



Impact of Salary Hikes on Employee Attrition

Team Billions

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Problem Statement

The Cost of Losing Employees is Higher Than You Think

Employee attrition is a major concern for companies, impacting productivity, morale, and long-term growth.

High turnover leads to lost talent and productivity drop.

U.S. businesses lose **\$1 trillion annually** due to turnover (Gallup, 2019).

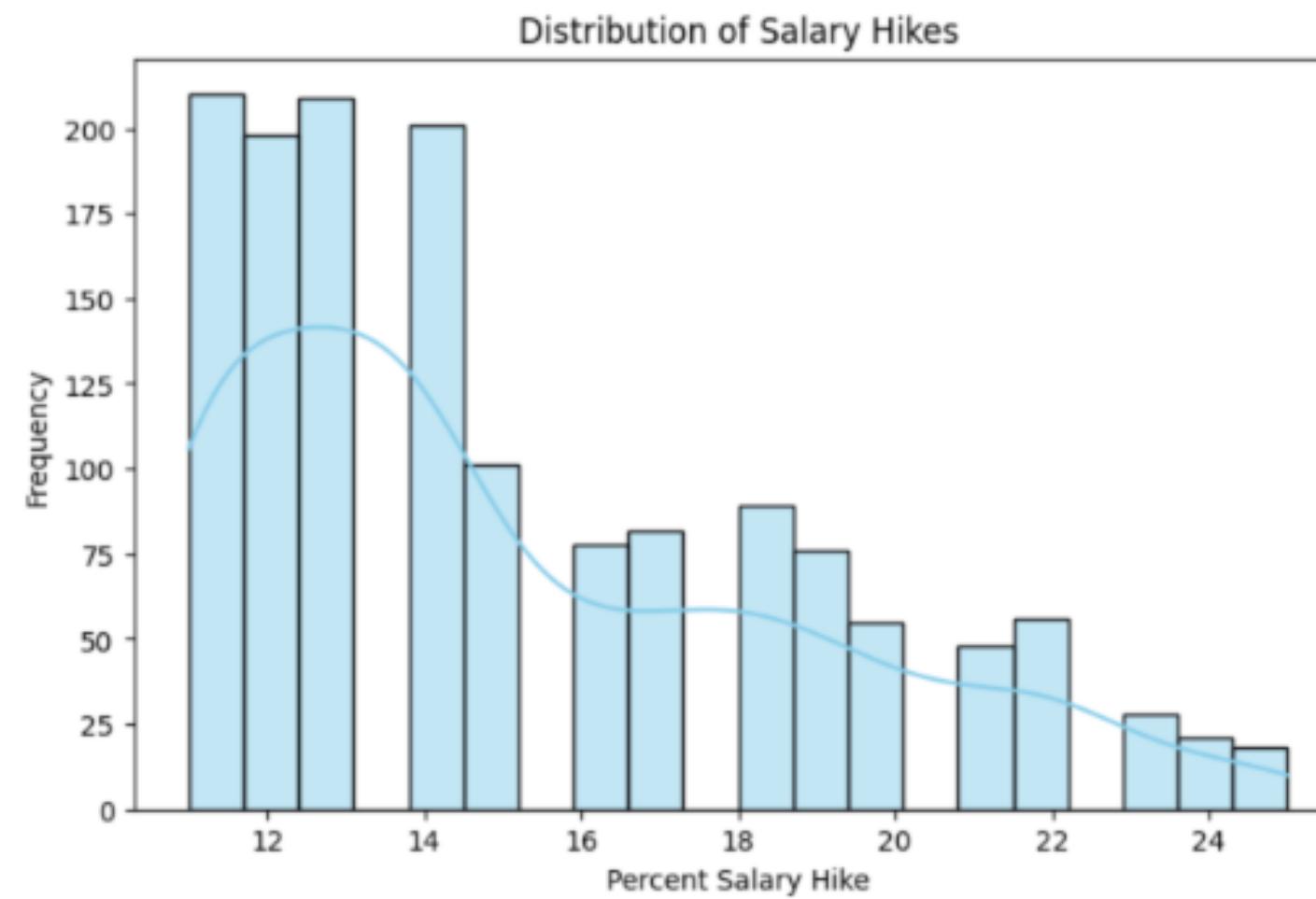
Replacing an employee costs **50-200% of their salary** (SHRM, 2022), making retention critical.



