International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

# FMCG DISTRIBUTOR SALES ANALYTICS AND PREDICTION

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## ABSTRACT

Employee satisfaction is an important factor in maintaining a productive, engaged, and stable workforce. Organizations collect large amounts of employee-related data, including salary, workload, working hours, job role, department, performance, training, and work-life balance. Analyzing this information can help organizations understand employee experiences and identify patterns associated with satisfaction.

The **Employee Satisfaction Score Prediction** system is developed to analyze employee data and predict satisfaction scores using data analytics and Machine Learning techniques. The system processes attributes such as department, job role, salary, experience, workload, working hours, performance rating, training participation, and satisfaction score. Data preprocessing techniques are applied to handle missing values, duplicate records, inconsistent formats, and invalid data.

The system performs exploratory and statistical analysis to understand the factors associated with employee satisfaction. Important metrics such as average satisfaction score, satisfaction distribution, department-wise satisfaction, role-wise satisfaction, workload impact, and experience-based satisfaction are calculated. Interactive dashboards display these insights using KPI cards, charts, graphs, tables, and filters.

The prediction module uses Machine Learning algorithms to predict an employee's satisfaction score or classify satisfaction into categories such as low, medium, and high. Historical employee data is used to train the model, while suitable evaluation metrics are applied to measure prediction performance. The system can therefore provide analytical and predictive insights from available HR data.

Overall, the proposed system combines HR analytics, employee satisfaction analysis, data visualization, and predictive modeling in a single platform. It can help HR teams understand satisfaction patterns and analyze workplace factors using historical data. Future enhancements can include real-time employee surveys, sentiment analysis, personalized recommendations, attrition-risk analysis, and automated HR alerts.

## I. INTRODUCTION

Employee satisfaction refers to the level of contentment employees experience with their job, workplace environment, responsibilities, compensation, management, and career opportunities. It is an important aspect of Human Resource Management because employee experience can influence engagement, productivity, and workforce stability. Therefore, organizations need effective methods to analyze and monitor employee satisfaction.

Modern organizations generate large amounts of employee information through HR systems, payroll platforms, attendance systems, performance-management systems, training platforms, and employee surveys. This information can contain useful indicators such as salary, workload, working hours, experience, performance, training, and employee feedback.

Traditional employee satisfaction analysis mainly depends on periodic surveys, feedback forms, interviews, and manual reporting. Although these methods can

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provide useful information, analyzing large datasets manually can be time-consuming. It can also be difficult to identify relationships between multiple workplace factors and satisfaction levels.

Data analytics and visualization can simplify employee satisfaction analysis by presenting important metrics through dashboards. HR professionals can examine satisfaction scores across departments, job roles, experience levels, salary groups, and other categories. Charts and graphs can make patterns and trends easier to identify.

Machine Learning can further improve HR analytics by predicting satisfaction scores or satisfaction categories using historical employee data. Models can learn relationships between available employee attributes and satisfaction outcomes. The proposed system integrates data preprocessing, analytics, visualization, and Machine Learning to provide a comprehensive employee satisfaction prediction framework.

## II. LITERATURE SURVEY

Employee satisfaction analytics has become an important area of Human Resource Analytics because organizations increasingly use data to understand employee experiences. Employee datasets can contain information about departments, job roles, salary, experience, working hours, workload, performance, training, and satisfaction. These attributes can be analyzed to identify patterns related to employee satisfaction.

Employee satisfaction is influenced by multiple workplace factors. Salary, workload, work-life balance, management support, career development, recognition, working conditions, and training opportunities are commonly considered in employee experience analysis. Statistical techniques can be used to examine relationships between these factors and satisfaction outcomes.

Employee surveys are widely used to collect satisfaction and engagement information. Surveys provide direct feedback from employees about their workplace experiences. However, survey datasets may contain missing responses, inconsistent values, subjective opinions, and categorical information that require appropriate preprocessing before analysis.

