

# अनुसंधान

Science Technology & Management Journal  
of  
**AISECT University**



AISECT University : Village - Mendua, Post - Bhojpur, District - Raisen, (M.P.) India Pin - 464993  
Ph.-0755-6766100, Ph.-07480-295707,  
E-Mail - [aisectjournal@rediffmail.com](mailto:aisectjournal@rediffmail.com), [info@aisectuniversity.ac.in](mailto:info@aisectuniversity.ac.in)  
Web site : [www.aisectuniversity.ac.in](http://www.aisectuniversity.ac.in)

## Anusandhan (AUJ-AN)

- Technology & Management

Indexing and Impact Factor :



NO  
IMAGE  
AVAILABLE

**INDEX COPERNICUS : 48609 (2018)**

[Read / Download More Articles](#)

# COMPUTATION OF POWER DISSIPATION EFFICIENCY IN PLASTIC FLOW OF MATERIAL USING SERIES EXPANSION METHOD

Amit Kumar Maheshwari<sup>1</sup>, S.P. Narayan<sup>1</sup>, N.K. Gaur<sup>2</sup>

Advanced Materials and Processes Research Institute (CSIR), Bhopal, 462064<sup>1,2</sup>

Department of Physics, Barkatullah University, Bhopal, 462026<sup>3</sup>

## ABSTRACT

*The efficiency of power dissipation ( $\eta$ ) is a criterion used by the metal architect for optimizing the efficiency of process and analyzing the metal forming problems like instabilities in a wide range of materials. Conventional way of obtaining the power dissipation is based on effective strain rate power law inculcating cubic spline method which is sometimes difficult to execute due to assumption of its piecewise continuity. The present article meets the expectation of obtaining the power dissipation by modeling the effective stress of the series expansion method for defining the plastic deformation of the engineering work piece. This modeling phenomena is utterly expressible as a single formula unit and helps in resisting the superficial error due to inherent material defect in its bulk as well as the error causing due to sudden throb in applied physical conditions. Different graphical as well as numerical results shows that the maximum value of power dissipation efficiency at each process zone of strain is obtained at  $s = 0.001$  & 773K temperature. Whereas, under the whole regime, the best efficiency correspond to  $\eta = 0.5$ ,  $\dot{\epsilon} = 0.001$ ,  $T = 773K$ .*

**Key Words** - power dissipation, A12024 alloy, Flow/True stress, True strain rate, Thermo- mechanical process, Material Modeling.

## I. INTRODUCTION

A revolution tendering the fair demanding engineering applications towards the critically designed parameters waiving various metals and alloys in a variety of aircraft and space works, lead to a thrust in the development of light weight alloys. The inclusion of high strength, good tolerance, super fracture toughness, corrosion resistivity and acceptable ductility is always in demand to work on such key applications [1, 2], All these aspects constitute the part of analyzing the

workability of the material which in case of metallic alloy refers to the plastic deformation ability to withstand the failure in different cases of processing phenomena like forging, extrusion and rolling [3]. The efficiency of power dissipation is always used in reference for explaining the deformation ability and maximizing the efficiency of process for the analysis of metal forming problems including instabilities in a wide range of materials. “Dynamic Materials Modeling” [4] is widely used to define these workable condition of a material which depends on the intensity of

deformation with respect to the externally imposed stress level at particular physical circumstances.

The aim of the present investigation is to evaluate the deformation behavior of the metal or the alloy which accounts for the efficiency of power dissipation as the dynamic metallurgical processes occurring during hot deformation. The study will in turn enlighten the influence of flow stress at elevated temperature on other predefined or contingent external physical conditions. The approach of “Series expansion method” [5] in combination with strain rate power law [6, 7] is used to reach the outcome. The results have been derived on the assumption of considering the testpiece as the inductive dissipater of power in the whole system.

## II FUNDAMENTAL THEORY OF POWER DISSIPATION DURING HOT WORKING

Strain independent power law gives a direct dependency of flow stress on strain rate. According to it, the flow stress ( $\sigma$ ) of a material under uniform plastic deformation can be expressed as the simple power relationship [6, 7]

$$\sigma = k\epsilon^m \tag{1}$$

Here, the Strain rate coefficient “ $k$ ” is a constant for particular strain, strain rate and temperature. The strain rate exponent “ $m$ ” is also constant at these particulars and is generally referred as “strain rate sensitivity parameter”. Its value always lies between 0 and 1. Mathematically “ $m$ ” is determined by the slope of the plot between  $\ln(\sigma)$  versus  $\ln(\dot{\epsilon})$ .

However, on taking the natural logarithm of equation (1), we obtain

$$\ln \sigma = \ln k + m \ln \dot{\epsilon} \tag{2}$$

Now differentiating this expression w.r.t. logarithm scale of strain rate, the value of “ $m$ ” can be alternatively expressed as following equation (3),

$$m = \frac{d \ln \sigma}{d \ln \dot{\epsilon}} \tag{3}$$

The basics of DMM have been adopted from [7], According to it, at particular strain and temperature, the power  $P$  (per unit volume) absorbed by the testpiece under plastic flow can be expressed as the sum of  $G$  (the dissipator content) and  $J$  (the dissipator co-content) i.e.

$$P = G + J \tag{4}$$

Where, the value of terms in right side of equation (4) can be defined in terms of “ $m$ ” as,

$$G = \frac{m}{1-m} P, J = \frac{1-m}{1-m} P \tag{5}$$

Where,  $P$  represents the average power or say the average amount of work done or energy transferred per unit time. In modeling the dynamic response of the material, a zero-dimensional efficiency index  $\eta_j$  is generally used to represent the power dissipation. It is nothing but the ratio of the “ $J$ ” value in equation (6) to its maximum i.e.

$$\eta_j = \frac{J}{J_{max}} \tag{6}$$

But, in lieu of equation (6), the maximum value of “ $J$ ” can be obtained at the unit of strain rate sensitivity parameter “ $m$ ”. Thus,

$$\eta_j = 1 - m \tag{7}$$

This is the factor that defines the optimum condition of processing with an alloy. Thus, it is useful for obtaining a good combination of the processing parameters temperature, strain & strain rate. On putting the different values in equation (7), we lead to give the efficiency of power dissipation as equation (8),

$$\eta_j = 1 - m \tag{8}$$

This mathematical expression is helpful in coding the experimental results to the numerical data.

