

HR Data Analysis: Uncovering Attrition Causes and Training Improvements

Introduction

The purpose of this report is to offer a comprehensive understanding of two critical facets of human resource management: employee turnover and the impact of training initiatives. The analysis is based on HR data that includes various metrics like age, department, performance ratings, and more.

Objectives

The project focuses on two key objectives:

1. To determine the reason behind the employee retention rate by analyzing the given dataset.
2. To evaluate and classify the effectiveness of employee training programs to refine their performance and development.

Data Cleaning and Preparation

The initial dataset contained various missing values and discrepancies. The data cleaning involved the following steps:

- 1) Age and Years_of_Service columns were categorized into more precise groups for better analysis and understanding:
 - a) Age Categories:
 - i. 20 – 30 years
 - ii. 31 – 40 years
 - iii. 41 – 50 years
 - iv. Other
 - b) Years_of_Service Categories:
 - i. '0-2 Years'
 - ii. '3-5 Years'
 - iii. '6-10 Years'
 - iv. '11-15 Years'
 - v. '15+ Years'
- 2) Transformations were applied to the Position and Gender columns to ensure accurate and precise results.

- a) 'Account Exec.', 'AccountExec.', 'AccountExecutive' were standardized as 'Account Executive'.
 - b) 'DataAnalyst' and 'Analyst' were unified as 'Data Analyst'.
 - c) 'Female' was abbreviated as 'F'
 - d) 'Male' was abbreviated as 'M'
- 3) To simplify analysis, Salary, training_hours, Absenteeism and Distance_from_Work were categorized into meaningful groups:
- a) Salary Categories:
 - i. '0-1 Lac'
 - ii. '1-10 Lacs'
 - iii. '10-20 Lacs'
 - iv. '20-30 Lacs'
 - v. '30-40 Lacs'
 - vi. '40-50 Lacs'
 - vii. '50-60 Lacs'
 - viii. '60-70 Lacs'
 - ix. '70-80 Lacs'
 - x. '80-90 Lacs'
 - xi. '90 Lacs-1 Cr'
 - xii. 'Above 1 Cr'
 - b) Training_hours Categories :-
 - i. '0-10 Hours'
 - ii. '11-20 Hours'
 - iii. '21-30 Hours'
 - iv. '31-40 Hours'
 - v. '40+ Hours'
 - c) Absenteeism categories :-
 - i. '0-5 Days'
 - ii. '6-10 Days'
 - iii. '11-15 Days'
 - iv. '15+ Days'
 - d) Distance_from_Work :-
 - i. '0-10 kms'
 - ii. '11-20 kms'
 - iii. '20-30 kms'
 - iv. '30-40 kms'
 - v. '40+ kms'

- 4) The Satisfaction_Score column was renamed to Employer_Satisfaction_Score for clarity.
- 5) To assess the work environment's impact on employee satisfaction and benefits, binary values columns representing various factors of job satisfaction and employee benefits were combined:
 - a) Job satisfaction factors included peer relationships, work-life balance, compensation, management, and job security.
 - b) Employee benefits included health insurance, paid leave, retirement plans, gym memberships, and childcare.From these, two new metrics were derived:
Employee_JobSatisfaction_Score and EmployeeBenefitScore.
- 6) Interns, representing approximately 32% of the total employees, were filtered out of the analysis since their promotion patterns differ from regular employees.

Analysis and Insights

1. Employee Attrition Insights:

a) Segmented by Gender

	Gender	TotalEmployees	Attrition_Yes	Attrition_No	Attrition_Yes %	Attrition_No %	AvgSalary	Avg_YearsOfService	AvgPerformanceRating	AvgWorkHours	Got_promoted	Not_promoted
▶	M	260	139	121	53	47	3,510,278	9.97	2.96	47.62	134	126
	F	245	121	124	49	51	3,368,661	10.04	2.91	47.53	118	127

	No_promotion	AvgTrainingHours	AvgEmployerSatisfactionScore	AvgEmployeeEngagementScore	AvgAbsenteeism	AvgDistanceFromWork	AvgEmployeeJobSatisfactionScore	AvgEmployeeBenefitScore
▶	126	27.73	3.18	3.05	11	27.54	59.31	60.77
	127	27.46	2.96	2.95	9	26.45	61.55	56.90

