

CORPORATE EMPLOYEE ATTRITION ANALYTICS

ABSTRACT

Employee turnover (attrition) is a major cost to an organization, and predicting turnover is at the forefront of needs of Human Resources (HR) in many organizations. Organizations face huge costs resulting from employee turnover. Some costs are tangible such as training expenses and the time it takes from when an employee starts to when they become a productive member. However, the most important costs are intangible. Consider what's lost when a productive employee quits: new product ideas, great project management, or customer relationships.

Our Project discusses on the analysis of factors affecting employee attrition and predicting it beforehand so as to take the necessary measures to retain a skilled and valuable employee. It gives a detailed account of the factors affecting an employee's decision to leave the company, predicted probabilities of their leaving the company the variation of a factor's influence on them.

Keywords — data analytics, employee attrition, jupyter notebooks, python programming.

INTRODUCTION

Employee attrition is defined as the natural process by which employees leave the workforce – for example, through resignation for personal reasons or retirement – and are not immediately replaced. Attrition is an inevitable part of any business. There will come a time when an employee wants to leave your company – for either personal or professional reasons. But when attrition crosses a particular threshold, it becomes a cause for concern. For example, attrition among minority employee groups could be hurting diversity at your organization. Or, attrition among senior leaders can lead to a significant gap in organizational leadership. In order for an organization to continually have a higher competitive advantage over its competition, it should make it a duty to minimize employee attrition. Therefore, for the better development of corporation, it is essential for the leader of companies to know the main reasons why their employees choose to leave the company, then take relevant measures to improve their company's productivity, overall workflow and business performance.

In today's competitive economy and its growing technological specialization, acquisition, study and analysis of data are giving rise to new knowledge, referred to as "knowledge economy". Information technologies are not only a source of data but are, above all, an enabling factor for data analysis, making it possible to process large data collections and allow information to be extracted from them. Data has become a strategic asset for most organizations across multiple sectors, including those linked to business processes. All types of organizations benefit from the adoption of new technologies and collection, management and analysis of data bring numerous benefits in terms of efficiency and competitive advantage. In fact, analyzing large amounts of data can lead to improvements in decision-making processes, the

achievement of prestablihed corporate objectives and better business competitiveness.

Within organizations there are several areas in which the adoption of artificial intelligence impacts on a company's decision-making activities. In recent years, increasing attention has been focused on human resources (HR), since the quality and skills of employees constitute a growth factor and a real competitive advantage for companies. In fact, after becoming more adopted in sales and marketing areas, artificial intelligence is now also starting to guide company decisions regarding their employees, with the aim of basing HR management decisions on the analysis of objective data rather than subjective considerations.

In general, companies try to maximize their profits. In companies where workers perform simple tasks, they can resort to on-call, occasional and temporary work (as in the gig economy), because they have fewer contractual obligations. However, for companies in which workers perform more specialized tasks, the specialization and continuity of work of the employee becomes essential.

The importance of skills, knowledge and continuous learning ability has proven to be fundamental for businesses. The application of artificial intelligence in the field of HR allows companies to transform data into knowledge by implementing predictive models: such models allow predictions on employees using data collected by the company over the previous years, thus reducing critical issues and optimizing all HR activities.

Companies invest a lot of time and resources in employee recruiting and training, according to their strategic needs. Therefore, the employees (to a greater or lesser extent) represent a real investment for organizations. When an employee leaves the company, the organization is not only losing a valuable employee, but also the resources, specifically money and HR staff effort, that were invested recruiting and selecting those employees and training them for their related tasks. Consequently, the organization must continuously invest in recruiting, training and developing new staff to fill vacant job positions. Training a new employee is a long and costly process and it is of full interest of the company to control and decrease the employee attrition rate: attrition is

defined as an employee resigning or retiring from a company. Moreover, satisfied, highly motivated and loyal employees form the core of a company and also have an impact on the productivity of an organization. In the literature, some authors suggest retaining only happy and motivated employees as they tend to be more creative, productive and perform better, which in the end generates and sustains improved firm performance. As job dissatisfaction is shown in the economic literature as a good predictor of turnover intention job satisfaction data are powerful predictors of both separations and resignations, even controlling for wages, hours and standard demographic and job variables.