Research Question:
Does significantly increasing salary have an effect on employee attrition?

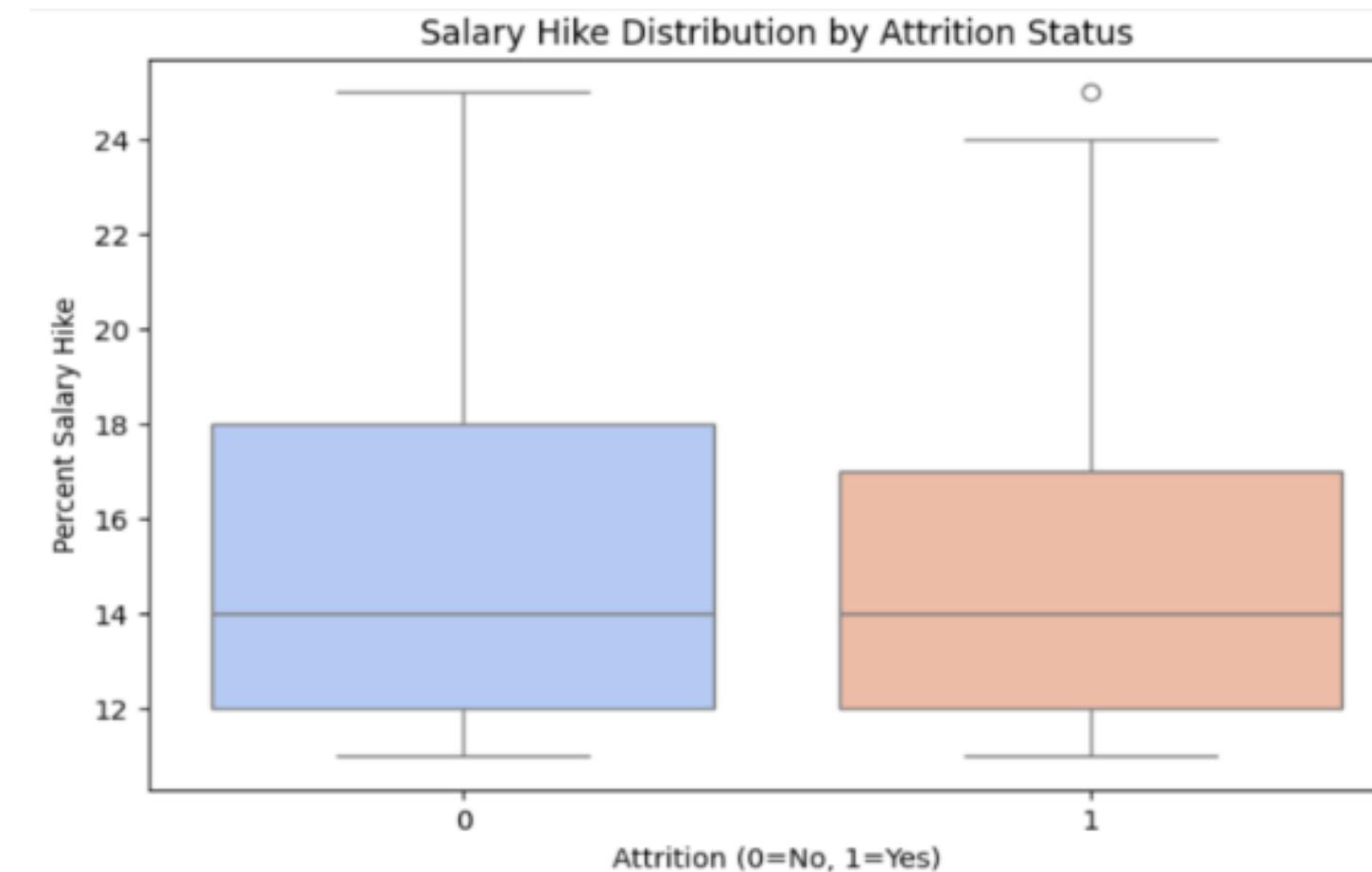


Salary Hike Distribution & Impact on Attrition



Most salary hikes fall between 10-20%.