- The attrition rate is higher among males (53%) compared to females (49%).
- The average salary for males is higher than for females, suggesting salary is not a primary factor for higher attrition among males.
- Average performance ratings, work hours, and training hours are comparable between males and females.
- The number of males and females who did not get promoted is similar, but more males received promotions.
- Males have higher average employee satisfaction scores and employee engagement scores compared to females.
- Despite these positive indicators, males have lower job satisfaction scores than females, although their employee benefit scores are higher.
- Males reported higher absenteeism and greater average distance from work than females, which could contribute to their higher attrition rates.
- Promotion opportunities seem adequate, but other aspects of job satisfaction need to be addressed to reduce attrition.

b) Segmented by Age Groups

	Age_Group	TotalEmployees	Attrition_Yes	Attrition_No	Attrition_Yes %	Attrition_No %	AvgSalary	Avg_YearsOfService	AvgPerformanceRating	AvgWorkHours	Got_promoted	Not_promoted
▶	50+	159	90	69	57	43	5,034,691	16.08	2.96	47.86	73	86
	20-29	100	50	50	50	50	1,006,689	2.94	2.89	47.15	43	57
	40-49	123	60	63	49	51	4,284,130	11.42	3.15	47.32	67	56
	30-39	123	60	63	49	51	2,519,199	6.47	2.72	47.80	69	54

AvgTrainingHours	AvgEmployerSatisfactionScore	AvgEmployeeEngagementScore	AvgAbsenteeism	AvgDistanceFromWork	AvgEmployeeJobSatisfactionScore	AvgEmployeeBenefitScore
26.40	3.05	2.90	10	27.26	61.26	58.24
28.49	3.02	2.87	10	27.56	63.60	58.60
29.15	3.05	3.20	10	27.27	54.31	57.56
26.88	3.17	3.03	10	25.98	62.76	61.30

- Employees in the 50+ age group show the highest attrition rate (57%). Potential reasons could include the highest average salary, lack of promotions, and lower employee engagement and benefit scores despite extensive years of service. This indicates that employees in this age group might expect more benefits and recognition after many years of service.
- The 20-29 age group also has a high attrition rate (50%), potentially due to lower engagement scores and a higher average distance from work, which could be affecting their work-life balance.
- The 40-49 age group has an attrition rate of 49%. Despite having the highest training hours, their average employee job satisfaction and benefit scores are lower compared to other groups. Salary could also be a factor contributing to attrition.
- The attrition rate in the 30-39 age group is also 49%. The average employee job satisfaction score is relatively high, but salary may still be a reason for leaving the company.
- The table suggests that salary, promotion, engagement, training, and benefits are all factors that could be influencing attrition across different age groups.

c) Summarize employee attrition rates by Department

	Department	TotalEmployees	Attrition_Yes	Attrition_No	Attrition_Yes %	Attrition_No %
▶	Sales	74	42	32	57	43
	HR	73	40	33	55	45
	Marketing	81	44	37	54	46
	Operations	95	50	45	53	47
	Finance	100	46	54	46	54
	IT	82	38	44	46	54

- The highest attrition rate at 57% in the Sales department indicates significant challenges in retaining employees in this area.
- HR and Marketing departments follow closely, with attrition rates of 55% and 54%, respectively, suggesting these areas also face challenges in retaining staff.
- Operations has an attrition rate of 53%, which is marginally lower than HR and Marketing but still high.
- Finance and IT departments exhibit the lowest attrition rates at 46%, indicating better employee retention or higher job satisfaction in these functions compared to others.

