HR Attrition Insights

Statistical Analysis & Interactive BI Dashboard

(Using: Excel + Power BI)

Business Problem

A large organization is facing a 15% annual employee attrition rate, which is significantly impacting overall business performance. High attrition means that a large number of employees either resign voluntarily or are terminated each year.

This problem creates several challenges for the company:

1. Increased Hiring & Training Costs

2. Workload Imbalance & Employee Burnout

3. Project Delays & Lower Productivity

4. Loss of Skilled & Experienced Talent

5. Weak Workforce Planning

Key Business Questions

The following business questions are designed to uncover critical insights related to employee attrition and to help the HR team make data-driven decisions. These questions demonstrate an analytical approach to solving workforce challenges rather than just creating visualizations.

1. Which department has the highest attrition?
2. Does low salary increase employee turnover?
3. Are employees with long promotion gaps more likely to leave?
4. Does overtime contribute to higher resignations?
5. Which age group is leaving the company the most?
6. Does job satisfaction score affect attrition?

7. Does education level impact turnover?
8. Does longer tenure reduce attrition?
9. Which job roles are at highest risk of leaving?
10. What factors most strongly predict employee attrition?

Tools & Techniques Used

Excel

DATA CLEANING

1. **Missing Value Check**

   Missing values were checked using COUNTBLANK() and conditional formatting. No missing records were found in the dataset.
2. **Duplicate Removal**

   Duplicate entries were identified using conditional formatting. A total of 45 duplicate rows were removed to improve data accuracy.
3. **Data Type Validation**

   Data types were reviewed, and the Job Satisfaction column was corrected from text to numeric for proper analysis.
4. **Categorical Consistency Check**

   Categorical fields were inspected for inconsistent or misspelled values. All categories were found to be standardized.
5. **Feature Engineering**

   Two new columns were created: Age Group and Income Category, using nested IF() formulas to enable segmentation.
6. **Outlier Detection**

   Outliers in numerical data were evaluated using the IQR method to identify potentially extreme values.

(Statistical Analysis)

Exploratory Data Analysis (EDA)

The dataset contains 1470 employees and 35 variables related to demographics, job characteristics, compensation, and turnover.

Descriptive Statistics

Descriptive Statistics	*Age*	*Monthly Income*	*Total Working Years*	*Years At Company*
Mean	36.92040816	6502.931293	11.27959184	7.008163265
Standard Error	0.23825372	122.7930538	0.202938554	0.159792192
Median	36	4919	10	5
Mode	35	2342	10	5
Standard Deviation	9.134785576	4707.956783	7.780781676	6.126525152
Sample Variance	83.44430753	22164857.07	60.54056348	37.53431044
Kurtosis	-0.402884153	1.005232691	0.918269537	3.935508756
Skewness	0.414423411	1.369816681	1.117171853	1.764529454
Range	42	18990	40	40
Minimum	18	1009	0	0
Maximum	60	19999	40	40
Sum	54273	9559309	16581	10302
Count	1470	1470	1470	1470

Descriptive Statistics	*Years Since Last Promotion*	*Job Satisfaction*
Mean	2.187755102	2.728571429
Standard Error	0.084047512	0.028764462
Median	1	3
Mode	0	4
Standard Deviation	3.222430279	1.102846123
Sample Variance	10.3840569	1.216269571
Kurtosis	3.612673115	-1.222192568
Skewness	1.984289983	-0.329671959
Range	15	3
Minimum	0	1
Maximum	15	4
Sum	3216	4011
Count	1470	1470

INTERPRETATION

1. Age

The workforce is relatively young to mid-career with an average age of about 37 years. Age distribution is slightly right-skewed, indicating more younger employees than older ones. The variability is moderate, with ages ranging from 18 to 60.

2. Monthly Income

Employees earn an average of ~6503 (currency), but the distribution is highly skewed, showing a concentration of employees in lower income brackets and a few high earners pulling the mean up. Income ranges widely, from 1009 to 19999, indicating substantial income inequality within the organization.

