



# Examining Human Resources Attrition: An Approach Through Thematic and Sentiment Analysis

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## Abstract:

This article examines the determinants of employee attrition and proposes the application of Artificial Intelligence to forecast forthcoming causes of attrition via sentiment and thematic analysis. The main aim of this research is to investigate the factors that influence employees' choices to depart from a company and to anticipate such behavior in advance through the use of NLP (Natural Language Processing) artificial intelligence. Employee attrition is influenced by a multitude of factors, the relative importance of which differs, as determined by a study conducted at Chakan MIDC, an auto-component manufacturing company located in Pune, India. Organizations must possess the ability to proactively mitigate attrition by identifying the critical factors that carry substantial weight. Conducting research can provide valuable insights into the factors that may influence employees to voluntarily depart from an organization in the future. A comprehensive inquiry was undertaken to identify the principal determinant influencing employee attrition. By adopting an innovative and proactive approach, it is possible to develop novel work policies that are advantageous to the employee and the business organization. It might be construed as an indication of the employees' working environments.

**Keywords:** *Artificial intelligence, employee attrition, prediction model, employee sentiment analysis, thematic analysis, natural language processing*

## 1. Introduction:

Let's discuss attrition, which occurs when employees are forcibly or voluntarily depart the organization. Attrition occurs when an employee vacates their position or makes the decision to retire from the organization [1]. At this time, employee turnover, which is also referred to as attrition, is a predominant concern for all organizations. This is because it impairs workplace productivity and the ability to meet organizational objectives within the specified timeframes. In order to maintain a competitive edge, it is imperative that

organizations place a high value on employee retention and strive to reduce turnover. Machine learning enables organizations to develop an algorithm capable of forecasting potential employee attrition and discerning the fundamental causes that contribute to it. The implementation of predictive measures has the potential to improve the human resources policies of organizations [2]. A comprehensive analysis of employee data spanning various domains—such as age, performance evaluations, training records, career aspirations, promotions, and recruitment—could be one approach to accomplish this goal. This capability empowers organizations to identify and analyze a multitude of factors that contribute to employee turnover.

## 2. Review of Literature

The incorporation of artificial intelligence (AI) into organizational contexts significantly impacts the decision-making processes of businesses in numerous ways. In contemporary times, an increasing focus has been placed on human resources (HR), as organizations acknowledge the critical significance of proficient and competent personnel in fostering expansion and attaining a competitive advantage [3]. As the implementation of artificial intelligence in sales and marketing expands, its influence on business decisions pertaining to employees is progressively expanding. The objective is to ensure that HR management decisions are based on objective data analysis as opposed to subjective considerations. In organizations where a greater proportion of employees perform specialized tasks, employee specialization and work continuity become critical. By employing predictive models and capitalizing on employee data accumulated in previous years, organizations have the ability to seamlessly incorporate artificial intelligence (AI) into their HR operations. By leveraging data and gaining valuable insights, this integration facilitates the resolution of challenges and enhances the efficiency of human resources functions for organizations. Significant resources are allocated by organizations towards the recruitment and training of new personnel in order to ensure that their activities are consistent with their strategic objectives. Regardless of the magnitude of their influence, personnel remain a valuable asset for brands. The company incurs costs, invests time, and allocates resources in addition to the value of the employee's contributions when they depart. These costs include the recruitment, selection, and training of the employee for their respective positions. Attrition occurs when employees voluntarily resign or abandon their positions within an organization [1]. A multitude of elements contribute to employee attrition, encompassing inadequate remuneration, managerial maltreatment, extended work hours, restricted progression prospects, religious and regional prejudices, inadequate assistance for senior staff, inequitable compensation for equivalent positions, inconsistent salary frameworks, performance evaluation biases, and job insecurity. Rural regions are characterized by a substantial labor. Concerns that require attention include inadequate safety measures for women, substandard sanitation conditions, inconsistent salary increments, failure to provide skill development training, and limited prospects for career progression. It is essential for an entrepreneur to address the elements that contribute to sluggish career advancement. The aforementioned elements encompass manipulated feedback, a grievance mechanism that is deficient, employee welfare that is