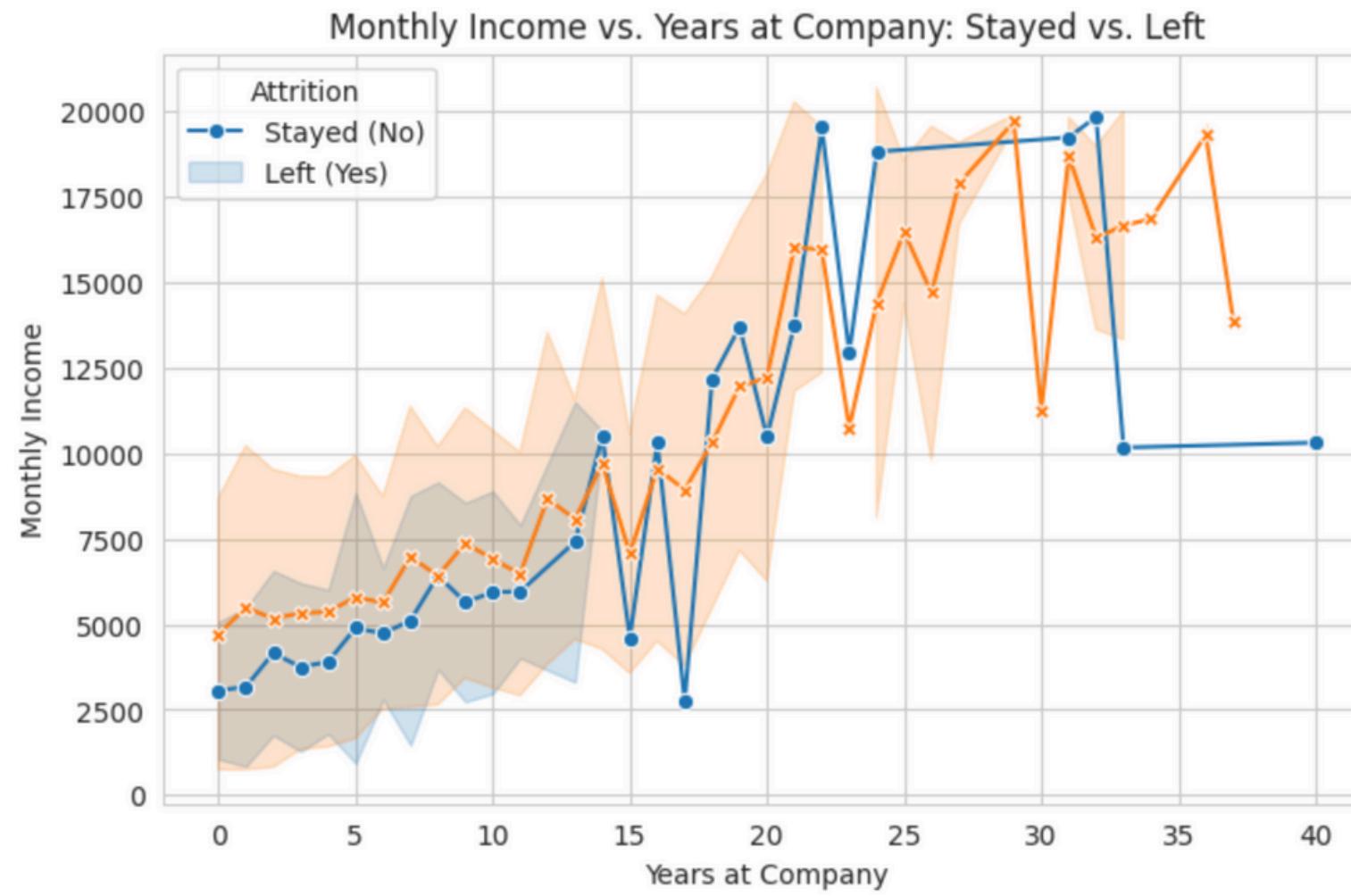
Indicates a structured salary raise policy.



