Study on HR Analytics and Metrics for Improving the Employee Performance with Special Reference to MP

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Abstract

HR analytics is formed as the interpretation of data patterns that help decision-making and operation getting more out. HR analytics is formed as the process of measuring the impact of HR metrics, such as time to get use of person for money and retention rate, on business operation. We are taking employee data of computer-based training and compare their process of evaluating employee performance by other employee related entities to determine their performance and suitability. The research analysis for HR Analytics in present scenario is a study provides practical information for HR managers aiming to adopt HR Analytics and how data analysis is helpful in forecasting and making future decisions, especially in Special Reference to MP. We are focusing on the computer-based analysis of employee performance is an attempt to assess the efficiency or effectiveness and performance of an enterprise. In this work, we collect data based on primary and secondary data. The objectives for data collection are calculating the performance of employee and take decision. The HR analytics finds that the useful decision- making processing of employee performance that is necessary to implement key recommendations contained in improving performance and to enhance the business operation.

Keywords: Performance Analysis, HR Analytics, Metrics, Critical Value, ANOVA

Introduction

HR analytics is a data-driven approach that enhances decision-making and optimizes HR operations. It relies on the quality of data derived from HR metrics such as time-to-hire, time-to-fill, application dropout rate, first-year turnover rate, top talent retention rate, average absenteeism rate, and training costs per employee. By effectively utilizing these metrics, HR leaders can identify best practices, pinpoint areas for improvement, and prioritize the most critical business issues.

HR analytics provides a detailed breakdown of HR functions and demonstrates how to align them with business objectives. Data scientists can assess the quality and accuracy of the data, helping HR professionals leverage it to make informed decisions. Ensuring that decisions are based on data-driven insights is a key aspect of HR analytics. Leaders can support HR professionals and business partners in adapting to digital transformation by simplifying their analytics education. This gradual adaptation helps employees integrate analytics into the workplace culture, fostering development and compliance with legal requirements.

HR analytics equips HR leaders with the necessary data to enhance HR functions and the employee experience. As technology continues to evolve, managing and supporting employees throughout their lifecycle is essential. Enhancing HR strategies through analytics can improve job satisfaction and contribute to a healthy organizational culture.

In a world of constant change, HR analytics is gaining widespread acceptance alongside HR automation. These tools work together to build sustainable businesses globally. HR metrics are crucial for evaluating various aspects of workforce performance and ensuring smooth operations. HR plays a pivotal role in managing the workforce, which is responsible for the success of any business. Understanding that an organization's success hinges on employee performance is vital.

To thrive in a rapidly changing environment, every organization needs specific HR metrics and benchmarks to ensure employees perform at their best. By establishing clear HR metrics, businesses can set well-defined goals aligned with organizational needs. These metrics help business managers track employee productivity, identify training opportunities, and provide necessary support to maintain performance levels.

HR metrics ensure that employees have the resources they need to achieve their goals within the organization. Key HR metrics include employee satisfaction, which measures whether employees would recommend their organization as a good workplace; headcount, which tracks the total number of employees in the organization or specific divisions; workforce demographics, which provides detailed information on the characteristics of the workforce, including age, gender, education level, and tenure; and time-to-hire, which measures the total days it took to hire a new employee after posting a job opening. Additionally, metrics like training cost per employee and training completion rate are essential for evaluating the effectiveness of training programs. These metrics, among others, are invaluable for making data-driven decisions backed by evidence.

HR analytics and metrics, regardless of the organization's size, are crucial for business success. They enable HR leaders to optimize processes, improve employee satisfaction, and ultimately drive the organization towards its goals.

Literature view

Aral, Brynjolfsson, and Wu (2012), in their study titled "Three-way complementarities: Performance pay, human resource analytics, and information technology," published in *Management Science*, examine how these practices work together to create a synergistic incentive system that enhances productivity. Their findings suggest that the adoption of Human Capital Management (HCM) software is most effective in firms that have also adopted performance pay and HR analytics practices. They found that these practices are mutually reinforcing, and when implemented together, they yield a greater productivity premium than when implemented separately. Momin and Mishra further elaborate that organizations seeking a competitive edge must leverage HR analytics for accurate and real-time data.