### III. PROPOSED MODEL

According to “Series expansion method” [5], the flow stress with comparatively lesser number of coefficients can be defined by the following equation,  $\sigma = \sum_{j=1}^n A_j \ln^j s + A_{n+1}$  (9)

Where,  $X = \ln s$ ,  $A_j$  are the functions of  $T$ . In order to go to its experimental counterpart the alloy taken under study is Al-2024 and the study data were collected from “HOT WORKING GUIDE” [4]. The value of different parameters in equation (9) by the process of series expansion is described in Table-1.

$A_j$	Value of $A_j$
$A_n$	$2367.5/T + 0.921$
$A_{12}$	$0.0002T - 0.0249$
$A_{13}$	$-112420/T^2 + 338.5/T - 0.2513$
$A_{21}$	$-275.5/T + 0.3235$
$A_{22}$	$-0.026$
$A_{23}$	$9620/T^2 - 5.4/T - 0.0195$

Table1-Value of  $A_{ij}$

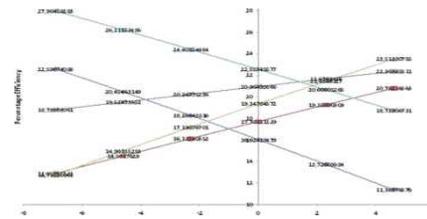
The percentage efficiency of power dissipation is obtained through equation (9) by using the following equation,

$$\eta = \frac{2m}{m+1} \times 100 \quad (10)$$

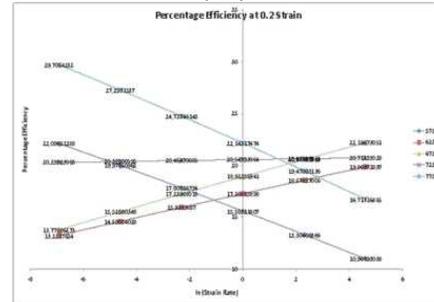
### IV. RESULT & DISCUSSION

Different plots for obtaining percentage efficiency of power dissipation by equation (10) at various strains are shown in Fig. (1). It can be easily analyzed from these plots that the maximum value of efficiency at each process zone of strain is obtained at  $s = 0.001$  & 773K temperature.

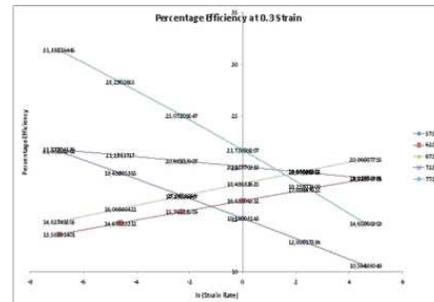
Whereas, in the whole regime the best efficiency correspond to  $\epsilon' = 0.5$ ,  $s = 0.001$ ,  $T=773K$ .



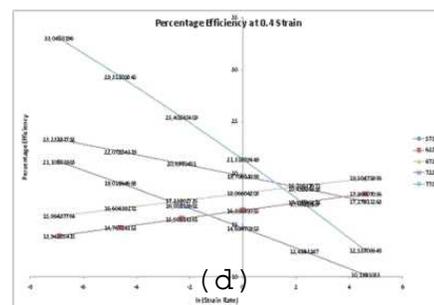
(a)



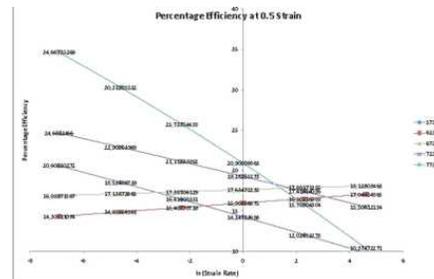
(b)



(c)



(d)



(e)

Fig-1: *Percentage Efficiency - ln(Strain Rate)* plot at (a)  $\dot{\epsilon} = 0.1$   
(b)  $s = 0.2$  (c)  $s = 0.3$  (d)  $s = 0.4$  (e)  $e = 0.5$

## V. CONCLUSION

Analysis carried out in this research article reflects the dependency of the Power dissipation efficiency during the plastic flow of the material under a deforming process on strain, strain rate & temperature. Various graphical and numeric results lead us to reach the following outcomes,

1. The maximum value of efficiency at each process zone of strain is obtained at  $\dot{\epsilon}' = 0.001$  & 773K temperature. Whereas, under the whole regime the best efficiency correspond to  $\dot{\epsilon}' = 0.5$ ,  $s = 0.001$ ,  $T = 773K$ .
2. Values of power dissipation efficiency can be obtained at many stringent experimental conditions by simply using the extrapolation or interpolation
3. This model may be used to eliminate the efficiency calculation at those points of experimental error where sudden changes in physical conditions like voltage fluctuation occurs.
4. The proposed model can ably covers a wider range of materials exhibiting the similar compressive behavior under the deforming compressive load.

## REFERENCES

- [1] Sanjib Banerjee, Nastagis Niyas Ahmed, Pranjal Bhuyan, Subhashish Baruah, Computational Modeling of high temperature processing maps for microalloyed Al-Cu-Mg alloy using artificial Neural Networks, Journal of Applied Sciences 12(10), 2012, 902- 912.
- [2] Sanjib Banerjee, P.S. Robi, A. Srinivasan, Deformation Processing Maps for Control of Microstructure in Al-Cu-Mg Alloys Microalloyed with Sn, Metallurgical And Materials Transactions A, 43A 2012, 3834-3849.
- [3] Juan Liu, Zhenshan Cui, Congxin Li, Analysis of metal workability by integration of FEM and 3-D processing maps, journal of materials processing technology 2005, 2008, 497-505.
- [4] Y.V.R.K. Prasad S. Sasidhara, Hot Working Guide: A Compendium of Processing Maps, American Society of Materials International, 1997.
- [5] Amit Kumar Maheshwari, S.P. Narayan., Mathematical Model for the Flow Stress constitutive Equation using Series Expansion, Anushandhan, 1(2), 2012, 88-91.
- [6] Amit Kumar Maheshwari, K. K. Pathak, N. Ramakrishnan, S. P. Narayan, Modified Johnson-Cook Material Flow Model for Hot Deformation Processing, J Mater Sci, 45, 2010, 859-864.
- [7] Sasi Bhushan Bhimavarapu, Amit Kumar Maheshwari, Deepti Bhargava, Shashi Prakash Narayan, Compressive deformation behavior of Al 2024 alloy using 2D and 4D processing maps, J Mater Sci 46, 2011, 3191-3199.