No major difference in salary hike distribution between employees who stayed vs. left.

Salary hikes alone do not strongly influence attrition—other factors like job satisfaction and career growth matter more.

Attrition Rate & Key Factor Relationships

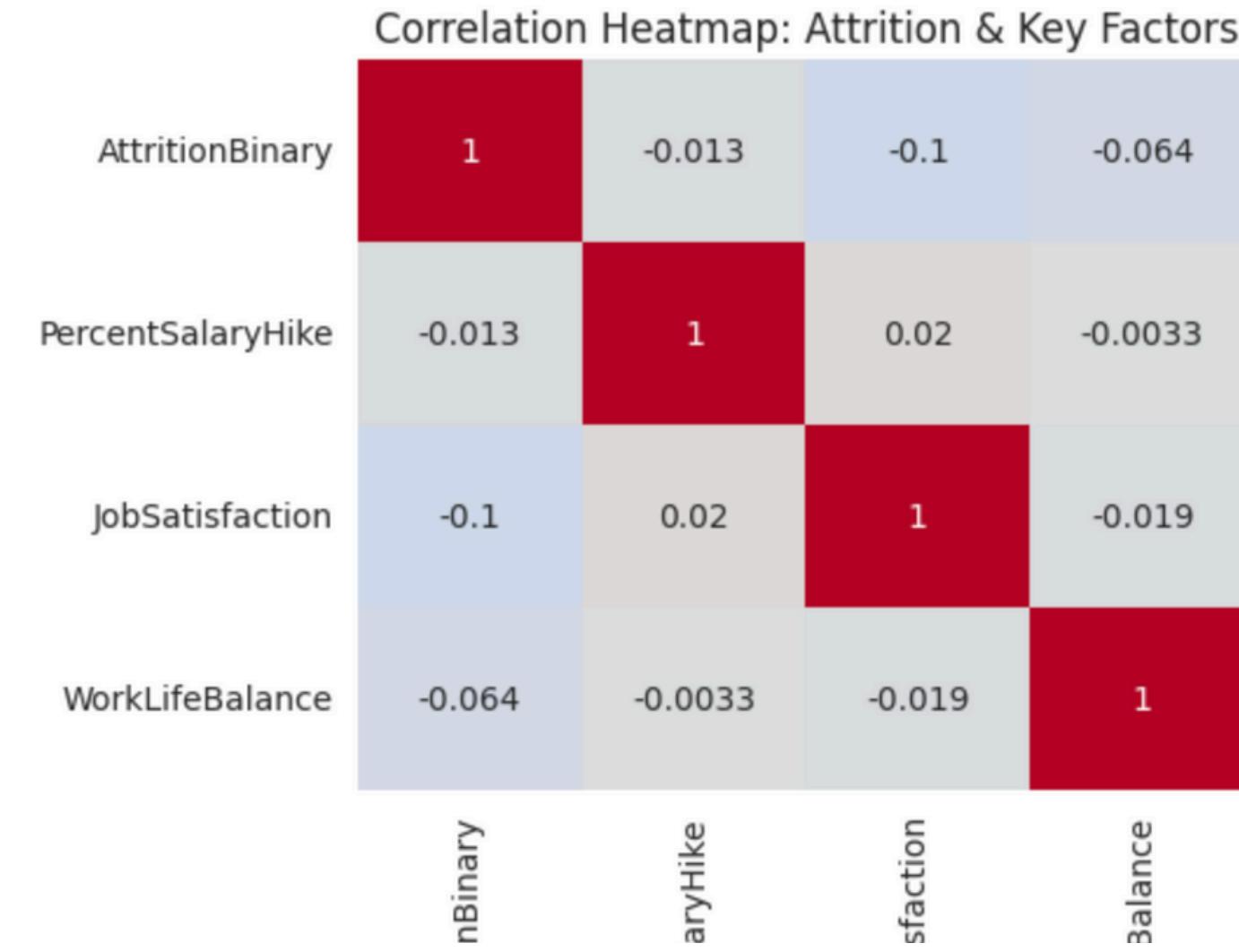


Early-career attrition: Low salaries + smaller hikes → higher exit rates.

