HR ANALYTICS PROJECT REPORT

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EXECUTIVE SUMMARY

This HR Analytics Project investigates patterns and drivers of employee attrition using historical HR data. The project leverage SQL for data extraction, Power BI for visualization, and DAX for advanced analytics. With a structured approach, the analysis provides valuable insights into workforce dynamics, identifying key risk factors such as overtime, job dissatisfaction, low income, and delayed promotions. A predictive risk model was also built to help HR proactively manage retention. The final output is a dynamic, interactive dashboard that empowers decision-makers to reduce turnover and improve employee experience.

PROJECT OBJECTIVES

The objectives of the project are:

- To analyze employee attrition trends across multiple dimensions.
- To identify key demographic and workplace factors that influence turnover.
- To develop DAX-based measures for real-time analysis.
- To create a retention risk scoring model using business rules.
- To deliver an interactive Power BI dashboard for HR strategic decisions.

TOOLS & TECHNOLOGIES USED

Tool/Technology	Purpose
Microsoft Excel	Initial data review, cleaning, column formatting
MySQL	Data extraction, grouping, and transformation queries
Power BI	Visualization, dashboard design, DAX measures
DAX (Power BI language)	Advanced calculations, KPIs, retention scoring
Dataset:*HR-Employee-Attrition.csv*	Source data with 1470 employee records and 35 features

DATA UNDERSTANDING

The dataset used for this project contains 1,470 records representing individual employee profiles. The data covers demographic information, job roles, income, tenure, work conditions, and attrition status. Key variables include:

- **Attrition** (target): Yes/No
- **Age**, **Gender**, **Job Role**, **Department**
- **Monthly Income**, **Years at Company**, **OverTime**
- **Satisfaction Metrics**: Job, Environment, Work-Life Balance
- **Promotions**, **Training Times**, **Education Field**

The goal is to understand what drives attrition and how patterns vary across groups.

DATA PREPARATION & CLEANING

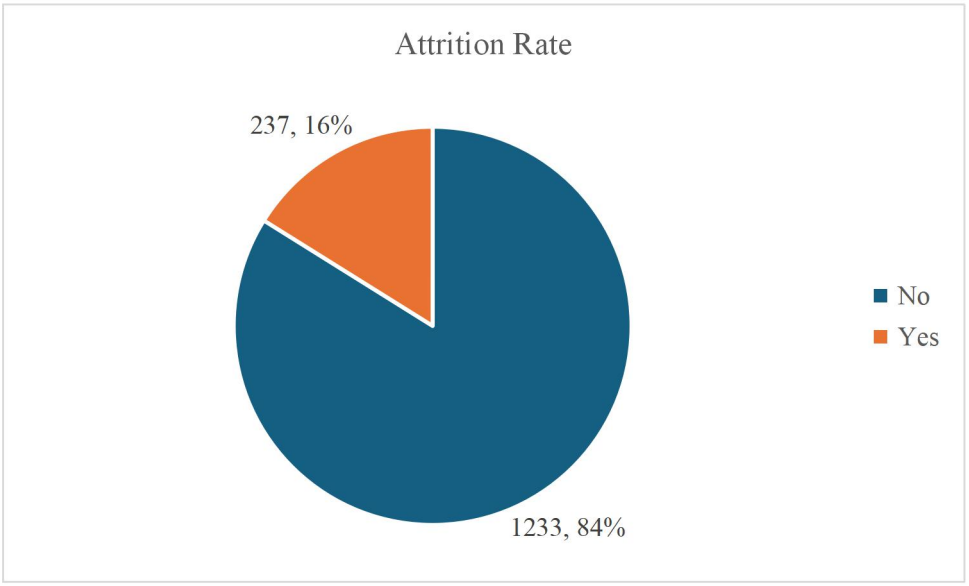
Cleaning steps included:

- Handled data type mismatches (e.g., converting text to categorical values)
- Removed irrelevant or redundant columns (e.g., EmployeeNumber, StandardHours)
- Created calculated columns such as Date Joined and Years Since Promotion
- Exported clean dataset to CSV for use in Power BI
- Ensured categorical variables were labelled properly for DAX filtering