# KNOWLEDGE MANAGEMENT – ITS SOURCES & CONTRIBUTION IN MODERN BUSINESS ORGANIZATIONS

Dr. D.C. Johri<sup>1</sup>, Ashish Khare<sup>2</sup>  
RKDF Institute of Management, Bhopal<sup>1</sup>  
Bansal MBA College, Bhopal<sup>2</sup>

## ABSTRACT

*Knowledge is “a fluid mix of framed experience, contextual information, values and expert insight that provides a frame work for evaluating and incorporating new experiences and information”. The knowledge remains in the minds of organizational members conducting the operations – be it research, design, development, manufacturing or services. Knowledge is an important part of strategic planning. The inputs that a company receives during its strategic planning process can ensure that the organization and its operational practices are managed appropriately. Both internal and external sources of information should be considered.*

**Keywords:** *knowledge Repository, Knowledge Management, organizational culture, explicit knowledge, management system*

## I. INTRODUCTION

*Knowledge Management (KM) is a management technique of effectively managing knowledge in an organization. It comprises construction (i.e. compilation; collection; collation) of knowledge generated within the organization and from external sources into Knowledge Repository (KR) organize the Knowledge so constructed in the organization in such a way that it is easily accessible to all those in the organization, who need it, on time. In other words, a management system maintains the knowledge Repository (KR) which can be used at the time of need. A set of tools including computer system facilitates ease of accessing the KR as well as building and maintaining it.*

*Peter Drucker defines KM as “the co-ordination and exploitation of organizational knowledge resources in order to create benefit and competitive advantage”.*

*According to Davenport & Prusak “Knowledge Management (KM) is managing the corporations knowledge through a systematically & organizationally specified process for acquiring, organizing, sustaining, applying, sharing, renewing both the tacit and explicit knowledge of employees to enhance organizational performance and create value”.*

*Knowledge Management is not about managing knowledge for knowledge sake, the overall objective is to create value & to leverage, improve and refine the firm’s competencies and knowledge assets to meet organizational goals & targets. Implementing knowledge management thus has several dimensions including:-*

- (a)Organizational – The right processes, environments, culture and systems.*
- (b)Managerial Leadership – The right focus, strategy, implementation etc.*

(c) Cultural :- The organizational culture, as well as national culture for Multinational firms, influences the way people interact, the content within which knowledge is created, the resistance they will have towards certain changes & ultimately they share knowledge.

(d) Technological: - *The right systems, tools and technology properly implemented.*

(e) Political: - The support to implement & sustain initiatives that involves virtually all organizational functions that may be costlier to implement and which often don't have a direct visible return on investment.

## II. SOURCES OF KNOWLEDGE

Each of us possesses a great deal of knowledge. We know about ourselves and about people around us. We know about abstract concept and ideas. The main sources of knowledge are as follows -

(a) Internal sources: They emerge from the operations of the organization. Internal sources include the organizational operations such as design, development, engineering, sales, marketing, manufacturing, customer contact etc. This is the basic source of organizational information which is controllable and can be easily canalized to knowledge Repository. In the absence of any formal mechanism. This knowledge remains in the minds of organization members and usually, disappears with them.

(b) External Sources: External sources include Industry or Professional Associations, Commercial Web sites etc. There are many -many professional bodies such as IEEE, academic bodies such as

Universities, Research Institutions, Industry Associations such as NEMA and Commercial organizations. These sources usually make the knowledge available through Web sites and sometimes through publications. Some of them could be free services & some could be for a fee. A well designed knowledge management should be able to take advantage of both. The sources to create and maintain a knowledge Repository & allow members to easily access the knowledge stored inside it.

## III. TYPES OF KNOWLEDGE

(a) Explicit Knowledge: This type of knowledge is formalized & codified and is sometimes referred to as know what. It is, therefore, fairly easy to identify, store & retrieve. This is the type of knowledge most easily handled by KMS, which are very effective at facilitating the storage, retrieval & codification of documents & texts. Explicit knowledge is found in databases, Memos, notes & documents etc. From a managerial perspective, the greatest challenge with explicit knowledge involves ensuring that people have access to what they need, that important knowledge is stored & that the knowledge is reviewed, updated or discarded.

(b) Tacit knowledge: - It is referred to as know how & refers to intuitive, hard to define knowledge that is largely experiences based. Because of this, tacit knowledge is often context dependent and personal in nature. It is hard to communicate & deeply rooted in action, commitment and involvement.

Tacit knowledge is also regarded as being the most valuable source of knowledge & most likely to lead

to break through in the origination. Tacit knowledge is found in the minds of human stakeholders. It includes cultural beliefs, values, attitudes, mental models etc. as well as skills, capabilities and expertise.

(c) Embedded knowledge: Embedded knowledge refers to the knowledge that is locked in processes, products, culture, routines, artifacts or structures. Knowledge is embedded either formally such as through a management initiative to formalize a certain beneficial routine or informally as the organization uses & applies the other two knowledge types.

The challenges in managing embedded knowledge are very considerable and will often differ from embodied tacit knowledge. Culture and routines can be both difficult to understand & hard to change. Formalized routines on the other hand may be easier to implement and management can actively try to embed the fruits of lessons learned directly into procedures, routines and products. Embedded knowledge is found in rules, processes, manuals, organizational culture, codes of conduct, ethics and products etc. It is important to note that while embedded knowledge can exist in explicit sources, the knowledge itself is not explicit i.e. it is not immediately apparent while doing something this way is beneficial to the organization.

#### **IV. CONTRIBUTIONS OF KNOWLEDGE MANAGEMENT**

(a) Creates knowledge Repository (KR):- Involves finding and collecting internal knowledge and best practices. Some of the knowledge may be found in organizational documents such as memos, reports

and presentations and can be easily stored in a repository. Other knowledge is discovered through discussion. Discussion databases are another form of knowledge repository. Tools like Lotus Notes and Microsoft exchange server facilitate these discussion / databases.

(b) Improves Knowledge Access: - Involves determining ways to facilitate, finding the person with the required knowledge and then transferring the knowledge to another person. Sometimes, simply storing the knowledge in a repository is not sufficient; Face to face transfer of knowledge can be more effective. Technology such as desktop video conferencing, can enable face to face knowledge access.

(c) Enhances knowledge environment: Involves changing the way people work. Employees are encouraged to share knowledge as well as reuse existing knowledge. Coaching and training in learning and sharing practices will probably be necessary. This may be a very difficult task if the organization's culture does not currently share information.

(d) Manages knowledge as an Asset: - Involves demonstrating that effectively using the knowledge management responsibilities or face to face transfer of knowledge has allowed the organization to save or make money. This is currently difficult but will probably become more accepted as knowledge management becomes more widely used.