Bassi (2011), in "Raging Debates in HR Analytics," published in *People and Strategy*, explores the role of HR analytics in elevating the status of the HR profession and as a source of competitive advantage. The study argues that HR analytics should be used to enhance individual and employee performance rather than merely to justify the cost of HR. Sharma, Mithas, and Kankanhalli (2014) also highlight that business analytics can improve decision quality, though it remains unclear whether it improves decision acceptance. HR analytics facilitates manpower planning and the analysis of various HR metrics, yet a consensus exists that the lack of analytical skills among HR professionals is a significant barrier to its implementation. The

transformation of HR requires attracting talent from the education sector and equipping HR practitioners with numeracy and metrics skills to fully incorporate HR analytics into all HR processes.

Bhattacharyya (2017), in his book "HR Analytics: Understanding Theories and Applications," discusses the application of analytic logic in HRM functions. Dahlbom et al. (2020), in their study "Big Data and HR Analytics in the Digital Era," focus on how the HR function can leverage HR analytics, including big data, while discussing the technical and human challenges that hinder the adoption of advanced HR analytics. They identify technology, organization, and people as the key factors influencing HR analytics adoption.

Gurusinghe, Arachchige, and Dayarathna (2019), in "Identified Research Gaps in HR Analytics," presented at the conference "Challenges to Humankind in the Face of New Technologies" in Colombo, Sri Lanka, note that the Asia-Pacific region is expected to grow rapidly in HR analytics due to quick digital transformation. They emphasize that HR analytics enables organizations to make data-driven business decisions, thereby enhancing organizational performance.

Jabir et al. (2019), in "HR Analytics: A Roadmap for Decision Making: Case Study," describe HR analytics as a tool for understanding why and how things happen, providing alerts for subsequent actions, and predicting best and worst-case scenarios based on analyzed data. Jain and Nagar (2015), in "An Emerging Trend in Human Resource Management," emphasize the future of HR analytics in integrating quantitative and qualitative data to derive insights that support management decisions.

Kapoor and Sherif (2012), in "Human Resources in an Enriched Environment of Business Intelligence," discuss the role of business intelligence (BI) and data analytics as precursors to HR management protocols. They highlight the challenges global organizations face in managing a diverse workforce and underscore the importance of HR analytics in managing HR-related data and supporting decision-making.

Kiran et al. (2018), in "HR Analytics: Transactional to Transformational HR Approach," describe HR analytics as a knowledge-driven framework for solving business problems. It involves smart decision-making supported by a combination of software, hardware, and methodologies that apply statistical models to HR data.

Considering the above definitions, HR analytics can be defined as the application of research designs and advanced statistical tools for evaluating HR data to make evidence-based decisions, thereby achieving a competitive advantage through a resource-based view.

Molefe (2013), in "From Data to Insights: HR Analytics in Organizations," highlights the role of HR analytics in measuring employee performance and engagement, analyzing workforce patterns, and optimizing return on investment (ROI) through data-driven decision-making. HR analytics is expected to continue growing within organizations, with HR managers increasingly focusing on business outcomes and improving employee engagement.

Mondore et al. (2011), in "Maximizing the Impact and Effectiveness of HR Analytics to Drive Business Outcomes," published in *People and Strategy*, argue that for HR to become a strategic function within organizations, proper implementation of HR analytics is key.

Reddy and Lakshmi Keerthi (2017), in "'HR Analytics' - An Effective Evidence-Based HRM Tool," emphasize the importance of data-driven, evidence-based HRM in making accurate HR decisions. They advocate for the use of data, analyses, and research to understand the relationship between people management practices and business outcomes, such as profitability and customer satisfaction.

Shahzad (2014), in "Impact of Organizational Culture on Employees' Job Performance: An Empirical Study of Software Houses in Pakistan," finds that organizational culture has a significant positive impact

on employee performance. Vihari and Rao (2013), in "Analytics as a Predictor for Strategic and Sustainable Human Resources Function: An Integrative Literature Review," discuss the application of advanced data processing and business analytics techniques to the HR field, emphasizing its role in strategic HR management.

Research Gap

HR analytics and metrics have become crucial in the competitive business landscape, significantly enhancing HR operations. However, a gap exists in the literature regarding the application of HR analytics and the variables that influence organizational productivity. Specifically, the relationship between HR analytics, metrics, employee behavior, employee attitude, and employee performance is not thoroughly explored. This study aims to identify and analyze these relationships to better understand how HR analytics and metrics can be leveraged to meet organizational expectations, improve productivity, and foster a positive work culture.

