years since the last promotion |
| YearsWithCurrManager | Number | Years under the current manager |

**2. Performance Table**

| Field Name | Data Type | Description |
|---|---|---|
| EmployeeID | Number | Foreign key referencing the Employee table |
| EnvironmentSatisfactionID | Number | Satisfaction with the work environment (linked ID) |
| JobSatisfactionID | Number | Satisfaction with the job (linked ID) |
| ManagerRatingID | Number | Rating given by the manager (linked ID) |
| OverallSatisfactionID | Number | Overall satisfaction (linked ID) |
| PerformanceID | Number | Unique performance record ID |
| RelationshipSatisfactionID | Number | Interpersonal relationship satisfaction (linked ID) |
| ReviewDate | Date | Date of the performance review |
| SelfRatingID | Number | Self-assigned rating by the employee (linked ID) |
| TrainingOpportunitiesTaken | Number | Number of training sessions attended |
| TrainingOpportunitiesWithinYear | Number | Training attended in the current year |
| WorkLifeBalanceID | Number | Work-life balance score (linked ID) |

# Preparation steps:

1. Load data files to the power query.
2. Merged FirstName and LastName into FullName
3. Renamed “Education” to “EducationID”
4. Created an “Education” column referring to the Education ID with the corresponding Education Level
5. Renamed “StockOptionLevel” to “StockOptionLevelID”
6. Added a conditional column named “StockOptionLevel” as follows:

| StockOptionLevelID | StockOptionLevel |
|---|---|
| 0 | No Stock Options |
| 1 | Low-level Stock Options |
| 2 | Medium-level stock options |
| 3 | High-level stock options |

7. Added a conditional column named “Age Range” which groups up the “Age” column as follows: < 25, 26 – 35, 36 – 45, > 45
8. Added a conditional column named “DistanceFromHome Range” which groups up the “DistanceFromHome” column as follows:

| DistanceFromHome | DistanceFromHome Range |
|---|---|
| 0 - 9 | Very Short |
| 10 – 19 | Short |
| 20 – 29 | Moderate |
| 30 – 39 | Long |
| 40 and more | Very Long |

9. Renamed “EnvironmentSatisfaction” to “EnvironmentSatisfactionID”
10. Added a new column using DAX named “EnvironmentSatisfaction” as follows:

| EnvironmentSatisfactionID | EnvironmentSatisfaction |
|---|---|
| 1 | Very Dissatisfied |
| 2 | Dissatisfied |

| | |
|---|---|
| 3 | Neutral |
| 4 | Satisfied |
| 5 | Very Satisfied |

11. Renamed “JobSatisfaction” to “JobSatisfactionID”
12. Added a new column using DAX named “JobSatisfaction” as follows:

| JobSatisfactionID | JobSatisfaction |
|---|---|
| 1 | Very Dissatisfied |
| 2 | Dissatisfied |
| 3 | Neutral |
| 4 | Satisfied |
| 5 | Very Satisfied |

13. Renamed “RelationshipSatisfaction” to “RelationshipSatisfactionID”
14. Added a new column using DAX named “RelationshipSatisfaction” as follows:

| RelationshipSatisfactionID | RelationshipSatisfaction |
|---|---|
| 1 | Very Dissatisfied |
| 2 | Dissatisfied |
| 3 | Neutral |
| 4 | Satisfied |
| 5 | Very Satisfied |

15. Created a new column named “OverallSatisfactionID” which represents the average of all satisfaction dimensions.
16. Added a new column using DAX named “EnvironmentSatisfaction” as follows:

| OverallSatisfactionID | OverallSatisfaction |
|---|---|
| 1 | Very Dissatisfied |
| 2 | Dissatisfied |
| 3 | Neutral |
| 4 | Satisfied |
| 5 | Very Satisfied |

17. Renamed “WorkLifeBalance” to “WorkLifeBalanceID”.
18. Added a conditional column named “WorkLifeBalance” as follows:

| WorkLifeBalanceID | WorkLifeBalance |
|---|---|
| 1 | Very Poor |
| 2 | Poor |
| 3 | Neutral |
| 4 | Good |
| 5 | Excellent |

19. Renamed “SelfRating” to “SelfRatingID”.
20. Added a conditional column named “SelfRating” as follows:

| SelfRatingID | SelfRating |
|---|---|
| 1 | Unacceptable |
| 2 | Needs Improvement |
| 3 | Meets Expectation |
| 4 | Exceeds Expectation |
| 5 | Above and beyond |

21. Renamed “ManagerRating” to “ManagerRatingID”.
22. Added a conditional column named “ManagerRating” as follows:

| ManagerRatingID | ManagerRating |
|---|---|
| 1 | Unacceptable |
| 2 | Needs Improvement |
| 3 | Meets Expectation |
| 4 | Exceeds Expectation |
| 5 | Above and beyond |