(e) Other Contributions of knowledge management are:-

- (i) Fostering innovation by encouraging free flow of ideas.
- (ii) Improving customer service by streamlining response time.
- (iii) Enhancing employee retention rates by recognizing the values of employees knowledge and rewarding them for its.
- (iv) Boosing revenues by getting products and services to market faster.
- (v) Streamlining operations & reducing costs by eliminating redundant or unnecessary processes.

A creative approach to KM can result in improved efficiency, higher productivity and increased revenues in practically any business function.

## V. CONCLUSION

Various types of knowledge discussed above are complimentary to each other and all are crucial to knowledge creation. They interact with and change into each other in the creative activities of human beings.

Explicit knowledge & tacit knowledge have significant role. Understanding this reciprocal relationship between explicit knowledge and tacit knowledge is the key to understanding the knowledge creation process. This interaction between two types of knowledge can also be called as knowledge conversion. Knowledge is created through such interactions among individuals with different types and contents of knowledge.

Knowledge Management thus consists of the initiatives and systems that sustain and support the

storage, dissemination assessment, application, refinement and creation of relevant knowledge. It involves the understanding of where and in what forms of knowledge exists, how to make the right knowledge available to the right people, what the organization needs to know, how to best generate and acquire new relevant knowledge, how to promote a culture conducive to learning, sharing and knowledge creation, how to manage all these factors so as to enhance performance in light of the organization's strategic goals and short term opportunities and threats.

## REFERENCES

- [1] Alvi M (1991), "Knowledge Management Systems: Issues, Challenges and Benefits", Communication of the Association for Information Systems, Vol.1.,pp. 1-28.
- [2] Alvesson Mand Kareman D(2001). "Odd Couple: Making sense of Curious Concept of Knowledge Management", *Journal of Management Studies*, (Guest Eds: Swan J and Scarbrough H), Vol.38, No.07, pp. 995-1018.
- [4] Drucker P(1998), "The Coming of The New Organization" in Harward Business Review on Knowledge Management", Harward Business Press Boston, MA.
- [5] Davenport T H and Prusak L(1998), *Working Knowledge: How Organisations Manage What They Know*, Harward Business School Press, Boston.
- [6] Easterby Smith M (1997), *Discipline of Organizational Learning in Human Relations*, Vol.50, No.9, pp. 1085-1116.
- [7] Mathew V(2007), Business Review, Vol.I, No.1.

# ORGANIZATIONAL COMMITMENT AND CORPORATE GOVERNANCE – CASE STUDIES

**Dr. Priya K.Dubey**

AISECT University, Bangarasia , Bhopal (M.P.)

## ABSTRACT

*When employees mix personal and business interests, conflicts of Governance will eventually arise. A conflict of workplace commitment exists when an employee's loyalties or actions are divided between the employer's interests and those of another person or entity, such as a family member, a supplier, or a customer. Both are actual conflict of corporate governance and the appearance of a conflict of interest should be avoided. Despite best intentions, these conflicts of corporate governance will likely negatively affect both the employee and the employer. The mere appearance of behavior adverse to the employer may impact business performance and workplace morale. This paper discusses corporate governance building workplace commitment involving personal and business relationships and provides practical guidance on how to avoid those relationships. Conflict of workplace commitment can easily manifest themselves when transactions are not at an arms length.*

**Keywords:** Ethics, Electronic, Security, On-line, Transferred, Damage, Hacking, Viruses.

## I. INTRODUCTION

This paper presents three cases on common types of conflicts of corporate governance and workplace commitment in the workplace (1) when a relative or friend is employed by a supplier or customer (2) Fraternization (supervisor-subordinate dating) (3) Favoritism. These short case studies can be used in the classroom to explore the difficult issues that accompany conflicts of corporate governance and commitment in the workplace. It is envisioned that these three cases will generate classroom discussion at a level appropriate for business management related courses dealing with governance issues caused by conflicts of commitment.

## II. CASE 1: RELATIVE OR FRIENDS EMPLOYED BY SUPPLIERS OR CUSTOMERS

The objective of this paper is to identify the various electronic crimes such as service theft, money theft ,programme data theft, programme damage, data destruction, programme copying, data alteration, hacking violation of privacy. It provides a numbers of techniques and methodology that are used in an unethical manner in support of electronic commerce. Our implementation and testing section represents that how someone can steal your information in unethical way with example. Finally it provides some suggestions to try and prevent any of this information being available to unauthorized.

**(a) Fact**

Jay is responsible for identifying and approving a vendor for machine cleaning services for their company's worldwide headquarter. Jay has narrowed the potential vendor list to two machine cleaning companies: X's machine cleaning and Y's machine cleaning. Evaluation of X's machine cleaning company revealed that X recently acquired expensive, state of the art equipment enabling X to provide high quality, industrial machine cleaning. In addition, X machine cleaning is both price and time competitive with all alternative cleaning operations available. Jay was excited about X's machine cleaning company and knew the company well because his wife, Jenny, is employed as the controller of X's machine cleaning company. X's machine cleaning has a bonus incentive plan that (1) pays a finder's bonus to employees who find new customers (2) pays a bonus to employees based on profit sharing. Jenny intends to put in for a finder's bonus should her husband decide to select X's machine cleaning company as his company's machine cleaning vendor. Jenny is also excited about the possibility of a larger profit sharing bonus that would likely result from the increased business. Y's machine cleaning, which has been used in the past, uses outdated, older equipment. Regardless, Y's machine cleaning is both price and time competitive.

Jay decided to hire X's machine cleaning company as the sole machine cleaning vendor for his company because of the anticipated higher quality of work associated with the newer equipment that

would be used. Jay has not disclosed any information regarding his wife's employment to his company.

**(b) Discussion Questions**

Is there a corporate Governance and organizational commitment problem? If so, is there a real problem or merely the appearance of one? If you feel that there is a conflict of governance and commitment, what is the immediate financial cost to Jay's company of this conflict? What is the immediate financial cost to Jenny's company of the conflict of commitment? Why is the marriage between Jay and Jenny, and their employment positions, a cause for concern for both companies?

- What action(s) should Jay take to reduce or eliminate the conflict of governance and commitment? Is disclosure sufficient?
- If Jay disclosed Jenny's position with X's machine cleaning company, would a conflict of governance and commitment still exist.
- How could the conflict of governance and commitment have been prevented?
- As a high level manager within the organization, how would you address and resolve the conflict of governance and commitment problem?

**III. CASE 2: FRATERNIZATION**

This fraternization case, slightly modified, was taken from Kizirian et al (2004)

**(a) Fact.** Sid and Rajni are peers in the same accounting firm and are scheduled on many of the

same audits. After working together for six weeks on an audit, they developed a romantic relationship outside of work.

