Splint International Journal of Professionals (A bi-Annual Peer Reviewed International Journal of Management & IT)

Vol. 2	No. 1	Jan. 2015

ISSN: 2349-6045

Splint International Journal of Professionals

(A bi-Annual Peer Reviewed International Journal of Management & IT)

Vol. 2, No. 1 Jan. 2015

© Splint International Journal of Professionals

Typeset by: Splint DTP Centre New Delhi

Printed by: Nandalal Prakashan F-755/4, Sector - 9, CDA Cuttack - 753014, Odisha, India Chief Patron

Prof. Indira Chakravarty Ph.D, D.Sc., FICAN(USA), FIC, FIMSA, FIWA, FIPHA

Padmashri Awardee - 2014

Chief Advisor, WSSO, Public Health Engineering Department, Government of West Bengal Member, Board of Advisers, United Nations University, IIGH Member, National Water and Sanitation Council, MDWS, Government of India Ex-Member, Food Safety and Standards Authority, MDHFW, Government of India Former Addl. DGHS, Director and Dean, All India Institute of Hygiene & Public Health, GOI Former Director, Chittaranjan National Cancer Institute, MOHFW, GOI Former Regional Director, South Asia, MI, IDRC (Canada)

Chief Editor

Prof. S.K. Baral Director, Kushagra Institute of Information & Management Science (KIIMS), Cuttack, Odisha, India

Editorial Advisors

Prof. Partho S. Sengupta Professor, Behavioral Sciences KIIT University, Bhubaneswar, Odisha, India

Prof. M.Z. Mamun Professor, Institute of Business Administration University Dhaka, Bangladesh

Editorial Board

Prof. V. Shekhar Principal, University College of Commerce & Business Management Osmania University, Hyderabad, India

> Prof. Arindam Gupta Professor of Commerce, Vidyasagar University West Bengal, India

Prof. Rabindra Kumar Professor & Head, Deptt. of IRPM, Tilak Manjhi Bhagalpur University Bhagalpur, Bihar, India

> **Prof. P. Indrasena Reddy** Professor of Commerce, Kakatiya University Warangal, Andhra Pradesh, India

Prof. Sambasiva Rao Deptt. of Commerce & Management Studies Andhra University, Visakhapatnam, Andhra Pradesh, India

> **Prof. Sudarsan Sasmal** Former Principal Scientist, CRRI Cuttack, Odisha, India

... from the desk of Chief Editor

Regulations are indispensable to the proper functioning of economies and societies. They underpin markets, protect the rights and safety of citizens and ensure the delivery of public goods and services. At the same time, regulations are rarely costless. In this environment of rapid change and what can seem like ever increasing demands, management often finds it difficult to fully comprehend the total cost of compliance. It sees the potential for costs to escalate without the organisation realising the full benefit of such investment. Additionally, there is the need to provide more relevant and timely information in the public arena. New levels of accountability, which come not just from new laws and regulations but also from the expectations of a broader stakeholder group, have elevated the concerns at board level of ensuring that effective, robust and reliable governance and compliance tools are in place and being utilised. In recent times there has been a paradigm shift in many economies in the way that corporate governance and business ethics are approached. It is a shift that continues to be driven by demanding performance expectations, increasing stakeholder demands and growing public scrutiny after some spectacular failures around the globe. For a large number of companies from different countries and the corporate governance plays a crucial role in efficient company monitoring and shareholder protection and consequently positively impacts valuation. Corporate governance appears more valuable for companies that rely heavily on external financing.

The economic growth has been driven by the expansion of services that have been growing consistently faster than other sectors. It is argued that the pattern of Indian development has been a specific one and that the country may be able to skip the intermediate industrialisation-led phase in the transformation of its economic structure. Serious concerns have been raised about the jobless nature of the economic growth. Favourable macroeconomic performance has been a necessary but not sufficient condition for the significant reduction of poverty amongst the Indian population. The progress of economic reforms in India is followed closely. The World Bank suggests that the most important priorities are public sector reform, infrastructure, agricultural and rural development, removal of labour regulations and reforms in lagging states.

We sincerely hope this bi-Annual International Journal Vol. 2, No. 1, with its contents would enrich the wisdom of our esteemed readers.

We have received many research articles for this edition from different institutiosn, universities and corporate for which we express our sincere gratitude to the authors.

We sincerely acknowledge the valuable suggestions and active guidance of the Editorial Advisors & Board of Editors to bring this Jornal for academic and professional endeavour.

Dr. S.K. Baral

Contents

1.	Industrial Relations – Impact on Quality and Productivity in Manufacturing Industries O Dr. S. Pruthviraja Pande & Dr. S. Ramesh	01-09
2.	An Empirical Study on the Performance of Selected Mutual Fund Schemes In India Dr.Girija Nandini	10-17
3.	Technology: A Tool for Clearing Misconceptions in Mathematical Concepts 1 Dr. Neelam Yadav	18-28
4.	The Implementation of Total Quality Management to the Banking Sector in Rajasthan:A Case Study of HDFC BankDr. Ankita Chaturvedi	29-33
5.	Comparative Analysis of Public Sector and Private Sector Banks of NSE in Aditya Birla Money, Virudhunagar Dr. E.V. Rigin	34-37
6.	Performance of Thermal & Gas Power Generation by GUVNL Company Dr. Gaurangkumar C. Barot	38-46
7.	Impact of Human Resource Information Systems on Organizational Performance:An Empirical Study4Dr. Kishore Kumar Das & Ms Aftab Ara	47-64
8.	A Comprehensive Study on Indian Coal Sector – Challenges and Impact on Corporate Strategy 6 Dr. S.K. Baral	65-76
9.	Enterprise Equipment Management, Replacement Economics and Value Creation 7 Dr. Rohtash Kumar Garg	77-82
10.	A Study on Investment Pattern of Salaried Individuals in Odisha 8 Santosh Kumar Mohapatra	33-89

Industrial Relations — Impact on Quality and Productivity in Manufacturing Industries

Dr. S. Pruthviraja Pande * Dr. S. Ramesh **

ABSTRACT

This study was conducted on the study and the Impact of Industrial Relations on Quality and Productivity in Manufacturing Industries in Karnataka State. As the study was made on all types of Industries like Government Sector, Public Sector and Private Sector Industries, the analysis and the inferences comparatively among all these sectors have significant variance and the responses from the respondents is resulting to a derived and proved evidence to strengthen the statement that there is an Impact of Industrial Relations for better Quality and Productivity in the manufacturing Industries. The study concludes inferring from the analysis of this Objective, the conclusion is drawn that the type of the organisation - Government, Public Sector or Private Sector - is an important factor in deciding the parameters of industrial relations.

Key Words: Industrial Relations, Organisation, Manufacturing Industries, Type of Organisation.

INTRODUCTION

In any organisation, the Industrial Relations is one tool which enhances the production, inter-personnel relations, better industrial relations between the management and the working staff along with better performance, updation of skills, technology including training and motivations. However, there are some facts that influence the Industrial Relations in any organisation as for as any research study, survey or opinions are concerned.

The samples are drawn from the population of different levels of employees differing in their age profile, gender, educational qualification, working status etc., which is heterogeneous in nature. For this purpose, the population was divided in to various homogeneous strata and from these strata, random samples of employee respondents have to be taken. Hence the Stratified Random Sampling Method was used for this study by taking 500 as the sample size of respondents. Stratified sampling techniques are generally used when the population is heterogeneous, or dissimilar, where certain homogeneous, or similar, sub-populations can be isolated (strata). The sample size of 500 respondents is categorized as under:

Company Type	No. of Respondents
Government Companies	100
Public Sector Companies	150
Private Sector Companies	250
Total No. of Respondents	500

Tuble 1. 140. Of Respondents in unicient types of Companie	Table	1:	No.	of	Respondents	in	different	ty	pes	of	Compa	nies
--	-------	----	-----	----	-------------	----	-----------	----	-----	----	-------	------

The data collected has been tabulated and analysed to arrive at suitable inferences in this chapter. Statistical tools such as tabulation & diagrammatic/graphical presentation of the data collected, and analytical tools like ratios, percentages are used in this Study. Graphical representation of data has been carried out with the help of MS-EXCEL software. Since the Study has more than 50 variables to be covered, these are grouped in to several Factors and this has been achieved with the help of Factor Analysis using SPSS software. This software programme is extensively used to draw various bi-variate frequency distributions involving two variables & correlation coefficients

* Visiting Professor, Department of Management, Bangalore University, Bangalore, Karnataka, India

** Professor & Dean, Faculty of Commerce & Management, Mount Carmel College Autonomous, Bangalore University, India

Industrial Relations - Impact on Quality and Productivity in Manufacturing Industries

between related variables. Hypothesis Testing is carried out by using Analysis of Variance procedures & Levene's Statistic. The study of the association between related attributes is analysed with the help of the Spearman's Correlation Coefficients.

To identify and analyse the important element of success in IR.

The success of industrial relations in any organisation would depend on many factors. The Study has identified the following six factors along with the Industrial Relations as the factors that drive the industrial relations forward in the organisations.

- 1.Trade Unions and Associations2.Labour Management
- 3. Production & Organisational Design 4. Job Design
 - Employee Development 6. External linkages

All these factors seem to be very important elements for the success of industrial relations. In order to achieve the above Objective, a detailed analysis of these factors has been carried out in the following paragraphs with the help of the correlation studies between the variables grouped in to several factors with the average rating score of industrial relations.

(1). The correlation between the parameters of Industrial Relations with Trade Unions & Associations is tabulated as below:

Spearman's rank correlation coefficients for the variables of Factor 1 "Trade Unions and Associations"

Parameters of Industrial Relations	1.0000	
Strength of TU in bargaining	0.5597	
Elections in TU	0.5804	
Communication between TU & Management	0.5408	
Information transmission within the TU	0.6306	
Friendly relations with Management	0.5767	
Recognition to TU by Government	0.6153	
Practice of retiring and workforce	0.5214	

Il these correlation coefficients are depicted in the following graph:



5.

The first parameter of the Trade Unions & Associations is "Strength of Trade Unions in bargaining with the Management of their organisations". The correlation of this variable with the average rating score of the parameters of industrial relations is found to be 0.5597. This implies that the association between these two variables can be explained to an extent of 55.97 percent. The parameter "Elections in Trade Unions" has a positive correlation which is moderate also to an extent of 58.04 percent with the Industrial Relations. The parameter "Communication between the Unions & the Management" has a moderate degree of positive association with the industrial relations to an extent of 54.08 percent. There is a high degree of positive correlation of the parameter "Information transmission within the Unions" with the industrial relations and is found to be 63.06 percent. There is 57.67 percent of positive and moderate degree of positive correlation between the "Friendly Relations with Management" and the industrial relations. There is a high degree of positive degree of correlation to Trade Unions by Government" with the industrial relations. There is a high degree of moderate and positive degree of correlation between "Practice of Retirements & Workforce Reduction by the Managements" and the Industrial Relations.

Inference: From the above analysis, the important element of success in Industrial Relations in the organisation by considering the factor "Trade Unions & Associations" is found to be *"Information Transmission within the Union and among the members of the Trade Unions & Associations"* with the correlation coefficient being highest at 0.6306. This shows the importance of the flow of information, whatever it may be, relating to the organisation & the employees, within the members of the Unions & Associations, which makes the path of success of industrial relations smoother in any organisation. This also supports the fact that if there is a continuous stress on the importance of flow of information it enhances the degree of good industrial relations in the organisations.

(2). The correlation between the parameters of Industrial Relations with Labour Management is depicted in the following table and the graph:

Parameters of Industrial Relations	1.0000
Link between Management & Workforce	0.5945
Employee participation in decision making	0.5496
Access of information to workers	0.5621
Issues relating to jobs	0.5698
Availability of Employee Information	0.5889
Requisites for benefits and promotions	0.5530
Issues of performance appraisal	0.5302
Stage-to-Stage Communication	0.6255
Emphasis on developing the leadership skills	0.5874

Spearman's rank correlat	ion coefficients for	for the variables	of Factor 2 "Labour	Management
--------------------------	----------------------	-------------------	---------------------	------------



Industrial Relations - Impact on Quality and Productivity in Manufacturing Industries

The findings of the above table and the graph are as follows:

The variable "Link between Management & Workforce" of the factor Labour Management has a moderate degree of positive correlation with the factor Industrial Relations and the correlation is found to be 0.5945. The correlation between "Employee Participation in Decision Making" and the factor Industrial Relations is found to be moderate and positive at 0.5496. There is 56.21 percent of moderate and positive association between "Access of Information to Workers" and the factor Industrial Relations. The variable "Issues relating to Jobs" has a moderate and positive degree of association to an extent of 56.98 percent with the Industrial Relations. There is 58.89 percent of moderate and positive degree of correlation between "Availability of Employee Information in the organisations" and the Industrial Relations. The association between "Requisites for benefits & promotions" and the Industrial Relations is 55.30 percent, which is positive and again moderate. The variable "Issues of performance appraisal" has a moderate and positive association with the Industrial Relations and this correlation is found to be 0.5302. The correlation between the variable "Stage-to-Stage Communication" has a high impact on the industrial relations with the correlation coefficient at 0.6255. There is also a moderate and positive degree of association between "Emphasis on developing the leadership skills" and the Industrial Relations and this correlation is found to be 0.5874.

Inference: The above analysis brings forth the important element of success in Industrial Relations in the organisation by considering the factor Labour management" as the "Stage-to-Stage Communication within the Organisations at all levels" with the correlation coefficient being highest at 0.6255. This shows the importance of the flow of information, whatever it may be, relating to the organisation & the employees, without of any distinction between the stages that makes the success of industrial relations imperative for any organisation. It means that if there is a continuous stress on the importance of Communication channels within the organisation, it improves the degree of good industrial relations.

(3). The correlation between the Industrial Relations with the variables of Production & Organisational Design is depicted in the following table:

Parameters of Industrial Relations	1.0000
Living & Working Conditions	0.4368
Motivated Workers	0.3812
Labour welfare measures	0.5090
Matching the Goals with the Resources	0.6416
Care towards Employees' basic needs	0.5511
Presence of Quality checks	0.5296
Cordial Management	0.5188
Efforts of workers for best productivity	0.5758

Spearman's rank correlation coefficients for the variables of Factor 3 "Production & Organisational Design"

From the above table, it is found that among the variables of the "Production & Organisation Design", the "Matching the Goals of the Organisation with the Resources within" has a high degree of positive correlation with the Industrial Relations & found to be 0.6416. This has been identified as the element of success in Industrial Relations so far as "Production & Organisational Design" factor is considered. Next below this value is the value of correlation at 0.5758 which pertains to the moderate and positive correlation between "Efforts of Workers for best productivity" and the Industrial Relations. The correlation between "Living & Working Conditions" and Industrial Relations is 0.4368 which is low in degree and is positive. The correlation between "Motivated Workers" and the Industrial Relations is also found to be low and positive at 0.3812. The variable "Labour Welfare Measures" has an average degree of positive correlation at 0.5090 with Industrial Relations. The association between "Care towards the basic

needs of the Employees" and the Industrial Relations is 0.5511 which is just above the average (moderate) degree of correlation and is positive. The variable "Presence of Quality Checks" has a moderate degree of positive correlation with the Industrial Relations at 0.5296. The correlation between the "Cordial Management" and the Industrial Relations is found to be just above the average & is positive at 0.5188. All these values of correlation coefficients are presented in the graph as follows:



Inference: The correlation coefficients for all the variables of "Production & Organisational Design" are positive indicating that if the efforts on these variables are increased, the effect on the Industrial Relations will be positive. Among these variables, "Matching the Goals of the Organisation with the Resources within" has a high degree of positive correlation with the Industrial Relations & found to be 0.6416. Therefore, this has been identified as the element of success in Industrial Relations so far as "Production & Organisational Design" factor is considered. This shows the importance of matching the goals of the organisation with the available resources to gain momentum in the industrial relations.

(4). The correlation coefficients have been found for the variables of the factor "Job Design" with the Industrial Relations and are tabulated as under:

Parameters of Industrial Relations	1.0000	
Effect of IR on Productivity	0.5099	
Organisational Tendency to have industrial/labour oriented issues alive	0.5191	
Updating Knowledge of Human Resources	0.4918	
Job Security & Job Satisfaction	0.5308	
Attendance at training	0.6067	
Treatment of Female Workers	0.5096	
Leave provisions	0.5233	
Awareness about Quality & IR	0.5606	

The findings of the above table are as follows:

From among the correlation coefficients listed in the above table, the value 0.6067 is the highest for the variable "Attendance at Training" and the Industrial Relations. This is a moderate degree of positive correlation. The correlation between the "Effect of IR on Productivity" and the Industrial Relations is 0.5099; between Organisation Tendency to have industrial/labour oriented issues alive and the Industrial Relations is 0.5191; between the Updating Knowledge of Human Resources in the Organisations and the Industrial Relations is 0.4918. There is a moderate degree of positive association between the Job Security & Job Satisfaction and the Industrial Relations and is found to be 0.5308. The variable "Treatment of Female Workers in the organisations" has an average degree of positive

correlation with the Industrial Relations and the correlation coefficient is found to be 0.5096. There is a moderate degree of positive correlation between "Leave Provisions" and the Industrial Relations (0.5233) and "Awareness about Quality & IR" and the Industrial Relations (0.5606).



All these correlation coefficients are plotted in the following graph:

Inference: From the above analysis, the important element of success in Industrial Relations in the organisation by considering the factor "Trade Unions & Associations" is found to be "Attendance at Training" with the correlation coefficient being highest at 0.6067. This shows the importance of the regular attendance of the workers/employees/ staff in the Trainings, Workshops, and Seminars & Conferences etc. Regular attendance at the trainings etc. will definitely yield positive results in the organisation because of the improved working knowledge levels of workers. When working knowledge increases, it is bound to have positive impact on the relations with the staff & managerial side in the organisations. This improves the Industrial Relations within the organisations significantly.

(5). The correlation coefficients have been found for the variables of the factor "Employee Development" with the Industrial Relations and are tabulated as under:

Parameters of Industrial Production	1.0000
Recruitment & Training - fine tuned processes	0.5469
Competent selection processes	0.5350
Impartial recruitment	0.6302
Turning employees in to stock holders	0.4985
Innovative salary package	0.5138
Pre-permanent employee status	0.3715
Employee self-realisation	0.5636
Mechanism of Labour-Management	0.5547

The findings of the above table of correlation coefficients are as follows:

It is seen that there is a high degree of positive correlation to an extent of 0.6302 for the variable "Impartial Recruitment" of the factor Employee Development with the Industrial Relations. The correlation between the "fine tuned processes of recruitment & training" and the Industrial Relations is 0.5469 that is moderate and positive. There is a moderate & positive degree of association between Competent Selection Processes relating to Employee Development and Industrial Relations which is found to be 0.5350. The correlation coefficients between "turning employees in to stock holders of the organisation" & the Industrial Relations is 0.4985; that between "Innovative Salary Package" & Industrial Relations is 0.5138; that between "Employee Self Realisation" & Industrial Relations is 0.5636; and that between "Mechanism of Labour-Management" & Industrial relations is 0.5547. All these

correlations are moderate and positive. There is a low degree of positive correlation between "Pre-permanent employee status" & Industrial Relations and this is 0.3715. All these coefficients are plotted in the following graph for pictorial presentation:

Inference: From the findings, it is concluded that the important element of success in Industrial Relations with regard to Employee Development is "Impartial Recruitment" within the organisations with its correlation being high among all the other coefficients within the group. This stresses the need for impartial recruitments & interviews, transparency in recruitment systems, emphasis on skills & qualifications/experience of the candidates at the time of recruitment etc., to improve the atmosphere of Industrial relations in the organisations. It is evident from the results that if the recruitment processes are more impartial & transparent, it results in the smoother industrial relations within the organisation.



(6). The correlation coefficients have been found for the variables of the factor "External Linkages" with the Industrial Relations and are tabulated & are shown in the graph as under:

Parameters of Industrial Relations	1.0000
Workforce Outsourcing/hiring	0.5628
Legal status of the firm	0.4535
Government Policies	0.5580
Investment on Plant & Machinery	0.5256

The findings of the above table and the graph are as follows:



Industrial Relations - Impact on Quality and Productivity in Manufacturing Industries

There is a moderate degree of positive correlation between the variable "Workforce Outsourcing/Hiring" of the Factor "External Linkages" and the Industrial Relations and is found to be 0.5628. This is very closely followed by another external variable "Government Policies" whose correlation is found to be 0.5580 with the Industrial Relations which is again moderate and positive. Other two variables viz., "Legal Status of the firm" and "Investment on Plant & Machinery" are positively correlated but to an average extent with the Industrial Relations. The coefficients are found to be 0.4535 and 0.5256 respectively.

Inference: From the analysis, it is concluded that there are two variables viz., "Workforce Outsourcing/Hiring" & "Government Policies" of the factor "External Linkages" which are identified as important elements of success of the Industrial Relations within the organisations. Outsourcing being the Mantra today of any business organisation, it is not surprising to see that more the efforts on outsourcing more will be the success rate of the Industrial Relations in the organisations. Very effective Government Policies on the Industries also have a direct impact on the Industrial Relations in the organisations.

From the identified elements of success of Industrial Relations of the various factors, it is found that the variable "Matching the Goals with the Resources in the Organisation" of the factor "Production & Organisational Design" has the maximum amount of correlation with the parameters of Industrial Relations & hence this is identified as a very important element of success of the Industrial Relations within the organisations.

Matching the goals with the resources in the organisation is the process of choosing and implementing a structural configurations for an organisation with design to contingent upon several factors like size of the firm, operational parameters, information technology, its environment, the strategic planning for both survival and growth. The matching the goals is the combination of resources, technology, knowledge to enhance quality and productivity in an organisation, with organisational ancillaries like plant and machinery, procedures designing and systems with disseminate information for translating into knowledge.

From the study and the analysis carried out on to identify and analyse the important element of success in Industrial relations mainly focusing on the six factors studied above, it is found that the Matching the Goals with the Resources in the Organisation" of the factor "Production & Organisational Design is a very important element of success of the Industrial Relations within the organisations.

The workplace situations or the organisational design should much look into the factors like the need for achievements like drive to excel, to achieve relations to a set of standards and to strive to succeed. It is also essential to match the goals and resources i.e. both the men and material to desire the competence, close interpersonal relationships and the organisational goals to find the better solutions for the industrial issues. This also includes mainly on the designing of the organisational and production factors, which includes mechanisation, automation and rationalisation including computerization.

The other element in the organisational design in the updation of the skills of both men and materials by motivation, trainings and better industrial relations in the manufacturing industries. The factors like job designing, organisational designing, work scheduling and motivation, which are the major tools which, impacts the quality and the performance of the employees in the manufacturing industries. As it is found, it is not only the organisational goal, which is more vital and met in the study, but also it is the job satisfaction and the specialisation of the job, which creates the better industrial relations in the organisation.

Therefore, the organisation, which matches the goals with its resources, would increase the worker's satisfaction, challenge and competence among the employees to enhance task identity, task significance and skill variety which, derives job enrichment, motivational level of the employees with better self-evaluation of their work.

CONCLUSION

Therefore, for a long term managerial and employee's relations, peace and co-ordination in any organisation and especially in the Manufacturing Industries can be sustained only by industrial relations and the success in Industrial Relations is the success of the organisational goal as for as quality and productivity are concerned.

REFERENCES

- 1. "Applied Human Relations: An Organisational Appraoch", Mr. Halloran, Jack, published by Prentice Hall of India.
- 2. "Dynamics of Personnel Administration", Mr. Rudra Basavaraj M.N published by the Himalaya Publishing House, Bombay.
- 3. "Economic Development of Karnataka", Sri. Srinivasagowda M.V., Nanje Gowda, Indian Economic Association, Bangalore University, Bangalore.
- 4. "Human Development", Mr. Grace Craig, from University of Massachusetts, Fourth Edition, Prentice-Hall Publications.
- 5. "Human Resource Development in Public Enterprises", MR. Bansal M.P., published by RBSA Publishers, Jaipur.
- 6. "Human Resource Management" Mr. G. Satyanarayana, published by the Edition, Apollo Publishers.
- 7. "Industrial Development in India", Mr. Vakil. C.N. published by the Orient Longman Publications, New Delhi.
- 8. "Industrial Growth and Stagnation (the Debate in India)", Mr. Nayyar Deepak, published by Sameeksha trust, Oxford University Press, New Delhi.
- 9. "Industrial Psychology", Mr. Chatterjee N.R., published by Sudha Publications [P] Ltd., New Delhi.
- 10. "Industrial Psychology"., Mr. Tiffin Joseph Published by George Allen & Unwin Limited, London.
- 11. "Industrial Relations", Mr. Wiley Blackwell published by Blackwell Publishing.
- 12. "International Management Behaviour", Mr. Henry W. Lane and Joseph Distefano, Second Edition, PWS-KENT PUBLISHING COMPANY Publications.
- 13. "Labour Laws", Mr. Taxmann's, published by Taxmann Allied Services [P] Ltd Publishers.
- 14. "Man Power Planning in India Activating Poverty and Unemployment", by Mr. Ashok Kumar
- 15. "Personal Management", by Mr. C. B. Mamoria, Published by the Himalaya Publishing House.
- 16. "Personnel & Human Resource Management" by Mr. David A. Decenzo & Stehphen P. Robbins, Third Edition, Eastern Economy Edition, Prentice-Hall India Publications.
- 17. "Public Undertakings and Labour of India", Mr. Mehta V.D & Mr. Maheshwari P.D published by Progress Publishers, Bhopal
- 18. "Task Design and Employee Motivation", Mr. Adag, Raymond J and Arthur P. published by Glenview, III: Scott Foreman Publications.
- 19. The Public Sector Today (New Perspective in Economic Reforms)" by Mr. Brahmacharya Om Prakash,
- 20. "The Social Psychology of Industry", Mr. Brown JCA, Published by English Language Book Society, London.
- 21. "Upper Management and Quality", Mr. Juran J published by Juran Institute Publications New York.

An Empirical Study on the Performance of Selected Mutual Fund Schemes In India

Dr.Girija Nandini*

ABSTRACT

A mutual fund is a scheme in which several people invest their money for a common financial cause. The collected money invests in the capital market and the money, which they earned, is divided based on the number of units, which they hold. So, there is a need for the mutual fund investors to evaluate the performance of schemes before deciding on investments. Past performance is taken as reference by many investors. The present paper investigates the performance of 9 fundsfrom three different companies for the period from April 2007 to March 2012 (five years). Yearly NAV of different schemes have been used to calculate the returns from the fund schemes. NSE- Nifty has been used for market portfolio. The historical performance of the selected schemes were evaluated on the basis of Sharpe, Treynor, and Jensen's measure whose results will be useful for investors for taking better investment decisions. The results of various statistical measures are tabulated and consolidated to get a comprehensive picture of the performance of the select schemes.

Keywords: Mutual Fund, Sharpe, Treynor, Jensen's Measure.

INTRODUCTION

The Indian mutual fund industry has comea long way from its inception in 1964. There is lotof structural transformation in the industry overthe years. The competition is intense in thecurrent scenario as there are a variety of players in all types of fund schemes. At present, thereare four players in the industry viz. UTI, Publicsector banks, Insurance corporations and theprivate sector. The industry has witnessedenormous growth in terms of size, operations, investor base, and variety of schemes. It is further expanding in tune to the needs of the investors and market pressures. Statistical measures are available which utilizespast data to know about the worthiness of schemes in a scientific manner. The mutual fund industry started in India in a small way with the UTI Act creating what was effectively a small savings division within the RBI. Over a period of 25 years this grew fairly successfully and gave investors a good return, and therefore in 1989, as the next logical step, public sector banks and financial institutions were allowed to float mutual funds and their success emboldened the government to allow the private sector to foray into this area. The advantages of mutual fund are professional management, diversification, economies of scale, simplicity, and liquidity. Mutual funds are easy to buy and sell. You can either buy them directly from the fund company or through a third party. Before investing in any funds one should consider some factor like objective, risk, Fund Manager's and scheme track record, cost factor etc. There are many types of mutual funds. The funds can be classified on the basis of structure (open-ended & close-ended), nature (equity, debt, balanced), investment objective (growth, income, money market) etc.

