UCS2H27 – BUSINESS INTELLIGENCE
ASSIGNMENT – 1

AIM:

To design an interactive dashboard that visually represents key HR analytics metrics such as attrition rates, job satisfaction, promotion history, work-life balance, and salary distribution. This dashboard helps identify patterns and trends in employee behavior that influence attrition and satisfaction, aiding HR in making data-driven decisions.

QUESTION:

Organizations are continuously seeking ways to improve workforce efficiency, enhance employee satisfaction, and reduce attrition. To make data-driven HR decisions, businesses need insights into key workforce metrics such as employee turnover, salary distribution, job satisfaction, and career growth trends.

The goal of this assignment is to **develop a comprehensive HR Analytics Dashboard in Power BI** that will allow HR professionals to:

- **Monitor employee attrition trends** across various dimensions.
- **Analyze salary and compensation structures** to ensure fair pay distribution.
- **Evaluate job satisfaction and performance ratings** to improve engagement.
- **Identify career progression trends** based on promotions and training.

Tasks to be Performed:

1. Data Preparation & Cleaning (CO1, CO2)

- Load the **employee dataset** into Power BI.
- Perform **data cleaning** (handle missing values, remove inconsistencies).
- Create calculated columns/measures where necessary (e.g., **Attrition Rate, Average Salary by Job Level**).

2. Dashboard Development & Visualization (CO1, CO2)

Build an **interactive Power BI dashboard** with the following components:

A. Employee Attrition Analysis

- Calculate **overall attrition rate** and display as a KPI card.
- Create a **bar chart** showing attrition by **department and job role**.
- Analyze **attrition trends over tenure (Years at Company, Years in Current Role)**.
- Use a **slicer** to filter attrition by demographics (Age Group, Gender, Education Field).

B. Salary & Compensation Analysis

- Display **Average Salary by Job Level & Department** in a **column chart**.
- Create a **heatmap** showing salary hikes based on performance ratings.
- Compare **monthly income across different job roles** using a **box plot**.

ANSWER:

DATASET CHOSEN:

The dataset selected for this assignment is titled **"WA_Fn-UseC_-HR-Employee-Attrition"**, which originates from IBM's HR analytics division and is made publicly available on Kaggle. This dataset is designed for organizational-level analysis of employee attrition and offers a comprehensive view of human resource trends.

DATASET DESCRIPTION:

Source: Kaggle
Link: IBM HR Analytics Dataset
Total Records: 1470 rows
Total Features: 35 columns

Key Attributes:
Includes fields like Age, Attrition, Department, JobRole, MonthlyIncome, YearsAtCompany, JobSatisfaction, OverTime, PerformanceRating, among others.

The dataset is structured and contains no missing values by default, which makes it suitable for advanced dashboard visualization and performance insights.

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DATA PREPARATION AND CLEANING:

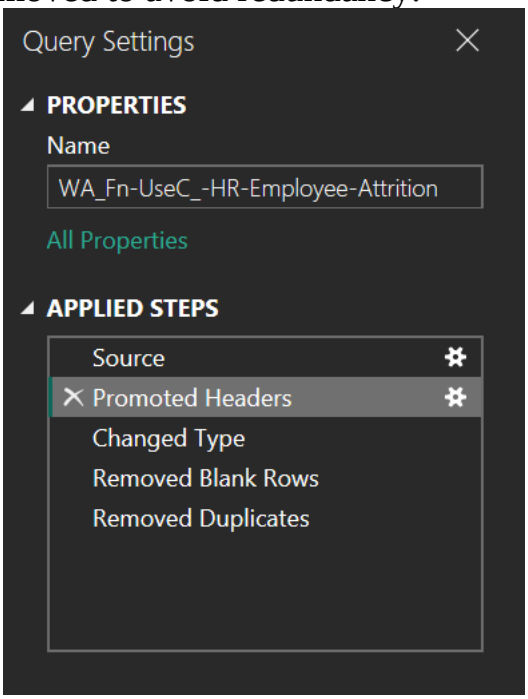
Loading the Dataset:

The dataset file in .csv format was loaded into Power BI using the "Get Data" feature. Each column was reviewed, and data types were verified for consistency. Numerical fields such as MonthlyIncome, YearsAtCompany, and PercentSalaryHike were set as numeric, while categorical fields like Attrition, Department, and JobRole were appropriately classified as text.