To maintain their privacy and avoid gossip, Sid and Rajni agree to keep the personal relationship as quiet as possible and refrain from publicly displaying affection at work. Sid and Rajni are confident that relationship is not common knowledge within the firm. In the fall, Rajni is promoted to a managerial position. In Rajni's new role, she will manage Jack. Jack will manage Sid as Sid's senior on several key audit engagements.

Since, Rajni will not be directly managing Sid, she and Sid decide to continue to keep the relationship secret. Both are certain that the relationship will not cause any issues within the audit team and that no actual conflicts of governance and commitment will occur. Rajni is not directing or reviewing Sid's work at a detailed level and they know they can maintain a purely professional relationship at work.

**(b) Discussion Questions**

- (i) Did a conflict of corporate governance and workplace commitment exist? Before Rajni was promoted?
- (ii) Does a conflict of governance and workplace commitment exist now that Rajni has a managerial position within the accounting firm?
- (iii) What are the implications of disclosure vs. non-disclosure of the relationship to Rajni and Sid?
- (iv) Which is bigger conflict: the relationship or the failure to disclose the relationship?

Assuming that the relationship is disclosed, what are the implications of the mere appearance of a conflict of organization governance and workplace commitment caused by the relationship on the behavior of Rajni, Sid and Jack?

As partner in charge of the accounting firm, how would you address and resolve the conflict of governance and commitment problems?

**IV CASE 3: FAVORITISM**

**(a) Fact**

Radha is the daughter of Raghu who is an accounting manager at a company. Radha has a minor in accounting, so she meets the minimum qualifications for a job opening in the accounting department. Radha applies for a position through normal staffing procedures. Raghu supervises Roma who makes the hiring decisions for their department.

Roma sees that Rahul has also applied for the position. Rahul has a Masters degree in accounting from a reputable school and unlike Radha, has passed the CPA examination. Rahul is a much stronger candidate. Raghu drops a hint to Roma that Roma will be rewarded for hiring Radha.

**(b) Discussion Questions**

- (i) What is meant by the term favoritism?
- (ii) How is Raghu acting in a manner that exhibits favoritism?
- (iii) How is Raghu's favoritism's behavior hurting the company?
- (iv) How might Raghu's favoritism action hurt her? Radha?

- (v) How could the conflict of corporate governance and organizational commitment problem have been prevented?

As a high level manager within the organization, how would you address and resolve the favoritisms problem?

## V. ANALYSIS AND INTERPRETATION

### (a) Case 1

If Jay did not formally disclose his wife's high level employment with X's machine cleaning company, he has likely violated his employer's standards on conflict of commitment and disclosure. Most employers have a policy that employees avoid and activity that shows favoritism towards family members or the perception of such favoritism. Such behavior is considered disloyal or at odds with the best interests of the employer. Employees should always inform their managers when confronted with any situation that may be perceived as conflict governance, even if the employee doesn't believe the situation would actually result in a conflict of workplace commitment.

To prevent the perception that Jay's recommendation was influenced by the possibility that he or his wife might somehow benefit from the vendor decision. Jay should have formally declared the relationship whether or not he believed a conflict existed. To prevent and actual or perceived conflict of governance and commitment, Jay's employer probably should have removed Jay from a decision-making role for the machine cleaning decision.

Some practical steps managers can take to avoid risks associated with conflicts of commitment and governance when relatives or friends are employed by suppliers or customers include:

- (i) Review your company's policies on conflict of governance and commitment to be sure that you are current on policies governing conflicts of interest involving relatives or friends. Most firms have policies and guidelines which address "relative or friends employed by suppliers or customers" types of conflict of commitment. Be sure that disclosure issues are addressed. In many situations, publicizing the family/friend relationship will reduce or eliminate the perception of a conflict of governance and commitment. Other prevention options available to an employer should be identified such as transferring and employee, or changing the employee's responsibilities either temporarily or permanently.
- (ii) Require all your subordinates to periodically review your firm's policies, guidelines and resolutions procedures related to conflicts of governance and organizational commitment involving relatives or friends.
- (iii) Direct your human resources department to resolve any such conflict of commitment issue which might be unresolved in a timely manner.
- (iv) Direct your employees who have a conflict of commitment concern to describe the

situation to a human resources department contact and ask for guidance. Employees should always inform their employers when confronted with any situation that may be perceived as a conflict of governance, even if the employee doesn't believe the situation would violate employer guidelines.

(v) Investigate, address and resolve any conflict of commitment or governance concerns (either real or apparent) immediately upon identification to lessen their repercussions.

(vi) Do not allow gossip to flourish and fuel unwarranted perceptions of favoritism that could, if uncontrolled, negatively impact your organization.

#### (b) Case 2

As stated by Kizirian et al (2004), Rajni's conduct probably violates her firm's rules on fraternization. Supervisors who pursue romantic relationships with subordinates usually do so in violation of their firm's principles of conduct and guidelines to behavior. Since most employees will spend more time interacting with colleagues than they will spend with people outside the company, workplace dating and intimacy is a natural and likely outcome. While most firms do not generally prohibit workplace dating, they do prohibit managers from pursuing romantic or sexual relationships with employees whom they supervise. Involved managers need to take steps immediately to end the supervisory relationship. The notion of supervision extends to anyone within the manager's direct or

indirect chain of supervision. Manager-subordinate dating relationships damage workgroup morale, create perceptions of favoritism and can easily generate lawsuits for sexual harassment, retaliation and wrongful termination.

If the relationship ends on a bad note, the subordinate may claim 'quid pro quo' harassment. The subordinate can complain that he or she thought their job depended on the continuance of the relationship. Quid Pro Quo represents a form of harassment requiring a favor or interaction as a condition for employment, continuing employment, or in exchange for employment benefits (e.g. promotion, pay raise, etc.)

Some practical steps to guide managers on how to avoid risks of fraternization include the following (Kizirian et al, 2004):

Review your company's policies on fraternization to maintain your currency. Most companies have employment guidelines specifically stating that managers are not permitted to date or pursue romantic or sexual relationships with employees whom they supervise directly or indirectly.

Require all your subordinates to periodically review your firm's fraternization guidelines and resolution procedures.

- (i) Direct your human resource department to resolve any current fraternization issues outstanding.
- (ii) Direct your employees who have a conflict of interest concern to describe the situation to a human resources department contact and ask for guidance. Employees should

always inform their employers when confronted with any situation that may be perceived as a conflict of governance and commitment, even if the employee doesn't believe the situation would violate employer guidelines.

(iii) Address and resolve all new fraternization concerns immediately to lessen the chances of lawsuits.

