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The Impact of HR Analytics Usage Frequency on Retention Effectiveness and Attrition Control: A Logistic Regression Approach

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Abstract
It is well known that the two most significant factors that affect an organization's performance are attrition and retention. In recent times, organizations are experiencing increase in retention and decrease in attrition due to implementation of HR Analytics. The purpose of this research paper is to study the relationship between the frequency of HR analytics usage and its impact on retention and attrition management. We have used Logistic Regression method to study the relationship between influence of HR analytics with retention and attrition. The logistic regression analysis assessed the relationship between HR analytics usage for attrition and retention with retention effectiveness and likewise for attrition control.

Keywords: HR analytics, Attrition control, Retention effectiveness, Logistic Regression

Introduction
With the support of data analytics, HR management has considerably developed, thereby improving efficiency and employee satisfaction. It has been playing a significant role, which is a requirement for maintaining a skilled employee among increasing talent competition (Karekar & Jiby, 2021).
The frequency of using HR analytics tools for handling retention and attrition issues is an important but overlooked factor. The overall research done on how the frequency of analytics use affects the effectiveness of retention strategies and the control of employee attrition is limited. There is very less research on how the usage of HR analytics in organisations varies. The basic assumption is that with regular and integrated use of HR analytics most likely leads to better retention outcomes.
The aim of this study is to analyse the relationship between the frequency of using HR analytics for employee retention effectiveness and attrition control using a logistic regression approach. The result thus obtained could provide valuable insights for HR professionals seeking to optimize their workforce management strategies and enhance organizational performance.
This study explores role of HR analytics in employee retention and attrition control, review of existing literature, and uses logistic regression to assess the impact of analytics usage frequency on retention outcomes.

Literature Review
HR analytics integration is gaining prominence as organizations optimize workforce management, improve employee retention, and control attrition through data-driven decision-making (Ravesangar & Narayanan, 2024). HR analytics collects, analyses, and interprets data to inform HR policies, aiding decision-making on hiring, training, performance management, and employee engagement (Jain & Jain, 2020). However, its impact on retention effectiveness and attrition control remains less studied.

- **HR Analytics and Retention**

The interest in the application of HR analytics to retention tactics has grown recently. The ability of a company to retain its workforce, especially those who are highly performing or critical to the company's success, is referred to as retention (Robinson & Sethukarasi, 2024). HR analytics can be very useful in determining factors like work-life balance, compensation, career development opportunities and job satisfaction that affect employee retention (Saxena, Bagga, & Gupta, 2021). HR departments can identify trends in employee attrition and create specific strategies for solving these issues, such as creating retention programs or providing customized interventions, by examining employee data (Ragimol, Sudha, & Peterkumar, 2021).

The application of analytics in HR can considerably improve retention in the organization, especially when they use data to calculate turnover risks and proactively manage employee satisfaction (Varma & Chavan, 2019). The probability of an employee quitting the company can be calculated using predictive analytics models on the basis of past data and trends (Mohammed, 2019).

- **Attrition Control and HR Analytics**

Use of analytics in HR also helps in handling the expensive and time-consuming problem of employee turnover, including cost benefit analysis, thereby by showing considerable improvement in controlling attrition (Chandwani, Rangaswamy, & Kembhavi, 2020). HR analytics helps organizations in monitoring trends in attrition, identify causes like management dissatisfaction, career development, and compensation issues. Through this information, organizations can take preventative measures to reduce employee turnover, like creating focused retention plans or changing HR policies (Das & S.C, 2020).

HR analytics can improve attrition control by supporting real-time monitoring and problem-solving, thereby reducing turnover rates by allowing organizations to adjust to changing conditions (Gupta & Sharma, 2022).

- **Logistic Regression in HR Analytics Research**

Logistic regression is an ideal statistical method used in HR analytics research to model the probability of two variables (Setiawan, Suprihanto, Nugraha, & Hutahaean, 2020), in this case employee retention and turnover based on various predictors. We have used logistic regression to identify factors that affect turnover and retention, such as compensation, job satisfaction, and employee engagement.

Objective of the Study

The frequency of use of HR analytics accelerates and enhances organizational outcomes by enabling real-time decision-making, improving operational efficiency, employee engagement, satisfaction, and retention. Near to accurate predication of retention effectiveness and attrition control is a result of frequent and regular data analysis, indicating that the more frequently HR analytics tools are used, the more likely an organization is to find ways that substantially improve retention. Despite the amount of research on the use of HR analytics in retention and attrition control, there is a shortage of information linking frequency of using HR Analytics to improve retention outcomes particularly in the Banking, Financial Services and Insurance (BFSI) sectors. This study uses a logistic regression approach to assess the impact of HR analytics usage frequency on attrition control and retention effectiveness.