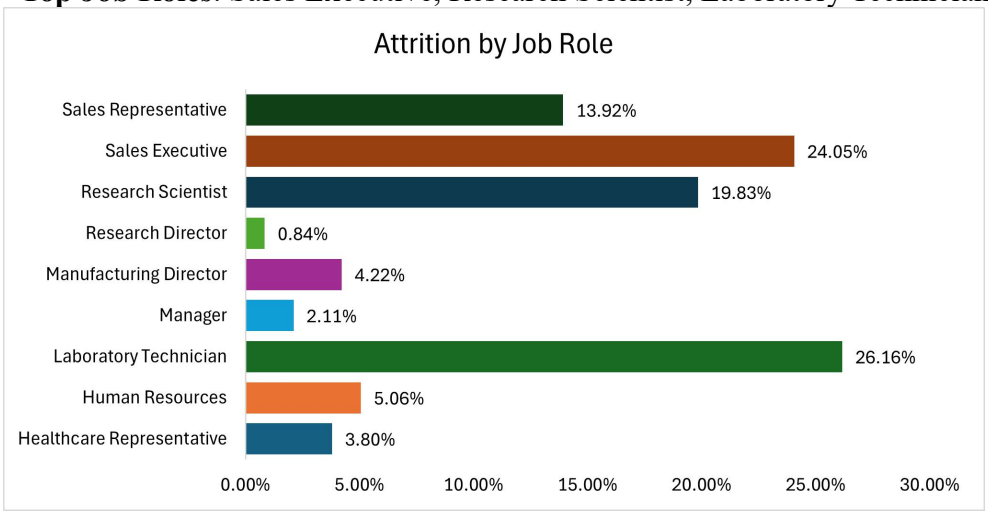
MICROSOFT EXCEL

Observations from Exploration

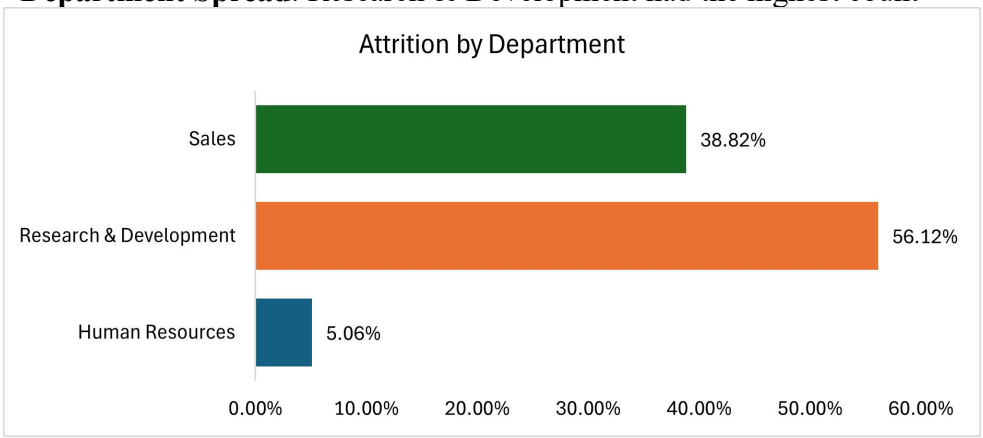
a) **Attrition Rate**: 16.1% (237 out of 1470 employees)



b) **Top Job Roles**: Sales Executive, Research Scientist, Laboratory Technician



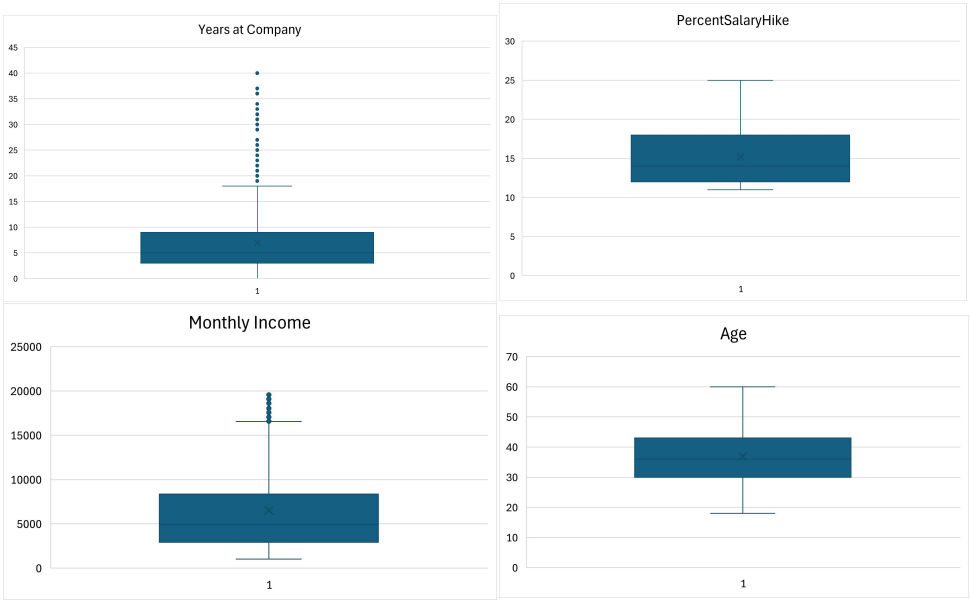
c) **Department Spread**: Research & Development had the highest count



d) No blank values or duplicates identified.

e) All column headers were clearly labelled.

f) Outlier Detection: **Numerical columns were inspected (**MonthlyIncome, Age, YearsAtCompany, PercentSalaryHike)



- **Observation**: "Monthly Income" and "Years at Company" has some high outliers, but they are realistic for executive roles, so no removal was done.

