

HR Analytics using R-Machine Learning Algorithm: Multiple Linear Regression Analysis



A. M. Mahaboob Basha, J. Srivani, B. Ankaiah, U. Dadakalandar, T. Srinivaslulu

Abstract: The purpose of empirical research study to know the impact of various HRD practices and its impact on predictor (job satisfaction). The structured survey research instrument was used to gather the data from 500 sample respondents. The questionnaire was validated with pilot study and data was with crone Bach's alpha reliability test. The results of the outcome validated with R-Machine Learning Algorithm, multiple linear regression analysis with the help of train data and test data (30:70) ratio. Furthermore results reveals corrgram plot, matrix correlation plot and validation of data with validation match test among various HRD practices and it's inter relationship. The analysis supported with various reviews which include both western and Indian reviews. The study can be generalized to any sector wherever HRD practices can be implemented. The study feasible/applicable to social implications and employee concern problems and related productivity. The study provides new insights to the readers and analysis which was not published by any other in the relevant topic related machine learning algorithm in analytics world.

Keywords: HR analytics, HR analytics with machine learning, analytics, machine learning algorithm, Analytics, Human Resource analytics etc.,

I. INTRODUCTION

The main purpose of HR analytics was to take effective and efficacy in the decision making process of human resource management. The HR analytics showed the third priority in the Google trend analysis. The present study is concerned to predictive analytics of machine learning algorithm. The researcher is going to apply the predictive analytics concept to predict the impacting factors on employee job performance. The analytic process was begun by dividing the total data into 30:70 ratios. The training data comprises of 30% and to validate with testing data with remaining 70%. The outcome of the research proved with variety of plots like: residual plots, standardized residual plot, Normal Q-Q plot, correlation grid plot, correlation plot, scatter matrix plot, train and test data related plot etc.

II. REVIEW OF LITERATURE

M. R. S. Surya Narayana Reddy et al [1] the existing HRD climate will influence a lot on productivity of employees, employee job satisfaction. In all scenarios witnessed about HRD practices positively will influence the employee performance in the organization. Federici et al [2] the study attempts to investigate, weather career planning and development will enhance the performance of employee in organization. He also proposed that, the employee high performance work practices also will influence the performance of employees. Lina Hamdan Mahmoud Al-Abbadi [3] started research to investigate with 600 samples, regarding influencing factors of employee job performance. He witnessed that, the employee commitment and dedication mediates the significant positive impact on employee performance in the organization. (Srinibash Dash & Uma Charan Patti [4] conducted a research work in the area of employee growth and high performance in IT companies, depicts that, HRM is a continuous process which influence the performance of employees and contemporary issues need to be handled in the area of HRM practices for the wellbeing of employees. The major skill enhancement programs in IT industry will plays a significant role for the enhancement of skills of employees in the organization. Zeinab Inanlou & Ji-Young Ahn [5] the outcome of the research showed that, employee communication, trust, positive organizational commitment, appreciation for innovativeness, employee participation in decision-making, employee training are the positive influencing aspects of employee performance in the organization. Jae Young Lee et al [6] organized a research study in the area of HRD practices, the top level management support, employee attitude; employee-employer relationship will plays significant results on job performance at work space. Even the results also evident that, the employee commitment and dedication will play a significant impact on work performance. The top management assistance will moderates the employee performance in the organization. Sagwa et al [7] the mediating role of employee outcomes plays a significant role in the relationship between HRMP and firm performance, the researcher used cross sectional descriptive survey was used and the response rate was 60%. Tehmina Sattar et al [8] researcher attempted to reveal the employee engagement role in between the employee job satisfaction and employee job performance. Vermeeren.B et al [9] reveals that, HR practices are directly and indirectly

Revised Manuscript Received on March 30, 2020.

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linked to the three different outcomes. They are financial outcomes, organizational outcomes and human resource outcomes. The outcome of HR and organizational outcomes provides substantially larger than their impact on the outcome of financial aspects. Ahmed Mohammed Sayed Mustafa & Julian Seymour Gould-Williams [10] reveals about the high performance HR practices are significantly positively related to employee outcomes. Daniel Esem Gberville [11] study reveals that enhanced quality in service delivery required the competent employees in the organization. Also, witnessed that, the strategic HR practices reveals enhances the employee competences in the organization. Rebecca R. Kehoe & Patrick M. Wright [12] conducted a research study market outcomes and firm level performance is depends upon strategic human resource development practices in the organization. The overall literature explains about, the employee job performance depends upon the many factors which will influence in positive manner to wards organizational and individual development.