Mid-career stability: Moderate hikes + steady income growth → lower attrition.

Late-career turnover: High salaries but stagnant hikes → increased exits.

Salary hikes alone don't prevent attrition—career growth & job satisfaction matter.



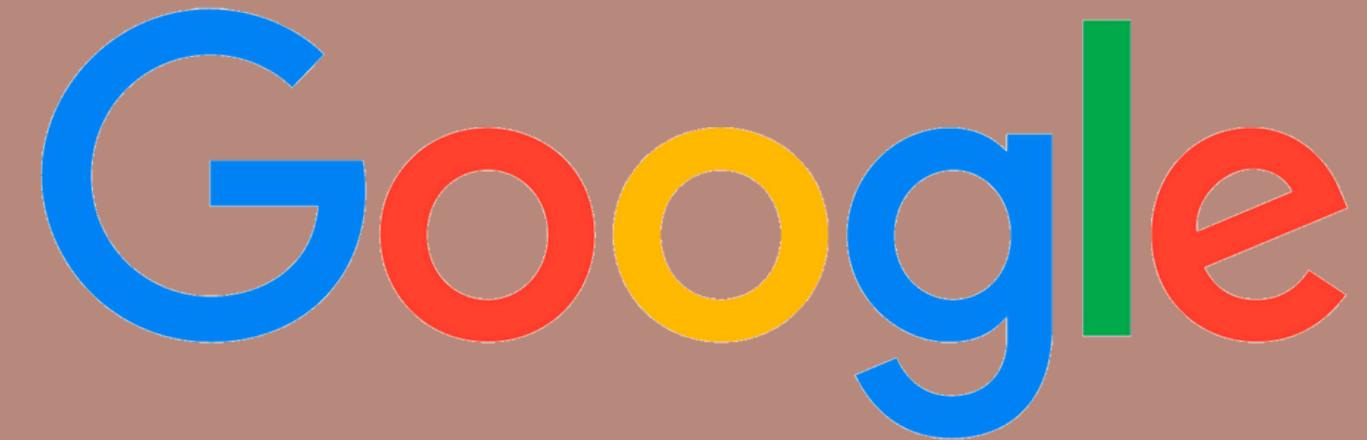
Salary hikes have very weak correlation (-0.01) with attrition.

Job satisfaction (-0.10) and work-life balance (-0.06) show stronger relationships.

Years at the company (Confounding Variable) may also influence trends.

Possible Outcome: Higher Salary Hike Reduces Attrition

Employees feel valued, enhancing loyalty and reducing job-seeking behavior.



Google's turnover rate is under 10%, compared to the tech sector's average voluntary turnover rate of 13.2%.



Due to the competitive compensation, Costco's turnover rate stands at 8%, far below the retail industry's 60% average.

Possible Outcome: No Significant Relationship between Salary Hikes and Attrition

Other factors (work-life balance, career growth) outweigh salary hikes in retention.

Goldman Sachs

Despite the high compensation, 44% of junior M&A and corporate finance bankers exit the industry within three years.

McKinsey & Company

McKinsey is considered one of the highest paying firms in the management consulting industry, but still facing 27% annual turnover rate.

Goldman Sachs



citibank

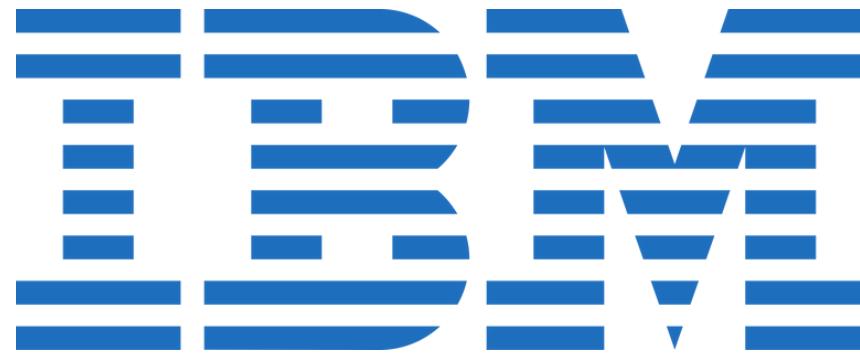
J.P.Morgan

Possible Outcome: **Higher Salary Hike Increases Attrition**

A strong raise signals high performance, making employees attractive to competitors.