3. Total Working Years

Employees have an average of 11.3 years of total experience, with moderate dispersion. The positive skewness indicates a larger proportion of employees with relatively shorter careers, while fewer very experienced employees increase the mean.

4. Years at Company

Employees have served an average of 7 years in the organization, showing a relatively stable workforce. The distribution is positively skewed, suggesting many employees are still early in their tenure, with fewer long-tenured employees.

5. Years Since Last Promotion

On average, employees were last promoted about 2.2 years ago, but the distribution is highly skewed, indicating most employees have had recent promotions, while a small group has gone many years without advancement, potentially signaling stagnation for some roles.

6. Job Satisfaction

Job satisfaction averages at 2.73 (on a scale of 1–4), indicating a generally moderate to positive sentiment. The distribution is fairly symmetric, with limited variation, suggesting relatively consistent satisfaction levels across employees.

- **Gender Distribution**

Gender	Count
Male	2646
Female	1764
Total	4410

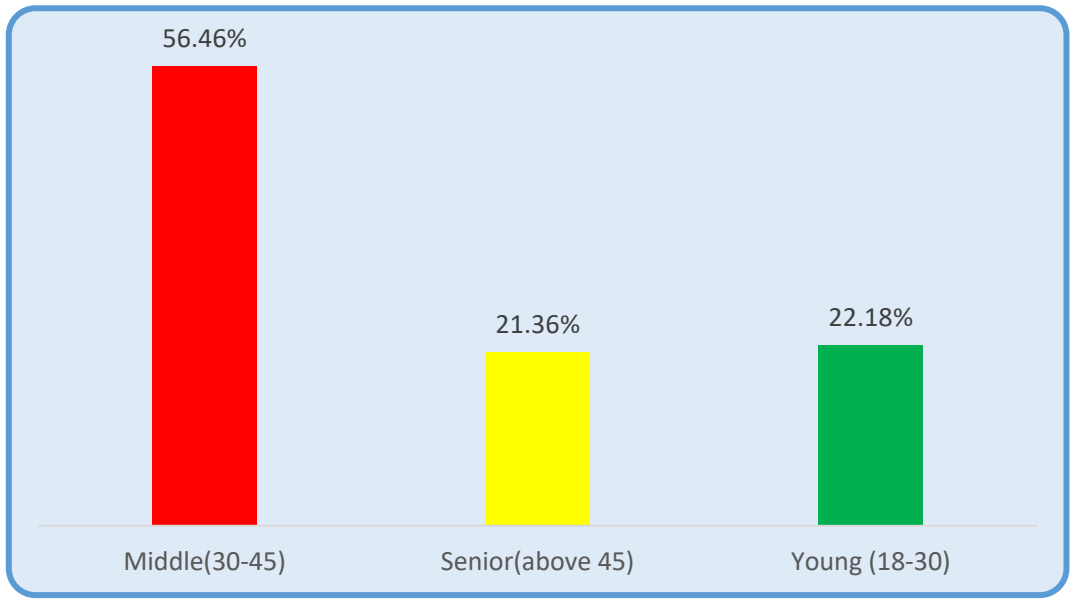
- **Employees in Each Department**

Departments	No. of Employees
Human Resources	189
Research & Development	2883
Sales	1338
Total	4410

