

Factors influencing the Performance Appraisal System among men and women with reference to Agriculture Research Institutes around Hyderabad: A Comparative Analysis using Multiple Regression

K.D.V. Prasad^{1*}, Rajesh Vaidya²

^{1*} Faculty of Commerce, Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur (Corresponding Author)

²Associate Professor, Department of Management and Technology, Shree Ramdeobaba College of Engineering and Management, Ramdeo Tekdi, Gittikhadan, Katol Road, Nagpur – 444 013 (Maharashtra State), India

Abstract- In this research study we reported the results of a comparative analysis among men and women on the employee factors influencing the evaluation performance appraisal system using multiple regression analysis with reference to Agriculture Research Institutes employees in Hyderabad Metro, India. The primary data collected from the performance appraisal forms of 400 employees working in the agriculture research institutes in and around Hyderabad, India consisting of from 300 men and 100 women employees. The seven independent factors Job Knowledge, Skill Level, Job Execution, Initiative, Client Orientation, Team Work, Compliance to Policies and Practices, and one dependent factor, the outcome of the Performance Appraisal System (PAS) the Rating measured. The descriptive analysis, correlation techniques and parametric statistics like t-test and multiple regression analysis carried out to arrive at the conclusions. To measure the reliability of the scale used for this study, and internal consistencies of the instrument, the reliability statistics Cronbach's alpha (C-Alpha) was estimated. The overall C-Alpha value for men measured at 0.91 and 0.94 for women, and the C-Alpha values for all the factors ranged 0.84 to 0.85 for men and 0.79 to 0.90 for women. The overall Spearman Brown Split-half reliability measured at 0.88 and 0.86 for men and women respectively. The multiple regression analysis reveal 85% and 86% variance observed for women and men respectively in this model. We observed statistically significant differences among the factors influencing the outcome of Performance Appraisal Rating among men and women and there some common factors Job Skill, Job Execution and Team work having statistically significant influence the outcome of performance appraisal system outcome.

Index Terms- Performance Appraisal, Cronbach Alpha, Spearman-Brown Reliability, Effectiveness, Regression

I. INTRODUCTION

Performance Appraisal is a formal system of review and evaluation of individual performance and peers review an individual's performance on yearly basis. The Performance Appraisal System (PAS) – a common tool used to measure the actual performance in an organization, aligning the vision, mission and goals of with that of individual performance. Using

PAS an employee's performance is measured against factors such as job knowledge, Skill level, Job execution, Initiative, Client orientation, Team Work, quality and quantity of output, leadership qualities, and compliance to policies and practices including safety and environment, efficient handling of available resources, intuitiveness to take new assignments. The factors will vary from organization to organizations depending on its objectives, business strategies, and mission.

The performance management is an extensive, methodical, sequential and continuous process that involves performance mapping processes and sequences [1]. Performance measurement is the process an organization follows to objectively measure how well its stated objectives/mission or goals are being met. Organizations that emphasize accountability tend to use performance targets, but too much emphasis on "hard" targets can potentially have dysfunctional consequences. Organizations focus more on management improvement demonstrate steady improvements in performance. In most of the organizations across the globe an employee performance is measured on yearly basis. In general most of the organizations include the performance appraisal system under Performance Management system, where supervisor/subordinate interview with a standard performance appraisal form with the factors to be appraised or listed in the form [2]. The performance management provides more opportunities for individuals to discuss their work with their managers in an attractive atmosphere[3]. Performance Appraisal system is a continuous process and a natural aspect of management and assess performance by reference to agreed objectives. Performance management gives direction to the employees through guidance from management (Medlin 2013). The human resources managers believe that PAS is a good tool for performance improvement [4]. The performance appraisal system, if well designed and implemented it can benefit both the employees and the organizations[5]. DeNisis and Pritchard (2006) [6] aver that attitudes toward performance management affect the performance of employees in organisations.