Goldman Sachs' AI talent getting poached by the bank's Wall Street rivals.

Data Overview



kaggle

Source

IBM HR Analytics Employee Attrition Dataset

Key Variables

X (Independent Variable): Percentage Salary Hike

Y (Dependent Variable): Attrition Rate

Confounding Variables

JOB SATISFACTION

Employees who are already satisfied may be less likely to leave, regardless of salary.

WORK-LIFE BALANCE

Poor work-life balance might drive employees away, even if they receive a raise.

YEARS AT COMPANY

Newer employees might be more likely to leave, making salary less relevant to their decision.

STOCK OPTIONS

Employees with stock options might stay longer, independent of salary changes.

JOB LEVEL

Higher-level employees may have different retention patterns compared to entry-level workers.

Excluded Data

EMPLOYEES WITHOUT SALARY HIKES

We focused on employees who received a salary hike, meaning those without a salary increase were excluded.

MISSING VALUES IN KEY VARIABLES

Any row with missing values in **JobSatisfaction**, **WorkLifeBalance**, etc., was automatically removed.

EXTREME SALARY HIKES (OUTLIERS)

If salary hikes were extremely high (e.g., top 1%), we may have removed them to avoid bias. This ensures we are not misled by a few large raises.

EMPLOYEES WITH UNDEFINED PROMOTION HISTORY

Employees with missing or undefined promotion history (e.g., **YearsSinceLastPromotion** = NaN) were excluded.

EMPLOYEES WITH TOTALWORKINGYEARS = 0

These created division-by-zero errors when calculating AttritionRate. They were dropped or replaced.

Ideal Experimentation

Difference-in-Differences (DiD)

WHAT IS DiD?

DiD is a causal inference method that estimates the impact of an event or policy change

Compares trends between a group that experiences the change (treatment) and one that doesn't (control)

Controls for pre-existing differences, isolating the true effect of salary hikes on attrition

WHY IS DiD THE BEST FIT?

WHY NOT USE RCTs?

Expensive & Impractical – Randomly assigning salary hikes isn't feasible in a real-world business setting

Ethical Concerns – It's unfair to give raises to some employees but not others just for an experiment

Business Constraints – Companies don't randomly increase salaries; raises happen based on policies, performance, and market conditions

Mimics an experiment using real-world salary hike data

Leverages natural salary increases as the 'treatment' while keeping a control group

Removes bias from factors affecting both groups equally (e.g., economy, company policies)

Study Design

Hypothesis

Null Hypothesis (H_0): Salary hikes have no impact on attrition

Alternative Hypothesis (H_1):

Salary hikes significantly impact employee attrition (either reducing or increasing it).

1) Defining the Study Group

Treatment Group: Employee who receive salary hike $\geq 18\%$

Control Group: Employee who receive salary hike $< 18\%$

Pre-treatment: Employee who received promotion ≤ 2 years ago

Post-treatment: Employee who received promotion > 2 years ago

2) Checking Parallel Trend Assumption

Run an OLS regression on pre-treatment data:

$$\circ \text{Attrition} = \alpha + \beta_1 \cdot \text{Treatment} + \varepsilon$$

If β_1 is not significant, it means attrition rates were not significantly different before the hike (Parallel Trends Assumption Met).

3) Adding Control Variable

Performance Rating, JobSatisfaction, WorkLifeBalance, YearsAtCompany, StockOptionLevel, JobLevel

4) DiD Logit Regression Analysis

$$\beta_0 + \beta_1 \cdot \text{Treatment} + \beta_2 \cdot \text{Post} + \beta_3 \cdot (\text{Treatment} \times \text{Post}) + \text{Control} + \varepsilon$$