# 1. Data Analytical Questions:

1 What is the overall attrition rate in the company?

2 Which department experiences the highest attrition?

3 Which age group has the highest turnover rate?

4 How does salary affect attrition?

5 What is the average salary per department?

6 Is there a gender gap in attrition?

7 Which ethnicity shows the highest turnover?

8 How does tenure impact employee stability?

9 What is the relationship between promotions and turnover?

10 Which education field dominates the workforce?

11 How does work-life balance affect turnover?

12 How are salaries distributed by age?

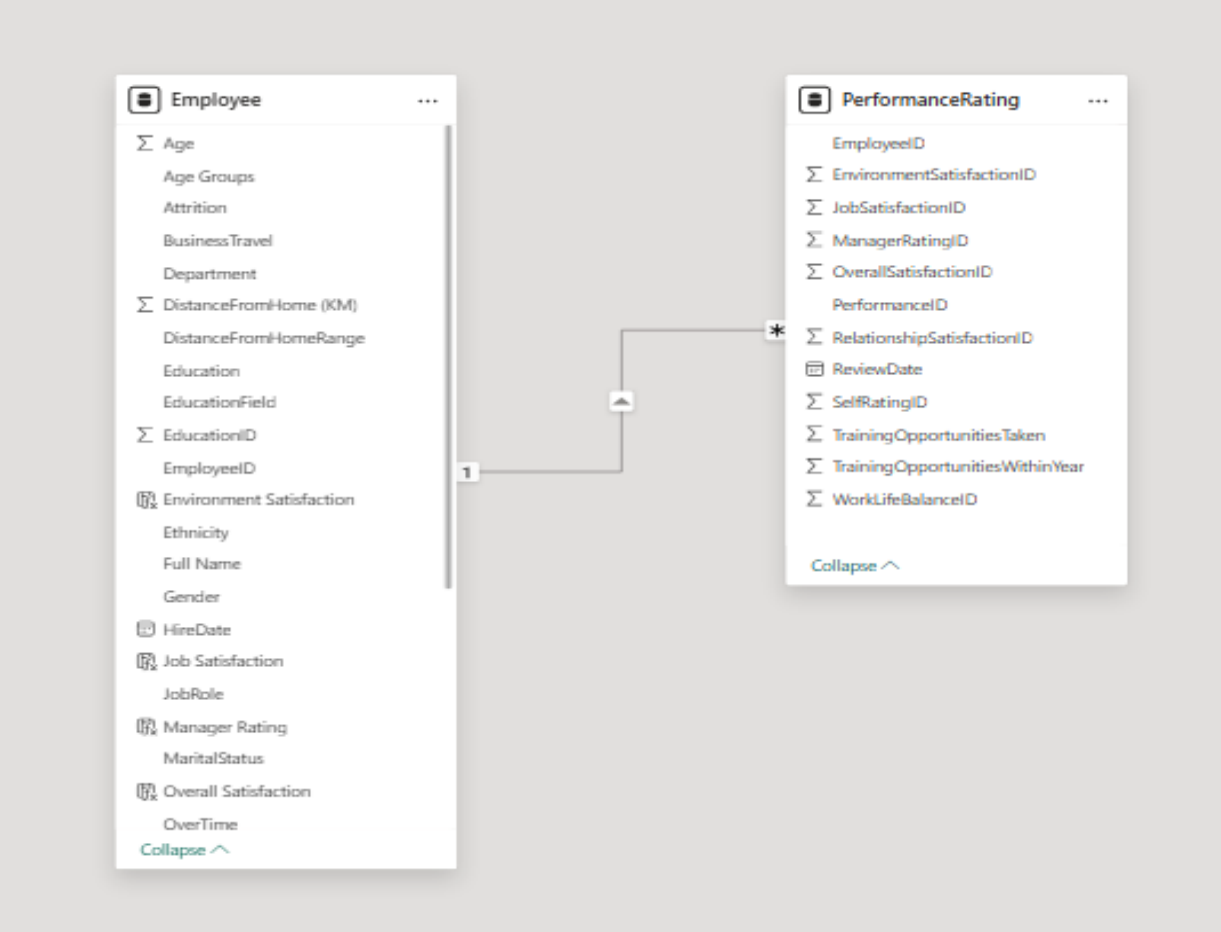
13 Is there a relation between self-rating and manager rating?

14 How does distance from home impact retention?

15 Which positions are most stable?

## Data Modeling:

### The Data has two main tables




1. **Employee Table (Main Dimension Table)**
2. **PerformanceRating Table (Fact Table)**

