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IDENTIFICATION AND RANKING OF FACTORS INFLUENCING HUMAN RESOURCE PRODUCTIVITY IN MANUFACTURING SECTOR INDUSTRIES IN AND AROUND MYSORE

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Abstract

Productivity is an economic term describing the relation between the outputs as compared to the inputs needed to produce those outputs. There are different measures of productivity and one of the most widely used measures of productivity is Gross Domestic Product (GDP) per hour worked. The purpose of this study is to identify and study the various factors influencing the human resource productivity in manufacturing sector, to study the extent to which each factor has an impact on the HR productivity and to rank them. The factors influencing the HR productivity were identified from the literature review and by taking expert opinion. These factors were Motivation, Training, Organizational culture, Job clarity, Environment, Job recognition, Salaries and emoluments, Leadership, Job security and job satisfaction. A structured questionnaire was designed to measure each of these dimensions and the primary data was obtained from the employees of five industries. The sample size was taken as one hundred. To examine the reliability of the questionnaire cronbach's alpha test was conducted which showed that the data had satisfactory reliability. Using Statistical Package for Social Sciences (SPSS) factor analysis was conducted to identify factors influencing human resource productivity in surveyed organizations. Eight factors were extracted. The factors thus obtained were ranked in an order based on the average factor scores obtained for each of the dimension. The various factors ranked according to the average scores are training (4.04), salary (4.013), motivation (4.008), physical environment (3.900), leadership (3.833), recognition (3.812), and organizational culture (3.720), and retirement benefits (3.593).

Introduction

Productivity is an economic term describing the relation between the outputs as compared to the inputs needed to produce those outputs. It is a measure of efficiency. Productivity is considered as a key source of economic growth and competitiveness and as such it is basic structural information for many international comparisons and country performance assessments Productivity is measured by comparing the amount of goods and services produced with the inputs which were used in production [1]. There are different measures of productivity and the choice between them depends either on the purpose of productivity measurement. One of the most widely used measures of productivity is Gross Domestic Product (GDP) per hour worked. This measure captures the use of labor better than just output per employee. The works done with respect to the determination of factors influencing human resource productivity in the manufacturing sector are very less or negligible. Hence this project mainly concentrates on the factors influencing the human resource productivity in the manufacturing sector in Indian context [2].

Literature review

G. A. Shekari [3] has stated in his work that for improving and efficient uses of various resources such as labor, capital, materials, energy and information, productivity is the purpose of all economic and industrial organizations and service enterprises. This study is performed to identify and prioritize the factors affecting the productivity of human resources. Research results show that factors affecting the productivity of human resources in Khorasan Razavi Gas Company in which the research was conducted in order of importance are: Health aspects, leadership style, motivational factors, organizational commitment, work experience, general and applied education, demographic characteristics, physical environment within the organization, external environment and competitive spirit. The actors taken into consideration here were motivational actors, leadership style, background and experience, organizational commitment, health dimensions, creativity and innovations, general and applied education, competitiveness, demographic characteristics, physical environment, external environment

Nader Bohlooli [4] has argued that with over looking to the successful countries of world, we can see these countries make necessary worth to the human resource as the most important productivity factor. Gradation of productivity is all of the systematic efforts, structured for eliminating or reducing losses of material, machine, human or incorrect balance between them. Therefore in this essay after studying the theories about productivity ACHIEVE model is chosen which contain seven effective factors (Ability, Clarity, Help, Incentive, Evaluation, validity, Environment) that effects human resource productivity and then with indexing for each of dimensions of mentioned model and with using of field method and promoting of questionnaire. According to information that was obtain by using questionnaire, and after analyzing them with Spearman method and prioritizing factors by TOPSIS method, it is specified that two factors (ability and clarity) were the most effective on gradation of human resource productivity

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and organization help, incentive, evaluation, and environment are the factors that are less effective. So it must be analyzed and these factors must be noticed so that the productivity can be increased. By giving attention to the findings of this research, ability and clarity can be seen as the most effective factors influencing the productivity. So for the effective utilization of human resource there must be specialty courses for workers, value for the creativity of the personnel. The talent of the workers must be utilized and also the workers must know the goals of the organization so that they can try to achieve those goals.

Objectives
1. To identify the crucial factors that influences the human resource productivity.
2. To determine the factors influencing the human resource productivity using factor analysis for the surveyed organizations.
3. To rank the factors using average scores of variables for each dimension or factor.