Research Methodology

The purpose of this study is to explore the relationship of how frequently HR Analytics is used for determining attrition and retention and how it affects workforce outcomes, mainly attrition rates and retention effectiveness. The sample included organization from the Banking, Financial Services and Insurance (BFSI) sectors. A multistage stratified sampling approach was used to ensure diversity in

responses. Data was collected from twelve companies that were randomly selected within the above sectors. Respondents included HR professionals and managers with at least six months of experience using HR analytics tools.
The data collection was done using a structure questionnaire, using a five-point Likert scale. Retention effectiveness was measured using eight statements, while seven statements were used to analyse attrition control. A pilot test was done on 40 HR professionals in Mumbai, and minor changes were made to improve clarity and validity. The study's reliability was confirmed through Cronbach's alpha, Exploratory Factor Analysis, and Bartlett's Test of Sphericity, indicating strong internal consistency and dimensionality of the concepts.

Data Analysis
In this study, we have used logistic regression to look at the relationship between retention effectiveness and also attrition control amongst employees and the frequency of HR analytics utilisation. The responses for each parameter were averaged to create combined scores for attrition control and retention effectiveness. Z-Scores were used to standardize the score to support comparison across respondents. On the basis of the Z-scores, participants were grouped into two binary groups: low (coded as 0) and high (coded as 1) for retention effectiveness and attrition control. The study used logistic regression to find the relation between a respondent's probability of being in a high or low group and the frequency of HR analytics usage for attrition and retention. This method provides detailed analysis into the effect of HR analytics on retention effectiveness and attrition control.

The regression equation is:
$\text{Logit}(P) = -0.610 + 0.258(a) + 0.457(b)$
Where:

- P = Probability of high retention effectiveness (retention effectiveness = 1).
- a = HR analytics usage frequency for attrition.
- b = HR analytics usage frequency for retention.

Table 1. Omnibus Tests of Model Coefficients

Test	Chi-square	df	Sig.
Step	8.978	2	0.011
Block	8.978	2	0.011
Model	8.978	2	0.011

The logistic regression model was statistically significant ($\chi 2=8.978$, $p=0.011$). This shows that frequency of HR analytics use significantly predicts retention effectiveness.

Table 2. Model Summary

Step	-2 Log Likelihood	Cox & Snell R^2	Nagelkerke R^2
1	263.938	0.04	0.056

The logistic regression model shows nearly 4.0% (Cox & Snell R^2) to 5.6% (Nagelkerke R^2) of the variance in retention effectiveness. These pseudo-R^2 values show how well the independent variables, here, the HR analytics usage frequency for attrition and retention affect changes in the dependent variable i.e. retention effectiveness. The Cox & Snell R^2 provides a broad indicator of model performance but does not reach a maximum value of 1.0, but the Nagelkerke R^2 adjusts this to provide a more interpretable range. A Nagelkerke R^2 of 0.056 show that the HR analytics usage frequency explains 5.6% of the variability in retention effectiveness. This suggests that while the use of HR analytics is a statistically significant predictor, retention outcomes are not completely determined by

it. There could be other factors like industry-specific practices, employee engagement, and organisational culture that affect the retention effectiveness. Therefore, even if the results highlight the value of HR analytics, there could be other factors that may also influence retention effectiveness.

Table 3. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.563	7	0.476

The Hosmer and Lemeshow Test ($\chi 2=6.563$, $p=0.476$) is a goodness-of-fit test used to assess whether the logistic regression model adequately fits the data. A non-significant result ($p>0.05$) shows that the model's predicted probabilities are in line with the observed outcomes, suggesting a good model fit. In this case, the p-value of 0.476 explains that there is no major difference between the predicted and observed values of retention effectiveness across different groups. On the basis of the frequency of HR analytics usage, this shows that the model is rightly used and predicts the probability of retention effectiveness. As a result, the outcomes give confirmation that the model can appropriately represent the data without either overfitting or underfitting.

Table 4. Values of Regression Coefficients and Odds Ratios

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI for Exp(B)
a	0.258	0.182	2.013	1	0.156	1.294	[0.936, 1.789]
b	0.457	0.181	6.392	1	0.011	1.58	[1.111, 2.244]
Constant	-0.61	0.504	1.464	1	0.226	0.543	

Note: a = usage of HR analytical tool for attrition; b = usage of HR analytical tool for retention
The logistic regression analysis examined the relationship between HR analytics usage for attrition (a) and retention (b) with retention effectiveness. The results revealed that HR analytics usage for attrition (a) had a positive but statistically insignificant effect on retention effectiveness ($B=0.258$, $p=0.156$). The odds ratio ($Exp(B)=1.294$) indicates that for every one-unit increase in the usage frequency of HR analytics for attrition, the odds of high retention effectiveness increase by approximately 29.4%. However, the confidence interval ([0.936, 1.789]) includes 1, reinforcing the lack of statistical significance.