## Relationships Between the Tables

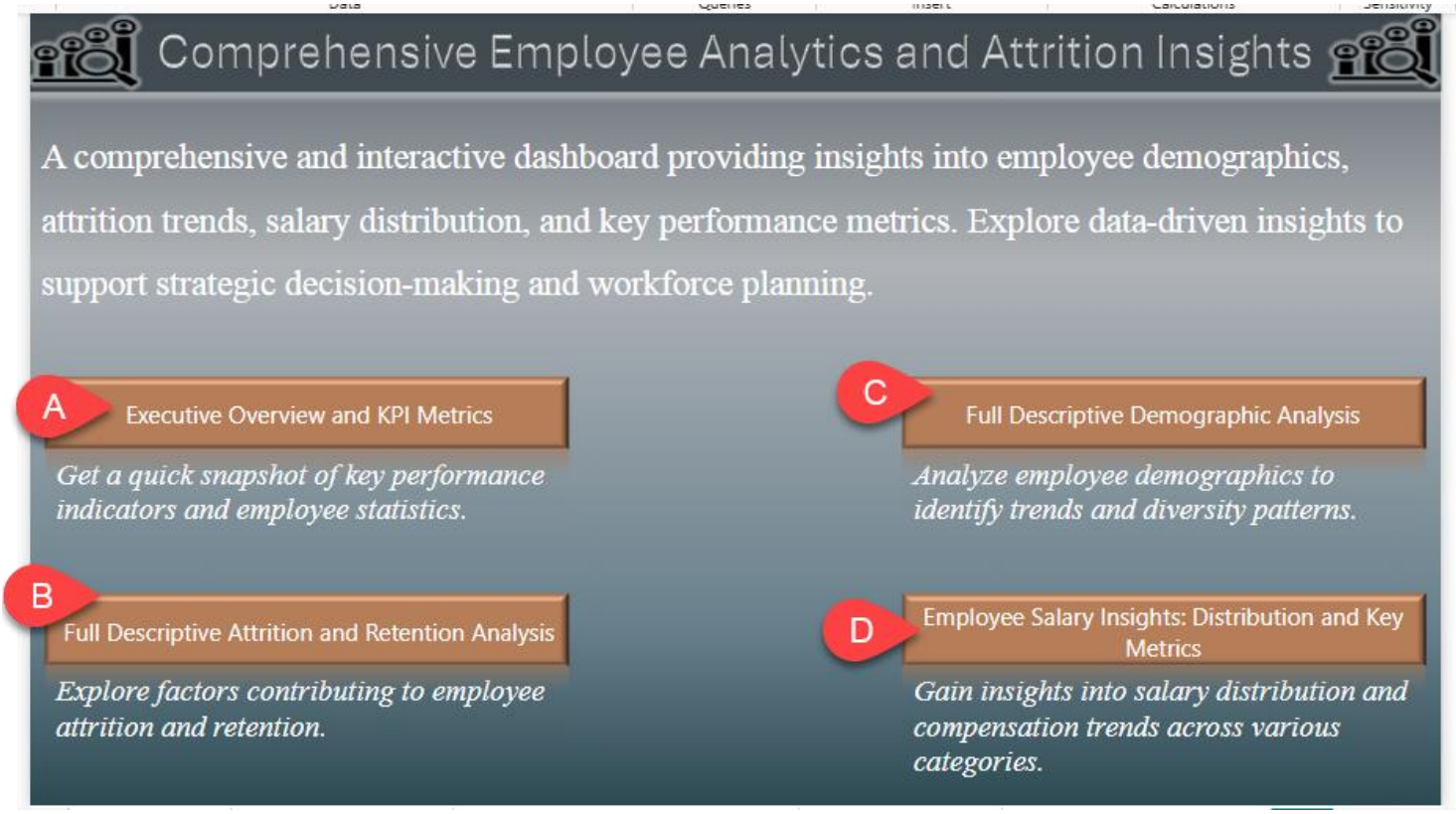
1. **One-to-Many** relationships between:
    - Employee (EmployeeID) → Performance Rating (EmployeeID)

## Analysis Methodology

### 1.DAX

| | |
|---|---|
| Attrition rate | Provide the overall rating of attritional people according to analyzed value |
| Average Environment Satisfaction | Calculate the average rating by environment satisfaction |
| Average Job Satisfaction | Calculate the average rating by job satisfaction |
| Average Manager Rating | Calculate the average rating satisfaction by manager for the employees |
| Average Overall Satisfaction | Calculate the average rating by satisfaction overall |
| Average Relationship Satisfaction | Calculate the average rating satisfaction by relationships |
| Average Salary | Calculate the average amount of total Salaries |
| Average Self Rating | Calculate the average rating by the employees for themselves |
| Average Tenure | Calculates the average Tenure rate of the employees |
| Average work life balance | Calculates the average balance ability between life and work |
| Average years since the last promotion | Calculates the average number of years since the last promotion per employee |
| Average years with current manager: | Calculates the average years of experience with the current manager |
| Employee Counts: | This measure counts the number of employees according to analyzed value |
| Employee Percent: | This measure calculates the percentage amount of the employees according to full descriptive demographic analysis |
| Total Salary: | This measure calculates a sum of total salaries of the employees in the dataset. |

# Home Page (The First Page of Dashboard)




**Overview:**

The Home Page serves as the central navigation hub for accessing all analytical components of the dashboard.

Navigation Flow

The Home Page serves as the primary navigation point, with each section linking to its corresponding detailed analysis page. Users can return to the Home Page from any other page via a "Home" button in the global navigation.

**Page Components**

1. **Header Section**

   Title: "Comprehensive Employee Analytics and Attrition Insights"

   "A comprehensive and interactive dashboard providing insights into employee demographics, attrition trends, salary distribution, and key performance metrics. Explore data-driven insights to support strategic decision-making and workforce planning=

2. **Navigation Section:**

   **A. Executive Overview and KPI Metrics**

   Navigation Link: Clicking this section directs users to the Executive Overview dashboard page=

   Content Includes=

   High-level KPIs (Headcount, Attrition Rate, etc.)

