HR Analytics Dashboard for Attrition & Workforce Insights

Introduction

In today's dynamic workplace, understanding employee behavior is essential for improving retention and organizational performance. This project develops an HR Analytics Dashboard using Power BI to visualize workforce metrics and identify the key factors affecting employee attrition. a comprehensive HR Analytics Dashboard was developed using Power BI to analyze employee attrition, workforce demographics, salary distribution, and overtime patterns.The dashboard provides HR managers and business leaders with data-driven insights to identify key factors influencing employee turnover, enabling proactive decision-making for workforce stability and retention improvement.

The dashboard transforms raw HR data into actionable insights through data modeling, DAX measures, and interactive visualizations, enabling HR leaders to make informed, data-driven decisions.

Objective

The main objectives of this project are to:

- Measure and monitor employee attrition trends across departments, job roles, income levels, and age groups.
- Identify the key drivers of employee turnover, including salary, overtime, and career stage.
- Visualize workforce demographics and experience to understand retention patterns.
- Support HR strategy through interactive, visual, and actionable insights.

Data Description

This dataset contains information on employees' demographics, job roles, income levels, experience, and attrition status. Each record represents an individual employee, providing the necessary variables for workforce analysis.

Key columns included:

	Column name	
0	Age	Employee's age
1	Attrition	Does the employee leave the organization
2	BusinessTravel	Frequency of employees' business trips
3	DailyRate	Daily salary rate for employees

4	Department	Office of employees
5	DistanceFromHome	Distance from home in miles to work
6	Education	Level of education achieved by staff
7	EducationField	Employee's field of study
8	EmployeeCount	Total number of employees in the organization
9	EmployeeNumber	A unique identifier for each employee record
10	EnvironmentSatisfaction	Employee satisfaction with their working envir...
11	Gender	Employee's Gender
12	HourlyRate	Hourly rate for employees
13	JobInvolvement	Level of involvement required for the employee...
14	JobLevel	Employee's level of work
15	JobRole	The role of employees in the organization
16	JobSatisfaction	Employee satisfaction with their work
17	MaritalStatus	Employee's marital status
18	MonthlyIncome	Employee's monthly income
19	MonthlyRate	Monthly salary rate for employees
20	NumCompaniesWorked	Number of companies the employee worked for
21	Over18	Whether the employee is over 18 years old
22	OverTime	Do employees work overtime
23	PercentSalaryHike	Salary increase rate for employees
24	PerformanceRating	The performance rating of the employee
25	RelationshipSatisfaction	Employee satisfaction with their relationships
26	StandardHours	Standard working hours for employees
27	StockOptionLevel	Employee stock option level
28	TotalWorkingYears	Total number of years the employee has worked
29	TrainingTimesLastYear	Number of times employees were taken to traini...
30	WorkLifeBalance	Employees' perception of their work-life balance
31	YearsAtCompany	Number of years employees have been with the c...
32	YearsInCurrentRole	Number of years the employee has been in their...
33	YearsSinceLastPromotion	Number of years since employee's last promotion
34	YearsWithCurrManager	Number of years an employee has been with thei...

Data Preparation

The Data Preparation and ETL (Extract, Transform, Load) process forms the foundation of the HR Analytics dashboard. This step ensures that the dataset is accurate, clean, and ready for analysis in Power BI. The ETL process was conducted using Power Query Editor in Power BI, which provides a robust environment for performing data cleaning, transformation, and modeling tasks.

Data Extraction

The dataset used for this project, titled *HR Employee Attrition*, was imported into Power BI Desktop from a CSV file using the Get Data → Text/CSV option.

Data Transformation

The transformation phase was completed in the **Power Query Editor**, where the dataset was cleaned and prepared for modeling.
The following tasks were performed:

1. **Data Cleaning**
   - Handled missing numeric and text values by replacing “0” and “Unknow”.
   - Removed duplicate records and null values.
   - Ensured correct data types for each column.
   - Renamed columns name.