Use of Performance Appraisal System in Agricultural Research Institutes (ARIs)

The main objective of PAS in ARI is to improve employee and institutes performance. Though the PAS can some dissatisfaction over how the employee as appraised, still it can

help to achieve institutes' vision and mission. PAS one of the human resources valuable functional area which is helpful in correcting the deviations/errors in employee performance. At the Institute PAS being effectively used for Human Resource Planning In assessing a list of staff to be promoted, to identify the underperformed employees who need a corrective action. PAS also a useful tool for succession planning and provides a profile for the institutes strengths and weakness. The PAS evaluations ratings will be used for Recruitment and Selection at the next level. The ratings will provide a benchmarks for evaluating internal applicant responses obtained through interviews. The PAS will be used to identify the Training and Development needs of the institute by identifying the employee deficiencies in those factors that effect the outcome of the institute. The PAS system is helpful for career planning, compensation program, succession planning and human resources development.

II. REVIEW OF LITERATURE

Performance appraisal is an unpleasant management practice. With so much controversy in it, appraisal is continually used in the public sector around the world as an instrument to oversee the performance of its personnel [7]. Researchers suggested to have an effective human resource system for organizations the use of an appraisal system which is reliable and accurate for employee assessment and organisational development [8]-[10]. From the results of the factors influencing the Employees' service performance in Ministry of Education in Sultanate of Omani using Factor Analysis suggested that the training and performance appraisal have a significant influences on the employees' Performance[11].

George Ndemo Ochoti et al. (2012) [12] studied the Factors Influencing Employee Performance Appraisal System: A Case of the Ministry of State for Provincial Administration & Internal Security, Kenya. Performance Appraisal system is a good tool for human resource management and performance improvement [4]. Involving the employees to understand organizational goals, what is expected of them and what they will expect for achieving their performance goal will help in organizational development [13]. PAS should also link individual performance with reward management [14]. Linking performance with reward increases the levels of performances and should be used in both public and private sectors [15]

Feedback is an important factor of PAS and the rates should be given feedback on their competence and overall progress [16]. The 360 degree feedback method can be utilized by organizations as this method combines evaluations from various sources into over all appraisal [17]. Performance ratings are based on rater evaluations which are subject to human judgements and biasedness. Personal factors and prejudices are like to influence ratings [18]. The interpersonal factors are important to the PAS as they influence the outcome of the interactions [19] (Greenberg (1993). The employee attitude toward the system is strongly linked to satisfaction with the system. The perceptions of fairness of the system are an important aspect that contributes to its effectiveness [20]. Understanding the employee's attitude and behaviour about the

PAS in organizations is important as they are key to determine the effectiveness [21]. Zakaria et al. (2012) [22] reported that (HRM practices can develop the performance of an organisation by contributing to employee satisfaction. The performance appraisal is arguably one of the more critical factor in terms of organisation performance and appears to be an indispensable part of any HRM system when compared among the HR practices studied [23].

Yee and Chen 2009 [24] applied fuzzy set theory in the multi-criteria performance appraisal system and developed a performance appraisal system utilizing the performance appraisal criteria from an Information and Communication Technology based company in Malaysia. This system uses multifactorial evaluation model in assisting high-level management and following a systemic approach for assessing the employee performance.

III. OBJECTIVES AND HYPOTHESES

The objective of the study is to present the main factors influence the PAS system in the agriculture sector institute employees;

- To identify the factorsthat influence PAS at the workplace of Agriculture research institutes in Hyderabad, India
- To identify whether there are any significant mean differences in the above said factors in influencing the PAS among men and women

Research question

1. Does Performance Appraisal System process influence the organizational performance and effectiveness
2. Does the seven independent factors – Job knowledge, Skill level, Job execution, Initiative, Client Orientation, Team Work, Compliance to Policies and Practices one dependent factor outcome of the PAS Rating influence the PAS?