Data Cleaning:

Upon inspection in Power Query Editor:

- No null values were found in the dataset.
- Data types were corrected wherever necessary.
- Columns like EmployeeCount and StandardHours were found to have constant values and were removed to avoid redundancy.



This screenshot explains the applied steps in the Data Preparation and Cleaning. Changed the type, Removed blank rows and duplicates and removed all the inconsistencies.

Now, the data is cleaned and transformed and we can move on towards creating new columns and measures

CREATING MEASURES AND COLUMNS:

To enhance the analytical depth of the dashboard, several measures and calculated columns were created

1. Attrition Rate (Measure):

Attrition Rate = DIVIDE(CALCULATE(COUNTROWS(EmployeeData), EmployeeData[Attrition] = "Yes"), COUNTROWS(EmployeeData))

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

2. Average Monthly Income (Measure):

Used for comparisons across job levels and departments.

Avg Monthly Income = AVERAGE(EmployeeData[MonthlyIncome])

3. Age Group (Calculated Column):

Employees were grouped into buckets

```
Age Group =
SWITCH(
    TRUE(),
    EmployeeData[Age] < 30, "Under 30",
    EmployeeData[Age] >= 30 && EmployeeData[Age] <= 40, "30-40",
    "40+"
)
```

4. Tenure Group (Calculated Column):

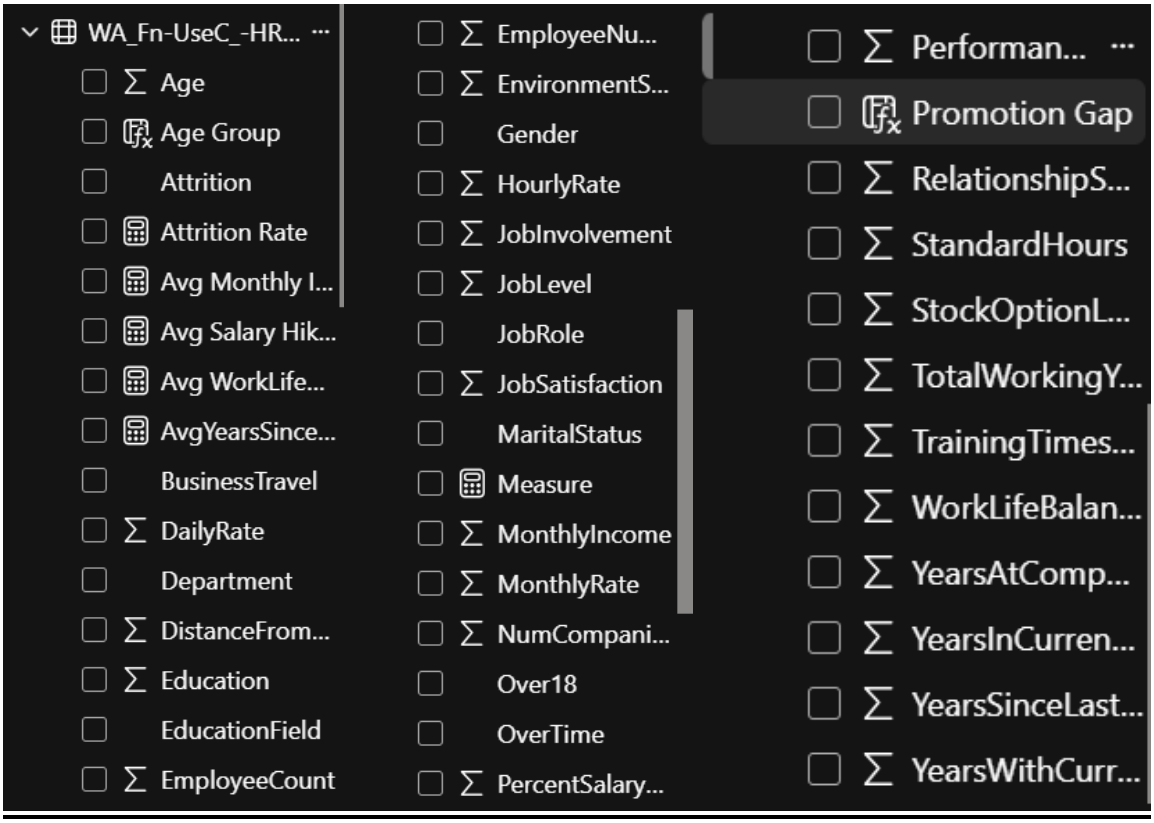
Based on YearsAtCompany

```
Tenure Group =
SWITCH(
    TRUE(),
    EmployeeData[YearsAtCompany] <= 2, "0-2 Years",
    EmployeeData[YearsAtCompany] <= 5, "3-5 Years",
    EmployeeData[YearsAtCompany] <= 10, "6-10 Years",
    "10+ Years"
)
```

