Project Summary – HR Analytics with AdventureWorks 2022 Database

Project Title:
Human Resources Analytics: Workforce Insights through Data

Summary:
The purpose of this project is to explore and analyze Human Resources data to generate valuable insights for organizations. Human Resources is a key area in any business, directly influencing company growth through workforce management, recruitment, and performance analysis.

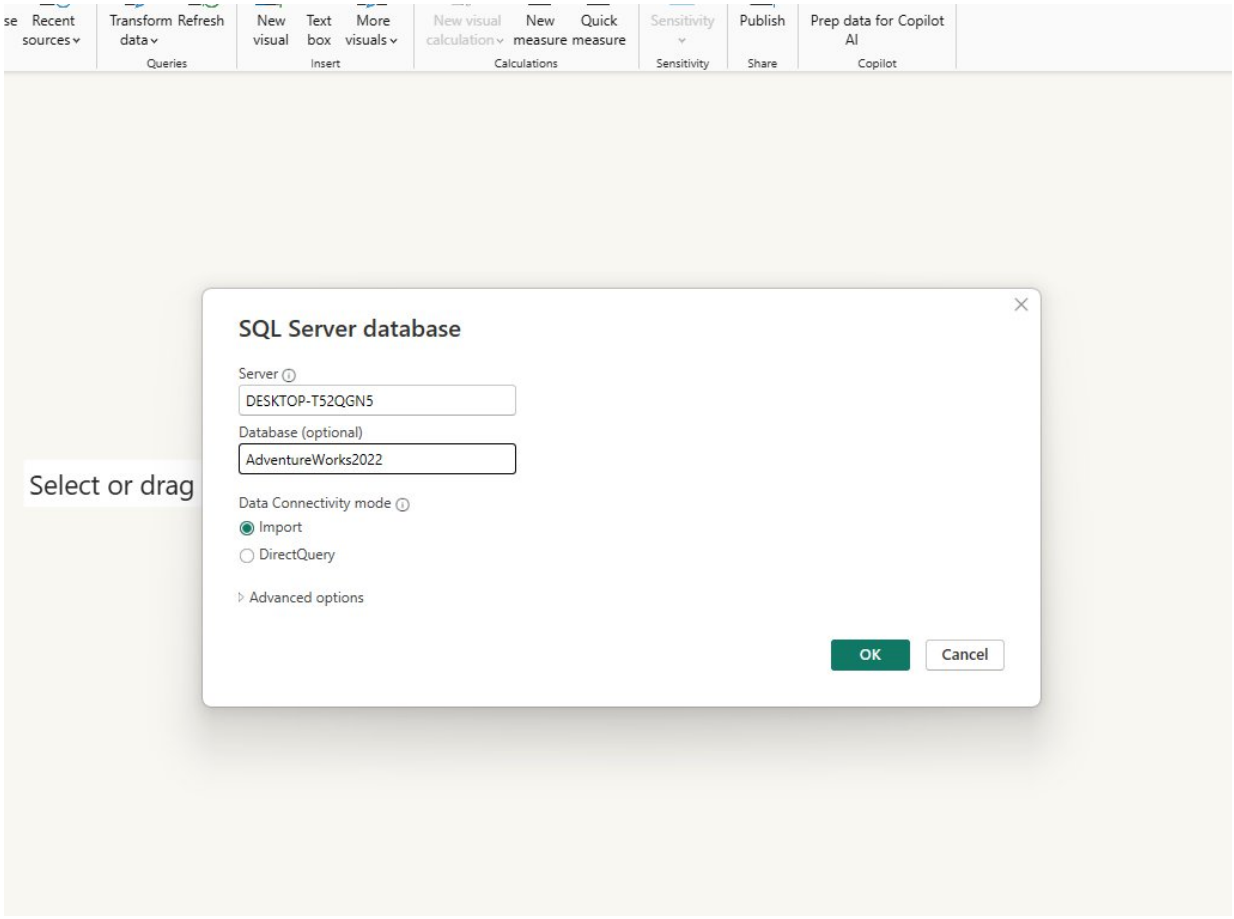
This project aims to deliver meaningful dashboards that help visualize workforce demographics, department structures, work schedules, and HR performance trends. These insights are crucial for supporting data-driven decision-making within HR departments.

The dashboards were created using realistic corporate data from Microsoft's AdventureWorks 2022 database and developed in Power BI.

