

Factors Influencing Employee Attrition in Manufacturing Firms: A Data Visualization Approach

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KEYWORDS

Employee Attrition, Retention Strategies, Data Visualizations, Data-Driven Decisions.

ABSTRACT

This study focused on determining employee attrition by analyzing HR data points such as employee demographics, motivation, engagement, and satisfaction. The research methodology includes primary and secondary data collection, with a structured non-disguised questionnaire used for primary data collection. The study design is descriptive in nature, with statistical tools and techniques used in this study including percentage analysis, Chi-Square test, Correlation, ANOVA, and Power BI analysis. The findings suggest that a lack of professional development opportunities, misalignment of job responsibilities with employees' skills and abilities, and inadequate support to manage stress at work are key factors contributing to attrition. The study's advanced visualization using Power BI includes a dashboard that can help organizations improve employee engagement and retention by developing efficient retention strategies. The dashboard's topics include employee turnover, retention, causes of attrition, professional development opportunities, job satisfaction, stress levels, work-life balance, and overall satisfaction with employment. This dashboard allows the company to make data-driven decisions to promote a positive workplace culture and increase productivity.

1. INTRODUCTION OF STUDY AND RESEARCH METHODOLOGY

In the dynamic landscape of today's business world, employee attrition, often referred to as turnover, is a pivotal concern for all sizes of enterprises. The departure of employees and its impact on the workforce can be a significant obstacle to an organization's growth and success. High attrition rates not only come with a financial cost in terms of recruitment and training but can also disrupt the rhythm of the workplace. This has led to a growing emphasis on understanding the factors behind attrition and implementing strategies to mitigate its effects.

For HR professionals, the challenge of retaining top talent has never been more pronounced, particularly in a competitive employment market. Recent surveys, such as one conducted by LinkedIn, have consistently highlighted employee retention as a top priority for HR departments across industries. To address this issue effectively, HR departments need to craft and execute retention strategies rooted in a deep understanding of the underlying causes of attrition.

This introduction explores employee attrition's complex and multifaceted nature and its far-reaching consequences. It delves



into the pivotal role that HR professionals play in addressing this challenge, emphasizing the need for a holistic understanding of the factors driving attrition, including poor management, workplace culture, growth opportunities, and job satisfaction. Organizations can create retention plans by identifying the causes of attrition which not only reduce turnover but also foster a workplace culture conducive to employee engagement, productivity, and long-term success. In this context, it is crucial for organizations to identify and tackle the root causes of attrition to retain their valuable talent and ensure sustained growth.

Figure 1: Attrition Reasons



2. REVIEW OF LITERATURE

The focus is on examining past studies on the elements that lead to employee attrition. Understanding the different philosophies put out by the earlier researchers on the subject and recognizing the research gap is made easier by the prior study. These are some reviews that were chosen from a list of well-known authors' works.

Sankararaman G & Ragothaman CB et al (2023), have done research on “A Study on Understanding Employee Attrition-Causes and Consequences in the Workplace”. In order to determine the reasons for workplace turnover, this study looks at the relationships among overall job satisfaction, development opportunities, stress, and work-life balance. 110 employee samples were surveyed for the study, and statistical analytic methods were used to analyze the results. According to the research, stress, a lack of possibilities for professional progress, and work-life balance are the main reasons why employees leave their jobs. The study also found a relationship between workplace stress levels and work-life balance satisfaction, as well as a negative correlation between work-life balance contentment and the frequency of working overtime. However, the study also found a positive correlation between the organization's support for stress management and the degree of satisfaction with work-life balance. These results offer HR professionals guidance on how to lower employee retention rates by enhancing work-life balance, offering growth opportunities, and controlling stress levels.