5. Salary Band (Optional for Box Plot Analysis):

Monthly income categorized into bands for comparison.

These transformations ensure that the dashboard supports grouped and segmented analysis across key employee attributes.



DASHBOARD DEVELOPMENT AND VISUALIZATION:

The dashboard was developed in Power BI and divided into two major analytical blocks: **Employee Attrition Analysis** and **Salary & Compensation Analysis**. Interactive visuals were supported by slicers and tooltips to ensure dynamic filtering and interpretation.

A. Employee Attrition Analysis:

1. **KPI Card: Overall Attrition Rate**
   - This card prominently displays the attrition percentage across the entire workforce.
   - **Purpose**: Highlights organizational health and HR effectiveness in retaining employees.

2. **Bar Chart: Attrition by Department and Job Role**
    - Shows how many employees have left from each department and job function.
    - X-axis: Department or JobRole
    - Y-axis: Count of attrited employees (Attrition = Yes)
    - **Purpose**: Helps identify high-risk areas and departments needing retention focus.

3. **Line Chart: Attrition vs Tenure**
    - Visualizes attrition rates over YearsAtCompany and YearsInCurrentRole.
    - **Purpose**: Highlights the point in tenure where attrition peaks. Early exit trends can be identified, especially in the 0–3 year range.

4. **Slicers: Age Group, Gender, Education Field**
    - Enable filtering across visuals for demographic-based analysis.
    - **Purpose**: Provides HR managers the ability to study attrition patterns within specific age, gender, or education segments.

B. <u>Salary & Compensation Analysis:</u>

1. **Column Chart: Average Salary by Job Level and Department**
    - X-axis: JobLevel or Department
    - Y-axis: Average Monthly Income
    - **Purpose**: Demonstrates how compensation scales with hierarchy and reveals department-wise salary gaps.

2. **Heatmap: Salary Hike by Performance Rating**
    - X-axis: PerformanceRating
    - Y-axis: JobLevel
    - Color Gradient: Average PercentSalaryHike
    - **Purpose**: Evaluates fairness and consistency in salary increments tied to performance.

3. **Box Plot: Monthly Income Across Job Roles**
    - Visualizes spread of monthly salaries by JobRole, showing median, quartiles, and outliers.
    - **Purpose**: Detects compensation anomalies, pay imbalances, or unusual variations within roles.