IV. HYPOTHESES

Based on the identified problem, research question and the objectives the following hypotheses were formed:

H₀: There are no statistically significant differences among seven independent factorsthat influence the PAS

H₁: There are statistically significant differences among the factors that influence the PAS among men and women

V. RESEARCH METHODOLOGY

5.1. Conceptual Framework

The proposed framework was adopted based on the past research[12]. The factors under the study have been represented diagrammatically to show the relationship between independent factors and dependent factors (Figure 1).

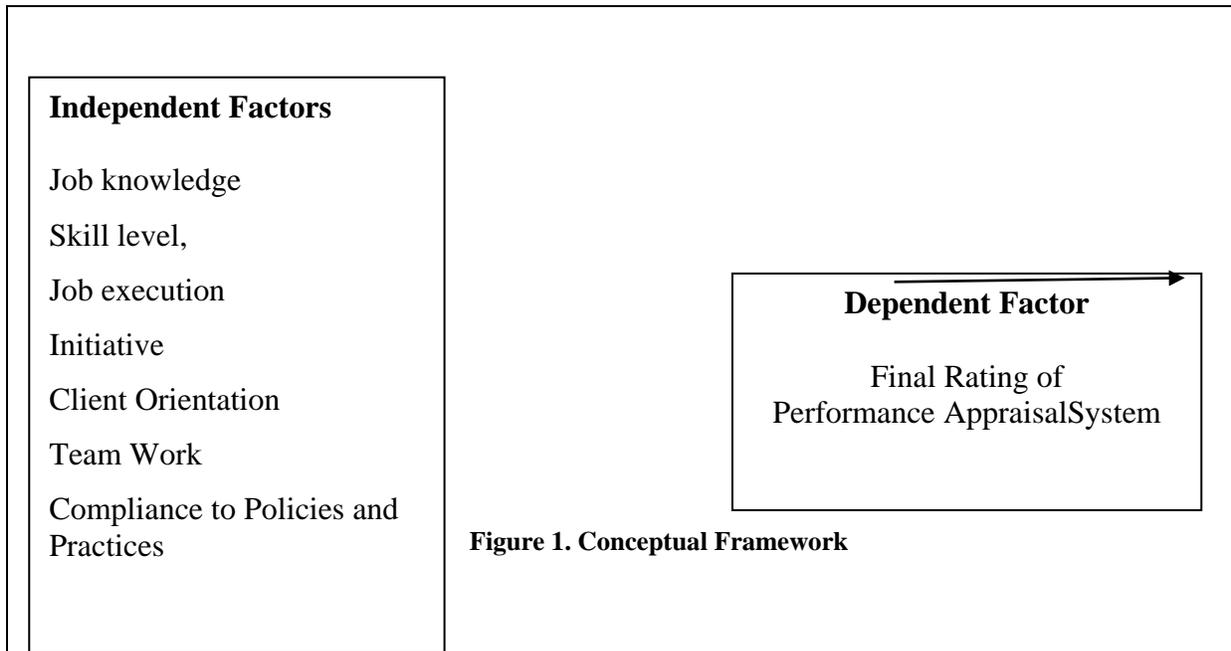


Figure 1. Conceptual Framework

5.2. Data Collection

Sample Size: A sample size of 400 employees selected using simple random sampling without replacement, where each number of the subset has an equal probability of being chosen, and the demography of sample indicated the following tables.

Table 1. Demography of the research Sample.		
Gender	Frequency	Percent
Men	300	75
Age:		
20-29	75	25
30-34	90	30
35-39	66	22
>40	69	23
Women	100	25
Age:		
20-29	25	25
30-34	30	30
35-39	22	22
>40	23	23
Total	400	100

Source: Primary data

5.3 Research Instrument

The research instrument used for the study is a standardized, structured undisguised performance appraisal form —a main source for the primary data collection. Secondary data was collected from other sources like published books, websites and records pertaining to the topic. The instrument was divided into 2 sections. In the Section I, background information/personal such as employee name, designation, institute, program, date of joining and other details of the employee were readily available (pre-filled). The Section II of the instrument, the appraisal section where seven factors – the factors Job knowledge, Skill level, Job execution, Initiative, Client Orientation, Team Work, Compliance to Policies and Practices one dependent factor

outcome of the Performance Appraisal System (PAS) the Rating was used to find out the PAS performance levels of the employees and impact of the PAS.