Dr. L. Kesavan & Mrs. S. Dhivya et al (2022), has done research on “A Study on Causes of Employee Attrition”. It is to pinpoint the reasons behind employee churn and ascertain the variables that affect it. For the present paper, the descriptive research design is appropriate. Also, the population of the research is made up of private-sector employees. There is a cap of 86 samples that can be collected by the researcher using a straightforward random sampling procedure. The tool will be used to assess the survey's quantitative methods. The study discovered that pay has a significant impact on employee attrition. Furthermore, there is no discernible difference in the ANOVA result between the respondents' demographic profile and the reasons for employee attrition. The survey came to the conclusion that companies need to have a plan in place to lower employee attrition and take worker turnover seriously.

Gayatri Negi et al (2013) conducted research on “Employee Attrition: Inevitable Yet Manageable”. The most precious resource for a company is its workforce. They are the ones who give the organization value in both quantity and quality. Maintaining a stable and capable workforce is therefore essential; nevertheless, doing so has grown more difficult for employers over time, which has led to a rise in employee attrition in businesses. The goal of this research study is to investigate attrition from a variety of angles. It investigates how the same affects both employers and employees. In light of this, numerous peculiar causes of attrition have been discussed. It has also been noted how attrition has benefits. The research examines the function of leadership styles in reducing attrition. Additionally, the corrective actions have been covered in this article.

Semu Bacha et al (2016) researched the “Antecedents and Consequences of Employee Attrition: A Review of Literature”. For every type of firm, human resources are the most important resource in the competitive and unstable world of today. Monitoring the number of people leaving a company and the positive and negative effects this element has on the organization is crucial for those employers and organizations. Several scholars have conducted studies on the causes of staff turnover and the costs that firms incur as a result. However, very few or none of them discussed the possible advantages of employee attrition. This term paper analyzes the literature, finds the reasons behind the intention to leave, and discusses the effects of



employee turnover. Two theoretical frameworks are presented in the study to show the elements that contribute to employee turnover intention and its consequences.

Tracy Machele Hayes et al (2015), conducted research on “Demographic Characteristics Predicting Employee Turnover Intentions”. Over 25 million American workers left their jobs with their respective companies of their own volition in 2012. Demographic variables such as age, education, gender, income, and length of service are significant influences on an employee's likelihood of quitting. This study's goal was to ascertain whether the factors—age, gender, education, income, and duration of service were associated with the Texas full-time workers' inclination to quit their jobs. Members of the Survey Monkey Audience who were over 18, employed full-time, resided in Texas, did not work for themselves, and were not restricted to any one industry made up the sample. For this study, an online survey was completed by 187 participants from the Survey Monkey audience as a sample. The proximal similarity model can be used to apply the study's findings to the United States. The human capital hypothesis served as the theoretical basis. Age, income, and turnover intentions were found to be significantly correlated in the multiple regression analysis results; in contrast, the relationships between tenure duration, gender, and education were not statistically significant. Organizational leaders need to create retention measures to hold onto Millennial staff as the Baby Boomer generation gets ready to retire. Pay-for-performance initiatives should be used by organizational leaders to offer incentives and higher compensation to top performers, which will decrease their likelihood of leaving. These findings have social ramifications that could lower work stress levels, promote family well-being, and boost involvement in social and civic activities by lowering turnover.

James JOSEPH, et al (2019), conducted research on “Factors Affecting High Employee Attrition in Manufacturing Firms – A Case Study”. The term "human resource management" refers to the range of practices intended to improve an organization's ability to use its workforce more effectively in order to accomplish its objectives. HR managers need to give several issues facing Indian firms careful consideration. Organizations must ensure that their HR staff is well-supported by upper management. Employee attrition, often known as turnover, is the departure of workers from an organization due to a variety of reasons, including superannuation, job or career changes, relocation, illness, etc. This study determines the variables influencing a manufacturing company in India's high employee attrition rate. It also concentrated on making recommendations for policies to deal with the high attrition rate that exists in the factory. A structured questionnaire is used to gather primary data for quantitative analysis. In this investigation, stratified random sampling is employed. The factors are found and their effects on different levels of management are determined using factor analysis and multiple regression analysis. The study found that the two key elements influencing employee attrition are company culture and employee leave policies. The organization's work environment also turned out to be the second most important component. The results show that in order to lower high employee attrition, the organization's HRM processes need to be greatly improved. The management of the company and other manufacturing-related businesses will be able to solve the issue of high employee attrition with the help of this study.