A code of conduct is there for registration structure of mutual fund intermediaries, which were subsequently mandated by SEBI. In addition, this year AMFI was involved in a number of developments and enhancements to the regulatory framework. The most important trend in the mutual fund industry is the aggressive expansion of the foreign owned mutual fund companies and the decline of the companies floated by nationalized banks and smaller private sector players. Reliance Mutual Fund, UTI Mutual Fund, ICICI Prudential Mutual Fund, HDFC Mutual Fund and Birla Sun Life Mutual Fund are the top five mutual fund companies in India. It should always be keptin the mind that if particular mutual funding scheme is on larger scale then next time, it may not give the same results. So being a careful investor everyone should take major step diligently to obtain the high returns.

^{*} Asst. Professor, Department of Management Studies, Regional College of Management Autonomous, Bhubaneswar, Odisha, India

OBJECTIVES OF THE STUDY

- 1. To determine the performance of selected open end mutual fund schemes using various statistical measures like Sharpe ratio, Treynor ratio, and Jensen Ratio.
- 2. To suggest the investors, on investment in mutual fundsaccording to their performance.

REVIEW OF LITERATURE

Studies by Treynorand Mazuy(1966), Jensen (1968), Kon and Jen (1979), Henriksson and Merton (1981), Chang and Lewellen (1984), Henriksson (1984), and Jagannathan and Korajczyk (1986) have generally concluded that mutual fund managers cannot consistently time the market or select under-priced securities. This has led to the conclusion that long-term individual mutual fund performance can best be described as random. Very few studies have attempted to explain the flow of money into and out of mutual funds. Harry Markowitz (1952) provides a theory about how investors should select securities for their investment portfolio given beliefs about future performance. He claims that rational investors consider higher expected return as good and high variability of those returns as bad. From this simple construct, he says that the decision rule should be to diversify among all securities, securities which give the maximum expected returns. His rule recommends the portfolio with the highest return is not the one with the lowest variance of returns and that there is a rate at which an investor can increase return by increasing variance. This is the cornerstone of portfolio theory as we know it. His portfolio theory shows that an investor has a choice of combinations of return and variance depending on the percentage of wealth invested in various combinations of risky assets. William Sharpe (1964) and John Lintner (1965) separately extend the work of Markowtiz. They show that the theory implies that the rates of return from efficient combinations of risky assets move together perfectly (will be perfectly correlated). Spitz(1970) related mutual growth to performance. Growth was measured by net cash inflows which were defined as sales of capital shares less the redemption of capital shares. A study by Smith (1978) related mutual fund growth to fund performance and found some positive relationships after adjusting for risk using Jensen's Alpha. Santini, Donald Louis (1990) made an attempt to measure the competitive success the mutual fundsby assessing the ability to attract new money. In 1992 Pinto and Jerald have incorporated three empirical studies investigating the informational efficiency of the U.S. capital markets. The evidence of each study is consistent with a traditional view of market efficiency. Another study by Prather and Larry Joseph (1995) re-examines performance evaluation of managed portfolios. The Capital Market Research Bureau (1993) made a research presentation explaining how different mutual funds and their various schemes fared during 1992, the turbulent period. The financial express investment magazine, (1997) conducted a study jointly with Value Research, a pioneer in tracking mutual funds in India shows that the bondfunds have emerged as winners, while equity funds plunged deeper into red.

RESEARCH METHODOLOGY

The study is empirical in nature. The present paper investigates the performance of 9 funds from three different companies for the period from April 2007 to March 2012 (five years). Yearly NAV of different schemes have been used to calculate the returns from the fund schemes. NSE- Nifty has been used for market portfolio. The historical performances of the selected schemes were evaluated on the basis of Sharpe, Treynor, and Jensen's measure. It helps us see how the funds stand in comparison with each other.

Risk Free Rate of Return

The weekly yields on 91-day treasury bills (T-bills) are used as a surrogate for risk free rate of return. The T-bills information has been obtained from the Annual Reports of the RBI for the current year.

Benchmark Portfolio

S&P CNX Nifty Index has been used as the benchmark portfolio to compare with the performance of the sample schemes. The S&P CNX Nifty is a well-diversified 50 stock index accounting for 25 sectors of the economy. It is used for a variety of purposes such as benchmarking fund portfolios, index based derivatives and index funds. The index is computed using market capitalization weighted method, wherein the level of the index reflects the total

market value of all the stocks in the index relative to a particular base period. The method also takes into account constituent changes in the index and importantly corporate actions such as stock splits, rights etc without affecting the index value.

Measures of Mutual Fund Performance

There are various measures to evaluate theperformance of mutual funds like

- * Sharpe ratio
- * Treynor ratio
- * Jensen ratio
- * Sharpe differential return measure

This study has attempted to calculate three measures viz. Sharpe ratio, Treynor ratio, and Jensen ratio.

Sharpe ratio:

It is also called Sharpe's reward to variability ratio. It measures the excess return per unit of total risk as measured by standard deviation. It is computed by the following formula:

$$S_1 = \frac{R_p - R_f}{\sigma_p}$$

R_n - Portfolio's average rate of return

R_f - Riskless rate of return

 σ_{n} - Standard deviation of the portfolio return

The larger the St, better the fund has performed

Treynor ratio:

The Treynor ratio's rewardto volatility ratio measures the excess return perunit of market (systematic) risk.

$$T_n = \frac{R_p - R_f}{\beta_p}$$

The larger the Tn, better the fund has performed. Larger Tn is more desirable because it earned more risk premium per unit of systematic risk.

Jensen ratio:

This is anabsolute measure whereas Sharpe and Treynorratios are relative measures. It reflects whetheror not fund managers are able to generate returns in excess of equilibrium returns.

The basic model of Jensen is:

Rp = a + b (Rm - Rf)

Rp = average return of portfolio

Rf = riskless rate of interest

a = the intercept

b = a measure of systematic risk

Rm = average market return

ANALYSIS AND INTERPRETATION

The analysis includes calculation of Sharpe, Treynor and Jensen ratios for different funds which will help the investor to invest their money in right avenues for the profitable purpose.

PERFORMANCE OF HDFC FUND

Performance of different funds of HDFC has been calculated through the Sharpe, Treynor and Jensen ratio in the table no 1.

YEAR	FUND	HDFC High interest	HDFC incom	e HDFC floating rate
	Ratios	fund-short term plan(G)	fund	income fund-stp- wholesale
2007-2008	Sharpe	0.699	-1.65	0.38
	Treynor	-69.67	79.81	-28.59
	Jensen	3.16	-5.86	0.17
	Benchmark index	-73.46	-73.46	-73.46
2008-2009	Sharpe	1.93	-0.81	2.1
	Treynor	-192.21	39.36	-158.14
	Jensen	6.49	-3.97	2.92
	Benchmark index	60.21	60.21	60.21
2009-2010	Sharpe	1.1	-1.37	0.95
	Treynor	-111.24	- 66.42	-71.49
	Jensen	-1.11	-4.82	-0.32
	Benchmark index	16.93	16.93	16.93
2010-2011	Sharpe	0.43	-1.83	0.005
	Treynor	-2.03	-8.6	-0.43
	Jensen	-0.47	-8.96	0.17
	Benchmark index	-27.42	-27.42	-27.42
2011-2012	Sharpe	0.07	-2.07	-0.49
	Treynor	-7.37	10.37	7.26
	Jensen	1.28	-6.91	1.26
	Benchmark index	23.73	23.73	23.73

Table 1: Sharpe, Treynor & Jensen Ratios of HDFC Fund

Table 1 shows that in 2007-2008, the Sharpe ratio of HDFC High interest fund-short term plan(G), HDFC income fund and HDFC floating rate income fund-stp- wholesale are 0.699, -1.65 and 0.38 respectively. The Treynor ratios are -69.67, 79.81 and -28.59 and Jensen ratios are 3.16, -5.86 and 0.17. The benchmark index was -73.46. The benchmark index was less than the ratios. So it would be good opportunity for the investor to invest in these funds. In 2008-2009, the Sharpe ratio of HDFC High interest fund-short term plan(G), HDFC income fund and HDFC floating rate income fund-stp- wholesale are 1.93, -0.81 and 2.1 respectively. The Treynor ratios are -192.21, 39.36 and -158.17 and Jensen ratios are 6.49, -3.97 and 2.92. The benchmark index was 60.21. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

In 2009-2010, the Sharpe ratio of HDFC High interest fund-short term plan(G), HDFC income fund and HDFC floating rate income fund-stp- wholesale are 1.1,-1.37,0.95 respectively. The Treynorratios are -111.24, - 66.42 and -0.32 and Jensen ratios are -1.11,-71.49 and -3.2. The benchmark index was 16.93. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

In 2010-2011, the Sharpe ratio of HDFC High interest fund-short term plan(G), HDFC income fund and HDFC floating rate income fund-stp- wholesale are 0.43, -1.83 and 0.005 respectively. The Treynor ratios are -2.03, -8.6 and - 0.43 and Jensen ratios are -0.47, -8.96 and 0.17. The benchmark index was -27.42. The benchmark index was

less than the ratios. So it would be good opportunity for the investor to invest in these funds.

In 2011-2012, the Sharpe ratio of HDFC High interest fund-short term plan(G), HDFC income fund and HDFC floating rate income fund-stp- wholesale are 0.07, -2.07 and -0.49 respectively. The Treynor ratios are -7.37, 10.37 and 7.26 and Jensen ratios are 1.28, -6.91 and 1.26. The benchmark index was 23.73. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

PERFORMANCE OF TATA FUND

Performance of different funds of TATA has been calculated through the Sharpe, Treynor and Jensen ratio in the table no 2.

YEAR	FUND	Tata treasury manager	Tata floater	Total
		fund-High investment	fund (G)	income fund (G)
	Ratios	plan (G)		
2007-2008	Sharpe	0.37	0.37	-0.25
	Treynor	-23.48	-26.25	14.63
	Jensen	0.32	0.04	-3
	Benchmark index	-73.46	-73.46	-73.46
2008-2009	Sharpe	1.98	2.01	0.19
	Treynor	-123.82	-141.69	-11.4
	Jensen	3.19	2.87	-3.32
	Benchmark index	60.21	60.21	60.21
2009-2010	Sharpe	0.9	0.91	-0.1
	Treynor	-56.71	-64.47	6
	Jensen	-0.35	-0.29	-2.42
	Benchmark index	16.93	16.93	16.93
2010-2011	Sharpe	0.02	0.01	-0.35
	Treynor	-1.67	-1.15	20.29
	Jensen	0.03	0.37	-5.34
	Benchmark index	-27.42	-27.42	-27.42
2011-2012	Sharpe	-0.44	-0.46	-0.48
	Treynor	17.51	12.43	17.86
	Jensen	0.96	1.2	3.06
	Benchmark index	23.73	23.73	23.73

Table 2; Sharpe, Treynor & Jensen Ratios of Tata Fund

Table 2 defines that in the year 2007-2008, the Sharpe ratio of Tata treasury manager fund-High investment plan(G), Tata floater fund(G) and Tata income fund(G) are 0.37, 0.37 and -0.25 respectively. The Treynor ratios are -23.48, -26.25 and 14.63 and Jensen ratios are 0.32, 0.04 and -3. The benchmark index was -73.46. The benchmark index was less than the ratios. So it would be good opportunity for the investor to invest in these funds.

In 2008-2009, the Sharpe ratio of Tata treasury manager fund-High investment plan (G), Tata floater fund (G) and Tata income fund (G) are 1.98, 2.01 and 0.19 respectively. The Treynorratios are -123.82, -141.69 and -11.4 and Jensen ratios are 3.19, 2.87 and -3.32. The benchmark index was 60.21. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

In 2009-2010, the Sharpe ratio of Tata treasury manager fund-High investment plan (G), Tata floater fund (G) and Tata income fund (G) are 0.9, 0.91and-0.1 respectively. The Treynor ratios are -56.71,-64.47 and 6 and Jensen ratios are -0.35,-0.29, and -2.42. The benchmark index was 16.93. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

In 2010-2011, the Sharpe ratio of Tata treasury manager fund-High investment plan(G), Tata floater fund(G) and Tata income fund(G) are 0.02, 0.01 and -0.35 respectively. The Treynor ratios are -1.67, -1.15 and 20.29 and Jensen ratios are 0.03, 0.37 and -5.34. The benchmark index was -27.42. The benchmark index was less than the ratios. So it would be good opportunity for the investor to invest in these funds.

In 2011-2012, the Sharpe ratio of Tata treasury manager fund-High investment plan(G), Tata floater fund(G) and Tata income fund(G) are -0.44, -0.46 and -0.48 respectively. The Treynor ratios are 17.51, 12.43 and 17.86 and Jensen ratios are 0.96, 1.2 and 3.06. The benchmark index was 23.73. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

PERFORMANCE OF HSBC FUND

Performance of different funds of HSBC has been calculated through the Sharpe, Treynor and Jensen ratio in the table no 3.

YEAR	FUND	HSBC Income Fund- investment plan(G)	HSBC Flexi debt fund-institutional	HSBC Floating rate fund-LTP
	Ratios		plus (FD)	(regular plan)(G)
2007-2008	Sharpe	0.16	-2.91	-0.04
	Treynor	-8.24	157.74	3.001
	Jensen	1.06	-7.28	-0.41
	Benchmark index	-73.46	-73.46	-73.46
2008-2009	Sharpe	0.65	-1.67	1.62
	Treynor	-32.88	-90.74	-109.19
	Jensen	2.13	-5.69	2.51
	Benchmark index	60.21	60.21	60.21
2009-2010	Sharpe	0.32	-2.5	0.5
	Treynor	-16.4	5.55	-34.14
	Jensen	0.35	-5.71	-1.28
	Benchmark index	16.93	16.93	16.93
2010-2011	Sharpe	0.05	-3.18	-0.4
	Treynor	-2.88	172.3	27.39
	Jensen	-3.38	-9.4	-0.65
	Benchmark index	-27.42	-27.42	-27.42
2011-2012	Sharpe	-0.08	-3.54	-0.89
	Treynor	4.28	11.73	6.03
	Jensen	2.65	-7.03	0.21
	Benchmark index	23.73	23.73	23.73

Table 3: Sharpe, Treynor & Jensen Ratios of HSBC Fund

An Empirical Study on the Performance of Selected Mutual Fund Schemes In India

Table 3 depicts that in 2007-2008, the Sharpe ratio of HSBC Income Fund-investment plan(G), HSBC Flexi debt fund-institutional plus(FD) and HSBC Floating rate fund-LTP (regular plan)(G) are 0.16, -2.91 and -0.04 respectively. The Treynor ratios are -8.24, 157.74 and 3.001 and Jensen ratios are 1.06, -7.28 and -0.41. The benchmark index was -73.46. The benchmark index was less than the ratios. So it would be good opportunity for the investor to invest in these funds.

In 2008-2009, the Sharpe ratio of HSBC Income Fund-investment plan(G), HSBC Flexi debt fund-institutional plus(FD) and HSBC Floating rate fund-LTP (regular plan)(G) are 0.65,-1.67 and 1.62 respectively. The Treynor ratios are -32.88, -90.74 and -109.19 and Jensen ratios are 2.13,-and 5.69 and 2.51. The benchmark index was 60.21. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

In 2009-2010, the Sharpe ratio of HSBC Income Fund-investment plan (G), HSBC Flexi debt fund-institutional plus(FD) and HSBC Floating rate fund-LTP (regular plan)(G) are 0.32,-2.5 and 0.5 respectively. The Treynor ratios are -16.4, 5.55 and -34.14 and Jensen ratios are 0.35,-5.71 and -1.28. The benchmark index was 16.93. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

In 2010-2011, the Sharpe ratio of HSBC Income Fund-investment plan(G), HSBC Flexi debt fund-institutional plus(FD) and HSBC Floating rate fund-LTP (regular plan)(G) are 0.05, -3.18, -0.4 respectively. The Treynor ratios are -2.88, 172.3 and 27.39 and Jensen ratios are -3.38, -9.4 and-0.65. The benchmark index was -27.42. The benchmark index was less than the ratios. So it would be good opportunity for the investor to invest in these funds. In 2011-2012, the Sharpe ratio of HSBC Income Fund-investment plan(G), HSBC Flexi debt fund-institutional plus(FD) and HSBC Floating rate fund-LTP (regular plan)(G) are -0.08, -3.54 and -0.89 respectively. The Treynor ratios are 4.28, 11.73 and 6.03 and Jensen ratios are 2.65, -7.03 and 0.21. The benchmark index was 23.73. The benchmark index was greater than the ratios. So it would not be good opportunity for the investor to invest in these funds.

CONCLUSION

Mutual Funds now represent perhaps most appropriate investment opportunity for most investors. As financial markets become more sophisticated and complex, investors need a financial intermediary who provides the required knowledge and professional expertise on successful investing. As the investor always try to maximize the returns and minimize the risk. Mutual fund satisfies these requirements by providing attractive returns with affordable risks. From the above analysis it is found that the years 2007-08 and 10-11 were the better period to invest in HDFC funds. But the years 2008-09, 09-10, 11-12 were not the right period to invest in HDFC fund. The years 2007-08, 10-11 and 11-12 were the better period to invest in TATA funds. But the years 2008-09 and 09-10 were not the right period to invest in TATA funds. The years 2007-08 and 10-11 were the better period to invest in HSBC funds. But the years 2008-09, 09-10 and 11-12 were not the right period to invest in HSBC funds.

The fund industry has already overtaken the banking industry, more funds being under mutual fund management than deposited with banks. With the emergence of tough competition in this sector mutual funds are launching a variety of schemes which caters to the requirement of the particular class of investors. Risk takers for getting capital appreciation should invest in growth, equity schemes. Investors who are in need of regular income should invest in income plans. The stock market has been rising for over three years now. This in turn has not only protected the money invested in funds but has also to help grow these investments. This has also instilled greater confidence among fund investors who are investing more into the market through the MF route than ever before. India's largest mutual fund, UTI, still controls nearly 80 per cent of the market. Also, the mutual fund industry as a whole gets less than 2 per cent of household savings against the 46 per cent that go into bank deposits. Some fund managers say this only indicates the sector's potential. If mutual funds succeed in chipping away at bank deposits, even a triple digit growth is possible over the next few years

REFERENCES

- 1. Afza, Talat and Rauf, Ali (2009). Performance Evaluation of Pakistani Mutual Fund. Pakistani Economic and Social Review, 47(2), 199-214.
- 2. Debasish, SathyaSwaroop (2009). Investigating Performance of Equity-based Mutual Fund Schemes in Indian Scenario. KCA Journal of Business Management, 2(2), 1-15.
- 3. Garg, Sanjay (2011). A Study on Performance Evaluation of Selected Indian Mutual Funds. International Journal of Innovation Creativity and Management (IJICM), 1(1), 1-10.
- 4. Gupta Amitabh, "Performance Evaluation of Select Mutual Fund Schemes", Indian Journal of Finance and Research, October 2004, pp. 15-30.
- 5. Gupta O.P.& Gupta Amitabh, "Performance evaluation of select Indian mutual fund schemes: An empirical study", The ICFAI journal of Applied finance, December 2004, pp.81-98.
- 6. Jayadev, M (1996). Mutual Fund Performance: An Analysis of Monthly Returns. Finance India, 10 (1), 73-84.
- 7. Kundu, Abhijit (2009). Stock Selection Performance of Mutual Funds Managers in India: An Empirical Study. Journal of Business and Economic Issues, 1(1) 59-73.
- 8. Prabakaran, G and Jayabal, G (2010). Performance Evaluation of Mutual Fund Schemes in India: An Empirical Study. Finance India, 24 (4), 1347-1363.
- 9. Sondhi, H.J and Jain, P.K (2010). Market Risk and Investment Performance of Equity Mutual Funds in India: Some Empirical Evidence. Finance India, XXIV (2), 443-464.
- 10. Shanmugham, R and Zabiulla (2011). Stock Selection Strategies of Equity Mutual Fund Schemes in India. Middle Eastern Finance and Economics, ISSN 1450-2889, Issue 11, 19-28.
- 11. Tandon B.B. & Vashisht A.K., "Financial Sector Reforms An unfinished agenda for economic development", Deep & Deep publications Pvt. Ltd., Delhi, 2002.
- 12. www.amfiindia.com
- 13. www.mutualfundsindia.com
- 14. www.indiainfoline.com
- 15. www.investsmart.com

Technology: A Tool for Clearing Misconceptions in Mathematical Concepts

Dr. Neelam Yadav *

ABSTRACT

Mathematics is used as a tool in solving various problems in Engineering, science, Commerce, Management and other streams of Education. Research has shown that by the appropriate use of technology the conceptual understanding can be enhanced. Technology can transform the traditional mathematics classroom into a dynamic learning environment where the students can form new concepts, develops logical thinking and reasoning, Think analytically and can improve their decision making power. Understanding mathematics is a major burden for the students as there is a misconception among the students that it is very difficult. So it becomes the responsibility of the teacher to develop the interest in mathematics, identify their weakness, and try to rectify it, remove the fear form the heart of the students and make learning mathematics a fun. It's the right time to introduce technology in Indian education system. Using appropriate technology along with activity method helps in the conceptual clarity of the topics. There are lot of mathematical tools by the use of which the students are able to explore and define new concepts. These includes Autograph, Geogebra, CAS, calculators, Mathdisk etc. Because of these technologies mathematics learning becomes fun and interesting. The techniques should be demonstrated in such a way that it gives proper understanding of basic concepts and eradicates the mistakes done by the week students. This paper focus on how an appropriate combination of these tools and different activities along with their paper pencil tasks can be used to clear mathematical concepts develops love for mathematics and motivates them to explore new ideas.

Keywords : Misconceptions in Mathematics, Dynamic Classroom, Technology in Classroom, Autograph Tool, Activities along with Paper Pencil.

INTRODUCTION

Every day, many students are spending countless hours immersed in popular technologies such as Facebook, WhatsApp, World of Warcraft, candy crush, Farm villi, Sim City etc. which at first glance may seem like a waste of time, and brain cells. But these genres of technologies- Social Networking, Digital Gaming, and Simulations-deserve a second, deeper, look at what's actually going on. Welcome to the technical era!!!

For over two decades, many stakeholders have highlighted the potential of digital technologies for mathematics education. The National Council of Teachers of Mathematics, for example, in its position statement claims that "Technology is an essential tool for learning mathematics in the 21st century, and all schools must ensure that all their students have access to technology". ICMI devoted two studies to the integration of ICT in mathematics education, the second one expressing that "...digitaltechnologies were becoming ever more ubiquitous and their influence touching most, if not all, education systems" (Hoyles & Lagrange, 2010, p. 2)"

The use of technology when studying mathematics is not a new issue, since. Human kind always has been looking for solutions to avoid time consuming routine work. Maybe the definition of routine work has changed, since the implementation of modern computers. Today we can not only get help with long and complicated calculations, we can also use computers and modern software to simulate and model complex situations described by mathematical structures. The views on how information and communication technology can be used to support learning of mathematics have changed over time. The view on how technology should be used in the mathematical classroom is also affected by many forces, as for instance strong expectations that our present colleges should mirror what goes on in the surrounding society in this respect.

Technology can provide mechanisms to sustain assistance to mathematics teachers in their use of technology to implement mathematics education reforms in their classes. Technology enables mathematics education

^{*} Assistant Professor, Mathematics Department, L.S. Raheja College of Arts and Commerce, Santacruz (W), Mumbai, Maharastra, India

reformMathematics content and pedagogy are enhanced through technology. It is important to recognize, however, that as technology tools become available and our insight in using them expands .Technology often provides convincing demonstrations of ideas, helps to generate hypotheses, and encourages exploration. Demonstration, however, does not replace the need for proof.

In this research paper, the researcher has attempted to study whether effective teaching methodsPlay any role in understanding the topic and apply it in practical problems.

HYPOTHESIS: "Appropriate use of technology helps the student to understand the concept, improve their skills and apply it wherever required."

OBJECTIVE OF RESEARCH

- i. To teach them how to use autograph tool, Math Disk, Calculator.
- ii. To choose the appropriate tool by which a particular topic can be made effective and interesting.
- iii. To develop quantifiable standards to measure effectiveness of teaching methods in terms of memory skills, application skills, understanding skills, calculative skills and interpretation skills.
- iv. To prepare questionnaires for collecting information about learning output before and after the experiment.
- v. To analyse and interpret the collected data and find out whether the hypothesis is Proved ordisproved.

RESEARCH METHODOLOGY

Data was collected through questionnaire method. Sample size is 100. Engineering students of IV semester are selected from different engineering college of Mumbai. The data through questionnaires, which the students were asked to fill before and after the lecture is collected. The response given by students are collected and compared to find whether technology has helped in understanding the concept or not.

The Research was carried out to measure the effectiveness of the teaching method researcher decided to test the following aspects.

- * Basic understanding of the topic.
- * Memory skills.
- * Skills to recapitulate.
- * Practical Applicability skills.
- * Interpretation skills.

DATA ANALYSIS:

The following questions were asked to test the different skills related to the topic vector algebra, Normal DistributionWhich they have already studied in III semester of Engineering.

- To test the memory and recapitulations skills following question were asked:
 - * Define vectors, cross product, and scalar product of vectors.
 - * Define surface integrals, volume integrals.
- To test the Practical applicability following question were asked:
 - * Draw the sketch of the following curves
 - 1) $x^2 + y^2 + z^2 4by 2bz = 0$
 - 2) 2x +-7z = 2a
 - 3) Hemisphere $x^2 + y^2 + z^2 = 9$ lying above the x axis
 - 4) $y^2 + z^2 = 7$
- To test the analytical and understanding skills following question were asked:
 - 1) Are vectors a x b and b x a equals
 - 2) What are the directions of vectors a x b and b x a

3) What is the curve of intersection of x² + y² + z² - 4by - 2az = 0 and the x + z = a + b.
4) What will be the curve of intersection of y² - 2z² = 9 and x + z = 1.

When these tools are taught to students they are able to answer many questions and starting exploring the vector product concept to understand the direction changes. They are also able to answer the following questions themselves.

Are vectors a x b and b x a equals
 What are the directions of vectors a x b and b x a



1) What is the curve of intersection of $x^2 + y^2 + z^2 - 4by - 2az = 0$ and the x + z = a + b. What will be the curve of intersection of $y^2 - 2z^2 = 9$ and x + z = 1.





Pre experiment survey results:



The result shows that most of the students are able to recall the definitions correctly, but when it comes to apply their theoretical understanding to draw curve and fine intersection between the curves. The above chart demonstrates that there are 64 students who answered Q1 correctly, 45 students who answered Q2 correctly and so on.

Post experiment survey results:



The result shows that most of the students not only are able to recall the definitions correctly, but apply their theoretical understanding to draw curve and fine intersection between the curves. The students had personally composed problem situations on their own through these tools and began to enjoy mathematics.

The above chart demonstrates that there are 89 students who answered Q1 correctly, 84 students who answered Q2 correctly and so on.

- To test the memory and recapitulations skills following question were asked:
 - * The probability curve of a normal distribution is(Answer : Symmetric)
 - * Total area under normal distribution curve and X axis is ...(Exactly 1)
 - * The shape of normal curve is(Bell shaped)

Pre experiment survey results: 18% students answer all the three questions correctly and remaining 82% students tell either 1 or 2 questions correctly.



* **Post experiment survey results:** All the 100 % students answered it correctly.

This shows that maximum students do not posses this skill or they are not attentive in the class .After using Autograph tool and PPT they are able to answer means they are learning by doing and the effect is long lasting.



- * To test the Practical applicability and interpretation skills following question were asked:
 - * The area under probability curve for a standard normal variate (Z) beyond ordinate Z = 0 is
 - * For a standard normal variate (Z) if the area between Z = 0 and Z = 1.3 is 0.45 then the probability (0 < Z < 1.3) is
 - * For a standard normal variate (Z) if the area between Z = 0 and Z = 1.3 is 0.4032 then probability (Z<1.3) is

Pre experiment survey results: Only 6%students answer all the three questions correctly, 20 % students answered it but there answer was wrong and 74% students says that they don't know the answer.