Logistic Regression

Dep. Variable:	Attrition	No. Observations:	1470
Model:	Logit	Df Residuals:	1463
Method:	MLE	Df Model:	6
Date:	Thu, 27 Feb 2025	Pseudo R-squ.:	0.08075
Time:	00:45:44	Log-Likelihood:	-596.86
converged:	True	LL-Null:	-649.29
Covariance Type:	nonrobust	LLR p-value:	2.421e-20

	coef	std err	z	P> z	[0.025	0.975]
Intercept	1.2691	0.486	2.612	0.009	0.317	2.221
PercentSalaryHike	-0.0146	0.021	-0.707	0.480	-0.055	0.026
JobSatisfaction	-0.2660	0.066	-4.028	0.000	-0.395	-0.137
WorkLifeBalance	-0.2358	0.101	-2.343	0.019	-0.433	-0.039
YearsAtCompany	-0.0435	0.018	-2.404	0.016	-0.079	-0.008
StockOptionLevel	-0.4979	0.101	-4.943	0.000	-0.695	-0.300
JobLevel	-0.4046	0.094	-4.322	0.000	-0.588	-0.221

Percent Salary Hike (coef = -0.0146, p = 0.480)

Negative coefficient but not statistically significant

Confounding Variables

Job Satisfaction & Work-Life Balance

- Higher job satisfaction (-0.2660, p=0.000) and better work-life balance (-0.2358, p=0.019) significantly reduce attrition.
- Employees who are happier and have a balanced workload are less likely to leave.

Tenure & Career Progression

- More years at the company (-0.0435, p=0.016) and higher job levels (-0.4046, p=0.000) decrease the likelihood of leaving.
- Employees with longer tenure and career growth tend to stay.

Financial Incentives (Stock Options)

- Stock options (-0.4979, p=0.000) strongly discourage attrition.
- Employees with stock-based compensation have a financial reason to remain.

Difference-in-Differences (DiD) Analysis

Dep. Variable:	Attrition	No. Observations:	1470
Model:	Logit	Df Residuals:	1461
Method:	MLE	Df Model:	8
Date:	Thu, 27 Feb 2025	Pseudo R-squ.:	0.08309
Time:	00:45:44	Log-Likelihood:	-595.34
converged:	True	LL-Null:	-649.29
Covariance Type:	nonrobust	LLR p-value:	1.030e-19

	coef	std err	z	P> z	[0.025	0.975]
Intercept	1.0603	0.371	2.855	0.004	0.332	1.788
Treatment	-0.0694	0.207	-0.336	0.737	-0.475	0.336
Post	0.3288	0.192	1.709	0.087	-0.048	0.706
Treatment_Post	-0.1644	0.362	-0.454	0.650	-0.874	0.545
JobSatisfaction	-0.2696	0.066	-4.077	0.000	-0.399	-0.140
WorkLifeBalance	-0.2392	0.101	-2.370	0.018	-0.437	-0.041
YearsAtCompany	-0.0541	0.019	-2.810	0.005	-0.092	-0.016
StockOptionLevel	-0.5055	0.101	-4.996	0.000	-0.704	-0.307
JobLevel	-0.4073	0.093	-4.360	0.000	-0.590	-0.224

Treatment_Post Coefficient: -0.1644 (p = 0.650)

The negative coefficient suggests that salary hikes may have reduced attrition, but **the effect is not statistically significant (p > 0.05)**.

Confounding Variables

Employee Engagement Matters More than Salary Hikes

- Job Satisfaction (-0.2696, p = 0.000): Employees who feel valued and engaged are significantly less likely to leave, even if pay increases.

Long-Term Incentives Improve Retention

- Stock Options (-0.5055, p = 0.000) & Job Level (-0.4073, p = 0.000): Employees with higher job levels and stock options are much more likely to stay, suggesting that career growth and ownership matter.

Work-Life Balance & Stability Reduce Attrition

- Work-Life Balance (-0.2392, p = 0.019) & Years at Company (-0.0541, p = 0.005): Employees with better work-life balance and longer tenure are less likely to leave, reinforcing that stability and well-being drive retention.