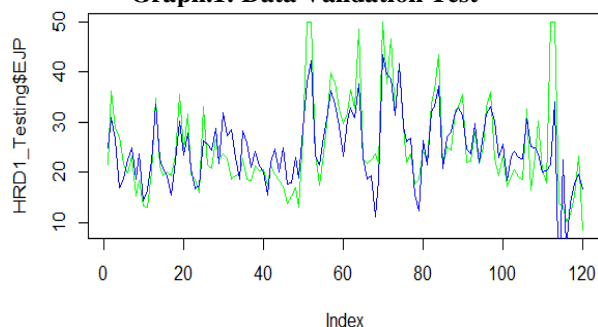
III. RESEARCH METHODOLOGY

By nature, it is a descriptive research design. Here both descriptive and inferential statistics were used to test the relationship existed in the variables.

- **Data Sources:** Both primary and secondary data sources were used to conduct the research.
- **Sample Size:** From the procedure of sample size determination 500 samples were taken.
- **Sampling Method/Technique:** The stratified Random sampling was applied.
- **Sampling Frame/Unit:** Taken all employees from three levels (top, middle, lower).
- **Sampling Tools:** Machine learning algorithm of multiple liner regression analysis
- **Software's:** R-Programming language was used.

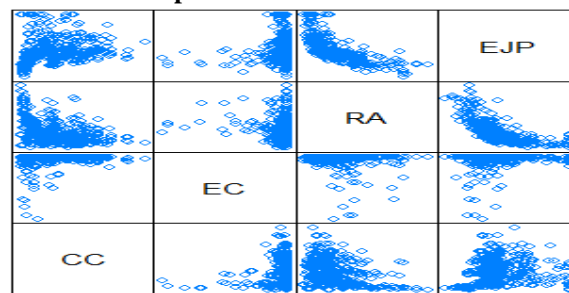
IV. DATA ANALYSIS AND INTERPRETATION

Graph.1: Data Validation Test



The above graph reveals that, the total data has been divided into training and test data in the portion of 30:70. The data validation has shown 90% accuracy in the data analysis. Hence, it can be conclude that, both train and test data has shown equal tendency/behavior in the analysis.

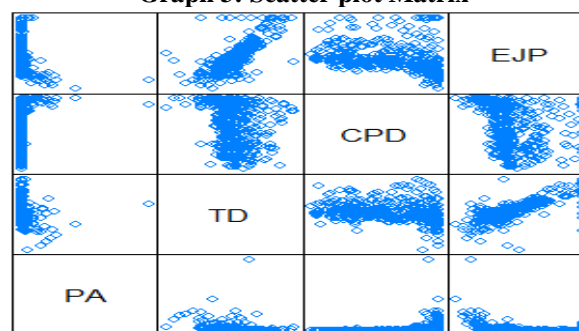
Graph.2: Scatter Plot Matrix



Scatter Plot Matrix

The scatter plot matrix shows reveals the association/relationship between the variables. The employee job performance has shown the positive relationship with the coaching and counseling, employee compensation and rewards cum awards. It can be infer that, almost all variables have shown positive tendency/behavior towards employee job performance.

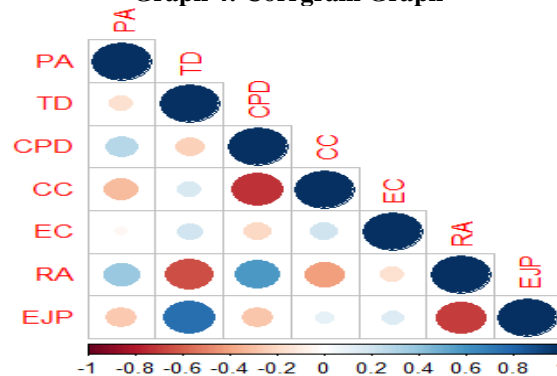
Graph 3: Scatter plot Matrix



Scatter Plot Matrix

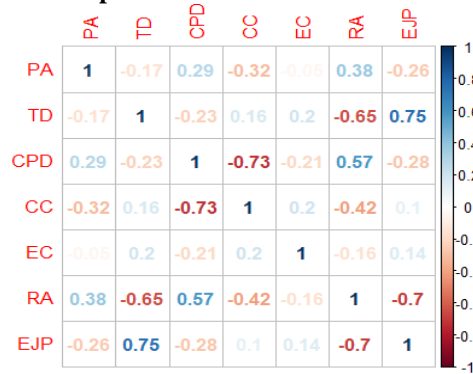
The scatter plot matrix-II also showed the pattern of output. The employee job performance is positively associated with employee performance appraisal followed by training and development, career planning and development. All the independent variables are having strong association/relationship with employee job performance in the organization.

