

# IBM-HR ANALYTICS EMPLOYEE ATTRITION

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## 1.INTRODUCTION

Employee attrition, or the rate at which employees leave an organization, is a major concern for businesses worldwide. High attrition can lead to increased recruitment costs, loss of organizational knowledge, and reduced productivity. Understanding the factors that influence employee turnover is therefore critical for effective workforce management.

This project focuses on the **IBM HR Analytics Employee Attrition dataset**, which contains detailed information about employees, such as demographics, job roles, income, satisfaction levels, and attrition status. Using **Microsoft Excel**, the dataset was cleaned, explored, and visualized to identify patterns and key factors contributing to employee attrition.

The analysis was structured around the following objectives:

- To investigate the characteristics of employees who are more likely to leave the organization.
- To create both **static and interactive dashboards** for visual insights.
- To derive meaningful conclusions and actionable recommendations for HR teams.

Through this documentation, the entire process of the project—from dataset understanding and preparation to insights and dashboards—has been clearly outlined, providing a comprehensive view of the analysis and findings.

## 2.Objectives

The primary objectives of this project are as follows:

### 1. Identify Key Factors of Attrition

- Analyse demographic and job-related variables such as age, gender, job role, income, and job satisfaction to understand which factors contribute most to employee attrition.

### 2. Visualize Workforce Trends

- Use Excel pivot tables, charts, and dashboards to present workforce distribution and attrition patterns in a clear and interactive way.

### 3. Develop Dashboards for Insights

- Create a **static dashboard** that provides an overall view of employee attrition.
- Build an **interactive dashboard** that allows HR professionals to filter and drill down into specific categories (e.g., department, age group, or gender).

### 4. Generate Actionable Insights

- Provide HR with recommendations based on findings, helping the organization reduce turnover and improve employee retention strategies.

### 5. Enhance Analytical Skills

- Demonstrate proficiency in data cleaning, analysis, and visualization using Microsoft Excel as a tool for HR analytics.

## 3.Dataset

The dataset used for this project is the **IBM HR Analytics Employee Attrition dataset**, which is publicly available on Kaggle. It contains detailed records of employees, designed to help organizations understand the factors influencing employee turnover.

### Key Features of the Dataset

- **Employee Demographics:** Age, Gender, Education, Marital Status.
- **Job-Related Details:** Job Role, Department, Years at Company, Job Level.
- **Compensation & Benefits:** Monthly Income, Overtime, Stock Option Level.
- **Work Environment:** Work-Life Balance, Job Satisfaction, Environment Satisfaction.
- **Attrition Status:** Indicates whether an employee has left the organization (Yes/No).

The dataset includes **1,470 employee records** with more than **30 variables**, making it suitable for exploratory data analysis, visualization, and dashboard creation.

This structured dataset allows HR professionals and analysts to uncover patterns related to attrition and design strategies for improving employee retention.

## 4.Methodology

The project followed a structured step-by-step workflow, starting from understanding the dataset and moving toward analysis and dashboard creation. The key steps are outlined below:

### 4.1 Data Understanding

- Reviewed the **IBM HR Analytics Employee Attrition dataset** from Kaggle.
- Explored the structure of the dataset: 1,470 rows (employees) and 35 columns (employee details).
- Identified important fields such as **Age, Job Role, Monthly Income, Years at Company, Job Satisfaction, and Attrition**.

### 4.2 Data Cleaning & Preparation

- Imported the dataset into **Microsoft Excel**.
- Checked for **missing values** and confirmed there were none in this dataset.
- Standardized column names for clarity (e.g., "YearsAtCompany" → "Years at Company").
- Verified data types (numeric, categorical) to ensure they aligned with the analysis.
- Removed any duplicate entries.

### 4.3 Exploratory Data Analysis (EDA)

- Used **Excel Pivot Tables and Charts** to explore relationships between employee attributes and attrition.
- Performed analysis on key aspects:
  - Attrition by **Age Group**
  - Attrition by **Department and Job Role**
  - Attrition by **Monthly Income Levels**
  - Attrition by **Years at Company**
  - Impact of **Job Satisfaction** and **Work-Life Balance** on attrition

#### 4.4 Dashboard Creation

Two dashboards were designed to present findings in a clear and interactive manner:

1. **Static Dashboard** – Provided a consolidated overview of attrition trends across demographics, departments, and salary levels.
2. **Interactive Dashboard** – Enabled dynamic filtering by categories such as **Gender**, **Department** to allow deeper insights.

