A Structural Equation Modelling & Artificial Neural Network Approach to examine the Impact of Human Resources Accounting on Firm's Performance

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Abstract

Intangible assets like Human resources are a very important asset for a firm. Human capital is an important part of intellectual capital. The success of any firm depends on the quality of its human resources, whether it belongs to any sector or any industry. Physical assets are used to increase earning capacity of any business organization, and used to increase productivity, earning capacity, increasing the wealth and profit, market value, economic value added, etc. Nowadays because of the global transition service industry has become one of the leading industries which are mainly based on human resources. This study focuses on the implication in Human Resources Accounting and to measure the impact of HRA on a firm's performance and Managerial Efficiency. The aim of the study is to measure the contribution of human resources, and their impact on managerial efficiency and valued HRA. Primary data is taken to test the hypothesis. Statistical tools like regression, Structural Equation model and artificial neural network is used to analyze the result.

Keywords:

Human Resources Accounting, Cost and Value, Retention and Productivity, Managerial Efficiency and social responsibility, Firm Performance

Introduction

Success of corporate undertakings purely depends upon the quality of human resources. It is accentuated that; Human element is the most important input in any corporate enterprise. The investments directed to raise knowledge; skills and aptitudes of the work force of the organization are the investments in human resource. In this context, it is worthwhile to examine and human resource accounting practices in corporate sector in India and to understand how the HRA is effecting the financial and overall performance of the company. (Sharma, A. 2012).

HRA comprises the energies, skills, talents and knowledge of people which are, or which potentially can be applied to the production of goods or rendering useful services (Syed (2009).

It is simply an attempt to identifying measuring and communicating information about human resources and it ought to

be viewed as a metaphor. It's the way of thinking about management of people. It is a recording of transactions related to the value of human resources.

It is highly complicated in today's market to find well knowledge, and highly motivated people. But Human Resource is one of the most important operations for any organization or business. Without the human involvement can lose its efficiency in work, and all the areas of business and levels human efficiency is required with machine efficiency. (Ks, G. 2018).

Literature Review

Oko, S (2018) explained in his paper on A Human Resource accounting system identifies the costs occurrence associated with manpower and separates such human cost from other costs of business. It is therefore significant in deciding and affecting corporate investment and employment decisions of management. It is concluded that capitalizing human assets would positively impact on performance and financial position of organizations and recommended its disclosure as intangible asset in the balance sheet.

Amahalu, N., Abiahu, M.-F. C., Chinyere, O., & Christian, O. (2016) ascertained the effect of Human Resource Accounting on Financial Performance of deposit money banks listed on Nigeria Stock Exchange in their study. The specific objectives are to ascertain the effect or otherwise of staff cost on return on asset, return on equity and market-to book value of banks listed on the floor of Nigeria Stock Exchange from 2010-2015.

Sharma, R., & Sharma, A. (2013) conducted a study with a view to study current practices of human resource accounting in Infosys limited and to find relationship between human resource values and rate of return, fixed assets, current assets, total assets and value added. The researcher found that there is a highly positive correlation between no. of employees and earning capacity of company. Human assets have equally contribution like fixed assets in value addition of company. The researcher also concluded that sound financial health of company is due to its appropriate human resource value.

Sharma, A. (2012). Commented on the applicability of HRA system that it can be used to enhance performance of employees as well as company and to take a variety of decisions in the area of human resource management. But the number of organizations that have adopted HRA system in India is low as it is not compulsory for the Indian organizations to value human resources and mostly used by public sector but private sectors companies are least interesting. Still all those companies who are adopting this accounting system are enjoying their strong financial performance and efficient management.

Sen, D.K., Jain, S.C., Jat, S.L and Saha, R.K. (2008) concluded in their study whether HR information has any impact on internal decision-making i.e. in the context of personnel management decision-making related to employee recruitment and employee turnover control in banking industry of Bangladesh. It is very important to know the perceptions of the management about the specific uses to which HRA information can be put.