Data visualization is frequently used in HR analytics to present employee satisfaction information. Bar charts, pie charts, histograms, scatter plots, heatmaps, and trend graphs can show differences in satisfaction between departments, job roles, and experience groups. Interactive dashboards can make this information easier for HR teams to explore.

Machine Learning techniques can be applied to employee satisfaction prediction. Regression algorithms can be used to predict numerical satisfaction scores, while classification algorithms can categorize employees into satisfaction groups. Features such as workload, salary, working hours, experience, performance, and training can be used when they are available and appropriate for the dataset.

Modern HR analytics platforms combine employee information, survey responses, descriptive analytics, predictive modeling, and visualization. Advanced systems can also analyze employee comments using Natural Language Processing and sentiment analysis. The proposed system follows this analytical approach by integrating satisfaction analysis and Machine Learning-based prediction into a centralized platform.

## III. SYSTEM ANALYSIS

The Employee Satisfaction Score Prediction system is designed to analyze employee information and predict satisfaction outcomes. The system accepts data such as department, job role, salary, experience, workload, working hours, performance,

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training, and satisfaction score. The input data is validated to ensure that required fields and supported formats are available. The preprocessing module handles missing values, duplicate records, invalid entries, and inconsistent formats. Numerical attributes such as salary, working hours, workload, and performance are converted into suitable numerical formats. Categorical attributes such as department, job role, education, and employment type are encoded for analysis. Feature engineering creates useful attributes such as experience groups, workload categories, salary bands, and performance groups. The analytics module calculates average satisfaction score and satisfaction-level distribution. Department-wise and job-role-wise analysis is performed to identify satisfaction patterns. Correlation analysis examines relationships between satisfaction and selected workplace factors. Trend analysis can identify changes in satisfaction across available time periods. The Machine Learning module uses historical data to train a suitable prediction model. The prediction module generates an estimated satisfaction score or satisfaction category for suitable employee inputs. Visualization components present analytical results through dashboards, charts, graphs, tables, and KPI cards. The system provides an integrated environment for employee satisfaction analysis and prediction.

**Existing System**

Existing organizations generally measure employee satisfaction through surveys, feedback forms, performance reviews, interviews, and HR reports. These methods provide useful information about employee opinions and workplace experiences. However, traditional satisfaction analysis is often performed manually using spreadsheets or basic reporting tools. Processing large employee datasets can be time-consuming and difficult to manage manually. Existing systems may primarily display collected satisfaction scores without providing advanced predictive capabilities. Relationships between salary, workload, working hours, performance, training, and satisfaction may require separate analysis. Department-wise and role-wise satisfaction comparisons may not always be available through interactive dashboards. Employee feedback may remain in an unstructured form and may not be analyzed automatically. Periodic surveys may also make continuous satisfaction monitoring difficult. Separate analytical and Machine Learning tools may be required for advanced prediction. These limitations create a need for a centralized platform that combines satisfaction analytics, visualization, and prediction.

**Disadvantages of Existing System**

- Heavy dependence on periodic employee surveys.
- Manual analysis can be time-consuming.
- Limited satisfaction prediction capabilities.
- Difficult to analyze large employee datasets.
- Limited department-wise satisfaction analysis.
- Limited job-role-wise satisfaction comparison.
- Workplace factors may not be analyzed together.
- Employee feedback may remain unstructured.
- Limited continuous satisfaction monitoring.
- Manual HR report generation may be required.
- Separate tools may be required for Machine Learning.
- Difficult to identify complex satisfaction patterns.