Mr. Jicin Mathew & Mr. Jirrin Mathew et al (2016), has done research on “Perspectives on addressing high employee attrition in manufacturing firms: A case study”. An economy's core is its industrial sector. The industrial and service sectors account for a sizeable amount of the GDP. The labor force, sometimes called "manpower", is a vital component of any corporation. Any company's ability to function and expand is largely dependent on its workforce. Consequently, human resource departments handle all employee-related tasks in all firms. Although retention and attrition are two distinct phenomena with separate functions, they are fundamentally related in that one creates space for the other. Global marketplaces are growing more competitive over time, which has an impact on workplace culture. The human resource department and managers are facing problems due to a competitive labor market, a growing mismatch between shortages including the need for skilled labor, and a stronger focus on work-life balance. Employee turnover as well as retention rates are often used by businesses to assess employment trends, overall business growth, issues, and motivations. In the setting of the global competitive climate, organizations are known to be devoting a large amount of time, resources, and energy to employee retention because losing a valuable employee can have a negative impact on lost capital, worried coworkers, and knowledge value. This article provides insight into the current state of affairs in Indian manufacturing companies, examining the causes of employee turnover and the tactical measures implemented to guarantee retention. A variety of workplace kinds have been considered, and pertinent aspects have been researched to provide an appropriate analysis.

Tariqul Islam & Shenghuan Yang (2020) conducted a study, "IBM Employee Attrition Analysis" to ascertain the main reasons why employees leave their jobs. To find pertinent features from the IBM Employee Attrition dataset, the study makes use of Random forests and correlation matrices. We create two sets of individuals with the K-means cluster. Regular journeys as well as HR work are linked to higher turnover rates.

Dr. Anjana Devi S, & Rupa Chatterjee Das (2020), "Conceptualizing HR analytics' role in attrition reduction in order to lower attrition rates in the business world" was the subject of research. The study strikes a balance between the advantages and disadvantages of HR analytics, focusing on the effects of attrition on the finances, culture, and reputation of a company. We make use of academic journals, main and secondary data sources, and relationships with human resources managers. Having motivated staff, promoting a positive work environment, and making thoughtful hiring decisions are all crucial for



lowering turnover. The study offers insights into the analytical process and emphasizes the usefulness of HR analytics in forecasting attrition gaps.

Dr. R. Gopinath, & Dr. M. Subhashini (2020), carried out research on "Employee attrition prediction in the industry using machine learning techniques" and proposed a machine learning-based feature selection method as a means of precisely predicting staff turnover. The results show that classification accuracy is increased when a Gradient Boosting Tree classifier is used in conjunction with a Chi-Square feature selection technique. Research underscores the significance of machine learning in forecasting employee loss, even in the face of intricate human resource concerns.

Frye et al (2018) studied "Employee Attrition: What Causes an Employee to Quit?" discovered that the study looks into the moral implications of a model used to forecast staff turnover. Principal Component Analysis and classification approaches were used to discover and evaluate the factors influencing employee turnover using data from multiple sources. Logistic regression was found to be the most accurate method. It examines the impact on the workforce and how challenging it will be to apply the paradigm inside businesses.

Al-Suraihi et al (2021) "Employee Turnover: Causes, Importance, and Retention Strategies" was the topic of study. According to research on employee retention and turnover, a company's work environment, motivation, pay, and rewards, as well as factors like job stress, job satisfaction, job security, and work environment all affect its productivity, sustainability, competitiveness, and profitability. A corporation needs a thorough understanding of the needs of its personnel to put policies into place that increase motivation, job satisfaction, and productivity while lowering employment problems, absenteeism, and turnover.