DATA AND METHODOLOGY

Employee attrition is the internal data of the company, which is difficult to obtain, and some data has a certain degree of confidentiality, therefore our paper used the data set disclosed by kaggle. The sample size of the data set is 1471, there are 34 feature variables, mainly divided into three types of variables: personal basic information, work experience, attendance rate. This paper explored the relationship between employee's characteristics and employee attrition, found Whether characteristics have a great influence on employee attrition. In addition, we used machine learning algorithms to select important features that influenced the employee attrition, and predicted the it. In this paper, we exploited three machine learning algorithms: Decision Tree, and Logistic Regression and k-means clustering.

Tackle the objective with business domain knowledge, data analysis and machine learning.

4 data analysis approaches are covered throughout this project:

Descriptive Analysis: Based on the data available, what relationship we can draw and what patterns we can find.

Diagnostic Analysis : Among all employees who stay or leave, what kind of traits they share in common.

Predictive Analysis : Building predictive models to anticipate which employee will likely to leave the company and the probability of attrition.

Prescriptive Analysis : Based on the predictions, what recommendations we can come up with to help businesses.

RELATED WORKS

Many researchers have proved the usefulness of human resource management (HRM) in working scenarios, production and management, and in identifying relationships with productivity. In fact, the results confirm that the impact of HRM on productivity has positive effects on a business's capital growth and intensity. Most studies focus on analyzing and monitoring customers and their behavior, and do not address the main assets of a company, as represented by its employees. Many studies analyzed employee attrition. An existing research showed that employee demographics and job-related attributes are the factors that most affect employee attrition, such as the salary and the duration of the employment relationship. Another research evaluated the impacts of demographic attributes and employee absenteeism on attrition. Authors in focused only on work-specific factors. Authors in compared a Naïve Bayes classifier and the decision tree algorithm J48 in predicting the likelihood of an employee departing from the company. In particular, two methodologies were evaluated for each algorithm: tenfold cross-validation and percentage split 70. The results showed an accuracy of 82.4% and an incorrect classification of 17.6% with J48 using tenfold cross-validation, while there was an accuracy of 82.7% and an incorrect

classification of 17.3% using percentage split 70. In contrast, the Naïve Bayes classifier obtained an accuracy of 78.8% and an incorrect classification of 21.2% using tenfold cross-validation, while an accuracy of 81% and an incorrect classification of 19% was obtained using percentage split 70. Authors in explored the application of Logistic Regression when predicting employee turnover and obtained an accuracy of 85% and a false negative rate of 14%.

LITERATURE REVIEW

Literature review has also shown how various researchers have identified a plethora of reasons behind the escalating problem of attrition and how many of them have even suggested recommendations to combat it (Ramani and Raghunandan, 2008; Misra, 2007; Prakash and Chowdhary, 2004). Many researchers have also worked on various domains like the HRM systems and practices (Budhwar et al. 2006), job satisfaction (Sharma, 2006; E-sat survey 2005), organization factors for turnover (Porter and Steers, 1973) and burnout prevention. However, no systematic and comprehensive work has been found that collaborate all the facets to combat the most smouldering problem of the present times.

On the voyage thorough these literature and in an effort to understand the various factor influencing the theses issues, some important observations have been noted. This paper attempts to present analysis and comprehend the knowledge available on the factors of attrition and retention. The acquisition, development and retention of talent form the basis for developing competitive advantage in many industries and countries (Pfeffer, 1994, 2005).

CONCEPT OF ORGANIZATION COMMITMENT AND TURNOVER INTENTIONS

In the words of Pfeffer (1994), having good HRM is likely to generate much loyalty, commitment or willingness to expend extra effort for the organization's objectives.

Moreover, Stone (1998) comments that HRM is either part of the problem or part of the solution in gaining the productive contribution of people.

March and Simon (1958), in their classic book —Organizations, introduced a general theory of organizational equilibrium, which highlighted the importance of balancing employee and organization contributions and stimuli. According to them two aspects that regulate an employee's stability are perceived attractiveness and perceived ease of leaving the organization; today these concepts are normally categorized as job satisfaction and perceived alternatives.