**Proposed System**

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The proposed Employee Satisfaction Score Prediction system provides a centralized platform for analyzing employee satisfaction and predicting satisfaction outcomes. Users can upload historical HR datasets or connect the system to an authorized employee data source. The validation module checks required fields, data types, formats, and basic data quality. The preprocessing module removes duplicate records and handles missing, invalid, and inconsistent information. Numerical and categorical attributes are transformed into suitable formats for analytics and Machine Learning. Feature engineering creates attributes such as workload category, salary band, experience group, performance category, and working-hour group. The analytics module calculates average satisfaction, satisfaction distribution, and employee-level satisfaction metrics. Department-wise and job-role-wise analysis identifies differences in satisfaction across employee groups. Factor analysis examines the relationship between satisfaction and available workplace factors. Historical trends can be analyzed when date-based information is available. A Machine Learning model is trained using historical employee records to predict numerical satisfaction scores or satisfaction categories. The prediction module generates estimated satisfaction outcomes for suitable employee inputs. Interactive dashboards display KPIs, satisfaction distributions, trends, comparisons, and prediction results. The proposed system therefore provides a unified platform for employee satisfaction analytics and prediction.

**Advantages of Proposed System**

- Provides centralized employee satisfaction analytics.
- Automates satisfaction-score calculations.
- Supports department-wise satisfaction analysis.
- Supports job-role-wise satisfaction comparison.
- Analyzes multiple workplace factors.
- Provides interactive dashboards.
- Identifies satisfaction patterns and trends.
- Supports numerical satisfaction prediction.
- Supports low, medium, and high satisfaction classification.
- Reduces manual HR analysis effort.
- Supports data-driven workforce planning.
- Can be extended with employee feedback analysis.

## IV. METHODOLOGY

The methodology begins with collecting historical employee and satisfaction data from authorized HR datasets, employee surveys, or organizational sources. The collected data is validated to check its structure, required attributes, data types, and completeness. Data preprocessing is performed to remove duplicate records and handle missing, invalid, and inconsistent values. Numerical attributes such as salary, working hours, workload, performance, and satisfaction scores are converted into suitable formats. Categorical attributes such as department, job role, education, and employment type are encoded for analysis and Machine Learning. Feature engineering creates useful attributes such as experience groups, workload categories, salary bands, and performance categories. Exploratory Data Analysis is performed to understand satisfaction distributions and identify important patterns. Statistical analysis is used to examine relationships between satisfaction and selected workplace factors. Visualization techniques are applied to compare satisfaction across departments, roles, experience groups, and other categories. Machine Learning

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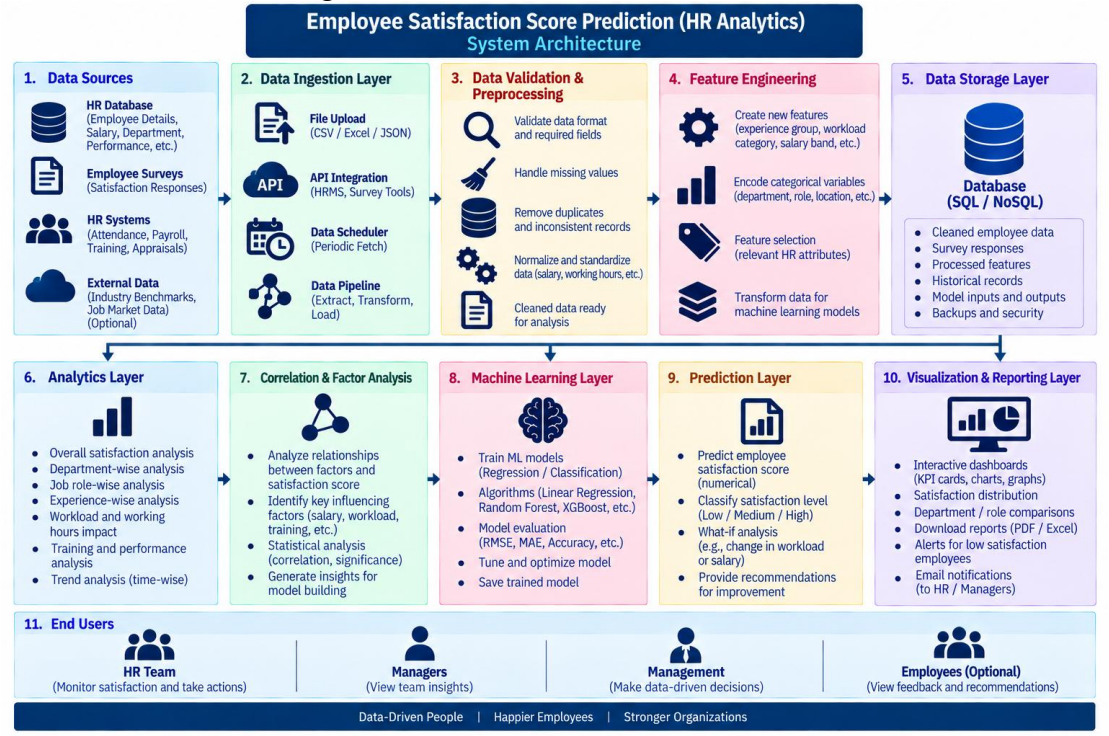
models are trained using suitable historical employee features to predict satisfaction scores or satisfaction categories. Model performance is evaluated using appropriate regression or classification metrics. Finally, analytical insights and prediction results are integrated into an interactive HR analytics dashboard.