   **B. Full Descriptive Attrition and Retention Analysis**

   Description: "Explore factors contributing to employee attrition and retention".

   Navigation Link: Clicking this section directs users to the detailed Attrition Analysis page.

   **C. Full Descriptive Demographic Analysis**

   Description: "Analyze employee demographics to identify trends and diversity patterns".

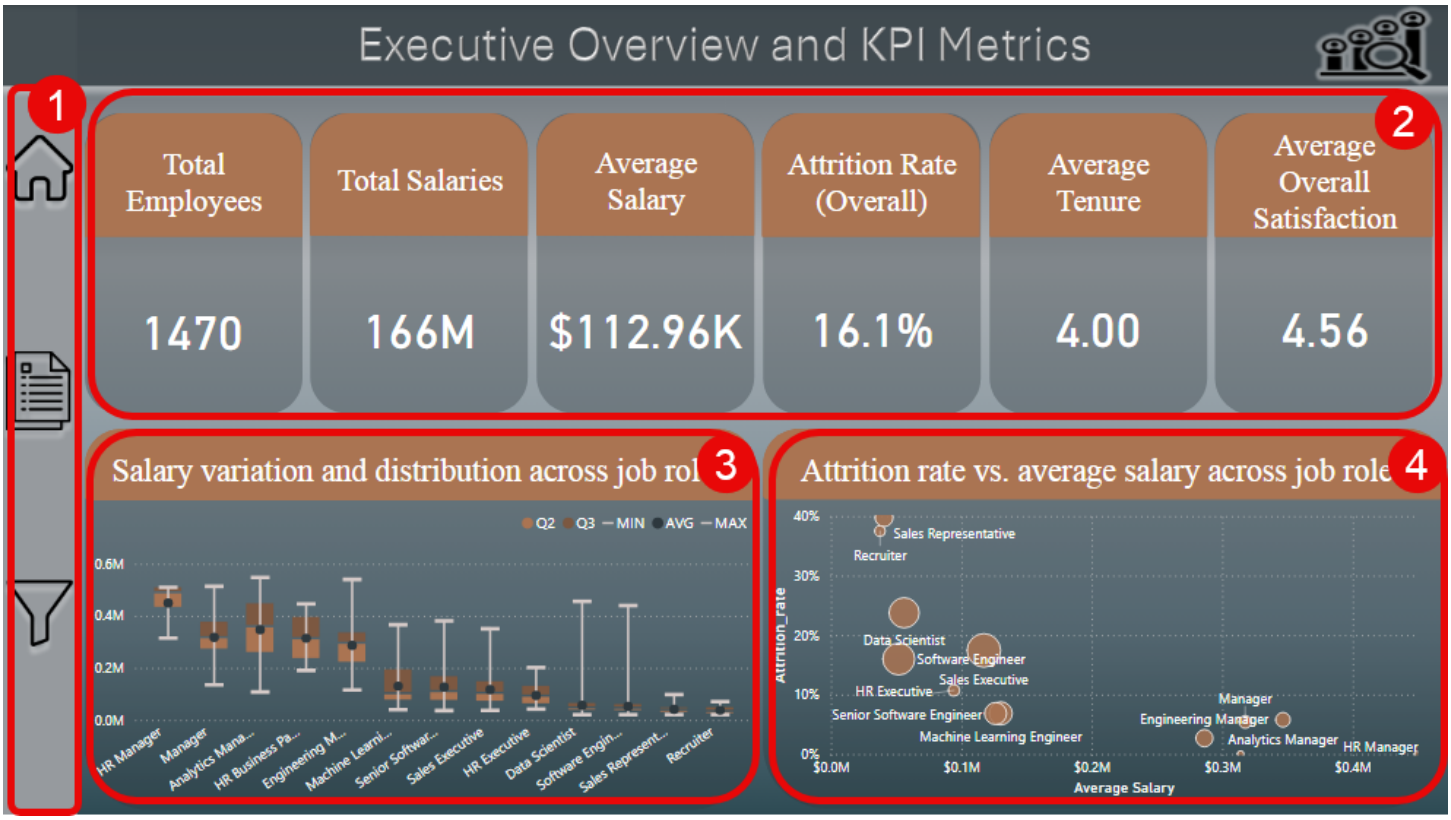
   Navigation Link: Clicking this section directs users to the Demographic Analysis page.

   **D. Employee Salary Insights: Distribution and Key Metrics**

   Description: "Gain insight into salary distribution and compensation trends across various categories."

   Navigation Link: Clicking this section directs users to the Salary Analysis page.

## A- Executive Overview and KPI Metrics Dashboard:




(A) **Navigation Panel (Left Sidebar):**

A vertical set of interactive icons (Home, Data View, Filters) allowing users to switch between different report pages, such as the main dashboard, filter views, or more detailed HR reports.