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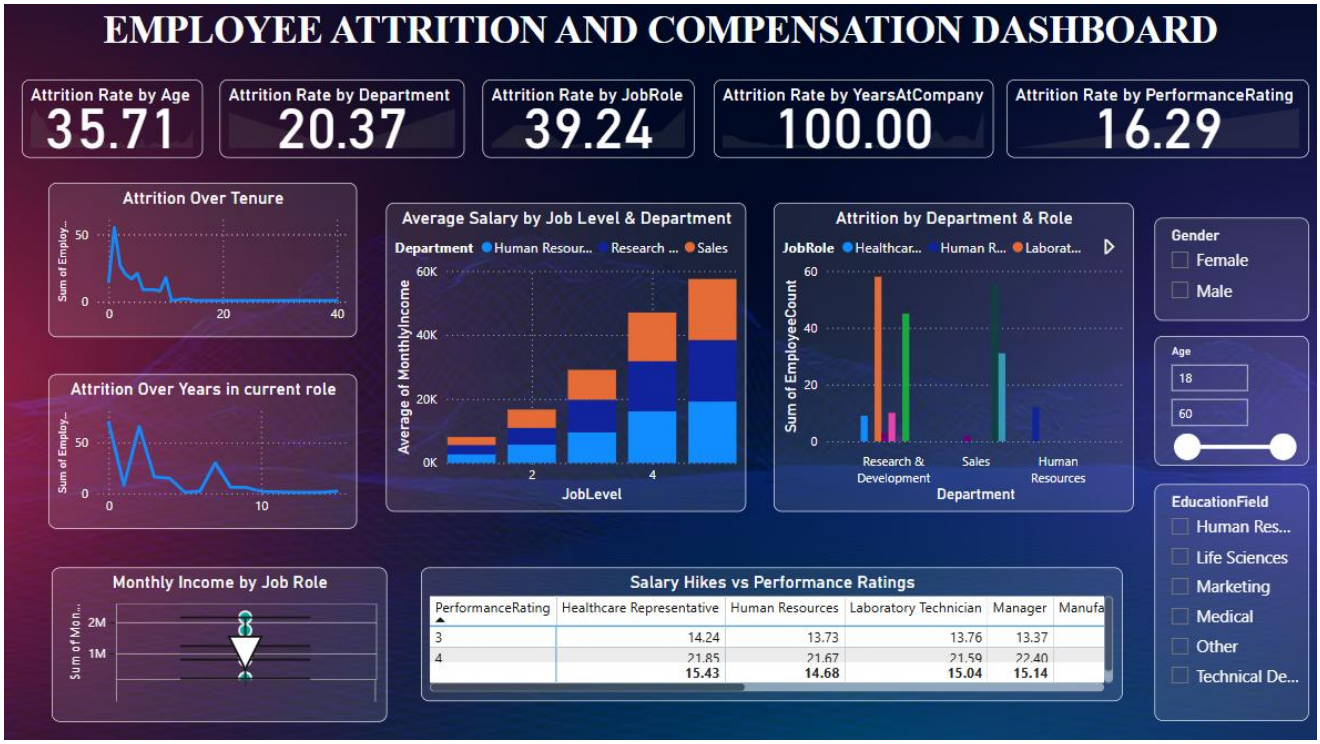
FINAL INTEGRATION AND INTERACTIVITY:

The dashboard integrates all key visuals onto a single interactive report page with:

- Global slicers for Gender, JobRole, Department, and Age Group
- Sync across visuals to reflect any filtering instantly
- Tooltips and hover effects for better interpretability
- Color schemes standardized for visual coherence

DASHBOARD:



The dashboard is fully interactive, allowing users to explore different filters and metrics, though only the default view is shown due to layout constraints.

Dashboard Link:

https://app.powerbi.com/groups/me/reports/6dc6c48b-0572-477d-ae1a-0f60de6fb075/eb73fa708ba3b517eb95?experience=power-bi

ASSIGNMENT – 2

AIM:

The objective of this dashboard is to derive key insights into workforce satisfaction, performance metrics, and diversity trends using interactive data visualizations. The aim is to assist HR decision-makers in identifying patterns related to employee attrition, job satisfaction, work-life balance, promotions, and demographic distribution using the IBM HR Analytics Attrition Dataset.

QUESTION:

1. Dashboard Development & Visualization (CO5)

Include the following components in the existing **interactive Power BI dashboard**

C. Job Satisfaction & Performance Evaluation

- Develop a **scatter plot** to analyze the relationship between **job satisfaction and performance ratings**.
- Visualize **employee satisfaction by department** using a **stacked bar chart**.
- Use a **KPI card** to show **average work-life balance score** across the company.

D. Work-Life Balance & Overtime Analysis

- Create a **line chart** showing overtime trends across different job levels.
- Compare **work-life balance ratings among different departments**.

E. Career Progression & Promotions

- Analyze **average years since last promotion** per department using a **histogram**.
- Correlate **training frequency and promotion rate** using a **correlation matrix**.

F. Workforce Demographics & Diversity

- Show **gender distribution by department** using a **donut chart**.
- Map **education field to job roles** using a **treemap**.
- Analyze **age group distribution** using a **bar chart**.

2. Insights Generation

- Provide a **summary of key findings** from the dashboard.
- Identify actionable insights for **reducing attrition, improving employee satisfaction, and optimizing salary distribution**.
- Document key observations and recommendations for HR decision-making.