An Empirical Study on the Performance of Selected Mutual Fund Schemes In India

Post experiment survey results : 84% students could answer all the three questions correctly and only 14 % students answered it but there answer was wrong and 2% students says that they don't know the answers.





- To test the analytical and understanding skills following question were asked:
 - * The two tails of the normal probability distribution.....
 - * The height of the normal curve is maximum at.....
 - * The shape of normal curves for different values of μ and ϕ is

Pre experiment survey results: Only 10%students answer all the three questions correctly and remaining 90% students tell either 1 or 2 questions correctly.



Post experiment survey results :All the 100 % students answered it correctly.

After using Autograph tool, they are able to answer all the three questions correctly.



To find the practical applicability skills I asked can you construct a 3d image and find the angel between any two points in that image.



Initially no student was able to answer the question correctly but to a great surprise after using technologies 98% able to answer the question correctly.

The students become curious and started asking that in cutting of pipe or designing can we use these tools. The students will be able to easily investigate how different values for the parameters will affect the graph of the function.

Further I asked few more questions like When will a population of 50,000 bacteria become extinct if the decay rate is 4% per day? Two students developed an initial exponential model for the population y at any time x, y = 50000 x (0.96)x. They then equated the model to zero in order to represent the point at which the bacteria would be extinct, with the intention of using CAS to solve this equation. When they entered the equation into their CAS calculator, however, it unexpectedly responded with a false message. The students thought this response was a result of a mistake with the syntax of their command. When they approached me for help, I confirmed their syntax was correct, but said they should think harder about their assumptions. Eventually, I directed the problem to the whole class and one student spotted the problem: 'You can't have an exponential equal to zero'. This resulted in a whole class discussion of the assumption that extinction meant a population of zero, which they decided was inappropriate. The class then agreed on the position that extinction was 'any number less than one'. Students used CAS to solve this new equation and obtain a solution.

LIMITATIONS AND SCOPE AND BARRIERS

- * Research is limited to a small group of selected college in Mumbai. Any change in the number of students and location of research may affect the results. Due to limited time small sample size is taken.
- * There is a scope to carry out research in rural areas.

- * There is a scope to carry out research in larger group of students.
- * The survey was taken immediately after the experiment . The answers were given by the Student when the topics were fresh in mind. There is a scope to measure the output after a gap of time.
- * There is a scope of studying other aspects also.
- * The questions asked in pre and post lecture test questionnaire was same . Therefore the student who has answered earlier already knew the questions to be asked.
- * Teachers' beliefs and attitudes can be a barrier to change. Some teachers fear relationships changing within a classroom when learner focused pedagogy replaces a teacher focused pedagogy. This can essentially be a fear of losing power and control.
- * Insufficient resources such as time and support for teachers to develop the necessary new skills.
- * Teacher workload is also seen as a significant barrier, as unfortunately teachers are frequently not allocated enough time or support to become familiar with the technology available or to incorporate it into their classroom practice.

SUMMARY AND CONCLUSIONS

Analysis of data including worksheets, questionnaire, autograph, math disk ,CAS and other activities along with the paper pencil showed effects of geometric understanding as result of using innovative technologies. Thus they are able to answer most of the questions and tried many new problems themselves. They were taking interest in mathematics and applied their creativity in solving many problems with the help of these tools. Learning becomes fun for them. Now the students are able to find relation between analytical expression and its geometrical meaning. Students correct their misconceptions and began to understanding things logically. The students had personally composed problem situations on their own through these tools, they had intuitively recognised beyond geometrical meaning. All the students said that lecture given by using autograph tool has helped them in understanding the topic. Their interpretation skills have improved. They could analyse the problem in a better way. Their Practical Applicability skills have improved drastically. They could analyse the problem in a better way.

An appropriate combination of these tools and different activities along with their paper pencil tasks can be used to clear mathematical concepts develops love for mathematics and motivates them to explore new ideas.

Thus through this experiment it can be concluded that the hypothesis is proved i.e. "Appropriate use of technology helps the student to understand the concept, Improve their skills and apply it wherever required."

REFERENCES

- 1. Birman, B., et al. (1997). The effectiveness of using technology in K-12 education: A preliminary framework and review. Washington, DC: American Institutes for Research
- Bransford, J. D., Zech, L., Schwartz, D., Barron, B., Vye, N., & The Cognition and Technology Group at Vanderbilt. (1996). Fostering mathematical thinking in middle school students: Lessons from research. In R. J. Sternberg & T. Ben-Zeev (Eds.). The nature of mathematical thinking (pp. 203-250). Mahwah, NJ: Lawrence Erlbaum Associates.
- 3. Coley, R., Cradler, J., & Engel, P. (1997). Computers and classrooms: The status of technology in U.S. schools. Princeton, NJ: ETS Policy Information Center.
- 4. Davis, E., & Padilla, M. (1991). Final Report: Developing a Model Teacher Education Program for Middle School Teachers in Mathematics and Science Education. National Science Foundation.
- 5. Dreyfus, T. & Eisenberg, T. (1996). On different facets of mathematical thinking. In R. J. Sternberg & T. Ben-Zeev (Eds.), The nature of mathematical thinking (pp. 253-284). Mahwah, NJ: Lawrence Erlbaum Associates.

- 6. Eisenhower Professional Staff Development (1995). Needs Assessment for the State of Georgia. Athens, GA: University of Georgia.
- 7. GCATT (1997). The status of educational technology in the State of Georgia: A Report submitted to Board of Directors. Atlanta, GA: Georgia Center for Advanced telecommunications Technology,
- 8. Georgia Department of Education. (1997). Quality Core Curriculum (draft document).
- 9. Galbraith, P., Goos, M., Renshaw, P., & Geiger, V. (2001). Integrating technology in mathematics learning: What some students say. In J. Bobbis, B. Perry, & M. Mitchelmore (Eds.), Proceedings of the 24th annual conference of the Mathematics Education Research Group of Australasia: Numeracy and beyond (pp. 225-232). Sydney: Mathematics Education Research Group of Australasia
- Goos, M. (2002). Beginning teachers and technology: Developing identities as teachers. In B. Barton, K. C. Irwin, M. Pfannkuch, & M. O. J. Thomas (Eds.), Proceedings of the 25th annual conference of the Mathematics Education Research Group of Australasia, Auckland: Mathematics Education in the South Pacific (pp. 309-317). Sydney: Mathematics Education Research Group of Australasia.
- 11. Klein, M. (1998). New knowledge/new teachers/new times: How processes of subjugation undermine the implementation of investigatory approaches to teaching mathematics. In C. Kanes, M. Goos, & E. Warren (Eds.), Proceedings of the 21st annual conference of the Mathematics Education Research Group of Australasia Vol. 1: Teaching mathematics in new times: (pp. 295-302). Sydney: Mathematics Research Group of Australasia.
- 12. Ministry of Education. (1992). Mathematics in the New Zealand curriculum. Wellington, NZ: Learning Media.

The Implementation of Total Quality Management to the Banking Sector in Rajasthan: A Case Study of HDFC Bank

Dr. Ankita Chaturvedi *

ABSTRACT

Total Quality Management (TQM) is an integrative viewpoint of management for constantly improving the quality of products and processes of an organization. Banking authorities in all country of the world are paying enormous attention to the state of the three 'S' (3S) - safety, security and stability in their different banking systems. Banking is an vital sector in India. The government has introduced several laws and constitutions aimed to further grow this sector, improve its ability to compete within a global market and encourage investment in the country. Though, slight work has been done to assess and control quality in this sector. This paper emphasize on the application of TQM to the service sector from the employees and the customer's points of view. The requirements and actions needed for the implementation of the TQM philosophy was measured by a questionnaire answered by the bank employees. And also a survey was conducted regarding the level of satisfaction of customer's from the services rendered by the bank. The study reveals that there is nearly equal adaptation from the bank in Rajasthan to all principles of TQM and its main basic elements such as focus on customer and employee's needs, focus on continuous improvement and focus on management competition needs. While in reality there is little focus on customer needs regarding to customers viewpoint.

Keywords: Total Quality Management (TQM), Services, Banking Sector.

INTRODUCTION

In today's world, organizations are facing the growing challenges from global competition and more sophisticated customers in terms of what they want and their changing needs. One of the main ideas that came from the Japanese industry is TQM, which means that all workers within a given organization must participate in improving the product or service quality, an activity that was previously the concern of the quality control department employees. TQM can be explained as "An overall philosophy whose objectives is to meet or exceed the needs of the internal and the external customer by creating an organizational culture in which everyone at every stage of creating the product as well as every level of management is committed to quality and clearly understands its strategic importance"1. It is the application of quantitative methods and human resources to improve all the processes within an organization and exceed customer needs now and in the future. It integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach.

Due to the large success of TQM in manufacturing companies, service organisations have started to follow in their footsteps and consider the application of TQM. Service can be evaluated according to cost, flexibility, acquirability, totality, and response time2,3. This paper will concentrate on the affect of applying TQM to the service industry and will use banks in Rajasthan.

Total Quality Management requires the following six concepts which are as follows:

- 1. A highly committed and involved management providing continual organizational support.
- 2. Focus on customer needs.
- 3. Total involvement and utilization of the present workforce
- 4. Continuous improvement of the existing business processes and production processes
- 5. Considering Suppliers as partners
- 6. Establishing performance measures for the processes.

* Assistant Professor, Department of Accounting and Taxation, The IIS University, Jaipur, India

The Implementation of Total Quality Management to the Banking Sector in Rajasthan: A Case Study of HDFC Bank + 29

RESEARCH METHODOLOGY

In order to understand the current state of application of TQM in the banking sector in Rajasthan a survey was conducted in HDFC bank. The requirements and actions needed for the implementation of the TQM philosophy was measured by a questionnaire answered by the bank employees. And also a survey was conducted regarding the level of satisfaction of customer's from the services rendered by the bank.

Study Sample

For the bank employees, (100) Questionnaires were distributed and retrieved to the employees of these banks in different work levels and different branches all within the capital city Jaipur. For the bank customers group, (150) Questionnaires were distributed on HDFC banks customers that were selected randomly from different branches inside and outside the capital city Jaipur. (100) Questionnaires were retrieved.

Study Hypotheses

Employees related hypothesis set that covers the employees viewpoint about the adoption of TQM concepts, focus on the customer, employee and competition needs and continuous improvement. Customer related hypothesis set that cover the level of customer satisfaction from financial services quality in the banks after the implementation of TQM from a customer view. These are three hypotheses that focus on the customer evaluation of provided service based on previous experience with the bank.

RESULTS AND ANALYSIS

The 5-Likert scale has been used in the questionnaire with the following values: highly agree (5), agree (4), approximately agree (3), disagree (2), and completely disagree (1). The mean and the standard deviation of the different questions were calculated. It was considered that the customer or the employee agree on a given statement when the mean is (3.5) or more. A mean below this value, indicate a negative response. For the purpose of testing hypotheses, the joint mean for all statements was calculated to be considered as the factor of analysis (reference), while the standard deviation representing for the same hypothesis was calculated to be compared with the reference using Z test.

Table 1: Result for the Managers and Employees Questionnaire Statements with their Respective Means.

	Sl.No	Questions	Mean	Overall
Employees	1	The TQM concepts are introduced by the management to their		
viewpoint about		employees.	3.87	
the adoption TQM	2	The motivation structure is continuously enhanced and developed		3.83
Concept		by the management to go with the TQM concept.	3.91	5.65
	3	The management elucidates the service quality enhancement steps		
		to their employees	3.71	
Focus on	4	The bank management pays attention to the customer complaints		
Customer Needs		and gives an abrupt solution.	4.18	4 085
	5	The bank management makes regular reviews to make out the		4.065
		customer needs and wants.	3.99	
Focus on	6	The bank has a proper training department with an annual budget		
employee needs		and equipment needed for training.	3.92	
	7	The training programs are designed to minimize the mistakes and		
		achieving high level of excellence.	3.58	
	8	The management of the bank promotes and adapts the new ideas.	3.69	
	9	The senior management promotes their employees for the joint		3.49
		efforts.	3.75	
	10	The employees have the opportunity to express their views about		
		the jobs they are doing.	3.07	
	11	The bank management forms teams work to develop the bank		
		worth involving employees in all levels.	2.93	

Focus on	12	The bank has a proper documentation system that is introduced and		
continuous		applicable from employees at all levels.	3.58	
improvement and	13	The bank regularly attempts to simplify the steps required to		
meeting		provide the service.	3.92	
competition needs	14	The bank has a program to eradicate the unfruitful activities and		
		training work.	3.56	
	15	The bank management studies the state of affairs of the other		
		competitors to get better the service.		3.83
			4	
	16	The bank management has methods to track the changes in		
		customer requirements and needs.	3.55	
	17	The senior management has a long term strategies for the service		
		quality.	4.05	
	18	The bank management rework the statistics utilized to measure the		
		performance quality to ensure its valid for the future functions.	4.16	

Hypothesis			Calculated	Critical Value	Result
			Z test value	@ α=5	
1	H₀	The employees disagree that the TQM			
		concepts are effectively adapted by the bank	7.387235	1.06	Accorded Ha
	H1	The employees agree that the TQM		1.90	Accepted H
		concepts are effectively adapted by the bank			
2.	H₀	The bank doesn't focus on the customer's	8.246557	1.96	Accepted H ₁
		needs.			
	H ₁	The bank focuses on the customer's needs.			
3.	H₀	The bank doesn't focus on the employee's	4.2938	1.96	Accepted H ₁
		needs.			
	H1	The bank focuses on the employee's needs.			
4.	H₀	The bank doesn't focus on continuous	6.842312	1.96	Accepted H ₁
		improvement and meeting competition			
		needs			
	H1	The bank focuses on continuous			
		improvement and meeting competition			
		needs			

Employee Questionnaire Analysis and Results

From Table 1, it is noted that the employees:

- * Agree on the introduction of TQM concepts by the management. They believe that there is a well-built relation between TQM introduction and the success of the bank. They praise the management for continuous altering the organization structure and work practices to facilitate the accomplishment of TQM concepts.
- * Deems that the bank management is "customer focused", as they run surveys to discover what the customer needs are, and they pay attention and try to provide instant solution to the problems at hand.

The Implementation of Total Quality Management to the Banking Sector in Rajasthan: A Case Study of HDFC Bank + 31
- * Agree that the bank management focus on employees needs as they try to improve their performance by holding training programs, promote creative thinking and teamwork to improve their professionalism, allow them the chance to express them self's and giving rewards for the excellent performance.
- * Believe that the bank management seeks to improve the quality continuously by trying to evade mistakes, minimize the cost of financial services, keeping a fair documentation system and continuous amendment of work practices
- * Believe that the bank management is devoted on developing their competitive edge by creating effective communication between them and the customers and follow the customer's needs.

The hypotheses for the employee questionnaire were analysed statistically using Z test at 95% confidence level. The result of the analysis can be seen in Table 2. The results indicate that banks in Rajasthan adapts TQM principles and its main basic elements such as focus on customer and employees needs, focus on continuous improvement and focus on management competition needs.

	S.No	Questions	Mean	Overall
Customers	1	The bank provides an appreciable ATM services	4.43	
viewpoint to	2	The ATM services facilitate time saving and service		
the TQM		achievement.	4.61	
services	3	The bank has recent techniques equipments.	4.2	110
provided	4	The documentations of the bank management are accurate.	3.94	4.10
	5	The bank employees are trustworthy.	3.93	
	6	The general appearance of the bank compatible with the		
		services offered.	3.5	
Care for the	7	Personal care is given to the customers by the bank		
needs of		management.	3.79	
customers	8	The bank has a continuous enhancement in the quality of the		
		financial services.	3.79	
	9	The bank has qualified employees.	3.79	2 5 7
	10	The bank management supports the customers in their		3.57
		problems.	3.52	
	11	The working times of the bank don't suit all the customers.	2.79	
	12	The suggestions and comments of the customer are considered		
		by the management of the bank.	3.79	
Customers	13	The bank interest loans provided are lower as compared to		
viewpoint		other banks.	2.59	
about the	14	The bank services are comparatively better than the other bank		3.23
financial		services	3.82	
services	15	The bank has financial counselors with good experience.	3.27	

Table 3: Result for the Customer Questionnaire Statements with their Respective Means.

Customer Questionnaire Analysis and Results

From Table 3 it is noted that the customers:

* Agree that the bank has up to date technical equipments that are necessary in developing the level of service provided and plays an significant role in the stability of the bank. Thus they agree that the A.T.M services introduced by their banks are appreciable and that this service helps in save their times and assists their deal with the banks.

		Hypothesis	Calculated Z test value	Critical Value @ α=5	Result
1	H₀	The customers disagree that bank effectively provides the TQM services	7.738641	1.96	Accepted H ₁
	Ηı	The customers agree that bank effectively provides the TQM services		1.70	
2.	H₀	The bank doesn't care for the needs of the customer	4.45867	1.96	Accepted H ₁
	H₁	The bank cares for the needs of the customer			
3.	H₀	The customer disagree that the bank provides appropriate financial services.	1.830978	1.96	Accepted H₀
	H1	The customer agrees that the bank provides appropriate financial services.			

Table 4: Customers Questionnaire Hypothesis Test

- * Agree that their bank is reliable and does have good documentation that they can depend on.
- * Agree that the bank employees are trustworthy and qualified. Customers also believe that they receive immediate services and that the employees and the bank management care for their needs. This reflects the fact that customers feel that they are the focus of the bank operation, which satisfies an important criterion in the TQM implementation process.
- * Agree that the banks take into consideration their suggestions to improve financial services quality.
- * Marginally agree that bank management takes care in trying to solve their problems.
- * On the other hand they agree that their bank working hours are not suitable for them.
- * Do not agree that the interest rate their bank is giving is lower than other rates offered by other banks.

The results of the analysis for the customer satisfaction hypothesis can be seen in Table 4. The hypothesis was tested using the Z test with a 95% confidence level. The results indicate that there is good level of implementation of certain TQM concepts in the banks of Rajasthan. However at some places the other concepts seems to be lacking since the customer feels that their comfort ability is not taken into consideration.

CONCLUSION

The study reveals that there is nearly equal adaptation from the bank in Rajasthan to all principles of TQM and its main basic elements such as focus on customer and employee's needs, focus on continuous improvement and focus on management competition needs. While in reality there is little focus on customer needs regarding to customers viewpoint. The customer's evaluation of the banks in Rajasthan to the provided services quality level was positive although the general feeling of customers was not satisfied. The study showed that customer's evaluations regarding the provided financial services quality differs, and this gives to the management an indication of the need of giving high priority to develop quality approaches.

REFERENCES

- 1. Youssef, M.A., Boyd, J. and Williams, E., (1996). The impact of TQM on firms' responsiveness: an empirical study. Total Quality Management, 7(1), 127-144.
- 2. Evans J.R., "Applied production and operations management", 4th edition, West Publishing Com., 1993.
- 3. Tokan, K., "The ISO-9000 series and its importance in applying Total Quality Management", The Jordanian Engineer, 1995

The Implementation of Total Quality Management to the Banking Sector in Rajasthan: A Case Study of HDFC Bank + 33

Comparative Analysis of Public Sector and Private Sector Banks of NSE in Aditya Birla Money, Virudhunagar

Dr. E.V. Rigin *

ABSTRACT

The banking industry in India plays a significant role in the development of the country. This study has taken by the researcher to study the comparison between public sector and private sector bank's share price movements. The public sector and private sector banks were chosen for the study by the researcher namely State Bank of India, Bank of Baroda, Punjab National Bank, Bank of India, Canara Bank and HDFC, ICICI, Axis Bank, Kodak Mahindra Bank, IndusInd Bank respectively. These are the top 5 banks on the basis of their performance and market capitalization during September to December-2013. The main purpose of the study is to compare strength and weakness, to compare change rate and to estimate share price fluctuations. To accomplish those objectives share price fluctuation, analysis of rate of change, analysis of relative strength index and moving average tools are selected.

Keywords: Public Sector Banks, Private Sector Banks, Share Price Fluctuation.

INTRODUCTION

The banking sector has undergone a massive restructuring during recent years as a result of recent developments. New technologies have added to the competition. It provides ease and flexibility in operations to customers thus making banking simpler and easier. This banking sector provides a vital role in stock exchange. Stock exchange is something which anybody can't predict what is going to happen tomorrow without proper analysis of the market. So it is always preferable to go for professional help, if anybody wishes to invest in stock market. The researcher hopes that this study may helps to those who are interested in stock market.

REVIEW OF LITERATURE

Bhanu Pant and Dr. T.R.Bishnoy (2001) analyzed the behaviour of the daily and weekly returns of five Indian stock market indices for random walk during April 1996 to June 2001. They found that Indian Stock Market Indices did not follow random walk.

Nath and Verma (2003) examine the interdependence of the three major stock markets in south Asia stock market indices namely India (NSE-Nifty) Taiwan (Taiex) and Singapore (STI) by employing bivariate and multivariate co integration analysis to model the linkages among the stock markets, No co -integration was found for the entire period (daily data from January 1994 to November 2002). They concluded that there is no long run equilibrium.

Debjiban Mukherjee (2007) made a comparative Analysis of Indian stock market with International markets. His study covers New York Stock Exchange (NYSE), Hong Kong Stock exchange (HSE), Tokyo Stock exchange (TSE), Russian Stock exchange (RSE), Korean Stock exchange (KSE) from various socio- politico-economic backgrounds. Both the Bombay Stock exchange (BSE) and the National Stock Exchange of Indian Limited (NSE) have been used in the study as a part of Indian Stock Market.

The main objective of this study is to capture the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts.

The time period has been divided into various eras to test the correlation between the various exchanges to prove that the Indian markets have become more integrated with its global counterparts and its reaction are in tandem with that are seen globally.

Juhi Ahuja (2012) presents a review of Indian Capital Market & its structure. In last decade or so, it has been observed that there has been a paradigm shift in Indian capital market. The application of many reforms

Assistant Professor, Department of Management Studies, VHNSN College (Autonomous) Virudhunagar, Tamilnadu, India

& developments in Indian capital market has made the Indian capital market comparable with the international capital markets. Now, the market features a developed regulatory mechanism and a modern market infrastructure with growing market capitalization, market liquidity, and mobilization of resources. The emergence of Private Corporate Debt market is also a good innovation replacing the banking mode of corporate finance.

OBJECTIVES OF THE STUDY

- 1. To study the comparison between private sector and public sector banks of NSE
- 2. To compare the change rate of share price between private sector banks and public sector banks.
- 3. To compare the Relative strength index of both banking sector.

RESEARCH METHODOLOGY

This study comes under an Analytical Research. The researcher has used only secondary source of data for the analysis. The researcher has obtained the data from, company records and website. The researcher collected the data from December 2013 to January 2014. Convenient sampling method to be adopted. The following statistical tools used for the analysis Quarter Analysis, Moving Average, Relative Strength Index, Rate of Change, Characteristic Regression Line.

Month	Share Price Movement		
	Public Sector	Private Sector	
Sep	7.03	4.05	
Oct	-0.4	1.69	
Nov	2.37	-5.57	
Dec	8.42	17.97	
	17.42	18.12	

Table 1: Comparison between Public Vs Private Sector Banks

Source: Secondary data

The short term seasonal fluctuation is derived from two analyses, namely quarter analysis and four quarter moving average

Inference: The private sector banks had a greater fluctuation than the public sector banks.

RELATIVE STRENGTH INDEX (RSI)

RSI can be calculated for scrip by adopting the following formula.

```
RSI=100-(100/1+Rs)
```

Rs=Average Gain per Day/Average Loss per Day

Table 2: Comparison of Relative Strength Index

Ranks	Public Sector Banks	Private Sector Banks	
1	41.18	61.2	
2	66.89	40.48	
3	60.48	62.41	
4	59.18	59.19	
5	61.2	50.98	
Average	e 57.79	54.85	
Courses Coopedamy data			

Source: Secondary data

An Empirical Study on the Performance of Selected Mutual Fund Schemes In India

Inference:

The above table shows that the public sector banks have a greater strength index than the private sector banks.

Based on the Characteristic Regression Line (CRL) formula $\beta=n^{"}XY-("X)("Y) "n"x^{2"}("x)^{2}$

Table 3 : Analysis of Characteristic Regression Line

Public sector banks	β Value	Private sector banks	β Value
State Bank of India	1.39	HDFC	1.32
Bank of Baroda	1.60	ICICI	2.48
Punjab National Bank	1.52	Axis Bank	1.52
Bank of India	2.11	Kodak Mahindra Bank	1.10
Canara Bank	2.78	IndusInd Bank	2.15

Source: Secondary Data

Interpretation:

From the above table, it is clear that the Canara Bank which yield high rate of index return on Scrip.

RATE OF CHANGE

Rate of change indicator or the ROC measures the rate of change between the current price and the price 'n' number of days in the past. ROC helps to find out the overbought and oversold positions in scrip.

Date Banks	SBI S	BOB	PNB	BOI Bank	Canara	HDFC Bank	ICICI	Axis	Kodak	IndusInd
Dec12	2 97.99	105.24	105.33	102.01	107.87	106.02	104.35	104.53	100.84	101.89
13	95.94	102.25	99.35	98.94	102.92	104.92	101.76	104.09	101.26	97.65
16	93.33	98.2	97.1	95.19	96.91	99.46	96.63	101.6	98.54	94.77
17	92.4	94.76	94.79	93.35	92.24	96.32	96.01	98.15	97.72	92.87
18	93.26	93	96.48	95.76	92.65	95.64	91.19	98.42	98.21	91.99
19	93.91	90.42	95.69	95.75	94.51	93.66	91.81	99.38	93.46	93.39
20	97.48	94.56	99.72	99.84	99.79	95.55	93.9	100.37	95.34	95.36
23	98.96	96.49	106.51	104.58	105.9	95.58	96.95	103.49	95.75	99.34
24	100.9	97.9	112.35	108.24	114.23	95.27	101.28	103.48	96.08	101.66
26	101.2	3 98.37	110.99	110.66	113.18	97.76	100.19	102.83	96.68	100.94
27	103.0	1100.67	112.25	114.8	114.98	101.83	101.09	103.06	99.93	101.83
30	100.0	7 98.85	106.03	108.72	106.85	100.49	100.08	100.27	97.55	97.25
31	102.0	5101.08	108.03	112.85	109.95	102.04	103.31	103.39	100.87	99.49

ROC= (Today's Price/Price 'n' days back) 100-100

Source: Secondary Data

Table 4: Over All Comparison between	Public Sector and Private Sector Banks
--------------------------------------	--

Particulars	Public Sector Banks	Private Sector Banks	
Short Term Seasonal Fluctuation	4.36	4.53	
Relative Strength Index	57.79	54.85	
Value	1.88	1.71	
Total	64.03	61.09	

Source: Secondary Data

Inference:

From the above table, it is clear that the investment made in public sector banks is better than the private sector bank investment proposal.

FINDINGS

- 1. The overall share price movement of public sector banks is 17.42 and the share price fluctuation of private sector banks is 18.12.
- 2. The private sector's price fluctuation is higher than the public sector's price movement.
- 3. The overall strength index of public sector and private sector banks are 57.79 and 54.85 respectively.
- 4. The public sector banks had a greater relative strength index than the private sector banks.
- 5. From the analysis of Characteristics of Regression Line, the Canara bank produce a better result. It produce that one per cent change in market index return would cause 2.78 per cent change in Canara bank stock return. Most of the public sector banks would cause highest return than private sector banks.
- 6. From the Analysis of Rate of Change, the current researcher had find out the overbought zone and oversold zone for each selected banks.

SUGGESSION

At the end of the analysis which was made by the researcher, the researcher could find out the reality of stock market. From the overview of those analyses, it is clear that the investment proposal made in public sector banks yield high range of return. High rate of return could indirectly reduce the risk factor. So it is advisable to make an investment in public sector banks.