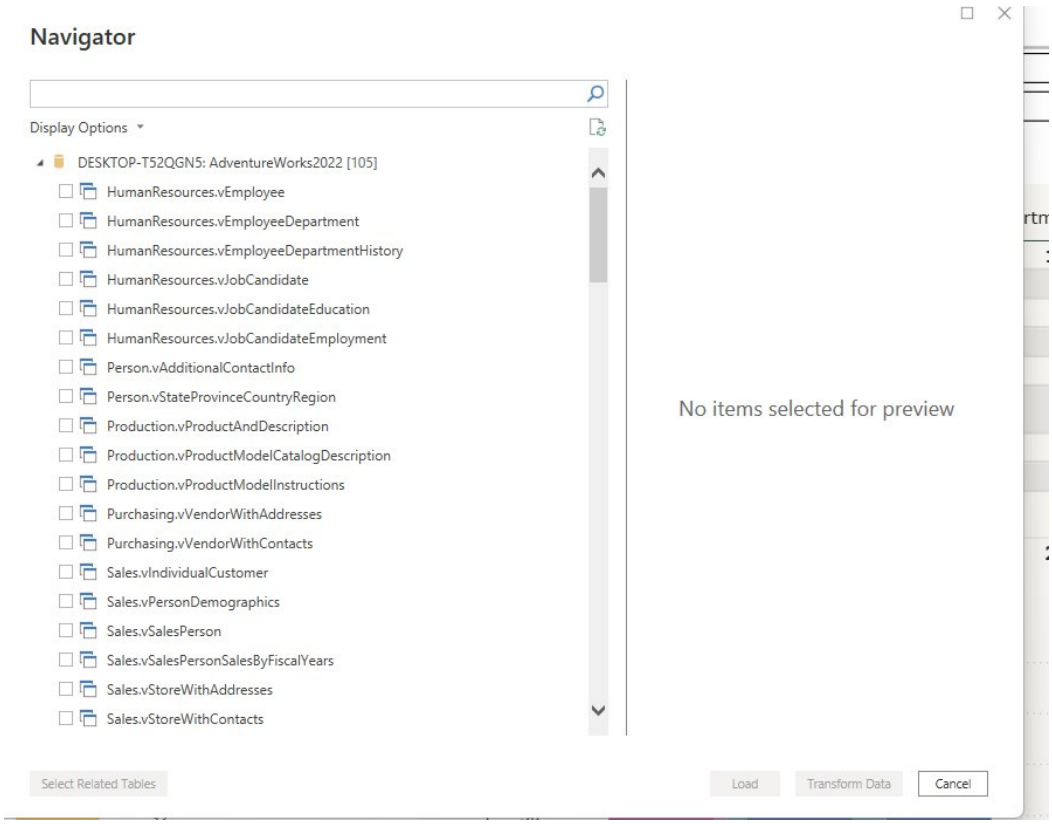
Mini Report – HR Analytics Project

1. Project Overview

The main goal of this project was to simulate a realistic Human Resources data analysis scenario using **Power BI**, aiming to extract relevant workforce insights that could support decision-making in a corporate environment.
To achieve that, I used the **AdventureWorks 2022** database, which simulates data from a U.S.-based bicycle company. This database was chosen due to its complexity and relevance, and because it closely reflects the types of data I expect to work with in a real job setting.



Note - I did the import from database in SQL server.



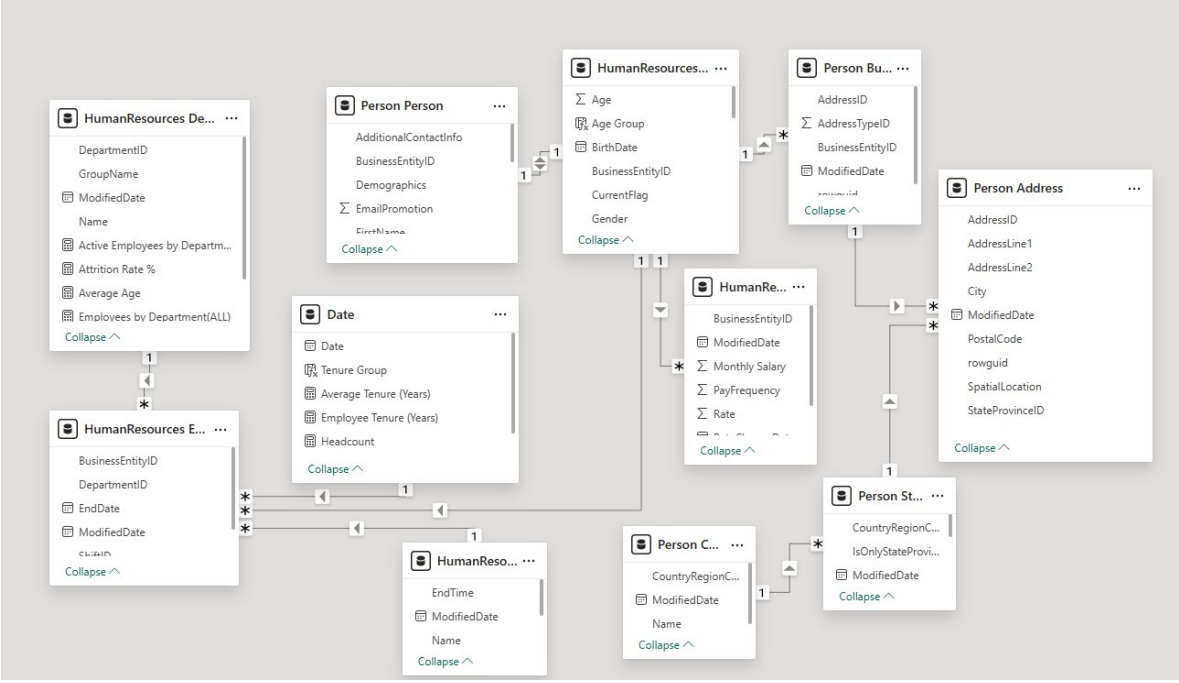
2. Data Sources

The analysis was based on **10 interrelated tables** from the AdventureWorks 2022 database, all of which are focused on Human Resources and employee management. These tables were imported into Power BI and properly connected using **foreign key relationships** to create a functional and efficient **data model**.