2. **Feature Engineering (New Calculated Columns)**
   To improve analysis and visual grouping, new columns were created using DAX formulas:

   1) Attrition as numeric flag

   ```
   Add_AttritionFlag =
       Table.AddColumn(Deduped, "AttritionFlag", each if [Attrition] = "Yes" then 1 else 0, Int64.Type)
   ```

   2) Age bands

   ```
   Add_AgeBand =
       Table.AddColumn(
           Add_AttritionFlag,
           "AgeBand",
           each
   ```

```
        if [Age] < 26 then "18–25"
        else if [Age] < 36 then "26–35"
        else if [Age] < 46 then "36–45"
        else if [Age] < 61 then "46–60"
        else "60+",
      type text
    ),
```

3) Company tenure groups

```
  Add_TenureGroup =
    Table.AddColumn(
      Add_AgeBand,
      "TenureGroup",
      each
        if [YearsAtCompany] < 1 then "Under 1"
        else if [YearsAtCompany] < 3 then "1–2"
        else if [YearsAtCompany] < 6 then "3–5"
        else if [YearsAtCompany] < 11 then "6–10"
        else "10+",
      type text
    ),
```

4) Total working years groups

```
  Add_ExperienceGroup =
    Table.AddColumn(
      Add_TenureGroup,
      "ExperienceGroup",
      each
        if [TotalWorkingYears] < 5 then "0–4"
        else if [TotalWorkingYears] < 10 then "5–9"
        else if [TotalWorkingYears] < 15 then "10–14"
```

```
            else if [TotalWorkingYears] < 21 then "15–20"
            else "20+",
        type text
    ),
```

5) Income bands using actual distribution (tertiles: Low/Med/High)

```
    IncomeList   = Table.Column(Add_ExperienceGroup, "MonthlyIncome"),
    Qs           = List.Quantiles(List.Sort(IncomeList), {0.33, 0.66}),
    Q33          = Qs{0},
    Q66          = Qs{1},
    Add_IncomeBand =
        Table.AddColumn(
            Add_ExperienceGroup,
            "IncomeBand",
            each if [MonthlyIncome] <= 3333 then "Low"
                else if [MonthlyIncome] <= 6666 then "Medium"
                else "High",
            type text
        ),
```

6) Overtime flag

```
    Add_OvertimeFlag = Table.AddColumn(Add_IncomeBand, "OverTimeFlag", each
if [OverTime] = "Yes" then 1 else 0, Int64.Type),


    Add_AsOfDate   = Table.AddColumn(Add_OvertimeFlag, "AsOfDate", each
Date.From(DateTime.LocalNow()), type date),
```

After all transformations were complete, the cleaned and structured dataset was loaded into Power BI's data model using the Close & Apply command. This allowed the dataset to be utilized for creating relationships, DAX measures, and visualizations in the HR Analytics Dashboard.

Data Modeling and DAX Measurement

The Data Modeling and DAX (Data Analysis Expressions) phase defines how different data entities relate to one another and how key performance metrics are calculated within Power BI. This step transforms the cleaned dataset into a structured and analytical model that supports interactive dashboards and deep workforce insights.

1. Data Modeling

To enhance analytical flexibility and maintain scalability, a **Star Schema** model was implemented. This model design helps ensure efficient querying and simplifies the visualization process.