Expected Deliverables:

Power BI Dashboard with interactive filters, KPIs, and charts.

DASHBOARD DEVELOPMENT AND VISUALIZATION:

The existing Power BI dashboard was extended to incorporate four additional analytical components. It has been included in a separate page in the pbix file

TOOLS USED IN POWER BI:

- **Stacked Bar Chart** – to compare multiple categorical variables in a single bar group
- **KPI Card** – for quick display of key metrics like average scores
- **Scatter Plot** – to analyze relationships between two numeric variables across categories
- **Line Chart** – for identifying trends over job levels or time
- **Donut Chart** – to visualize proportional breakdowns within categories
- **Treemap** – for hierarchical data representation based on size and category
- **Histogram** – to display frequency distribution of numeric values
- **Slicers** – to enable interactivity and drill-down capabilities for filters like Gender, Department, and Education Field
- **Bar Charts (Horizontal & Vertical)** – for comparisons across categories like departments, job roles, and age groups
- **Correlation Mapping (via stacked bar approximation)** – to examine relationships between training and promotions

C. Job Satisfaction & Performance Evaluation:

1. **Scatter Plot: Satisfaction vs Performance Rating**
    - This visual analyzes how employee satisfaction levels vary with their performance ratings. Each point represents employees grouped by Job Level.
    - It helps in assessing whether high-performing employees are also satisfied, and if any job levels show signs of imbalance.

2. **Stacked Bar Chart: Employee Satisfaction by Department**
   - Displays the distribution of satisfaction scores (ranging from 1 to 4) within each department.
   - It gives a comparative view of departmental satisfaction levels, revealing which areas may require intervention.

3. **KPI Card: Average Work-Life Balance Score**
   - A key performance indicator card is used to show the overall average score of work-life balance across the company.
   - It serves as a quick benchmark for HR to evaluate employee wellness.

D. **Work-Life Balance & Overtime Analysis:**

1. **Line Chart: Overtime Trends Across Job Levels**
   - This line chart plots the number of employees doing overtime, split by gender, across each job level.
   - It allows comparison of how workload is distributed and whether certain roles experience disproportionate overtime.

2. **Bar Chart: Work-Life Balance by Department**
   - Compares the average work-life balance score across Human Resources, Sales, and Research & Development departments.
   - It provides insights into how organizational units manage employee work-life expectations.

E. **Career Progression & Promotions:**

1. **Histogram: Years Since Last Promotion by Department**
   - Depicts the average number of years since the last promotion in each department.
   - This helps uncover if promotion delays are isolated or systemic and whether certain departments require a review of growth policies.

2. **Correlation Matrix: Training Frequency vs Promotion Rate**
   - A stacked horizontal bar chart groups employees by how frequently they underwent training and maps it against average promotion years.
   - This visual provides clarity on whether upskilling efforts are translating to career progression.

F. **Workforce Demographics & Diversity:**

1. **Donut Chart: Gender Distribution by Department**
   - This chart shows the breakdown of male and female employees in each department.
   - It aids in analyzing the organization's gender balance and equity in departmental hiring.

2. **Treemap: Education Field to Job Role Mapping**
   - Displays the variety of education fields and how they align with specific job roles.
   - It helps HR understand recruitment pipelines and education-job role matching effectiveness.

3. **Bar Chart: Age Group Distribution**
   - A horizontal bar chart showing employee distribution by age group and gender.
   - It provides a demographic overview to assist in age diversity planning and future talent management.

FINAL INTEGRATION AND INTERACTIVITY:

All visual components were integrated into a single unified dashboard, ensuring consistency in color scheme, layout, and filter interactions. Slicers were implemented for Gender, Education Field, and Job Role, enabling users to dynamically explore specific workforce segments. The dashboard is fully interactive, allowing users to hover, filter, and drill down into visuals for more detailed analysis.

DASHBOARD EXPLANATION:

The dashboard delivers a comprehensive overview of employee metrics through categorized visuals. Each section targets a core HR concern: attrition, compensation, satisfaction, performance, promotion, and diversity. The layout ensures easy navigation between thematic areas, and the use of KPIs, charts, and treemaps makes complex insights easy to understand. Every visual is data-bound, meaning any filter applied updates all visuals in real-time, improving decision-making efficiency.