CONCLUSION

At the end of this study, the researcher has concluded that the performance of public sector banks is better than the private sector banks. From the overview of this study, the Indian stock market has gone downward movement i.e., the market is in dull situation. Those who have an interest in stock market investment, they must aware of the reality of the current market situation, after that they wants to decide whether they wants to invest in stock market or not. Then only they got a flexible return with limited risk.

REFERENCE

- 1. Indian Stock Market, a Publication of TRANS Asian Research Journals, Vol.2 Issue 7, July 2013, ISSN 2279-0667.
- 2. Kothari C.R., Research Methodology Methods and Techniques, WishwarPrakashan, New Delhi.
- 3. Punithavathy Pandian., Security Analysis and Portfolio Management, VIKAS Publishing House Pvt Ltd, New Delhi.

Performance of Thermal & Gas Power Generation by GUVNL Company

Dr. Gaurangkumar C. Barot *

ABSTRACT

Electricity is most important infrastructure facility in India. In Gujarat The Gujarat Urja Vikas Nigam Limited (GUVNL) is serving and provide electricity facility in throughout Gujarat state. This research paper contains the performance of GUVNL in Gujarat. The major part cover points like profit of the company Gas and Thermal power generation. How GUVNL getting benefits from the various sources and how power generated by the company.

Keywords: Thermal Power, Gas Power, Gujarat Urja Vikas Nigam Limited (GUVNL).

INTRODUCTION

The Gujarat Urja Vikas Nigam Limited (GUVNL)³ is an electrical services umbrella company in the state of Gujarat, India. It was set up in May 1999 and is registered under the Companies Act, 1956. The Company was created by the Gujarat Electricity Board (GEB) as its wholly owned subsidiary in the context of liberalization and as a part of efforts towards restructuring of the power sector with the aim of improving efficiency in management and delivery of services to consumers. As a part of Power Reform Process, the Electricity Act, 2003, was passed by the Central Government and Gujarat Electricity Industry (Re-organization & Regulation) Act, 2003, was passed by the Government of Gujarat to restructure the Electricity Industry with an aim to improve efficiency in management and delivery of services to consumers. Under the provisions of the said Acts Govt. of Gujarat framed the Gujarat Electricity Industry Re-organization & Comprehensive Transfer Scheme, 2003, (the Transfer Scheme) vide Government Notification dated 24-10-2003 for transfer of assets/liabilities etc. of erstwhile GEB to the successor entities. Accordingly erstwhile Gujarat Electricity Board (GEB) was reorganized effective from 1 April 2005 into Seven Companies with functional responsibilities of Trading, Generation, Transmission and Distribution etc.

Table	1:	Subsidiary	Companies
-------	----	------------	-----------

Gujarat Urja Vikas Nigam Ltd. (GUVNL)	Holding Company
Gujarat State Electricity Corp. Ltd. (GSECL)	Generation
Gujarat Energy Transmission Corp. Ltd.(GETCO)	Transmission
Uttar Gujarat Vij Company Ltd. (UGVCL)	Distribution
Dakshin Gujarat Vij Company Ltd. (DGVCL)	Distribution
Madhya Gujarat Vij Company Ltd. (MGVCL)	Distribution
Paschim Gujarat Vij Company Ltd. (PGVCL)	Distribution

Functions of GUVNL:

The Company was incorporated to take over the assets, liabilities and personnel of the GEB in accordance with Schedule G of the Main Transfer Scheme Notification dated 24 October 2003. The Company has to carry out the residual functions (including power trading) of the defunct GEB. One of the functions of the Company includes coordination of the activities of its subsidiaries, business, and works to determine their economic and financial objectives and targets and to review, control, guide and directs their performance with a view to secure optimum utilization of all resources placed at their disposal.

Assistant Professor, Dept. of Commerce, Silvassa College, Silvassa, Naroli, U.T. of D. & N.H, India

7569.74	
1986.34	
501.15	
373.96	
	7569.74 1986.34 501.15 373.96

Table 2: Profit of the GUVNL Company

Sources: Annual Report of the GUVNL

Chart 1: Profit of the GUVNL Company



Objective of Study

- * To study Electricity Regulation and Rules of Transmission, Distribution and Generation on the bases of some Review of Literature.
- * To Know the Performance of generation of energy of Thermal power and Gas power through various sources by GUVNL Company.
- * To Check the Co-relation between Income and Expenses of GUVNL in last few years.

REVIEW OF LITERATURE

Transmission and Distribution of Electricity in India Regulation, Investment and Efficiency:

The inherited model of energy development and consumption in India was that of a centrally planned system in largely publicly owned and operated electricity and energy system, with a substantial Central Government capacity and the rest in State Electricity Boards (SEBs). The driving force of this system was achievement of generation targets and meeting the objectives set up by administrative and political leadership groups, rather than commercial objectives (For a description of the internal logic and system features see Joel Ruet (2005) and K.P.Kannan (2005). They have also shown on the basis of field work that reform is not possible by outside intervention, without an understanding of the system of organization and incentives and disincentives actually working in State Electricity Boards in India. Growth of capacity and generation of electricity in the period of the reform process since 1991 slowed down. Thermal capacity which grew by 160.23% in the decade 1980/91 only went up by 60.70% in the decade of reform. In other words with a substantial increase in the growth rate of the economy, thermal capacity growth was only 38% of the decade before privatization. Since thermal capacity was a large part of the total the growth of total generation capacity in the Nineties was around half that of the previous decade. The situation in this

decade up to 06/07 with a growth rate of 27.31% was worse. In this decade growth of hydro and wind capacity goes up substantially, since it was 33.51% in the decade of the Nineties and is already at 38.25% until 06/07. This is particularly true of wind capacity of which growth is encouraging and which stands at 9000MW now.

Period	Generation Capacity Hydro+wdThermalNuclearTotal			Hyd	Electri ro+wdThe	city Gener ermalNucle	ation earTotal	
1	2	3	4	5	6	7	8	9
1980/81-1990/91	59.32	160.23	61.67	118,15	26.90	204.24	103.33	118.79
1990/91-2000/01	33.51	60.70	93.3	58.71	3.9	118.32	177.05	88.99
2000/01-2006/07	38.25	27.31	34.5	30.22	52.3	31.22	10.06	33.63

Table 3:	Growth	of	Capacity	and	Generation	of	Electricity	/	(%Growth	in	Decade)
----------	--------	----	----------	-----	------------	----	-------------	---	----------	----	---------

Source: GOI, 2008,

Above Table shows capacity growth which was at around 120% in the decade of the Eighties went down to around 60% in the decade of the Nineties and was only around 30.2% in the period 2000/07. Generation growth was also around 120% in the Eighties and so capacity use was roughly constant. But in the Nineties at around 90% it was much higher than expansion of capacity at 60%, showing a substantial increase in Plant Load Factors. However in this decade the slack seems to have been used up and both capacity and generation growth are similar at around 30 to 33%. The Chart below describes these trends. The Plant Load Factor on an average is around 75% for an average hydel year and this is high since planned shutdown for repair is also necessary. Generation growth is now around 5% annual as compared to around 9% in the last decade and a near crisis situation is emerging. There is some difficulty on recent figures, but if we take the higher Ministry of Power, as compared to the lower Central Electricity Commission's figures, the following picture emerges for the period 2006/07 to 2009/10, which also shows generation growth slightly higher than capacity:

SI. No. Capacity/Generation	(Growth Rat	е
	07/08	08/09	09/10
1. Capacity Growth (Utilities)	8.09	3.50	N.A
2. Power Generation by Utilities	7.74	5.98	6.00

Table 4: Capacity and Generation Growth Rate

According to the Planning Commission, The likely growth of supply in first three years of Eleventh Plan works out to 5.59 per cent as compared to actual growth of 5.32 per cent in The Tenth Plan period. But generation efficiency seems to be peaking as a source of growth since plant load factors now are not increasing.

Table 5. I fait load factor of Ocherating Stations (in percentage	Table 5:	Plant lo	ad factor	of	Generating	Stations	(In percentag	je)
---	----------	----------	-----------	----	------------	----------	---------------	-----

Year Ce	entral	State	Private	Overall
2006-07	84.8	70.6	86.3	76.8
2007-08	86.7	71.9	90.8	78.6
2008-09	84.3	71.2	91.0	77.2

Source: GOI, 2010

As regards transmission and distribution, India by now has one of the largest HVDC transmission capacities at around 1500 CkM, which is to rise to 1600 Ckm. 765 kV lines are at 1088 CkM and will reach around 2500 CkM. 400 kV lines around 17000 CkM and 220kV lines at around 17000CkV will be doubling in the next two years

Voltage	Programme of	Targets Achievement	Anticipated Achievement
	Eleventh Plan	(Up to October 2010)	(At the end of Eleventh Plan)
HVDC	5,400	1,480	1,600
765kV	5273	1,088	2,773
400 kV	47,446	16,982	40,000
220 kV	30,396	10,813	24,300

Table 6: Targets and	Achievements of	Transmission	Capacity	Addition	(In	CkM)
----------------------	-----------------	--------------	----------	----------	-----	------

Source: GOI, 2010

The development of a national grid facilitates optimal utilization of resources by bulk transfer of power from surplus regions to deficit regions in the country as well as to facilitate scheduled/unscheduled exchange of power between regions and has been an objective from 1997. India has the largest capacity in High Voltage DC lines in the world. Inter-regional transfer capacity currently available is 20,800 MW and will go up to 32,650 MW by 2012. During the last two years the Power Grid Corporation of India Limited (PGCIL) has added 5,900 MW of transmission capacity. This capacity is becoming critical as open access becomes operational. India's North Eastern (NE) Region is a hub of hydel generation. A major part of this power is exported to the power deficit Northern and Western Region. Considering the contingency and reliability needs and total power evacuation from the NE Region through what is called the Chicken neck area, five to six HVDC lines (800 kV) and three to four Extra High-Voltage Alternating Current (EHVAC) lines (400 kV) would have to be established to eventually evacuate about 50,000 MW in NE Region and 15,000 MW from the Sikkim/Bhutan area. These very substantial achievements co exist with major problems. "Although the power transmission segment has been opened to private investment in 1998 there has been only a limited success in attracting private investment. T&D losses at the national level were at 29 per cent in 2006-07 and are expected to fall to 27 per cent in 2007-08. But AT&C losses are reported to be over 30 per cent. While T&D losses are technical losses incurred in transmission and distribution of electricity to the consumer, AT&C represents aggregate technical & commercial losses which estimates commercial losses (covering theft and deficiencies in billing and collection) besides T&D losses and is a true indicator of total losses in the system.

Particulars	2005-06	2006-07	2007-08	2008-09(1)	2009-10(2)
Energy Sold (MU)	3,51,200	3,90,232	4,29,709	4,69,427	5,25,140
Energy Sold/ Energy					
Available (Percent)	65.40	65.41	72.42	74.72	76.27
Sales Revenue (Rs.00crore)	1014	1173	1321	1542	1777
Commercial Loss (Rs.00crore)	208	284	338	409	384
Average cost of supply					
(Paise/Kwh)	368	391	405	433	429
Average tariff (Paise/Kwh)	289	301	308	329	338

	Table 7	7: Financial	Performance	of	20	Major	States	Excluding	Delhi	and	Odisha
--	---------	--------------	-------------	----	----	-------	---------------	-----------	-------	-----	--------

Notes: (1.) Revised Estimates (2.) Provisional **Source:** GOI, 2010

This leads to high financial losses. The total loss, incurred by the distribution companies, taken together is estimated at about Rs. 40,000 crore in 2009-10. It is likely rise to even higher levels because of the increasing share of short term purchase of power at high prices. The weakest part of the power sector in India remains distribution which is incurring large losses. This description highlights the considerable achievements of the Indian transmission system and its major problems to which we will now turn.

RESEARCH METHODOLOGY

I have taken GUVNL's Power generation data of last three to four years as per availability (2008-09, 2009-10, 2010-11 & 2011-12). Secondary data is opted from its annual publication for this research paper. Data is related with Gujarat state electricity department base only. For hypotheses testing I have used Statistics tools, ANOVA (Analysis of Variance test) because various kinds of subsidiaries and other company are associated with it and performance is fluctuated every year. I am interested in investigating two factors at a time, hence I used two ANOVA test to check the performance year wise as well as company wise. By testing the significance of difference between more than two sample means we make such with table value of 'F' and analyzing the significance of difference (if any) we test our hypothesis. 5% level of significant level is use for ANOVA test calculation results. The answer of ANOVA Calculation and the value of the table is compared and on that basis: If, F calculation is less than F-table value than H_o hypothesis may be Accepted If, F calculation is greater than F-table value than Ho hypothesis may be Rejected. To check the co-relation between Income and Expense of GUVNL I have used statistical formula for the same.

List of Hypotheses

- 1) H_0 =There is no significance difference in thermal power generating capacity year wise.
 - H_1 = There is significance difference in thermal power generating capacity year wise.
- 2) H_0 =There is no significance difference in thermal power generating capacity subsidiaries wise. H_1 = There is significance difference in thermal power generating capacity subsidiaries wise.
- 3) H_0 =There is no significance difference in Gas power generating capacity year wise.
- H_1 = There is significance difference in Gas power generating capacity year wise.
- 4) H_0 =There is no significance difference in Gas power generating capacity subsidiaries wise. H_1 = There is significance difference in Gas power generating capacity subsidiaries wise.
- 5) $H_0 =$ There is no Negative Co-relation between Income and Expenses of GUVNL in last few years. $H_1 =$ There is Negative Co-relation between Income and Expenses of GUVNL in last few years.

Hypotheses Testing:

For hypotheses testing ANOVA statistically test is used as mention below and its result show its performance. No. wise all hypotheses tested.

Test of Hypotheses No. 1 and 2

- 1) H_0 =There is no significant difference in thermal power generating capacity year wise. H₁= There is significant difference in thermal power generating capacity year wise.
- 2) H_0 =There is no significant difference in thermal power generating capacity subsidiary wise.

 H_1 = There is significant difference in thermal power generating capacity subsidiary wise.

Years		Name of	f Subsidiary		Total
	GSECL	State Own IPP	Pvt. Sector	Central Sector	
2009-10	39	5	4	15	63
2010-11	37	5	9	15	66
2011-12	37	8	20	16	81
	113	18	33	46	210

Table 8: Thermal Powers Generating (in Hundred MW)

Sources: Annual Report of the GUVNL

Variation	d. f.	SS	MSS	F
Year Wise	2	46.5	23.25	F1= 23.25/-212.01 =0.109
Subsidiary Wise	3	1757.6	585.86	F2= 3.22/-212.01 =0.0151
Deviation	6	-1272.1	-212.01	
Total	11	532		

Table 8.1: Two Way ANOVA Test

Result of Hypothesis Testing 1 and 2

 F1cal < F1tab, (6, 2) Degree of Freedom at Significant Level 5%
 0.109 < 19.31 Calculation value is lesser than table value hence Ho hypothesis is Accepted Therefore, H₀=There is no significant difference in thermal power generating capacity year wise.
 E2cal = E2table (4, 2) Degree of Exceders at Gianificant Level at E94

2) F2cal < F2tab, (6, 3) Degree of Freedom at Significant Level at 5%

0.015< 8.94 Calculation value is lesser than table value hence Ho hypothesis is Accepted Therefore,

 H_0 =There is no significant difference in thermal power generating capacity its Subsidiaries wise.

Interpretation:

From the first Hypothesis result shows that GUVNL does not make any significant difference in thermal power generating capacity year wise. Which is maintained and managed is specific manner by the company. And the second Hypothesis result shows that GUVNL does not make significant difference in thermal power generating capacity its subsidiary wise. Which is maintained and managed is specific manner by the company. For the betterment of the Company should increase its growth rate of thermal power generation year wise and try to increase more no. subsidiary for generating Thermal power.

Test of hypotheses No. 3 and4

- 3) H_0 =There is no significance difference in Gas power generating capacity year wise.
 - H₁= There is significance difference in Gas power generating capacity year wise.
- 4) H_0 =There is no significance difference in Gas power generating capacity Subsidiaries wise.

 H_1 = There is significance difference in Gas power generating capacity Subsidiaries wise.

Table No. 9 Gas Power Generating (in Hundred MW)

Years		Name of Subsidiaries			Total
	GSECL	State Own IPP	Pvt. Sector	Central Sector	
2009-10	3.54	4.66	10.55	4.24	22.99
2010-11	7.29	4.66	22.02	4.24	38.21
2011-12	7.29	4.66	21.02	4.24	37.21
	18.12	13.98	53.59	12.72	98.41

Sources: Annual Report of the GUVNL

Table No.	9.1.	Two	Way	ANOVA	Test
-----------	------	-----	-----	-------	------

Variation	d. f.	SS	MSS	F
Year Wise	2	835.08	417.54	F1= 417.54/-127.17 =3.28
Subsidiary Wise	3	1177.32	392.44	F2= 392.44/-127.17 =3.08
Deviation	6	-763.03	-127.17	
Total	11	1249.37		

Result of Hypothesis Testing 3 and 4

3) F1cal < F1tab, (6, 2) Degree of Freedom at Significant Level 5% 3.28 < 19.31 Calculation value is lesser than table value hence Ho Hypothesis is Accepted therefore, H₀=There is no significance difference in Gas power generating capacity year wise.

4) F2cal < F2tab, (6, 3) Degree of Freedom at Significant Level at 5% 3.08 < 8.94, Calculation value is lesser than table value hence H₀ Hypothesis is Accepted therefore, H₀=There is no significance difference in Gas power generating capacity Subsidiaries wise.

Interpretation:

From the third Hypothesis result shows that GUVNL does not make any significant difference in Gas power generating capacity year wise. Which is maintained and managed is specific manner by the company. And the forth Hypothesis result shows that GUVNL does not make significant difference in Gas power generating capacity its subsidiary wise. Which is maintained and managed is specific manner by the company. For the betterment of the Company should increase its growth rate of Gas power generation year wise and try to increase more no. subsidiary for generating Gas power.

Test of hypotheses No.5

5) H_0 =There is no Negative Co-relation between Income and Expenses of GUVNL in last few years.

H₁= There is Negative Co-relation between Income and Expenses of GUVNL in last few years.

	Particulars 2007-08	2008-09	2009-10	2010-11	
Х	Income of GUVNL	1414744	1767829	1743487	2485600
Y	Expenses of GUVNL	1414205	1767314	1737811	2018935

Table 10: Co-relationship between Income and Expenses of GUVNL (Rs. In Lakhs)

Sources: Annual Report of the GUVNL

x	γ	Rx	Ry	D (Rx-Ry)	D ²	
1414744	1414205	4	4	0	0	_
1767829	1767314	2	2	0	0	
1743487	1737811	3	3	0	0	
2485600	2018935	1	1	0	0	
				0	0	

Table 10.1: Rank Co-relation

 $Ed^{2} = 0$

		n (n*-	1)	
6 x 0	0	0	0	
R= 1	— = 1- ———-	— = 1- ——	= 1	
4 (4 ² -1)	4(16-1)	4(15)	60	
R= 1 – 0				

R= + 1.00 its shows positive relationship between Income and Expenses of GUVNL

6Ed²

Result of Hypothesis testing no. 5

Hence, here H₀ hypothesis is accepted, therefore There is no Negative Co-relation between Income and Expenses of GUVNL in last few years.

Interpretation:

From the tenth Hypothesis test result shows that GUVNL does not have any Negative Co-relation between Income and Expenses of GUVNL in last few years. Company should maintain and managed this positive relation for smooth financial operation.

CONCLUSION

The first part of the study introduction is given. In Gujarat electricity department (GEB) has created the company GUVNL in may 1999 and have 7 subsidiaries. This Company performs the functions of generating, disbursement, purchasing and selling the various types of power. In the second part of the study is based on the review literature which covered govt. rules, regulation regarding electricity department. The study shows growth of electricity department in India and its performance in last decade. It also covered eleventh plan programme and its achievements which cover major part of India. In the third part of this paper covers research methodology. That is mainly focus on the performance of the company in last few years. Company is generating Thermal and Gas power. Through the hypotheses testing I can recommends that company should maintain its present performance of year wise and

subsidiary wise in future. After the hypotheses testing result separate Interpretation is given to better understand its importance and its role in the development of the company. In the case of examination the co-relation between income and expenditure of the company shows the result of positive co-relation and which is good for the company and try to maintain it in future.

REFERENCES

- 1. Annual Report of GUVNL from year 2007-08 to 2011-12
- 2. Bottom-up Electricity Reform Using Industrial Captive Generation: A Case Study of Gujarat, India, by Christopher Joshi Hansen, Oxford Institute for Energy Studies, EL 07, ii, March 2008.
- 3. http://en.wikipedia.org/wiki/Gujarat_Urja_Vikas_Nigam accessed on dated 10.04.2014
- 4. http://www.pgvcl.com/petition/PETITION%2010DEC13/GUVNL%20-0CoS%20 Report_ 2011-12. pdf accessed on dated 10.04.2014.
- 5. Independent Power Producers: A Review of the Issues, By Kate Bayliss, Research Fellow, PSIRU, University of Greenwich and David Hall, Senior Research Fellow PSIRU, University of Greenwich, November 2000, commissioned by Public Services International
- 6. Khotari C.R. Reserch Methodology Wishwa Publication Delhi 2007
- 7. Transmission and Distribution of Electricity in India Regulation, Investment and Efficiency, By Yoginder Alagh, Chairman, IRMA and Former Minister of Power and Science, Technology of India.
- 8. www.govermentofindia.planningcommissionofindia.in

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

Dr. Kishore Kumar Das * Ms Aftab Ara **

ABSTRACT

This study focuses on the empirical investigation of the two stage impact of Human Resource Information Systems (HRIS) on the Organizational Performance (ORP). The dimensions of the HRIS considered in this study include General Administration (GAD), Training (TRN), Recruitment (RCT), Performance Evaluation (PFE), and Data Management (DTM). In the first stage, the influences of the dimensions of HRIS on Operational efficiency (OPE), Acceleration of the process (ACP), and Cost benefits (CBN) are studied. In the second stage, the influence of these three intermediate variables on the ORP is studied. The ORP includes both the financial performance and Non-financial performance measures. The study has been carried out in select product and service industries with a sample size of 244 HR managers. The research methodology adopts a mixed method approach with both qualitative and quantitative research. While the qualitative component involves the analysis of data from questionnaire (primary source) and journals (secondary source), the quantitative analysis is through the analysis of the data obtained through questionnaire survey using 5-point Likert scale. The metric in the form of questionnaire has been developed to test the hypothetical model. The metric is tested through the standard procedure of construct, content and criterion validity. The second generation statistical technique of Structural Equation Modelling (SEM) using Partial Least Square Method (PLSM) has been adopted to test the hypotheses. The results have indicated that among the moderators, only cost reduction and operational efficiency have significant influence on organizational performance. HRIS intervention in training and performance evaluation both influence the cost reduction and operational efficiency significantly. General administration influences accelerated process and cost reduction. Performance evaluation has influence on operational efficiency and accelerated processes. Recruitment has failed to cause any significant influence on the endogenous variables of interest. Accordingly, implications have been drawn for the benefit of HR managers for the effective usage of HRIS as it contributes to the organizational performance.

Keywords: Operational Performance, Human Resource Information Systems, Cost Reduction.

INTRODUCTION

The research in Human Resource Information System (HRIS) is active since the past two decades. Researchers converge to a general view that the success of an organization (both service and production oriented) is having an important bearing on its ability to manage information in an efficient way. There are two streams of study in HRIS which are dominant viz., the first focusing on the efficiency of HRIS and the second focusing on the effectiveness of HRIS. The former stream of research focuses on the processes involved in HRIS and the study here is with regard to the capability of the processes in delivering the required output. Whereas, the latter stream of research looks into the effectiveness of the HRIS in achieving its outcome on the overall basis. These studies have the focus on whether HRIS contributes to the organizational objectives, enhance the organizational performance, or help in gaining the competitive advantage in business. This research belongs to the effectiveness part of the study and aims to investigate if HRIS contributes to the organizational performance.

PROBLEM STATEMENT

The problem tackled in this research has a multi-dimensional perspective. First, should identify the dimensions of HRIS which would be of higher level of significance in the context of organizational performance. Second, it should identify if these dimensions significantly contribute to the operational efficiency, process acceleration, and cost reduction. Finally, it should investigate if these moderating variables contribute to the organizational performance. To put it in a nut shell, the research should resolve the issue whether HRIS contributes to the effectiveness of running the business.

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

 ^{*} Head, Department of Commerce and Management, Ravenshaw University, Cuttack, Odisha, India
 ** Research Scholar in Management, Ravenshaw University, Cuttack, Odisha, India

LITERATURE REVIEW

The fundamental reason why HRIS exists is to strengthen the strategic objectives of the organization and provide accurate information in connection to the human resources with minimum time and cost. To achieve this purpose it should support the basic HR activities such as general administration, training, recruitment, performance evaluation, and data management.

The two core activities of HRIS in general administration aremaintaining the employee information and the organizational salary structure (Ball, 2001). The employee information covers the complete set of the qualifications, experience, competencies, capabilities, skills, knowledge, attitude and the background of the employees (Martinsons, 1997). The organizational salary structure also need to be captured by the HRIS so that there is a clear measure of the total amount of financial commitment the organization has towards its employees and what future plans of action are required to increase the work force depending upon the growth of the business or the right sizing of the organization to make it more cost effective (Raka et al., 2013). It may also include the budget information management. The administration also covers the organizational chart with very clear roles, responsibilities and duties assigned to each cadre of employees. Absence monitoring is also an administrative activity (Marouf, 2005). Identification of the jobs and the suitable positions of the employees will also become the administrative responsibility (Ngai&Wat, 2006). Wage modelling and control is one among the administrative responsibilities which need the support of HRIS (Stone et al., 2006; Bondarouk& Rue, 2008). Finally, benefit management of the employees also comes under the administrative responsibilities where HRIS can assist in the decision making process (Stone et al., 2006; Bondarouk& Rue, 2012).

Training is an activity where HRIS has an active intervention. Training has several activities to be monitored including programme administration, programme evaluation, need analysis, scheduling, event management, effectiveness analysis, programme management, and course evaluation (Ball, 2001; Marouf, 2005; Véronneau, & Cimon, 2007; Ebrahimi, 2008; Bondarouk& Rue, 2008; Markova, 2012; Ahmad & Scott , 2012; Raka et al., 2013).

Recruitment is a crucial aspect of HRIS and the success of any organization is based on the talent which it can attract and retain. Recruitment has a series of processes: applicationtracking, interview management, skills matching, manpower planning, applicant screening, data management, talent assessment, and profile building (Shani, & Tesone, 2003; Gardner et al., 2003; Stone et al., 2006; Tansley& Newell, 2007; Ferguson & Ted, 2010; Kock et al., 2010; Ahmad & Scott, 2010).

Performance evaluation is an important process in an organization. Unless the organization has a systematic and standardized process for performance evaluation of the employees the progress cannot be monitored, without which the company cannot scale up its operations (Martinsons, 1997; Shani, andTesone, 2003). It includes the process of appraisal, skills monitoring, tracking of employee progress, competency assessment, performance monitoring, and contribution recording (Stone, &Lukaszewski, 2009; Duc et al., 2013).

Data management is one of the quintessential tasks which HRIS has to discharge to the required level of accuracy. This may involve a series of activities including employee background recording, media response analysis, salary information maintenance, content management, employee data management, budgetary data management, financial data management, and marketing data management (Martinsons, 1997; Gardner et al., 2003; Marouf, 2005; Ngai&Wat, 2006; Lee et al., 2007; Bondarouk& Rue, 2008).

Operational efficiency is considered to be influenced by HRIS as opined by several researchers in the field (Ball, 2001; Tansley& Williams, 2001; Hussain et al., 2007; Tansley& Newell, 2007; and Ngai&Wat, 2006). Ultimate purpose of HRIS is to enhance the operational efficiency of HR activities so that it may contribute to the overall performance efficiency enhancement of the organization. Several aritcles have been published on how HRIS if used effectively can contribute to the performance enhancement and gaining of the competitive advantage in business (Longenecker& Fink, 2013). The process through which this is achieved is by the leveraging and maximizing the potential of the human resources to contribute towards effectiveness and innovation (Fink et al., 2009).

