

# Turnover Analysis

Tech Sector



By Vitória Willani

# About The Project

Employee turnover is a significant challenge for companies. Every time an employee leaves, the organization incurs costs and time delays related to new interviews and the training of replacements. Additionally, productivity in the affected department often suffers due to this turnover.

There are various reasons why employees may leave a company, such as better job opportunities, poor organizational culture, ineffective management, or a lack of work-life balance, among others.

In light of this, the HR department commissioned a data analyst to identify the key reason for turnover and how we can approach this issue.

# Metadata

Variable	Description
ID	Employee ID
Employee_left_company	Mark indicating whether the employee has recently left the company
Age	Employee's age
Travel_Frequency	Frequency of the employee's work-related travels
Distance_from_home	Distance in kilometers from the employee's home to the workplace
Education_Level	Level of education
E-Sat	Satisfaction with the organizational climate
Gender	Employee's gender
Marital_Status	Employee's marital status
Salary	Monthly salary
Companies_Worked_For	Number of companies the employee has worked for

Variable	Description
Overtime	Whether the employee regularly works overtime
Salary_Increase_Perc	Percentage salary increase from 2018 to 2019
Company_Stock_Options	Number of company stock option units the employee owns
Career_Length	Number of years the employee has been in their career
Training_Hours	Number of training hours the employee received last year
Work_Life_Balance	Employee's rating of their work-life balance
Years_at_Company	Number of years the employee has worked at the company
Years_in_Current_Role	Number of years the employee has been in the same role
Years_Since_Last_Promotion	Number of years since the employee's last promotion
Years_with_Same_Manager	Number of years the employee has reported to the same manager
Companies_Worked_For	Number of companies the employee has worked for

# Problem

- ❑ What company policies or factors should change to reduce employee turnover?

To investigate the characteristics that influence whether an employee stays or leaves, HR collected data on 1,470 employees who either left or remained with the company over the past year. The goal of this project is to analyze this data and provide actionable insights to help minimize turnover, particularly in the tech industry.



# Approach



## 01 Business Understanding

In this initial phase, we researched turnover patterns in the tech industry, identified acceptable turnover benchmarks, and analyzed important aspects of this metric.

## 02 Data Exploration

In this phase, the data underwent a sanity check and proved to be robust and ready for analysis. After processing, a unidimensional analysis was conducted to gain a clearer understanding of the data.

## 03 Data analysis

We applied Information Value and Pearson correlation coefficient to assess the strength and significance of the relationship between various factors and turnover.

## 04 Conclusions and Proposed Strategies

At this point, we synthesize the major findings and make practical recommendations to the HR team. These findings will inform strategic activities aimed at lowering turnover and increasing staff retention.

# Tech Industry

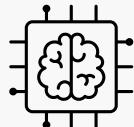


## TURNOVER RATE



Today, tech has the highest employee turnover of any business sector, with a staggering churn rate of 13.2%. Even if companies do manage to attract and onboard a great candidate, chances are they won't stick around for long.

## Big Techs



- Turnover is a concern in all tech companies, regardless of size. While Google is frequently praised for its extensive benefits package and quirky workplaces, the average length of service for Google employees is only 1.1 years. Amazon's tech staff typically stay for one year, whereas Apple has a somewhat better average tenure of 24 months.



## The biggest reasons

- Lack of growth: Two of the most common reasons for employee turnover in technology are a lack of career development opportunities and stagnant compensation. According to a recent study of a niche technological ecosystem, one-third of employees intend to quit their current positions within the next year, with 44% citing a lack of income increases and career stagnation as the primary reasons for leaving.

- Intense competition: Low unemployment, a growing skill shortage, and stagnant salaries have fostered a culture of strong competitiveness among technology businesses. Often, your tech staff are seduced away from your company without actively looking for alternative opportunities. Market conditions have led to aggressive recruitment efforts as organizations compete for the best people.
- Company culture: The value of organizational culture has grown dramatically in recent years. Professionals prefer to work for firms that have a clear mission and a positive culture.



