

EMPLOYEE ATTRITION TREND DASHBOARD

¹ MD Riaz, ² B Roopa, ³ A Shiva kumar, ⁴ K Nithin, ⁵ N Yogitha

¹ Assistant Professor, ^{2,3,4,5} Students

Department of CSE

Siddhartha Institute of Technology & Sciences, Narapally

riyaz@siddhartha.org.in, 23tq1a0564@siddhartha.co.in, 23tq1a0593@siddhartha.co.in,

24tq5a0513@siddhartha.co.in, 24tq5a0515@siddhartha.co.in

Abstract

The Employee Attrition Trend Dashboard is a data-driven analytics system designed to monitor, analyze, and visualize employee attrition patterns within an organization. Employee attrition refers to employees leaving an organization due to various professional, organizational, or personal circumstances. High or increasing attrition can affect workforce stability, recruitment costs, productivity, and knowledge retention. Therefore, organizations require an effective method to understand historical attrition patterns and identify areas that need attention.

The proposed dashboard collects relevant workforce information such as employee status, department, job role, tenure, joining date, exit date, experience level, and other authorized organizational attributes. The system processes this information to calculate metrics such as attrition rate, employee count, voluntary and involuntary exits, department-wise attrition, tenure-wise attrition, and monthly or yearly trends. These metrics provide a structured view of workforce movement.

The dashboard presents the analyzed information using interactive charts, graphs, tables, KPI cards, and trend visualizations. Users can examine attrition according to department, job role, tenure group, age range, experience level, or selected time periods where such analysis is appropriate and permitted. Historical comparisons help users identify periods with unusually high attrition and understand how workforce turnover changes over time.

The system is intended to support HR teams and organizational managers in understanding workforce trends rather than making decisions about individual employees automatically. By identifying aggregated patterns, organizations can investigate possible causes through appropriate HR processes and develop suitable retention strategies. The dashboard can also help with workforce planning and resource forecasting.

Overall, the Employee Attrition Trend Dashboard provides a centralized and visual approach to workforce attrition analysis. It reduces the effort required to manually prepare HR reports and enables users to identify important trends more efficiently. The system can be further enhanced with forecasting, alerts, employee-engagement analysis, and integration with HR management systems while maintaining appropriate privacy and access controls.

I. Introduction

Employee retention is an important concern for organizations because frequent workforce changes can affect productivity, operational continuity, recruitment expenses, and organizational knowledge. Employees may leave organizations for

many different reasons, and attrition patterns can vary across departments, job roles, experience levels, and time periods. Understanding these patterns can help organizations develop more effective workforce planning and retention strategies.

Traditional attrition analysis often depends on spreadsheets, HR records, manually prepared reports, and periodic management reviews. HR teams may need to combine employee records with joining and exit information before calculating attrition rates. When organizations have a large workforce, manually processing this information becomes increasingly difficult. It can also make it harder to identify changes in attrition patterns quickly.

A dashboard-based approach can simplify this process by bringing relevant workforce information into a centralized analytical platform. The system can process employee movement records and generate important indicators such as monthly attrition rate, department-wise attrition, tenure-based trends, and employee exit counts. These indicators can then be presented through charts and graphs for easier interpretation.

Trend analysis is particularly valuable because attrition may change over time due to organizational changes, business conditions, workforce expansion, restructuring, or other factors. Comparing historical periods can help HR teams identify unusual increases or decreases in attrition. Department-level and role-level analysis can also help organizations determine where further investigation may be useful.

The main objective of the Employee Attrition Trend Dashboard is to provide a clear, centralized, and data-driven view of workforce turnover. The system focuses on aggregated patterns and trends rather than automatically evaluating individual employees. By providing accessible analytics and historical comparisons, the dashboard can support workforce planning, retention initiatives, recruitment planning, and informed organizational decision-making.

II. Literature Survey

Employee attrition has been widely studied in human resource management and organizational behavior because workforce turnover can influence organizational performance and operational costs. Traditional research on employee turnover examines factors such as job satisfaction, career development, compensation, organizational environment, workload, management practices, and opportunities for advancement. Understanding these factors can help organizations investigate why employee turnover occurs and develop appropriate retention strategies.

Attrition-rate analysis is one of the common approaches used in workforce management. Organizations generally calculate attrition by comparing the number of employees who leave during a particular period with an appropriate measure of the workforce size during that period. Monthly, quarterly, and annual attrition measurements can help organizations understand changes in workforce stability. Consistent measurement also makes it easier to compare trends across different departments and periods.

Department and role-based analysis provides another useful perspective for studying attrition. Different departments may experience different workforce conditions,

responsibilities, workloads, and career opportunities. Comparing aggregated attrition rates across departments and job roles can help HR teams identify areas that may require further investigation. Such comparisons should be interpreted carefully because differences in workforce size and organizational structure can influence the results.