Research Methodology

Research methodology comprises the research design, sample design, sources of data, selection of data, various designs and techniques used for analyzing the data. The methodology used for the study at hand is as under:

Research Design: The research design used for the research problem in hand is causal research as the objective is to determine which variable might be causing certain behavior, i.e. whether there is a cause and effect relationship between variables. In order to determine cause and effect, it is important to hold the variable that is assumed to cause the change in the other variable(s), constant, and then measure the changes in the other variable(s). This type of research is very complex and the researcher can never be completely certain that there are no other factors influencing the causal relationship, especially when dealing with people's attitudes and motivations.

Total 18 questions were framed, they are segregated in various dimensions, on the behalf of nature of questions.

Table 1 List of dependent and independent variables

Independent Variable		**Dependent Variable**	
Cost and Value (CV)	14, 15, 16, 18	Firm's Performance (FP)	1, 2, 4, 5, 7, 13
Retention and Productivity (RP)	6, 9, 12, 17	Management and Society (MS)	3, 8, 10, 11

Independent Variables: Cost and Value (CV), Retention and Productivity (RP)

Dependent Variables: Firm's Performance (FP), Managerial Efficiency and Social Responsibility (MS)

Sample Design: The sample design adopted for the research problem in hand is convenience random sampling. The following points are also included in sample design for the purpose of the study:

- **Sample Size**: 385 samples are taken but out of them 254 was found suitable.
- **Sampling Unit**: The study includes executives, managers, investors and shareholder.
- **Sample Area:** The sample area for the study in hand was metro cities.

Objectives

To find out the cost and value of human resource

To know the effect of human resources accounting on retention and productivity of employees

To understand the impact of the HRA on firm's performance

To determine the impact of HRA on managerial decision making capacity

To measure the impact of HRA on social responsibility

Hypotheses

In order to realize the above objectives, the following hypothesis has been formulated.

H1: There is no significant impact of adaptation of HRA on firm's financial performance

H2: There is no significant impact of HRA on managerial decision making capacity and social responsibility

Methods of data collection

For the study in hand, the primary was collected. The primary data for the study was collected directly from target respondents through structured questionnaire. This questionnaire includes the personal information about the respondents. The questions asked to respondents are related to

Research Technique Applied

Likert Five-Point scale was applied in order to analyze the results. The percentage response for each category was calculated and the various weights assigned to different opinions as per Likert's Five Point scale i.e. strongly agree =5, Agree= 4, Neutral = 3, Disagree = 2, strongly disagree = 1.The mean scores and standard deviation scores were calculated for the same.

Research Analysis And Implications of Findings

Following statistical tests and tools will be used to meet with above mentioned objectives and for proving the hypothesis:

- ANOVA
- Structural Equation model and
- Artificial Neural Network

For applying this statistical tools software **SPSS 19** and **AMOS 26** are used.

Anova

ANOVA is a collection of statistical models and their associated estimation procedures (such as the variation among and between groups) used to analyze the differences among group means in a sample. The ANOVA is based on the law of total variance, where the observed variance in a particular variable is partitioned into components attributable to different sources of variation. In its simplest form, ANOVA provides a statistical test of whether two or more population means are equal, and therefore generalizes the t-test beyond two means".

Table 2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821[a]	.673	.663	.44634

a. Predictors: (Constant), CV2, RP2, RP1, RP4, RP3, V4, CV1, CV3

Table 3 ANOVA [a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	100.154	8	12.519	62.843	.000[b]
	Residual	48.608	244	.199		
	Total	148.763	252			