Xuedi Qin & Yuyu Luo et al (2019) have conducted a survey on the topic of "Making data visualization more efficient and effective". In today's data-driven corporate climate, data visualization is essential and frequently used to support decision-making that is directly tied to the significant profits of many industrial enterprises. However, due to the increasing demand for data processing with regard to the quantity, speed, and accuracy of data, database experts are becoming more and more necessary to help with effective and efficient data visualization. This article examines methods for improving the effectiveness and efficiency of data visualization in response to this need. (1) The way in which users can indicate their needs for creating visuals is outlined in the visualization specifications. (2) Proficient techniques for data visualization entail handling the data in conjunction with a predetermined visualization specification and producing visualizations that are primarily intended to be scalable and efficient at a fast interactive rate. (3) The recommendation for data visualization is to find more intriguing renderings by using a reference visualization as a guide or to finish an incomplete specification automatically.

Krishnan & Vijay et al (2017) conducted studies on "Research Data Analysis with Power BI". The disciplines of analytics, data visualization, and business intelligence have all seen a total change thanks to Power BI. One online application that lets users search through, transform, and visualize data is called Power BI. Once reports and dashboards are created, they can be shared with other users within the same department or company, with other departments, or perhaps in front of others. As of February 2017, Power BI was being used by over 200,000 enterprises across 205 countries. With its sufficient features and capabilities, Power BI is a free choice that is becoming a strong challenger for small and medium-sized businesses to use as a business intelligence platform. One of Power BI's innovative features is the Quick Insights function, which is built on an ever-expanding library of complex analytical algorithms. This tool may be accessed with a single button click after uploading a dataset to Power BI. It then automatically generates numerous reports based on its analysis of the data, negating the need for human interaction. This also aids in minimizing human error in statistical computations and methods, which results in research that cannot be independently verified. A user-friendly and widely adopted platform for research data analysis is Power BI. Excel spreadsheets can even be used as input. This paper aims to demonstrate the ease with which Power BI can be used to transform a dataset of study data into a number of dashboards and analytical reports that are simple to share.

Mohammed Ameer & Simhadri Prem Rahul et al (2020) have conducted studies on the topic of "Power Bi Visualization Tool for Human Resource Analytics." Predictive analytics is one of the key components of human resource (HR) management, a large field of study that includes outcomes from analyses of employee work performance, turnover, and training needs. Human resource management's primary goals are to evaluate workers' work performance, assess how they contribute to the services or business that benefits the organization, and track how long they have been there. Human resource analytics' primary goal is to find highly qualified workers who are driven to maximize the return on investment for the company. To do this, it takes into account a number of variables that contribute to predictive analysis's ability to comprehend each individual. For many firms, employee churn is regarded as a serious issue. It is one of the most important issues to recognize since it impacts planning for the organization, improving work culture harmony, and sustainability. As a result, every organization's human resource department works very hard and pays close attention to finding fundamental improvements. By identifying this need, the project aims to enhance the ability to use real-time data insights to identify staff turnover using Machine learning models such as Random Forest and Logistic Regression are run in the background by POWER BI dashboards.



3. METHODOLOGY

A methodology is a planned approach to gathering information, proof, or data for a study that aims to answer a certain research issue. This descriptive study investigates the reasons behind employee attrition. Primary as well as secondary data were used in this investigation. Primary data was gathered via questionnaires that included five-point ratings for employee demographics and reasons behind employee attrition. The population size of the research is 250, the sample size is 152 (determined using a standard sample size calculator), and the number of respondents is 130. The convenience sampling strategy was used in this study. Books, websites, corporate profiles, and other published sources were the sources of the secondary data. Anova, chi-square, Power BI, percentage analysis, correlation, and other pertinent statistical tools were used to analyze the data and determine the various factors influencing employee attrition.