Imported tables:

- HumanResources.Employee
- HumanResources.EmployeeDepartmentHistory
- HumanResources.Department

- HumanResources.Shift
- Person.Person
- Person.BusinessEntityAddress
- Person.Address
- Person.StateProvince
- Person.CountryRegion
- HumanResources.EmployeesPayHistory

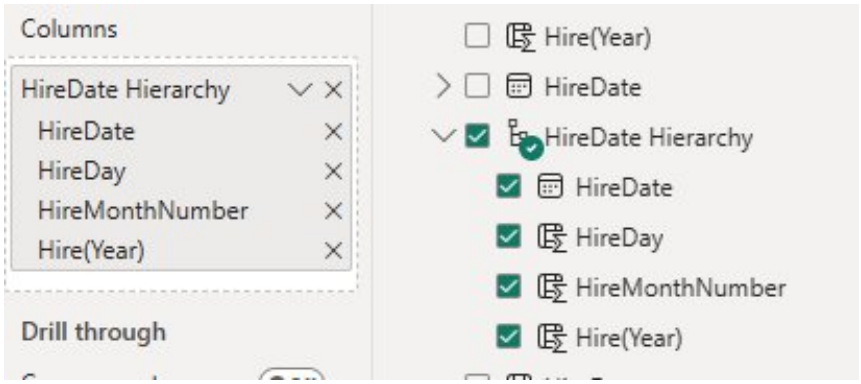


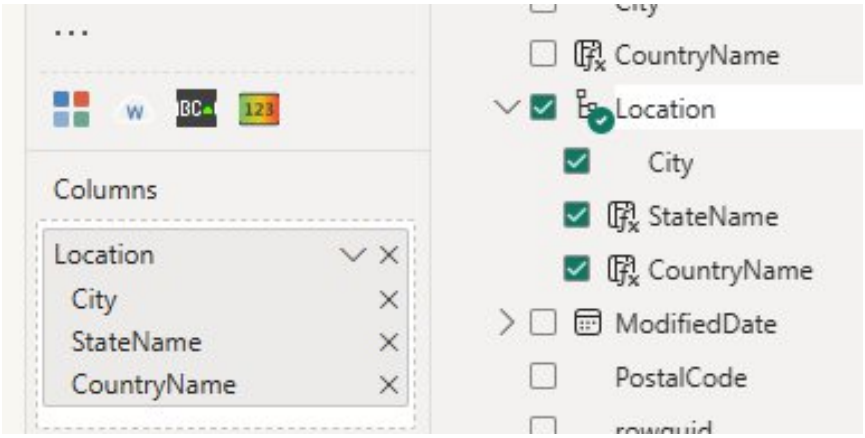
3. Data Preparation and Modeling

Once the tables were imported, I used the **Power Query Editor** to perform the following data preparation steps:

- Removed unnecessary columns to simplify the model
- Handled missing values and inconsistent data formats
- Renamed columns for clarity and consistency
- Converted data types (e.g., dates and numbers) where needed

- Created new calculated columns for custom analysis
- Built **relationships** between tables using foreign keys
- Created **hierarchies** for advanced drill-down capabilities (e.g., Country → State → City)





4. Dashboard 1 – Employees Overview

This dashboard provides a general overview of the current workforce within the company, focusing on key demographic and departmental metrics. The visuals allow for quick insights into employee distribution across various categories.

Main KPIs and Visuals:

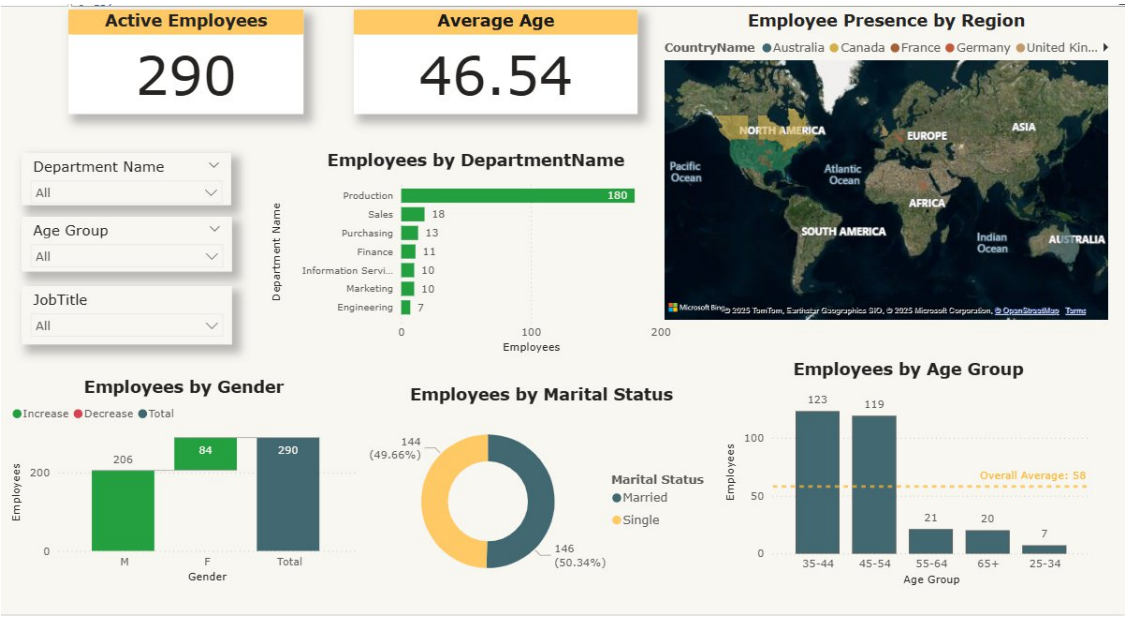
- **Total Active Employees:** 290
- **Average Age of Employees:** 46.54 years
- **Employees by Department:** The Production department is the largest, employing 180 people.

- **Total Employees by State:** A world map visual illustrates employee distribution by geographic region.
- **Employees by Gender:** 206 male and 84 female employees, totaling 290.
- **Employees by Marital Status:** Perfectly balanced – 50.34% married, 49.66% single.
- **Employees by Age Group:** Most employees are aged between 35–54, indicating a mature and experienced workforce.

Interactivity:

- The dashboard includes slicers for **Department**, **Age Group**, and **Job Title**, allowing dynamic filtering for more personalized insights.

Key Insight:
The company's workforce is concentrated in the Production department and dominated by employees aged 35–54. This may imply a solid level of expertise and experience, but also highlights the need to plan for future retirements or generational shifts.

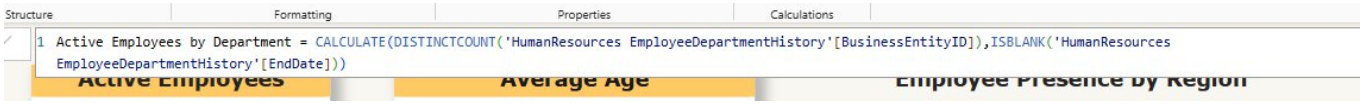


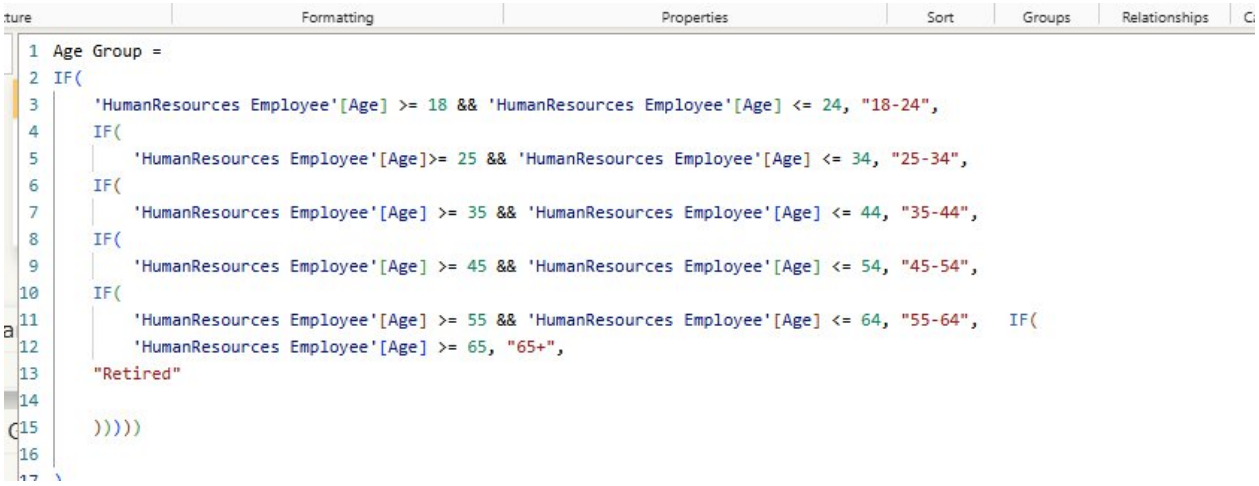
Why These Visuals Were Chosen

- **KPI Cards** (Active Employees, Average Age) were chosen to **highlight key workforce metrics at a glance**, providing immediate context for analysis.

- **Bar Charts** (Employees by Department, by Gender, by Age Group) provide **clear comparisons** across categories, making it easier to detect imbalances or trends.
- The **Map** (Total Employees by State) adds a **geographical dimension** to the analysis, essential for companies with distributed operations.
- The **Donut Chart** (Employees by Marital Status) visually represents proportion and is ideal for highlighting a balanced or imbalanced distribution.
- **Slicers** allow for interactive exploration of the data, enabling HR managers to filter results by department, age group, or job title as needed.