inadequate, holiday and Sunday work that does not provide compensatory time off, leave policies that are insufficient, leave refusals, an improper system, a negative work culture, and harassment in the workplace. Gender-based promotion inequities, unethical conduct from superiors, an absence of strategic planning and a distinct corporate vision, and a deficient performance evaluation system. Human resource employee attrition results in a number of expenses, including the loss of knowledge, a decline in employee morale, and an effect on the ethos of the organization [4]. Employee attrition can erode the competitive advantage of an organization, which can become a significant issue. Satisfied, motivated, and devoted employees are critical to the success of any organization, as they positively impact the company's productivity [5]. HR management can benefit significantly from classification algorithms, which facilitate the incorporation of staff management support technologies throughout the organization. Effective personnel management skills are strongly correlated with employee turnover. According to research, mistreatment of employees by managers can result in increased employee turnover and decreased job satisfaction [6]. Establishing a proficient and knowledgeable workforce can be an exceedingly challenging undertaking for any organization; however, the task of locating appropriate replacements for such personnel becomes even more formidable. Failure by the newly recruited employee to establish and sustain a robust rapport with the client may result in a detrimental impact on the company's revenue subsequent to the departure of the experienced staff member [7]. Turnover, or employee attrition, can impose significant financial burdens on organizations and ultimately impede operational efficiency. Organizations make annual efforts to introduce novel strategies aimed at reducing employee attrition and retention, both of which can be detrimental to business expansion. These approaches consist of expanding training opportunities, instituting more comprehensive training programs, and providing retention bonuses in addition to offering stock options that mature after a specified period. By identifying the primary cause of attrition, therefore, organizations can formulate retention strategies that are more targeted [9]. Organizations may encounter significant difficulties in managing employee attrition, especially when they lose critical, technical, and highly skilled personnel who opt to pursue greater opportunities elsewhere. Through the examination of data pertaining to both present and past personnel, organizations can acquire significant knowledge regarding the primary elements that contribute to employee attrition. This information can assist them in forecasting attrition and capitalizing on the benefits of artificial intelligence and machine learning methods [10]. The enterprise environment has undergone a swift transformation as a result of the extraordinary progress made in artificial intelligence. The incorporation of AI into human resources can significantly enhance employee-related decision-making. AI technology provides worthwhile insights [11] through the analysis, prediction, and diagnosis of challenges encountered by organizations. Comprehending the intricacies of human discourse can present a formidable challenge. In order to fully comprehend human discourse, a technological system must possess an extensive comprehension of informal language elements, meaning, grammar, context, and meaning within a particular language. NLP algorithms provide computers with significant support by emulating the way in which humans interpret unstructured text data [12]. Language is a pivotal factor in numerous facets of the business world. We possess an extensive assortment of disorganized data, encompassing PDFs, business documents, emails, videos, and various other formats. A

considerable proportion of organizational data, estimated to be between 80% and 90%, is unstructured. This information is extraordinarily valuable and may provide businesses with invaluable insights. Notwithstanding this, NLP is critical to its release [13].

### 3. Research Methodology

#### 3.1 Algorithm Utilized

In the field of Natural Language Processing (NLP), numerous algorithms have been implemented, including Tokenization, Keyword Extraction, Topic Modeling, Word Cloud, and Sentiment Analysis. The investigation is conducted through the subsequent phases:

Stage I: Data Collection: Confidentiality concerns posed obstacles to the collection of internal corporate data on employee attrition for this study. To circumvent this, a dataset comprising 109 employees from an auto-component manufacturing company situated in Pune MIDC, India, was utilized.

Stage 2: the information gathered in the initial stage was imported into the Orange application software. During this phase, the data was converted to lowercase and all URLs and annotations were removed.

Tokenization: Data is decomposed into regular expressions during the tokenization process, enabling the extraction of individual words.

Normalization was performed on the data set using Wordnet Lemmatization in order to extract text and contextual meaning from the document.

The purpose of filtering is to eliminate those annoying stop words that clog the English language. During this phase, one will meticulously select vocabulary and eliminate superfluous components that fail to contribute to the intended message. The purpose of a stop word is to eliminate conjunctions (e.g., in, and, or).

Stage 3 order to facilitate subsequent analysis, we will implement Topic Modeling in this Stage 3 utilizing the Latent Dirichlet Allocation Process (illustrated in Figure 1).