Methodology
From the literature review and by taking expert opinion the various factors that influence the human resource productivity were identified. These factors are Motivation, Training, Organizational culture, Job clarity, Environment, Job recognition, Salaries and emoluments, Leadership, Job security and job satisfaction. In order to measure these factors a suitable questionnaire was designed for each and every factor. A set of four variables were considered and these variables measured the factors. Four questions were designed to measure each of the nine factors and a five point likert scale was used where 1 denoted "strongly disagree" and 5 denoted "strongly agree". The sample size was taken as one hundred and a survey was conducted to obtain the primary information from the employees. The questionnaire was distributed among the employees. The primary data was collected by the questionnaire method and interviewing the employees of the organization. The copy of the questionnaire was distributed among the employees of different organizations and their response was collected and recorded. This is a technique of data collection in which each person will be asked to respond to the same set of questions in a predetermined order. This study was conducted in five manufacturing firms in and around Mysore. A total of one hundred people were interviewed. The questionnaire was subjected to reliability test through Cronbach's alpha, a tool for assessing the reliability. It will be very difficult to judge which the influencing factors are and hence factor analysis, a statistical tool was conducted using SPSS (Statistical Package for the Social Sciences)As given in the first objective, i.e. the identification of factors that influence the human resource productivity was done by going through the literature review and by taking expert opinion. The second objective, which is to identify the factors influencing the human resource productivity in the surveyed organizations, was done through the factor analysis process. The third and the final objective, which was to rank the factors in an order was done on the basis of the average scores obtained from the factor analysis process for each dimension or factor individually
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Data analysis - Demographic characteristics of the survey
The outcome of the survey conducted in four industries can be summarized as below
The various demographic characteristics of the persons interviewed in the survey is as follows
Gender of the employees interviewed
Among the employees interviewed 67 % were males and 22% were females. Gender was not specified by the remaining 11 % of the employees
Age of the employees interviewed in years
Among the one hundred employees interviewed 24 % were of the age group of 20 – 25. 30 % of the employees were under the age group of 25 – 30. 14 % of the employees were under the age group of 30 – 35. 6 & of the employee were under the age group of 35 – 40. 4 % of the employees were under the age group of 40 – 45 and 18 % of the employees did not wish to specify their age.
Educational qualifications of the persons interviewed
Among the one hundred employees interviewed 15% of the employees were ITI qualified. 29 % of the employees were diploma holders. 20 % of the employees were B.E graduates. 5 % of the employees were post graduates and 6 % of the employees had other educational qualifications. Remaining 25 % of the employees did not wish to specify their educational qualifications.
Work experience of the persons interviewed
Among the interviewed employees 26 % of the employees interviewed were having experience of 1 – 5 years. 23 % of the employees were having experience of 5 – 10 years. 14 % of the employees were having experience of 10 – 15 years. 4 % of the employees were having experience of 15 – 20 years. 2 % of the employees were having experience of 25 – 30 years. Remaining 27 % of the employees did not wish to specify their educational qualifications.

Data analysis using a statistical package
The information gathered through the questionnaire was introduced into the SPSS software. Based on the objectives some of the statistical tools were applied accordingly.

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Reliability analysis

Statistical reliability: This is needed in order to endure that the validity and precision of the statistical analysis. It refers to the ability to reproduce the results again and again as required. This is essential as it builds trust in the statistical analysis and the results which are obtained.

Cronbach's alpha

Cronbach's alpha is the most common measure of internal consistency or reliability. It is the most commonly used tool when multiple Likert questions are used in a survey or questionnaires that form a scale and the reliability of the scale is determined. To test the reliability of the data collected, Cronbach's alpha test is used which showed that the data has satisfactory reliability and validity. The reliability statistics table provides the actual values for Cronbach's alpha.

Table 6.1 – Cronbach's alpha value for the nine initial factors

SL.NO	FACTOR	VALUE OF CRONBACH'S ALPHA
1	Motivation	0.819
2	Training	0.791
3	Salary and emoluments	0.742
4	Job clarity	0.842
5	Organizational culture	0.759
6	Environment	0.745
7	Job recognition	0.778
8	Job security and satisfaction	0.770
9	Leadership	0.821

Factor analysis

Factor analysis is used to find factors among observed variables. In other words, if the data contains many variables, factor analysis can be used to reduce the number of variables. Factor analysis groups variables with similar characteristics together. With factor analysis a small number of factors can be produced from a large number of variables which is capable of explaining the observed variance in the larger number of variables. The reduced factors can also be used for further analysis.