5.4. Data Analysis

5.4.1. Methods of Data Analysis

In our research study we used statistical techniques to analyse the data for drawing inductive inferences from our research data. The descriptive statistics used to summarise the data, and to investigate the survey questionnaire, formulating the hypotheses and the inferential statistics were employed. To measure the central tendency such as means, variance and standard deviation, we used the dispersion methods.

5.4.2. Reliability test of the instrument

To measure the internal consistency, reliability of our research instrument, and to maintain similar and consistent results for different items with the same research instrument, we used the reliability methods Cronbach’s alpha. The Cronbach alpha is an index of reliability that may be thought of as the mean of all possible split-half co-efficient corrected by Spearman-Brown formula [25] and subsequently elaborated by others [26],[27]The estimated values of the Cronbach’s alpha are indicated in Table 3. The Statistical Analytical System (SAS) was used to measure the central tendency, measures of variability, reliability statistics, correlations, parametric tests and to predict the dependent factor PMS based on independent factors multiple regression analysis carried out [28].

Formula for Cronbach’s Alpha (C-alpha can vary between 0.00 and 1.00)

$$r_{\alpha} = \left(\frac{N}{N-1} \right) \left(1 - \frac{\sum \sigma_j^2}{\sigma^2} \right)$$

Where r_{α} is coefficient alpha; N is the no of items; σ^2 variance of items

$\sum \sigma_j^2$ is sum of variances of all items and σ_j^2 is the variance of the total test scores

The outcome of the PAS Rating was measured using a Likert-type scale with items 1-5 was used (where 1=Unsatisfactory, 2=Satisfactory, 3=Good, 4=Excellent and 5

=Outstanding) in this study. The reliability statistic Cronbach’s alpha coefficient value (C-alpha) was calculated to test the internal consistency of the instrument, by determining how all items in the instrument related to the total instrument [29]. This instrument was tested with the data of 50 employees and using SAS the Cronbach alpha static was measured at 0.78, suggesting

a strong internal consistency. Three months later, keying data for all the 400 employees the overall C-alpha measured at 0.91 for men and 0.94 women and it ranged from .084 and 0.85 for men and between 0.79 and 0.90 men women for the 7 independent and one independent factors (Table 2).

Table 2. Cronbach’s alpha values for factors used in this study			
Sl. No	Factor	Cronbach’s alpha	
		Men	Women
	Overall	0.91	0.94
1	Job knowledge	0.84	0.88
2	Skill level	0.84	0.90
3	Job Execution	0.85	0.84
4	Initiative	0.85	0.79
5	Client Orientation	0.84	0.86
6	Cooperation and ability to work in teams	0.84	0.86
7	Compliance to policies and practices including safety and environment	0.84	0.88
8	Final Rating	0.85	0.89
Overall: Spearman-Brown Split-half statistic: 0.88; 0.86 Spearman-Brown Prophecy: 0.90; 0.92			

The second reliability method Split-half reliability in which scores from the two halves of a test (e.g. even items versus odd items) are correlated with one another and the correlation is then adjusted for test length. The Spearman-Brown’s formula is employed enabling correlation as if each part were full length the value is measured 0.88 and 0.86 for men and women us and the Spearman Brown Prophecy was measured at 0.90 and 0.92 for men and women respectively (Table 2).

$R = (2r_{hh}) / (1+r_{hh})$ where rhh is the correlation between two halves.

Compliance to Policies effect on dependent variable final Rating on men and women, the data gathered from the performance appraisal forms of the employees was analysed. The calculated Mean, Standard Deviation and Standard Error Values for men and women, for the primary data collected from the respondents (n=300, men and n=100, women) are presented in the Table 3. The estimate overall SE of 0.05 and 0.07 for men and women is relatively small, indicating that the means are relatively close to the true mean of the overall population.