Here are some examples of DAX formulas I used to build this dashboard:





5. Dashboard 2 – Work Shifts Overview

This dashboard provides a comprehensive view of the company's workforce, highlighting employee status, departmental and shift distribution, and historical hiring trends. It offers detailed insights into the active employee base through various breakdowns.

Main KPIs and Visuals:

- **Employee Status Overview:** Displays key figures including **Total Employees (296)**, **Active Employees (290)**, **Inactive Employees (5)**, and **Pending (1)**.
- **Shift Distribution Summary:** Shows a quick breakdown of employees by shift, indicating **52 employees on Night shift** and **176 on Day shift**.
- **Hierarchical Employee Breakdown:** A treemap visualizes the distribution of **290 active employees**, allowing for a hierarchical exploration by Department, Gender, and Job Title. The current view shows a filter applied for 'Finance' department, 'F' (Female) gender, and 'Accounts Receivable' job title, demonstrating a drilled-down insight.
- **Employees by Department (Day Shift):** A table lists the number of employees for various departments specifically on the Day shift, totaling 290 active employees.
- **Distribution of Employees per HireDate:** A bar chart illustrates the company's hiring history, with a significant peak in **2008 (148 employees hired)** and **2007 (74 employees hired)**, indicating an overall average of 36 hires per year. This suggests a more established workforce with fewer recent hires.
- **Active Employees by Shift and Gender:** A stacked bar chart provides a detailed breakdown of active employees by shift (Day, Evening, Night) and gender (Female/Male). It clearly shows the **Day shift as the largest with 176 employees (120 M, 56 F)**, followed by Evening (62 employees: 29 M, 33 F) and Night (52 employees: 33 M, 19 F).

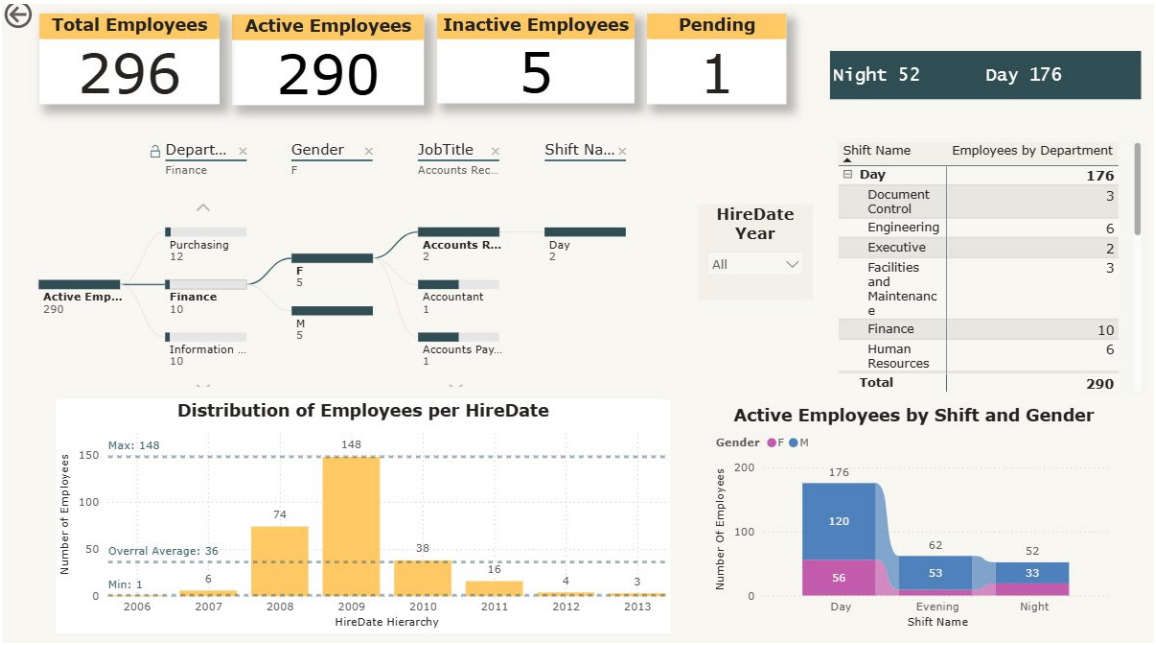
Interactivity:

The dashboard includes slicers for "Department," "Gender," "Job Title," "Shift Name," and "HireDate Year," enabling users to dynamically filter the data for specific insights. The hierarchical treemap also allows for interactive drill-down analysis.

Key Insight:

The company maintains a large active workforce, predominantly working the day shift. The hiring trend shows a significant number of employees were hired around 2007-2008, suggesting a mature employee base. The gender distribution

varies noticeably across different shifts, with a higher proportion of males on day and night shifts, and a more balanced distribution on the evening shift.