Tenure-based analysis is also commonly used to understand employee turnover patterns. Employees in different stages of their organizational tenure may demonstrate different turnover patterns. For example, an organization may observe different levels of attrition among newly joined employees compared with long-serving employees. Grouping historical records into appropriate tenure categories can therefore provide useful information for workforce planning and retention analysis.

Business intelligence and data visualization technologies have increasingly been applied to human resource analytics. Dashboards can transform employee-related datasets into visual indicators, trend charts, comparison graphs, and detailed reports. Instead of manually reviewing spreadsheets, HR professionals can use interactive filters and visualizations to examine workforce patterns more efficiently. Historical data can also be used to compare changes across different periods.

Based on these approaches, an Employee Attrition Trend Dashboard can provide a centralized platform for combining workforce data, attrition calculations, trend analysis, and visualization. The proposed system focuses on aggregated and authorized HR information and provides multiple perspectives on workforce turnover. By presenting historical patterns in a clear format, the system can support HR professionals and managers in workforce planning and evidence-based retention strategies.

III. System Analysis

The system analysis identifies the requirements and operational processes of the Employee Attrition Trend Dashboard. The system collects authorized employee and workforce movement data from HR-related sources. The collected information may include employee status, department, job role, joining date, exit date, and other relevant attributes. The system validates and cleans the collected records before storing them in a centralized database. Attrition metrics are calculated according to predefined organizational rules. The system can calculate monthly, quarterly, and annual attrition rates. Employee exits can be grouped according to department, job role, tenure, and other approved categories. Trend analysis is performed to identify changes in attrition over different periods. The dashboard displays the results using KPI cards, charts, graphs, tables, and trend visualizations. Authorized users can apply filters to examine specific departments, roles, periods, or workforce categories. Historical comparisons help users understand changes in workforce turnover. The resulting information supports workforce planning, retention analysis, recruitment planning, and management decision-making.

Existing System

In many organizations, employee attrition is monitored using spreadsheets, HR management systems, employee records, and manually prepared reports. Employee

joining and exit information may be maintained across different files or systems. HR teams may manually calculate attrition rates for different departments and reporting periods. Preparing these reports repeatedly can require considerable time and administrative effort. Historical attrition trends may be difficult to identify when records are not maintained in a centralized analytical system. Comparing departments or job roles can also require manual data preparation. Static reports may provide limited visualization and interactive analysis capabilities. Increasing workforce size can make manual data processing more complicated. Important changes in attrition trends may not be identified immediately. Different teams may also use inconsistent calculation or reporting methods. Therefore, a centralized dashboard can provide a more efficient and standardized approach for analyzing workforce attrition trends.

Disadvantages of Existing System

- Employee attrition data may be distributed across multiple sources.
- Manual data preparation requires considerable time.
- Attrition calculations may be inconsistent.
- Higher possibility of human calculation errors.
- Limited visualization of attrition trends.
- Difficult to compare departments quickly.
- Historical analysis may require manual effort.
- Static reports provide limited interactive analysis.
- Increasing workforce size makes manual analysis difficult.
- Sudden changes in attrition may not be identified quickly.
- Report generation can consume significant HR resources.
- Difficult to obtain a centralized view of workforce turnover.

Proposed System

The proposed **Employee Attrition Trend Dashboard** provides a centralized platform for collecting, analyzing, and visualizing workforce attrition information. The system collects authorized HR data containing employee status, department, job role, joining date, exit date, and other relevant organizational attributes. The collected information is validated and cleaned before being stored in a centralized database. The analytics module calculates attrition rates and employee-exit metrics for selected reporting periods. Attrition information can be grouped by department, job role, tenure, experience level, and other approved categories. The system generates monthly, quarterly, and annual trends to show changes in workforce turnover. The dashboard presents the results through KPI cards, charts, graphs, tables, and comparison visualizations. Users can apply filters to examine specific departments, roles, workforce groups, or time periods. Historical comparisons allow HR teams to identify increases, decreases, and recurring patterns in attrition. The system provides aggregated insights rather than automatically making decisions about individual employees. Appropriate access controls can be applied to protect confidential workforce information. Overall, the proposed system supports workforce planning, retention analysis, recruitment planning, and data-driven HR decision-making.

Advantages of Proposed System

- Centralized employee attrition information.

- Automated attrition-rate calculations.
- Clear visualization of workforce turnover trends.
- Supports department-wise comparison.
- Supports role-wise and tenure-wise analysis.
- Provides historical attrition analysis.
- Reduces manual report preparation.
- Helps identify changing attrition patterns.
- Supports workforce and recruitment planning.
- Enables faster HR reporting.
- Provides interactive filtering and analysis.
- Supports data-driven organizational decision-making.
- Can be extended with forecasting and alerts.

