DAT-430 Project Two (Part I)

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**HR Attrition Analysis Report**

Employee attrition is a major concern for organizations, affecting productivity, morale, and financial resources. Understanding why employees leave can help companies develop better retention strategies (Oak Engage, 2024). This analysis examines the HR Attrition dataset to identify factors that contribute to employee turnover. Through exploratory data analysis (EDA) and visualizations, we explore key trends and insights that may explain why employees decide to leave.

**Establishing a Baseline**

To begin, we established a baseline using the HR Attrition dataset, which contains various employee-related attributes such as age, job role, job level, income, business travel, job satisfaction, work-life balance, and more. The dataset consists of 7040 employees, with both numerical and categorical features. The target variable, "Attrition," indicates whether an employee has left the company (Yes) or stayed (No).

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This dataset will be used for further analysis to determine the factors contributing to employee attrition.

**Exploratory Data Analysis (EDA)**

To gain insights into employee attrition, we conducted exploratory data analysis (EDA) by examining various factors such as age, job role, job level, business travel, job satisfaction, and work-life balance. Below are the key findings from the analysis.

Attrition by Age

One key focus was analyzing the relationship between employee age and attrition. The visualization below demonstrates how attrition varies across different age groups.

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A graph of age distribution

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A graph with purple lines and numbers

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Our analysis of age and attrition indicates that younger employees tend to leave the company at a significantly higher rate than older employees. The attrition rate is highest among employees in their 20s and early 30s, suggesting that younger workers may be more inclined to seek new career opportunities, better salaries, or greater job satisfaction elsewhere. Additionally, entry-level employees often face limited job security and fewer growth opportunities, making them more likely to leave.

To improve retention among younger employees, the company could implement mentorship programs, career development initiatives, or skill-building workshops that create clear pathways for advancement within the organization.

Attrition by Gender

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A screenshot of a computer program

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A graph of a distribution of gender

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The analysis of gender and attrition reveals no significant difference between male and female employees in terms of leaving the company. Both genders experience similar attrition rates, suggesting that factors other than gender—such as job role, job satisfaction, and work-life balance—are more influential in employee turnover.

This insight implies that HR should focus more on role-specific or department-specific attrition trends rather than implementing gender-targeted retention strategies.

Attrition by Distance From Home

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A graph with blue lines

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The data reveals a correlation between commute distance and attrition rates. Employees who live farther from the workplace (20+ miles) have a noticeably higher likelihood of leaving, while those with short commutes (under 5 miles) tend to stay longer.

One possible reason for this trend is commute-related stress, which can impact work-life balance and overall job satisfaction. To address this, the company might consider offering remote work options, commuter benefits, or flexible scheduling to accommodate employees who live farther away.

Attrition by Job Role

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A graph with purple line

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Attrition rates vary significantly by job role, with Sales Executives and Laboratory Technicians experiencing the highest turnover. In contrast, Research Directors and Managers have the lowest attrition rates, likely due to higher salaries, greater job stability, and leadership responsibilities.

For Sales Executives, the high-pressure nature of sales roles and performance-based targets may lead to burnout. Similarly, Laboratory Technicians may feel limited in career growth opportunities, pushing them to look elsewhere for better advancement prospects.

To retain employees in these high-turnover roles, HR could introduce better incentive structures, career growth plans, and enhanced support systems to reduce stress and improve job satisfaction.

Attrition by Job Level

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Employees in lower job levels (Levels 1 and 2) have significantly higher attrition rates compared to those in higher-level positions (Levels 4 and 5). This aligns with expectations, as entry-level employees may leave to seek higher salaries, promotions, or more fulfilling career paths.

To reduce turnover at the junior levels, HR should focus on creating career development programs, internal promotion opportunities, and mentorship initiatives to keep employees engaged.

Attrition by Department

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A graph with a line

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The attrition rate varies by department, with Sales and Human Resources experiencing the highest turnover, while Research & Development has the lowest.

* Sales: Higher attrition may be due to the pressure to meet targets, frequent travel, and commission-based pay.
* Human Resources: High turnover may result from burnout due to handling employee issues, compliance tasks, and administrative workload.
* Research & Development: The lowest attrition rate suggests that stable career paths, research-focused work, and higher job satisfaction contribute to longer employee retention.

To address these trends, HR should focus on department-specific retention strategies to reduce turnover in high-risk departments.