Why These Visuals Were Chosen

- **KPI Cards** (Total Employees, Active, Inactive, Pending, Shift Numbers) highlight key workforce metrics at a glance, offering immediate insights into employee status and shift distribution.
- **Treemap** (Active Employees by Department, Gender, Job Title) visualizes hierarchical relationships and proportions, helping identify dominant categories in a compact layout.
- **Table** (Employees by Department – Day Shift) provides precise values and is ideal for reviewing detailed, structured data.
- **Bar Chart** (Employees by Hire Date) shows hiring trends over time, enabling quick comparisons across different periods.
- **Stacked Bar Chart** (Active Employees by Shift and Gender) compares total employees per shift while revealing gender distribution within each shift, supporting diversity analysis.

Here are some examples of DAX formulas I used to build this dashboard:

```
Active Employees by Department = CALCULATE(DISTINCTCOUNT('HumanResources EmployeeDepartmentHistory'[BusinessEntityID]),ISBLANK('HumanResources
EmployeeDepartmentHistory'[EndDate]))
```

```
Inactive Employees =
CALCULATE(
    DISTINCTCOUNT('HumanResources EmployeeDepartmentHistory'[BusinessEntityID]),
    NOT(ISBLANK('HumanResources EmployeeDepartmentHistory'[EndDate])
)
)
```

6. Dashboard 3 – Department Insights

This dashboard offers a detailed view of compensation levels, attrition rates, and headcount trends across the company, helping stakeholders evaluate workforce stability and salary dynamics.

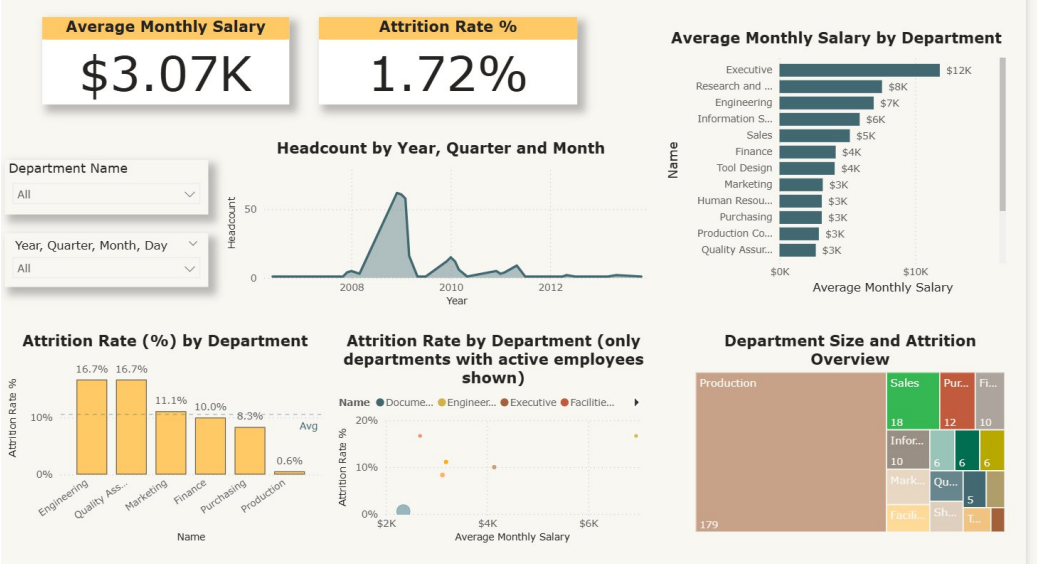
Main KPIs and Visuals:

- **Average Monthly Salary:** $3.07K
- **Attrition Rate:** 1.72% overall
- **Headcount Over Time:** Line chart shows a peak in 2008–2009 followed by a decline and stabilization.
- **Average Monthly Salary by Department:** Highlights salary differences; Executives earn the most ($12K).
- **Attrition Rate by Department:** Engineering and QA show the highest attrition (14.3%), while Production is lowest (0.6%).
- **Salary vs. Attrition Scatter Plot:** Reveals potential correlation between compensation and turnover.
- **Department Size Treemap:** Shows Production as the largest department (179 employees), followed by Sales, Purchasing, and others.

Interactivity:

- Slicers for **Department** and **Time (Year, Quarter, Month, Day)** enable detailed and dynamic analysis.

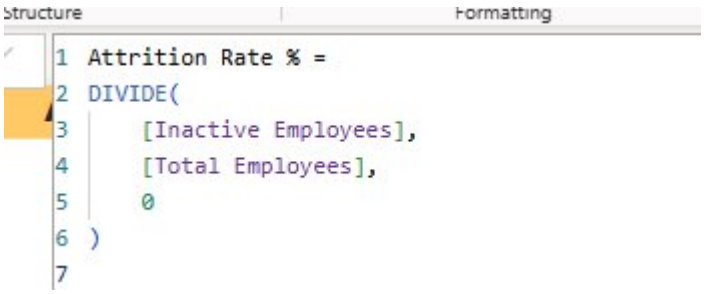
Key Insight:
Despite a low overall attrition rate, certain departments face high turnover. Salary differences may influence this trend, but not exclusively. Historical data shows a long-term decline in headcount since 2009, while compensation varies significantly across departments.