#### 4.5 Insights & Reporting

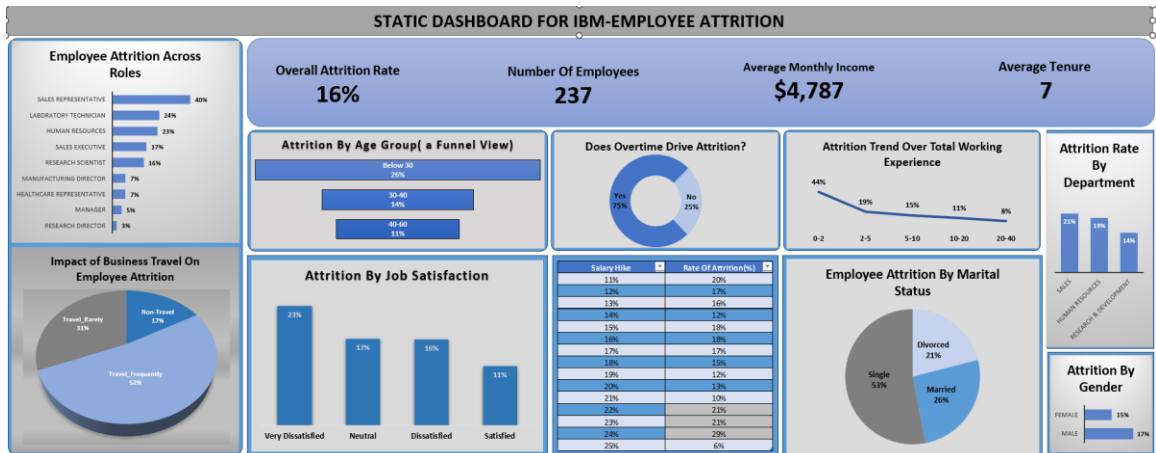
- Documented the main findings in a structured report.
- Highlighted key trends (e.g., higher attrition among younger employees, lower-income groups, and specific job roles).
- Converted findings into actionable recommendations for HR.

### 5.Dashboards

To present the findings of the analysis in a clear and visually engaging way, two dashboards were created using Microsoft Excel: one static and one interactive.

#### 5.1 Static Dashboard

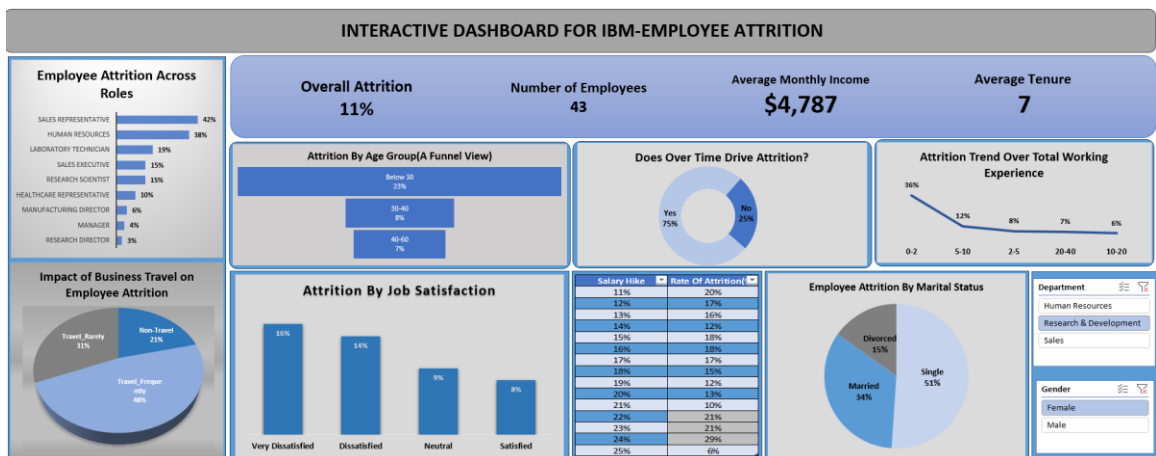
- The static dashboard provides an overall snapshot of employee attrition trends.
- It includes Charts and KPI's Showing:
  - Employee Attrition across different "Job Roles".
  - Employee Attrition according to the "Business Travel".
  - Employee Attrition by "Age Group".
  - Employee Attrition by "Job Satisfaction".
  - Employee Attrition based on Working "Over Time".
  - Employee Attrition by "Total Working Years/ Total Work Experience".
  - Employee Attrition based on the "Marital Status".