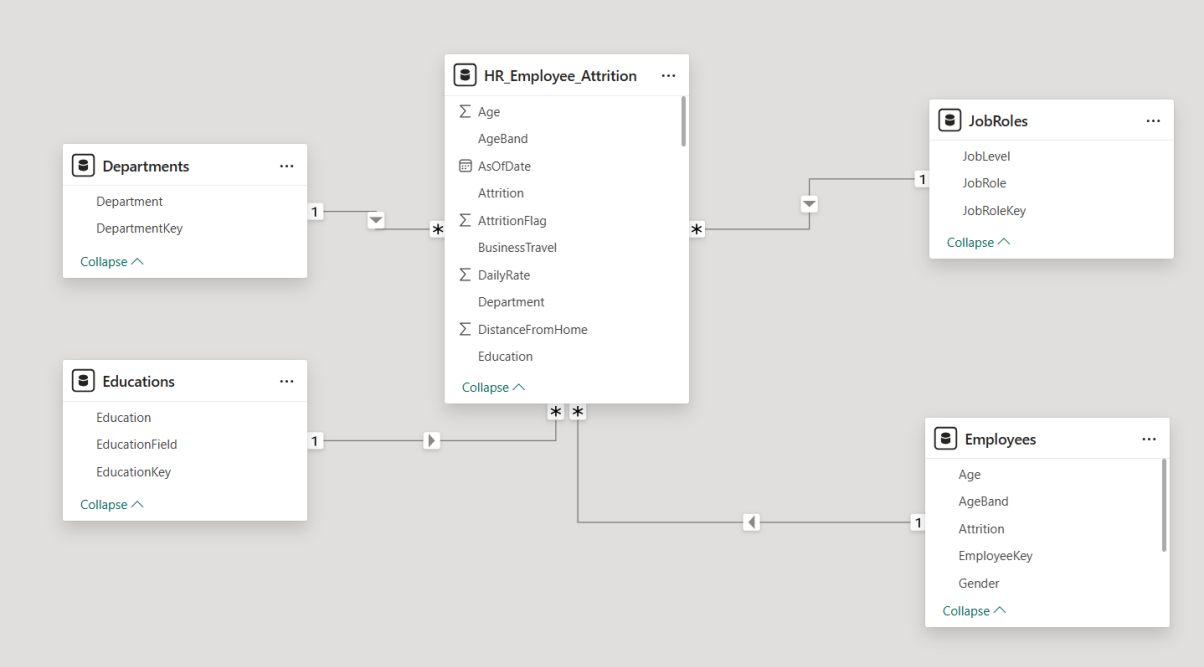
1.1. Star Schema Structure

- **Fact Table:**
  - ✓ HR_Employee_Attrition— Contains employee-specific data such as Employee ID, Age, Gender, Department, Job Role, Monthly Income, Total Working Years, Overtime, and Attrition status.
- **Dimension Tables:**
  - ✓ Departments — Department details.
  - ✓ JobRoles — Job role and category information.
  - ✓ Educations — Education Performance.
  - ✓ Employees— Employee Information.

Each dimension table has a **one-to-many** relationship with the fact table, enabling filtering and aggregation across multiple HR dimensions.

- **Relationships:**
  - ✓ Departments[Department] → HR_Employee_Attrition [Department]
  - ✓ JobRoles[JobRole] → HR_Employee_Attrition [JobRole]
  - ✓ Educations[EducationKey] → HR_Employee_Attrition [Education]
  - ✓ Employees[EmployeeKey] → HR_Employee_Attrition[EmployeeNumber]

This structure enables efficient data slicing (viewing attrition by department, gender, or experience group) and supports dynamic Power BI visuals.



Data Model Schema for HR Analytics Dashboard

This figure illustrates the star schema data model designed for the HR Analytics Dashboard in Power BI. The central Fact Table (HR_Employee_Attrition) stores key metrics such as employee demographics, attrition status, department, education, and salary-related data. It connects with four Dimension Tables — Departments, Educations, JobRoles, and Employees — through one-to-many relationships. This relational structure enables efficient data filtering, aggregation, and interactive reporting across multiple dimensions such as age, job role, income, and department.

2. DAX Measures

Key performance indicators (KPIs) were created using **DAX formulas** to summarize and calculate HR metrics accurately.

2.1 Total Employees

This measure counts the total number of active employees in the dataset.

Total Employees = COUNTROWS(Fact_Employee)

2.2 Attrition Count

This measure counts the number of employees who have left the organization (Attrition = "Yes").

Attrition Count =

CALCULATE(

```
    COUNTROWS(Fact_Employee),
    Fact_Employee[Attrition] = "Yes"
)
```

2.3 Attrition Rate (%)

This measure calculates the percentage of employees who have left the organization.

```
Attrition Rate =
DIVIDE(
    [Attrition Count],
    [Total Employees],
    0
)
```

Interpretation:
A higher attrition rate indicates higher employee turnover and potential retention challenges.

2.4 Average Monthly Income

This measure computes the average income across all employees, useful for identifying pay distribution patterns and equity across departments.

```
Average Monthly Income = AVERAGE(Fact_Employee[MonthlyIncome])
```

2.5 Overtime Count

This measure calculates how many employees regularly perform overtime.

```
Overtime Count =
CALCULATE(
    COUNTROWS(Fact_Employee),
    Fact_Employee[OverTime] = "Yes"
)
```

2.6 Overtime Rate (%)

This measure computes the proportion of employees who work overtime compared to total employees.

```
Overtime Rate =
DIVIDE(
```

```
    [Overtime Count],
    [Total Employees],
    0
)
```

2.7 Attrition Rate by Department

This measure isolates attrition rates for each department by removing filters from other columns except Department.

```
Attrition Rate by Department =
CALCULATE(
    [Attrition Rate],
    ALLEXCEPT(Fact_Employee, Fact_Employee[Department])
)
```

2.8 Attrition Rate by Job Role

This measure identifies how attrition varies across different job roles.

```
Attrition Rate by Job Role =
CALCULATE(
    [Attrition Rate],
    ALLEXCEPT(Fact_Employee, Fact_Employee[JobRole])
)
```

These DAX measures enable dynamic KPI tracking and visualization in Power BI. By combining attrition, overtime, and income indicators, HR managers can gain actionable insights into workforce health, identify high-risk areas, and make data-driven decisions to improve employee retention and engagement.