a. Dependent Variable: AVfp

b. Predictors: (Constant), CV2, RP2, RP1, RP4, RP3, CV4, CV1, CV3

Table 4 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.952	.128		7.412	.000
	RP1	.222	.032	.322	6.902	.000
	RP3	.074	.035	.109	2.118	.035
	RP2	.170	.033	.250	5.227	.000
	RP4	.043	.035	.063	1.202	.231
	CV1	.062	.037	.093	1.688	.093
	CV3	.091	.039	.130	2.346	.020
	CV4	.071	.037	.101	1.930	.055
	CV2	.003	.039	.005	.085	.933

a. Dependent Variable: AVfp

According to **Table 2, Table 3 and Table 4** it had been found, that there was no significant difference in the retention & productivity and firm's performance. P-Value is found less than .05, the null hypothesis is rejected, and so alternative hypothesis is accepted. The hypothesis is rejected on the basis of all the criteria of retention and productivity but it is accepted on the basis of cost and value. It means there is significant impact of adaptation of HRA on firm's financial performance.

H2: There is no significant impact of HRA on managerial decision making capacity and social responsibility

Table 5 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.833[a]	.693	.683	.48571

a. Predictors: (Constant), CV2, RP2, RP1, RP4, RP3, CV4, CV1, CV3

Table 6 ANOVA [a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	129.988	8	16.248	68.875	.000[b]
	Residual	57.563	244	.236		
	Total	187.550	252			

a. Dependent Variable: AVms

b. Predictors: (Constant), CV2, RP2, RP1, RP4, RP3, CV4, CV1, CV3

Table 7 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.649	.140		4.643	.000
	RP1	.268	.035	.347	7.660	.000
	RP3	.100	.038	.130	2.624	.009
	RP2	.238	.035	.312	6.730	.000
	RP4	.032	.039	.043	.842	.401
	CV1	.042	.040	.056	1.058	.291
	CV3	.105	.042	.133	2.480	.014
	CV4	.004	.040	.005	.104	.917
	CV2	.033	.042	.043	.789	.431

a. Dependent Variable: AVms

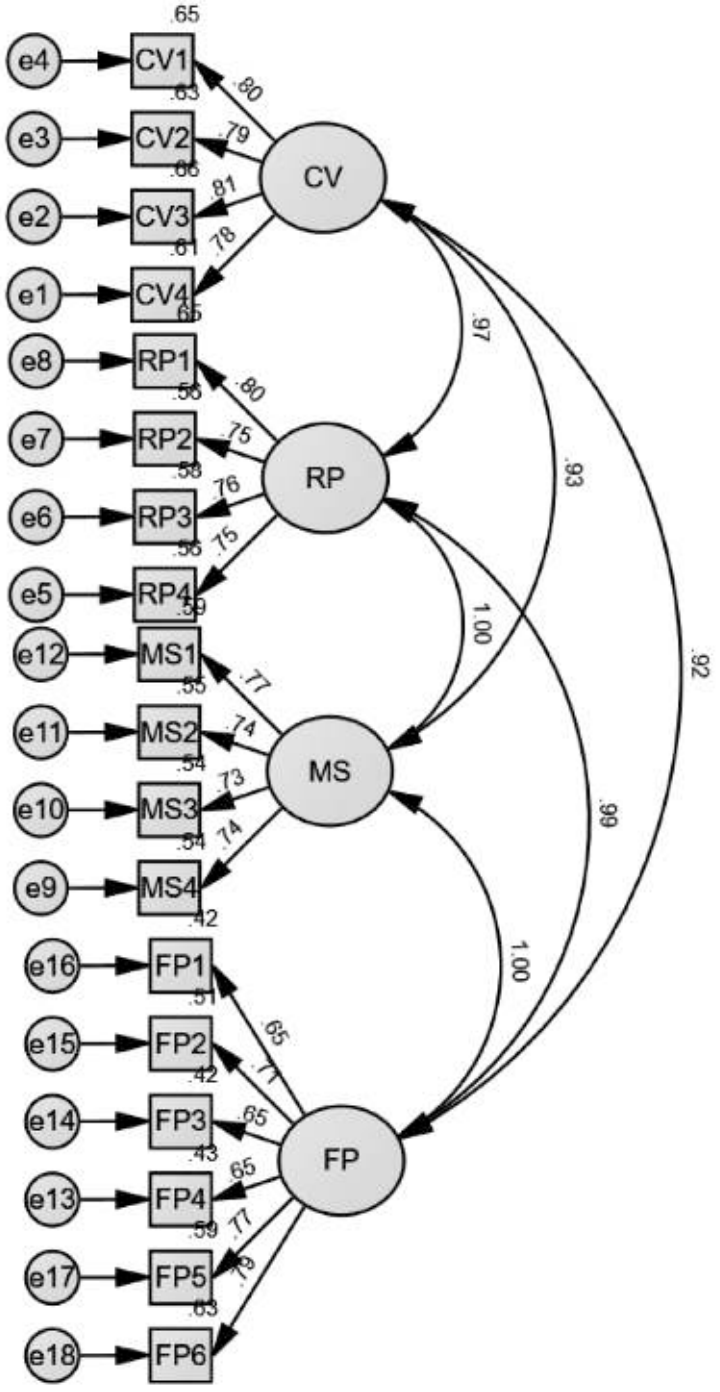
According to **Table 5, Table 6 and Table 7,** it had been found, that there was no significant difference in the retention & productivity and firm's performance. P-Value is found less than .05, the null hypothesis is rejected, and so alternative hypothesis is accepted. The hypothesis is rejected on the basis of all the criteria of retention and productivity but it is accepted on the basis of cost and value. It means there is significant impact of HRA on managerial decision making capacity and social responsibility