Objectives

1. To use data visualization to examine the factors impacting employee attrition.
2. To examine different HR data points, including employee demographics, motivation, engagement, and satisfaction.

Hypotheses

1. Ho: There is no association between Employment Status and attrition cause
2. H0: There is no correlation between work-life balance & stress at work.
3. H0: There is no correlation between the firm's support to handle stress & work-life balance.
4. H0: There is no significant difference between age & resigning the job.

4. RESULTS & DISCUSSIONS

In this phase, the elicited data is methodically presented, investigated, explained, and interpreted as the next step in the research process.

TABLE 1: THE RESPONDENTS' DEMOGRAPHIC PROFILE

Respondent's gender	Frequency	Percentage
Men	81	62.3
Women	49	37.7
Total	130	100.0
Respondent's age	Frequency	Percentage
Between 18 & 24	43	33.1
Between 25 & 34	70	53.8
Between 35 & 44	14	10.8
Between 45 & 54	3	2.3
Total	130	100.0
Respondent's employment status	Frequency	Percentage
Full-time	112	86.2
Part-time	18	13.8
Total	130	100.0
Respondent's marital status	Frequency	Percentage
Married	58	44.6



Unmarried	72	55.4
Total	130	100.0

According to Table 1 above, 62.3% of respondents were men and 37.7% of respondents were women. Consequently, it can be assumed that the majority of respondents were men. 33.1% of respondents were between the ages of 18 and 24, while 53.8% of those polled were between the ages of 25 and 34. 2.3% were between 45 and 54 years old, while 10.8% were between 35 and 44 years old. Therefore, it may be concluded that the bulk of the subjects were in the 25–34 age range. 13% of respondents work part-time, whereas 86.2% of respondents are full-time employees. So, in essence, the vast majority of responders were employed full-time. 55.4% of the respondents are unmarried, while 44.6% are married. It follows that the vast majority of respondents did not report their marital status.

TABLE 2: TEST OF ASSOCIATION BETWEEN EMPLOYMENT STATUS AND ATTRITION CAUSE

Chi-square tests			
	Value	Df	Asymp. Sig. (2-Sided)
Pearson chi-square	15.813	4	.003**
Likelihood ratio	19.833	4	.001
Linear-by-linear association	.000	1	.990
N of valid cases	130		

Note: **Statistically Significant at 5 %

With 15.813 chi-square values and a P value of 0.03 at the 5% significance level, above table 2 rejects the null hypothesis by showing a link between the reason for attrition and employment position.

TABLE 3: CORRELATION BETWEEN WORK-LIFE BALANCE AND STRESS AT WORK

		Level of satisfaction towards the present work-life balance	Frequency of stress at work
Level of satisfaction towards the present work-life balance	Pearson correlation	1	-.171
	Sig. (2-tailed)		.052
Frequency of stress at work	Pearson correlation	-.171	1
	Sig. (2-tailed)	.052	
N		130	130

The frequency of work-related stress and the degree of satisfaction with work-life balance have a negative correlation ($r = -0.171$, $p = 0.052$), according to Table 3. Thus, the null hypothesis is acknowledged. This suggests that there is a relationship existed between frequency of work-related stress and level of satisfaction towards work-life balance.

TABLE 4: CORRELATION BETWEEN ORGANIZATIONS' SUPPORT TO MANAGE STRESS AND WORK-LIFE BALANCE

	Level of satisfaction towards the support given by the organization to manage stress at work	Level of satisfaction towards the present work-life balance



Level of satisfaction towards the support given by the organization to manage stress at work	Pearson Correlation	1	.546**
	Sig. (2-tailed)		.000
Level of satisfaction towards the present work-life balance	Pearson Correlation	.546**	1
	Sig. (2-tailed)	.000	
	N	130	130

Note: **Statistically Significant at 5 %

Table 4 shows a substantial positive connection ($r = +0.546$) between the level of satisfaction with work-life balance and the level of satisfaction towards the organization's help in managing stress. Since the null hypothesis is rejected since the significance value is 0.000 which is less than 0.05, the alternative hypothesis has been accepted. This illustrates how employee satisfaction with work-life balance tends to increase in direct proportion to the organization's support for stress management.

