

Machine learning based strategies for managing employee retention: determining factors in hospitality industry

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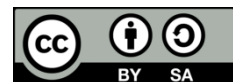
Work life balance

Working environment

ABSTRACT

In order to boost performance and remain competitive, the Indian hospitality industry must recruit and retain employees if it wants to succeed in the long run. In order to do this, it will need to use a number of staff retention initiatives. It is suggested that effective employee retention tactics be analyzed using machine learning (ML) approaches for prediction. The results show that the hotel industry uses tactics to keep its employees, such as competitive compensation and benefits, opportunities for growth and recognition, safe and healthy workplaces, adaptable schedules, employment stability, and ongoing education and development. There is a noticeable disparity between the hotel industry's demographics and retention tactics. In the hotel industry, there is a modestly negative correlation between employee desire to depart and employee retention methods. Pay and benefits, recognition and gratitude, a safe and healthy workplace, opportunities for professional growth, and development all play a role in how satisfied hospitality workers are with their jobs. The hotel sector has to implement strong welfare initiatives if it wants its workers to have a healthy work-life balance. The hotel business should promote the development of professional connections among its employees.

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1. INTRODUCTION

Human resources are undeniably the most valuable asset of any company, often referred to as its "lifeblood." While technological advancements have become crucial for modern businesses, they don't diminish the importance of human capital. In fact, the ever-growing challenges of globalization and rising competition in the market have made human resources even more essential. To stay ahead in this competitive environment, companies must focus on two key objectives: hiring top talent and retaining them for the long term. Managing the workforce and ensuring that employees remain engaged, motivated, and committed to the company's success is a complex task.

The Indian hotel industry has experienced remarkable growth over the last three decades, becoming a major cultural and economic contributor. Projections show that the industry will grow at a compound

annual growth rate (CAGR) of 7.92% from 2013 to 2025, positioning it as the third-fastest growing hospitality sector globally. With an investment of \$1 million generating 48 direct jobs and an additional 85 to 90 indirect jobs, the hospitality sector in India is a significant player in creating employment opportunities. This underscores the vital role of tourism in driving job creation.

Employee retention strategies, which encompass recruiting, training, motivating, and socializing new employees, are essential for companies aiming to maintain a competitive edge. These strategies not only help reduce turnover but also foster an environment where employees are dedicated and aligned with the company's success. As such, businesses must continuously innovate and implement strategies to retain their talent. Given the significant role that employees play in enhancing organizational performance, many companies focus on developing retention strategies.

2. LITERATURE REVIEW

How do workers perceive the broader impact and significance of IT investments in the hotel industry? [1] When analyzing this, it's important to consider the industry as a whole. The key objective is to demonstrate how the Mobley model can help identify factors that contribute to employee satisfaction and retention, as well as those that lead to dissatisfaction and turnover [2]. Several studies have explored how IT management (IMO) influences corporate performance, looking at factors such as competitive positioning, employee job satisfaction, and perceived customer satisfaction. For example, a job embeddedness survey of 327 frontline staff working in Australian hotels provided insights into these relationships [3]. According to Rahkra (2018), improving staff retention is a primary goal for the Indian hospitality sector to enhance both performance and competitiveness [4]. Kossivi et al. (2016) identified various strategies that can help companies achieve this aim [5]. This highlights the importance of exploring effective employee retention techniques, particularly in the hotel industry in southern Tamil Nadu.

One study aims to assess how organizations impact the health and productivity of millennials (those born between 1981 and 2000) working in the hotel industry, with a particular focus on employee "flourishing." The research seeks to examine how authentic leadership influences employees' career happiness within the hospitality sector [6].

A major objective of this research is to explore how human resource management practices affect the performance of businesses in the tourism sector [7]. The study also offers suggestions for future research and delves into the practical implications of its findings [8]. Another study, focused on Ho Chi Minh City, Vietnam, examines the relationships between career advancement, teamwork, workplace relationships, pay and benefits, working conditions, job stress, and overall productivity in the hospitality industry. Work satisfaction is identified as a moderating factor in these correlations [9].

In addition, there has been growing research on machine learning (ML) strategies for managing employee retention in the hospitality industry. However, significant gaps remain in this area, as detailed in Table 1 in Appendix, and addressing these gaps could help develop more effective solutions moving forward.

3. HYPOTHESIS

A key challenge for firms wanting to prosper in the highly competitive hospitality industry is the efficient management of staff retention [10], [11]. Talent retention has emerged as a critical success factor for hospitality companies in the face of a dynamic workforce and rising expectations from discriminating consumers [12]. Skilled and dedicated employees that offer outstanding service and cultivate client loyalty are crucial to the success and longevity of these businesses [13].