Attrition by Salary Hike

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Salary hikes do not always correlate with lower attrition. While employees who receive higher raises (15-20%) are slightly more likely to stay, a notable number of employees with substantial raises (20%+) still leave. This suggests that salary alone is not enough to retain employees.

To improve retention, HR should focus not just on financial incentives but also on non-monetary benefits, such as flexible work arrangements and leadership training.

Attrition by Business Travel

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A graph with a purple line

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Employees who travel frequently experience higher attrition rates than those who travel rarely or never. Frequent travel can lead to work-life balance challenges, stress, and job dissatisfaction, which may push employees to seek less-demanding roles.

Providing additional perks for traveling employees, such as more paid time off, travel allowances, or wellness programs, could help reduce attrition in these positions.

Attrition by Work-Life Balance

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Work-life balance plays a crucial role in employee retention. Employees who rate their work-life balance as poor (Level 1 & 2) are much more likely to leave the company compared to those who rate it higher (Level 3 & 4). This suggests that providing flexible work arrangements could help improve retention.

Attrition by Job Satisfaction

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Job satisfaction is another important factor in attrition. Employees with low job satisfaction (Levels 1 & 2) have a higher likelihood of leaving, while those with higher job satisfaction (Levels 3 & 4) tend to stay. Companies should consider strategies such as professional development, mentorship programs, and employee engagement initiatives to improve job satisfaction.

Attrition by Environment Satisfaction

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The work environment also impacts attrition rates. Employees who rate their environment poorly are more likely to leave, while those who are satisfied with their work environment tend to stay. Ensuring a positive and supportive work environment can be a key factor in reducing turnover.

**Feature Selection & Engineering**

After analyzing the dataset, we identified the most relevant features for further study and removed those that were either irrelevant, redundant, or had little impact on attrition.

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The features removed from the dataset include:

* DailyRate, HourlyRate, and MonthlyRate – These financial attributes may not be as useful as MonthlyIncome, which provides a clearer picture of compensation.
* NumCompaniesWorked, TotalWorkingYears, YearsInCurrentRole – While these indicate experience, they may not directly correlate with attrition in a meaningful way.
* TrainingTimesLastYear, PerformanceRating, StandardHours – These variables were considered less relevant in determining whether an employee is likely to leave.
* Gender – As shown in our exploratory data analysis (EDA), gender does not significantly impact attrition, making it unnecessary for predictive modeling.
* Over18, EmployeeCount, EmployeeNumber – These fields are either uniform across all employees (e.g., all employees are over 18) or act as unique identifiers without contributing meaningful predictive power.

Selected Features for Further Analysis

The following features were chosen as most relevant for understanding attrition:

* Age
* JobRole
* JobLevel
* BusinessTravel
* WorkLifeBalance
* JobSatisfaction
* EnvironmentSatisfaction
* MonthlyIncome
* DistanceFromHome

These variables were selected because they showed strong relationships with attrition in our EDA.

**Summary of Key Findings from EDA**

1. Younger employees (under 30) have the highest attrition rates, suggesting the need for stronger career development programs.
2. Employees who live farther from the workplace are more likely to leave, highlighting the need for flexible work arrangements.
3. Sales and HR departments experience the most attrition, indicating that job stress and performance expectations may be key issues.
4. Frequent business travel correlates with higher attrition, suggesting that reducing travel demands or improving travel-related compensation could help.
5. Poor work-life balance, low job satisfaction, and low environment satisfaction are strong predictors of attrition. HR should focus on improving employee experience, work flexibility, and recognition programs.
6. Higher salary increases reduce attrition, but salary alone is not a sufficient factor in employee retention. Focusing on holistic retention strategies that go beyond just pay raises should help drastically.

By leveraging these insights, HR can design targeted interventions to reduce attrition and improve employee retention strategies.

**Conclusion**

This analysis provides valuable insights into employee attrition and highlights key factors contributing to turnover. The findings suggest that job role, job level, business travel, work-life balance, job satisfaction, and environment satisfaction all play significant roles in employee retention. While further predictive modeling could provide more precise insights, the current analysis already offers actionable recommendations for reducing attrition.

**References**

Oak Engage. (2024, November 9). *Understanding Your Organizations Attrition Rate*. Oak.com. https://www.oak.com/blog/understanding-your-organisations-attrition-rate/