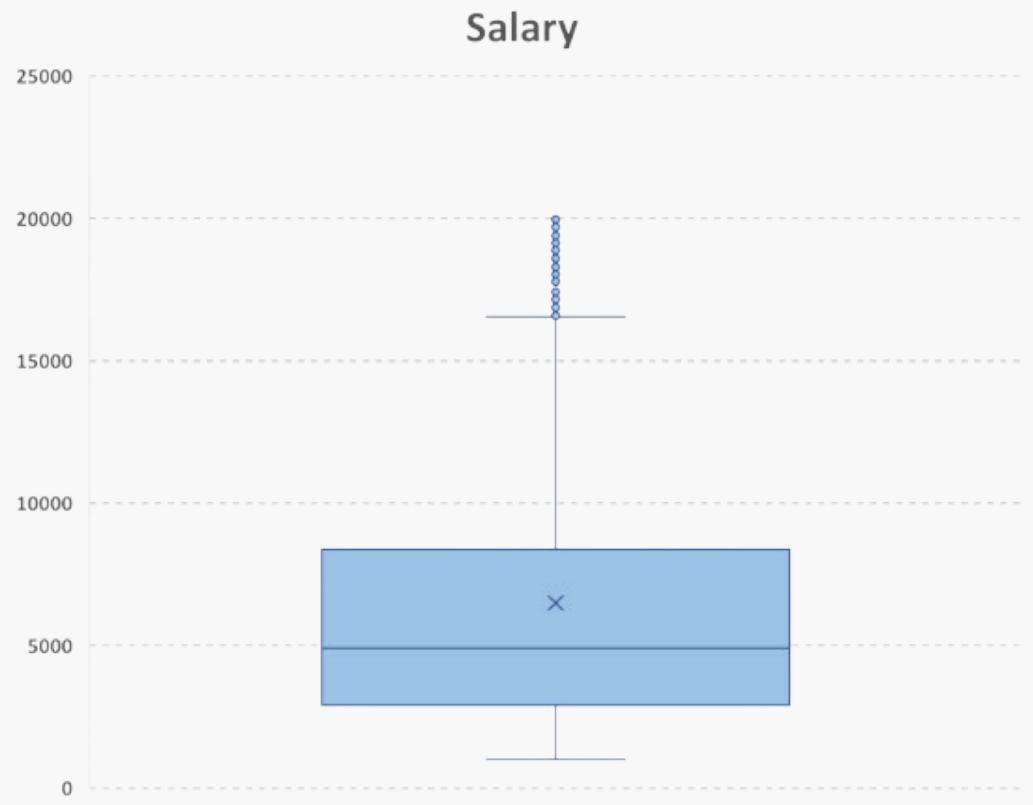
# Data exploration



## Sanity check

We checked for missing values, nulls, inconsistencies, and potential typographical errors. All these checks were conducted using pivot tables and Power Query in Microsoft Excel.

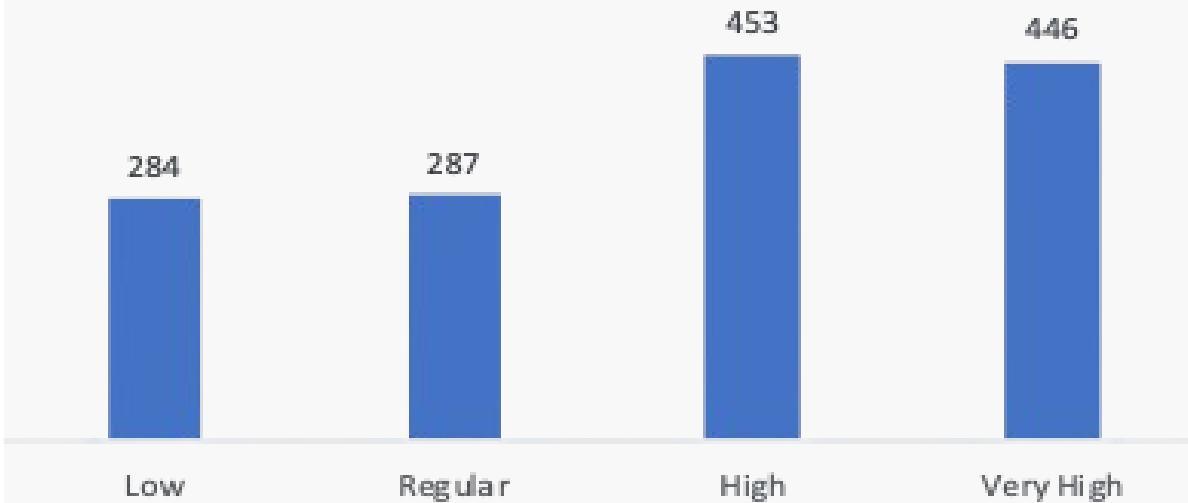
After ensuring data integrity, we began with unidimensional analysis.