TABLE 5: Analysis of variance between Age and Job Resignation

	Sum of squares	Df	Mean square	F	Sig
Between groups	3.440	3	1.147	5.082	0.002
Within groups	28.436	126	0.226		
Total	31.877	129			

Table 5 demonstrates that the generally accepted 0.05 value is greater than the significant value of 0.002. Consequently, the Alternative Hypothesis holds accepted, and it is determined that there is a significant difference existed between Job resignation and Age of the responders. Post hoc tests can not be performed as there are fewer groups in job resignation than the age of the respondents



TABLE 6 – POST HOC TEST FOR MULTIPLE COMPARISONS OF OPINION OF RESPONDENTS TOWARDS THEIR WILLINGNESS TO CHANGE FROM CURRENT ORGANISATION

Results of Tukey HSD Test

(I) How likely are you to change from your current Organisation	(J) How likely are you to change from your current Organisation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Very Likely	Somewhat Likely	.214	.210	.846	-.37	.80
	Neutral	.250	.209	.753	-.33	.83
	Unlikely	.100	.240	.994	-.56	.76
	Very Unlikely	.125	.310	.994	-.73	.98
Somewhat Likely	Very Likely	-.214	.210	.846	-.80	.37
	Neutral	.036	.154	.999	-.39	.46
	Unlikely	-.114	.194	.977	-.65	.42
	Very Unlikely	-.089	.276	.998	-.85	.67
Neutral	Very Likely	-.250	.209	.753	-.83	.33
	Somewhat Likely	-.036	.154	.999	-.46	.39
	Unlikely	-.150	.193	.937	-.68	.38
	Very Unlikely	-.125	.275	.991	-.89	.64
Unlikely	Very Likely	-.100	.240	.994	-.76	.56
	Somewhat Likely	.114	.194	.977	-.42	.65
	Neutral	.150	.193	.937	-.38	.68
	Very Unlikely	.025	.299	1.000	-.80	.85
Very Unlikely	Very Likely	-.125	.310	.994	-.98	.73
	Somewhat Likely	.089	.276	.998	-.67	.85
	Neutral	.125	.275	.991	-.64	.89
	Unlikely	-.025	.299	1.000	-.85	.80

It is observed from the Table 6 that the mean difference between various levels of willingness to change from current organization is not significant at 5% level of significance. Hence, the null hypothesis is accepted.

Data Visualization Approach

By utilizing Power BI's advanced visualization capabilities, the study aims to gain insights into the elements that contribute to employee attrition at a manufacturing company. The Dashboard topics such as employee turnover, retention, causes of attrition, professional development opportunities, job satisfaction, stress levels, work-life balance, and overall satisfaction