Structural Equation Model

To check the reliability and validity of the result, measurement model is prepared. It is tried to find the fitness of model. Structural Equation Model is a technique or tool of testing existing theory. It is an application of combination of exploratory aspect, experimental aspect and descriptive aspect for solving a problem.Reflective or formative construct is designed and fitness is checked through measurement and structural model.

Measurement Model

Figure1 Measurement Model



EMPIRICAL ANALYSIS AND FINDING

Table 8 CMIN (Measurement Model Evaluation)

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	42	259.499	129	.000	2.012
Saturated model	171	.000	0		
Independence model	18	386.015	153	.000	2.523
Zero model	0	2268.000	171	.000	13.263

Measurement Model Evaluation

Assessment of the convergent and discriminant validity considered item loadings, CMIN (Chi square min). The model exhibited a good fit with the data, thus; x2=259.44 with 129 df, x2/df = 2.012, p = 0.000; It is considered good if it's ranged between 1 to 3 (CMIN/df). It is 2.012 which is suggesting adequate reliability.

Table 9 RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.094	.886	.848	.668
Saturated model	.000	1.000		
Independence model	.588	.830	.810	.742
Zero model	.662	.000	.000	.000

Construct reliability

Table 9 presents the Good Fit Index (GFI) = 0.886; Root Mean Residual (RMR) = 0.094. GFI value must be > 0.80 and SRMR < 0.08 (Alalwan, et al., 2018) for adequate model fit.

The study considers GFI and RMR for construct reliability. In Table 3, value IS 0.886 which is above 0.80, is considered good for fitness of model.

Artificial Neural Network

Neural network technique is used to predict the demand for higher education and to prove the hypothesis. A computational neural network is a set of non-linear data modeling tools consisting of input and output layers plus one or two hidden layers.

Multilayer Perceptron (MLP) Procedure is applied to measure and predict further study. They map relationships implied by the data. The MLP feed-forward architectures, meaning that data moves in only one direction, from the input nodes through the hidden layer of nodes to the output nodes.

Table 11 Case Processing Summary

		N	Percent
Sample	Training	176	69.6%
	Testing	77	30.4%
Valid		253	100.0%
Excluded		0	
Total		253	

The case processing summary in table 11 shows that 176 cases or 69.6 % are assigned to the training sample, 30.4% are assigned to testing time, which is used to train the model and 77 cases are assigned to the testing sample which is used to validate the model.

