

# Employee Attrition Prevention Report

**Prepared for: HR Department**

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## I. Introduction

Employee attrition poses a significant challenge for organizations, leading to increased hiring costs, loss of expertise, and reduced productivity. To address this, HR Analytics provides data-driven insights that help organizations understand the underlying causes of attrition and proactively retain talent. This project applies statistical analysis, predictive modeling, and visualization techniques to study attrition patterns and predict future risks.

## II. Abstract

This project leverages HR analytics to uncover key patterns influencing employee attrition. Through Exploratory Data Analysis (EDA), trends across departments, salary bands, and promotions were identified. Predictive models, including Logistic Regression and Decision Trees, were built to forecast attrition, achieving up to **82% accuracy**. SHAP analysis was applied for model explainability, while interactive Power BI dashboards present insights for evidence-based workforce decisions.

### III. Tools Used

- **Python (Pandas, Seaborn):** Data preprocessing and exploratory analysis
- **Scikit-learn:** Machine learning model development and evaluation
- **SHAP:** Explainability of predictive models
- **Power BI:** Interactive dashboards for visualization and reporting

### IV. Steps Involved in Building the Project

1. Collected and cleaned the HR dataset for analysis.
2. Performed EDA to identify attrition trends across departments, salary bands, and promotions.
3. Built classification models (Logistic Regression, Decision Tree) to predict attrition.
4. Evaluated models using accuracy, confusion matrix, and SHAP analysis.
5. Developed Power BI dashboards to visualize key attrition factors.
6. Compiled actionable recommendations for attrition prevention.

### V. Conclusion

This HR Analytics project demonstrates the value of combining machine learning with visualization to tackle employee attrition. The findings highlight salary, departmental differences, and career progression as major attrition drivers. By leveraging predictive insights and interactive dashboards, organizations can design effective retention strategies, minimize turnover, and strengthen workforce stability.