In contrast, HR analytics usage for retention (b) was a significant predictor of retention effectiveness ($B=0.457$, $p=0.011$). The odds ratio ($Exp(B)=1.580$) suggests that for every one-unit increase in the usage frequency of HR analytics for retention, the odds of high retention effectiveness increase by 58%. The confidence interval ([1.111, 2.244]) does not include 1, confirming the reliability and significance of this predictor. The constant ($B=-0.610$, $p=0.226$) was not statistically significant, indicating that the baseline odds of high retention effectiveness without the influence of HR analytics usage were not substantial ($Exp(B)=0.543$).
Further, the logistic regression model examined the relationship between HR analytics usage frequency for attrition and retention with attrition rates (low = 0, high = 1). The analysis included all cases, with no missing data. The dependent variable, attrition rates, was categorized as low (1.00) and high (2.00).
The regression equation is:
$$Logit(P)=-0.610+0.258(a)+0.457(b)$$
Where:

- P: Probability of high attrition rates (attrition = 1).

- a: HR analytics usage frequency for attrition.
- b: HR analytics usage frequency for retention.

Table 5. Omnibus Tests of Model Coefficients

Test	Chi-square	df	Sig.
Step	0.414	2	0.813
Block	0.414	2	0.813
Model	0.414	2	0.813

The logistic regression model was not statistically significant ($\chi 2$=0.414, p=0.813), indicating that the independent variables (HR analytics usage frequency for attrition and retention) do not significantly predict attrition control outcome and the same gets supported by the other statistics. The Model Summary further reinforced this insignificance, with Cox & Snell R^2 and Nagelkerke R^2 values of 0.002 and 0.003, respectively, demonstrating that HR analytics usage frequency explains only 0.2% to 0.3% of the variance in attrition control outcomes. This highlights the limited predictive power of the model.

Table 6. Values of Regression Coefficients and Odds Ratios

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI for Exp(B)
a	-0.045	0.166	0.075	1	0.784	0.956	[0.695, 1.314]
b	0.097	0.162	0.354	1	0.552	1.101	[0.804, 1.508]
Constant	0.018	0.469	0.001	1	0.97	1.018	

Note: a = usage of HR analytical tool for attrition; b = usage of HR analytical tool for retention

Lastly, the regression coefficients for HR analytics usage frequency for attrition (B=−0.045, p=0.784) and retention (B=0.097, p=0.552) were also insignificant. The odds ratios (Exp(B)=0.956 for attrition and Exp(B)=1.101for retention) suggest negligible effects, further reinforcing that these variables have no substantial impact on attrition control outcomes.
In summary, the findings indicate that HR analytics usage frequency for attrition and retention does not significantly influence attrition control, emphasizing the need to explore additional predictors or contextual factors to better understand the drivers of effective attrition management.

Findings

The analysis done using logistic regression mentions that HR analytics usage frequency considerably impacts retention effectiveness, with higher usage, it increases retention effectiveness. This emphasizes the important role of analytics in identifying engagement issues and focusing on employee concerns. The study further analyzed that the frequency of HR analytics usage for attrition and retention did not largely predict the results of attrition control.
The effectiveness of HR analytics is based upon how well it is integrated into the organizational strategies. Attrition is also affected by market conditions, employee satisfaction, leadership practices, and organizational culture. By using HR analytics, the retention effectiveness can be improved by planning career development and recognition programs for employees. However, challenges in evaluating causes of attrition and possible lag between it's solutions and results may affect attrition control. One also needs to consider factors like work culture, work-life balance, employee benefits, and job security that affect employee happiness and job satisfaction, which may lead to increase in attrition (Moghe, Chaudhary, & Kumar, 2024). The above used model's low pseudo-R^2 values

recommend the need for future studies to consider additional factors like employee engagement, organizational support, and market conditions.

Theoretical Implications

The paper points out the impact of HR analytics on workforce outcomes, especially retention effectiveness and attrition control. It supports strategic HRM theories and suggests that organizational goals can be achieved using data-driven decision-making (Marler & Boudreau, 2017). It further suggests that HR analytics should be part of the entire organizational strategy, also considering related factors like organizational readiness and cultural dynamics.

Practical Implications

The study here suggests to focus on retention tools to identify early symptoms of employee disengagement and implementing specific programs. However, since attrition cannot be controlled using analytics, it suggests a more mixed approach that will include leadership training, employee engagement initiatives, and organizational culture awareness programs. The study also recommends including HR analytics into employee-interfacing platforms to support transparency and career growth.

Conclusion

This study emphasizes the role of HR analytics in affecting the employee outcomes, mainly retention effectiveness and attrition control. The results show that the use of HR analytics for retention largely improves retention effectiveness by focusing on its ability to introduce relevant employee engagement programs and bring about stability in the organization. However, the use of HR analytics for attrition has no clear impact on attrition control, since attrition is a result of multiple issues beyond analytics. The findings show that although analytics tools that are focused on retention suggest practical understanding with measurable outcomes, attrition dynamics require a greater understanding of organizational and historical factors. This study contributes to our understanding of HR analytics function in workforce management by highlighting its various implications and providing a detailed view on how useful it is for solving important workforce problems.

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