Table 12 Model Summary

Training	Sum of Squares Error		51.419
	Average Overall Relative Error		.294
	Relative Error for Scale Dependents	AVfp	.316
		AVms	.272
	Stopping Rule Used		1 consecutive step(s) with no decrease in error[a]
	Training Time		0:00:00.12
Testing	Sum of Squares Error		26.233
	Average Overall Relative Error		.277
	Relative Error for Scale Dependents	AVfp	.301
		AVms	.253

a. Error computations are based on the testing sample.

The following model summary table 12 displays information about the results of the neural network training the sum of square error is equivalent to 51.419 in the training samples and the relative error is .301 for training. So errors are very minutes.

Table 13 Network Information

Input Layer	Covariates	1	RP1
		2	RP2
		3	RP3
		4	RP4
		5	CV1
		6	CV2
		7	CV4
		8	CV3
	Number of Units[a]		8
	Rescaling Method for Covariates		Standardized
Hidden Layer(s)	Number of Hidden Layers		1
	Number of Units in Hidden Layer 1[a]		7
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	AVfp
		2	AVms
	Number of Units		2
	Rescaling Method for Scale Dependents		Standardized
	Activation Function		Identity
	Error Function		Sum of Squares

a. Excluding the bias unit

Table 13 gives information about the network. It describes the process of working. It works into three-layer: input layer, hidden layer, and output layer. It shows there are 8 units working under input layer, 7 units are under hidden layer, and 1 unit is working under the output layer.

Table 14 Independent Variable Importance

	Importance	Normalized Importance
RP1	.199	93.7%
RP2	.212	100.0%
RP3	.095	45.0%
RP4	.115	54.2%
CV1	.082	38.8%
CV2	.054	25.4%
CV4	.071	33.5%
CV3	.172	81.4%

Table 14 shows importance on how the network classifies the prospective applicants. So, statistical models will help in this situation. The highest importance is due to RP2 (Does HRA favour and develop to promote Human Resources in continuing of the concerns?) (100%), RP1 (Being considered as most important assets of the concern help in increasing productivity) (97.3.3%), and CV3 (Monetary and non- monetary rewards effected Employees for outstanding Performance) (81.4%) and RP 4 (Training and re-training improve employee's skill increase productivity of employees) (54.2%). Rest of the weighed is due to remaining factors.