According to some authors in the literature, only contented and driven workers should be kept on board because they are more likely to be innovative, productive, and perform better, all of which contribute to and maintain better business performance [14], [15]. Job satisfaction data are strong predictors of both separations and resignations, even after adjusting for wages, hours, and common demographic and job variables. This is because job dissatisfaction has been demonstrated in the economic literature to be a good predictor of turnover intention [16]-[20].

Numerous studies have demonstrated the value of human resource management (HRM) in production and management, working conditions, and determining correlations with productivity [21], [22]. Indeed, the findings support the idea that a company's capital growth and intensity are positively impacted by HRM's impact on productivity [23]. The majority of research focuses on analyzing and tracking consumer behavior [24], [25] and ignores a company's primary assets, which are its employees.

The following hypotheses were developed for the research project from the reviewed literature.

- First hypothesis: workers in the hospitality sector are more likely to stay around if they are satisfied with their jobs.

- Second hypothesis: human resources perks have a major impact on how happy hospitality workers are with their jobs.
- Third hypothesis: in the hospitality sector, operational benefits are a major factor in determining the level of work satisfaction among employees.

4. METHOD

This survey, which took place in Chennai, randomly selected individuals from the hotel business to participate. With the use of an interview schedule, we were able to collect data from 100 people working in the hotel business. The percentage system is used to study the demographics of the hospitality industry's workforce. The calculation of means and standard deviations helps to understand tactics for staff retention in the hospitality industry. When comparing demographics and staff retention tactics in the hospitality industry, ANOVA and t-tests are utilized. The purpose of this study is to examine the connection between hospitality sector employee retention methods and intention to leave via correlation analysis. Using binary logit regression analysis, we can look at how different retention techniques in the hotel industry affect employee happiness. Our study's methodological workflow is depicted in Figure 1. All of the steps in our study's workflow were detailed.

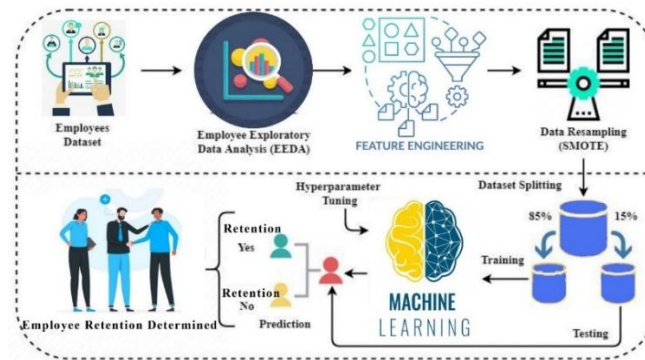


Figure 1. Methodological analysis for employee retention prediction

5. RESULTS AND DISCUSSION

The support vector machine (SVM) method is a subset of supervised learning models that use support vectors for classification. The SVM model builds a best-fit decision boundary to partition the input n-dimensional feature space data into target classes. The boundary that determines the choice is called a hyperplane. A hyperplane is a boundary that divides an n-dimensional Euclidean space into two distinct subsets. In order to minimize error, SVM used an iterative procedure to obtain the best-fitting hyperplane. In order to construct the hyperplane, the SVM selects the extreme vectors that are useful. Support vectors describe these extreme vectors. The equation for the separating hyperplane is given by (1). In this case, w is the weight matrix, b is the biased values, and x is the input feature.

$$\vec{w} \cdot \vec{x} + b = 0 \quad (1)$$

As evaluation metrics, our ML-based study employs ROC curve, recall, precision, F1-measure, training accuracy, and testing accuracy. Evaluation criteria must have the following elements:

In the case of a false positive, the method's predicted value is positive while, in fact, the value is negative; A false negative occurs when the method anticipates a negative value when, in fact, the value is positive;

- When the expected and observed values are positive, it is called a true positive.
- When both the actual and anticipated numbers are negative, we say that it is a true negative.