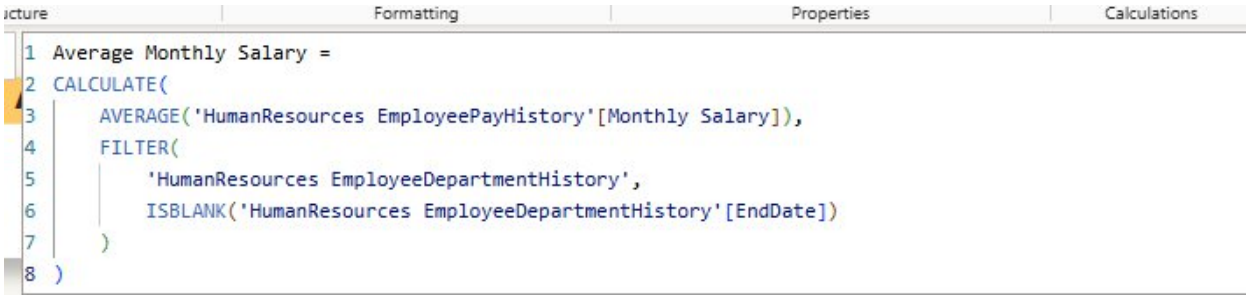


Why These Visuals Were Chosen

- **KPI Cards** (Average Monthly Salary, Attrition Rate) provide a quick snapshot of key workforce indicators, allowing stakeholders to assess overall compensation and turnover at a glance.
- **Line Chart** (Headcount Over Time) illustrates long-term workforce trends, making it easy to identify significant changes in company size over the years.
- **Bar Charts** (Salary and Attrition by Department) offer clear comparisons across departments, highlighting disparities in pay and employee retention.
- **Scatter Plot** (Attrition vs. Salary) is ideal for identifying potential correlations between compensation and turnover, revealing deeper patterns beyond surface-level metrics.
- **Treemap** (Department Size) effectively visualizes the relative size of each department, helping users understand organizational structure in a compact, space-efficient format.
- **Slicers** (Department, Time) enhance interactivity, enabling users to explore data dynamically and drill down into specific timeframes or organizational units.

Here are some examples of DAX formulas I used to build this dashboard:





7. Dashboard 4 – Work Force Trends

This dashboard provides a focused view on workforce stability and experience, highlighting key metrics such as active employees, average tenure, and attrition rates. It breaks down employee retention patterns across departments, age groups, genders, and tenure groups, offering valuable insights into employee longevity and turnover dynamics.

Main KPIs and Visuals:

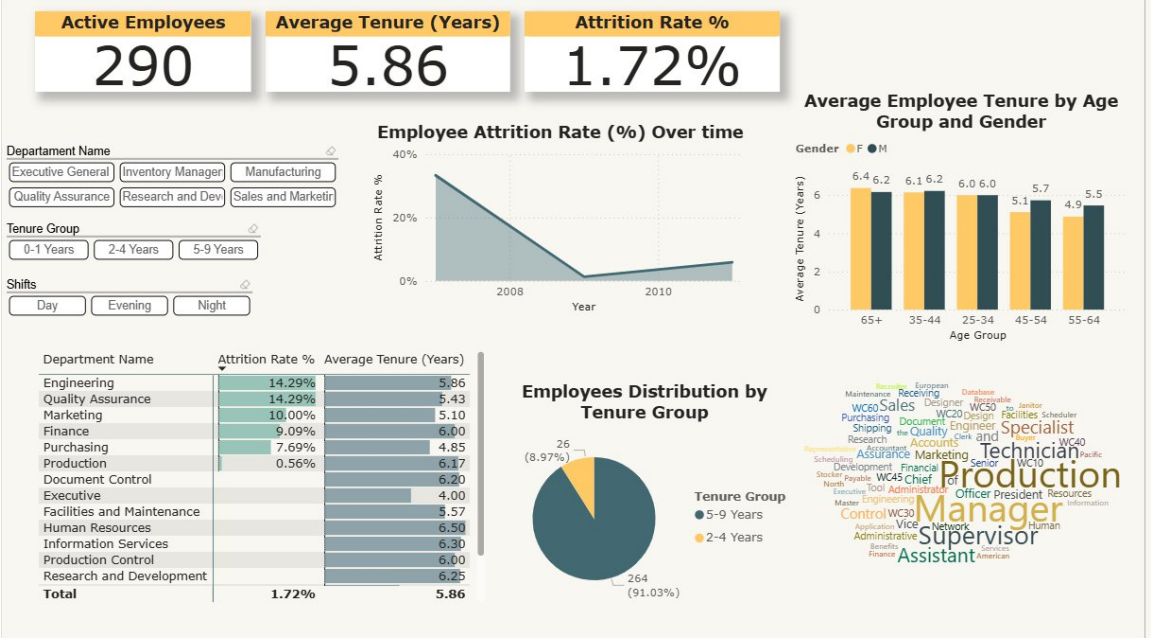
- **Active Employees:** 290 employees currently active.
- **Average Tenure:** 5.86 years, indicating a stable and experienced workforce.
- **Attrition Rate:** 1.72% overall.
- **Attrition Rate Over Time:** A line chart reveals a historical peak in 2008, followed by a sharp decline and stability from 2009 onward.
- **Average Tenure by Age Group and Gender:** Employees aged 65+ show the highest tenure (6.4 years), followed by 35–44 (6.2 years).
- **Attrition Rate and Tenure by Department:** A combined visual highlights Engineering and Quality Assurance with the highest attrition (14.29%), while Production shows the lowest (0.56%).