Stage 4: Thematic Analysis: An effective approach for comprehending the significance of data, thematic analysis is a valuable stage. It entails the organization of data into topics, which are subsequently subdivided into themes. This approach facilitates the process of data analysis and interpretation.

Stage 5, Sentiment Analysis is conducted using the Liu Hu method in order to forecast the sentiment of every document in the corpus. We executed the Liu Hu model today.

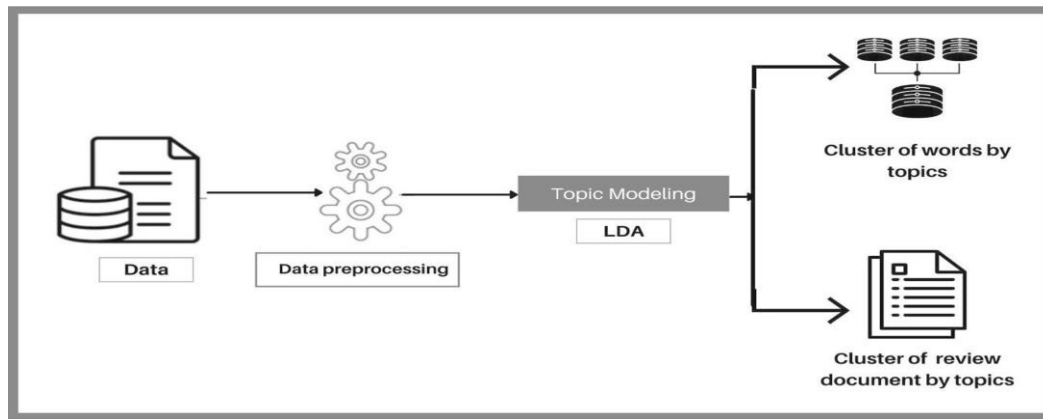


Figure. 1. Process of Topic Modelling

## 4. Analysis and interpretation of results

### 4.1 Topic Modelling

A comprehensive set of 109 employee evaluations was gathered from an automotive component manufacturing company located in Chakan, Pune, MIDC. In order to process the reviews, the text was lowercase converted, the data was tokenized, and stop words such as 'the', 'an', 'a', and numerals were filtered out. The data encompassed solely pertinent terms. The evaluations underwent topic modeling. In order to establish topics, the Latent Dirichlet Allocation method was utilized to model them. A wordcloud was generated for the purpose of visually depicting the most critical terms. Furthermore, individual keywords were extracted. The subject matter was subjected to sentiment analysis utilizing the VADER method, which divides statements into positive, negative, or neutral categories.

#### Wordcloud representation

Through the application of pre-processing and topic modeling techniques, in addition to an examination of the extracted reviews, we successfully discerned the company's most vital keywords. This facilitated the acquisition of knowledge regarding the precise domains of their work that require enhancement in order to optimize the employee experience. A word cloud is a graphical depiction of words arranged in a cloud-like configuration, wherein the weight of each word is determined in accordance with Table 1. The procedure arranges words in a descending order of significance according to their frequency of occurrence. At the center of the cloud, the most significant words are depicted in a larger font size and highlighted in bold. Conversely, as the significance of the words diminishes, so does the font size (Table 2).

**Table 1.** Table of Word Frequencies/Weights of Words

Weight	Word	Weight	Word
18	Poor	3	leaves
12	Career	3	better
7	Work	3	life
6	Working	3	work life
6	lack	3	managers
6	management	3	retirement
6	benefits	3	career growth
5	Job	3	development
4	employees	3	training development
4	opportunities	2	change
4	training	2	long
3	growth	2	hours
3	bad		
3	pay		
3	Conditions		

