

EMPLOYEE ATTRITION TREND DASHBOARD

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ABSTRACT

The **Employee Attrition Trend Dashboard** is a data analytics and visualization system designed to help organizations understand employee attrition patterns and workforce trends. Employee attrition refers to employees leaving an organization over a period of time. High attrition can affect productivity, recruitment costs, employee workload, and organizational performance. Therefore, understanding historical attrition patterns can help organizations plan workforce strategies more effectively.

The proposed system collects employee-related organizational data such as department, job role, tenure, salary range, employment status, joining date, exit date, and other relevant workforce attributes. The system processes this information and calculates important metrics such as attrition rate, employee count, average tenure, department-wise attrition, and monthly or yearly trends.

The dashboard presents the analyzed information through interactive charts, graphs, tables, and Key Performance Indicators (KPIs). Managers and HR teams can compare attrition across departments, job roles, experience groups, and time periods. Filters can be used to focus on specific organizational units or reporting periods, making the analysis easier and more flexible.

The system can also identify recurring workforce patterns and highlight areas where attrition levels have changed significantly. Historical trend analysis can help organizations understand whether attrition is increasing, decreasing, or remaining relatively stable. Optional analytics can provide aggregate-level insights that support workforce planning without making automated decisions about individual employees.

Overall, the **Employee Attrition Trend Dashboard** provides a centralized platform for understanding workforce attrition through data visualization and analytics. It can reduce manual reporting efforts and help HR teams make better-informed organizational decisions. The system is intended for **aggregate workforce analysis and planning**, and it should not be used to automatically label, rank, or make employment decisions about individual employees.

I. INTRODUCTION

Employee retention is an important concern for organizations across different industries. Employees may leave organizations for various reasons, including career opportunities, compensation, workload, organizational culture, relocation, or personal circumstances. When employee turnover becomes high, organizations may experience increased recruitment costs, loss of experience, productivity challenges, and additional workload for existing employees.

Traditional employee attrition analysis is often performed using spreadsheets, HR reports, and manually prepared presentations. HR teams may collect employee information from different systems and calculate attrition rates periodically. Although these methods can provide useful information, manually preparing reports can be time-consuming and may make it difficult to identify trends quickly.

Data analytics and Business Intelligence technologies provide organizations with better ways to analyze workforce information. Dashboards can combine workforce data from different sources and present important metrics through charts and

visualizations. Instead of reviewing large spreadsheets, HR professionals can quickly understand changes in employee counts and attrition patterns.

The **Employee Attrition Trend Dashboard** is designed to provide an interactive platform for analyzing historical workforce attrition. It can display department-wise, role-wise, tenure-wise, and time-based attrition trends. Users can apply filters and compare different organizational groups to understand where workforce changes are occurring.

The objective of the system is to support **evidence-based workforce planning** rather than making decisions about individual employees. The dashboard focuses on aggregate patterns and historical information. By presenting workforce trends clearly, the system can help organizations investigate potential operational issues and develop appropriate retention and workforce strategies.

II. LITERATURE SURVEY

Traditional employee attrition analysis commonly uses HR spreadsheets, employee databases, payroll systems, and manually prepared reports. These systems store important employee information but may require additional processing to calculate attrition rates and identify trends. Manual reporting becomes increasingly difficult as organizations grow and employee data increases.

Human Resource Information Systems (HRIS) provide centralized platforms for managing employee information, attendance, payroll, recruitment, and other HR activities. These systems can store historical workforce information and support basic reporting. However, the analytical and visualization capabilities available in basic HR systems may be limited.

Business Intelligence and data visualization tools have increasingly been applied to workforce analytics. Dashboards can display employee counts, attrition rates, department-level statistics, tenure distributions, and historical trends. Interactive filters and drill-down capabilities allow HR teams to explore workforce information from different perspectives.

Workforce analytics research has examined factors associated with employee turnover, including tenure, job role, compensation, workload, organizational environment, career development, and engagement. Statistical analysis and machine learning have also been explored for understanding workforce patterns. However, analytical results should be interpreted carefully because correlation does not necessarily establish the reason an employee leaves.

Predictive analytics has been used in some HR systems to estimate aggregate workforce trends and identify areas that may require organizational attention. Machine learning models can analyze historical patterns and generate estimates under specific assumptions. However, using predictions for individual employment decisions creates fairness, privacy, transparency, and ethical concerns.

Existing research demonstrates that combining HR data, analytics, and interactive visualization can improve workforce reporting and planning. However, many basic dashboards focus primarily on descriptive metrics and provide limited interactive trend analysis. The proposed **Employee Attrition Trend Dashboard** focuses on centralized data processing, KPI monitoring, trend analysis, department and role comparisons, and responsible aggregate-level workforce insights.