During the training and testing processes, we measured the accuracy score values for our suggested model. As evidence of our ML model's efficacy on both training and testing data, we found that it achieved an accuracy score of 93% when presented with unknown data. After that, we went on and made our model more generic. The accuracy score is calculated using the formula equation, which is expressed in (2).

$$Accuracy = \frac{TruePositiveValue + TrueNegativeVaule}{TruePositiveValue + FalsePositiveVaule + TrueNegativeValue + FalseNegativeVaule} \quad (2)$$

5.1. Demographics of employees of tourism industry

The demographics of the hospitality industry's workforce are presented in Figure 2. The age distribution is diverse, with the largest groups being those below 30 years (27.6%) and those over 40 years (27.8%) as given in Figure 2(a). There is a notable drop in the 36 to 40 years category (15.4%) as given in Figure 2(b). The educational background of the employees shows a majority having either a diploma (30.0%) or an undergraduate degree (32.8%), with a significant portion having completed higher secondary education (37.2%) as given in Figure 2(c). The working experience of employees is fairly spread out, with the largest group having more than 5 years of experience (24.2%) as given in Figure 2(d). There is a significant proportion of employees with less than a year of experience (28.2%), indicating a mix of both new and experienced employees in the workforce as given in Figure 2(e). The mix of employees with varying levels of experience can foster a dynamic work environment where mentorship and knowledge sharing are possible. The high percentage of employees with less than a year of experience might require robust onboarding and training programs to integrate them effectively into the workforce.

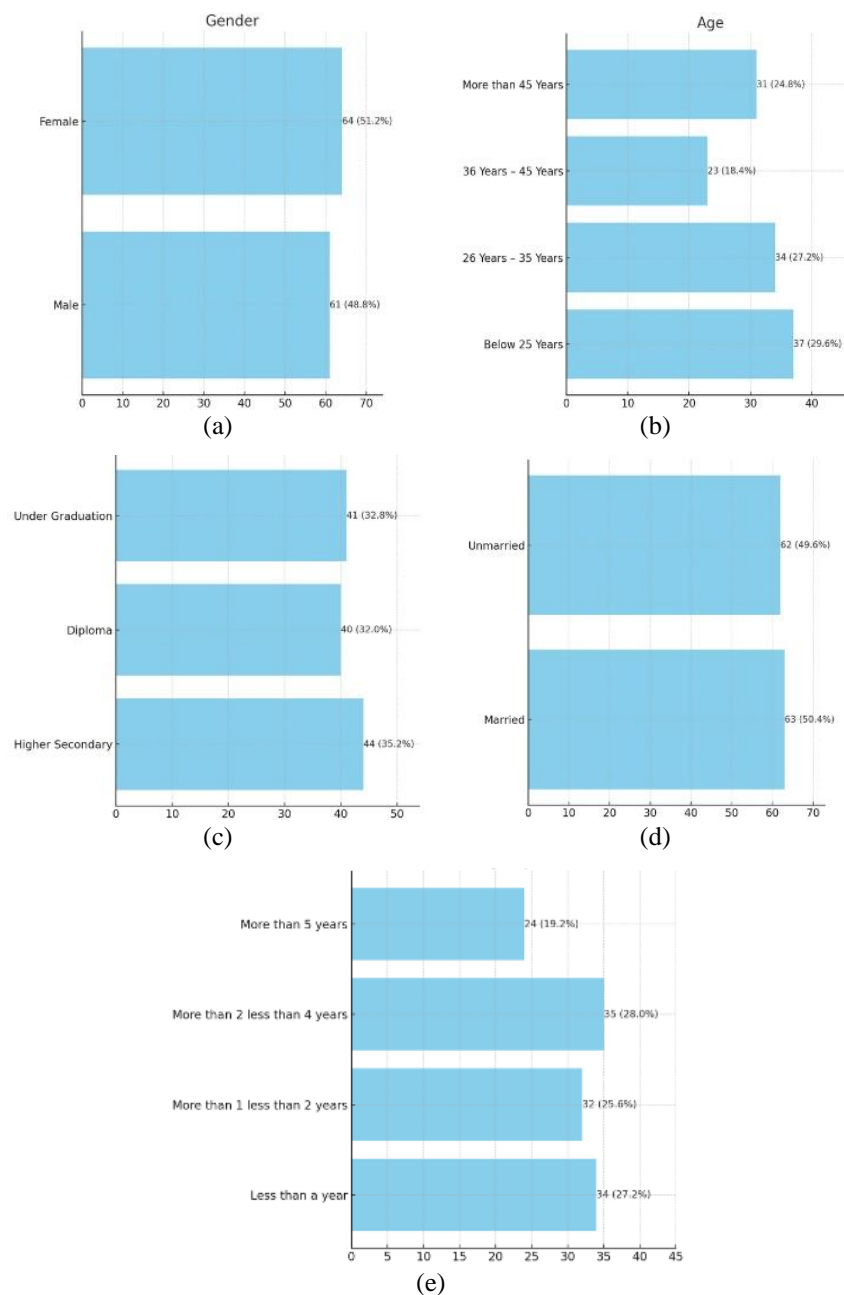


Figure 2. Demographic of employees of hospitality industry; (a) gender, (b) age, (c) education, (d) marital status, and (e) experience

5.2. Employee retention strategies followed in hospitality industry

Figure 3 shows that employees in the hospitality industry are in favor of stable employment, a good system of incentives and rewards, rules and values, and pay packages, but they are against a positive and productive work environment, market-competitive wages, and a work-life balance culture. One tactic that businesses in the hospitality sector have used to keep their employees around is to live by the company's principles and policies.