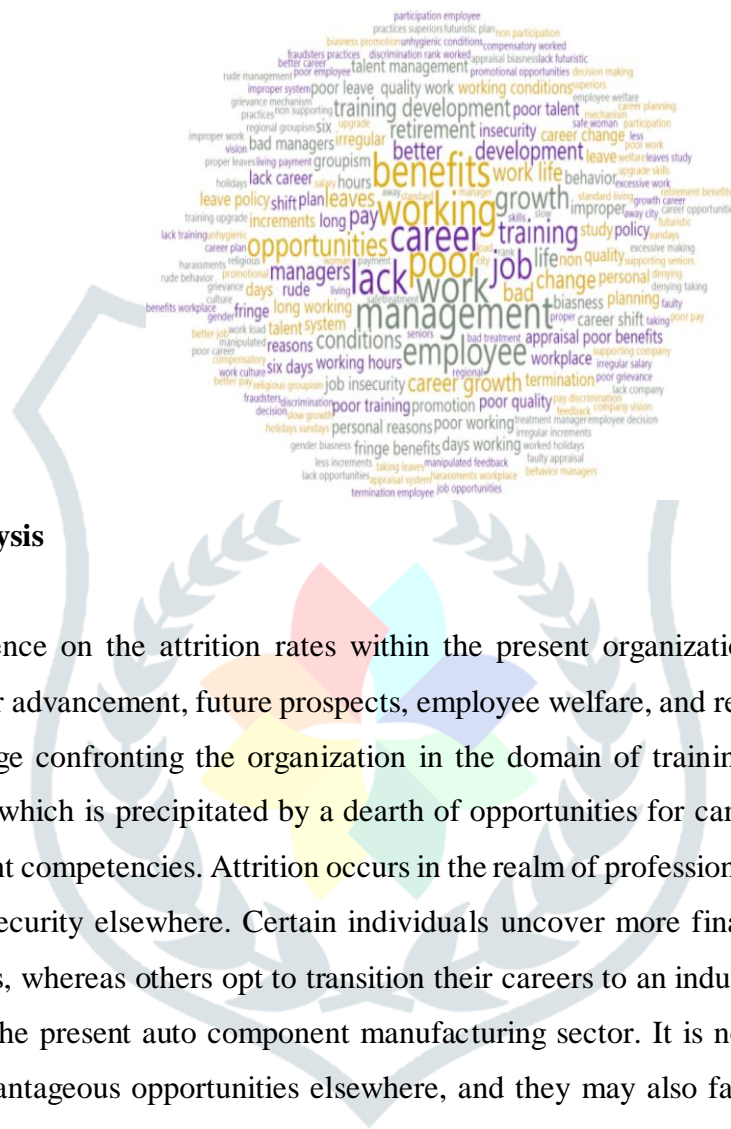
**Table 2.** Analysis of Sentiments

Sentiments	No. of employees	Percentage
Anger	11	10%
Disgust	0	0%
Fear	13	12%
Joy	49	45%
Sad	25	23%
Surprise	11	10%

Based on the data presented in the word frequency table, it is evident that specific words bear greater significance, indicating their pivotal role in instigating attrition. The negative facets of the workplace are denoted by terms such as "childhood," "management," "career," and "working." The statement posits that high employee attrition rates can be attributed to various factors, including an inadequate work environment and culture, ineffective management strategies, restricted career advancement opportunities, inadequate benefits and compensation, dearth of training and development prospects, ineffective leave policies, and an unsatisfactory work-life balance. The company ought to assign greater significance to these phrases, given

that they are the primary determinants of attrition. The organization demonstrates a strong ability to anticipate employee attrition and proactively responds to it through the modification of its human resources strategies (refer to Figure 2).

Figure 2. Word Cloud



#### 4.2 Thematic Analysis

A significant influence on the attrition rates within the present organization is found to be training and development, career advancement, future prospects, employee welfare, and relations, as revealed by thematic analysis. A challenge confronting the organization in the domain of training and development pertains to employee attrition, which is precipitated by a dearth of opportunities for career progression and inadequate instruction in nascent competencies. Attrition occurs in the realm of professional development when personnel seek employment security elsewhere. Certain individuals uncover more financially rewarding prospects in alternative locations, whereas others opt to transition their careers to an industry that offers more auspicious opportunities than the present auto component manufacturing sector. It is not uncommon for employees to leave for more advantageous opportunities elsewhere, and they may also face difficulties concerning team dynamics within the organization. The welfare and relations of employees have a significant impact on attrition rates. Detrimental elements that can impair employee retention include insufficient benefits, unprofessional conduct by managers, and excessive work schedules. The policy pertaining to employee absence is inadequate. By integrating this thematic analysis into our artificial intelligence algorithm, we can effectively forecast the determinants and motivations underlying attrition. By embracing a proactive stance, we can fortify our strategies and execute countermeasures to reduce attrition. This examination can function as a guide for organizations to address and reduce attrition rates (see Figure 3).