III. SYSTEM ANALYSIS

The **Employee Attrition Trend Dashboard** is designed to analyze historical employee attrition and workforce trends at an aggregate level. The system collects workforce information such as employee counts, departments, job roles, tenure, joining dates, exit dates, and employment status from supported organizational data

sources. A data-ingestion module imports the information into the analytics platform. The data-cleaning module handles missing values, duplicate records, inconsistent formats, and invalid entries. The system organizes workforce information by department, role, tenure group, location, and reporting period where appropriate. A KPI engine calculates metrics such as total employees, attrition count, attrition rate, average tenure, and workforce changes. A trend-analysis engine examines attrition patterns across monthly, quarterly, and yearly periods. A comparison module allows users to compare aggregate results across departments and job categories. The visualization layer presents the results through charts, tables, graphs, and KPI cards. Filters allow users to select specific reporting periods or organizational groups. The dashboard highlights significant aggregate changes that may require further investigation. Finally, HR teams can generate reports to support workforce planning and organizational analysis.

Existing System

Existing employee attrition analysis is commonly performed using HR spreadsheets, HRIS platforms, payroll systems, and manually prepared reports. Employee information is collected from different organizational systems and combined for periodic analysis. HR teams may manually calculate the number of employees who joined or left during a particular period. Attrition rates are often calculated using spreadsheet formulas and presented through static charts or reports. Comparing multiple departments may require creating separate tables and calculations. Historical trends can be difficult to analyze when data is stored across multiple files. Manual reporting can also introduce calculation errors or inconsistencies between reports. Existing systems may provide limited interactive visualization and filtering capabilities. HR teams may need to prepare new reports whenever management requests a different comparison. Basic reports may focus on current employee counts without providing detailed historical trend analysis. Some systems also provide limited tools for identifying changes across job roles or tenure groups. As a result, traditional methods can require significant manual effort and may not provide a comprehensive interactive view of workforce attrition.

Disadvantages of Existing System

- Heavy dependence on manual HR reports.
- Time-consuming spreadsheet-based analysis.
- Difficult to combine data from multiple sources.
- Manual calculations may introduce errors.
- Limited interactive visualizations.
- Difficult to compare many departments quickly.
- Historical attrition trends may be difficult to analyze.
- Limited filtering and drill-down capabilities.
- Reports may become outdated quickly.
- Repeated report preparation increases HR workload.
- Limited centralized workforce analytics.
- Difficult to identify important aggregate-level trends quickly.

Proposed System

The proposed **Employee Attrition Trend Dashboard** provides a centralized platform for analyzing historical employee attrition and workforce trends. The system collects relevant workforce information from supported HR systems, spreadsheets, or databases. A preprocessing module validates, cleans, and standardizes the data before analysis. The system organizes workforce information according to department, job role, tenure group, location, and time period where appropriate. A KPI engine

calculates important aggregate metrics such as employee count, attrition count, attrition rate, average tenure, and workforce changes. A trend-analysis engine identifies changes in attrition across monthly, quarterly, and yearly periods. A comparison engine allows HR teams to compare aggregate attrition patterns across departments and job categories. Interactive charts and graphs make the results easier to understand. Users can apply filters based on reporting periods and organizational groups. The dashboard can highlight significant changes and provide supporting information for further organizational investigation. Reports can be generated for management review and workforce planning. The system focuses on aggregate-level insights and avoids automatically making employment decisions about individual employees.