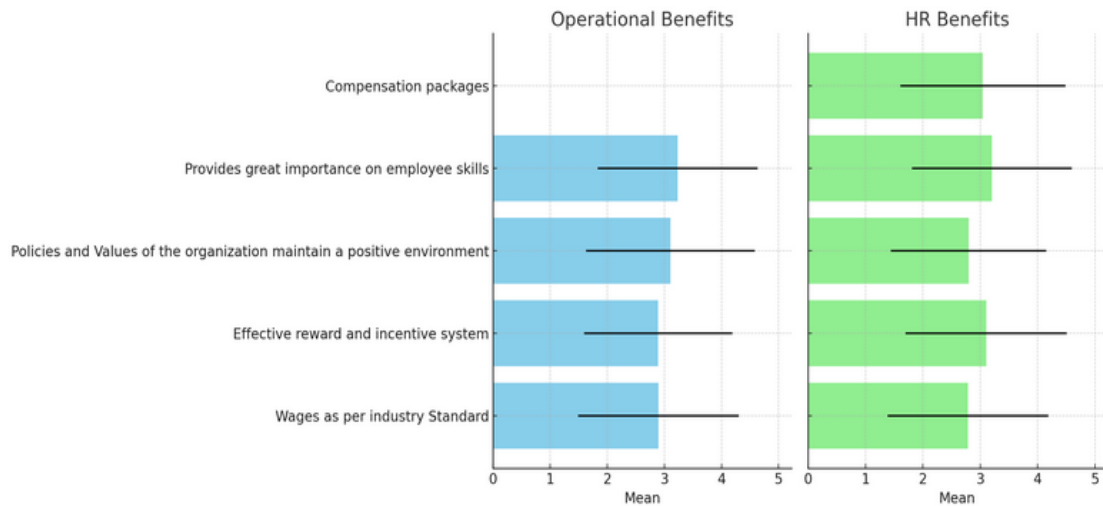


Figure 3. Employee retention strategies followed in hospitality industry

5.3. Connection between the level of job satisfaction and professional tenure

The correlation analysis is employed to study relation amongst level of job satisfaction and professional tenure and the result are as follow. The pearson correlation coefficient between work experience and level of job satisfaction is 0.048. This indicates a very weak positive linear relationship between the two variables. A pearson correlation of 1 on the diagonal indicates that each variable is perfectly correlated with itself. The p-value for the correlation between work experience and level of job satisfaction is 0.010. This p-value indicates that the correlation is statistically significant at the 0.01 level (typically interpreted as a 1% chance that the observed correlation is due to random variation). The sample size for both variables is 100. The data indicates that there is a statistically significant but very weak positive correlation between work experience and level of job satisfaction. While this correlation is statistically significant, its practical impact might be minimal due to the low correlation coefficient.

5.4. Relationship between job satisfaction level and operational work benefits

To investigate the connection between operational work benefits and job happiness, a correlation analysis is used. There is a robust positive association between operational benefits and work satisfaction in the hotel industry, according to the findings. Employees' stated levels of work satisfaction are strongly correlated with the operational benefits offered by the company (pearson correlation coefficient: 0.745). Further, at the traditional significance level of 1, this connection is statistically significant, as shown by the two-tailed significance value of 0.054. According to the results, businesses in the hospitality sector who provide their workers with good operational perks also tend to have happier workers. These findings highlight the need of thoughtfully designing and executing operational benefit packages for hospitality firms to increase work happiness, retention, and productivity.

5.5. Relationship between Job satisfaction level and HR benefits

The relationship between HR perks, work satisfaction, and the end outcome is investigated using a correlation analysis. An examination of the relationship between HR benefits and work satisfaction in the hotel industry finds a strong positive link. With a pearson correlation value of 0.589, we can see that there is a robust positive association between the amount of HR perks offered by companies and the levels of work satisfaction reported by employees. Moreover, the two-tailed significance value of 0.026 suggests that this association is statistically significant at the standard significance level of 0.026.

Employees in the hotel industry are more likely to report high levels of work satisfaction when their employer provides them with comprehensive and attractive HR perks, according to the results. These findings reinforce the important role of HR benefits as a major driver of employee happiness and illustrate the necessity of strategic HR practices in generating a good work environment and building a happy and engaged workforce within the hospitality industry.