Objective of the Study

1. To study the impact of HR analytics and HR metrics on employee performance.

3. Proposed Methodology

Research involves a scientific and systematic search for relevant information on a specific topic. It includes clearly stating the problem, formulating a hypothesis, collecting data, analyzing the facts, and reaching conclusions either as solutions to the problem or generalizations for theoretical formulation.

3.1 Data Collection

In this phase, I will collect relevant data from various heterogeneous and homogeneous sources. The data, particularly from various HR forms in the context of Madhya Pradesh (MP), will be crucial for analyzing and improving employee performance.

3.2 Hypothesis

- H_0: There is no significant relationship between HR analytics and metrics on employee performance.
- H_1: There is a significant relationship between HR analytics and metrics on employee performance.

Research Design

Research design involves planning and selecting the research framework and methodology to analyze the problem. It serves as a blueprint for conducting research, determining sample size, methods of data collection, research scale, and so on.

For this study, **descriptive research** was adopted due to its suitability for the research objectives. Descriptive research is statistical in nature and describes the data and features of the population or phenomenon being studied. It answers questions such as who, what, where, when, and how, covering characteristics like age, income, education, and more. The qualitative nature of data collected includes knowledge, attitudes, assumptions, and opinions, making this research design appropriate for the study.

Research Parameters:

1. **Population**: The population will consist of 120 employees from Lakshmi Narain College of Technology, Oriental Institute of Science & Technology, and Jai Narain College of Technology in Bhopal, MP.

2. **Sample Unit**: Employees of Lakshmi Narain College of Technology, Oriental Institute of Science & Technology, and Jai Narain College of Technology, Bhopal, will be considered the sample unit.
3. **Sample Size**: The sample size will be approximately 120.
4. **Sampling Frame**: The sampling frame will include employees from MP.
5. **Sampling Technique**: Convenience sampling will be used to select the sample.

Tools Used for Data Analysis

A one-way ANOVA (Analysis of Variance) will be employed to compare the means between different groups of employees from Lakshmi Narain College of Technology (LNCT), Oriental Institute of Science & Technology (OIST), and Jai Narain College of Technology (JNCT) in Bhopal. The goal is to determine whether there are statistically significant differences in employee performance among these groups.

The one-way ANOVA test is instrumental in determining whether the survey or experimental results are significant. It helps in deciding whether to reject the null hypothesis (H10) or accept the alternative hypothesis (H11). Methodical factors can have statistical effects on the given data set, while there are no random factors considered in this analysis.

Data Interpretation and Analysis

In this experimental observation, the HR department uses a one-way ANOVA to test the null hypothesis that the means of employee performance ratings from three populations (LNCT, OIST, and JNCT) are equal.

The table below (Table 1) shows how 120 employees rated their training on a scale of 1-10. A significance level of 0.05 is used for the analysis. The calculated test statistic (F) is 7.2183, the P-value is 0.0008, and the critical value is 0.563.

Table 1: Comparison of Employee Performance Ratings

LNCT(Out of 10)	OIST(Out of 10)	JNCT(Out of 10)
4	9	6
5	8	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
4	9	6
5	8	8
6	4	7
8	8	4
4	7	6
7	6	8

9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8

6	5	7
7	9	8
4	9	6
5	8	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
4	9	6
5	8	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8

9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
6	4	7
8	8	4
4	7	6
7	6	8
9	8	9
5	6	8
6	5	7
7	9	8
∑ LNCT = 764	**∑ OIST = 810**	**∑JNCT = 854**

Table 2: ∑ LNCT, OIST, JNCT

(LNCT)²	(OIST)²	(JNCT)²
16	81	36
25	64	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
16	81	36
25	64	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81

25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49

49	81	64
16	81	36
25	64	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
16	81	36
25	64	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81

25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
36	16	49
64	64	16
16	49	36
49	36	64
81	64	81
25	36	64
36	25	49
49	81	64
$\sum (LNCT)^2 = 5148$	$\sum (OIST)^2 = 5774$	$\sum (JNCT)^2 = 6322$