As we can see from the salary boxplot, although salary stagnation is one of the main complaints among technology professionals, the average salary in this industry is much higher than in other sectors. Additionally, outliers are not particularly rare, and the salary range reaches considerably high values.

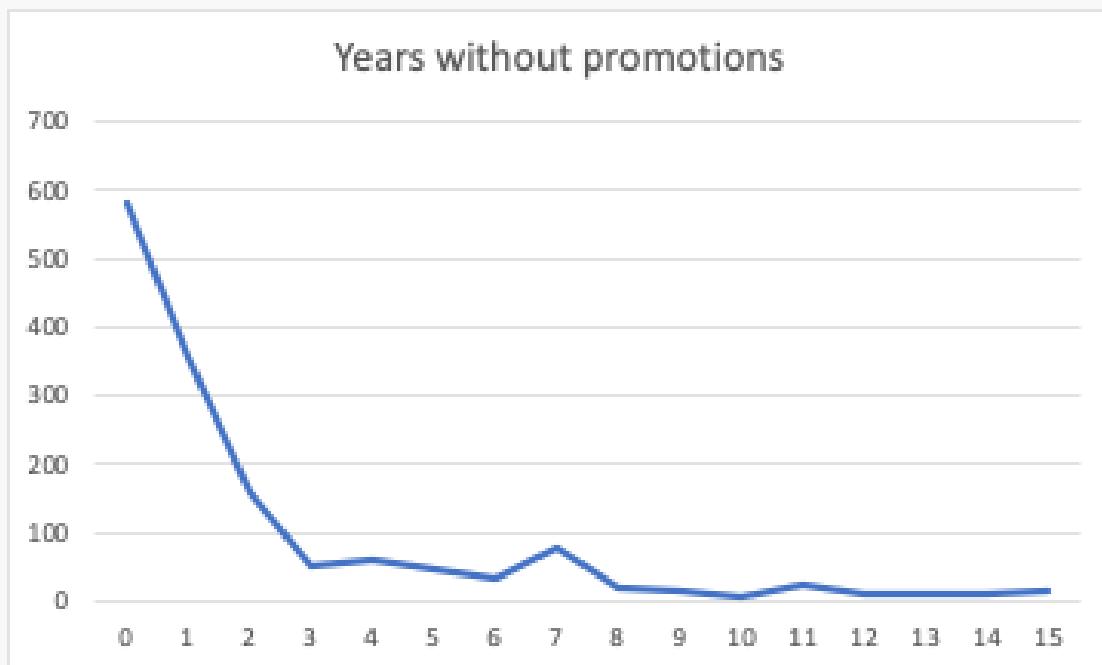
**\$ 3,063**  
Average salary on Canada  
(2018)

## E-Sat



Analyzing the E-Sat (Satisfaction with the organizational climate), we observe that although this is often cited by the industry as a reason for high turnover rates, the majority of employees reported high or very high satisfaction levels. However, the company's turnover rate remains above the industry average.





Much like we observed with E-Sat, the market's rationale of career stagnation has not been evident within our company. As shown in the graph, the vast majority of employees have received promotions over the past two years. One hypothesis we can consider is that promotions alone may not be sufficient. Perhaps these employees seek continuous technical development, not necessarily just advancement in job titles within the company.