This data modeling and DAX phase transformed the HR dataset into a structured analytical model, allowing Power BI to efficiently calculate and visualize key metrics. By integrating relationships and calculated measures, the HR Analytics Dashboard can now dynamically track attrition patterns, workforce demographics, and performance trends across multiple dimensions.

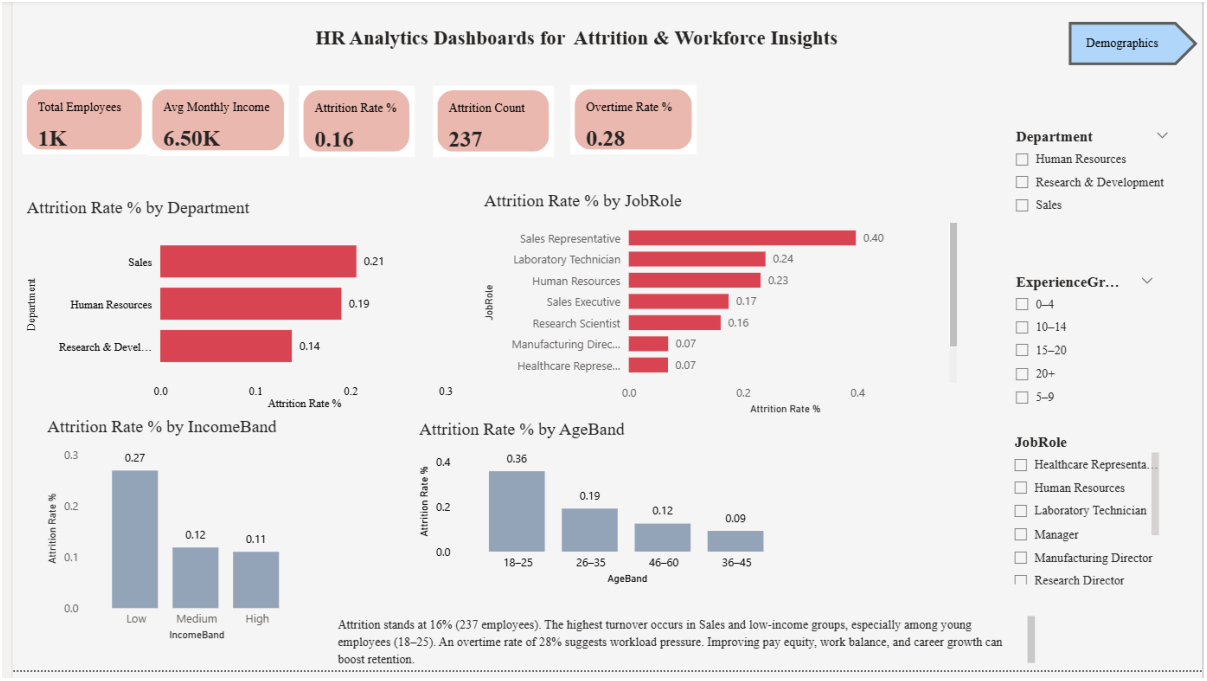
Visualization Dashboard

The **HR Analytics — Attrition & Workforce Insights Dashboard** was designed in Power BI to provide an interactive and user-friendly interface for exploring key workforce metrics. The layout emphasizes clarity, color consistency, and storytelling to help HR professionals identify employee attrition patterns, workforce composition, and retention risks at a glance.

The dashboard contains **three interactive pages**, each focusing on a specific area of analysis.Navigation buttons (Home | Demographics | Salary Insight) allow smooth movement across pages.

Executive Overview: Attrition & Workforce Insights

The Executive Overview page provides a high-level summary of key HR metrics and employee attrition performance. It gives management an immediate understanding of the organization's workforce structure, attrition behavior, and potential problem areas. This page focuses on identifying which departments, job roles, and employee groups are most affected by turnover and highlights the key factors influencing attrition.



Attrition & Workforce Insights Dashboard

At the top of the dashboard, key performance indicators (KPIs) are presented to give an instant snapshot of organizational health:

- **Total Employees:** 1,000 employees currently in the organization.
- **Average Monthly Income:** $6.5K, representing the average employee salary.
- **Attrition Rate:** 16%, with 237 employees having left the company.
- **Attrition Count:** A total of 237 employees have left during the analysis period.

- **Overtime Rate:** 28% of employees are involved in overtime work.

These indicators provide a quick assessment of the overall workforce situation. The relatively high attrition and overtime rates suggest potential workload pressure and employee dissatisfaction.