- And Attrition based on some other factors.
- This dashboard is useful for presenting high-level insights at a glance, without requiring interaction.

## 5.2 Interactive Dashboard

- The interactive dashboard was built using **Excel slicers** for dynamic filtering.
- **Filters available:**
  - **Gender**
  - **Department**



- When a filter is applied, all the linked charts and metrics update instantly to reflect the selected group.
- This enables HR professionals to compare attrition patterns across departments and genders in a more flexible and efficient way.

## **6.Key Insights**

### **6.1 Overall Attrition**

- The overall attrition rate is 16% with 237 employees leaving.
- The average monthly income of employees is around \$4,787 with an average tenure of 7 years.

### **6.2 Age and Attrition**

- Employees below 30 years old have the highest attrition rate (26%).
- Attrition decreases significantly with age: 14% for 30–40 years and 11% for 40–60 years.

### **6.3 Job Role**

- Sales Representatives (40%) and Laboratory Technicians (24%) show the highest attrition.
- Senior roles like Managers (5%) and Research Directors (3%) have the lowest attrition.

### **6.4 Overtime Impact**

- 75% of attrition cases are linked to employees working overtime, indicating workload is a key factor in turnover.

### **6.5 Work Experience**

- Employees with 0–2 years of total working experience show the highest attrition (44%).
- Attrition drops steadily as work experience increases (down to 8% for 20–40 years).

### **6.6 Job Satisfaction**

- Employees who are very dissatisfied (23%) or dissatisfied (16%) are more likely to leave.
- Employees who are satisfied show the lowest attrition (11%).

### **6.7 Business Travel**

- Employees who travel frequently are more likely to leave (52%).
- Those with rare travel (31%) or non-travel (17%) have lower attrition.

## 6.8 Salary Hike

- Attrition is higher among employees with lower salary hikes (e.g., 20% attrition for 11% hike).
- Employees with higher hikes (24–25%) have a much lower attrition rate (down to 6%).

## 6.9 Marital Status

- **Single employees (53%)** account for the majority of attrition cases.
- Married employees contribute **26%** and divorced employees **21%**.

## 6.10 Gender

- Attrition is slightly higher among **male employees (17%)** compared to females (15%).

## 7. Conclusion

From both the static and interactive dashboards created for the IBM HR Attrition dataset, several clear patterns emerged:

- **Overall Attrition** was found to be **16%** in the static view and **11%** in the interactive dashboard, showing how filtering and drill-downs helped refine the analysis.
- **Younger employees (below 30)** consistently showed the highest attrition, highlighting early-career retention challenges.
- **Job Roles** such as *Sales Representatives* and *Human Resources* showed disproportionately high attrition compared to others, suggesting role-specific stress or dissatisfaction.
- **Overtime** was one of the most significant factors, with nearly **75% of attrition cases involving employees who worked overtime**, signalling workload imbalance.
- **Job Satisfaction** strongly influenced attrition, with higher turnover seen among those who were *dissatisfied or very dissatisfied*.
- **Business Travel** also played a role—employees who travels frequently were more prone to leave compared to those who rarely travels.
- **Attrition by Marital Status** showed that single employees contributed the most to attrition, possibly due to greater career mobility and fewer personal constraints.

Together, these dashboards highlight that attrition is **multi-dimensional**. The interactive dashboard, with its slicers for gender and department, added a more flexible way to isolate trends, such as seeing department-wise differences.

In conclusion, the analysis demonstrates that attrition cannot be explained by a single factor—it is a combination of **demographics, role-related challenges, workload, and satisfaction levels**. These insights can guide HR teams in designing focused interventions for high-risk employee groups.