Price and Mueller (1981, 1986) developed a comprehensive structural model based on Price's work in 1977, which acknowledged the antecedents of job satisfaction and intent to leave and added organizational commitment as a mediator between these two variables. They advocated that satisfaction indirectly influences turnover in that it influences commitment and hence turnover intentions. Linkages between commitment and labour turnover and absenteeism have been established (Mobley 1982; Mowday et al 1979; Steers 1977). Lum et al (1998) figured that many studies have reported a significant association between organizational commitment and turnover intentions). In his study of paediatric nurses, it was supported that organizational commitment has the strongest and most direct impact on the intention to quit whereas job satisfaction has only an indirect influence. Griffeth et al (2000) analysis showed that organizational commitment was a better predictor of turnover than overall job satisfaction. But Tang et al (2000) comprehended through his study that there is link between commitment and actual turnover. Some researchers have established a relationship between satisfaction, organizational commitment and

turnover (Mueller & Price, 1990). In addition, Guimaraes and Igbaria (1992) found that organizational commitment is an intervening variable of intentions of turnover and job satisfaction.

ORGANIZATIONAL FACTORS

Organizational Policies

The researcher studying the various factors affecting organization commitment and turnover intention have found that the organizational factors play a vital role in an employee's decision to stay or leave. These include a wide array, which may be classified as organizational policies, organizational support and organizational culture.

Organizational Justice

The organizations should be careful about their internal variables like organizational justice, transparency, quality of work life, restructuring and/or downsizing policies. Evidence from massive studies is that turnover rates are negatively related to financial performance (e.g. Glebbeek & Bax, 2004; Kacmar et al., 2006; McElroy et al., 2001; Shaw et al., 2005). The results of the study conducted by Trevor et al (2009) support the general logic of the Unfolding model of turnover (Lee et al., 1996), in which shocks such as downsizing are argued to prompt employees to engage in this comparison. One of many reasons that cause an individual turnover intention is closely related to organizational justice, which denotes the fairness and evaluation of treatment received by an individual in the organization (Cropanzano & Greenberg, 1997). Considerable amount of studies has been done to study the dimensionality of organizational justice. It has been concluded that employees differentiate between three forms of justice (Niehoff et. al., 1993) (1) distributive justice (how fair are the outcomes that the employee receives); procedural justice (how fair are the procedures used

to determine those outcome distribution decisions) and international justice (how fair are the communications or interpersonal treatment that supplements an organization's formal procedures). These dimensions of organizational justice have an influence on employees' work attitudes & behaviours and act as predictors of turnover intentions.

Organizational Support

Studies consider either the immediate supervisor (Kidd et. al., 2001; Rafferty et. al., 2004; Eisenberger et. al., 2003) or the co-workers (e.g., Mueller, Finley, Iverson, & Price, 1999; Wallace, 1995) support as an important variable for organization commitment of an employee. In a recent studies conducted by Lobburi (2012) of social support and turnover intention, the results suggested that in a collectivist cultural context, not only does workplace social support (supervisor and co-worker support) influence the satisfaction, commitment, and turnover intention of workers but also non-workplace social support (family and friends support). It has been concluded that the supervisors may contribute more than co-workers to the strengthening of employees' emotional attachment toward their employing organization Rousseau et al (2010).

Organization Culture

Bergman (2006) argues that organizational cultures, which emphasize strong norms for obligation, are likely to create high normative commitment. Similarly, Bergman argues that organizational cultures, which have strong norms for internalization and identification, are likely to generate high levels of affective commitment. Culture is theorized as having three dimensions as innovative, supportive and bureaucratic. It is emphasized that the supportive culture has been proved to show highest correlations with commitment Crawford (1999), Lok and Crawford (2001).

HR Factors

Numerous studies, including empirical and available which have proved that the HR practices are the most influencing when it comes to individuals decision to stay or leave the organization. The kind of compensation policies, faulty recruitments, absence of faulty performance management systems, suitable reward & recognition and lack of appropriate training and career development an opportunity lead to dissatisfaction of and employee, his commitment to the organization and influence his decision of leaving or staying with an organization (Kundu Subhash 2007, Janet Chew 2008, Govaert Natalie 2011, Jins Joy 2012). Mahal (2012) proved that there is a positive correlation between HR and organizational practices and a significant positive relation was found in employee retention and organizational and HR practices.