- **Tenure Distribution:** A donut chart shows that 91% of employees fall into the 5-9 year tenure group, indicating workforce maturity.
- **Job Title Word Cloud:** Highlights the most common roles, such as Manager, Technician, and Supervisor.

Interactivity:

- Slicers for **Department Name**, **Tenure Group**, and **Shifts (Day, Evening, Night)** allow for customized exploration of workforce segments.

Key Insight:
The company maintains high workforce stability, with a low attrition rate and long average tenure. While most employees have been with the company for 5–9 years, Engineering and Quality Assurance show signs of higher turnover and may require targeted retention strategies. Historical trends show that attrition challenges peaked in 2008 but have since improved significantly.

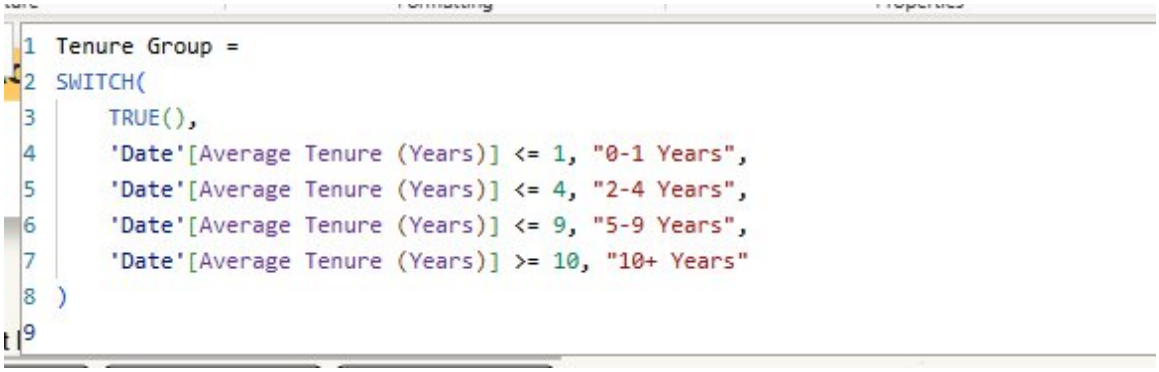


Why These Visuals Were Chosen

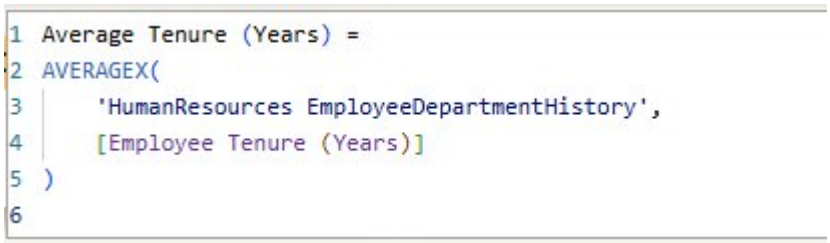
- **KPI Cards** (Active Employees, Average Tenure, Attrition Rate) provide immediate visibility into core workforce stability metrics. These high-level indicators help users quickly assess the overall health of the organization’s employee retention.

- **Line Chart** (Attrition Over Time) was selected to visualize historical trends and highlight specific periods of change, such as the attrition spike in 2008.
- **Bar Chart** (Average Tenure by Age Group and Gender) offers a clear comparison across demographics, enabling analysis of how tenure varies by age and gender.
- **Combined Chart** (Attrition Rate and Tenure by Department) facilitates side-by-side evaluation of two critical HR metrics across departments, revealing patterns and outliers.
- **Donut Chart** (Tenure Group Distribution) effectively illustrates the concentration of employees in tenure categories, making it easy to interpret proportions and workforce maturity.
- **Word Cloud** (Job Titles) provides a quick visual summary of the most common roles in the company, supporting organizational understanding in an engaging format.
- **Slicers** (Department, Tenure Group, Shifts) enhance interactivity, allowing users to filter data and explore specific workforce segments for deeper analysis.

Here are some examples of DAX formulas I used to build this dashboard:



```
Tenure Group =
SWITCH(
    TRUE(),
    'Date'[Average Tenure (Years)] <= 1, "0-1 Years",
    'Date'[Average Tenure (Years)] <= 4, "2-4 Years",
    'Date'[Average Tenure (Years)] <= 9, "5-9 Years",
    'Date'[Average Tenure (Years)] >= 10, "10+ Years"
)
```



```
Average Tenure (Years) =
AVERAGEX(
    'HumanResources EmployeeDepartmentHistory',
    [Employee Tenure (Years)]
)
```