Dashboard Link:

https://app.powerbi.com/groups/me/reports/6dc6c48b-0572-477d-ae1a-0f60de6fb075/eb73fa708ba3b517eb95?experience=power-bi

Date: 08.04.2025
Assgn. No: 1, 2

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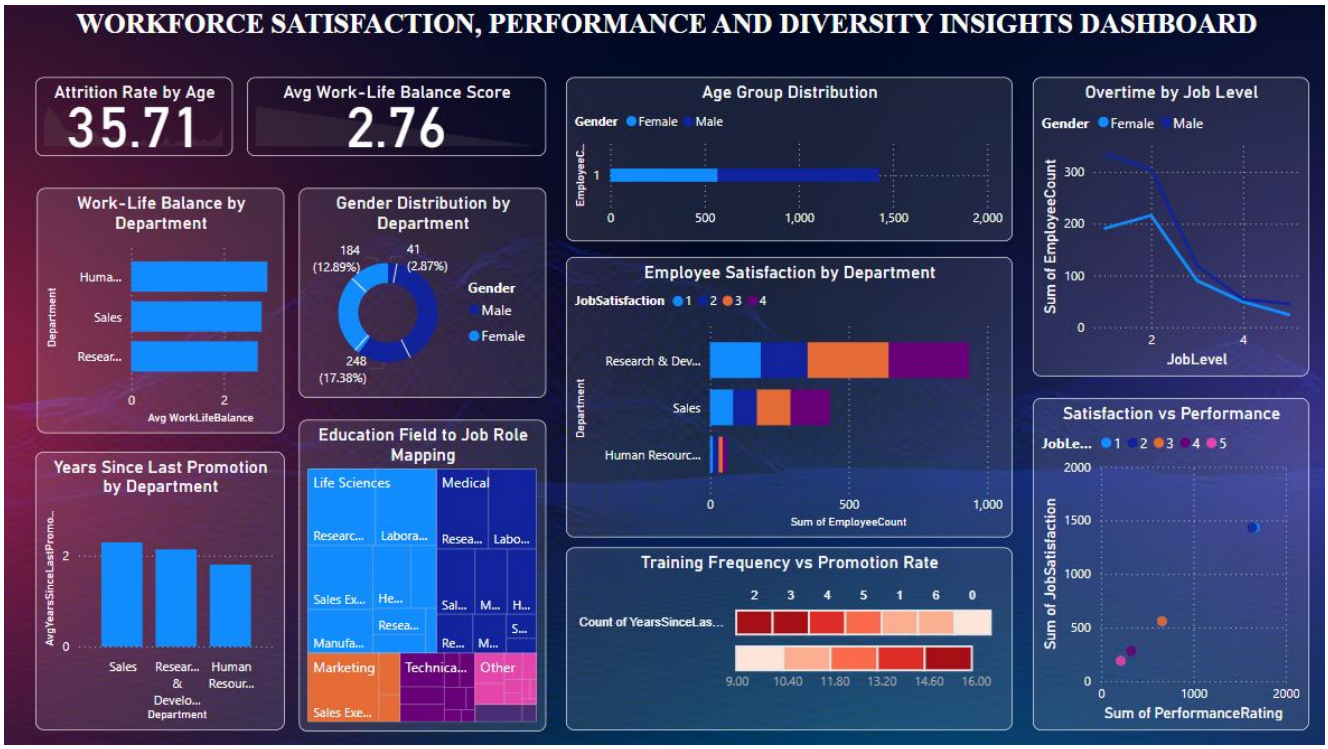
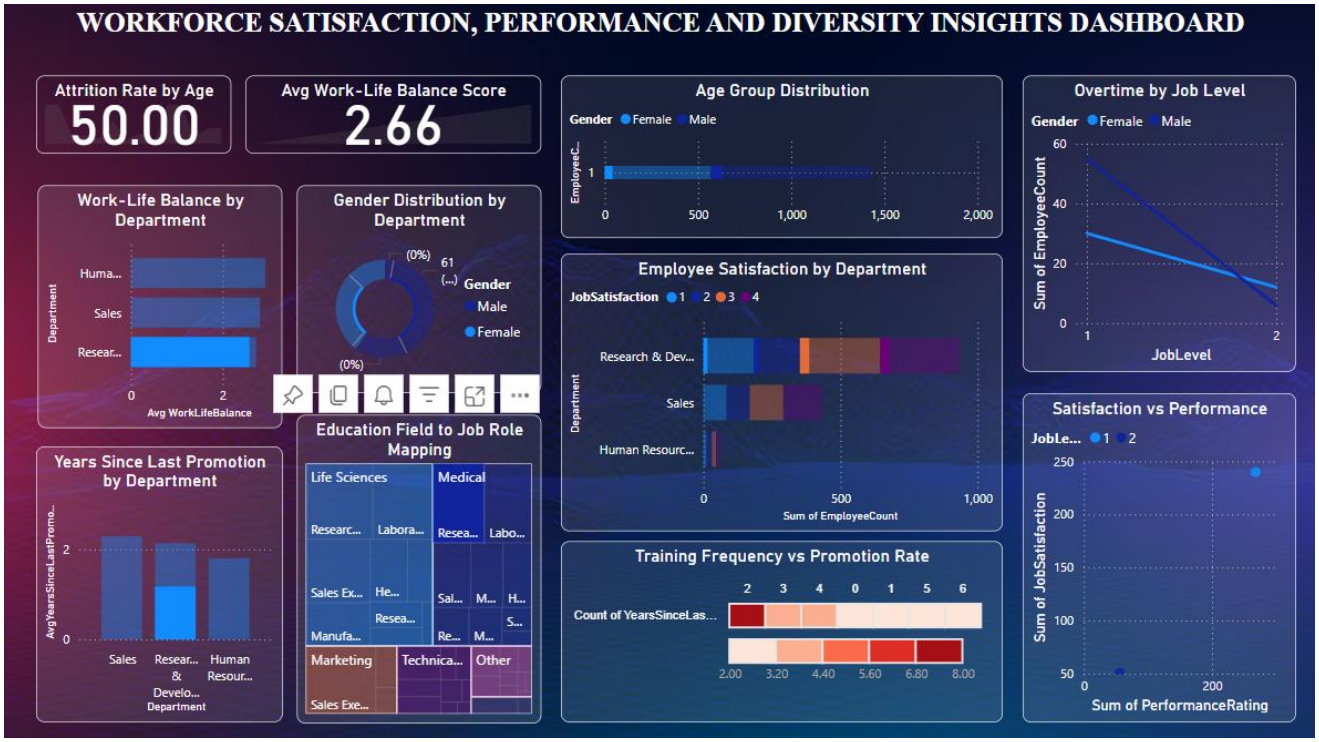
DASHBOARD SCREENSHOTS:





KEY INSIGHTS DERIVED FROM THE DASHBOARDS:

The workforce dashboard provides a comprehensive view of employee engagement, performance, demographics, and career progression. By leveraging key visual indicators like KPI cards, bar charts, scatter plots, line graphs, and histograms, the analysis delivers a multi-dimensional understanding of the workforce. This enables HR leaders to adopt **data-backed interventions** for reducing attrition, enhancing satisfaction, and driving organizational efficiency.

KEY OBSERVATIOS AND INTERPRETATION:

1. High Attrition Rate Among Younger Age Groups

- Data Insight: KPI cards and age-wise bar charts highlight that the 35.71% attrition rate is disproportionately high among younger employees.
- Value Interpretation: Early-career employees represent future organizational leaders. Losing them due to poor onboarding, mismatched expectations, or limited growth directly affects long-term talent pipelines and increases recruitment costs.
- Recommendation: Implement mentorship programs, tailored onboarding, and early-career roadmaps to retain high-potential young talent.

2. Work-Life Balance Imbalance Across Departments

- Data Insight: Sales shows significantly lower average WLB scores (~2.76), while HR and R&D score higher.
- Value Interpretation: Sustained work-life imbalance leads to burnout, absenteeism, and attrition in high-pressure departments like Sales, reducing productivity.
- Recommendation: Introduce flexible scheduling, workload redistribution, and mental wellness initiatives to enhance sustainability in demanding roles.