1) Home: Navigation Link clicking this section directs users to the Home Page
2) Data View : Navigation Link clicking this button open menu that direct users to the data Pages
3) Filters: the user can filter the data with more than one condition and the data visualization will affect immediately (Demographic Filters – Ethnicity -Gender - Age Group - Marital Status - Education Field - Education Level - Job role – Department)

(B) **KPI Metric Cards (Top Section):**

This section features a series of summary cards presenting key HR performance indicators: (Total Employees, Total Salaries, Average Salary, Attrition Rate (Overall), Average Tenure, Average Overall Satisfaction)

These metrics provide a real-time overview and are responsive to filters applied throughout the dashboard.

(C) **Salary Variation and Distribution Across Job Roles (Bottom Left)**:

A box plot chart that illustrates salary distribution across different job roles. It shows statistical points such as minimum, maximum, Quarters

(D) **Attrition Rate vs. Average Salary Across Job Roles (Bottom Right):**

A scatter plot visualizing the relationship between attrition rates and average salaries for different job roles.

Bubble sizes can represent additional measures (such as number of employees), providing deeper insights into retention and compensation dynamics per role.

**Key Findings:**

- **Comprehensive Overview of Workforce Metrics**
  The top KPI cards provide a high-level snapshot of employee count, total compensation, satisfaction, tenure, and attrition.
- **Clear Salary Distributions by Role**
  The salary box plot reveals noticeable variations in compensation across different job positions, highlighting disparities and salary ranges=
- **Insights into Attrition vs. Salary Dynamics**
  The scatter plot identifies roles with high attrition and relatively low or high salaries, helping HR managers to spot roles at risk and consider strategic adjustments
- **Interactive Navigation for User Flexibility**
  Sidebar icons ensure smooth access to different pages and filtered views, supporting efficient and targeted data exploration.

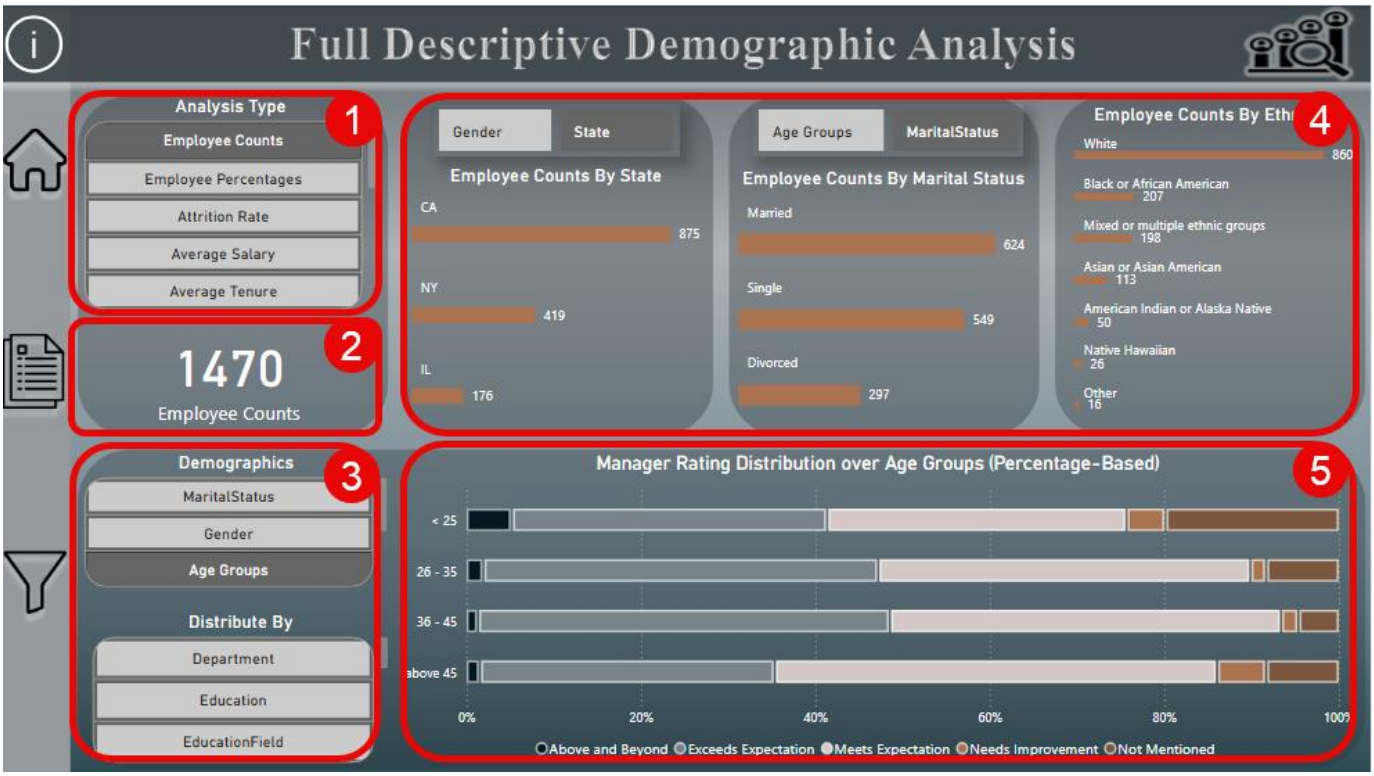
**Summary:**

This enhanced dashboard offers a well-rounded view of organizational HR performance through dynamic metrics and detailed salary analyses=

By combining high-level KPIs, salary distribution insights, and attrition analysis, it empowers HR leaders and business stakeholders to make data-driven decisions on workforce management, compensation strategies, and retention planning=

The intuitive navigation panel ensures a seamless and interactive user experience across different report sections.

