AI In Compensation Management: Optimizing Pay Structures with Predictive Analytics

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Abstract- In an era of rapid digital transformation, compensation management has evolved from a static function to a strategic pillar of human resource management (HRM). Organizations must ensure fair, competitive, and motivating pay structures, which traditional models often fail to deliver due to reliance on outdated benchmarks and subjective decision-making.

I. INTRODUCTION AND BACKGROUND

In an era of rapid digital transformation, compensation management has evolved from a static function to a strategic pillar of human resource management (HRM). Organizations must ensure fair, competitive, and motivating pay structures, which traditional models often fail to deliver due to reliance on outdated benchmarks and subjective decisionmaking.

This thesis explores how Artificial Intelligence (AI) and predictive analytics can revolutionize compensation planning. By analyzing large-scale HR data, AI helps forecast salary expectations, detect pay disparities, and prevent attrition. The research leverages the IBM HR Analytics Employee Attrition & Performance dataset, making IBM an ideal case study due to its leadership in AI-driven HR solutions.

II. RESEARCH OBJECTIVES AND QUESTIONS

The core aim is to build AI models that optimize compensation by predicting salary fairness, attrition risk, and performance-based pay alignment. The specific objectives include:

- Forecasting optimal salary using features like job role, education, tenure, and performance.
- Identifying salary gaps and their impact on employee attrition.
- Evaluating AI-driven pay bands for fairness and transparency.

• Ranking influential predictors in salary and retention decisions using machine learning.

The research addresses these key questions:

- How can AI enhance compensation decisions?
- What factors best predict compensation satisfaction and retention?
- Can AI tools like IBM Watson forecast optimal salary ranges?

III. METHODOLOGY

A mixed-methods approach is used, combining:

Primary Data

A survey of 33 respondents analyzed salary satisfaction, tenure, and age distribution. Key insights:

- 60.6% were under 25 years of age.
- 66.7% had less than 1 year of experience.
- 54.5% expressed neutral or negative salary satisfaction.

Secondary Data

The IBM HR dataset includes demographic, job, and compensation data from 1,470 employees. Predictive models were built using:

- Regression Models (Linear, Random Forest, XGBoost): For predicting ideal salaries.
- Classification Models: To identify employees likely to leave due to pay gaps.
- Clustering (K-Means): To define salary bands based on similar roles and performances.
- SHAP Analysis: For model explainability and fairness evaluation.

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IV. KEY FINDINGS

Predictive Model Accuracy

- XGBoost predicted attrition with 87% accuracy and AUC = 0.91.
- Salary prediction models achieved RMSE < 15%.

Insights from IBM Data

- Employees with salaries below predicted benchmarks had 2.3x higher attrition risk.
- Job Role, Years at Company, and Performance Rating were the top predictors of salary.
- Clustering revealed underpaid top performers and overpaid low performers—guiding targeted pay corrections.

Survey Validation

- Younger employees expected faster career and salary progression.
- Engineers (largest group in the survey) showed varied satisfaction levels, highlighting the need for role-based salary bands.

CONCLUSIONS AND IMPLICATIONS

- AI-powered tools can proactively reduce attrition by identifying and resolving salary mismatches.
- One-size-fits-all salary strategies are no longer viable. AI enables personalized compensation planning based on role and performance.
- Organizations can use data-backed salary audits to meet legal compliance, improve equity, and boost employee trust.

RECOMMENDATIONS

- Adopt AI models (e.g., XGBoost) for real-time compensation management.
- Develop career acceleration programs for earlytenure employees.
- Establish standardized salary bands by job role and experience using clustering.
- Conduct bi-annual salary satisfaction audits with employee feedback and analytics.
- Integrate non-monetary rewards such as learning opportunities, flexibility, and recognition.

LIMITATIONS AND FUTURE SCOPE

- The primary survey had a small sample size.
- The IBM dataset may not capture all real-world dynamics (e.g., changing market trends or job culture factors).
- Future research should include:
- Broader datasets across industries.
- Gender and diversity equity analysis.
- Sentiment analysis of employee feedback.
- Longitudinal studies on retention post-pay adjustments.