Accelerated processes are also the result of the efficient HRIS as opined by a group of researchers in this area (Iwu& Benedict, 2013; Kock et al., 2012 & Kassim et al., 2012). All the HR related processes are time consuming e.g. recruitment, and if they can be accelerated it would provide an edge in business. This is because, of the sequential and interdependent nature of a series of processes interacting with each other in an organizational set up. HRIS can play a key role here to accelerate the individual processes this contributing to the overall speed of execution of the HR processes(Labib& Shah, 2001; Bateman, 2005; Hodgkinson& Kelly, 2007; Zellner, 2011; Dawei& Betts, 2011; Mandal, 2012).

Cost reduction is an important component of gaining of competitive advantage in business. HRIS can be cost effective on a long term in large organizations. The cost factor would be only at the installation stage of the system for the hardware and the software and thereafter it can continuously assist in decision making by providing the right information to the right person at the right time (Jago&Deery, 2002; Spee& Douw, 2003; Peccei, 2004; Kim & Kim, 2010; Bromiley& Washburn, 2011; Elbireer, 2013). In the highly competitive business world of today the key to competitive advantage is either product differentiation or the cost leadership and HRIS can contribute to the latter in a very significant manner.

Organizational performance enhancement is one of the ultimate purposes of a business and HRIS is considered to contribute to this as opined and theoretically proved by a group of researchers (Mills & Smith, 2011 and Ramezan et al., 2013). Organizational performance has many different definitions as it is organization specific. It could be simply the financial performance of a business. Several researchers have focussed on non-financial performance which also contribute to the growth of the organization on a long run. So organizational performance includes a series of variables including revenue growth, rise in net profit, higher return on asset, better R & D investments, building of competitive profile, continuous new product developments, and better market standing (McGivern&Tvorik , 1997; Lee. & Yu, 2004; de Waal, 2010; and Jing et al., 2011;)

OBJECTIVES OF THE RESEARCH

The aim of the research is to establish the empirical evidence for the relationship among human resource information system and organizational performance. To accomplish this aim the following objectives are framed.

- * Perform meta-analysis of the contemporary research and identify the variables of human resource information system and organizational performance.
- * Develop a metric to measure above research parameters and the overall performance of these organizations and validate the same.
- * Develop a hypothetical research model through meta-analysis of literature so as to relate the above mentioned enablers to performance.
- * Empirically investigate the significance of the relationship between the strategic enablers and performance and draw implications to the managers for performance enhancement of the organizations.

RESEARCH METHODOLOGY

The concept of meta-analysis was used to screen the dimensions of the study. The approach of this study was both qualitative and quantitative in nature and it basically being an exploratory and 'ex post facto' kind of research (Creswell, 2008), the concepts and models evolved as the research made progress both in terms of literature review and field work on international business environment and discussions with the knowledge workers. Informal interviews with the HR managers of product and service industries and the secondary sources such as journals and conference proceedings were used to collect the qualitative data and questionnaire with 5-point Likert scale was used for collecting the quantitative data. Data was collected from both product and service industries. A total of 38 industries were earmarked and 380 questionnaires in the electronic form were emailed to the manager cadre. After repeated requests 248 were received out of which 244 were fit for analysis.

Structural Equation Modelling (SEM) was used for exploratory factor analysis and hypothesis testing was undertaken using path modelling approach. The quantitative analysis involved mainly statistical analysis, which had the distinct components of descriptive statistics and inferential statistics. Descriptive statistics provided the general idea about the sample demographics, sample normality study using Skewness and Kurtosis measures, and the overall perceptions. The inferential statistics was used for drawing the inferences of the study mainly with reference to hypothesis testing.

The hypothetical Research Model

HRIS basically assists the HR practices by providing the right information, to the right person, at the right place and necessarily it has to enhance the performance of the organization either directly or through the moderating influence of other variables. The five dimensions of HRIS discussed before collectively contribute to the organizations growth in various forms. Duc et al., (2013) found that among the variables studies trust forms a very important component for technology management and have linked HRIS to the operational efficiency of the organization. Troshani et al., (2011) have undertaken a study of HRIS in public sector and found that there could be a group of factors which moderate the influence of HRIS on the operational performance. Markova (2012) proved that implementation of HRIS contributes to the organizational competitiveness which includes the enhancement of operational performance. Fujimoto (2007) found that use of information systems in HRM can enhance the cross cultural communication thus contributing to the accelerated processes. Alvarez-Suescun (2007) proved that HRIS has the ability to outperform the competitors through the accelerated processes. The cost reduction of HRIS on a long term basis has been proved by a group of researchers (Alvarez-Suescun, 2007; Ruël, 2007 and Kassim, 2012). Similarly HRIS has been related to organizational performance by a group of researchers (Ngai& Wat, 2006; Burbach& Royle, 2010; Kassim&Kurnia, 2012). While some of the aforementioned studies have been empirical some have been theoretical. So, to provide empirical relationship between these variables of interest the following hypotheses have been postulated.

Following hypotheses are developed based on the hypothetical research model (figure 1):

- H_{1a} : There is a significant influence of general administration on operational efficiency.
- H_{10} : There is no significant influence of general administration on operational efficiency.
- H_{2a} : There is a significant influence of general administrationon accelerated processes.
- H_{20} : There is no significant influence of general administrationon accelerated processes.
- H_{3a}: There is a significant influence of general administrationon Cost Reduction.
- H₃₀: There is no significant influence of general administrationon Cost Reduction.
- H_{4a}: There is a significant influence of training on operational efficiency.
- $\rm H_{40}$: There is no significant influence of training on operational efficiency.
- H_{5a} : There is a significant influence of training on accelerated processes.
- H_{s_0} : There is no significant influence of training on accelerated processes.
- H_{ha} : There is a significant influence of training on Cost Reduction.
- H_{so} : There is no significant influence of training on Cost Reduction.
- H_{γ_a} : There is a significant influence of recruitment on operational efficiency.
- $H_{_{70}}$: There is no significant influence of recruitment on operational efficiency.
- H_{8a}: There is a significant influence of recruitment on accelerated processes.
- H_{a_0} : There is no significant influence of recruitment on accelerated processes.

 H_{ω} : There is a significant influence of recruitment on Cost Reduction. H_o: There is no significant influence of recruitment on Cost Reduction. H_{10} : There is a significant influence of performance evaluation on operational efficiency. H_{10} : There is no significant influence of performance evaluation on operational efficiency. H_{11a}: There is a significant influence of performance evaluation on accelerated processes. H_{110} : There is no significant influence of performance evaluation on accelerated processes. H_{122} : There is a significant influence of performance evaluation on cost reduction. H_{120} : There is no significant influence of performance evaluation on cost reduction. H_{12} : There is a significant influence of Data Management on operational efficiency. $H_{_{130}}$: There is no significant influence of Data Management on operational efficiency. H₁₄₂: There is a significant influence of Data Management on accelerated processes. H₁₄₀: There is no significant influence of Data Management on accelerated processes. H₁₅₂: There is a significant influence of Data Management on Cost Reduction. H₁₅₀: There is no significant influence of Data Management on Cost Reduction. H_{16a}: There is a significant influence of operational efficiency on organizational performance. H₁₆: There is no significant influence of operational efficiency on organizational performance. H_{17} : There is a significant influence of accelerated processes on organizational performance. H₁₇₀: There is no significant influence of accelerated processes on organizational performance. $H_{1_{RS}}$: There is a significant influence of cost reduction on organizational performance.

H₁₈₀: There is no significant influence of cost reduction on organizational performance.



The original questionnaire had 75 questions which were subjected to pilot study and the standard procedure for construct, content and criteria validity was adopted? Six questions were reframed to make them more understandable. As the metric was a derivative of standard questionnaire used in similar analysis but in a different context with different endogenous latent variables exploratory factor analysis was not required, instead, a confirmatory factor analysis was used and the final questionnaire had 41 items.

RESULTS AND ANALYSIS Descriptive Statistics

Dimension	Description	Sample Item	No. of Items	Literature		
General Administration	It is the general administrative work such as budget control, employee information capturing, organization chart etc.	Employee information has been captured to my satisfaction.	9	Martinsons, 1997; Marouf, 2005; Ngai&Wat, 2006; Stone et al., 2006; Bondarouk& Rue, 2008; Kock et al., 2010; Kassim, &Kurnia, 2012; and Raka et al., 2013.		
Training	Monitoring of training activities including need analysis, training scheduling, event management etc.	The training programme administration is to my satisfaction.	8	Ball, 2001; Marouf, 2005; Véronneau, & Cimon, 2007; Ebrahimi, 2008; Bondarouk& Rue, 2008; Markova, 2012; Ahmad & Scott, 2012; Raka et al., 2013.		
Recruitment	Recruitment activities starting from placement of advertisement to the selection of the right employees.	Skills matching is to my satisfaction.	8	Shani, &Tesone, 2003; Gardner et al., 2003; Stone et al., 2006; Tansley& Newell, 2007; Ferguson & Ted, 2010; Kock et al., 2010; Ahmad & Scott, 2010.		
Performance Evaluation	The process of performance appraisal of employees such as skill monitoring, employee progress monitoring, competency assessment etc.	Tracking employee progress is to my satisfaction.	6	Martinsons, 1997; Shani, &Tesone, 2003; Stone, &Lukaszewski , 2009; Duc et al., 2013.		
Data Management	Maintenance of the company data in a systematic manner.	Salary information is maintained to my satisfaction.	8	Martinsons, 1997; Gardner et al., 2003; Marouf, 2005; Ngai&Wat, 2006; Lee et al., 2007;Bondarouk& Rue, 2008.		
Operational Efficiency	Day to day operation management including cost reduction measures, waste reduction, quality enhancement etc.	Improving flexibility is a part of our goal.	5	McLean, 2006; Min, &Joo, 2006; Kanghwa, 2010; Brown et al., 2011; Nanayakkara&Mia, 2012;		
Accelerated Processes	Enhancement of the management processes in the organization.	The general administration has been accelerated.	6	Labib& Shah, 2001; Bateman, 2005; Hodgkinson& Kelly, 2007; Zellner, 2011; Dawei& Betts, 2011;and Mandal, 2012.		
Cost Reduction	Cost reduction of the operations of the organization through various measures.	Recruitment cost has been reduced on long term.	6	Jago&Deery, 2002; Spee& Douw, 2003;Peccei, 2004; Kim & Kim, 2010; Bromiley& Washburn, 200; Elbireer, 2013.		
Organizational Performance	Performance of the organization at elevated level. This could be in the form of increase in revenue, rise in net profit,	Our investments in R&D are high.	9	McGivern&Tvorik , 1997; Lee. & Yu, 2004; de Waal, 2010; Jing et al., 2011; Mills & Smith, 2011Ramezan et al., 2013		

Table 1: Survey Constructs, Sample Items and Sources

Splint International Journal of Professionals

Demographics

Demographic distribution gives the general idea about the respondents who have participated in this research. This becomes important as an idea about the participants gives the strength to the inferences which are drawn through the data. It can be observed that majority of the respondents happen to be male in this research. Majority of the respondents are in the age group of 45-55 years (54.1%) followed by the age group of 35-45 years (25.4%). It can be seen that majority of the respondents are PhDs (41.4%). The highest salary range is Rs. 75K to 100K followed by Rs. 50K to 75K. Majority of the respondents are having six to ten years (62.3%) of experience followed by more than ten years (33.2%) and two to five years (4.5%) in that order (Table 2).

Attributes	Frequency	Percentage	
Gender			
Male	167	68.4	
Female	77	31.6	
Age			
25 – 35 years	32	13.1	
35 – 45 years	62	25.4	
45 – 55 years	132	54.1	
Great than 55 years	18	7.4	
Educational qualification			
Diploma	74	30.3	
Under graduate	47	19.3	
Post graduate	22	9.0	
Ph.D.	101	41.4	
Income			
Rs. 20,000 to Rs. 30,000	4	1.6	
Rs. 30,000 to Rs. 40,000	11	4.5	
Rs. 40,000 to Rs. 50,000	43	17.6	
Rs. 50,000 to Rs. 75,000	59	24.2	
Rs. 75,000 to Rs. 1,00,000	89	36.5	
Above Rs. 1,00,000	38	15.6	
Experience in the present company			
2 – 5 years	11	4.5	
6 – 10 years	152	62.3	
More than 10 years	81	33.2	

Table 2	: Demographic	Distribution	of the	Respondents
---------	---------------	--------------	--------	-------------

Normality of the data

Normality assumption was not violated with an acceptable range of Skewness and Kurtosis statistics (threshold values 1.00 and -3 to +3 respectively) (table 3). Therefore, the data could be subjected to further level of statistical analysis. The negative Skewness shows that the response is towards the higher side of agreement in the Likert scale (Mean = 3.5).

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

	Ν	Min.	Max.	Mean	Std. Dev.	Skewness		к	Kurtosis	
	Statis.	Statis.	Statis.	Statis.	Statis.	Statis.	Std.Error	Statis.	Std.Error	
VAR00001	244	1.00	5.00	2.9631	1.03572	486	.156	443	.310	
VAR00002	244	2.00	5.00	3.7705	.95828	374	.156	777	.310	
VAR00003	244	1.00	5.00	3.2131	1.05977	059	.156	926	.310	
VAR00004	244	1.00	5.00	3.5820	1.09500	211	.156	-1.050	.310	
VAR00005	244	1.00	5.00	3.3443	1.29113	305	.156	-1.015	.310	
VAR00006	244	1.00	5.00	3.5410	1.15931	364	.156	844	.310	
VAR00007	244	1.00	5.00	3.8852	1.07111	418	.156	-1.002	.310	
VAR00008	244	1.00	5.00	3.1803	1.03053	254	.156	480	.310	
VAR00009	244	1.00	5.00	3.7090	.93918	140	.156	783	.310	
VAR00010	244	1.00	5.00	3.2828	1.13943	051	.156	879	.310	
VAR00011	244	1.00	5.00	3.9385	1.05033	800	.156	279	.310	
VAR00012	244	1.00	5.00	3.0656	1.02430	294	.156	672	.310	
VAR00013	244	1.00	5.00	3.6680	.99817	121	.156	966	.310	
VAR00014	244	1.00	5.00	3.2418	1.28097	260	.156	-1.001	.310	
VAR00015	244	1.00	5.00	3.8443	1.04642	531	.156	555	.310	
VAR00016	244	1.00	5.00	3.3361	1.16612	.135	.156	-1.090	.310	
VAR00017	244	1.00	5.00	3.9057	1.06735	691	.156	594	.310	
VAR00018	243	1.00	5.00	3.0617	.99186	458	.156	376	.311	
VAR00019	244	2.00	5.00	3.8361	.88760	384	.156	560	.310	
VAR00020	244	1.00	5.00	3.4426	1.34286	581	.156	845	.310	
VAR00021	244	1.00	5.00	3.5041	1.26197	189	.156	-1.175	.310	
VAR00022	244	1.00	5.00	3.4631	1.29047	497	.156	893	.310	
VAR00023	244	1.00	5.00	3.6352	1.08968	543	.156	359	.310	
VAR00024	244	1.00	5.00	2.9344	1.06371	.049	.156	637	.310	
VAR00025	244	1.00	5.00	3.5451	.92185	276	.156	356	.310	
VAR00026	244	1.00	5.00	4.0533	1.04292	919	.156	.008	.310	
VAR00027	244	2.00	5.00	3.9959	.84862	725	.156	.128	.310	
VAR00028	244	1.00	5.00	3.6393	1.13722	306	.156	828	.310	
VAR00029	244	2.00	5.00	4.0082	.99377	422	.156	-1.155	.310	
VAR00030	244	1.00	5.00	3.5615	1.33036	413	.156	-1.190	.310	
VAR00031	244	2.00	5.00	3.8648	.76049	221	.156	353	.310	
VAR00032	244	2.00	5.00	3.7787	.99804	120	.156	-1.197	.310	
VAR00033	244	2.00	5.00	3.9959	.71721	129	.156	665	.310	

Table 3: Skewness and KurtosisDescriptive Statistics

Splint International Journal of Professionals

	N	Min.	Max.	Mean	Std. Dev.		Skewness	к	urtosis
-	Statis.	Statis.	Statis.	Statis.	Statis.	Statis.	Std.Error	Statis.	Std.Error
VAR00034	244	2.00	5.00	3.8156	.88588	.084	.156	-1.214	.310
VAR00035	244	3.00	5.00	4.1311	.70799	193	.156	989	.310
VAR00036	244	2.00	5.00	3.8811	.96343	.018	.156	-1.531	.310
VAR00037	244	2.00	5.00	4.1270	.78845	280	.156	-1.192	.310
VAR00038	244	2.00	5.00	4.0328	.86481	371	.156	893	.310
VAR00039	244	2.00	5.00	3.9631	.72767	977	.156	1.575	.310
VAR00040	244	2.00	5.00	3.6557	.89139	.207	.156	966	.310
VAR00041	244	2.00	5.00	3.9918	.76439	042	.156	-1.137	.310
VAR00042	244	3.00	5.00	4.1393	.91008	280	.156	-1.741	.310
VAR00043	244	2.00	5.00	4.1844	.88588	406	.156	-1.517	.310
VAR00044	244	2.00	5.00	4.3074	.82139	-1.252	.156	1.277	.310
VAR00045	244	2.00	5.00	3.9016	.73602	467	.156	.249	.310
VAR00046	244	2.00	5.00	3.5533	.80714	.086	.156	501	.310
VAR00047	244	2.00	5.00	3.5820	.86866	.277	.156	789	.310
VAR00048	244	3.00	5.00	3.8975	.73266	.162	.156	-1.119	.310
VAR00049	244	3.00	5.00	4.0902	.80128	164	.156	-1.423	.310
VAR00050	244	2.00	5.00	4.0902	.85591	254	.156	-1.394	.310
VAR00051	244	2.00	5.00	4.1516	.90128	576	.156	907	.310
VAR00052	244	2.00	5.00	4.1680	.74290	342	.156	922	.310
VAR00053	244	2.00	5.00	3.9180	.87103	443	.156	491	.310
VAR00054	244	2.00	5.00	3.9303	.79560	567	.156	.114	.310
VAR00055	244	2.00	5.00	3.7541	.94552	.039	.156	-1.179	.310
VAR00056	244	2.00	5.00	4.1475	.86707	329	.156	-1.496	.310
VAR00057	244	2.00	5.00	4.3033	.84998	666	.156	-1.174	.310
VAR00058	244	2.00	5.00	4.1557	.90286	516	.156	-1.108	.310
VAR00059	244	2.00	5.00	3.9508	.94152	438	.156	828	.310
VAR00060	244	2.00	5.00	3.9590	.74698	232	.156	452	.310
VAR00061	244	2.00	5.00	3.7910	.88968	142	.156	857	.310
VAR00062	244	2.00	5.00	4.1721	.71656	470	.156	249	.310
VAR00063	244	2.00	5.00	3.8811	.90165	273	.156	859	.310
VAR00064	244	2.00	5.00	3.7992	.87761	149	.156	820	.310
VAR00065	244	2.00	5.00	3.8893	.78571	110	.156	732	.310
Valid N (listwise)	243								

Inferential Statistics Measurement Model *Reliability and Validity*

A pilot study was undertaken to validate and test the reliability of the questionnaire with a sample size of 35. The questionnaire with a total 65 indicators of the latent variables was reduced to a total of 41 items through factor analysis, which were subsequently used for collecting data through a total sample size of 244. To verify the reliability of the latent variables in the model, internal consistency reliability measure, item reliability measure, and composite reliability measures were calculated. Table 4 shows the Cronbach's alpha coefficient and the composite reliability result for the model. The alpha coefficient has the acceptable value ranging from (0.7 to 0.8), indicating a moderately high level of internal consistency. The result of item reliability (IR) measured as standardized confirmatory factor loading (FL) ranged from 0.5 to 0.9 (Table 5 and figure 3). The composite reliability is in the range of 0.7 to 0.9 indicating moderate to high reliability score. The convergent validity assessment based on factor loading and composite reliability indicate moderate to high acceptable range of factor loading for all items and good composite reliabilities in general. To test for discriminant validity, the square root of average variance extracted (AVE) for each construct was compared with the correlation between the construct and the other constructs (Table 6) and was found to be higher (shown in bold), and hence, the discriminant validity is proved. The data could be subjected to the further analysis as very high measures were indicated in all the methods of reliability and validity.

	AVE	Composite	R	Cronbach	's	
		Reliability	Square	Alpha	Communality	Redundancy
General Administration	0.5382	0.8199	0	0.7216	0.5382	0
Training	0.5061	0.7544	0	0.5117	0.5061	0
Recruitment	0.4	0.7259	0	0.5777	0.4	0
Performance Evaluation	0.5691	0.8342	0	0.7438	0.5691	0
Data Management	0.4758	0.8424	0	0.7749	0.4758	0
Operational Efficiency	0.5311	0.8497	0.6548	0.7792	0.5311	0.3065
Accelerated Processes	0.4278	0.7432	0.5039	0.5618	0.4278	0.0494
Cost Reduction	0.4956	0.8525	0.0857	0.7948	0.4956	0.0215
Organizational Performance	e 0.5001	0.8284	0.6278	0.7429	0.5001	0.0306

Table 4: The Reliability Measures

Table 5: The Correlation Matrix

GAD	TRN	RCT	PFE	DTM	ΟΡΕ	ACP	CSR	ORP	
0.7336									
-0.1389	0.7114								
0.181	0.0533	0.6325							
0.0829	-0.0949	0.0889	0.7544						
-0.0073	-0.0921	0.1242	0.4563	0.7898					
0.005	-0.1528	0.1187	0.5927	0.7758	0.7288				
0.1675	-0.1177	0.0892	0.6881	0.4679	0.5555	0.6541			
0.1732	-0.1206	0.0817	0.0803	0.5384	0.2321	0.5384	0.7040		
0.1401	-0.1022	0.161	0.2229	0.2988	0.3385	0.5207	0.7001	0.7072	
	GAD 0.7336 -0.1389 0.181 0.0829 -0.0073 0.005 0.1675 0.1732 0.1401	GADTRN0.7336-0.13890.71140.1810.05330.0829-0.0949-0.0073-0.09210.005-0.15280.1675-0.11770.1732-0.12060.1401-0.1022	GADTRNRCT0.7336	GADTRNRCTPFE0.7336-0.13890.71140.1810.05330.63250.0829-0.09490.08890.7544-0.0073-0.09210.12420.45630.005-0.15280.11870.59270.1675-0.11770.08920.68810.1732-0.12060.08170.08030.1401-0.10220.1610.2229	GADTRNRCTPFEDTM0.7336-0.13890.71140.1810.05330.63250.0829-0.09490.08890.7544-0.0073-0.09210.12420.45630.78980.005-0.15280.11870.59270.77580.1675-0.11770.08920.68810.46790.1732-0.12060.08170.08030.53840.1401-0.10220.1610.22290.2988	GADTRNRCTPFEDTMOPE0.7336-0.13890.71140.1810.05330.63250.0829-0.09490.08890.7544-0.0073-0.09210.12420.45630.78980.005-0.15280.11870.59270.77580.72880.1675-0.11770.08920.68810.46790.55550.1732-0.12060.08170.08030.53840.23210.1401-0.10220.1610.22290.29880.3385	GADTRNRCTPFEDTMOPEACP0.7336-0.13890.71140.1810.05330.63250.0829-0.09490.08890.7544-0.0073-0.09210.12420.45630.78980.005-0.15280.11870.59270.77580.72880.1675-0.11770.08920.68810.46790.55550.65410.1732-0.12060.08170.08030.53840.23210.53840.1401-0.10220.1610.22290.29880.33850.5207	GADTRNRCTPFEDTMOPEACPCSR0.7336-0.13890.71140.1810.05330.63250.0829-0.09490.08890.7544-0.0073-0.09210.12420.45630.78980.005-0.15280.11870.59270.77580.72880.1675-0.11770.08920.68810.46790.55550.65410.1732-0.12060.08170.08030.53840.23210.53840.70400.1401-0.10220.1610.22290.29880.33850.52070.7001	GADTRNRCTPFEDTMOPEACPCSRORP0.7336-0.13890.71140.1810.05330.63250.0829-0.09490.08890.7544-0.0073-0.09210.12420.45630.78980.005-0.15280.11870.59270.77580.72880.1675-0.11770.08920.68810.46790.55550.65410.1732-0.12060.08170.08030.53840.23210.53840.70400.1401-0.10220.1610.22290.29880.33850.52070.70010.7072

Splint International Journal of Professionals

	General	Training	Recrui-	Perfor.	Data	Opt.	Acce.	Cost	Org.
	Admn.		rement	Evalu.	Mgmt	Effi.	Proc.	Red.	Perfor.
GAD1	0.7353	0	0	0	0	0	0	0	0
GAD4	0.7699	0	0	0	0	0	0	0	0
GAD6	0.8495	0	0	0	0	0	0	0	0
GAD8	0.5456	0	0	0	0	0	0	0	0
TRN2	0	0.7363	0	0	0	0	0	0	0
TRN4	0	0.6849	0	0	0	0	0	0	0
TRN8	0	0.712	0	0	0	0	0	0	0
RCT3	0	0	0.6144	0	0	0	0	0	0
RCT5	0	0	0.6092	0	0	0	0	0	0
RCT7	0	0	0.5815	0	0	0	0	0	0
RCT8	0	0	0.7164	0	0	0	0	0	0
PFE3	0	0	0	0.8533	0	0	0	0	0
PFE4	0	0	0	0.506	0	0	0	0	0
PFE5	0	0	0	0.6618	0	0	0	0	0
PFE6	0	0	0	0.9243	0	0	0	0	0
DTM1	0	0	0	0	0.5428	0	0	0	0
DTM4	0	0	0	0	0.7968	0	0	0	0
DTM5	0	0	0	0	0.735	0	0	0	0
DTM6	0	0	0	0	0.7478	0	0	0	0
DTM7	0	0	0	0	0.7102	0	0	0	0
DTM8	0	0	0	0	0.5671	0	0	0	0
OPE1	0	0	0	0	0	0.6988	0	0	0
OPE2	0	0	0	0	0	0.6881	0	0	0
OPE3	0	0	0	0	0	0.7774	0	0	0
OPE4	0	0	0	0	0	0.7386	0	0	0
OPE5	0	0	0	0	0	0./3/4	0	0	0
ACPT	0	0	0	0	0	0	0.7972	0	0
	0	0	0	0	0	0	0.6964	0	0
ACP3	0	0	0	0	0	0	0.48	0	0
	0	0	0	0	0	0	0.0001	U 1 2 7 2 1	0
CSRI	0	0	0	0	0	0	0	0.7731	0
CSR2	0	0	0	0	0	0	0	0.0229	0
CSR4	0	0	0	0	0	0	0	0.0722	0
CSR5	0	0	0	0	0	0	0	0.3071	0
CSR6	0	0	0	0	0	0	0	0.0704	0
OGP1	0	0	0	0	0	0	0	0	0.7999
OGP2	0	0	0	0	0	0	0	0	0.7595
OGP3	0	0 0	0	0	0	0	0	0	0.8366
OGP4	0	0	0	0	0	0	0	0	0.5833
OGP7	0	0	0	0	0	0	0	0	0.4937

Table 6: Factor Loadings (after reduction)

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

Structural Model

The hypothesized model was designed to test 18 hypotheses built based on the research literature on human resource information system and organizational performance. The model with path coefficients and the explanatory power (R2) for each dependent construct is displayed in figure 2. While path coefficients show the strength of relationship between the two latent variables, the t-values (figure 3 and Table 7) are indicative of the significance of relationships which enable hypotheses testing. The R2 values range from 0.2 to 0.5 (cut-off 0.1) which indicates moderate explanatory power of the model, in other words, the exogenous variables influence up to 50% on the endogenous variables of the study. The path coefficients are in the range of 0.08 to 0.65 for the variables associated through hypotheses testing and indicate a moderate to high influence.