Graph 4: Corrgram Graph



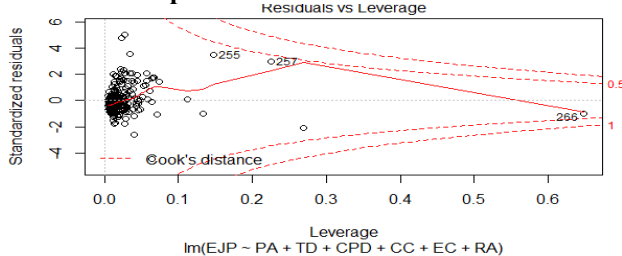
The corrgram graph reveals the relationship on the basis of colors. The employee job satisfaction has shown the positive relationship with employee compensation and rewards cum awards. In corrgram graph, if the bubble color is dark blue, it shows strong relationship and if the navy blue that shows weak relationship and if it is in dark red, it shows no relationship. So, it can be proved that almost all variables have proved that, almost all variables have shown positive relationship with the variables.

Graph 5: Correlation Grid Matrix



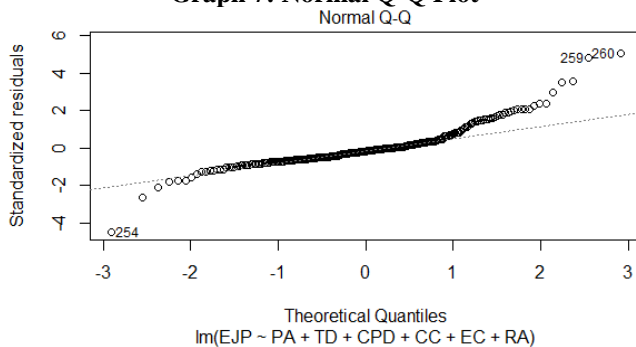
The correlation grid matrix shows the relationship in terms of numbers. The employee training has shown 0.75 (strong) relationships with job performance followed by counseling & coaching, career planning and development have shown the positive relationship with the employee job performance. It is a mixed pattern of both color combination with numbers. Hence, it can be conclude that, all most maximum number of variables has shown the positive tendency with the job performance of employees in the organization.

Graph 6: Standardized Residuals



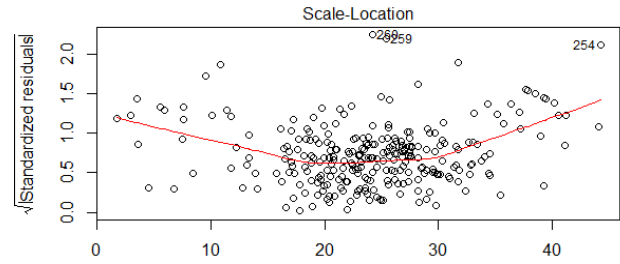
Cook's distance is used to identify the outlier's existed in the data. It is used to identify the influencing factors in the dataset. The point 266 which shows the highest distance in the data points. It will impact on R value. Adding or removing can change the data analysis.

Graph 7: Normal Q-Q Plot



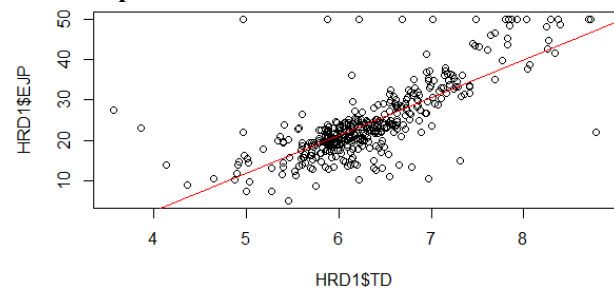
In general Q-Q plot is used to check the quantiles of the dataset. It can be used to check, weather the data is normally distributed among the points in the analysis. And it also reveals that, weather two points are come from same distribution or not, can be identified with the Normal Q-Q plot. The absence of normality, either it may lead towards right or left, it can be analyzed with the help of Q-Q distribution plot.