Six out of ten  
employees received  
an annual increase  
between 11% and 14%  
in our company



# Data Analysis



## A Brief Introduction

The analysis was conducted in Excel, as the dataset was of a suitable size and structure. We used Pivot Tables, descriptive statistics, and Power Query to establish the necessary relationships for our analysis. For technical metrics, we applied the information value for qualitative variables and Pearson's correlation index for quantitative variables

# Information Value



Information Value (IV) is a measure of how well an independent variable can predict a specific outcome—in this case, employee turnover. It quantifies the predictive power by calculating the separation between groups based on the Weight of Evidence (WOE). WOE measures the distribution of employees who leave versus those who stay, often referred to as 'bad' and 'good' employees, respectively, in a turnover context. A higher IV indicates that a variable more effectively differentiates between employees likely to leave and those likely to stay, making it a useful tool for identifying factors that drive turnover.

IV	Statistical Strength
<= 0.02	Insignificant Predictive Power
0.02 - 0.1	Weak Predictive Power
0.1 - 0.3	Medium Predictive Power
0.3 - 0.5	Strong Predictive Power
>0.5	Suspicious; too good to be true

# Predictive power

WORK OVERTIME  
0.40

Work overtime is the variable with the highest information value, indicating a strong predictive power for turnover. The category of employees working overtime showed a turnover rate of 30.5%, compared to 10.4% among those who do not work overtime. Comparing these values with the overall turnover rate of 16.1% highlights this as the primary factor to address.

MERITAL STATUS  
0.22

Marital status shows moderate predictive power regarding turnover. Analyzing each category individually, turnover among divorced employees is 10.1% and 12.5% for married employees. The only category exceeding the average is single employees, with a turnover rate of 25.5%.

TRAVEL FREQUENCY  
0.12

Travel frequency shows moderate predictive power in relation to turnover. When examining each category, turnover is 8% among those who do not travel, 15% for those who travel rarely, and 24.9% for frequent travelers. Notably, turnover among those who travel frequently is three times higher than among those who do not travel.

E-Sat  
0.10

E-Sat demonstrates moderate predictive power for turnover. Turnover rates by category are as follows: 25.4% for low satisfaction, 15% for regular, 13.7% for high, and 13.5% for very high satisfaction. While most categories do not deviate significantly from the overall average, turnover is notably higher in the low satisfaction group.

Distance from home, education level, and work-life balance exhibited low predictive power, suggesting they are not significant factors for turnover analysis. Gender, meanwhile, showed no predictive power and should be excluded from considerations related to turnover.

Row Labels	Travel frequency							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
Does not travel	12	138	150	5,1%	11,2%	8,0%	0,4523941	0,0486147
Travels rarely	156	887	1043	65,8%	71,9%	15,0%	0,9149887	0,0054333
Travels frequently	69	208	277	29,1%	16,9%	24,9%	1,7258398	0,0668199
Grand Total	237	1233	1470			16,1%		0,12

Row Labels	Distance from home							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
1-5	87	545	632	36,7%	44,2%	13,8%	0,8304959	0,0139156
6-10	57	337	394	24,1%	27,3%	14,5%	0,8799534	0,004196
11-15	25	90	115	10,5%	7,3%	21,7%	1,4451477	0,0119641
16-20	23	102	125	9,7%	8,3%	18,4%	1,1731199	0,0022866
21-25	32	85	117	13,5%	6,9%	27,4%	1,9586001	0,0444233
26-30	13	74	87	5,5%	6,0%	14,9%	0,9139583	0,0004646
Grand Total	237	1233	1470			16,1%		0,08

Row Labels	Education level							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
High School	31	139	170	13,1%	11,3%	18,2%	1,1602768	0,002686
Technical Education	44	238	282	18,6%	19,3%	15,6%	0,9618126	0,000287
University Degree	99	473	572	41,8%	38,4%	17,3%	1,088902	0,0029047
Master	58	340	398	24,5%	27,6%	14,6%	0,8874907	0,003703
Phd	5	43	48	2,1%	3,5%	10,4%	0,6049455	0,0069247
Grand Total	237	1233	1470			16,1%		0,02