Fig. 2: Path Coefficients and Factor Loading





Hyp Star	ootheses Origin ndard Error (STERR)T S	al Sample tatistics (((O)Sample D/STERR)	Mean (M)S	Iean (M)Standard Deviation (STDEV) Outcome		
1.	General Administration ->						
	Operational Efficiency	-0.0266	-0.0252	0.0195	0.0195	1.3625	Х
2.	General Administration ->						
	Accelerated Processes	0.1153	0.1164	0.0232	0.0232	4.9778	$\sqrt{*}$
3.	General Administration ->						
	Cost Reduction	0.1629	0.1656	0.0309	0.0309	5.279	$\sqrt{*}$
4.	Training ->						
	Operational Efficiency	-0.0757	-0.0752	0.0248	0.0248	3.0517	$\sqrt{*}$
5.	Training ->						
	Accelerated Processes	-0.031	-0.0328	0.0219	0.0219	1.4138	Х
6.	Training -> Cost Reduction	-0.0845	-0.0852	0.0302	0.0302	2.8006	$\sqrt{*}$
7.	Recruitment ->						
	Operational Efficiency	0.0266	0.0296	0.0211	0.0211	1.2606	х

Table	7:	The	t-values	of	the	Hypothetical	model
1 4010			t vulues	v .		Typothotiour	mouor

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

8.	Recruitment ->							
	Accelerated Processes	-0.0019	0.0035	0.0336	0.0336	0.056	Х	
9.	Recruitment ->							
	Cost Reduction	0.0334	0.0389	0.0349	0.0349	0.9582	Х	
10.	Performance Evaluation ->							
	Operational Efficiency	0.2523	0.252	0.0183	0.0183	13.7526	$\sqrt{*}$	
11.	Performance Evaluation ->							
	Accelerated Processes	0.5954	0.5954	0.0253	0.0253	23.5091	$\sqrt{*}$	
12.	12. Performance Evaluation ->							
	Cost Reduction	-0.069	-0.0695	0.0384	0.0384	1.7982	Х	
13.	Data Management ->							
	Operational Efficiency	0.6325	0.6322	0.0176	0.0176	36.0038	$\sqrt{*}$	
14.	Data Management ->							
	Accelerated Processes	0.1526	0.1506	0.0281	0.0281	5.4347	$\sqrt{*}$	
15.	Data Management ->							
	Cost Reduction	0.237	0.2351	0.0412	0.0412	5.748	$\sqrt{*}$	
16.	Operational Efficiency ->							
	Organizational Performance0.1398		0.1415	0.0268	0.0268	5.2104	$\sqrt{*}$	
17.	Accelerated Processes ->							
	Organizational Performance0.0616		0.0599	0.0309	0.0309	1.9942	Х	
18.	Cost Reduction ->							
	Organizational Performan	ce0.7085	0.7094	0.0205	0.0205	34.5292	$\sqrt{*}$	

*significance level of 10%; **significance level 5%; rest are at 1%.

Following hypotheses stand supported:

H_{2a}: There is a significant influence of general administration on accelerated process.

 H_{3a} : There is a significant influence of general administration cost reduction.

 H_{4a} : There is a significant influence of training on operational efficiency.

 H_{ka} : There is a significant influence of training on cost reduction.

 H_{102} : There is a significant influence of performance evaluation on operational efficiency.

 H_{112} : There is a significant influence of performance evaluation on accelerated process.

 H_{132} : There is a significant influence of data management on operational efficiency.

 $H_{_{14a}}$: There is a significant influence of data management on accelerated process.

 H_{15a}^{14a} . There is a significant influence of data management on cost reduction.

 $H_{1/4}$: There is a significant influence of operational efficiency on organizational performance.

 H_{183} : There is a significant influence of cost reduction on organizational performance.

Following hypotheses are not supported:

 H_{1a} : There is a significant influence of general administration on operational efficiency.

 H_{5a}^{-} : There is a significant influence of training on accelerated processes.

 H_{7a} : There is a significant influence of recruitment on operational efficiency.

 ${\rm H}_{\rm a\!a}$: There is a significant influence of recruitment on accelerated processes.

H_{9a}: There is a significant influence of recruitment on Cost Reduction.

H_{12a}: There is a significant influence of performance evaluation on cost reduction.

H_{17a}: There is a significant influence of accelerated processes on organizational performance.

IMPLICATIONS TO THE MANAGERS

From the theoretical perspective the work has extended the work of a group of HRIS researchers who have endorsed the use of information systems in the present business scenario. However, there were certain revelations through the hypotheses testing which have led to the implications to the managers for the effective use of HRIS.

- * Among the moderators, operational efficiency and cost reduction contribute to the organizational performance and the accelerated process have failed to have significant contribution on the organizational performance. So, managers have to consider the information systems on those processes which have significant influence on the former two constructs.
- * Data management has influence on both operational efficiency and cost reduction, as revealed through hypotheses testing and it has to be seriously considered by the HRIS managers. Any lapses on the part of data management may adversely affect the organizational performance. The ideal solution would be to outsource the HR technology infrastructure to a third-party vendor which has been successfully tried by many leading organizations. This way the vendor will provide service on both employee database management and applications drawn from it. The rule of the game in data management is that 'more data more answers' and more answers can lead to better organizational performance. The primary purpose of HRIS is to act as a decision support system and to make the right decisions high quality data in large quantity is required. The futuristic organizations ask pertinent questions such as 'what information on job applications can provide long-term performance and retention?' So, the third generation HR must be able to anticipate the future challenges and accordingly select the employees, which demands an efficient data management system.
- Training has emerged out as another construct which significantly influences the operational efficiency and cost reduction, which are vital for the organizational performance. This calls for the extensive use of HRIS in training. The present day training needs of the employees is significantly different from the yesteryears. Today, employee will look forward for a training schedule posted online. The employees may request for a review of their current training needs and then enroll for the online training. Having undergone the training successfully, the employees may demand the results to be posted to them immediately so that they may record it in their forthcoming performance appraisal. The employees may also require the resources to be available online for their future use. HRIS can support all these additional requirements which are demanded by the employees. Thus training process can be made highly effective through the HRIS intervention. The revelation of the empirical study match with the qualitative information collected through the knowledge workers. Many had openly expressed that HRIS application in training is vital as constant up-gradation of knowledge and skills is a survival tool in the present highly competitive business environment.
- ^{*} General administration has influence on cost reduction and accelerated processes. Even though contribution to organizational performance is not all that significant in comparison to the data management and training in HRIS, cost reduction is important as it adds to performance as well as helps in gaining of the competitive advantage. It is an obvious fact that general administration if undertaken efficiently, it would accelerate the processes of the organization which is also revealed through the hypothesis testing. However, process acceleration has not significantly contributed to the organizational performance in the organizations which were under study. It is logically meaningful as 'faster doesn't mean effective' e.g. HRIS may aid in faster decision making by providing the necessary data in the shortest period of time. But, the quality of decision which is important and not the speed in which the decision is made.
- * Performance evaluation as indicated through hypothesis testing has a significant contribution on operational efficiency, which in turn, has significant influence on organizational performance. So use of HRIS in performance evaluation need to be considered seriously by the managers. Performance evaluation is a multi-dimensional activity. For instance, computer based performance monitoring can be an important part of performance evaluation. The project deadline will be recorded in the database and the progress made by the employees on a project may be constantly monitored and reminders may be sent to the employees when they are behind the schedule. Such real time monitoring acts as a self-correcting system with checks and balances than knowing about the failure at the last stage when no corrective action can be taken. So, HRIS can be very effective in performance evaluation as indicted through the hypothesis testing.

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

CONCLUSIONS

This research has been an attempt to fill the research gap that exists in the empirical evidence for the relationships between the components of HRIS on the organizational performance. The study has resulted in the development of a metric which has been validated and can be used by the future researchers. The data was found to be normally distributed for a considerable extent and was suitable for statistical analysis using SEM technique. The sample size selected for this research is adequate, but generalization of the results may not be completely reliable as it has considered both the service and production industries together. This opens up a new scope for extending the study separately in thetwo or more sectors. The empirical study has its own set of assumptions and limitation which are applicable to this research too. The study has considered only five major processes of HRIS and there is a scope to consider other endogenous variables of HRIS and extend this study further.

The hypothesis testing has revealed the fact that among various constructs of HRIS data management and training have emerged out as the significant factors influencing the organizational performance. This is because they directly influence the operational performance and cost reduction, which have bearing on organizational performance. This has led to the drawing of managerial implications so that HRIS can be more effectively used in the organizations under consideration. In this knowledge driven economy, HRIS provides the solution for all the strategic issues related to the human resources leveraging in the context of employee productivity and innovative abilities. Hence, the implications of this study could be timely and beneficial for the organizations under consideration.

REFERENCES

- 1. Ahmad, R., & Scott, N. (2010). Human Resource Practices System Differentiation?: A Hotel Industry Study. Journal of Hospitality and Tourism Management, 17(1), 72-82.
- 2. Alvarez-Suescun, E. (2007). Testing resource-based propositions about IS sourcing decisions, Industrial Management & Data Systems, 107(6), 762 779.
- 3. Ball, K. S. (2001). The use of human resource information systems?: a survey, 30(6), 677-693.
- 4. Bateman, N. (2005). Sustainability: the elusive element of process improvement, International Journal of Operations & Production Management, 25(3), 261 276.
- 5. Bondarouk, T. V, & Rue, H. J. M. (2008). HRM systems for successful information technology implementation?: evidence from three case studies, 153-165.
- 6. Bromiley, P. & Washburn, M. (2011). Cost reduction vs innovative search in R&D, Journal of Strategy and Management, 4(3), pp.196 214.
- 7. Brown, C., Waldron, S., & Longworth, J. (2011). Specialty products, rural livelihoods and agricultural marketing reforms in China, China Agricultural Economic Review, 3(2), 224 244.
- 8. Burbach, R & Royle, T. (2010) "Talent on demand?: Talent management in the German and Irish subsidiaries of a US multinational corporation", Personnel Review, Vol. 39 Iss: 4, pp.414 431
- 9. Dawei Lu, Betts, A. (2011). Why process improvement training fails, Journal of Workplace Learning, 23(2), 117 132.
- 10. de Waal, A.A. (2010). Performance-driven behavior as the key to improve organizational performance, Measuring Business Excellence, 14(1), 79 95.
- 11. Duc, N. N., Siengthai, S., & Page, S. (2013). A conceptual model of HRIS-Trust?: an understanding of suppliers '/ customers ' relationship, 15(2), 106-116.
- 12. Ebrahimi, M., Saives, A., & Holford, W. D. (2008). Qualified ageing workers in the knowledge management process of high-tech businesses, 12(2), 124-140.
- 13. Elbireer, A., Chasseur, J.L. & Jackson, B. (2013). Improving laboratory data entry quality using Six Sigma, International Journal of Health Care Quality Assurance, 26(6), 496 509.
- 14. Fink, L.S., Longenecker, C.O. and Cutcher, A. (2009). Creating human-resource management value in challenging economic times, HR Advisor Journal, May/June, 13-22.

- 15. Fujimoto, Y., Bahfen, N., Fermelis, J., & Härtel, C.E.J. (2007). The global village: online cross-cultural communication and HRM, Cross Cultural Management: An International Journal, 14(1), 7 22
- 16. Hodgkinson, M. & Kelly, M. (2007). Quality management and enhancement processes in UK business schools: a review, Quality Assurance in Education, 15(1), 77 91.
- 17. Hussain, Z., Wallace, J., & Cornelius, N. E. (2007). The use and impact of human resource information systems on human resource management professionals, Information Management, 44, 74-89.
- 18. Jago, L. & Deery, M. (2002). The role of human resource practices in achieving quality enhancement and cost reduction: an investigation of volunteer use in tourism organisations, International Journal of Contemporary Hospitality Management, 14(5), 229 236.
- 19. Jing, F.F., Avery, G.C., Bergsteiner, H. (2011). Organizational climate and performance in retail pharmacies, Leadership & Organization Development Journal, 32(3), 224 242.
- 20. Kanghwa, K. (2010). From operational efficiency to financial efficiency, Asian Journal on Quality, Vol. 11 Iss: 2, pp.137 - 145.
- 21. Kassim, N.M., Ramayah, T. & Kurnia, S. (2012). Antecedents and outcomes of human resource information system (HRIS) use, International Journal of Productivity and Performance Management, 61(6), 603 623.
- 22. Kim, S. & Kim, S. W. (2010). The trade-off of service quality and cost: a system dynamics approach, Asian Journal on Quality, 11(1), 69 78.
- 23. Kock, H., Wallo, A., Nilsson, B., &Ho, C. (2010). Outsourcing HR services?: the role of human resource intermediaries.
- 24. Labib, A. W., & Shah, J. (2001). Management decisions for a continuous improvement process in industry using the analytical hierarchy process, Work Study, 50(5), 189 194.
- 25. Lee, S. M., Lee, Z., & Lee, J. (2007). Knowledge transfer in work practice?: adoption and use of integrated information systems, 107(4), 501-518.
- 26. Lee, S.K.J. & Yu, K. (2004). Corporate culture and organizational performance, Journal of Managerial Psychology, 19(4), 340 359.
- 27. Longenecker, C.O. & Fink, L. S. (2013). Creating human-resource management value in the twenty-first century: Seven steps to strategic HR, Human Resource Management International Digest, 21(2), 29 32.
- 28. Mandal, P. (2012). Improving process improvement: executing the analyze and improve phases of DMAIC better, International Journal of Lean Six Sigma, 3(3), 231 250.
- 29. Markova, G. (2012). Building dynamic capabilities?: the case of HRIS, 10(2), 81-98.
- 30. Martinsons, M. G. (1997). Human Resource Management Applications of Knowledge-based Systems, 17(I), 35-53.
- 31. McLean, D. (2006). The operational efficiency of passenger aircraft", Aircraft Engineering and Aerospace Technology, Vol. 78(1), 32 38.
- 32. Mills, A.M. & Smith, T.A. (2011). Knowledge management and organizational performance: a decomposed view, Journal of Knowledge Management, 15(1), 156 171.
- 33. Ramezan, M., Sanjaghi, M.E., &Baly, H.R.K. (2013). Organizational change capacity and organizational performance: An empirical analysis on an innovative industry, Journal of Knowledge-based Innovation in China, 5(3), 188 212.
- 34. Stone, D. L., Stone-romero, E. F., & Lukaszewski, K. (2006). Factors affecting the acceptance and effectiveness of electronic human resource systems, 16, 229-244.
- 35. Tansley, C., & Williams, H. (2001). Effecting HRM-style practices through an integrated human resource information system, Personnel review, 30(3), 351-370.
- 35. Véronneau, S., & Cimon, Y. (2007). Maintaining robust decision capabilities?: An integrative human systems approach, 43, 127-140.
- 37. Zellner, G. (2011). A structured evaluation of business process improvement approaches, Business Process Management Journal, 17(2), 203 237.

Impact of Human Resource Information Systems on Organizational Performance: An Empirical Study

A Comprehensive Study on Indian Coal Sector – Challenges and Impact on Corporate Strategy

Dr. S.K. Baral *

ABSTRACT

Mining in India is a major economic activity which contributes significantly to the economy of India. The GDP contribution of the mining industry varies from 2.2% to 2.5% only but going by the GDP of the total industrial sector it contributes around 10% to 11%. Coal with a proven reserve of 860 billion tonnes is mined the most in the world. At the same time, the demand curve for this sector is always on the rising side. The major reasons are the soaring power demand in India and China, the growing worldwide steel production, and lastly, the increasingly stringent environment regulations. As a prospering economy, India faces energy security as a growing challenge and the coal production is expected to grow at a CAGR of around 7% during 2011-12 to 2013-14. The Indian coal market is set to witness great boost in near future because of the rising government initiatives. Recently, allocation of coal blocks and stake sales in PSU are some of the major steps that were taken by the government to boost the production and investment in the coal industry. However, the upward pressure would definitely widen the demand supply mismatch in the coming years. To address these concerns, Indian conglomerates are making efforts in overseas acquisitions as well. In addition, it is also exploring un-conventional alternatives such as Coal Gasification for supply of energy; varied coal gasification technologies are re-evolving over the globe to replace the conventional power generation methods. This paper emphasizes on the present and future challenges on Indian coal sector. Data has been collected from multiple sources of evidence to understand the importance of the topic, in addition to secondary sources.

Keywords: Coal, Strategy, Demand & Supply, Policy, Challenges.

INTRODUCTION

Globally, coal resources have been estimated at over 861 billion tonne. While India accounts for 286 billion tonne of coal resources (as on 31 March 2011), other countries with major chunk of resources are USA, China, Australia, Indonesia, South Africa and Mozambique. Coal meets around 30.3% of the global primary energy needs and generates 42% of the world's electricity. In 2011, coal was one of the fastest growing forms of energy after renewable sources and its share in the global primary energy consumption increased to 30.3%-highest since 1969. Coal production in the Asia Pacific region has grown tremendously and accounts for over 67% of the total production globally (2011) as compared to about 27% in 1981 (in terms of energy equivalent). The coal sector, which contributes over half of India's primary commercial energy, has recently been beset with controversies such as the 'coal-gate' scam and insufficient coal production leading to questions about who should bear the increased costs of coal imports. This report presents a broad overview of the coal sector with the objective of highlighting the key challenges to be overcome and provides some suggestions on how this can be done. The study reveals that weaknesses in accountability mechanisms, planning and execution, transparency mechanisms and monitoring and oversight are some of the fundamental challenges faced by the Indian coal sector.

India is not able to meet its coal demand and import of coal from other countries has become inevitable. With a large of number of captive coal blocks stuck in various pre-implementation stages, companies' dependency on coal import has increased. Even some of the India's large power producers have shown a greater tendency to rely on imported coal to an extent despite the fact that domestic coal blocks have been allotted to most of their projects. Presently, India ranks fourth in the coal import demand, being led by Japan. India accounts for about 10% of the world's import coal demand. It is facing stiff competition from other Asian economies like Japan, South Korea and China. Japan has continued to lead the import demand, China is fast catching up and its demand is estimated to rise at significantly high rate (CAGR 29%) between 2008 and 2013.

^{*} Director, Kushagra Institute of Information & Management Science (KIIMS), Pira Bazar, Cuttack, Odisha, India

LITERATURE REVIEW

- 1. Chakraborty, P.K. (1989)1, in his monograph, "Coal Industry in West Bengal" has attempted to find a quantitative relationship between production and price, employment and wage, employment and output, average productivity and real wage, size of the firm and rate of profit covering a wide range of data from 1901 to 1976 related to coal industry in West Bengal.
- 2. In a research study titled "A Study of The Performance of Eastern Coalfields Limited(ECL) since the Nationalization of Coal Industry in 1973", Chakraborti, U. K. (1997), has attempted to judge the performance of ECL since its nationalization with the help of certain indicators like trend of production, labor productivity, wage rate, investment, and trend of profit and loss etc. since 1973.
- 3. Ghosh and Basu (2006), in their article titled "Coal and Gas consumption with economic growth: Cointegration and Causality evidences from India", have examined the causal relationship between Coal consumption and GDP (Gross Domestic Product)' as well as gas consumption and GDP using annual data, covering the period 1970-71 to2001-02. This study has established the existence of unidirectional causality between coal consumption and economic growth and between economic growth and gas consumption.
- 4. Chikkatur and Sagar (2007) have conducted a research study to find out an effective strategy for developing and deploying cleaner and more efficient energy technology. The objectives were to reduce conventional air pollution, minimize future green house-gas emissions, reduce dependence on oil, facilitate poverty alleviation and promote economic growth particularly in three of the biggest energy consuming nations in the world: United States, China and India.
- 5. Lester and Steinfeld (2007), in a similar study have stated that India's largest indigenous fuel resource is coal and it has reserves to production ratio of about 230 years at today's production level. Further, they have mentioned that higher generating efficiency technology like Integrated Gasification Combined Cycle (IGCC) Technology etc. is very much important to use this resource most wisely with the control on CO2.

OBJECTIVES OF THE STUDY

- 1. To point out the prospects and the challenges of coal sector of India from different perspectives.
- 2. To understand the current demand and supply of coal in India and corporate strategy.

CURRENT SCENARIO

India is the world's fifth largest energy consumer, accounting for 4.1% of the global energy consumption. Maharashtra is the leading state in electricity generation. The current per capita consumption of energy in India is 0.5 toe against the global average of 1.9 toe, indicating a high potential for growth in this sector. Of the total electricity consumed in the country, approximately 80% is produced from coal.



Fig. 1: Sources of Electricity Generation

A Comprehensive Study on Indian Coal Sector – Challenges and Impact on Corporate Strategy

Steel Sector

Coal is an essential input in the production of steel. In 2011, the world crude steel production reached 1,518 MT, reflecting a growth of 6.2% over 2010. The per capita finished steel consumption in 2011 is estimated at 215 kg for world and 460 kg for China, while that for India it is estimated currently at 55 kg (provisional). This clearly indicates scope for increasing the per capita steel consumption, a factor which correlates to the coking coal availability and production within the country. India has very limited reserves of coking coal which is a key raw material for the production of steel. Coking coal accounts for only 15% of the country's overall proven coal reserves. The Jharia coalfield, located in the state of Jharkhand, holds the majority of the coking coal reserves The Indian steel industry has been facing acute shortage of coal for the last several years. As per the report of the Working Group of Coal and Lignite for the 12th Five Year Plan, the steel production by 2016-17 is projected to be 105 MT. The corresponding requirement of coking coal for this quantity of steel is worked out at 67.2 MT in 2016-17.

Cement Sector

India is the second largest producer of cement in the world. Large amount of energy is required during the production of cement and coal is used as an energy source. During the process, coal is usually burnt in the form of powder. Around 450g of coal is consumed to produce 900g of cement. The cement industry is the third largest consumer of coal in the country. Due to the high cost and inadequate availability of oil and gas, coal is used as the main fuel in the industry. However, in the last few years due to rapid adoption of the dry process, the specific consumption of coal for producing cement has reduced significantly. It has also improved efficiency in cement kilns and increased the use of fly ash (produced in power plants) and granulated slag (produced in blast furnaces of steel plants) in the production of cement (Coal Vision, 2025).

DEMAND AND SUPPLY

The overall long-term demand of coal is closely linked to the performance of the end-use sectors. In India, the end-use sectors of coal mainly include electricity, iron and steel and cement. Demand from the unorganised small scale sector comprising primarily of the brick and ceramic industry is relatively large though infirm as users switch between coal, firewood and biomass depending on their relative prices. Other industries using coal have only a marginal impact on the long-term demand for coal.

The charts show the projected sector-wise coal consumption in India by the end of the 12th Plan and 15th Plan.



Source: India Energy Book 2012, (World Energy Council, Indian Member Committee)

The report of the Working Group of Coal and Lignite for the 12th Five Year Plan projects the coal demand in India to grow at a CARG of 7.1% till 2016-17 and reach 980.5 MT annually under realistic demand. At a CAGR of 7.0%, the demand is expected to reach 1,373 MT by 2021-22. Further, the Ministry of Steel (MoS) projected to build steel production capacities of 200 MT by 2020 to meet the rising demand. Out of this, almost 70% of the steel might be based on basic oxygen furnaces (BOF) technology.



Fig. 3: Coal Demand in India

The current shortage of coal stands at 84 MT and the same is expected to rise to 300 MTPA in medium-term if all the letters of assurance issued by the state-owned coal companies materialise. Some of this shortfall will be met by supplies from captive coal blocks and rest through imports. Also, the choice between the supplies from domestic and imported coal is mainly driven by timely availability of coal from domestic sources, quality requirements and the economics of landed cost of coal at the end-use plant. Captive coal mining in India was, gradually, being permitted by amending the Coal Mines Nationalisation Act, primarily in iron and steel making, power generation and cement production. However, the capacity augmentation from captive coal blocks was dismal as only 30 mines could come online as compared to a targeted 76 mines. Hence, it became important for India to secure coal through imports from international market to meet their significantly rising coal demand. However, import is mainly dependent on availability of coal in global market, increasing competitive scenario and affordability.





In the global market, China, India and Indonesia are expected to account for nearly 80% of the total incremental growth in demand for coal. As per projections, by 2035, China will remain the world's largest consumer of coal, followed by India, US and Indonesia. Coal-based thermal power projects will be the main drivers of demand in China and India. The projected coal fired generation capacity in Asia will rise to 1,464,000 MW in 2020 up from 918,000 MW this year, while for India it will rise from 95,000 MW to 294,000 MW over the next 11 years (a 300% increase).

Asia Pacific is expected to account for 70.8% of the global coal production and 71.3% of the global consumption in 2015 with China and India being two largest consumers. The demand and supply gap is expected to widen in 2030 as Asia Pacific is expected to produce 73.8% of the global coal production but consume 77.7% of the total consumption. The negative coal balance will have significant impact on coal prices.

Source: The report of the Working Group for Coal and Lignite for 12th Five Year Plan

A Comprehensive Study on Indian Coal Sector - Challenges and Impact on Corporate Strategy
As India have the fifth largest coal reserves in the world. Of the total reserves, nearly 88% are non-coking coal reserves, while tertiary coals reserves account for a meager 0.5% and the balance is coking coal. The Indian coal is characterised by its high ash content (45%) and low sulphur content. The power sector is the largest consumer of coal followed by the iron and steel and cement segments. The country's coal production has increased from 431 MT in 2006-07 to 554 MT in 2011-12 (an increase of 28.5%). On the other hand, the demand for coal has grown at a CAGR of more than 7% in the last decade and has reached around 600 MT. The India Energy Book, 2012 pegs the country's total demand-supply gap (including coking coal) at about 98MT. Out of this, India imports about 85 million tonne of coal.



Fig. 5: Global Coal Production (Mtoe)

Last year, around 6.1 billion tonne of hard coal and 1 billion tonne of brown coal were used worldwide. Since 2000, the global consumption of coal has grown faster than any other fuel. Currently, the five largest coal users are China, USA, India, Russia and Germany. They account for 77% of the total global use.



Fig. 6: Demand-Supply Scenario

Source: India Energy Book, 2012 (World Energy Council, Indian Member Committee)

Currently, the government enjoys a monopoly in producing coal with over 90% of the production coming from government-controlled mines. The policy for captive mining was introduced in 1993. This opened the coal sector to private investment, although no promising progress has been made in the captive coal blocks allotted by the government. Out of the 200 allocated blocks (22 have been de-allocated), only 30 mines have commenced production due to various reasons. The following figure explains details aboutcoal demand for steel.

Source: BP's Statistical Review of World Energy, June 2012



Fig. 7: Coking Coal Demand for Steel

The following figure explains sector-wise consumption in India.





Source: Annual report, Ministry of coal

The combined production from these was merely 36.30 MT in FY 2010-11 against a target of 104 MT. Contentious issues, availability of geological data, land acquisition and R&R, environment clearances, mining lease, etc. are the primary reasons behind the dismal production. Currently, coal block auction is proposed and detailed mechanism is being formulated for transparency and efficient processing.

CHALLENGES AHEAD

Although India has the fifth largest reserves of coal in the world, it is not able to meet its domestic demand. Since FY 04, the country's coal import has grown at a CAGR of 15% (till 2010-11). During the same period the thermal coal import grew at a CAGR of ~25%. According to projections, India's coal import requirement will be more than 200 MT by the end of the 12th Five Year Plan.

Some of the challenges in increasing the production capacity are as follows:

- 1. According to the data proved by CIL, 179 forestry proposals are awaiting clearances and if all approvals are secured on time, it can more than double its output to 1,132 MT, given that mines start production from 2016-17.
- 2. Majority of the coal projects have been halted and delayed due to issues in acquiring land and strict rules and regulations (R&R).
- 3. Even subsidiaries of CIL, such as MCL in Angul, face issues pertaining to R&R.
- 4. Bottlenecks in domestic coal transportation and lack of proper road connectivity further increase the challenge. Also, availability of railway wagons and mismatch of demand and supply of wagons and coal offtake affect production capacity.
- 5. Delay in mining activities at captive coal blocks and concerns relating to the increasing ash content of runof-mine (ROM) coal further hinder production.