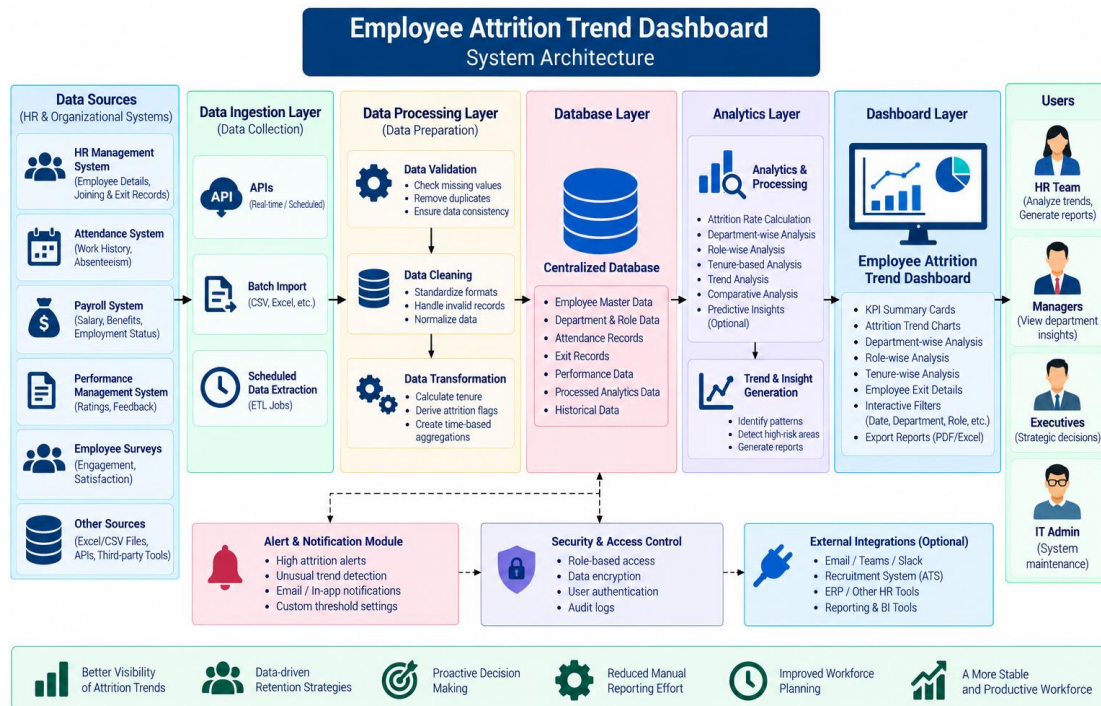
IV. Methodology

The methodology begins by collecting authorized workforce and employee-movement information from HR systems and organizational records. The collected data may include employee status, department, job role, joining date, exit date, and other approved attributes. The raw records are validated to identify missing, inconsistent, or invalid information. Data preprocessing is then performed to clean and standardize the records before analysis. The processed information is stored in a centralized database for efficient retrieval and historical analysis. The system calculates appropriate attrition metrics for selected reporting periods. Attrition records are grouped according to department, role, tenure, and other approved workforce categories. Trend analysis is performed to identify changes in attrition over time. The analytics results are converted into KPI cards, charts, graphs, tables, and comparison reports. Authorized users can apply filters to examine specific workforce groups or time periods. Historical comparisons help HR teams understand recurring patterns and changes in workforce turnover. The resulting insights support retention planning, recruitment forecasting, workforce planning, and organizational decision-making.

System Architecture

The system architecture consists of multiple layers responsible for collecting, processing, storing, analyzing, and presenting employee attrition information. The Data Source Layer contains authorized HR systems, employee records, attendance systems, payroll-related records, and workforce-management sources where applicable. The Data Collection Layer retrieves relevant workforce information through secure APIs, database connections, or scheduled data imports. The Data Processing Layer validates, cleans, transforms, and standardizes the collected information. The processed records are stored in the Centralized Database Layer, which maintains current and historical workforce information. The Analytics Layer calculates attrition rates, employee-exit counts, department-wise trends, role-wise trends, and tenure-based metrics. The Trend Analysis Module compares results across different time periods and workforce categories. The Dashboard Layer presents the analytical results through KPI cards, trend charts, comparison graphs, tables, and reports. Authorized HR professionals and managers can interact with the dashboard using appropriate role-based access controls. Users can filter the information by date, department, role, tenure group, or other approved categories. Historical information allows users to identify changes and recurring workforce attrition patterns. The

architecture can be extended with forecasting, automated alerts, retention-analysis modules, and integration with additional HR systems while maintaining appropriate data privacy and security controls.