KMO and bartlett's test of sphericity

The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. If any pair of variables has a value less than this, consider dropping one of them from the analysis. For the KMO statistic Kaiser (1974) recommends a bare minimum value of 0.5 and that values between 0.5 and 0.7 are mediocre, values between 0.8 and 0.9 are great values. And the values above 0.9 are superb values. In this case the value obtained is 0.860 as shown in the table 6.2

Table 6.2 - KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.860
Bartlett's Test of Sphericity	Approx. Chi-Square	2168.742
	df	630
	Sig.	0.000

The table 6.3 shows the actual factors that were extracted. If we look at the section labeled "Rotation Sums of Squared Loadings," it shows only those factors that met the cut-off criterion (extraction method). In this case, there were eight factors with Eigen values greater than 1. SPSS always extracts as many factors initially as there are variables in the dataset, but the rest of these didn't make the grade. The "% of variance" column tells us how much of the total variability (in all of the variables together) can be accounted for by each of these summary scales or factors. Factor 1 account for 14.726 % of the variability in all 36 variables, factor two accounts for 28.490 % of the variability of all 36 variables and so on.

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Table: 6.3 - Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.971	36.031	36.031	12.971	36.031	36.031	5.302	14.726	14.726
2	3.090	8.582	44.613	3.090	8.582	44.613	4.955	13.763	28.490
3	1.838	5.105	49.718	1.838	5.105	49.718	3.193	8.870	37.359
4	1.629	4.525	54.242	1.629	4.525	54.242	2.981	8.281	45.640
5	1.450	4.029	58.271	1.450	4.029	58.271	2.908	8.077	53.717
6	1.275	3.541	61.812	1.275	3.541	61.812	2.014	5.595	59.312
7	1.093	3.035	64.846	1.093	3.035	64.846	1.594	4.427	63.739
8	1.001	2.780	67.626	1.001	2.780	67.626	1.399	3.887	67.626
9	.980	2.722	70.348						
10	.890	2.472	72.820						
11	.815	2.265	75.085						
12	.811	2.252	77.337						
13	.747	2.075	79.412						
14	.692	1.923	81.335						
15	.617	1.713	83.048						
16	.589	1.636	84.684						
17	.547	1.520	86.203						
18	.498	1.382	87.586						
19	.463	1.287	88.873						
20	.418	1.160	90.033						
21	.380	1.055	91.087						
22	.345	.959	92.046						
23	.339	.941	92.987						
24	.311	.865	93.852						
25	.297	.824	94.676						
26	.273	.757	95.433						
27	.258	.717	96.150						
28	.253	.704	96.854						
29	.196	.545	97.399						
30	.191	.531	97.930						
31	.172	.478	98.408						
32	.147	.408	98.816						
33	.127	.352	99.168						
34	.119	.330	99.498						
35	.096	.267	99.765						
36	.084	.235	100.000						

Extraction Method: Principal Component Analysis.

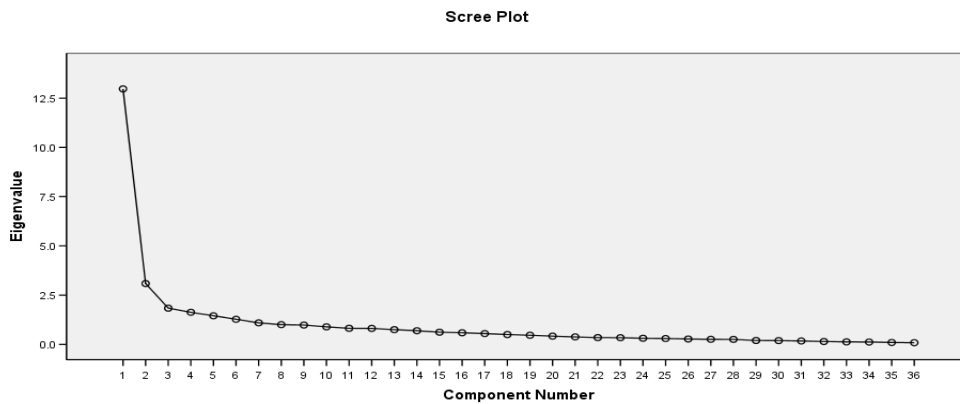# INTERNATIONAL JOURNAL OF RESEARCH SCIENCE & MANAGEMENT

Figure: 6.1 – Scree Plot

The scree plot as shown in the Figure 6.1 is a graph of the Eigen values against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten.