VI. RESULTS

The general objective of this research was to assess and compare the independent variables Job Knowledge, Skill Level, Job Execution, Initiative, Team Work, Client Orientation and

Table 3. Mean, Standard Deviation and Standard Error of Mean of the primary data of independent and dependent factors (Men and Women)			
Factor	Mean	SD	SE
Job knowledge			
Men	3.99	0.84	0.05
Women	3.87	0.76	0.07
Skill level			
Men	3.90	0.89	0.05
Women	3.900	0.71	0.07
Job Execution			
Men	4.07	0.85	0.05
Women	3.93	0.84	0.08
Initiative			
Men	3.78	0.86	0.04
Women	3.73	0.95	0.09
Client Orientation			

Men	3.76	0.86	0.04
Women	3.76	0.82	0.08
Cooperation and ability to work in teams			
Men	4.02	0.86	0.04
Women	3.91	0.80	0.08
Compliance to policies and practices including safety and environment			
Men	3.98	0.81	0.04
Women	3.81	0.77	0.07
Final Rating			
Men	3.90	0.88	0.05
Women	3.79	0.74	0.07
Overall			
Men	3.82	8.79	0.05
Women	3.81	0.73	0.07

6.1 Results from Correlation studies: The correlation analysis was carried out to measure the relationships between the variables (Table 4) and (Table 5). All the seven factors positively correlated with the rating ($r=0.69, 0.71, 0.66, 0.53, 0.62$ and $0.61,$

two-tailed, $p < 0.01$) for women employees and ($r=0.65, 0.74, 0.67, 0.62, 0.60,$ and $0.65,$ two-tailed, $p < 0.01$) for men. Overall the correlations are medium and with the available data we cannot conclude the nature of differences among the variables.

Table 4: Correlation among the study variables Female

	Job Knowledge	Job Skill	Job Execution	Initiative	Client Orientation	Team Work	Compliance To Policies	Rating (Final)
Job Knowledge	1							
Job Skill	.674**	1						
Job Execution	.599**	.567**	1					
Initiative	.634**	.593**	.668**	1				
Client Orientation	.420**	.449**	.605**	.591**	1			
Team Work	.558**	.519**	.496**	.601**	.550**	1		
Compliance to Policies	.540**	.521**	.582**	.533**	.485**	.555*	1	
Rating (Final)	.738**	.694**	.718**	.662**	.531**	.627*	.615**	1

Pearson Correlation **Correlation is significant at prob. < 0.01; Source: Primary Data

Table 5: Correlation among the study variables Male

	Job Knowledge	Job Skill	Job Execution	Initiative	Client Orientation	Team Work	Compliance To Policies	Rating (Final)
Job Knowledge	1							
Job Skill	.697**	1						
Job Execution	.519**	.501**	1					
Initiative	.577**	.488**	.647**	1				
Client Orientation	.591**	.555**	.590**	.552**	1			
Team Work	.344**	.373**	.526**	.460**	.559**	1		
Compliance to Policies	.424**	.411**	.534**	.492**	.512**	.513**	1	
Rating (Final)	.612**	.654**	.741**	.679**	.628**	.605**	.653**	1

Pearson Correlation **Correlation is significant at prob. < 0.01; Source: Primary Data

1.2 Results from the Multiple regression analysis

We carried out the multiple regression analysis to predict the value of a dependent variable outcome, Performance based on the value of six independent variables, and to measure the cause and effect relationship between independent and dependent variables (Table 6). With the p-value of zero to four decimal

places, the model is statistically significant. The R-squared is 0.850 for women and 0.869 for men meaning that approximately 85% and 86.9% of the variability of performance are explained for women and men respectively, accompanied for by the independent variables in the model and, even after taking into account the number of predictor variables in the model.