Row Labels	E-Sat							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
Low	72	212	284	30,4%	17,2%	25,4%	1,7668975	0,0750575
Regular	43	244	287	18,1%	19,8%	15,0%	0,9168396	0,0014288
High	62	391	453	26,2%	31,7%	13,7%	0,8249539	0,0106815
Very High	60	386	446	25,3%	31,3%	13,5%	0,8086837	0,0127181
Grand Total	237	1233	1470			16,1%		0,10

Row Labels	Gender							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
F	87	501	588	36,7%	40,6%	14,8%	0,9034336	0,0039847
M	150	732	882	63,3%	59,4%	17,0%	1,0660926	0,0025112
Grand Total	237	1233	1470			16,1%		0,01

Row Labels	Marital Status							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
Single	120	350	470	50,6%	28,4%	25,5%	1,7837251	0,1287435
Married	84	589	673	35,4%	47,8%	12,5%	0,741957	0,0367906
Divorced	33	294	327	13,9%	23,8%	10,1%	0,5839576	0,0533636
Grand Total	237	1233	1470			16,1%		0,22

Row Labels	Work overtime							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
No	110	944	1054	46,4%	76,6%	10,4%	0,6062272	0,1508895
Yes	127	289	416	53,6%	23,4%	30,5%	2,2862336	0,2492933
Grand Total	237	1233	1470			16,1%		0,40

Row Labels	Work Life Balance							
	Yes	No	Total	% LEFT	% STAY	Turnover	Odds	IV
Poor	25	55	80	10,5%	4,5%	31,3%	2,3647871	0,0523975
Good	58	286	344	24,5%	23,2%	16,9%	1,0550589	0,0006845
Very good	127	766	893	53,6%	62,1%	14,2%	0,8625607	0,012624
Excellent	27	126	153	11,4%	10,2%	17,6%	1,1148282	0,0012755
Grand Total	237	1233	1470			16,1%		0,07

# Pearson Correlation



Pearson correlation measures the strength and direction of the linear relationship between two variables. In the context of employee turnover, it assesses how changes in independent variables (like age, salary, or career length) relate to turnover rates.

Correlation values range from -1 to 1:

- 1 indicates a perfect positive correlation (both variables increase together).
- -1 indicates a perfect negative correlation (one variable increases while the other decreases).
- Values close to 0 suggest no significant linear relationship.

For example, a negative correlation between salary and turnover indicates that higher salaries may lead to lower turnover rates.

Coefficient Interval	Relationship Level
0.8-1.0	Very Strong
0.6-0.79	Strong
0.4-0.59	Strong Enough
0.2-0.39	Low
0.0-0.19	Very Low

# Correlation Level

Variables	Pearson
Age	-0,16
Career_Length	-0,17
Companies_Worked_For	0,04
Company_Stock_Options	-0,14
Salary	-0,16
Salary_Increase_Perc	-0,01
Training_Hours	-0,06
Years_at_Company	-0,13
Years_in_Current_Role	-0,16
Years_Since_Last_Promotion	-0,03
Years_with_Same_Manager	-0,16

- Among our variables, the strongest negative correlations are observed in Career Length, Age, Salary, Years in Current Role, and Years with Same Manager. This indicates that employees who are more likely to experience turnover tend to be newer in their careers, younger, earn lower salaries, have been in their current positions for a short duration, and have spent less time under the same management.

# Conclusions and Proposed Strategies



Based on the analysis of the variables' connections, I highly propose that the overtime policy and the company's travel policy be re-evaluated immediately. The data show a substantial relationship between these factors and employee turnover, implying that they may contribute to employee discontent and a higher risk of leaving the firm.

Excessive overtime can lead to burnout and lower job satisfaction, therefore it's critical to evaluate how the present policy affects employees' work-life balance. In addition, the travel policy should be reviewed to ensure that it meets the needs and expectations of the employees. Frequent or extended travel can be stressful, especially for people with family responsibilities or who prefer more stable working hours.



In conclusion, I recommend conducting a deeper analysis using more robust models capable of capturing interactions among the quantitative variables. The Pearson correlations did not demonstrate sufficiently strong relationships with turnover, and employing advanced techniques such as decision trees or other machine learning models could provide more accurate insights into the factors driving employee turnover, ultimately guiding more effective retention strategies.