d) Segmented By Position

	Position	TotalEmployees	Attrition_Yes	Attrition_No	Attrition_Yes %	Attrition_No %	AvgSalary	AvgPerformanceRating
►	CEO	1	1	0	100	0	9,360,701	3
	COO	1	1	0	100	0	9,687,074	3
	Software Engineer	12	10	2	83	17	3,506,111	3
	Content Creator	10	7	3	70	30	442,308	4
	Account Executive	19	13	6	68	32	3,985,394	3
	Supply Chain Analyst	28	18	10	64	36	3,360,460	2
	HR Manager	29	18	11	62	38	3,845,569	3
	Sales Representative	28	17	11	61	39	3,201,556	3
	HR Coordinator	20	12	8	60	40	3,161,937	3
	Operations Manager	27	16	11	59	41	3,865,262	3
	Creator	16	9	7	56	44	393,751	3
	System Administrator	15	8	7	53	47	3,953,602	3
	Accountant	27	14	13	52	48	3,795,052	3
	Marketing Coordinator	24	12	12	50	50	3,937,669	3
	Marketing Manager	30	15	15	50	50	3,359,130	3
	Financial Analyst	32	14	18	44	56	2,564,198	3
	Sales Manager	27	12	15	44	56	3,205,413	3
	Finance Manager	40	17	23	43	58	4,116,851	3
	IT Support Specialist	14	6	8	43	57	3,571,214	2
	Recruiter	24	10	14	42	58	3,633,823	3
	Logistics Coordinator	40	16	24	40	60	4,058,854	3
	Data Scientist	16	6	10	38	63	2,882,773	4
	Data Analyst	23	8	15	35	65	3,374,862	3
	CTO	1	0	1	0	100	9,931,132	4
	Head Data Analytics	1	0	1	0	100	4,005,606	3

- Both the CEO and COO positions have a 100% attrition rate as there is only one employee for each position and both left the company. This significant change in leadership could have impacted employee morale and stability.
- High attrition rates are observed among Software Engineers (83%) and Content Creators (70%). This indicates potential dissatisfaction within these roles, possibly due to workload, job satisfaction, or career growth opportunities.
- Operational roles such as Account Executives, Supply Chain Analysts, HR Managers, and Sales Representatives have attrition rates above 60%, suggesting a need for better retention strategies in these critical positions.
- Data Scientist and Data Analyst positions have lower attrition rates at 37% and 35% respectively, suggesting better job satisfaction or career opportunities in these roles.

e) Salary x Promotion x Years_of_service

	Income_group	TotalEmployees	Attrition_Yes	Attrition_No	Attrition_Yes %	Attrition_No %	Got_promoted	Not_promoted	Got_promoted %	Not_promoted %	AvgYearsOfService
►	90 Lacs-1 Cr	25	18	7	72	28	8	17	32	68	19.8
	50-60 Lacs	33	20	13	61	39	20	13	61	39	19.4
	30-40 Lacs	19	11	8	58	42	9	10	47	53	18.2
	70-80 Lacs	30	16	14	53	47	14	16	47	53	18.6
	10-20 Lacs	83	43	40	52	48	41	42	49	51	4.0
	40-50 Lacs	31	16	15	52	48	13	18	42	58	18.3
	1-10 Lacs	121	60	61	50	50	56	65	46	54	1.9
	20-30 Lacs	112	54	58	48	52	63	49	56	44	8.0
	80-90 Lacs	30	13	17	43	57	16	14	53	47	19.0
	60-70 Lacs	21	9	12	43	57	12	9	57	43	19.5

- Employees in the higher income group 90 Lacs-1 Cr has the highest attrition rate at 72%. This could be due to a lack of promotions despite having a high average years of service (19.8 years) compared to other groups.
- The 50-60 Lacs income group might experience attrition due to inadequate salary increases despite having comparable average years of service (19.4 years) to higher salary groups (e.g., 70-80 Lacs, 80-90 Lacs).
- The 30-40 Lacs group appears to experience higher turnover due to limited promotion opportunities and insufficient salary hikes despite long tenure (18.2 years).

f) Departmental performance ratings in relation to training hours and satisfaction score

	Department	AvgPerformanceRating	AvgTrainingHours	AvgEmployeeSatisfactionScore
►	Operations	2.76	28.11	3.15
	Sales	2.81	26.07	3.20
	Marketing	2.91	25.17	3.06
	HR	3.00	27.64	3.30
	IT	3.01	27.94	3.05
	Finance	3.10	29.91	2.77

- Despite receiving the highest average training hours, the Operations department has the lowest average performance rating. However, they reported a satisfaction score of 3.15, indicating contentment with their role or work environment.
- The Sales department has the highest employee satisfaction score (3.20) among the departments with lower performance ratings.