## SYSTEM ARCHITECTURE

The system architecture consists of multiple interconnected layers that process employee information and generate satisfaction analytics and predictions. The Data Source Layer provides employee, salary, department, job-role, workload, working-hour, performance, training, and satisfaction information from authorized HR sources. The Data Input Layer accepts data through CSV files, Excel files, databases, surveys, or APIs. The Data Validation Layer checks file formats, required fields, data types, and basic data quality. The Data Preprocessing Layer handles missing values, duplicate records, invalid entries, and inconsistent formats. The Feature Engineering Layer creates attributes such as experience groups, workload categories, salary bands, performance groups, and working-hour categories. The Data Storage Layer securely stores cleaned employee and satisfaction records. The Satisfaction Analytics Layer calculates average satisfaction, satisfaction distribution, department-wise scores, role-wise scores, and other HR metrics. The Correlation and Factor Analysis Layer examines relationships between satisfaction and available workplace factors. The Machine Learning Layer trains and evaluates suitable models for satisfaction prediction or classification. The Prediction Layer generates estimated satisfaction scores or categories for suitable employee inputs. The Visualization Layer presents results through interactive dashboards, KPI cards, charts, graphs, tables, and filters. The Reporting Layer generates satisfaction reports and analytical summaries for authorized HR and management users.




## V. RESULT AND OUTPUT

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## VI. CONCLUSION

The Employee Satisfaction Score Prediction (HR Analytics) system provides a data-driven approach for analyzing employee satisfaction and understanding workplace-related factors. The system processes employee information and converts raw HR data into meaningful analytical insights using data preprocessing, statistical analysis, visualization, and Machine Learning techniques.

The system analyzes factors such as salary, workload, working hours, job role, department, experience, training, performance, and work-life balance. These factors help identify satisfaction patterns across different employee groups and provide a better understanding of the overall workforce experience.

The interactive dashboard presents important information through KPI cards, satisfaction trends, department-wise analysis, job-role comparisons, satisfaction-level distribution, factor analysis, and employee summaries. This makes complex HR data easier to interpret and allows users to examine employee satisfaction from multiple perspectives.

The prediction module can estimate an employee's satisfaction score or classify the employee into Low, Medium, or High Satisfaction categories based on the available historical data. The resulting predictions provide additional analytical information that can support HR teams in understanding employee satisfaction patterns and identifying areas that may require further attention.

In the future, the system can be enhanced with real-time employee surveys, sentiment analysis of feedback, personalized engagement recommendations, attrition-risk prediction, skill-gap analysis, automated HR alerts, and advanced Machine Learning models. These enhancements can make the system more comprehensive and useful for continuous employee experience and workforce analytics.

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International Journal of
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