(iv) Investigate all complaints of favoritism, retaliation, wrongful termination or sexual harassment for underlying signs of fraternization.

(v) Do not allow gossip to flourish and fuel unwarranted perceptions of favoritism that could, if uncontrolled, negatively impact your firm.

### (C) Case 3

A nepotism type of conflict of governance and commitment exists when one uses a position of power or authority to influence the hiring or promotion process of a spouse, partner, sibling, child or other relative. This same philosophical view also prohibits supervising or directing the work of a subordinate who is a family member. Such a prohibition removes from the workplace any hint of nepotism. This prohibition is extremely important since a supervisor's division of loyalties between the employer's best interests and family generates overwhelming perceptions of favoritism among co-workers. It also introduces a bona fide risk of biased judgment and decision-making.

Raghu is using her position to influence the hiring decision in favor of her daughter. The company should have policies and procedures in place to ensure that an employee does not use his or her position to exert influence to get a family member hired. Raghu's loyalties appear to be divided between her employer's best interests and her daughter's best interests. Raghu's action is hurting the company in the following ways:

(i) If successful, Raghu's actions will result in the hiring of a less qualified employee. Hiring Rahul would be best for the company.

(ii) If Radha is hired, department-wide perceptions of favoritism that will hurt morale is likely to occur.

(iii) If Radha is hired, Roma will be in an awkward position. Raghu will effectively supervise and evaluate Radha. Radha and Raghu will both also be in awkward positions.

Employees should avoid any nepotism type of activity whether in fact or in appearance that is adverse to the employer's best interests. Any such activity can significantly degrade workplace morale and result in internal turmoil. An employer's prohibition against undue positional influence or pressure to hire or promote relatives enables the company to focus efforts on hiring and promoting the best-qualified applicant without bias.

Some practical steps to guide managers on how to avoid risks of nepotism include:

- (i) Review your company's policies on nepotism to maintain your currency. Most companies have employment guidelines specifically stating that employees are not permitted to take part in activities that could be construed as nepotistic.
- (ii) Require all your subordinates to periodically review your company's guidelines and resolution procedures involving nepotism to assure familiarity.
- (iii) Direct your human resources department to resolve any nepotistic issues which might be unresolved in a timely manner.
- (iv) Direct your employees who have a conflict of interest concern to describe the situation to a human resource department contact and ask for guidance. Employees should always inform their employers when confronted with any situation that may be perceived as a conflict of interest, even if the employee doesn't believe the situation would violate employer guidelines.
- (v) Investigate, address and resolve any new nepotistic conflicts of governance and commitment concerns (either real or apparent) immediately upon identification to lessen their repercussions.

Do not allow gossip to flourish and fuel unwarranted perceptions of nepotism that could, if uncontrolled, negatively impact your organization.

## VI. CONCLUSION

These cases stress that employees should work proactively to prevent and resolve conflict of

governance and commitment issues. Failure to take such issues seriously can have dire consequences. Be sure to review your company's policies on conflict of governance and commitment, which should be available in the human resources department. If an employee is uncertain about whether a conflict exists, the employee should describe the situation to a human resource department contact and ask for guidance. Employees should always inform their employers when confronted with any situation that may be perceived as a conflict of interest in life management, even if the employee doesn't believe the situation would violate employer guidelines. If the employee or employer should conclude that there is a conflict of governance and commitment in organization, the employee must either relinquish the conflicting activity or resign the position. Most of the time, however, a solution is readily available. For example, the employee can be transferred or removed from a decision-making role on a temporary basis. Employees are expected to devote their best efforts and full attention to the performance of their duties. They are expected to use good judgment, adhere to high ethical standards and avoid situations that create an actual or perceived conflict between the employees' commitment and the governance of the employer in organization management.

## REFERENCES

- [1] Blau, G.J., The Measurement and Prediction of Career Commitment, Journal of

- Occupational Psychology, 58(4), 1995; 277-288
- [2] Cohen, A., Multiple Commitments in the Workplace: An Integrative Approach, Mahwah, NJ: Lawrence Erlbaum, 2003
- [3] Meyer, J.P. and Allen, N., Commitment in the workplace: Theory Research and Application. Thousand Oaks, CA: Sage, 1997.
- [4] Somers, M.J. Organizational Commitment, Turnover and Absenteeism: An Examination of Direct and Interaction Effects”, Journal of organizational Behaviors, 16(1), 1995: 49-58
- [5] T.K. Kizirian, and W.Leese.(2004). Fraternization in Accounting Firms: A Case Study. Journal of College Teaching and Learning. Volume 1. Number 12
- [6] Schultz, Vicki (2003), The Sanitized Workplace. Yale Law Journal, Volume 112, Issue 8.
- [7] Kaplan, R. and Norton, D, (2004). Strategy Maps: Converting Intangible Assets into Tangible Outcomes. Boston: Harvard Business School Press.
- [8] Strack, R., Baier, J. and Fahlander, A. (2008), Managing Demographic Risk’, Harvard Business Review, Vol.86 No.2, pp.119-134
- [9] Eisner,S.(2005),’Managing Generation Y’,SAM Advanced Management Journal, Autumn, Vol. 70 No.4, pp.4-15.

# DESIGNING A CHAT ROOM APPLICATION: USING PEER-TO-PEER AND CLIENT-SERVER APPROACH OF DISTRIBUTED SYSTEMS

**Dr. S.K Gandhi<sup>1</sup>, Pawan Kumar Thakur<sup>2</sup>**  
Department of Computer Science & Engineering<sup>1,2</sup>  
AISECT University, Bhopal (M.P)

**ABSTRACT**

*A distributed system is an application that executes a collection of protocols to coordinate the actions of multiple processes on a network, such that all components cooperate together to perform a set of related tasks. Early distributed systems emerged in the late 1970s and early 1980s because of the usage of local area networking technologies. Internet-scale distributed systems emerged in the 1990s because of the growth of the Internet. A distributed system can be physically instructed by two ways: First, fully connected network peer- to –peer approach in which each of the nodes is connected to each other. Second, partially connected network in which a direct links exist between some but not all pairs of computers. A few of the partially connected network models are star (client server) structured networks, multi-access bus networks ring structured networks, and tree-structured networks. The purpose of this paper is to design a chat room application which is based on the architecture of distributed system. This paper used a peer-to-peer approach and a client-server one to design the chat room application.*

**KEYWORDS:** Distributed system, Architecture, Peer-to-peer, Client-server, Manager, Login, Online Chat, Port

**I. INTRODUCTION**

A chat application can be design using different approaches of distributed system architecture. We will explain in more details two of them: a peer-to-peer approach and a client-server one. Even though different models are possible there remains some functionality in common as shown in Fig.1.1.