6. CONCLUSION

In conclusion, this research report provides light on the important relationship between HR benefits, operational benefits, and employee job satisfaction in the hotel business. The substantial positive correlations discovered between HR benefits and job satisfaction, as well as operational benefits and job satisfaction, underline the major role these elements play in influencing workers' overall happiness and engagement at work.

The study's findings underline the necessity of firms emphasizing the well-being of their workers by giving complete HR and operational benefit packages. By offering competitive benefits, firms may nurture a happier and motivated staff, which may contribute to greater productivity, higher employee retention rates, and enhanced service quality in the highly competitive hospitality industry.

However, the study has several shortcomings that require attention for future researches. The cross-sectional methodology inhibits the development of causal linkages, requiring longitudinal research to study the temporal dynamics of these interactions. Additionally, the research focused only on the hotel business, limiting the generalizability of results to other industries. Future study should involve a larger variety of sectors to strengthen the external validity of the findings.

Furthermore, the lack of inquiry into possible moderating factors, such as employee demographics or corporate culture, gives an opening for future research to gain a more comprehensive knowledge of intricacies of these interactions. By accounting for these moderating variables, researchers may gain more thorough insights into the delicate interaction between perks and work satisfaction.

Notwithstanding these limitations, the study's conclusions underline the relevance of carefully creating and managing HR and operational benefit programs to build a healthy and devoted staff within the hospitality business. By proactively addressing the needs and ambitions of workers, firms may build a pleasant work culture that ultimately leads to the ongoing success and competitive advantage of the hospitality industry.

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AUTHOR CONTRIBUTIONS STATEMENT

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Kannan Ramasamy	✓		✓	✓			✓			✓	✓		✓	
Geetha Mani	✓	✓	✓	✓			✓	✓	✓	✓				
Prabhu Jayamurugan			✓	✓	✓	✓			✓	✓	✓	✓		
Bhuvanesh Ananthan		✓	✓	✓	✓			✓	✓	✓	✓			

C : **C**onceptualization

M : **M**ethodology

So : **S**oftware

Va : **V**alidation

Fo : **F**ormal analysis

I : **I**nvestigation

R : **R**esources

D : **D**ata Curation

O : **O**riting - **O**riginal Draft

E : **E**riting - **R**eview & **E**editing

Vi : **V**isualization

Su : **S**upervision

P : **P**roject administration

Fu : **F**unding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [P.J], upon reasonable request.

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APPENDIX

Table 1. Research gaps




Area	Current status	Research gaps
Integration of diverse data sources	Most studies focus on structured data from HR systems, such as employee demographics, job performance, and tenure.	There's a lack of integration with unstructured data sources, such as social media, employee reviews, and feedback, which can provide deeper insights into employee sentiments and predictors of turnover.
Real-time predictive analytics	Existing models often rely on historical data to predict future turnover.	Developing real-time predictive analytics tools that can provide immediate insights and allow for proactive management of retention strategies is needed.
Explainability of machine learning models	Many machine learning models, especially deep learning, are often seen as "black boxes" with limited interpretability.	There is a need for models that not only predict turnover accurately but also provide clear explanations for their predictions, enabling HR managers to understand and act on the insights effectively.
Customized retention strategies	Many retention strategies are generic and not tailored to individual employee needs.	Developing personalized retention strategies using machine learning to cater to the unique motivations and career aspirations of individual employees in the hospitality industry.
Longitudinal studies and dynamic models	Most research involves cross-sectional studies or static models.	Longitudinal studies and dynamic models that can adapt to changes in employee behavior and external factors over time are needed.
Impact of external factors	Many models focus on internal company data, neglecting external factors such as economic conditions, industry trends, and regional employment rates.	Incorporating external data to understand how broader economic and industry trends impact employee retention in the hospitality sector.
Ethical considerations and bias mitigation	There is growing awareness of the ethical implications of machine learning models, but practical guidelines and tools are still developing.	More research is needed on ethical considerations, particularly on how to ensure fairness and mitigate biases in machine learning models used for employee retention.
Skill development and career progression insights	Many studies focus on immediate retention factors such as job satisfaction and compensation.	Understanding how opportunities for skill development and career progression influence retention and how machine learning can be used to provide personalized career development paths.
Cultural and geographic variations	Most research is conducted in specific regions or cultural contexts.	There is a need for studies that explore how cultural and geographic variations affect employee retention and the effectiveness of machine learning models across different contexts.
Employee well-being and work-life balance	Research often focuses on traditional factors like compensation and job satisfaction.	There is a growing recognition of the importance of employee well-being and work-life balance, but more research is needed to understand how these factors can be measured and improved using machine learning.

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