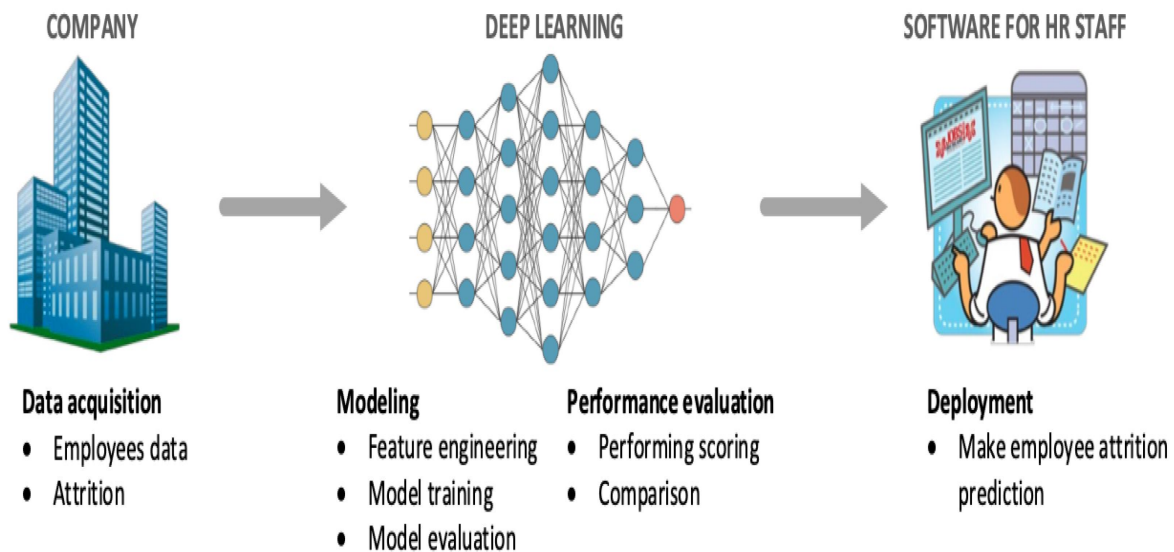
Other Factors

The research in past have also has thrown lights on the other factors, which are play, a vital role in an employee's decision to stay/ leave an organization. A short idea about the influences also to understand the whole phenomena of attrition and retention strategies may accordingly designed important have.

Many variables like age, tenure, gender, organization size, employer banding and environmental factors like availability of suitable opportunities and individual preference for a particular kind of job, location, one's personality etc. have been studied and they have been found as playing an important role in the increasing or decreasing attrition trend. Mathieu and Zajac (1990) found that age was significantly more related to affective commitment than to continuance (calculative) commitment. Tenure was excluded from this study because studies by Meyer and Allen (1997) supported that employees' age might be the link between tenure and affective commitment. In a study conducted by Marcie Pitt et. at (2009) found that the following factors

related to employees' characteristics explain higher levels of employee commitment: gender (being female), household income (having lower household income, however this effect was found to be very weak 29), elder care status (having no elder care responsibilities), physical health (being in better physical health), mental health (being in better mental health), core self-evaluation (having a more positive sense of self), and age (being older).

Taplin (2003) found that the other significant reason referred to industry image with staff leaving because of fears relating to the long-term future of clothing manufacture in the UK. In this study, turnover rates were highest among the most skilled workers. Lobburi (2012) found that unlike past studies of social support and turnover intention, the results of his study suggested that in a collectivist cultural context, not only does workplace social support (supervisor and co-worker support) influence the satisfaction, commitment, and turnover intention of workers but also non-workplace social support (family and friends support).



CONCLUSION

Since the beginning of 1980s, a huge literature has been developed calling for a strategic role for human resources (Guest, 1987; Lado and Wilson, 1994; Entekin and Court, 2001). The increasing interest in HR is due to the assumption that employees and the way they are managed is critical to the accomplishment of organizational goals and can be a source of that provide an sustainable competitive edge to the organization (Itami, 1991; Lado and Wilson, 1994; Wright et al., 1994; Kamoche, 1996; Mueller, 1996; Barney and Wright, 1998). Although HRM is currently considered to be crucial, researchers and professionals agree that its significance will grow further in the future (Sparrow et al., 1994; Becker and Gerhart, 1996; Ulrich, 1997). One of the significant strategic roles of HR will be control the attrition and reduce the negative effects of attrition by identifying the relevant factors and drawing upon effective retention strategies to uphold high performing talent pool of its organization.

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