Attrition Rate by Department

This bar chart compares the attrition rate across departments to identify where turnover is highest.

- Sales Department records the highest attrition rate at 21%, followed by Human Resources (19%), and Research & Development (14%).
- The Sales department appears most vulnerable, indicating possible stress due to performance targets or limited career growth.

Insight:
Departments with high-pressure roles and performance-driven targets experience greater turnover. This suggests that department-specific retention programs and workload management are necessary.

Attrition Rate by Job Role

This horizontal bar chart visualizes attrition distribution across various job roles.

- **Sales Representatives** show the **highest attrition (40%)**, followed by **Laboratory Technicians (24%)** and **Human Resources (23%)**.
- Roles such as **Research Scientists** and **Managers** demonstrate better retention, indicating stable work satisfaction in senior or specialized positions.

Insight:
High turnover among sales-related and technical roles suggests a need for targeted retention incentives and employee support initiatives.

Attrition Rate by Income Band

This column chart analyzes how employee income level affects attrition.

- **Low-income employees** have the **highest attrition (27%)**, while medium- and high-income bands have much lower turnover rates at **12%** and **11%**, respectively.
- The correlation indicates that **compensation** is a strong factor influencing employee retention.

Insight:
Enhancing pay equity, performance-based rewards, and fair salary structures could help reduce attrition among lower-income employees.

Attrition Rate by Age Band

This chart illustrates attrition rates across different age categories.

- The **18–25 age group** shows the **highest attrition (36%)**, which gradually decreases among older employees.
- Employees aged **26–35** (19%) and **36–45** (12%) are more stable, while attrition among **46–60** age group (9%) is minimal.

Insight:
Younger employees tend to leave early in their careers due to external job opportunities or unclear career progression. Implementing mentorship, career development programs, and skill training can improve retention for this group.

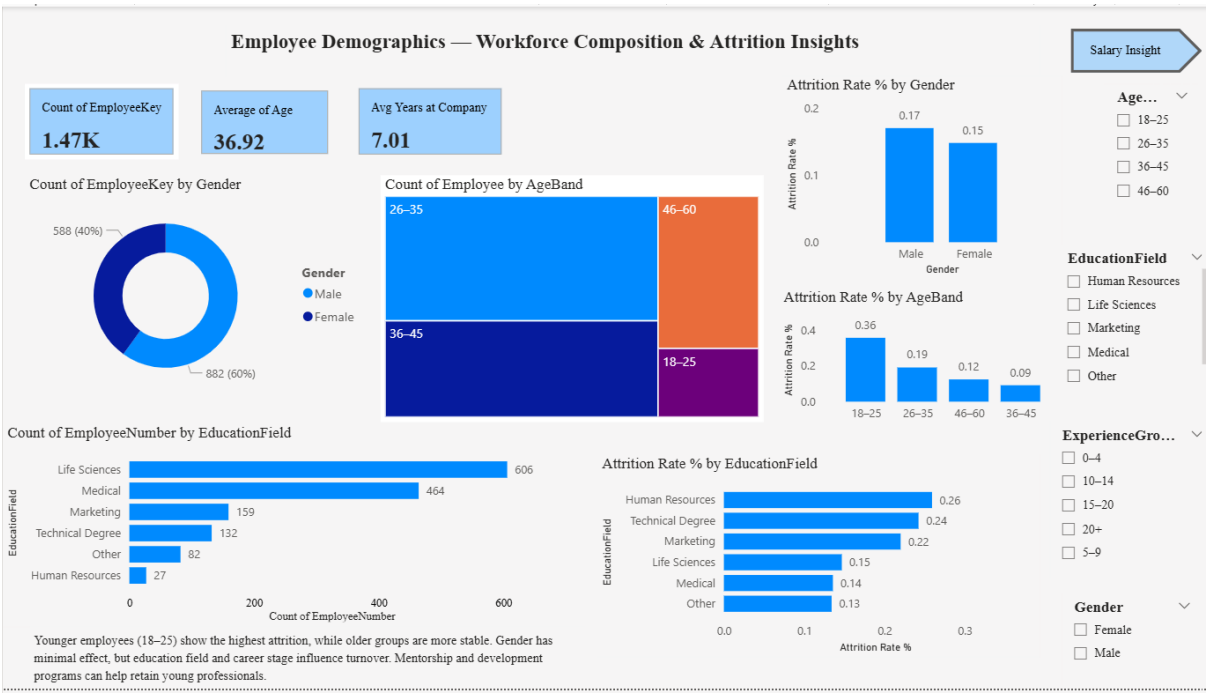
Storytelling Summary (Text Box Insight)

The organization has an overall attrition rate of 16%, representing 237 employees who have left. The Sales Department and Sales Representatives have the highest turnover, especially among young (18–25) and low-income employees. The overtime rate (28%) indicates workload-related stress contributing to attrition. Improvements in compensation structure, workload balance, and career growth opportunities are recommended to strengthen employee retention.