In the above Fig. 1.1, Part A remains the same in all architectural styles which consist of GUI, text and display manager and status manager. Part B must be different in case of a peer-to-peer or client-server architecture [1]. In this paper section 3 represents the design scheme of architecture, section 4 develop a chat application use of a peer-to-peer architecture and how it work, section 5 develop a chat application use of a client-server architecture, section 6 compare

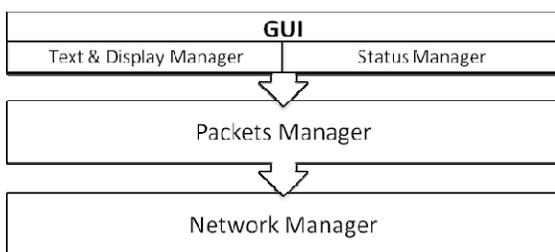


Fig.1. Architectural styles

the scalability and performance of both the architecture.

## II. OBJECTIVES

This paper designs a chat room by using the architecture of distributed system which fulfills the following objectives:

- (a) Design a Networks scheme for peer-to-peer and client server architecture.
- (b) Use the peer-to-peer architecture of distributed system to design a chat room with following concepts:
  - How does it work?
  - Login and who is on-line?
  - Ask for friend relation
  - Chatting
- (c) Use the client server architecture of distributed system to design a chat room with following concepts: How does it work?
  - Login and who is on-line?
  - Ask for friend relation
  - Chatting
- (d) Compare the both the architecture and find out which one architecture is best.

## III. DESIGN SCHEME

To design a chat room based on the peer-to-peer and client server architecture of distributed system we will use the following managers as shown in Fig.2[1]:

- (a) Network manager. A network manager is responsible for listening to the network.
- (b) Packets manager. The packet manager is responsible for classifying packets between system and normal chat messages.



Fig. 2 Networks Managers

- (c). Text and display manager. The text and display manager is responsible for normal chat messages received from the packet manager.
- (d). Status manager. This is responsible for status, login and friend messages.

The most important thing is to run all these modules in separate threads because it is really important to deal with and display messages when the network manager is sending another one, etc. Fig. 3(a,b) showed the global shape of the two architectures: client server architecture and peer-to-peer architecture[2].

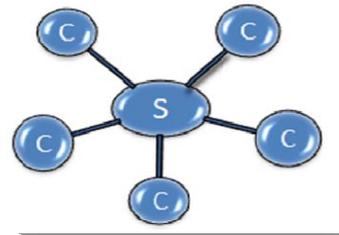


Fig.3(a) Client Server Architecture

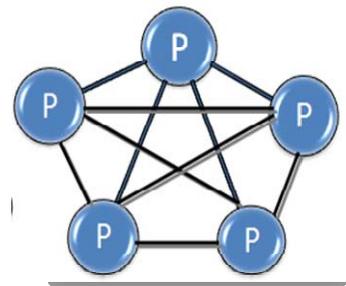


Fig. 3.(b) Peer-to-Peer Architecture

We would try to explain more how these two architectures can be developed and how we can deal with some aspects of the process such as login, discovery, friend relationships etc in the next section of this paper.

#### IV. FIRST APPROACH: PEER-TO-PEER ARCHITECTURE

The first possibility to develop a chat application is the use of a peer-to-peer architecture of distributed system[3]. A fully connected network peer to peer architecture is a network in which each of the nodes is connected to each other as shown in Fig. 1.3.

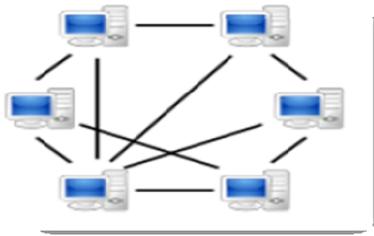


Fig. 4 Peer-to-peer architecture of distributed system (Wikipedia.org)

(a) How does it work?

We are working with a pure peer-to-peer network which is composed by peers and links between them only. We do not want to use the functionalities of super-peers to keep this system as basic and simple as possible. Every node must maintain two separated lists[4].

(i). One list containing names of friends (List<Friend1, Friend2, Friend3, ...,>).

(ii). Another list containing all online peers that we know (List<[User1, IP, Port], [User2, IP, Port], [User3, IP, Port], ...>).

The friends-list is modified when we add or remove a friend. This process will be explained in more details in our next section. The online-list is managed by the status manager[3]. In a first time, we add peers into this list during the login phase. But, after that, we can use an eventually perfect failure detector (EPFD) to remove peers when they leave or they crash[5].

#### (b) Login and who is on-line?

We take an example with five peers (nodes) already connected on the network we are the sixth one arriving on the network as shown in Fig.1.5 and let's make some assumptions:

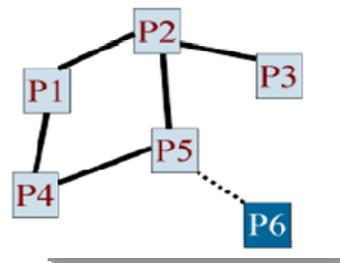


Fig. 5 Example sixth one (node) arriving on the network

We assume that the discovery process is made easier thanks to a public place where connected peers can publish their point-of-entrance in the network. Whatever happens we need to know at least one entry point. We assume that there exists a (well managed) DHT (Distributed Hash Table) containing all credentials of registered people of this chat service.

Peer 6 chooses Peer 5 as entry point. Peer 6 will send a join message to Peer 5 : **JOIN(Peer6, Password, IP, Port)** Figure 6 shows the behaviour of every node when a JOIN message arrives[6].

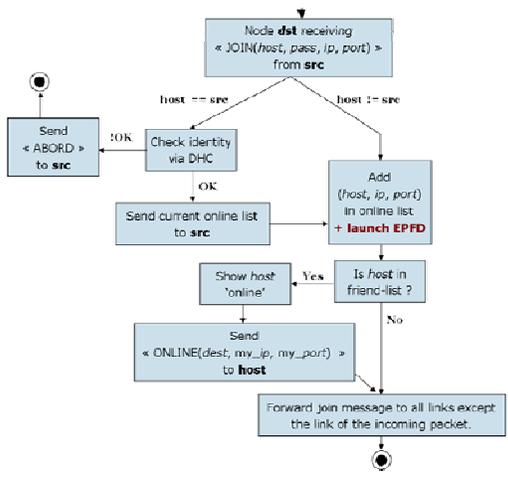


Fig6 Behavior model

In addition to that, we can imagine a way to avoid Join messages to loop forever in the network with a simple 'id' feature or something. Thanks to this login process, we can retrieve the list of already connected people and launch our EPFD on every host to detect when they leave or they crash. We are now ready to begin chat sessions with connected friends.