- The Finance department's high performance but low satisfaction scores indicate that improving work-life balance, recognition, or other satisfaction factors could be beneficial.

g) Segmented by Work Hours

	Work_Hours_Group	NoOfEmployees	Attrition_Yes %	Attrition_No %	AvgSalary	AvgYearsOfService	AvgTrainingHours	AvgEmployeeSatisfactionScore	Got_promoted %	Not_promoted %
►	50-55	122	56	44	3,643,176	10.7	29.96	2.93	53	47
	45-50	131	51	49	3,419,249	10.5	27.24	3.19	52	48
	40-45	252	50	50	3,355,576	9.4	26.65	3.08	47	53

AvgDistanceFromWork	AvgEmployeeJobSatisfactionScore	AvgEmployeeBenefitScore
28.17	60.16	60.98
26.35	60.46	58.47
26.8	60.48	58.10

- Employees working the longest hours (50-55 hours) exhibit the highest attrition rate and the lowest satisfaction score. Despite having the highest average training hours (29.96), their dissatisfaction may stem from unmet expectations regarding promotions and salary increases.
- The 45-50 hours group has a slightly lower attrition rate and higher satisfaction score compared to those working 50-55 hours. Their training hours (27.24) and average salary are also lower, indicating a better work-life balance could improve retention.
- Employees in the 40-45 hours group have the lowest average work hours, and their attrition rate is the lowest among the three groups. Their training hours are the lowest (26.65), suggesting that a balanced workload and training schedule contribute to better retention and satisfaction.
- Despite having higher benefit scores, longer work hours correlate with lower job satisfaction, indicating that benefits alone are not enough to retain employees working excessive hours.

h) Segmented by Promotion

	Promotion	Attrition_Yes %	Attrition_No %	AvgEmployeeJobSatisfactionScore	AvgEmployeeBenefitScore
►	No	54	46	60.79	57.08
	Yes	49	51	60.00	60.71

- Over half of the employees (54%) who did not receive promotions left the company. Despite having a higher job satisfaction score than those who were promoted, the lack of promotions and potentially insufficient benefits may have contributed to their decision to leave.
- Employees who received promotions had a slightly lower attrition rate. Their benefit score was higher, but their job satisfaction score was lower compared to those who did not receive promotions. This indicates that while promotions and benefits are important, they may not fully compensate for other factors affecting job satisfaction.

i) Segmented by Education level

	Education_Level	TotalEmployees	Attrition_Yes	Attrition_No	Attrition_Yes %	Attrition_No %	Promoted	NoPromotion	AvgSalary
►	Bachelor's	124	68	56	55	45	66	58	3,310,458
	PhD	125	68	57	54	46	56	69	3,360,131
	Master's	123	63	60	51	49	60	63	3,723,263
	Diploma	133	61	72	46	54	70	63	3,379,848

- The attrition rate for employees with a bachelor's degree is high at 55%. This could be due to a combination of factors such as pursuing higher studies or dissatisfaction with promotion opportunities.
- Employees with PhDs have a high attrition rate at 54%. The lack of promotions and similar salary ranges compared to other education levels might contribute to their dissatisfaction.
- The attrition rate for employees with a master's degree is slightly lower but still significant. Although they have the highest average salary, lack of promotion remains a concern.
- Employees with diplomas have the lowest attrition rate. This group also has the highest number of promotions, which may contribute to better retention.

j) Comparative Analysis of Metrics for Employees with and without Attrition

	Attrition	AvgAge	AvgSalary	AvgPerformanceRating	AvgWorkHours	AvgTrainingHours	AvgEmployerSatisfaction	AvgEmployeeEngagementScore	AvgAbsenteeism
►	Yes	41	3,558,438	3	48	28	3	3	10
	No	40	3,317,553	3	48	27	3	3	10

AvgDistanceFromWork	AvgEmployeeJobSatisfactionScore	AvgEmployeeBenefitScore
28	60	60
26	61	58

- The differences in metrics between employees who left and those who stayed are marginal, indicating that multiple factors contribute to attrition rather than a single dominating reason.
- Employees who left (Attrition Yes) had slightly more average training hours (28) and a higher average distance from work (28) compared to those who stayed (27 and 26, respectively). This suggests that extensive training hours and longer commutes could be contributing factors to attrition.
- Age does not appear to be a distinguishing factor, as the average age of employees who left is similar to that of those who stayed.
- Interestingly, employees with higher salaries are among those who left, which suggests that salary was not a primary driver of attrition in this instance.
- A slight discrepancy is observed in the average job satisfaction score, where employees who have left had a lower score by 1 point, potentially indicating a marginal but notable difference in overall contentment with their job.