# B- Full descriptive demographic Analysis




➢ **Visuals overview**:

**1. Analysis type filter panel:**

A custom slicer drives the primary metric displayed in the card below and controls interactively across other visuals on the page.

**2. Card visuals:**

to attract attention and illustrate the results of the data displayed interactively, depending on the type of data analysis chosen.

**3. Demographics and distributed by filter panel:**

Parameters for adjusting the Y (demographics) and X (distributed by) axis of the stacked bar chart visual. They are affecting only on this visual.

**4. A clustered bar chart**:

with the most important indicators according to the distribution of employees in terms of gender, age, race and marital status through the analysis type.

**5. Stacked bar chart:**

which is distributed by different categories within each group. The Y- axis is for demographic distribution and the X-axis is for the count of employees.

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- **Key Findings:**

**1.Employee Gender Distribution:** The distribution between males and females is very close, but there is a significant representation of the non-binary category (8.4%), which is a good indicator of diversity and inclusiveness.

**2.Age Group Distribution:** Most of the workforce is young, with those under 35 representing approximately 78%. This may reflect a dynamic work environment or one in need of ongoing training and development.

**3.Department Distribution:** The technology department has the largest percentage of employees, but HR is the least represented, which may indicate that the job structure is more focused on technical or sales positions.

**4.Ethnicity Distribution:** There is a clear dominance of a particular race (White - 58.5%), which may indicate a need to enhance racial diversity in hiring, without affecting job performance.

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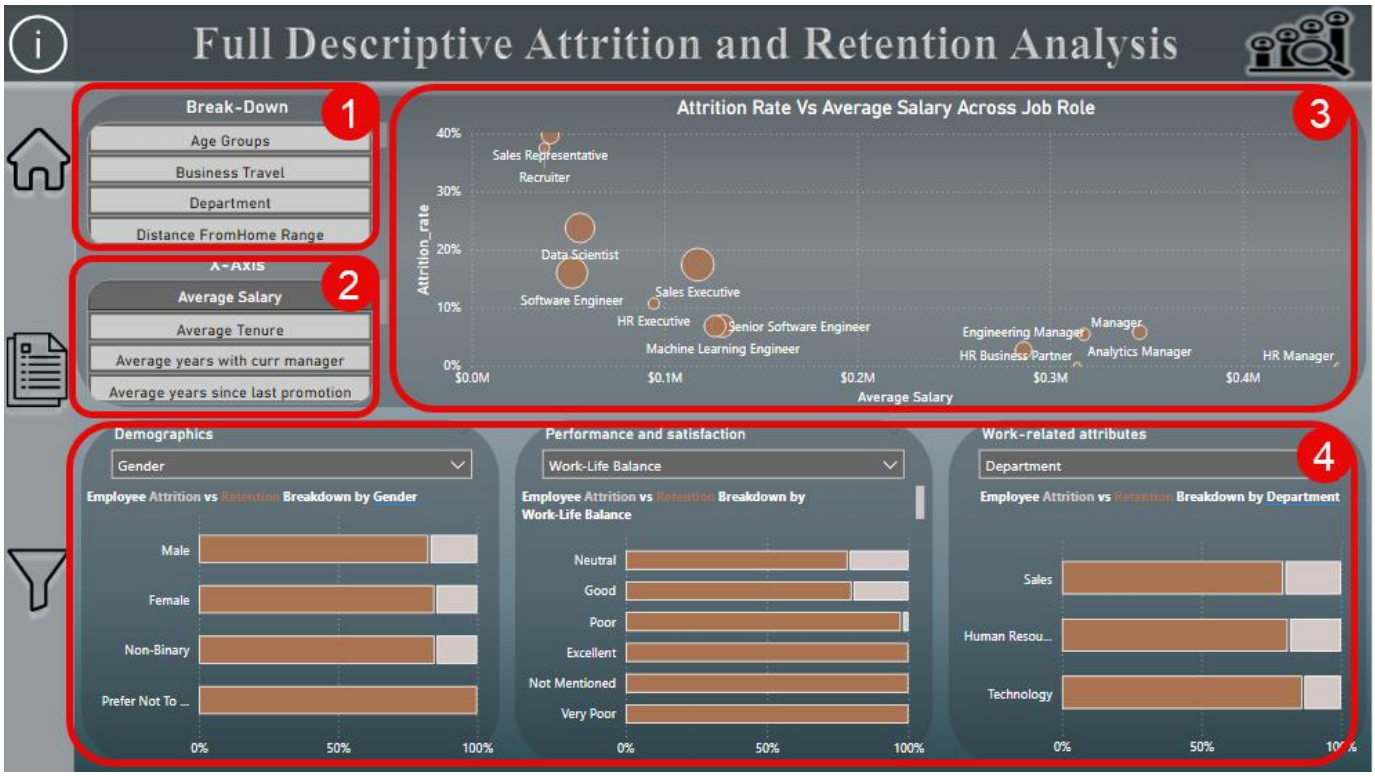
# C- Full Descriptive Attrition Dashboard




- **Visuals overview**:

1.Break- Down filter panel:

It's essential for slicing the attrition insights by key employee attributes. affecting only on the scatter chart and controls on the values of this visual.