Table 3: Data Summary

Groups	N	$\sum x$	Mean	$\sum x^2$	Std. Dev.	Std. Error
LNCT	120	764	6.3666666666667	5148	1.5445	0.141
OIST	120	810	6.75	5774	1.6049	0.1465
JNCT	120	854	7.1166666666667	6322	1.433	0.1308
Total	360	2428	6.7444444444444	17244		

Table 4: ANOVA Summary

Source	Degrees of Freedom (DF)	Sum of Squares (SS)	Mean Square (MS)	F-Stat	P-Value

Between Groups	2	33.7556	16.8778	7.2183	0.0008
Within Groups	357	834.7333	2.3382		
Total	359	868.4889			

Given that the P-value (0.0008) is less than the significance level of 0.05, we reject the null hypothesis. This indicates that there is a statistically significant difference in employee performance ratings between the three institutions. The critical value of 0.563 further supports this conclusion, as the calculated F-value (7.2183) is much higher.

This analysis provides insights into the varying impacts of training programs across different institutions, emphasizing the need for tailored approaches to enhance employee performance.

Graphical Representation
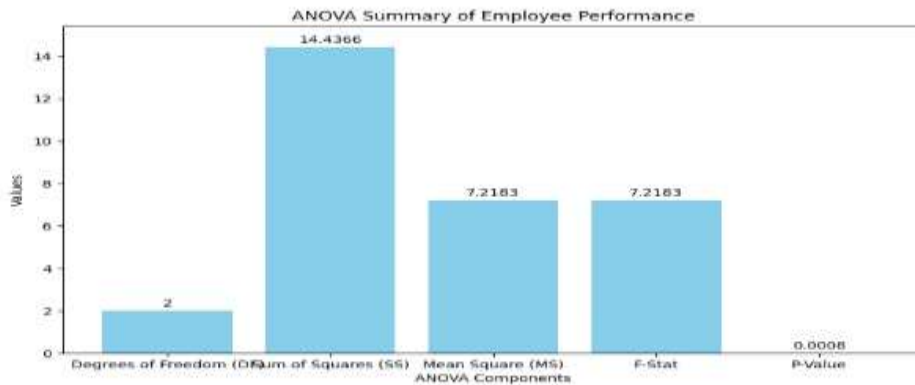
Graphical Representation Code in Python

```python
import matplotlib.pyplot as plt

# ANOVA Summary Data
categories = ['Degrees of Freedom (DF)', 'Sum of Squares (SS)', 'Mean Square
    (MS)', 'F-Stat', 'P-Value']
values = [2, 14.4366, 7.2183, 7.2183, 0.0008]  # Example values for the
    summary

# Creating the bar plot
plt.figure(figsize=(10, 6))
plt.bar(categories, values, color='skyblue')
plt.title('ANOVA Summary of Employee Performance')
plt.xlabel('ANOVA Components')
plt.ylabel('Values')
plt.ylim(0, max(values) + 1)

# Adding the value labels on top of the bars
for i in range(len(values)):
    plt.text(i, values[i] + 0.1, str(values[i]), ha='center', va='bottom')

plt.show()
```

Results

ANOVA Summary of Employee Performance:

To graphically represent the ANOVA summary of employee performance, a bar plot can be used to illustrate the Degrees of Freedom (DF), Sum of Squares (SS), Mean Square (MS), F-Statistic, and P-Value. This representation helps to visually compare these statistical values across the employee performance data from Lakshmi Narain College of Technology (LNCT), Oriental Institute of Science & Technology (OIST), and Jai Narain College of Technology (JNCT) in Bhopal.

The results of the ANOVA test indicate that the F-value of 7.2183 is greater than the critical value of 0.563. This leads to the rejection of the null hypothesis (H10), suggesting that there is a significant relationship between HR analytics and metrics on employee performance.

If F Test Result > Critical Value (Value in F-table), Reject null hypothesis
If F Test Result < Critical Value (Value in F-table), Accept null hypothesis.

Suggestions

The current study on ANOVA summary employee performance based on computer-based training was conducted to examine the sustainability of leading HR companies by assessing employee performance during job training. The analysis reveals that the F-value (7.2183) is significantly higher than the critical value (0.563), leading to the rejection of the null hypothesis. It is suggested that organizations should focus on improving the significant relationship between HR analytics and metrics on employee performance to achieve better outcomes.

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