Table: 6.4 - Rotated Component Matrix

Sl. No.	VARIABLES	COMPONENT							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1.	Motivation and support from HR is required to improve the productivity	0.629							
2.	Interest of management to motivate employees is important	0.766							
3.	Financial incentives motivates and improves the productivity	0.728							
4.	Pay hike motivates and improves the productivity	0.759							
5.	Training is must to improve productivity	0.514					0.527		
6.	Training results in working better						0.739		
7.	Training will be relevant to the present work	0.709							
8.	Training improves confidence	0.674							
9.	Salary and incentives influences productivity								
10.	Retirement benefits influences productivity					0.733			
11.	Medical benefits given influences productivity								
12.	Effective per formal appraisal system influences productivity							0.592	
13.	Understanding of goals and objectives is required to improve productivity	0.503		0.530					
14.	Expectation from the employees should be known to them			0.508					
15.	Understanding of day to day objectives should be known			0.604					
16.	Job responsibility should be clearly defined			0.545					
17.	Sharing of decision making power is required		0.685						
18.	Freedom to take decisions must be given		0.566						

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Table: 6.4 - Rotated Component Matrix (contd...)

Sl. No	VARIABLES	COMPONENT							
		1	2	3	4	5	6	7	8
19.	Sharing of information necessary to perform better		0.505						0.647
20.	Two way communication is important		0.544						
21.	Social relationship with workers is important							0.569	
22.	Physical working infrastructure is important				0.679				
23.	Safety precautions is important				0.703				
24.	Presence of first aid faculties is important				0.621				
25.	Recognition and respect motivates		0.703						
26.	Appreciation for good work motivates		0.629						
27.	Recognition by top management motivates		0.531						
28.	There should be importance to suggestions of employee								
29.	Sense of job security helps to perform better					0.501		0.509	
30.	Working hours has influence on worker productivity						0.518		
31.	Opportunity to learn from the job motivates					0.514			
32.	Overall satisfaction with the job					0.530			
33.	Leader communicates decision		0.677						
34.	Leader resolve conflicts within the group		0.717						
35.	Taking of responsibility without finger pointing			0.725					
36.	Involvement of all in planning actions			0.715					

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 31 iterations.

The rotated component matrix as shown in Table 6.4 shows the factor loadings for each variable onto each factor. First we should observe that the factor loadings below 0.5 have not been shown because we have asked for these loading less than 0.5 to be suppressed since it has negligible significance. The next step is to look at the content of the questions that load onto the same factor to try to identify the common themes. It is done and the factors are ranked based on their average scores as shown in table 6.5

Table 6.5 – Extracted factors, their average scores and their respective ranks

Sl. No	Factor	Average scores	Ranked factors
1	Motivation	4.008	III
2	Recognition	3.8125	VI
3	Leadership	3.833	V
4	Physical environment	3.9006	IV
5	Retirement benefits	3.5933	VIII
6	Training	4.04	I
7	Performance appraisal	4.013	II
8	Organizational culture	3.72	VII

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Findings

Initially nine factors, Motivation, Training, Organizational culture, Job clarity, Environment, Job recognition, Salary and emoluments, Leadership, Job security and job satisfaction, were considered for the study, but after factor analysis only eight factors were extracted. These eight factors are training, motivation, performance appraisal, physical environment, leadership, organizational culture, recognition and retirement benefits.

The findings of the study was that these eight factors had different average scores based on which they were ranked. Training which had the average score of 4.04 was found to be the most influencing factor on the human resource productivity in manufacturing sector in and around Mysore, followed by performance appraisal (4.013), motivation (4.008), physical environment (3.900), leadership (3.833), recognition (3.812), organizational culture (3.72), retirement benefits (3.593).

Conclusion

The personnel's performance has a critical role in any organization. As such, identifying variables affecting the productivity and efficiency of human resources is of high importance. The findings of the present study show that training is the most influencing factor on the human resource productivity followed by performance appraisal and motivation.

Scope for further work

This study concentrated only on the industries under the manufacturing sector. This study conducted only with respect to the industries coming under the manufacturing sector in and around Mysore. Similar study may be conducted for industries in other regions. A similar study may also be conducted with respect to various other sectors like information technology biotechnology, banking sectors etc.

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