2.X-Axis filter panel:

It's essential for slicing the attrition insights with different measurable attributes. affecting only on the scatter chart and controls on the values of this visual.

**3.Scatter chart:**

shows the attrition rate (Y-Axis) and (X-Axis) with some measures calculated in the model in the form of tile slicer valued by Break-Down filters panel.

### 4.Stacked bar chart:

allows us to compare the rates of resignations and retention in each category, within the same category and see relative distribution in a quick and clear way according to fields in slicers above categorized into three different categories.

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## ➢ Key Findings:

**1.Attrition rate vs. Average Salary per Job:** The analysis shows an inverse relationship between average salary and employee turnover, with turnover rates decreasing as income increases. The highest turnover rates occurred in lower-paying positions such as Sales Representative and Recruiter. While higher-paying managerial positions such as HR Manager and Analytics Manager had the lowest turnover rates.

**2.Attrition rate by marital status:** Single people are more likely to leave their jobs, but Married and divorced people have a higher rate of stability.

**3.Job Satisfaction vs. Turnover Rate:** Employees who are dissatisfied with their jobs are significantly more likely to quit and the gap between satisfaction levels and employee retention is very clear.

4. **Attrition rate by department:** Sales have the highest Attrition rateamong departments, but HR and Technology have relatively lower turnover rates.

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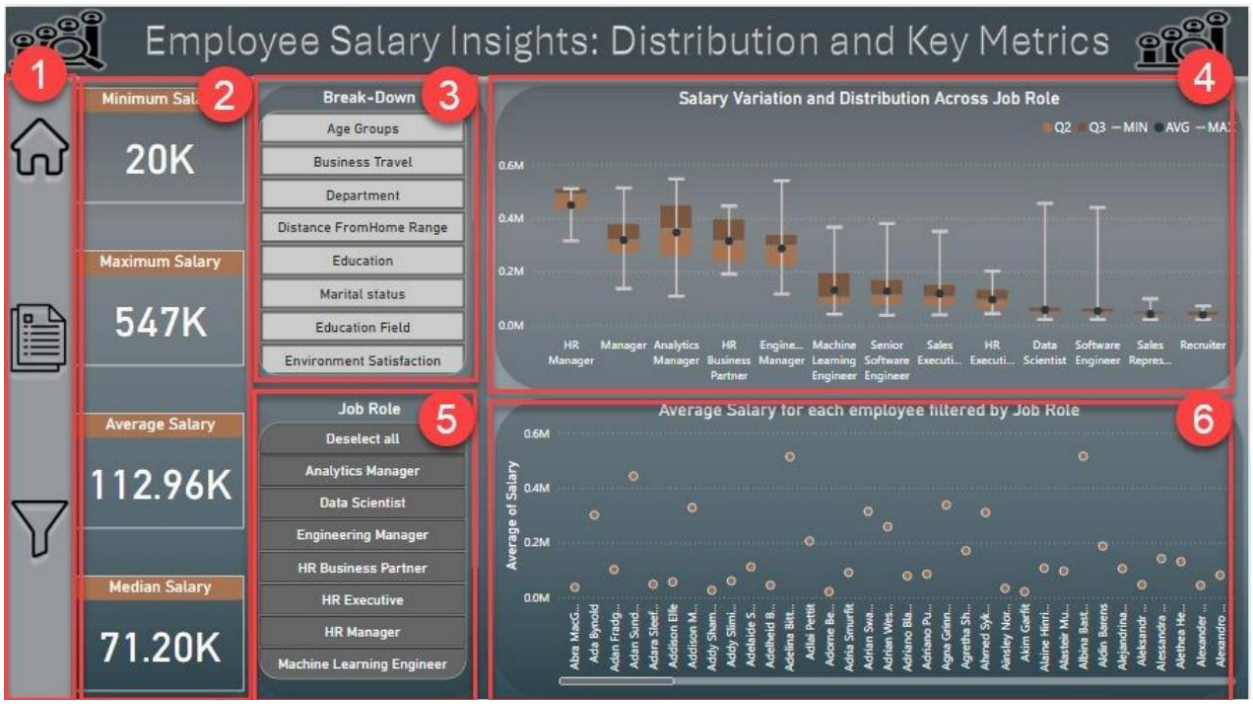
## ➢ Analysis Summary:

**The analysis shows that the overall employee Attrition rateis 16.1%, with resignations largely concentrated in lower-paying positions such as Sales Representative and Recruiter, potentially indicating dissatisfaction or workload in these roles. Meanwhile, managerial positions such as HR Manager and Analytics Manager were more stable, with lower turnover rates. Marital status also impacted on job stability, with single employees reporting higher turnover rates than married and divorced employees. The stacked bar chart also showed that the Sales department experienced the highest turnover rate, while the HR and Technology departments enjoyed higher retention rates.**