The Executive Overview effectively summarizes employee attrition patterns at an organizational level. It identifies Sales, low-income, and younger employees as the most vulnerable groups. This page serves as the foundation for deeper exploration in subsequent dashboard pages, guiding HR management to focus on workload management, fair compensation, and early-career engagement strategies.

Employee Demographics — Workforce Composition & Attrition Insights

The Employee Demographics page focuses on understanding the composition of the workforce by gender, age, education field, and experience. It provides valuable insights into how these demographic attributes correlate with employee attrition. The purpose of this page is to support data-driven HR decision-making by identifying workforce patterns, diversity distribution, and demographic risk factors that influence turnover.



Employee Demographics Dashboard

At the top of the dashboard, key metrics summarize the organization's workforce profile:

- Employee Count: 1.47K total employees in the company.
- Average Age: 36.92 years, indicating a mid-career workforce.
- Average Tenure: 7.01 years, showing moderate employee retention and stability.

These KPIs reflect a relatively experienced and mature employee base, suggesting that the company maintains a steady workforce with moderate turnover.

Count of Employees by Gender (Donut Chart)

Purpose:
To visualize the gender distribution across the organization.

Insight:

- **Male employees:** 882 (60%)
- **Female employees:** 588 (40%)

Interpretation:
The workforce maintains a **balanced gender ratio**, with slightly more male employees. Gender diversity appears healthy and does not show significant bias in the organization.

Count of Employees by Age Band (Tree Map)

Purpose:
To display how employees are distributed across different age groups.

Insight:

- The **26–35** and **36–45** age groups form the **largest segments** of the workforce.
- Fewer employees fall in the **18–25** and **46–60** age bands.

Interpretation:
The company's workforce is primarily composed of mid-career professionals, indicating strong job stability. However, younger employees (18–25) represent a smaller portion, suggesting potential challenges in attracting or retaining early-career talent.

Count of Employees by Education Field (Bar Chart)

Purpose:
To analyze employee distribution based on education specialization.

Insight:

- **Life Sciences (606 employees)** and **Medical (464 employees)** dominate the organization's educational profile.
- Fewer employees have **Marketing (159)** or **Technical Degree (132)** backgrounds.

Interpretation:
The organization primarily operates in scientific and research-related domains. This composition aligns with industries such as healthcare, pharmaceuticals, or biotechnology. However, limited representation from non-technical fields like Marketing or HR could impact functional diversity.

Attrition Rate % by Gender (Column Chart)

Purpose:
To compare male and female attrition rates and identify any gender-based differences.

Insight:

- **Male attrition:** 0.17 (17%)
- **Female attrition:** 0.15 (15%)

Interpretation:
Attrition rates between genders are nearly equal, indicating **no major gender disparity** in employee turnover. Retention efforts appear equally effective for both male and female employees.

Attrition Rate % by Age Band (Column Chart)

Purpose:
To explore how attrition varies across different age categories.

Insight:

- **18–25 years:** 0.36 (highest attrition)
- **26–35 years:** 0.19
- **46–60 years:** 0.09 (lowest attrition)

Interpretation:
Younger employees (18–25) are most likely to leave, possibly due to career exploration or lack of stability. Attrition decreases with age and experience, showing that older employees tend to remain longer with the company. This emphasizes the need for mentorship, early engagement, and growth opportunities for younger staff.

Attrition Rate % by Education Field (Bar Chart)

Purpose:
To determine if educational background affects turnover.

Insight:

- Human Resources (0.26) and Technical Degree (0.24) show the highest attrition.
- Marketing (0.22) and Life Sciences (0.15) display moderate levels.
- Medical (0.14) and Other (0.13) have the lowest attrition.