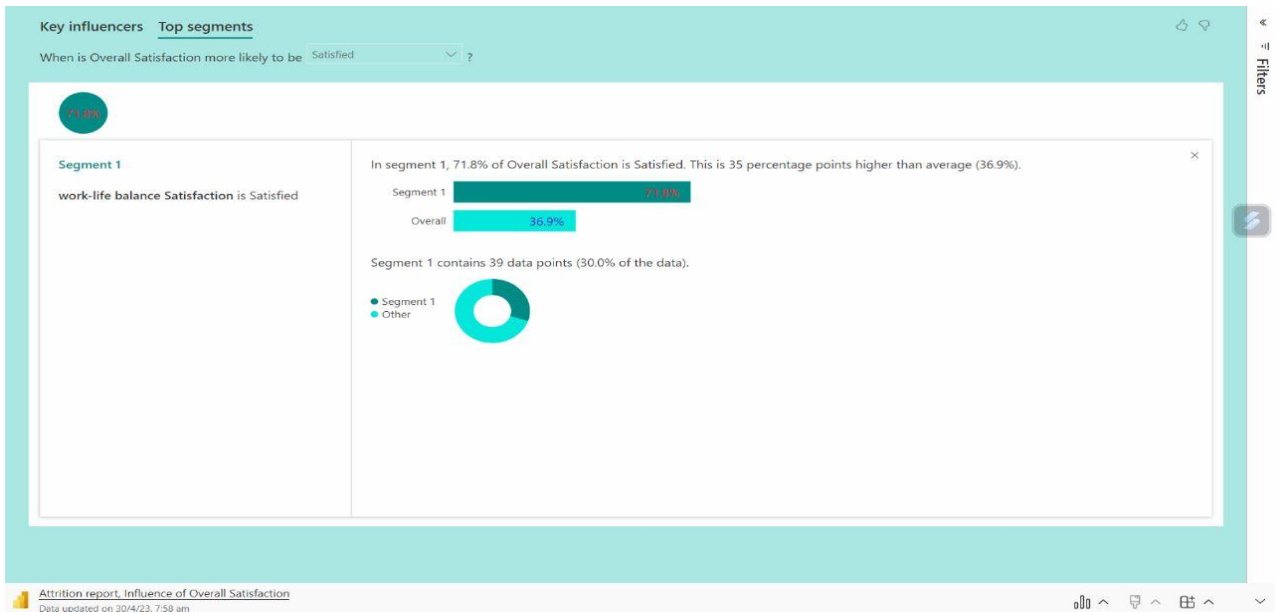


with employment. It also focused on how work-life balance influences overall, employment satisfaction. These visuals can be used to guide retention, talent development, compensation, and workload management strategies. The dashboard can assist companies in creating strategies that will increase employee satisfaction and retention, which will ultimately result in a more productive workforce.

Figure 2: Dashboard For Employee Attrition



Figure 3: Dashboard For Work-Life Balance Influencing Overall Employment Satisfaction



- Given that employee attrition is primarily caused by work-life balance, it is imperative to address this issue. The company should think about adopting work-life policies and providing assistance to workers who are having problems with this area of their lives.
- The firm ought to prioritize offering employees growth prospects since a deficiency of growth possibilities has been recognized as a contributing factor to employee attrition.
- The inverse link between work-life balance satisfaction and workplace stress indicates that there is a need to reduce workplace stress. The company may want to think about putting stress management plans in place and helping



stressed-out staff members.

- Employee satisfaction with work-life balance is positively correlated with the organization's support in managing stress, indicating that helping employees manage their stress can positively affect their overall work-life balance satisfaction.
- To pinpoint certain areas where the company can lower staff churn and raise job satisfaction, more studies could be helpful.

USE OF POWER BI TOOL

The present paper highlights the role of Power BI in solving real-world business challenges, with a focus on employee attrition. It demonstrates that Power BI is not just a visual data tool but a powerful platform that can help organizations improve employee retention, enhance workplace culture, and make informed decisions based on data analysis. This research paper serves as a practical example of how Power BI can be a valuable asset in addressing complex organizational issues.

5. CONCLUSION

The study looked at the key reasons for attrition and discovered that stress, a lack of growth possibilities, and an unsatisfactory work-life balance are the main culprits. Male respondents were employed full-time, unmarried, and most of the sample's participants were among the ages of 25 and 34. The study's findings demonstrated an adverse relationship between work-life harmony and workplace stress levels and a favorable relationship between work-life harmony and satisfaction with the firms support for stress management. There was a significant variation in the respondents' ages and levels of voluntary job departure. HR executives may lower employee turnover rates by managing stress levels, offering growth opportunities, and enhancing work-life balance with the use of the dashboard's insightful data. Businesses can provide their employees with a more encouraging and stimulating work environment by concentrating on these areas

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