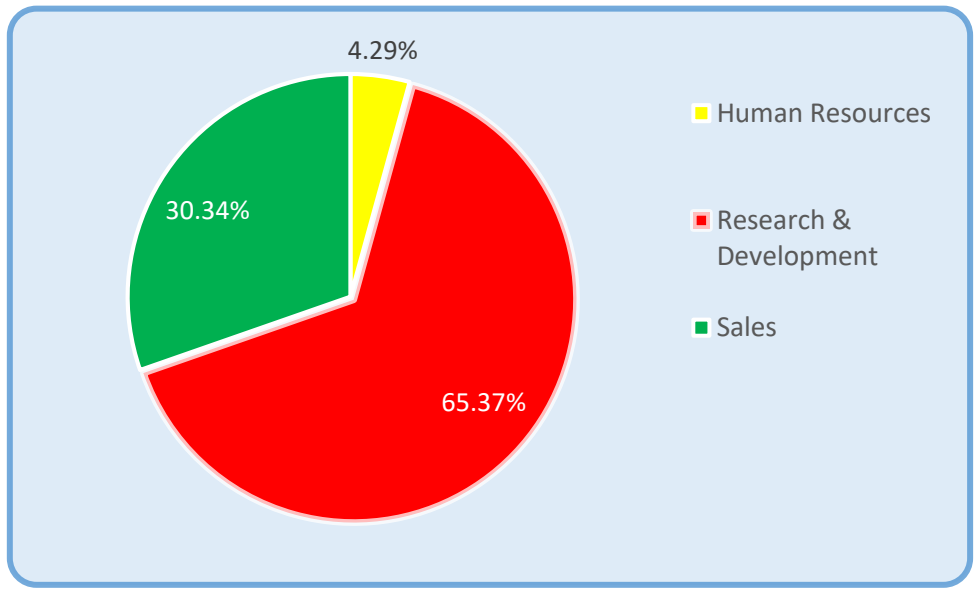
- **Distribution Based on Education Field**

Education_Field	No. of Employees
Human Resources	81
Life Sciences	1818
Marketing	477
Medical	1392
Other	246
Technical Degree	396
Total	4410

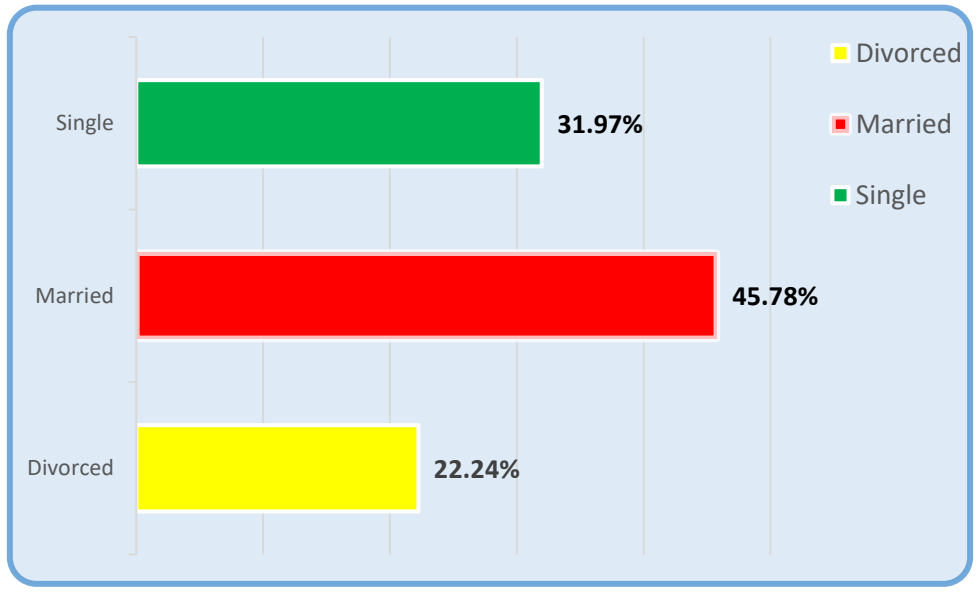
Attrition Distribution Based on Age Groups in %



Department wise Attrition Distribution Based on Attrition



Attrition vs Marital Status



Correlation Analysis

	Attrition_1	*Age*	*Monthly Income*	*Total Working Years*	*Years At Company*
Attrition_1	1				
Age	-0.160064843	1			
Monthly Income	-0.159839582	0.497926967	1		
Total Working Years	-0.171063246	0.680581378	0.772893246	1	
Years At Company	-0.134392214	0.31139012	0.514284826	0.628133155	1