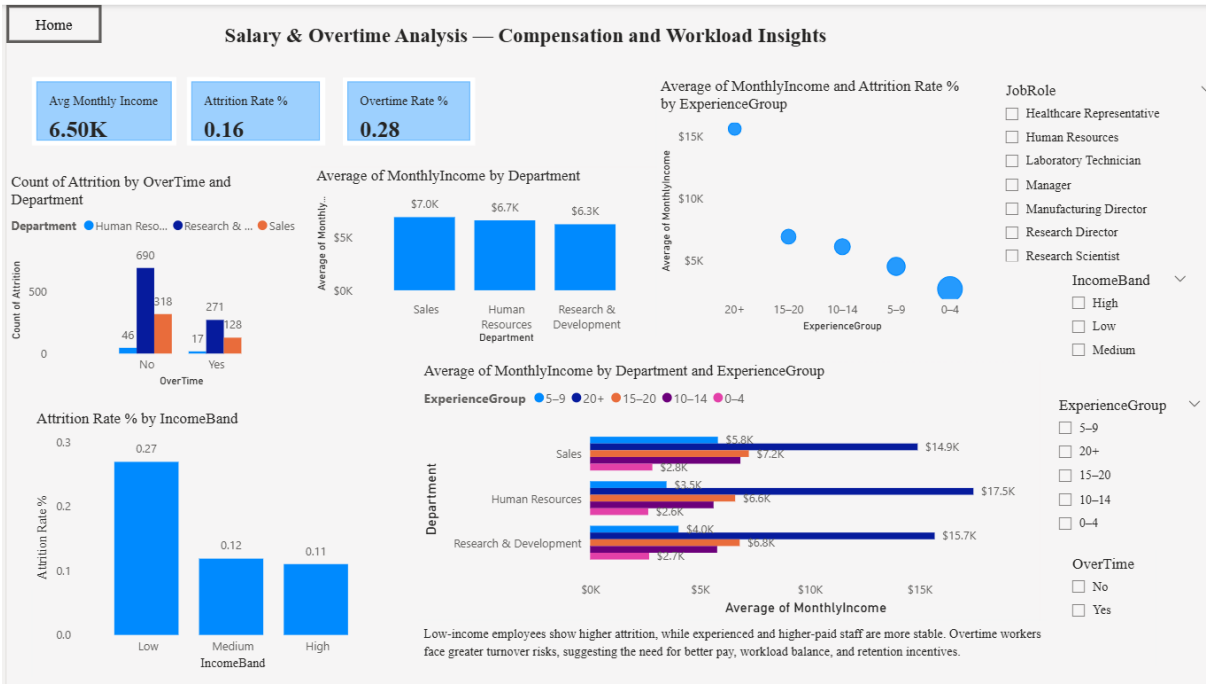
Interpretation:
Employees with HR and technical qualifications have higher mobility and may seek opportunities outside the organization. This insight suggests that cross-functional engagement and career development paths could improve retention within these groups.

Storytelling Summary (Text Box Insight)

Younger employees (18–25) exhibit the highest attrition, while older age groups remain more stable. Gender differences in turnover are minimal, but education field and career stage significantly influence employee retention. Implementing mentorship, skill development, and early-career support programs can help the organization retain young professionals and sustain long-term workforce stability. The Employee Demographics page delivers a clear understanding of workforce diversity and its impact on attrition.
The company maintains balanced gender representation and an experienced workforce, but faces challenges with young and low-tenure employees who are more likely to leave. By strengthening career growth initiatives, mentorship programs, and education-specific retention strategies, HR can build a more stable and satisfied workforce.

Salary & Overtime Analysis — Compensation and Workload Insights

The **Salary & Overtime Analysis** page focuses on understanding how compensation levels, employee experience, and overtime workload influence attrition. It integrates financial and workforce data to reveal patterns in salary distribution, overtime behavior, and their direct relationship with employee turnover. This page helps HR managers identify whether fair compensation and workload balance are contributing to workforce stability or employee dissatisfaction.



Salary & Overtime Analysis Dashboard

The top of the dashboard provides three key performance indicators summarizing employee compensation and attrition status:

- **Average Monthly Income:** $6.50K — indicating a moderate pay scale across the workforce.
- **Attrition Rate:** 16% — a significant proportion of employees have left during the period.
- **Overtime Rate:** 28% — showing that nearly one-third of employees regularly work overtime.

The combination of a 16% attrition rate and a 28% overtime rate implies that workload and compensation imbalances may be influencing employee retention.

Count of Attrition by Overtime and Department

Purpose:

To analyze how overtime work correlates with attrition across departments.

Insight:

- In the Research & Development department, 690 employees without overtime remain, while 318 employees with overtime have higher attrition.
- In the Sales department, 128 employees working overtime also show elevated turnover compared to 271 non-overtime employees.