A Comprehensive Study on Indian Coal Sector – Challenges and Impact on Corporate Strategy

^{2016-17 2021-2022}

IMPACT OF COAL SHORTAGES

As presented above, approximately 57% or 118.7 GW of India's total installed generating

capacity of 207.9 GW is coal-fired1 while over two-thirds of electricity generation is from coal-based plants. At a global level, coal accounts for 30% of the world's primary energy consumption. The average plant load factor for coal plants (which is a function of coal availability, repair and maintenance and connected demand) was 61.30%.

At the end of September 2012, 35 coal-based power plants had less than seven days of coal stocks. This was due to the following:

- 1. Twenty-two of these occurrences is due to no, inadequate or delayed receipt from Coal India or one of its subsidiary firms.
- 2. Ten of these instances are due to plants running at above-planned PLFs.
- 3. Five instances are due to inadequate import of coal.

Similarly, for the first half of 2012-13, the average PLF of coal-based plants has been 68.27%, as opposed to 71.20% for the same period a year ago. Approximately 12.3 BU of generation shortfall in this period is directly attributable to the shortage of coal. Considering the above facts, it is clear that the shortage of coal has lead to installed capacity remaining unutilised and shortfall in power generation. On the other hand, electricity being a basic and necessary public service, any nation wanting to grow in economic and social terms must be able to provide sufficient and efficient power generation. Neither manufacturing, industrial production, finance nor commerce can function without electricity. Coal contributes to about more than 1.5% of the GDP of the country. The unavailability of coal will have significant impact on the power generation in the country which in turn would impact new proposed projects in the manufacturing and cement sector in the country and retard overall economic growth.

Coal Prices

Like in every other commodity, the price of domestic coal is determined by the level of supply and demand. However, the response of overall demand and supply to price variations is slow due to the structure of the coal industry as well as the nature of the user industries. The two government-owned companies of India, namely Coal India Ltd and Singareni Collieries Company Ltd, working in different geographies, their role as one of fulfilling the production targets fixed by the government and take up plans and projects to meet the targets, with very little surplus to serve any unanticipated or sudden increase in demand.

Increase in Coal Production

Today, as the world has already started looking after a 'sustainable practice', in any domain and industrial and commercial practices, we really need to start assessing our potential and compare practices in the country vis-a-vis the other parts of the world which are more advanced in the sector. With the developments in mining in terms of technological improvements, production and productivity improvements have been observed. Within India itself, plans are being developed to produce 50 MTPA coal which when scaled down to monthly production, counts to nearly 4.2 MT which is, in many cases, the annual production of many mines in India. Operating such mines requires advanced technology, large equipments, involving a huge capital infusion at the starting of the project, followed by re-investments of a similar order.

Effective Exploitation of Reserves

Evaluation of mineral resource potential involves a complex process based on geologic analogy of promising or favourable geologic environments with geologic settings that contain known economic deposits (geologic models). Such subjective assessments or judgments depend upon available information concerning the area as well as current knowledge and understanding of known deposits. The government of India, along with its subsidiaries, is involved in continuous exploratory and evaluation works, establishing the country's potential of coal reserves.

With the limitation of non-renewable resources, the need is to develop operational practices whereby the extraction percentage is maximised. Whereas surface mining methods (open cast method or OCM) provide maximum extraction

percentage, focus is to be given to the upcoming and existing underground mining methods (UGM). Generally, whereas, in OCM, the extraction percentage has been in the range of approximately 90%, the extraction percentage in UGM lies in the range 20-70%, depending on the choice of mining technology. This shows a huge gap that UGM can fill leading to a maximised level of exploitation.

A sustainable development framework (SDF) comprises level of percentage extraction as one of the strongest pillars. Mining methods and/or technologies adopted in a mining project should also have a large focus on the level of extraction, keeping in mind the fact that these non-renewable sources of energy, and other end-usage, belong to a nation which is to preserved and used in a scientific manner so as to contribute to the SDF.

There may be numerous ways by which one can target a maximised extraction percentage. These are as follows:

- 1. Use of proper and scientifically proven mining technology.
- 2. Adopting the correct mining method (OCM/Longwall/other variants).
- 3. Combining smaller mining areas to develop these into one single mine of large capacities.
- 4. Promoting mining industries to have a maximum level of extraction by giving them incentives/tax rebates.
- 5. Close monitoring by our government agencies in each mining project to cross-check the progress of each mining project in terms of percentage extraction.
- 6. Meeting targets of mining projects not only in terms of production (per annum), but also on per annum level of extraction to match with the overall mineable reserves of a mining project.

Coal Quality Improvements

Typically, Indian coal is characterised by the following quality aspects:

- 1. Lower to medium grade coal
- 2. High ash
- 3. Low moisture
- 4. Low sulphur

While the sulphur content does not pose a serious threat in terms of coal quality (as India has low sulphur content in general) which has a significant effect on the

environment, the focus always lies on having a balancing process whereby ash

and grade are as per the desired input to the various consumers, while providing a maximum yield.

The major issues being faced by the coal industry today, leading to further quality deterioration as follows:

- 1. Increased production from lower seams
- 2. Lower liberation size
- 3. Low washability index
- 4. Enhanced production from OCM consisting of larger dirt particles and foreign materials
- 5. Depletion of good quality coal seams (coking as well as thermal coal)

Owing to a very wide spectrum of coal usage, ranging from power generation to steel production to infrastructure and commercial usage, we need to improve the quality of coal by washing, etc to reduce the environmental impact, enhance coal quality and increase process efficiency.

Coal washing and coal beneficiation processes are to be given major thrust in terms of developing strong research cells for developing better practices, suiting requirements of all the coalfields of India. Various quality measurements should be put into place complying with India ISO standards, or any other globally accepted standards, even at the waheries / beneficiation plants operating at smaller capacities. Apart from such processes, focus must also be given to our mining practices and stringent norms and practices should be put in place for better mining practice, so as to avoid contamination at the beginning level itself.

Improvements in Transport and Infrastructure

One of the major issues being faced by the industry for the coal movement within India is transportation and infrastructure. Following are the major challenges being faced in coal transportation:

- 1. Lack of availability of proper transportation mode for produced coal
- 2. Mismatch between the demand and supply of railway wagons
- 3. Lack of infrastructure to support a coal movement at full capacities

Some of the steps to improve the transport facilities and infrastructural requirements in order to compliment the coal industry rather than hamper its progress are as follows:

- 1. Enhanced road connectivity across mineral zones and consumers
- 2. Infrastructure developments driven by PPP
- 3. Restructuring and/or reallocation of railway networks to connect with the coal bearing areas
- 4. Doubling of railway routes at places where coal movement is higher
- 5. Enhancing port capacities as well as evacuation efficiency and augmenting the existing capacities from existing ports

SUSTAINABLE SUPPLY THROUGH LONG-TERM STRATEGIES

India is not able to meet its coal demand and import of coal from other countries has become inevitable. With a large of number of captive coal blocks stuck in various pre-implementation stages, companies' dependency on coal import has increased. Even some of the India's large power producers have shown a greater tendency to rely on imported coal to an extent despite the fact that domestic coal blocks have been allotted to most of their projects.

Presently, India ranks fourth in the coal import demand, being led by Japan. India accounts for about 10% of the world's import coal demand. It is facing stiff competition from other Asian economies like Japan, South Korea and China. Japan has continued to lead the import demand, China is fast catching up and its demand is estimated to rise at significantly high rate (CAGR 29%) between 2008 and 2013.

Considering above factors, it is necessary to secure sustainable supply of coal. The options available are:

- 1. Long term off-take contracts with coal producers and;
- 2. Acquisition of assets in foreign lands: In 2011, Coal Deals represented 26% of all deals by value globally. Coal targets had the highest average deal value of all resources (\$871 million) as mass consolidation between seniors continued across the Americas, Australia and Russia. Coal miners "stuck to what they know" and very little M&A driven by resource diversification strategies was observed. Presently, India is mainly dependent on Indonesia and South Africa for import of thermal coal and on Australia for coking coal. However, the new regulatory scenarios in these countries are reflective on the increasing coal prices. This necessitates the requirement of intensive efforts in identifying new avenues for supply, like Mozambique and others.

While the alternate sources for coal import beyond Indonesia, South Africa and Australia are identified, the challenges in these countries (like Mozambique, Columbia) are numerous ranging from lack of infrastructure to export coal out of country, concerns over stability of political and fiscal regime, unavailability of skilled manpower, etc. Beyond acquiring mineral assets, huge investment in developing surrounding infrastructure and government support to secure stable fiscal regime would be necessary to ensure long term sustainable coal imports from Mozambique and Columbia.

Following are the areas of improvement which can be considered for addressing the issues in the country to improve the coal supplies.

Туре	Issue	Possible actions by the Indian Government		
******	Fund raising	Exploration is a specialised job and is considered a risky venture. So investment should be encouraged in this sector through proper incentive and security of tenure.		
Operational or sustenance	Performance improvement	Ways of performance improvement in mining operations may be explored and implemented in Indian mines.		
issues	All the minerals are not reported as per UNFC classification. Hence, there is low level of confidence among investors to invest in explored areas.	State governments may be requested to agree for training camps to be held through IBM or tate DMG. The cost for running the training camps could be met by the state as well as through mandatory paid registrations.		
	Long queue of mining applications pending at different levels with the state and centre: This is a deterrent for future investments.	State orcentre may take action on these applications within a time-bound manner.		
Key administrative issues	Single window clearance agency (SWCA)	At present, all related subjects such as land, water, mineral, environment and forest, etc are administered by different independent departments and ministries at the state and central levels. Since the functions of departments and ministries are dependent and complimentary to each other with regard to the allocation and regulation of minerals, it is suggested that a single window agency at the state and central level may process the application. A single window committee will help to streamline the entire approvals process and bring about speed and consistency in decision-making.		
	Large number of compliance reports to be filed by the investors to CCO, state DMG, DGMS, tribunals, state and central agencies.	State or central government should consider online web portals through filing of returns which are considered essential. Online payment mechanism for royalty can also be explored.		
	Multiple registration requirements for miners, transporters, traders and end-users	States could create a single point registration facility preferably through an online web-based system. IBM could issue a single universal format for intra state transit, interstate transit, exports and imports.		

RISKS INVOLVED IN COAL IMPORTS

There are certain factors which can significantly affect the project economics. Some of the key risks involved are discussed below:

- 1. In case of acquisition, profile of the asset and timing of acquisition is important. Acquisition of wrong asset (where profile mismatch may be in terms of size, quality, developmental time required etc.) may result in heavy costs as huge sum of money is to be paid upfront.
- 2. Due Diligence of asset: While due diligence of source is necessary for reliability of coal supply, it becomes more important in case of asset acquisition. If detailed technical, financial, tax and other due diligence are not carried out, correct price may not be assessed resulting in heavy losses.
- 3. Commercial Contract: For reliability of long term supply, it is necessary that detailed contract is drafted to ensure that roles and responsibilities of the parties are clearly identified. This should also detail obligations and provisions for non performance. Contract should have enough enforcing provisions and deterrent for ensuring performance by each party.
- 4. Coal Prices: FOB price of coal forms more about 60-80% of landed cost of coal. Coal Prices in Global coal market has seen significant variation. Over past five years, coal price has seen about 300% increase and standard deviation of coal prices has been about 30% for various coal indices. (RB Index, NEWC Index, ICI Index)
- 5. Charter Cost: It forms about 50-60% of total transportation cost and about 10-15% of total landed cost of coal. Over past 4-5 years, a Charter rate has seen significant variation. In past years, charter rate has seen fluctuation of over 1000%.

- 6. Bunker Price: Variation in bunker cost will have significant impact on transportation cost as it cost about 40-50% of transportation cost. During 2004 and 2009, Bunker cost has seen significant variation with difference between maximum and minimum monthly average bunker cost has been about 25% with standard deviation of 19%. This signifies significant variation in bunker fuel prices.
- 7. Exchange rate: For a consumer in India, the net cost will also depend on the prevailing exchange rate. If we consider the present scenario, INR has fallen about 24% against USD in the last one year. The variation in exchange rate will increase the coal price volatility to consumers in India. However, this risk can be minimized by hedging the exchange rate.
- 8. Demand from buyers: For majority of coal moving into one territory, the role play of the buyers from such territories also dominate the price movement. In cases of sudden demand rise, the prices of sea-borne coal may tend to increase, while in case of shortage of demand, the prices may fall because of which the coal producers become reluctant to sell off their coal.
- 9. Changes in regulatory regime: As discussed earlier, in the recent years many countries have introduced new provisions which impact the cost of coal. For example, In Indonesia, on one hand, DMO impose the limit on coal to be traded internationally while on the other hand, price benchmarking is expected to increase the price of coal. Similarly, in Australia provisions for MRRT and Carbon Tax increase the price of coal to consumers.

CONCLUSION & RECCOMMENDATIONS

In the backdrop of increasing coal demand and reliance on coal for power generation, collective effort of the government, power producers, coal miners and service providers are necessary to ensure modern and sufficient infrastructure. Further, to reduce reliance on imported coal and boost the domestic supply, development and expansion of coal mines in the country is necessary. To ensure timely and smooth development of coal mines and for meeting coal demand, following steps should be taken:

- 1. Establishing a single window clearance process for coal mines.
- 2. Support in land acquisition and R&R related issues to ensure timely and smooth completion. Offering projects with secured clearances will boost timely development as well as increase the industry participation.
- 3. Currently, commercial sale of coal is allowed for government companies only. To meet the growing coal demand, it is prudent to consider commercial sales of coal by Private Developers though suitable framework may need to be developed for coal pricing, balance profits to private developers etc.
- 4. Measures to be imposed to improve productivity of the coal mines and improve recovery from the coal mines.
- 5. The government may consider creating funds to support overseas acquisition to supplement domestic resources. This is required since mining is a capital intensive industry. Further, mining projects often require investment in supporting infrastructure which is more capital intensive than mining.
- 6. Steps need to be taken to promote research and exploration activities and modern underground mass production technologies which will also help in dealing with land acquisition related issues as land requirements for UG mining will be lesser.
- 7. Indian Railways, port authority and the industry need to work in close collaboration to plan development of infrastructural facilities as per requirements.

REFERENCES

- 1. Balat, M. (2010). Coal in the Global Energy Scene. Journal of Energy Sources, Part B, 05, 50-62, ISSN-1556-7257.
- 2. Baade, C. (2010). Enhanced Process Control-Maximizing Coal Handling Preperation Plant Productivity. International Journal of Coal Preparation and Utilization, 30 (Special Issue), ISSN- 1939-2702, 239-251.
- 3. Bratton, R., Luttrell, G., Kasindorf, H., & Mcgraw, G. (2010). Evaluation of a Novel Fine Coal Dry Cleaning Process at Greenfields Coal Comany. International Journal of Coal Preparation and Utilization, 30 (Special Issue), 145-153, ISSN-1339-2702.
- 4. Chrisotoph Lattenmann, Mark Fetscherin, Ilan Alon; shao min Li, Anna Maria Schneider. (2009). "CSR Communication Intensity in Chinese and Indian Multinational Companies", Corporate Governance : An International Review, volume 17, no. 4, pp.426-442.
- 5. Dr. Satish Kumar (2012). "Application of Chi Square to analyse Corporate SocialResponsibility: A Study of BSE Sesex (30) based Companies". Journal of IPEM, Vol.: 6, No.:1, Jan, pp.1-11.
- 6. Foo Nin Ho, Hui Ming Deanna Wang, Scott j. Vtell (2012). "A Global Analysis of Corporate Social and Performance: The Effects of Cultural and Geographic Environments", Journal of Business Ethics", Vol.: 107, No.: 4, June, pp. 423-433.
- 7. Gupta Shruti (2011), "Consumer Stakeholdr View of Corporate Social Responsibility: AComparative Analysis from USA and India"; Social Responsibility Journal, Vol.: 7, No.: 3, pp. 363-380.
- Ghosh, S., & Basu, S. (2006). Coal and Gas Consumption with Economic growth: Co-Integration and Causality Evendiences from India. Journal of Resource Energy and Development, 03 (01), 13-20, ISSN-0973-0516
- 9. Kohmuench, J. N., Mankosa, M. J., & Yan, E. S. (2010). Evaluation of the Stack-Cell technology for Coal Applications. International Journal of Coal Preparation and Utilization, 30 (Special Issue), 189-203, ISSN-1939-2702.
- 10. Keles, S., Luttrell, G., Yoon, R. H., Estes, T. S., & Bethell, P. (2010). Development of the Centribaric Dewatering Technology. International Journal of Coal Preparation and Utilization, 30 (Special Issue), 204-216, ISSN-1939-2702.

Enterprise Equipment Management, Replacement Economics and Value Creation

Dr. Rohtash Kumar Garg*

ABSTRACT

This paper deals with a study for determining cut-off limits for equipment replacement in a company as using existing equipment beyond this limit may not be cost-effective. It reports the case for replacement economics of photocopying machines in the company with the help of a suggested methodology after quantifying all fixed and variable costs. In this paper based on operations of the photocopying machine, it has been attempted to determine cut-off limits for equipment replacement and presenting all computational details, and interpreting optimum period for equipment replacement as one that may lead to value creation for the company in view of reduced maintenance expenses, and higher productivity with novel machine features at less costs.

Keywords: Managerial Economics, Replacement Economics, Fixed Costs, Variable Costs, Depreciation.

INTRODUCTION

Every organization whether it is industrial firm or a service organization needs some technology and equipment to run its operations and if no other, it minimum needs information and communication technology (ICT), computers, office equipment and photocopiers. Whenever any equipment is in use, it always incurs some operating expenses and maintenance costs that grow with time, particularly maintenance expenses which significantly rise with equipment age. Rising maintenance expenses eventually lead to such searching queries whether existing equipment should continue to be used despite growing annual maintenance costs, or used with some major reconditioning, or replaced with new equipment with added features under exchange programme, etc, as replacement always makes better economic sense after some optimum period. Replacement acquires added attraction when there exists these days options to buy new equipment under various 'exchange schemes' which equipment vendors provide.

Equipment can be maintained when it actually breaks down by incurring expenditure whatever it entails including the cost of spares, etc, or actual break-downs can be averted by maintaining it preventively. A more preferred route for actual breakdown maintenance is by entering into a 'annual service contract' or 'annual maintenance contract' with the equipment supplier. While the former may take care of only service and maintenance part, the latter arrangement takes care of even costs of spare parts also but excluding supply of such spares in the contract that are categorized as 'consumables'.

Many organizations these days are in the business of reconditioning used equipment returned under exchange programme and selling reconditioned product at considerably lower cost and in the process achieving value creation. A wide range of products are being reconditioned these days such as photocopiers, automobiles, cellular phones, computers, consumer durable items such as washing machines, refrigerators, etc. Old products are often bought back under exchange schemes. A reconditioned product is 'as good as new' with enhanced useful life as replaced parts are always technologically superior. Reconditioning is essentially a value creation activity for the firm which is a 'win-win' situation for all. Buyer firm receives either a new product or the reconditioned product but perceived 'as-good-as-new'. Reconditioned product is sold to the market with a specific model name and generally at a much lower price than the new product (Mukherjee & Mondal, 2007).

'Returns acquisition' as a process is similar to procurement in a normal business activity. A company engaged in this business generally uses forward logistics chain for the 'reverse logistics'. The process begins by sending the returned

^{*} Assistant Professor, Delhi Institute of Rural Development, New Delhi, India

product to the remanufacturing plant through a logistics chain (reverse logistics). At the remanufacturing plant, the returned products are completely disassembled into parts and components. All the parts are thoroughly inspected, defective and worn out parts are repaired or replaced by new ones and then reassembled to build up the reconditioned product. Non-usable worn out parts are sold as scrap to the recyclers.

As alternative to reconditioning, 'postponement' for mass customization for satisfying customer demands through tailor-made products is yet another option. Companies such as Hewlett-Packard, among others, have been using a powerful design concept, known as 'design for postponement', to address some mass customization challenges. It basically involves reconfiguration of the returned product and process designs to counteract complexity and problems of uncertainty in supply chains. Postponement may similarly lead to significant value creation for the 'supplier' firm, as mass customization enables it to penetrate new markets and increase market share for current customer segments, improve customer satisfaction by offering more personalized products and increased product availability; and overall maintain low investments on inventory (Lee, 1999).

Growing global markets, with multiple local options, rapidly changing technologies, resulting in overlapping product lifecycles, expanding tastes and needs of diverse customers and the trend of channel distributors towards customized channel brands, drives companies to offer proliferating product options. Faced with such product variety and increasing pressure for customer service, challenge of effective delivery becomes an issue of corporate survival. Ability to offer and deliver a highly customized product quickly and efficiently to a customer may offer it a competitive advantage (Lee, 1999).

Postponement refers to delaying the timing of the crucial processes in which the end products assume their distinctive features. Thus customization can be done as soon as soon as some feedback is received from the firm whose product is to be replaced. Hence, in 'postponement' information flow or feedback is critical. In mass customization feedback is to be obtained not from one customer but from a large customer base. Postponemet can be 'pull' postponement, 'logistics' postponemet and 'form' postponement. 'Consumer durables' industry which now includes photocopiers, is increasingly using 'pull' and 'logistics' postponement to improve its order fulfillment process. 'Form' postponemet, involves fundamental change of the product structure, using designs that standardize some of the components or process steps. Only initial steps are standardized, but final product, which is differentiator and may impart it cutting edge is done at final stage, so that new product is developed with minimum of additional costs. Benefits of 'mass customization' can be reaped but if firms are ready to discard their old products and go for new ones as in competitive era market is flooded with newer options (Lee, 1999).

METHODOLOGY FOR ANALYZING REPLACEMENT ECONOMICS

For estimating depreciation, sinking fund method was suggested instead of straight line method as latter does not take into account sharper rate of depreciation that takes place after very first year of purchase and afterwards the rate of depreciation occurs only gradually and progressively less and less. In many organizations depreciation fund is maintained as a portion of working capital on which some interest (12 per cent in the present study) is charged notionally.

If C is the original cost, Sn is the salvage value, n is the useful life of the asset, i is the rate of interest, the annual deposit R in the depreciation fund is given by

$$R \cdot \frac{s}{ni} = C - S$$
$$\frac{s}{ni} = \frac{[1+i)^2 - 1]}{i}$$

From the above relationship, it is possible to estimate the annual deposit R in the depreciation fund. The analysis assumes that we are not indifferent to the time at which money is spent. Within this backdrop, a rupee invested now will be worth (1+i) a year hence, $(1+1)^2$ two years hence and $(1+i)^n$ in n years time. It follows that if we have to make a payment of one rupee in n years' time, it is equivalent to a payment today of $(1+i)^n$. We say that the present value

of the one rupee due in n years is $(1+i)^{-n}$ or if we donote $v = (1+i)^{-1}$, the present value is v^{n} .

Running (operating) cost of the equipment in year 'n' denoted by R_n is assumed to be payable at the start of the year. If one is required to replace the equipment at the end of year k, the present value of total costs including the cost of purchase is given by (Ackoff and Sasieni, 1968):

$$\mathbf{P} = \mathbf{C} - \mathbf{v}^k \cdot \mathbf{S}_k + \sum_{n=0}^{k-1} \mathbf{v}^n \mathbf{R}^n$$

The present value of P is equivalent to payments of x at the start of each year for k years, where

$$P = x + vx + \dots + v^{k-1} \cdot x$$
$$= \frac{x(1 - v^{k})}{(1 - v)}$$
Thus, $x = \frac{P(1 - v)}{(1 - v^{k})}$

The present value of all payments over the life of the equipment is equivalent to fixed annual payment of

$$x = \frac{\left[C - v^{k} \cdot S_{k} + \sum_{n=0}^{k-1} v^{n} R_{n}\right] \cdot (1 - v)}{(1 - v^{k})}$$

For determining the optimum period of replacement, we need to choose k which minimizes equivalent fixed cost which is the same as minimizing x/(1-v) which we shall denote by f(k).

$$f(k) = \frac{\left[C - v^{k} \cdot S_{k} + \sum_{n=0}^{k-1} v^{n} R_{n} \cdot R_{n}\right]}{(1 - v^{k})}$$

Analysis and Summary: Replacement Economics and Value Creation

Analysis was carried out after quantifying each and every cost element involved. Costs were divided into two categories, namely, fixed operating costs independent of machine usage; and variable operating costs dependent on machine usage. Electric power, consumables, and stationery formed variable costs as these are usage dependent. All the cost components were worked out for seven year period starting from the year of acquisition. In the office the assigned area to the machine and its operator was 48 ft² (8'x6') and the annual wage-bill of the operator at the time of study was Rs. 24256. For computing depreciation, sinking fund method was used instead of straight line method to account for higher depreciation in the initial years. Straight line method assumes uniform decline for each period. Depreciation schedule is given in Table 1 which shows that whereas the original machine cost was Rs. 3, 24,500; its salvage cost was Rs. 15,000 only, rate of interest as 12 per cent and period of depreciation taken as seven years.

C = 3, 24,500	S = 15,000
n = 7	i = 0.12

If i is the interest earned by the depreciation fund, then the annual deposit R in the fund is given by

$$R \overline{s_n} i = C(1+i)^n - S$$

= 324500(1+0.12)⁷ - 15000
= 702366.11
$$\overline{S_n} i = \frac{\left[(i+i)^7 - 1\right]}{i} = 10.09$$
$$R = \frac{702366.11}{10.09} = 69617.02 = 69617$$

 Table 1: Depreciation Schedule of Photocopier during Seven Year Period
 (All cost figures in rupees)

			-		
Age	Depreciation Charge	Interest on Fund	Increase on Fund	Amount in Fund	Discounted Block Value
0	0	0	0	0	7,17,366
1	69.617	0	69.617	69.617	6.47.749
2	69.617	8,354	77,971	1,47,588	5,69,777
3	69.617	17,710	87,327	2,34,915	4,82,644
4	69.617	28,189	97,809	3,32,722	3,84,644
5	69.617	39,926	1,09,543	4,42,266	2,75,100
6	69.617	53,071	1,22,688	5.64.955	1,52,411
7	69.617	67,794	1,37,411	7,02,366	15,000

This case study relates to replacement economics of a photocopying machine available at the corporate office of an industrial enterprise, which was purchased at a cost of Rs. 3, 24,500 though from the year of acquisition rates have gone up considerably. The machine had a KVA rating of 1.8. In the three years of machine operation from the year of acquisition cumulative expenditure on actual machine maintenance was Rs. 40536 (1177+11917+27442); expenditure incurred on maintenance contract was Rs. 18000 (6500+6500+5000); and total expenditure comprising both actual break-down costs and contract costs was Rs. 58526 (7677+18417+32442). While the ordinary service contract entailed an expenditure of Rs. 5000, the maintenance contract charges involved an expenditure of Rs. 15000 per annum. The annual maintenance contract was inclusive of cost of spare parts but exclusive of consumables, namely, toner (Rs. 350), drum (Rs.5600) and developer (Rs.1500) for which the payment is to be made extra.