Graph 8: Standardized residuals with fitted value



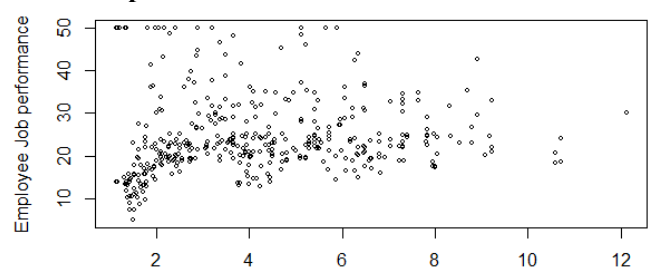
The scale value shows that, the relationship with all independent variables like: appraisal of employee performance, training and development, career planning and development, employee compensation and rewards and awards will have significant influence on employee job performance. All the values are concentrated at the middle which shows the nature of influencing factors.

Graph 9: Correlation Matrix Plot with line



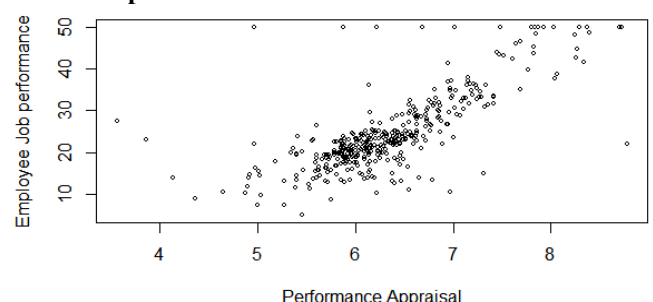
From the above graph reveals that, employee job satisfaction is positively associated with the training and development. The trend line moving from left to right has shown the positive relationship with the variable. The variable: Training and development is positively associated with the employee job performance in the organization.

Graph 10: Correlation Matrix Plot with line



The scatter plot matrix also, showed the positive tendency in the analysis. Even the coaching & counseling also showed the same tendency towards job performance. In fact, the movement of values from left to right showed the positive tendency in the analysis.

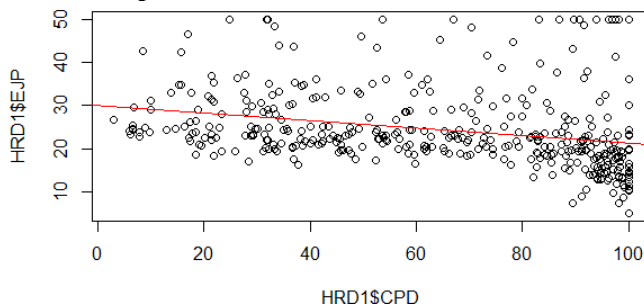
Graph 11: Correlation Matrix Plot with line



Even higher the employee

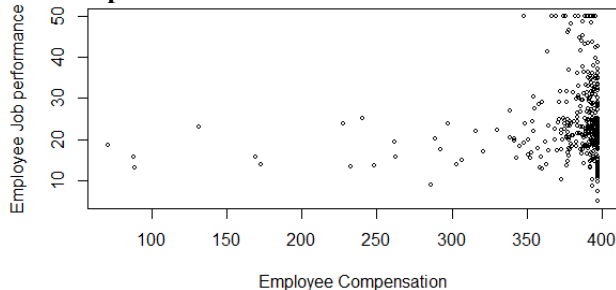
performance appraisal, the more that we can expect in employee job performance. Hence, it can be conclude that the employee performance is depends up on the employee performance appraisal.

Graph 12: Correlation Matrix Plot with line



The career planning and development has shown the neutral tendency towards employee job performance. The line which shows the almost straight line which proved that, employee job performance is slightly being influenced by career planning and development.

Graph 13: Correlation Matrix Plot with line



Even the employee compensation, also an influencing factor by employee job performance. The compensation plays a significant role on performance. Higher the compensation, higher will be the employee job performance. Almost all variables have shown the positive tendency towards, employee job performance.

V. RESULTS

- The trained and test data has shown the accuracy of 90% in the analysis. That means that our predicted algorithm has given the optimum solution in the given phenomenon.
- Both the correlation grid matrices have shown, all the values have shown the positive impact on employee job performance.
- The corrgram graph also showed there are more blue colors that can be seen in the analysis, which shows that all most all values are positively impact.
- The performance appraisal has shown the positive relationship with job performance in the organization
- Even, the scatter plot also shows the positive impact with the employee job performance in the organization.
- The scatter plot training and development also has shown the significant positive relationship with the employee job performance in the organization.
- All the variables have shown the positive relationship with the employee job performance in the organization.

VI. CONCLUSION

From this it can be conclude that R-machine learning

algorithm multiple linear regression analysis has given 90% accuracy in the outcome variable which is employee job performance. The employee job performance is being influenced by performance appraisal, training and development, coaching and counseling, rewards and awards, career planning and development will plays a significant role in the development of employee performance

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