Interpretation:

Employees involved in overtime exhibit **higher attrition rates**, particularly in workload-intensive departments such as **Sales** and **R&D**. This suggests that excessive working hours contribute to burnout and reduced retention.

Average Monthly Income by Department

Purpose:
To compare salary distribution among departments and identify which departments offer competitive compensation.

Insight:

- Sales Department: $7.0K
- Human Resources: $6.7K
- Research & Development: $6.3K

Interpretation:
While Sales offers slightly higher pay, the overall differences are small. Departments with lower pay but higher workloads (like R&D) may experience greater dissatisfaction, contributing to turnover.

Attrition Rate % by Income Band

Purpose:
To assess the impact of salary levels on attrition trends.

Insight:

- Low-income employees: 27% attrition rate (highest)
- Medium-income employees: 12% attrition rate
- High-income employees: 11% attrition rate

Interpretation:
There is a **strong negative correlation** between income and attrition — as pay increases, the likelihood of leaving decreases. Improving salary fairness and introducing financial incentives for lower-paid employees could significantly reduce turnover.

Average Monthly Income and Attrition Rate % by Experience Group (Bubble Chart)

Purpose:
To visualize the relationship between experience, salary, and attrition rate.

Insight:

- Employees with 0–4 years of experience earn the lowest average salary (around $5K) and show the highest attrition.
- Experienced employees (15–20+ years) have higher salaries (up to $15K) and lower attrition.

Interpretation:
Newer employees face the most instability, likely due to lower pay and limited advancement opportunities. Retention programs and structured career growth paths are essential for reducing early-career turnover.

Average of Monthly Income by Department and Experience Group

Purpose:
To examine how experience affects compensation across departments.

Insight:

- In all departments, income increases consistently with experience.
- Human Resources (20+ years) earns the highest average ($17.5K), followed by R&D ($15.7K) and Sales ($14.9K).

Interpretation:
The trend confirms that experience positively correlates with pay, yet junior employees (0–4 years) in all departments remain underpaid relative to workload. Targeted salary adjustments and early-career performance bonuses could improve motivation and retention.

Storytelling Summary (Text Box Insight)

Low-income employees and early-career workers experience the highest attrition, suggesting that pay and experience strongly influence retention. Employees performing overtime are also more likely to leave, emphasizing the need to balance workload and compensation. Strategic measures such as performance-based pay increases, flexible working hours, and overtime management can enhance employee satisfaction and reduce turnover.

The Salary & Overtime Analysis page demonstrates that income, experience, and overtime are significant predictors of employee attrition. Low-income and less-experienced employees are the most vulnerable, while long-serving and higher-paid employees show greater stability. Departments with heavy overtime workloads face higher turnover, highlighting the importance of balanced workload management, equitable compensation structures, and employee well-being programs. Addressing these factors can help HR design a more sustainable and motivated workforce.

Recommendation

The Salary & Overtime Analysis page demonstrates that income, experience, and overtime are significant predictors of employee attrition. Low-income and less-experienced employees are the most vulnerable, while long-serving and higher-paid employees show greater stability. Departments with heavy overtime workloads face higher turnover, highlighting the importance of balanced workload management, equitable compensation structures, and employee well-being programs. Addressing these factors can help HR design a more sustainable and motivated workforce.

Conclusion

This project successfully demonstrates how data-driven visualization using Microsoft Power BI can support strategic decision-making in human resource management. Through the analysis of employee demographics, compensation, experience, and attrition data, the dashboard provides a comprehensive overview of workforce performance and identifies the key factors influencing employee turnover. The findings reveal that young, low-income, and early-career employees experience the highest attrition, particularly in Sales and Human Resources departments. High overtime rates (28%) indicate workload pressure, while salary inequality further contributes to employee dissatisfaction.

In contrast, experienced and higher-paid employees show greater stability, suggesting that retention improves with tenure, fair compensation, and role clarity. By combining data modeling, DAX measures, and interactive visuals, this Power BI solution translates complex HR data into actionable insights. It empowers decision-makers to monitor real-time workforce trends, evaluate department-level performance, and identify emerging risks promptly. Implementing the recommendations — such as workload management, pay adjustments, mentorship programs, and data-driven HR policies — will enhance employee satisfaction and reduce turnover. Moreover, expanding this project with predictive analytics and automation could enable proactive attrition prevention and workforce forecasting in future iterations.

In conclusion, the HR Analytics Dashboard provides a valuable analytical framework that aligns with the organization’s strategic objectives. It not only improves visibility and transparency in HR operations but also serves as a foundation for building a data-driven HR culture focused on retention, engagement, and long-term workforce stability.