		(Al	l figures in ru	pees)			
Cost Item				Period			
	(t)	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)`
Maintenance Costs							
Annual contract charges	6500	6500	5000	5000	5000	5000	5000
annual break-down costs	1177	11917	27442	30000	32000	35000	36000
Sub Total	7677	18417	32442	35000	37000	40000	41000
Fixed Operating Costs							
Annual building rental							
for machines	3469	3469	3469	3469	3469	3469	3469
Annual manpower							
wagebills	24256	24976	25696	26416	27136	27856	28576
Sub Total	27725	28445	29165	29885	30605	31325	32045
Variable Operating Cos	sts						
Annual electric power costs	3335	3335	3335	3335	3335	3335	3335
Annual consumable charge	s 34425	34425	34425	34425	34425	34425	34425
(500 copies/day)							
Paper cost (500 copies/day)) 15600	15600	15600	15600	15600	15600	15600
Sub Total	53360	53360	53360	53360	53360	53360	53360
Capital recovery due to							
depreciation and interest							
on capital	69617	69617	69617	69617	69617	69617	69617
Total operating costs	88762	100222	114967	118245	120965	124685	1E+05
(Fixed + Vaiable (Rn)							
Salvage value Sn	647749	569777	482450	384644	275100	152411	15000
Discounting factor vn	0.8928	0.7971	0.7118	0.6355	0.5674	0.5066	0.452
(1-vn)	0.1072	0.2029	0.2882	0.3645	0.4326	0.4934	0.548
Discounted salvage value (vn.Sn)	578310	454169.2	343408	244441.2	156092	77211	6785
Discounted operating cost	88762.0	89478.2	91640.2	84166.8	76873	70746	64037
$(\Sigma \text{ vn-1. Rn})$							
Cum. Diso. Oper. Cost	88762.0	178240.2	269880	354047.2	430920	501666	565703.3
(?Vn-1. Rn)	150001	271020.0	221220		000570	1070004.0	100///7.0
(υ - νκ.sκ + <u>Σ</u> κ-1 vn, Rn) n=0	158201	371820.0	331330	/5/355.0	922578	1072204.2	1206667.8
Optimising function f (n) 1	475752.8	1832528.0	1149651 (Minimum)	2077791	2531077.3	2173093.2	2203154.6

 Table 1: Estimates on Annual Fixed and Variable Operating Expenses for a Photocopier

 Available with Corporate Office of a Firm

Note: 1. Annual break-down costs from fourth year onwards are assumed once and not actual.

In this exercise it has been attempted to compute and tabulate f (k) and select that k as the optimal period of machine replacement which corresponds to the minimum value of f (k). Complete details of the replacement analysis are summarized in Table 2 which shows that cut-off/optimum period for replacement is (t+3) since the value of the optimizing function f(n) reached minimum value (1149651) during the period (t+2), with period 't' representing as the year of acquisition.

CONCLUSION

Equipment replacement may achieve value creation both for 'buyer' and 'supplier' organizations. 'Buyer' organization is anyway benefited with newer equipment, which may give it higher speed and productivity, lower maintenance costs, reduced staffing needs, low operating expenses, and contributing towards value creation for the organization. In 'consumer durable' segment there is virtually proliferation of product variety in market. When there exists range of options to return old used products and buy absolutely new products in their place under exchange scheme, it makes all the more sensible to replace existing used products, without a shade of doubt.

REFERENCES

- 1. Ackoff, R.L. and Sasieni, M.W., Operations Research, John Wiley & Sons Inc, 1968.
- 2. Lee, Hau, Postponement for Mass Customization. In 'Gattorna, J.(ed.), Strategic Supply Chain Alignment: Best Practices in Supply Chain Management, Gower Publishing Limited, England, 1999, p.77-91.
- 3. Mukherjee, K. and Mondal, S., Management of Remanufacturing Business: A Critical Study of a Photocopier Remanufacturer, Productivity, 48(1), 80-90 (2007).

A Study on Investment Pattern of Salaried Individuals in Odisha

Santosh Kumar Mohapatra*

ABSTRACT

Savings and investments by individuals are important both for personal financial well-being and for economic growth. People with savings are better able to weather economic shocks such as a loss of income, to build assets for the future, and are less reliant on credit to cover unexpected expenses. Savings can also be turned into further increased income and wealth through proper and prudent investment. Proper investment spurs addition to wealth, as once people start investing, they begin to own assets and hence get an income from wealth in addition to their income from work. This study examined investment pattern of salaried individuals in Odisha. The underlying principle behind choosing this topic is the basis that the salaried class in India constitute majority of savers and has gained attention of the economists, policy makers and the marketers, as there remains a considerable untapped, unharnessed potential in this income class of India. The data was collected through a structured questionnaire from 100 salaried individuals from twin cities of Cuttack and Bhubaneswar where majority of salaried individuals reside or work. The research shows that the preferred mode of investment of respondents is bank deposits followed by life insurance. However, majority of the respondents are investing their lifetime savings/surplus income in real estate, though most have to borrow for this purpose. However, majority of the respondents have expressed that they are likely to invest in real estate followed by bank deposits, Life insurance in future. Though majority of respondents are likely to take moderate risk for moderate return, they attach more importance to safety and security of their investment.

Keywords: Demographic Variables, Preferred Mode of Investment, Investment Factors, Financial Risk Tolerance.

INTRODUCTION

Saving and investment behaviour has always been an area of interest to the economists and researchers. In common parlance, savings behavior means the manner in which an individual or household acts and reacts to the process of savings. On the other hand, investment behaviour of an individual reveals how one wants to allocate the surplus incomes to various instruments for investment available with an eye to generate higher returns. The saving and investment differs from person to person and place to place. In each life cycle stage, every individual desires his hard earned money to be invested in most secure and liquid avenues. Typically, households invest their savings in financial assets (i.e., a bank account, fixed deposits or life insurance or mutual fund, etc) or equity or bullion or real estate such as a home.

However, the landscape for the management of household wealth has changed dramatically in a relatively short time. People are also now increasingly expected to take individual responsibility for their economic well-being. Economic growth, prosperity provide many households with increased opportunities to accumulate savings and to invest their wealth portfolio. At the same time, the deregulation of financial markets has increased competition between financial institutions and heightened financial innovations, which among others has spawned a continuous stream of new financial instruments. We see the development of new products with greater complexity than ever before. A large number of innovative, esoteric and alternative investment avenues are also available today for wealth creation, each of these having varying degrees of risk and returns. One's investment style also changes to keep pace with risk profile. But a very few are investing in those investment avenues as the knowledge of people about those products has not grown in tandem with introduction of those products.

LITERATURE REVIEW

Any types of investors or salaried individuals have different preferences of investment decisions according to the demographic variables. According to The NCAER Survey (2007), majority of people are keeping their money in liquidity assets-in cash, bank deposits and post office deposits. While 23 percent are investing in physical investments like real estate, gold, and only 12 percent in financial instruments.

An Odisha Based Eminent Financial Columnist, Cuttack, Odisha, India

According to Invest India Income and Savings Survey (2007), investors perceive more risk in investing gold followed by silver, chit fund, livestock, equities, self help group, commodity future markets, savings schemes of Micro Finance Institution, Mutual Funds, Agricultural Land, House/real estate, residential plot, central government bonds, bank deposits, life Insurance and postal savings. However, if persons with no options are considered bank deposits are considered by investors as least risky followed by postal savings.

In India, the saving is invested very conservatively. It is primarily in low risk Bank Fixed deposits, which take a lion share of 56.5%. Stocks, Debentures and Mutual Funds take away only 10.5%. Indians have put more money on Insurance (17.6%) than stocks, Mutual Funds combined and they take Insurance as an investment option. The savings allocated to various financial assets shows downward trend (RBI Data)

According to NCAER household Survey (2011) sponsored by SEBI, the primary destination of savings across household categories in India is insurance schemes and banks, Post office savings schemes are, for obvious reasons, less preferred compared to commercial bank deposits and accounts as such schemes have cumbersome procedures and offer inadequate returns.

ArthaYantra.com (2013) made survey among a pool of over 2,000 salaried professionals working across industries in India. According to the survey, 77.50% stated that insurance is their primary choice as an 80C investment vehicle. When drilled down further, 96% preferred insurance as tax saving investment. Nearly 7% invest in equity-linked saving schemes

According to Survey of PHDCCI (Zee news, 12 October2014), the preferred choice for investment in India is real estate sector, followed by gold and silver. The survey said fixed deposits have also been an important avenue of investments.

Sanjay Kanti Das (2012) studied the saving & investment pattern of the middle class households of Barak Valley in Assam. He observed that Tax benefit, security & safety, high returns, liquidity and so on are the common order of investment objectives among the respondents.

Digal, and Chakraborty (2012) studied the Saving And Investment Behaviour of Individual Households in Odisha (nine districts). Fixed deposits in banks and investment in real estate is the most popular savings and investment avenues for male investors whereas, investment in real estate and bullion is the most preferred avenues for the female investors. The Government sponsored small saving schemes such as national saving certificates (NSC), public provident fund (PPF), Indian post office saving schemes, etc., has wider acceptance and are preferred by both male and females. They also observed that women are risk averse indeed but save more than the male counterparts as the income, level rises.

However, the study by B.N. Panda and J.K.Panda (2013) professes that for employees of education sector in Bhubaneswar, life insurance is most preferred investment avenues followed by PPF, bank deposits, equity mutual fund, real estate, post office?NSC, and company fixed deposits, gold, corporate debenture, FI bonds and others

Palanivelu and Chandrakumar (2013) made study, an analysis into preferred investment avenues among salaried peoples in Namakkal Taluk, Tamilnadu, India. The analysis shows that insurance is the preferred investment avenues for salaried class peoples followed by bank deposits, investment in Gold and Estate. As far as investment objective is concerned, main investment objective is safety followed by tax saving.

The research by V. Sornaganesh and, Karthikeyan (2014) shows that majority of the salaried class respondents are saving money in bank deposits for the safety of an unpredictable future. While B. Thulasipriya (2014) observed that salaried people will look after the safety of their investment rather than high returns. The study reveals that bank deposit remains the most preferred investment avenues of the households.

Puneet Bhushan Sood and Yajulu Medury (2014) analyzed the investment preferences of salaried individuals towards financial products based on various demographic factors drawn from Delhi, Gurgaon and Noida . He observed that males prefer Mutual funds and Life insurance Products whereas females prefer Recurring Deposits and Market Investments. The government employees tend to invest in safe investment instruments whereas private employees tend to invest in those investment instruments, which offer more returns and are more risky.

Married respondents prefer safe investment instruments whereas unmarried respondents prefer Mutual Funds and Market Investments, which offer more returns and are more risky

STATEMENT OF PROBLEM

The rate of savings of India is one of highest in world. Traditionally India is regarded as nation of savers. But one's savings are not necessarily his investment. Savings can also be turned into further increased income through proper investment. Savings becomes efficient investment when the return from that investment more than offsets the total cost of the asset, taxes and inflation. But, people confuse saving and investing today. Indians are wise savers, but poor investors (NCAER survey, 2007; various RBI report). Today, savers are losers. What one saves continuously depreciates due to inflation and income tax. Everyone wants to have money and be rich, but few go about it the right way. The major share of household wealth income, is being allocated to non-financial assets such as to gold jewellery, real estate etc, which is unproductive, inflationary in nature and serves as a conduit for investment of black money (S.K.Mohapatra, Orissa POST, 23 September 2012). Unless the common person becomes a wiser investor, wealth creation for the investor and the economy will remain a distant dream.

OBJECTIVES OF THE STUDY

- 1. To find out the distribution of savings/ surplus income in different instruments and preferred mode of investment
- 2. To explore the avenues where respondents have invested major portion of their surplus income
- 3. To find out Investment Avenue that is likely to get top priority in future by respondents
- 4. To explore whether investors borrow in order to make investment

VARIOUS SAVINGS/INVESTMENT AVENUES AVAILABLE

All savings products carry a level of risk and these can be rated as low risk, medium risk and high risk. Low risk products offer lower returns compared to high risk products. Products are chosen based on the individual's circumstances and their risk appetite. Depending upon risk embedded in it, all savings and investment avenues can be classified in to 7 categories such as: (1) Low Risk Savings/Investment Avenues (2) Moderate Risk Investment Avenues (3) High Risk Investment Avenues (4) Physical savings /Investment Avenues (5) Emerging /Alternative investment avenues (6) Traditional high risky investment avenues (7) Compulsory savings from salary, etc

Low Risk Savings/Investment Avenue: It includes Savings in Cash, Savings Account including other bank deposits, Bank Fixed Deposits, Public Provident Fund (PP F), National Savings Certificates (NSC), Other Post Office Savings /Small Savings, Government Bond/ Securities/Inflation Indexed National Savings Securities (IINSS) etc.

Moderate Risk Investment Avenue: It includes Mutual Fund/ Equity linked savings scheme (ELSSs), Unit Linked Insurance Plan (ULIP), The Rajiv Gandhi Equity Savings Scheme (RGESS), Life Insurance, Pension Schemes/ National Pension Schemes etc.

High Risk Investment Avenue: It includes Debentures in private companies, Company fixed deposits, Equity /Share Market/stock market, Derivatives such as future, options and swaps, Commodities Future, Exchange traded Fund etc.

Physical savings/ Investment Avenue: It includes Real estate: House property /land, Gold/silver/diamond as jewellery for ornament purpose, Gold/silver etc as investment purpose (Bullion - gold coin/bar/ingots, gold ETF, Small Businesses etc.

Emerging /Alternative investment avenue: It includes Real Estate Fund, foreign stock, forex trading, Private Equity/ Venture capital, Hedge funds, portfolio management schemes (PMS), Art and Film Funds, Wine, paintings, antiques, collectibles etc.

Traditional high risky investment avenue: It includes Chit Fund /pongy schemes/ money circulation/Public Investment schemes such as agro-bond, plantation bond etc

Compulsory savings from salary: It includes from savings compulsorily deducted from salary such as Employees Provident Fund (EPF) / General Provident Fund GPF/ Contributory provident Fund (CPF)/ National Pension Schemes (NPS) etc.

NEED OF OUR STUDY

The available literature suggests that there are no studies available, on the savings and investing behaviour across the all types of savings and investment avenues including latest alternative investment avenues. Many past studies have tried to unravel the preferred mode of savings or investment of respondents. But study has not been held where one has invested his /her major portion of his surplus income in life time. Many people borrow in order to save or invest in real estate, gold, chit fund, share etc in order to get higher return from those investments than they pay as interest rate on loans. Even in certain cases such as purchase of land or construction of house, require huge expenditure, which is feasible by borrowing only. Such things have not been studied in past.

RESEARCH METHODOLOGY

The study is based on primary and secondary data. Primary data have been collected from 100 respondents through a structure questionnaire covering different groups of salaried class in twin cities of Cuttack and Bhubaneswar. The secondary data have been collected from various books, magazine, journals, newspapers and websites. The sampling technique followed in this study is purposive stratified random sampling.

ANALYSIS AND INTERPRETATION

Demographic Variables

According to the Table 1, the proportion of male respondents was 70 % and that of female respondents was 30% per cent. It reveals that the salaried male investors are more than the salaried female investors are. It is understood that the majority of 40 % of the respondents belonged to the age group of '41 - 50 years' while the age group of 25% of the respondents was belonged to the age group of 31- 40. In the age group of '51 to 60 years', there were 20% of the respondents. The remaining 15% of the respondents belonged to the age group of '18 to 30' years'. It denotes that the majority of the investors are middle-aged persons. In the age group of '18 to 30', lower number of respondents is attributed to lack of recruitment in government and public sector undertakings in neo-liberal era. It is to be noted that 15% the respondents have completed their PG level education while 21% of the respondents hold professional qualification. It implies that the majority of the salaried investors are qualified and educated. In present era, professional qualification has gained importance.

Table 1 evinces that a higher proportion of 43 % of the respondents are doing supervisory and clerical job while 18% of the respondents are professional. Similarly, while 10% respondents are having managerial job, 14% respondents are doing administrative/executive jobs. However, only 15% belongs to class-iv or peon. It denotes that the majority of salaried investors doing supervisory and clerical job. As far as annual savings is concerned, it is evident that 15% of the total respondents had an annual savings up to Rs.50000 while the annual savings of 30% of the respondents was between Rs.50001 and Rs.1.5 lakh and that of 20% of the respondents were found to have savings between Rs.150001 lakh to 3 lakh. Similarly, while 18% of the respondents had annual savings above Rs 6 lakhs.. Out of the total respondents, 12% of the respondents earned an annual income up to Rs.2 lakh, while 40 % of the respondents earned an annual income Rs.200001 to 5 lakh. Similarly, while 32 % of the respondent earned annual income Rs.50001 to 12 lakh, the remaining 16% respondent earned annual income above 12 lakh. It signifies that the annual income of most of the respondents lies between Rs.200001 to 5 lakh.

DEMOGRAPHIC	VARIABLE	No. of	Percentage of
FACTOR		respondents	respondent
Gender	Male	70	70
	Female	30	30
	Total	100	100
Age	18-30	15	15
	31-40	25	25
	41-50	40	40
	51-60	20	20
	Total	100	100
Educational level			
	Undergraduate	15	15
	Graduate	40	40
	Post-Graduate	24	24
	Professional	21	21
	Total	100	100
Occupational			
	Managerial	10	10
	Administrative/Executive	14	14
	professional	18	18
	Supervisory/clerical	43	43
	peon/class-iv	15	15
	Total	100	100
Annual savings			
	Up to Rs 50,000	15	15
	50001 to150000	30	30
	150001 to 3 lakh	20	20
	30000001 to 6 lakh	18	18
	Above 6 lakh	17	17
	Total	100	100
Annual Income			
	up to 2lakh	12	12
	200001 to5 lakh	40	40
	500001 to12 lakh	32	32
	above 12 lakh	16	16
	TOTAL	100	100

Table 1 : Demographic Variable

Preferred Mode of Investment

In order to find out the preferred mode of Investment, the respondents were asked to state their current holdings in different savings/investment avenues as explained above. All most all are found having bank saving account and investment in gold jewellery for ornament purpose in lifetime. We considered only whether they have invested in bullion for investment purpose. Similarly all most all have any form of compulsory savings from salary. Hence, we consider only additional deduction made by respondents in compulsory savings apart from mandatory amount.

From our study, it was observed that total numbers investments made by100 respondents in different avenues is 386. From table -2, it is found that while understandably, life insurance is the most preferred mode or popular

			F	able 2: In	ivestors'	Prefere	nces					
Various Investments Avenues	Curr inves (Prefe	ently holo tment ave erred moo	ding enues de of ()	Major savings in 1	portion o investe ife time	- p	Likely to in fu	invest ture		Incurred b to in	orrowing vest	
	No. of	% of	Rank	No. of	Percen-	Rank	No. of	Percen-	Rank	No. of	Percen-	Rank
	respondent invested	s respo- ndents		Respon- dents	tage		Respon- dents	tage		Respon- dents	tage	
Bank Deposits	85	22	2	15	15	2	19	19	2	0	0	
Life Insurance	95	25	-	ω	8	4	15	15	с	0	0	
Share/Equity	8	2	0	0	0		2	2	œ	0	0	
Real Estate	80	21	3	68	68	-	43	43	-	80	72	-
Gold Bullion	15	4	7	0	0		ς	с	7	0	0	
Mutual fund	20	വ	9	0	0		4	4	9	0	0	
Compulsory savings												
such as GPF/EPF	25	9	2	6	6	S	വ	Ð	2	0	0	
Postal/PPF/NSC	32	8	4	0	0		9	9	4	0	0	
Alternative investment												
avenues	0	0	0	0	0		0	0		0	0	
Chit Fund/pongi schemees	7	2	10	0	0		0	0		0	0	
Derivative,Commodity												
Future	0	0	0	0	0		0	0		0	0	
Companies deposits	8	2	6	0	0		0	0		0	0	
Bond /debenture	11	с	8	0	0			-		0	0	
Total	386	100		100	100		98	98				
Cannot say now							2	2				
Total							100	100				

A Study On Investment Pattern Of Salaried Individuals In Odisha, India

+ 87

investment avenue as 95 out of 100 respondents have Life Insurance policies followed by bank deposits(85), Real estate(80), Postal/PPF/NSC(32), additional compulsory savings such as EPF, GPF.PPF/NPS (25), Mutual Fund/ULIP (20%), Bond/Debenture(11), Gold bullion(15), Company deposits(8%), Share /Equity (8), Chit Fund/Ponzi schemes (7) etc. However, it was observed that (see table-2), none of the investors have invested in Derivatives and Commodity Futures, Exchange Traded Fund including any alternatives investment avenues.

But when question was asked to respondents, where they have invested their major portion of surplus income of life, Real estate was found to be first choice. Out of 100 respondents, 68 persons say that they have invested major surplus income of their life in real estate followed by Bank deposits(15), Compulsory savings(9), Life insurance(8) etc. However, out of 80 respondents invested in real estate, 72 have reported that they have incurred borrowing to invest in real estate.

However, when respondents were asked where they would prefer to invest in future, it was observed (see table-2) that out of 100 respondent 43 say they want to invest in real estate followed by bank deposits(19), Life insurance (15), additional compulsory savings(5), Gold /Bullion (3), Mutual Fund (4), Postal/PPF(6), Equity/share(2) Bond/ debenture(1). However, 2 respondents said that they cannot say now.

Various Investment Avenues

Factors Influencing the Investment Decision Making

Various factors influence the investment decision making. Respondent were asked to give 3 option. 100 respondents gave 300 option. It was found (see table-3) that safety and security (30%) is the prime factors that guide investment followed by liquidity (17%), high returns (13%), Better service (12%), Risk diversification (10%), Easy access to Institution/marketability (8%) and Investment horizon (7%). Macro-Economic Scenario (3%)

Factors th	nat guide Investment	No. of Respondent	%	Rank
Factors	High Returns	40	13	3
	safety/security	90	30	1
	Liquidity	50	17	2
	Better Service	35	12	4
	Easy access to Institution	25	8	6
	Investment Horizon	20	7	7
	Risk Diversification	30	10	5
	macro-Economic Scenario	10	3	8
	Total	300	100	

Table 3: Factors	that	Guide	Investment
------------------	------	-------	------------

	Table	4:	Financial	Risk	Tolerance
--	-------	----	-----------	------	-----------

Financial Risk Tolerance	No of respondent	%	Rank
Low	38	38	2
Moderate	45	45	1
High	12	12	3
Extremely High	5	5	4
Total	100	100	

Financial Risk Tolerance

Respondents were asked to judge themselves what type of financial risk they have. It was observed (see table-4) that out of 100 respondents 40% want to take moderate risk for moderate returns of their investment. Similarly, 38% have low risk bearing capacity, which implies that they want to take low risk, even if the return is low. But only 12% want to take high risk for high returns. However, only 5 percent have mentality to take extreme high risk for excessive returns.

CONCLUSION

From above analysis, it can be concluded that Life insurance is the most popular and preferred most of investment of salaried individual followed by bank deposits, real estate. Nevertheless, major portion of surplus income/savings are invested in real estate followed by Bank deposits, additional compulsory savings from salary and Life Insurance. However, many take recourse to borrowing while investing in real estate. Even, majority want to invest in real estate in future followed by bank deposits, life insurance. Similarly, salaried individual consider safety/security of their investment first while investing and prepared to take moderate risk. Hence, government should incentivize the financial saving by ensuring higher returns through increase of interest rate or enhancing tax rebate limit. The government should make financial education as a compulsory curriculum in School and College.

REFERENCES

- 1. ArthaYantra(2012), "Personal Finance Habits of Salaried Professionals in India", Web link http:// www.slideshare.net/ArthYantra/personal-finance-habits-of-salaried-professionals-in-india
- 2. Chakrabourty, Suman and S. K. Digal (2012), "A study of savings and Investment Behaviour of Individuals of individual Households An empirical Evidence from Orissa", The International journal`s Research Journal of Economics and Business Studies, Vol No.2, No 1 (2012). Retrieved 18.10.2013 from http://www.theinternationaljournal.org/ojs /index.php ? journal=rjebs&page=article&op= view&path%5B %5D=1363
- 3. Das, Sanjay Kanti (2012), "Middle Class Household's Investment Behaviour: An Empirical Analysis", Journal of Radix International Educational and Research Consortium, RIJBFA Volume 1, Issue 9(September 2012).Retrieved on 21.10.2013 from http://rierc.org/banking/paper37.pdf
- 4. Invest India Income and Saving Survey (2007).http://cambridgeforecast. wordpress.com / 2007/08/01/ invest-I ndia-incomes-and-savings-survey-2007/
- 5. Mohapatra, S.K. (23.09 2012). Indian Economy: Perils of Low Savings. Orissa POST: power post, Page.8, 23.09.2012, http://www.orissapost.com/epaper/230912/p8.htm
- 6. Mohapatra, S.K. (01.05 2014) Opinion: Savings as way forward. Orissa POST: power post, Page.8 http:// www.orissapost.com/epaper/010514/p8.htm
- 7. Mohapatra, S.K. (2014) "A Study on Peril of Declining Savings in India", Development Strategies and Innovation Dynamics for Sustainability, PP.111-123, authored by Dr S. K. Baral, published by AITBS INDIA, New Delhi, ISBN: 978-93-7473-560-2,
- 8. NCAER-SEBI, Household Survey (2011), "How Households Save and Invest: Evidence from NCAER Household Survey Sponsored by Securities and Exchange Board of India (SEBI)", July 2011, web link:http:/ /www.sebi.gov.in/cms/sebi_data/attachdocs/1326345117894.pdf
- 9. Shukla ,Rajesh(2007), "How India Earns, Spends and Saves" Max New York Life and NCAER Survey, web link http://www.thesuniljain.com/files/thirdparty /NCAER% 20How%20India%20Earns%20Spends%2 0and%20Saves.pdf
- 10. Sornaganesh, V and Karthikeyan (2014), "A Study on Preference of Investment-with special reference to salaried class people in Tuticorin Town", International Journal Of Informative & Futuristic Research, Volume -1 Issue -9, May 2014-retrieved on 28012.2014 from http:// www.ijifr.com/pdfsave/25-05-201488110-05 014448 investment salaried people %20a3a. pdf

Splint International Journal of Professionals

(A bi-Annual Peer Reviewed International Journal of Management & IT)

SUBSCRIPTION ORDER FORM

Please accept the enclosed cheque / demand	d draft No	dated		. drawn on
	bank favouring	g "Splint International	Journal of Professional	ls", Payable
at Bhubaneswar for (INR/L	JS\$) towards subscript	ion of Splint Internatio	nal Journal
of Professionals for one / two / three years.				
Name:				
Organisation:				
Mailing Address:				
City: Pir	n/Zip:	Co	untry:	
E-mail:				
Contact No:				

Category	No. of Issues	One '	Year	Two \	/ears	Three	Years
Individual	2	INR 1000	US\$ 20	INR 1900	US\$ 38	INR 2600	US\$ 56
Institutional	2	INR 1200	US\$ 22	INR 2200	US\$ 42	INR 3000	US\$ 62
Student/Scholars	2	INR 900	US\$ 18	INR 1600	US\$ 18	INR 2100	US\$ 50

Manuscripts and all editorial correspondence should be addressed to:

The Chief Editor Splint International Journal of Professionals 108, Surekha Regency, Hanspal Bhubaneswar - 752101, Odisha, India E-mail: splintjournal@gmail.com

Splint International Journal of Professionals

(A bi-Annual Peer Reviewed International Journal of Management & IT)

IMPRINT LINE

1.	Title of the Publication	:	Splint International Journal of Professionals
2.	Language of the Publication	:	English
3.	Periodicity of the Publication	:	Half Yearly (Jan - Jun & Jul - Dec)
4.	Publisher's Name & Address	:	Dr. S.K. Baral Director, Kushagra Institute of Information & Management Science, Cuttack - 753011 Odisha, India
5.	Printer's Name & Address	:	Dr. S.K. Baral Director, Kushagra Institute of Information & Management Science Pira Bazar, Gopalpur, NH-5 Cuttack - 753011, Odisha, India
6.	Printing Press	:	Nandalal Prakashan F-755/4, Sector - 9, CDA Cuttack - 753014, Odisha, India
7.	Chief Editor's Name & Address	:	Prof. S.K. Baral 108, Surekha Regency Hanspal, Bhubaneswar - 752101 Odisha, India
8.	Owner	:	Splint International Journal of Professionals

Printed and Published by Dr. S.K. Baral, Director, Kushagra Institute of Information & Management Science, Cuttack, Odisha, India on behalf of Splint International Journal of Professionals, 108, Surekha Regency, Hanspal, Bhubaneswar - 752101, Odisha, India, E-mail: splintjournal@gmail.com, Printed at Nandalal Prakashan , F-755/4, Sector-9, CDA, Cuttack - 753014, Odisha, India & Published from Splint Journal of Professionals, 108, Surekha Regency, Hanspal, Bhubaneswar - 752101, Odisha, India, Edited by Prof. S.K. Baral.