Fg-2 Input, hidden and output layer

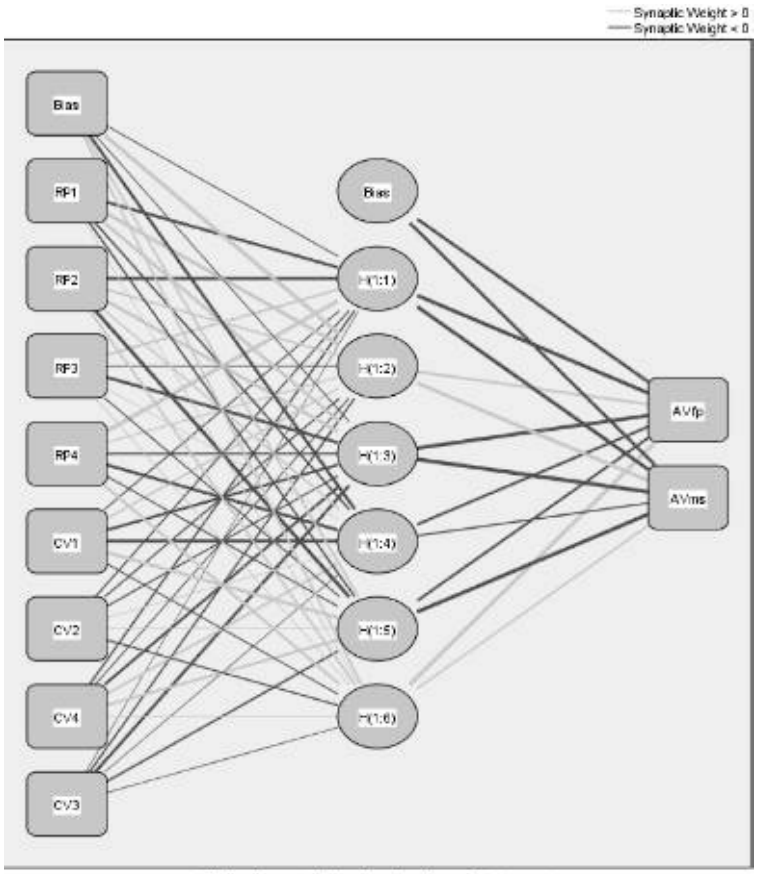


Figure 2 gives the network information. It describes the process of working. It works into three layer: input layer, hidden layer, and output layer. It is a complete connected graph of input, hidden layer and output respectively. It also synaptic weight which is categorized as less than 0 and more than0. The layers which are grey in colour have impacted more than 0. These layer describing out of the entire factor which components have more weight or more important.

Conclusion

The usefulness of human resource accounting is concluded in providing the estimates and measuring the cost occurred on acquiring, promoting, training, development. HRA is equally beneficial for employees and management. The managerial decisions can be taken on behalf of the statement of HRA. By analyzing the statement, productivity if employees can be measured and can motivate to attain their goals and enhancing their work efficiency. On the other hand employees got a psychological satisfaction to be assumed them as important assets and involving them into decision-making process, call for suggestion, participating in voting right and right in ownership.

All the approaches i.e. ANOVA, SEM, ANN used for measuring result says almost same result that HRA influences firm's performance, managerial efficiency. Finally we can say that the output of HRA system can be used to enhance performance of employees as well as company and to take a variety of decisions in the area of human resource management. Result of ANOVA presenting the facts that HRA (factors of retention of employees and productivity) mostly affect output of the firm. Highly correlation among dependent and independent variable is found in measurement model by Structural equation model. Artificial Neural Network explained that the highest impact of Human Resources Accounting is considered due to retention and productivity. Trained employees are capable to enhance productivity and it leads to increases firm's performance. So, it can be said those companies who are adopting this accounting system are enjoying their strong financial performance and efficient management.

Annexure:

Questionnaire

Human asset accounting significantly affects organizations' performance.	firm's performance	FP1
Human Resource Accounting assist to face the acute competition in the era of globalization?	firm's performance	FP2
The consumer and stakeholders also be affected positively by showing HRA as an asset by Indian company?	Management and society	MS1
HRA is a measurement of the cost and value of people as organizational resources	firm's performance	FP3
Is it beneficial for the progress of the companies and to enhance profits?	firm's performance	FP4
Being considered as most important assets of the concern help in increasing productivity	retention and productivity	RP1
Has it a great hand in the success of an organization?	firm's performance	FP5
Is it beneficial in communicating information in order to facilitate effective management?	Management and society	MS2
Does HRA favour and develop to promote Human Resources in continuing of the concerns?	retention and productivity	RP2
Does HRA inspire towards the social responsibilities?	Management and society	MS3
Does HRA help in taking managerial decision?	Management and society	MS4
Whether HRA is useful for improving to retain good/ skilled employees?	retention and productivity	RP3
Training and development cost are incurred in order to Improve Firm performance	firm's performance	FP6

The cost of providing shelter affects employees performance	cost and value	CV1
Cost incurred on Safety and health of the workers promote employee's commitment	cost and value	CV2
Monetary and non- monetary rewards effected Employees for outstanding Performance	cost and value	CV3
Training and re-training improve employee's skill increase productivity of employees	retention and productivity	RP4
Travel cost are incurred in order to improve in turnover rate of employees	cost and value	CV4

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