SQL ANALYSIS

SQL was used to derive foundational insights. Queries performed include:

a) Performance by Department
- Sales and R&D have the most employees with rating 4.
- HR has a relatively even spread between 3 and 4.

b) Performance vs. Overtime
- Employees who work overtime have a slightly higher proportion of performance rating 4.

c) Performance and Salary Hike Correlation
- Rating 4 employees receive higher average salary hikes.

d) Top Performers with Low Job Satisfaction
- Some top performers (especially in Sales and Research roles) are dissatisfied, indicating a retention risk.

e) Average Time Since Last Promotion
- **Average**: **2.19 years** since last promotion

f) Employees Not Promoted in Over 5 Years
- **179 employees** haven't been promoted in over 5 years

g) Promotion Delay vs. Attrition
- Attrition rate is **higher** among employees who haven't been promoted in 4+ years.

h) Tenure vs. Promotion
- Employees with 6–10 years at the company tend to experience longer gaps between promotions.

i) Departments with Longest Promotion Gaps
- **Sales** has the longest average promotion delay (~2.5 years)
- **HR** and **R&D** are slightly better

SQL helped create a clean and summarized dataset for visualization.

POWER BI DASHBOARD

The Power BI dashboard was structured into the following sections:

- **KPI Cards**: Attrition Rate, Avg Age, Total Employees, Overtime Rate
- **Charts**:
  - Pie Chart: Overall Attrition (Yes/No)
  - Column Chart: Attrition by Department
  - Donut Chart: Attrition by Overtime Status
  - Line Chart: Attrition by Age
  - Matrix Table: Gender x Department Attrition Rate
- **Slicers** for dynamic filtering: Department, Gender, Overtime, Job Role

Each visual responds to filters and offers deeper context for HR review.

DAX MEASURES (DYNAMIC KPIS)

To make the dashboard dynamic and intelligent, custom DAX formulas were implemented:

- **Total Employees**: COUNTROWS(hr_data)
- **Total Attrition**: CALCULATE(COUNTROWS(hr_data), hr_data[attrition] = "Yes")
- **Attrition Rate**: DIVIDE([Total Attrition], [Total Employees], 0)
- **Avg Monthly Income** and **Avg Age** of Attrited Employees
- **Overtime Attrition Rate**: Calculated using conditional filtering
- **Risk Score**: Composite score built from job satisfaction, overtime, income, and promotion delays

These KPIs adapt automatically with slicers, making the dashboard highly interactive.

Insights from Power BI and DAX

- 10% of employees are in the **High Risk** group.
- Sales and Lab Tech roles are overrepresented in this group.
- Most high-risk employees have **low job satisfaction**, **work overtime**, and haven't been promoted in years.
- Clear opportunity for **targeted HR interventions**.

RECOMMENDATIONS

Based on insights from the SQL analysis, Power BI dashboard, and retention risk scoring model, the following recommendations are proposed:

a. Proactively Manage High-Risk Employees

- Focus retention efforts on employees identified as "High Risk" in the scoring model.
- Prioritize check-ins, training, and engagement programs for this group.

b. Improve Job Satisfaction

- Departments with low job satisfaction and high attrition (e.g., Sales, Laboratory) should explore targeted morale-boosting activities, mentorships, and clearer career paths.

c. Monitor and Reduce Overtime

- A strong correlation was found between overtime and attrition. Work-life balance policies should be reinforced, and high-overtime units re-evaluated.

d. Streamline Promotions

- Employees with **4+ years since last promotion** are more likely to leave. Introduce performance-linked promotion reviews or skills development tracks.

e. Salary Review for Low-Income Staff

- Employees earning below $3,000 are overrepresented in attrition data. Benchmark salaries and adjust if discrepancies exist with industry standards.

LIMITATIONS

While the analysis is robust, several limitations were noted:

a. Static Dataset

- The dataset represents a one-time snapshot and doesn't include time-series trends or historical attrition.

b. Missing Factors

- Factors **External** like employee engagement, external job offers, or personal circumstances are not present in the data.

c. Equal Weighting Assumptions

- The risk scoring model uses rule-based weights which may oversimplify real-world complexity. In reality, factors interact in non-linear ways.

d. Limited Diversity Dimensions

- Attributes such as race, disability, or work location diversity aren't included, which could impact broader inclusion efforts.

CONCLUSION

This HR analytics project provided a comprehensive look at employee attrition using SQL and Power BI. Through descriptive analysis and DAX-driven modelling, the project surfaced key drivers of turnover including overtime, delayed promotions, low income, and job dissatisfaction.

The project didn’t stop at reporting past behaviour, it took a forward-looking approach by creating a **Retention Risk Score**, helping HR teams to **predict and prevent** potential exits. The resulting dashboard offers an intuitive, interactive experience for HR decision-makers, allowing for data-driven planning and employee retention strategies.