3. Correlation Between Job Satisfaction & Performance

- Data Insight: The scatter plot shows a positive correlation between performance and satisfaction, though some employees with high satisfaction underperform.
- Value Interpretation: High satisfaction doesn't guarantee high output, but it shows potential. These employees could become future top performers if supported well.
- Recommendation: Roll out personalized recognition, feedback loops, and goal alignment strategies to convert satisfaction into performance.

4. Overtime Burden Disproportionate Across Job Levels

- Data Insight: Line charts indicate that lower-level employees, especially females, do more overtime.
- Value Interpretation: Excessive overtime at lower levels can result in fatigue, resentment, and high turnover—and may reflect hidden gender imbalance.
- Recommendation: Audit task allocation, introduce workload equity tools, and ensure compensated overtime policies.

5. Stagnant Career Progression in Sales and R&D

- Data Insight: Histogram shows many employees have not been promoted for extended periods.
- Value Interpretation: Lack of upward mobility negatively impacts morale and loyalty, increasing the risk of top-talent attrition.
- Recommendation: Define structured promotion tracks, with transparent KPIs and cross-functional learning opportunities.

6. Training Frequency Not Translating to Promotions

- Data Insight: Correlation matrix shows inconsistent link between training frequency and promotions.
- Value Interpretation: Investing in training without ROI in promotions suggests misalignment in upskilling goals or ineffective training content.
- Recommendation: Revamp L&D programs, align them with career ladders, and track training-to-impact metrics.

7. Gender Disparity Across Roles

- Data Insight: Donut charts and age distributions reveal skewed gender distribution in roles and departments.
- Value Interpretation: Underrepresentation or disproportionate overtime can result in employee disengagement and public brand damage.
- Recommendation: Launch diversity hiring initiatives, mentorships for underrepresented groups, and enforce bias-free promotion and task allocation.

8. Education Field Influences Job Role Placement

- Data Insight: Treemap visual indicates fields like Life Sciences dominate certain roles like Medical Research.
- Value Interpretation: While specialization alignment is important, too rigid mapping restricts innovation and employee mobility.
- Recommendation: Offer cross-functional certifications, internal mobility programs, and exploratory projects to leverage diverse skill sets.

SUMMARY TABLE OF KEY METRICS AND THEIR INSIGHTS:

Metric	Insight
Attrition Rate (Age)	35.71% — highest among younger employees
Attrition (Departments)	20.37% — most significant in Sales & R&D
Attrition (Job Role)	39.24% — high among Healthcare & Lab roles
Work-Life Balance Avg	2.76 — Sales is below average
Job Satisfaction Trends	Majority score 3–4; high satisfaction ≠ high performance
Overtime Patterns	Higher in lower levels and among females
Years Since Promotion	High in Sales and R&D
Training & Promotion Link	Weak correlation — training impact is unclear
Income Trends	Increases with job level; Sales earns most; HR underpaid
Performance vs Salary Hike	Only minor differences in hikes based on performance

ACTIONABLE INSIGHTS:

To Reduce Attrition

- Focus retention efforts on Sales and R&D
- Improve onboarding and early engagement for new joiners
- Introduce mentorship & buddy programs

To Improve Satisfaction

- Launch career development plans
- Improve promotion visibility
- Enhance employee recognition systems

To Optimize Salary Structures

- Rebalance pay scales — especially for HR and lower levels
- Ensure performance-based hikes are meaningful and transparent
- Adjust salary levels where satisfaction and attrition are linked to pay

RECOMMENDATIONS FOR HR DECISION MAKING:

Priority Area	Strategic Recommendation
Promotion Systems	Redesign criteria; ensure timely evaluations
Compensation	Link rewards to performance; diversify pay structures
Workload Balance	Audit roles and redistribute tasks equitably
Gender Equity	Improve female representation & reduce overtime burden
Retention Strategy	Build internal mobility, recognition, and wellness programs
Engagement & Feedback	Launch pulse surveys and leadership tracks for top-performing employees

LEARNING OUTCOMES:

After completing this assignment:

1. Gained practical knowledge in designing multi-layered Power BI dashboards using visualizations like KPI cards, scatter plots, heatmaps, and treemaps.
2. Understood the relationships among employee demographics, satisfaction, compensation, and promotion through real-world data exploration.
3. Learned to extract and document actionable insights to support HR decision-making and reduce employee attrition.