SALES EXECUTIVE

Dep. Variable:	Attrition	No. Observations:	326
Model:	Logit	Df Residuals:	317
Method:	MLE	Df Model:	8
Date:	Thu, 27 Feb 2025	Pseudo R-squ.:	0.1357
Time:	01:53:30	Log-Likelihood:	-130.59
converged:	True	LL-Null:	-151.10
Covariance Type:	nonrobust	LLR p-value:	2.077e-06

	coef	std err	z	P> z	[0.025	0.975]
Intercept	0.6200	1.008	0.615	0.539	-1.356	2.596
Treatment	-0.4355	0.603	-0.722	0.470	-1.618	0.747
Post	0.8506	0.401	2.123	0.034	0.065	1.636
Treatment_Post	1.0064	0.783	1.285	0.195	-0.529	2.542
JobSatisfaction	-0.2059	0.137	-1.505	0.132	-0.474	0.062
WorkLifeBalance	-0.7713	0.230	-3.352	0.001	-1.222	-0.320
YearsAtCompany	-0.1152	0.038	-3.061	0.002	-0.189	-0.041
StockOptionLevel	-0.6282	0.217	-2.894	0.004	-1.054	-0.203
JobLevel	0.5531	0.299	1.851	0.064	-0.032	1.139

RESEARCH SCIENTIST

Dep. Variable:	Attrition	No. Observations:	292
Model:	Logit	Df Residuals:	283
Method:	MLE	Df Model:	8
Date:	Thu, 27 Feb 2025	Pseudo R-squ.:	0.1218
Time:	01:53:30	Log-Likelihood:	-113.16
converged:	True	LL-Null:	-128.85
Covariance Type:	nonrobust	LLR p-value:	0.0001200

	coef	std err	z	P> z	[0.025	0.975]
Intercept	1.3545	1.105	1.225	0.220	-0.812	3.521
Treatment	0.4564	0.471	0.969	0.333	-0.467	1.380
Post	1.1092	0.445	2.492	0.013	0.237	1.982
Treatment_Post	-0.6747	0.773	-0.873	0.585	-2.189	0.840
JobSatisfaction	-0.3634	0.153	-2.377	0.017	-0.663	-0.064
WorkLifeBalance	0.0517	0.244	0.212	0.832	-0.426	0.530
YearsAtCompany	-0.0380	0.057	-0.668	0.504	-0.150	0.074
StockOptionLevel	-0.6364	0.249	-2.551	0.011	-1.125	-0.147
JobLevel	-1.8415	0.789	-2.334	0.020	-3.388	-0.295

LABORATORY TECHNICIAN

Dep. Variable:	Attrition	No. Observations:	259
Model:	Logit	Df Residuals:	250
Method:	MLE	Df Model:	8
Date:	Thu, 27 Feb 2025	Pseudo R-squ.:	0.1716
Time:	01:53:30	Log-Likelihood:	-118.08
converged:	True	LL-Null:	-142.55
Covariance Type:	nonrobust	LLR p-value:	6.552e-08

	coef	std err	z	P> z	[0.025	0.975]
Intercept	3.2735	0.894	3.663	0.000	1.522	5.025
Treatment	-0.1048	0.390	-0.268	0.788	-0.870	0.661
Post	-0.5979	0.488	-1.225	0.220	-1.554	0.358
Treatment_Post	0.1565	1.152	0.136	0.892	-2.102	2.415
JobSatisfaction	-0.3402	0.147	-2.315	0.021	-0.628	-0.052
WorkLifeBalance	-0.6703	0.217	-3.090	0.002	-1.095	-0.245
YearsAtCompany	-0.1813	0.060	-3.034	0.002	-0.298	-0.064
StockOptionLevel	-0.5994	0.215	-2.784	0.005	-1.021	-0.177
JobLevel	-0.3946	0.463	-0.852	0.394	-1.302	0.513

STATISTICALLY
SIGNIFICANT

NOT STATISTICALLY
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JobLevel	-0.3946	0.463	-0.852	0.394	-1.302	0.513

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Conclusion

*Retention isn't just about compensation—
it's about commitment!*

Research Question

Does significantly increasing salary have an effect on employee attrition?

Logistic Regression & Difference-in-Differences

Provides strong evidence that significant salary hikes alone do not guarantee employee retention

Where should Businesses Invest Instead?

Investing in employee satisfaction, career development, and a supportive work environment will yield better long-term retention!



Thank You!