2. Optimising Training Program:

a) Training Impact relative to Years of service and Promotions

	Training_Hours_Category	AvgYearsOfService	Got_promoted %	No_promotion %
▶	21-30 Hours	11.96	45	55
	31-40 Hours	9.42	47	53
	0-10 Hours	9.97	51	49
	11-20 Hours	9.72	52	48
	40+ Hours	8.75	55	45

- Employees who received 40+ hours of training have the highest promotion rate (55%) and the lowest rate of not getting promoted (45%). This indicates a positive correlation between extensive training and promotions.
- In contrast, employees trained for 21-30 hours have the lowest promotion rate (45%) and the highest rate of not getting promoted (55%), despite having the highest average years of service (11.96). This suggests that this category should be reviewed for the training content and delivery methods to better align with career advancement opportunities.
- Employees receiving 31-40 hours of training have a slightly better promotion rate but are still below optimal levels. This indicates a potential need for improvement in the training content or approach.

b) Training Impact on Performance Rating and Engagement Score

	Training_Hours_Category	AvgPerformanceRating	AvgEmployeeEngagementScore
▶	40+ Hours	3.05	2.98
	31-40 Hours	2.80	3.04
	21-30 Hours	3.00	3.04
	11-20 Hours	2.88	3.02
	0-10 Hours	2.94	2.86

- Employees who received 21-30 hours of training have a balanced outcome, with both a high average performance rating (3.00) and a high average employee engagement score (3.04).
- Employees who received 40+ hours of training have the highest average performance rating (3.05) but a lower engagement score (2.98), indicating potential disengagement despite improved performance.
- The 31-40 hours training category shows the lowest average performance rating (2.80) but the highest engagement score (3.04). This suggests that while engagement is high, performance may not directly correlate with the amount of training in this range.
- The 11-20 training hours range produces moderate performance and engagement scores, suggesting room for improvement in both metrics.
- 0-10 hours of minimal training correlates with lower performance and engagement scores, indicating that insufficient training is not beneficial for employees.

Recommendations

- **Review Promotion Policies:** Promotions are a significant factor in employee attrition rates with 54% of employees who did not receive promotions leaving the company. It is recommended to reassess promotion policies to ensure they are fair, transparent, and based on merit. Consider implementing a more regular review process for promotions to keep employees motivated.
- **Address Commuting Challenges:** Distance from work is a considerable factor in employee turnover. Explore options such as remote work, flexible hours, or transportation benefits to accommodate employees with longer commutes.
- **Conduct Confidential Surveys:** High attrition across departments suggests underlying issues. Conducting confidential surveys can help identify department-specific concerns and allow employees to voice their challenges anonymously.
- **Leadership Changes:** The departure of key leadership figures such as the CEO and COO may have contributed significantly to the high attrition rate. Communicating transparently with employees about leadership changes and the company's future direction is essential to maintain trust and stability.
- **Salary and Tenure Policies:** Consider implementing a structured salary review process that rewards loyalty and performance, acknowledging the expectation of salary increases over time for long-serving employees.
- **Improve Departmental Performance:** Operations, Sales, and Marketing departments show lower performance and attrition concerns. Investigate underlying issues through surveys and focus groups. Provide targeted training and resources to address specific challenges in these departments.
- **Optimize Training Programs:** Reassess and optimize training programs to ensure they are effective and engaging, reducing the likelihood of training fatigue. Aim for an optimal training range (e.g., 21-30 hours) to balance both performance and engagement. Ensure training content is relevant and engaging. Consider incorporating interactive and varied training methods to maintain interest.
- **Foster a Positive Work Environment:** Create a positive work environment by promoting work-life balance, recognizing employee

achievements, and encouraging a collaborative culture. This can enhance overall job satisfaction and engagement.

- **Gather Qualitative Feedback:** Conduct detailed exit surveys and gather qualitative feedback from employees who leave to understand their reasons for leaving. This can help identify factors that are not evident from quantitative data alone and address any underlying issues. Also, gather feedback from current employees to continuously improve work conditions and retention strategies.