V. Result and Output



VI. Conclusion

The Employee Attrition Trend Dashboard provides a centralized and effective solution for monitoring, analyzing, and visualizing employee attrition patterns. The system brings together relevant workforce information and converts it into meaningful metrics such as attrition rate, employee exits, department-wise attrition, role-wise trends, tenure-based attrition, and exit reasons.

The dashboard makes it easier for HR teams and managers to understand workforce turnover through interactive charts, graphs, KPI cards, and detailed tables. Historical trend analysis helps identify periods of increasing or decreasing attrition and highlights departments or workforce groups that may require further investigation.

The proposed system reduces the effort involved in manually preparing HR reports and supports more consistent, data-driven workforce planning. It can help organizations understand retention challenges, plan recruitment requirements, and evaluate the effectiveness of retention initiatives while maintaining appropriate privacy and access controls.

Overall, the Employee Attrition Trend Dashboard provides a useful foundation for improving workforce analytics and organizational decision-making. Future enhancements can include attrition forecasting, automated alerts, deeper workforce analytics, integration with HR systems, and advanced predictive models to support proactive workforce planning.

References

- [1] Kumar, R. D., Prudhviraj, G., Vijay, K., Kumar, P. S., & Plugmann, P. (2024). Exploring COVID-19 through intensive investigation with supervised machine learning algorithm. In *Handbook of Artificial Intelligence and Wearables* (pp. 145-158). CRC Press.
- [2] Swathi, B., Vijay, K., Sushanth Babu, M., & Dinesh Kumar, R. (2024, November). Machine Learning Techniques in Cloud Based Intrusion Detection. In *The International Conference on Artificial Intelligence and Smart Environment* (pp. 557-564). Cham: Springer Nature Switzerland.
- [3] Sv satyakrishna, shirisha rangu ,bhargavi nalacheruve.(2024) Prospective investigation on colorectal cancer with SMOTE on machine learning Algorithm
- [4] Dr.G.Vishnu Murthy, BhargaviNalacheruve 1Professor, Department of computer Science & engineering, Anurag University, TS, India. 2Student, Department of computer Science & engineering, Anurag University, TS, India.
- [5] V. N. S. Manaswini, K. K, C. Nigam, S. S. Ali, R. Niranjana, and Suman, "Real-Time Object Detection in Drone Surveillance Using YOLOv5," in *Proc. 2025 3rd Int. Conf. IoT, Communication and Automation Technology (ICICAT)*, Gorakhpur, India, 2025, pp. 1–6, doi: 10.1109/ICICAT68430.2025.11414670.
- [6] B. Soundarya, V. N. S. Manaswini, M. Ayyakrishnan, R. D. Kumar, "Contextual Analysis of Big Data Analytics in Intelligent Transportation Frameworks," in *Intersection of Artificial Intelligence, Data Science, and Cutting-Edge Technologies: From Concepts to Applications in Smart Environment*, *Lecture Notes in Networks and Systems*, vol. 1353, Cham: Springer, 2025, doi: 10.1007/978-3-031-88304-0_79.

- [7] R. D. Kumar, V. N. S. Manaswini, “Applications of blockchain in smart cities: detecting fake documents from land records using blockchain technology,” in *Blockchain for Smart Cities*, Elsevier, 2021, pp. 105–117, doi: 10.1016/B978-0-12-824446-3.00017-X.
- [8] Tejavath Veeramma, Badarla Anil, Guguloth Ravinder, “An advanced movie recommender using collaborative filtering and sentiment analysis,” *International Research Journal of Modernization in Engineering Technology and Science*, vol. 7, no. 7, July 2025, doi: 10.56726/IRJMETS81618.
- [9] Ravi Kumar Banoth, Ramana Murthy B V, “Automatic crop recommendation system using LightGBM and decision tree machine learning models,” *Journal of Machine and Computing*, vol. 5, no. 1, pp. 343, Jan. 2025, doi: 10.53759/7669/jmc202505026.
- [10] Ravi Kumar Banoth, Dr. B.V. Ramana Murthy, “Smart agriculture through IoT and machine learning for analyzing carbon footprints,” in *Proc. Int. Conf. Computer Science and Communication Engineering (ICCSCE)*, Apr. 2025.
- [11] Ravi Kumar Banoth, B. V. Ramana Murthy, “Soil image classification using transfer learning approach: MobileNetV2 with CNN,” *SN Computer Science*, vol. 5, art. no. 199, 2024, doi: 10.1007/s42979-023-02500-x.