INTERPRETATION

The correlation analysis shows weak negative relationships between attrition and age, income, experience, and tenure, indicating that younger, lower-paid and less experienced employees are slightly more likely to leave the organization. In contrast, strong positive correlations exist among age, work experience, and salary, meaning older and more experienced employees tend to earn higher and stay longer. Overall, attrition appears more common among early-career employees, while tenure, experience and compensation contribute to greater job stability.

Recommendations Based on Excel Analysis

- Focus retention efforts on **younger and early-tenure employees**, as descriptive statistics and age-group analysis show higher attrition among these segments.
- Review **compensation policies for lower income brackets**, since statistical analysis indicates a negative relationship between income and attrition.
- Reduce **promotion stagnation**, as employees with longer gaps since last promotion show higher likelihood of leaving.
- Address **job satisfaction drivers** through targeted HR interventions, as lower satisfaction scores align with higher attrition patterns.
- Monitor employees with **short tenure but high workload**, as tenure-based analysis indicates instability in early employment years.
- Use **regular statistical monitoring (mean, median, skewness)** to detect early workforce imbalance and attrition risk trends

POWER BI

After completing data cleaning and statistical analysis in Excel, Power BI is used to transform analytical findings into interactive dashboards that help HR stakeholders quickly identify attrition drivers, monitor KPIs, and support data-driven retention decisions.

Key Business Questions

The following business questions are designed to uncover critical insights related to employee attrition and to help the HR team make data-driven decisions. These questions demonstrate an analytical approach to solving workforce challenges rather than just creating visualizations.