Model	R	R Square	Adjusted R Square	SE of the Estimate
1 Women	.0850 ^a	0.723	0.702	0.405
Men	.0868 ^a	0.753	0.747	0.445

a. Predictors: (Constant), Policies, Job Skill, Team Work, Initiative, Client Orientation, Job Execution, Job Knowledge

From the ANOVA Table 7 it was observed that there are statistically significant differences in among the factors effecting the outcome of the performance, the dependent variable Rating. Therefore we rejected the null hypothesis and accept the alternate hypothesis **H₁**: There are statistically significant differences

among the factors that influence the PAS among men and women. Therefore we proceed to find out the effect of each independent variable that impact the outcome of the PAS, the final Rating. With the p-value of zero to four decimal places, the model is statistically significant. (Table 7).

Model	Sum of Squares	df	Mean Square	F	Sig.
Women					
Regression	39.471	7	5.639	34.312	.000 ^b
Residual	15.119	92	0.164		
Total	54.590	399			
Men					
	176.409	7	25.201	127.341	.000 ^b
	57.788	292	0.198		
	234.197	299			

Dependent Variable: Rating
b. Predictors: (Constant), Policies, Job Skill, Team Work, Initiative, Client Orientation, Job Execution, Job Knowledge

From the Table 8 in case of Men, one can observe that the independent variable Job Skill, Job Execution, Initiative, Team Work and Compliances to Policies are significantly impacting the outcome of the PAS i.e. rating, Whereas in case of women Job Knowledge, Job Skill, Job Execution and Team work are the independent factors significantly contributing to the outcome of PAS i.e. rating. The coefficients of each variable indicates the amount of change one could expect in Final Rating given a one-unit change in the value of that variable, given that all other variables in the model are held constant. If we consider for Women, the independent variable Job Skill, we would expect an increase of 0.245 in the Final Rating score for every one unit increase, in Job Skill assuming that all other variables in the model are held constant and in case of women the increase was 0.207. To compare the strength among the coefficients the standardized beta coefficient values computed (Table 8). The Job Execution has highest standardized β value (0.285) for both men and women, whereas Client-orientation is lower for both men and women (β = 0.004). There are some statistically significant difference in β values for the factors for job skills, job

knowledge and compliance to policies and procedures. Considering the beta value of Job Execution for both Men and Women employees one standard deviation increase in Job Execution leads to 0.285 standard deviation increase in predicted final rating, with the other variables held constant. In the same way one standard deviation increase Team work for both men and women and when both work as a cohesive team leads to 0.158 standard deviation increase in final rating for Women and 0.156 with other variables in the model held constant, and so on. From the values of the estimated regression coefficients the sample regression equation can be written as:

For Men

$$Y = -0.6879 + 0.051_{JobKnowledge} + 0.245_{JobSkill} - 0.295_{JobExecution} + 0.170_{Initiative} - 0.004_{ClientOrientation} + 0.162_{Teamwork} + 0.233_{Compliance\ to\ Policies}$$

For Women

$$Y = -0.6879 + 0.267_{JobKnowledge} + 0.207_{JobSkill} - 0.251_{JobExecution} + 0.029_{Initiative} - 0.004_{ClientOrientation} + 0.144_{Teamwork} + 0.086_{Compliance\ to\ Policies}$$

Table 8. Results from Regression Analysis (Coefficients^a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Men					
Constant	-0.689	0.161		-4.290	0.000
Job Knowledge	0.051	0.048	0.049	1.077	0.282
Job Skill	0.245	0.042	0.248	5.840	0.000
Job Execution	0.295	0.045	0.285	6.608	0.000
Initiative	0.170	0.043	0.165	3.928	0.000
Client Orientation	0.004	0.044	0.004	0.096	0.923
Team Work	0.162	0.039	0.158	4.143	0.000
Compliances to Policies	0.233	0.041	0.214	5.690	0.000
Women					
Constant	-0.053	0.269		-0.196	0.845
Job Knowledge	0.267	0.083	0.273	3.214	0.002
Job Skill	0.207	0.084	0.196	2.457	0.016
Job Execution	0.251	0.075	0.285	3.336	0.001
Initiative	0.029	0.068	0.038	0.430	0.668
Client Orientation	0.004	0.069	0.004	0.057	0.955
Team Work	0.144	0.071	0.156	2.016	0.047
Compliances to Policies	0.086	0.072	0.090	1.203	0.232