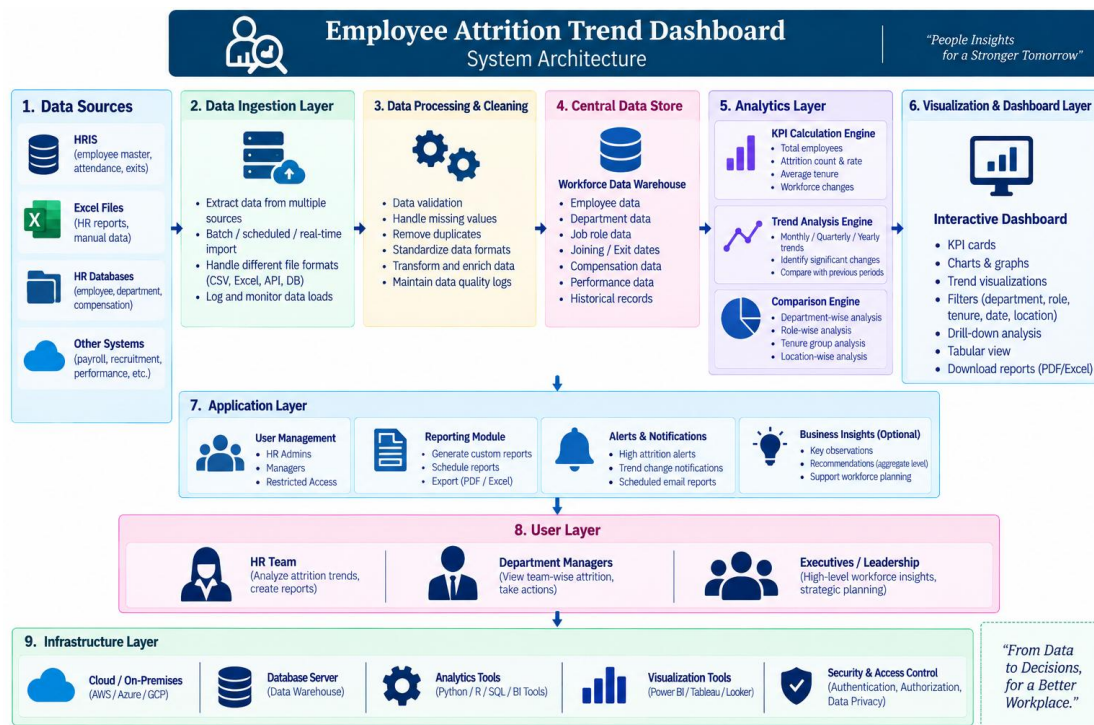
Advantages of Proposed System

- Provides centralized attrition analysis.
- Reduces manual HR reporting effort.
- Calculates important workforce KPIs automatically.
- Provides department-wise comparison.
- Supports role-wise and tenure-group analysis.
- Displays monthly, quarterly, and yearly trends.
- Provides interactive charts and visualizations.
- Supports filtering and drill-down analysis.
- Helps identify significant aggregate workforce changes.
- Makes historical comparison easier.
- Supports data-driven workforce planning.
- Enables faster generation of management reports.

IV. METHODOLOGY

The methodology begins by collecting historical workforce data from supported HR systems, spreadsheets, or organizational databases. The data-ingestion module imports the information into the dashboard platform and validates the available fields. The preprocessing module removes duplicate records, handles missing values, standardizes formats, and checks data consistency. The cleaned information is organized into structured workforce datasets containing departments, roles, employment status, dates, tenure groups, and other relevant attributes. A KPI calculation engine calculates employee counts, attrition counts, attrition rates, average tenure, and workforce changes. A trend-analysis module analyzes attrition patterns across different time periods. A comparison engine evaluates aggregate trends across departments, job roles, and tenure groups. The visualization engine converts the processed data into KPI cards, bar charts, line charts, tables, and other suitable visualizations. Users can apply filters to analyze selected reporting periods or organizational groups. The dashboard highlights notable aggregate changes for further investigation by HR teams. Reports can be generated and exported for management discussions and workforce planning. Finally, the system provides an interactive view of historical attrition trends while keeping final organizational decisions under appropriate human review.

SYSTEM ARCHITECTURE



The Employee Attrition Trend Dashboard consists of several interconnected layers for collecting, processing, analyzing, and visualizing workforce data. The User Interface allows HR professionals and managers to access the dashboard and apply filters. The Data Ingestion Layer imports workforce information from HRIS platforms, spreadsheets, databases, and supported data sources. The Data Cleaning and Transformation Module validates records, handles missing values, removes duplicates, and standardizes data formats. The Workforce Data Store maintains structured information about employees, departments, job roles, employment status, dates, and historical workforce records. The KPI Calculation Engine calculates aggregate employee counts, attrition counts, attrition rates, average tenure, and workforce changes. The Trend Analysis Engine examines historical attrition patterns across different periods. The Comparison Engine compares aggregate performance across departments, roles, tenure groups, and other organizational dimensions. The Visualization Engine generates KPI cards, charts, graphs, tables, and trend indicators. The Filter and Drill-Down Module allows users to explore selected periods and organizational groups. The Reporting Module generates downloadable workforce analytics reports. Finally, the Attrition Dashboard presents the analyzed information in an interactive and easy-to-understand format.

V. RESULT AND OUTPUT



VI. CONCLUSION

The Employee Attrition Trend Dashboard provides an effective and centralized solution for analyzing employee attrition and workforce trends. The system brings important workforce information such as employee count, attrition count, attrition rate, tenure, departments, job roles, and historical trends into a single interactive dashboard. This reduces the need for manually prepared reports and makes workforce analysis easier.

By using data processing, KPI analysis, data visualization, and trend analysis, the system transforms raw employee data into meaningful insights. HR professionals and managers can compare attrition across departments, job roles, tenure groups, and different time periods. Charts, graphs, tables, and KPI cards help users quickly identify significant aggregate workforce patterns.

The dashboard also supports better workforce planning by highlighting changes in attrition levels and identifying areas that may require further investigation. Interactive filters and drill-down features allow users to explore specific organizational groups and reporting periods. The system helps HR teams understand historical patterns while keeping final decisions under appropriate human review.

Overall, the Employee Attrition Trend Dashboard improves the efficiency, clarity, and accessibility of workforce analytics. It can support organizations in developing better retention strategies and workforce plans based on historical evidence. Future enhancements can include AI-assisted trend analysis, predictive workforce forecasting, anomaly detection, employee engagement analytics, real-time HR data integration, and automated management reports.

The system should be used responsibly for aggregate workforce analysis and should not automatically make decisions about individual employees. Attrition trends can have many causes, so dashboard findings should be investigated carefully and interpreted with appropriate organizational context.

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