# D Employee Salary Insights Dashboard




- **Visuals Overview:**

**1. Navigator Icons (Left Sidebar):**

**A set of intuitive icons located on the left sidebar enables smooth navigation across different sections of the dashboard, such as the Home page, Data view, or Filter settings. These icons are strictly navigational and are not influenced by filters.**

**2. Key Metric Cards (Left Panel):**

**These cards display essential salary statistics—Minimum, Maximum, Average, and Median salary values. The metrics automatically update based on any filters applied across the dashboard, providing a live snapshot of overall salary figures.**

**3. Filters Section (Top and Middle Left):**

**This section consists of two interconnected filter panels:**

- **Break-Down Filters (Top):**

  **A multi-select slicer allowing users to filter data using general employee attributes such as Age, Education, Department, Marital Status, Distance from Home, Business Travel, Education Field, and Environment Satisfaction.**

  **This filter affects the Box Plot only.**

- **Job Role Filter (Below Break-Down):**

  **A job-specific slicer used to select one or more job roles for detailed salary analysis.**

**This filter affects only the Scatter Plot and works in alignment with the Break-Down filter to allow more focused analysis.**

**4. Box Plot – Salary Distribution (Top Right):**

**A box plot visual designed to showcase the distribution and variation in salaries across different employee categories. It includes statistical markers such as Minimum, Q1, Median, Q3, Maximum, and Average.**

**This visual is controlled exclusively by the Break-Down Filters, allowing users to explore salary trends across selected segments.**

**5. Scatter Plot – Average Salary per Employee (Bottom Right):**

**A dynamic scatter plot that displays individual average salary data for employees within selected job roles. It's ideal for analyzing differences on an individual level.**

**This visual is exclusively controlled by the Job Role Filter, offering a more granular lens after general filtering is applied.**

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- **Key Findings:**
  1. **Layered Filtering Enhances Precision:**
     **The dual-filter approach (Break-Down + Job Role) creates a structured and targeted exploration experience, starting from broader categories down to individual job functions.**
  2. **Clear Visualization of Salary Spread:**
     **The Box Plot effectively communicates how salary ranges differ among various employee attributes, identifying key patterns and outliers.**
  3. **Role-Specific Salary Focus:**
     **The Scatter Plot enables a focused look at how salaries vary among employees in specific roles, complementing the broader Box Plot perspective.**
  4. **Real-Time Metrics Update:**
     **The metric cards provide live feedback as filters are applied, making it easy to monitor how different selections impact overall salary statistics.**
  5. **Smart Visual Independence:**
     **Each visual operates based on its associated filters, preventing confusion and enabling users to analyze specific data points without interfering with unrelated visuals.**

- **Analysis Summary:**

  **This dashboard is a powerful analytical tool designed to provide both a high-level overview and a deep dive into salary structures within an organization. It combines smart filtering mechanisms with impactful visuals to help users explore compensation dynamics across various employee segments.**

  - **The Break-Down Filters allow users to segment the data based on demographic or organizational factors.**
  - **The Job Role Filter then enables a closer inspection within those segments by narrowing the focus to specific job titles.**
  - **The Box Plot offers a comprehensive view of salary distribution across groups.**
  - **The Scatter Plot brings clarity to salary variations among individuals within selected roles.**
  - **Key Metric Cards serve as a constant summary that reflects any changes made through filtering.**
  - **Together, these elements provide HR professionals and decision-makers with valuable insights to identify pay trends, address compensation disparities, and guide equitable, data-informed salary decisions.**

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## ➢ Project Summary and conclusion:

**Objective**: To uncover actionable insights that strengthen workforce retention, enhance diversity, ensure fair compensation, and boost employee satisfaction.

- **Attrition Risk**: Concentrated among sales, early-career employees, and underpaid roles.
- **Compensation**: Clear salary disparities by role, department, and age.
- **Diversity Gaps**: Ethnic minorities face elevated attrition, indicating inclusion gaps.
- **Managerial Influence**: Long-term leadership correlates with better employee stability.
- **Career Growth**: Lack of promotions leads to higher resignation risk.

This HR Analytics project demonstrates the power of **data-driven HR decision-making**. With a focused action plan on **career growth, fair compensation, managerial development, and employee wellbeing**, the company can significantly **improve retention**, **diversify leadership pipelines**, and **enhance employee satisfaction** — ultimately driving **business success**.

## ➢ Recommendations Based on Analysis

- **Reduce Sales Attrition**:
  - Introducing **uncapped commission structures**.
  - Offer **wellness programs** and **clear promotion pathways**.
- **Target Mid-Career Talent**:
  - Launch **Leadership Development Programs** for employees aged **30–40**.
- **Optimize Salary Structures**:
  - Benchmark roles using **Mercer/Radford data**.
  - Introduce **retention bonuses** for high-risk positions.
- **Managerial Stability**:
  - Train managers in **emotional intelligence**.
  - Tie manager evaluates partly to **team retention KPIs**.
- **Career Growth Transparency**:
  - Publish **clear promotion criteria**.
  - Launch **peer-recognition programs** (e.g., *Quarterly Spotlight Awards*).

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