a. Dependent Variable: Rating

The multiple regression analysis also carried out on overall Performance Appraisal system and its effect on overall Rating and the results are presented in Table 9. The parameter estimates from the regression analysis and from the standardized beta values 0.846 for women and 0.866 for men indicates that an

overall increase one standard deviation independent factors of 0.846 and 0.866 standard deviations increase in final rating for both Women and Men indicating a positive impact of employee performance.

Table 9. Parameter estimates from the regression analysis: Overall Appraisal vs Final Rating

Factor	Label	Parameter Estimate	Standard Error	T value	Pr > t	Standardized Estimate
Women						
Rating	Constant	-0.444	0.138	-3.215	<.0001	0
Overall	PAS	1.105	0.035	31.710	<.0001	0.846
Men						
Rating	Constant	-0.432	0.128	-3.015	<.0001	0
Overall	PAS	1.234	0.039	32.732	<.0001	0.866

Therefore based on the results we reject the H_0 : There are no statistically significant differences among seven independent factors that influence the PAS and accept the alternate hypothesis H_1 : There are statistically significant differences among the factors that influence the PAS among men and women

VII. DISCUSSION AND CONCLUSIONS

The main reason for conducting this study is that authors have not able find sufficient literature on evaluating PAS using multiple regression analysis for agricultural research sector comparing both women performances. We made an attempt to assess the PAS using multiple regression model including

sufficient information address an overall evaluation of the model, statistical test of individual factors and assessment of standardized beta values for the factors of the performance appraisal system, and its influence on PAS. This model adequacy is justified by multiple indicators, including an overall test of all parameters, the statistical significance of each predictor, etc. We have carried out the reliability tests for all the dependent and independent factors and the reliability statistics C-alpha, Split-Half reliability and Spearman Prophecy suggests the internal consistency of the instrument the performance appraisal form.

The results of this study are in line with the studies conducted by the several authors using multiple regression analysis [12], [30-31]. The major limitation of the study is Rating biasedness by the evaluator/peer. The authors have no idea whether the one-to-one interview has been happened when appraising the employee. We also covered the study appraising separately for gender-related parity. The authors recommend the employee performance appraisal should is not the silver bullet to measure the outcome of the appraisal. Some jobs are easy as the decisions are already programmed to carry and some jobs involve carrying out the non-programmed decisions and the success of the job depend on the acumen and experience of the employee who is carrying the out job. The authors suggest while appraising an employee the peer/supervisor should consider the intricacies and complexities involved in the assignment/job.

To conclude, we have observed more or less similar performance by both women and men however only they differ in some factors that influence the outcome of PAS.

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AUTHORS

First Author – KDV Prasad Masters in Computer Applications 1994, and MS (Software Systems) 2002 from Birla Institute of Technology and Science, Pilani, Rajasthan; MBA, from IGNOU, New Delhi, and possess PhD in Management. Mr Prasad has

over 20 years of industrial/research experience in the area of Management and presently working in an International Agricultural Research Institute, Hyderabad, India. Dr Prasad published 15 journals articles in national and international journals. His main interests are application of applied statistics and quantitative techniques in allied fields of Human Resources and Behavioural Sciences. Email: k.d.prasad@cgiar.org

Second Author: Dr Rajesh Vaidya, Bsc. PGDMM, MBA, M.phil, Ph.D,Dip.T&D, . Dr Vaidya Total work experience of 31

years in Sales & Marketing, research, Training, Teaching and academic administration.experience and now working as Assistant Professor- Integrated MBA, Department Of Management Technology, Shri Ramdeobaba College of Engineering & Management, Ramdeo Tekdi, Gittikhadan, Nagpur-440013. He published several articles in national and international journals.