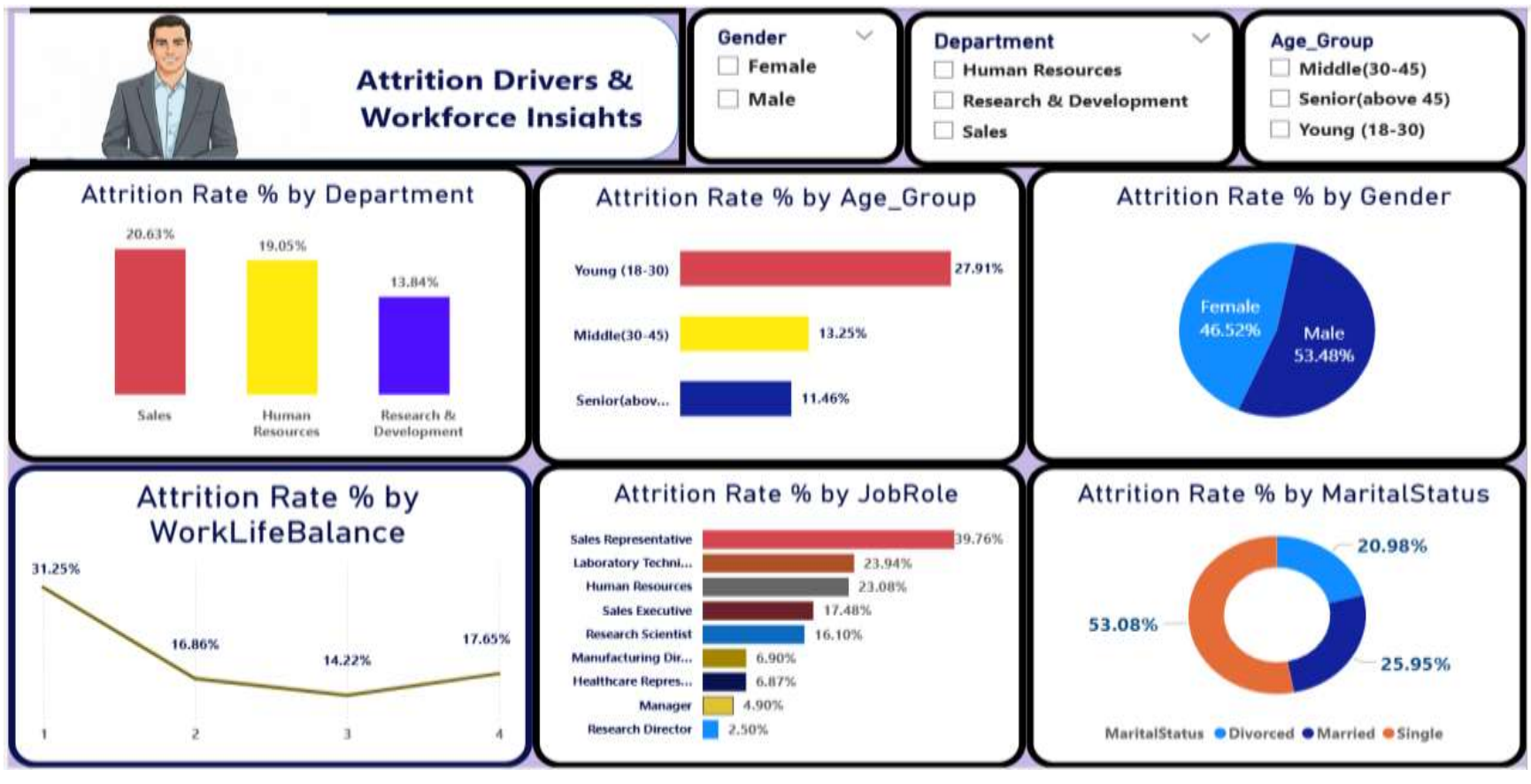
1. How does the attrition rate vary by department (e.g., Sales, Human Resources, Research & Development), and which department has the highest rate?
2. What is the attrition rate breakdown by age group (Young 18-30, Middle 30-45, Senior above 45), and why might younger employees have higher turnover?
3. How is attrition distributed by gender (Female vs Male), and what does this imply for diversity and inclusion strategies?
4. How does work-life balance rating (from 1 to 4) correlate with attrition rate, and what trends show the impact of poor balance on employee retention?
5. What are the attrition rates across different job roles (e.g., Sales Representative, Laboratory Technician, Research Director), and which roles are most at risk?
6. How does marital status (Single, Married, Divorced) affect attrition rates, and what insights can be drawn for family-oriented retention policies?

HR Attrition KPIs

1. Total employees in the dataset?
2. Number of employees who left (attrition count)?
3. Overall attrition rate %?
4. Current active employees?
5. % of employees at high attrition risk?
6. Average years since last promotion?
7. Promotion stagnation rate %?
8. Average distance from home and its attrition impact?

HR Attrition KPIs

HR Attrition Dashboard



Recommendations Based on Power BI Dashboard Insights (KPIs & Visual Analytics)

- Introduce **real-time attrition monitoring** using KPI cards (Attrition Rate, Retention Rate, Active Employees) for executive decision-making.
- Deploy **High Attrition Risk indicators** to proactively flag employees with overtime, low satisfaction, and long promotion gaps.
- Implement **department-specific action plans**, as dashboard visuals show varying attrition rates across departments.
- Reduce excessive **overtime policies**, as dashboard trends clearly link overtime with higher attrition rates.
- Prioritize **work-life balance improvements**, given its strong visual relationship with attrition levels.
- Use interactive filters (Age Group, Gender, Department) to support **data-driven HR strategy customization**.

Final Recommendation Statement

The combined Excel statistical analysis and Power BI dashboards clearly indicate that employee attrition is primarily driven by early-career instability, income disparities, promotion stagnation, and workload imbalance. By shifting from reactive attrition tracking to proactive risk-based retention strategies, the organization can significantly reduce turnover, protect institutional knowledge, and improve long-term workforce stability.