<b>Training &amp; Development</b>	<b>Career Growth</b>	<b>Future Prospects</b>
Career Poor		Better opportunities lack of job
Growth	Job Change	groupism
Training	Job Security	opportunities
Development	Promotion	
	Career change	
<b>Employee Welfare &amp; Relation</b>		
Managers	Employee benefits	
Poor Leave Policy	Talent	
Manager employee relation	Working hours	

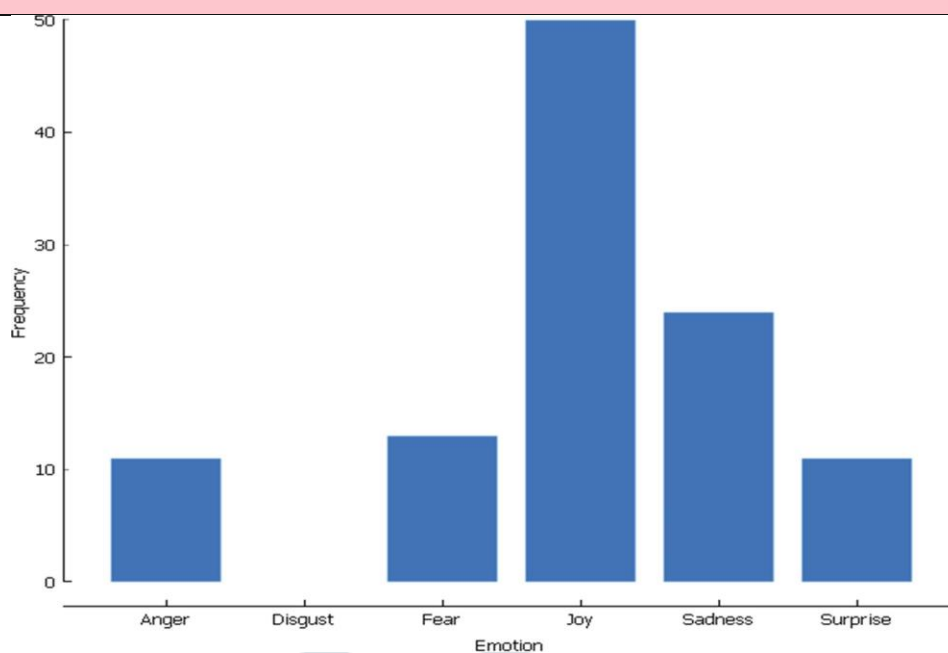


Figure 4. Analysis of Sentiments

### 4.3 Analysis of Sentiments

Through the implementation of a process bar chart, sentiment analysis is executed in order to extract significant insights from the 109 employees' collective feedback pertaining to the organization. These evaluations are essential in order to comprehend the elements that contribute to their decline. Upon conducting a meticulous examination, it has been determined that 10% of the workforce has expressed dissatisfaction with the present working conditions within the organization. Positive experiences and overall contentment have been conveyed by every employee at the present organization. A considerable proportion of personnel have expressed concerns about the prospective trajectory of this establishment. According to the data, a considerable proportion of personnel, precisely 45%, expressed satisfaction with their employment at this



organization. A significant proportion of this organization's personnel are dissatisfied with their jobs. A significant 10% of employees were taken aback by the working environment at their previous organizations, as shown in Figure 4.

## 5. Conclusion

There are several concepts that have the potential to augment the dynamics of the organization. Placing resources towards manager training programs that foster a culture of mutual respect and promote constructive engagements with staff members would yield substantial returns for the organization. Organizations possess the capacity to enhance employee job satisfaction through the following strategies: fostering a positive work environment; mitigating work overload; promoting work-life balance; establishing equitable performance evaluation standards; furnishing competitive remuneration; presenting avenues for professional development; engaging personnel in decision-making processes; instituting comprehensive paid leave policies; and granting personal time off. The adoption of these tactics may foster an engaged and fruitful labor force, thereby promoting long-term employee loyalty to the organization. Our proficiency enables us to develop an AI algorithm capable of efficiently analyzing data and generating precise predictions pertaining to attrition. We are also capable of providing counsel regarding the critical measures that an organization ought to contemplate in order to prevent subsequent attrition of personnel.