(c) Ask for friend relation

When the application that is running and the user fully logged-in, we can simply search in the online list to friend new friends. Then, we can directly send an Ask-Friend message to the IP address and the port of the new friend[5]. This kind of message is treated by the packets manager. If the new friend agrees with this new relationship, he replies with a Friend- Ok message to the original peer. If the new friend not wants to begin a relationship with the peer, he simply never replies to the message. This process is very simple thanks to the fact that we are in a peer-to-peer network, where every node

can act as a server, client or both[7]. The communication between peers can be done directly thanks to the information contained in the online-list.

(d) Chatting

In the same way than the friend messages, peers can simply exchange normal chat messages with each other thanks to the fact that they have all the information to join other peers. We can easily understand here the importance of the packets manager. Actually, when a packet arrives in a node, the packet manager can simply read the header of this packet to know if it is a system notification (friends, status, etc.) or a real chat message (containing text to display).

V. SECOND APPROACH: CLIENT-SERVER ARCHITECTURE

The second possibility to develop a chat application is the use of client-server architecture of distributed system as shown in Fig. 1.7.

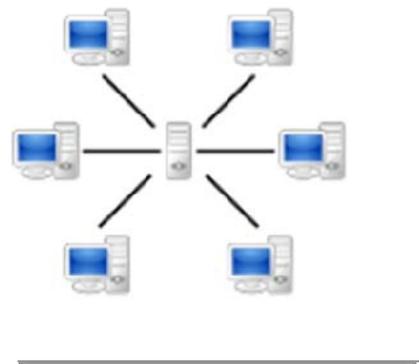


Fig. 7. A centralized server-based system of nodes (Wikipedia.org).1.5.1 How does it work?

We think that second architecture is simpler to achieve because this solution is more centralized and then, easier to understand. Fig.8 shows the main modules of a client and the server. We assume that the server is unique on the network. An important thing to notice is that the server might use a reliable multicast to contact every node connected to him. This kind of behaviour will happen every time a (new) node is connecting or disconnecting[8].

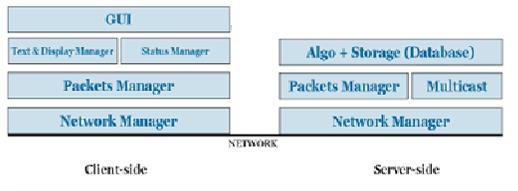


Fig. 8 Modules of a client and the server  
1.5.2 Login and Who is on-line

The login phase is simple it consists in simple messages send to the (only one) server on the network. Everything is centralized so the server has just to check in a local database if the permissions of the user are correct[4]. If they are:

Firstly, the server replies with a Join Ok message to the client. The message contains the list of connected friends.

Secondly, the server sends a notification to every node which has the new node in its friend list. Here, we can understand the usage of the multicast module. A global scenario:

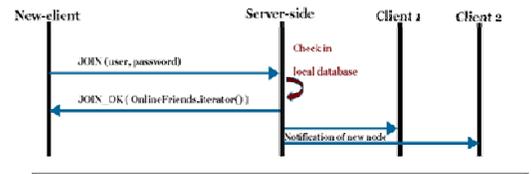


Fig. 9 Login Phase 1.5.3 Ask for friend relation

The process of ask for a friend relation is simpler than in the peer-to-peer architecture as shown in Fig.10.

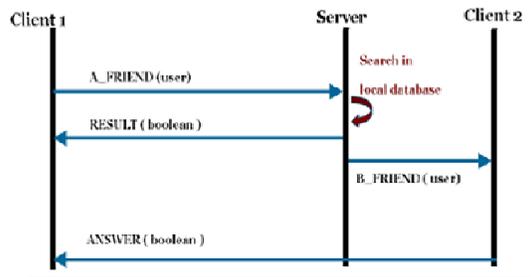


Fig.10 Ask for a friend relationship

In above Fig.1.10 note that the server replies with a Result message to indicate to the client if the searched user exists or not. The reply to the invitation of relationship is an Answer message.

**Chatting** The process is really simple again. When there is a friend who is online, you can begin a chat session with him. You always send your message to the server with its destination and the content[9]. Then, the server just forwards the content to the destination. As in the peer-to-peer architecture, the packets manager has a very important role to classify system notifications and real chat messages.

## VI. COMPARISON AND DISCUSSION

Our first peer-to-peer approach is really good for scalability because at no point of the architecture, the number of node is important. We do not have to change anything if we use this chat application with 5 people or 50 people. The only thing in relation with the number of node is the list of online people[10]. We can imagine a better data structure to store this information (local hash-map, etc.) But with the high volume of space we have in nowadays computers. Even if a list of 1000000-entries is not a problem to store. Once again, if we need to search in this list very often, we can imagine a better data structure than a list.

Our second client-server approach an application like that is not really effective. The major problem is the fact that everything is centralized and we cannot imagine a number of nodes growing up without a failure of the central server. In this case, the entire chat application is down. Also, we should add other servers to be able to reply to all the queries in a respectable delay.

## VII. CONCLUSION

The peer-to-peer is not the best one for the login performance. Actually, we have to wait until our Join message reaches the farthest node to be fully connected to the network. If we have a global network with a high latency and a shortest path from us to the farthest node of about 50 hops, we must wait 50 times the mean latency of the network to be sure that everybody on the network is aware of our presence. The

client-server architecture provide much better performance for the login phase thanks to the small number of hops needed to join all peers. This is the advantage of a centralized server. But to conclude we think that the drawbacks of client server are bigger than the advantages.

## REFERENCES

- [1] Kundan Singh and Henning Schulzrinne, "Peer-to-peer internet telephony using sip", Department of Computer Science, Columbia University.
- [2]. Yang, B. H. & Garcia-Moline, "Designing a Super-Peer Network", Stanford University, February 2002.
- [3] Sinha P.K, "Distributed Operating Systems Concepts and Design", Prentice-Hall of India private Limited, 2008.
- [4]. W. Siong Ng, B. Chini, K. Lee Tan. "Best Peer: A Self-Configurable Peer-to-Peer System." In Proc. of the 18th Int. Conf. on Data Engineering, California, 2002.
- [5]. Kwok, S., Lui, S., A License Management Model for Peer-to-Peer Music Sharing. International Journal of Information Technology & Decision Making, September, vol. 1, #3, pp. 541-558,2002.
- [6]. Lang, K. and Vragov, R. "Using Experimental Methods to Evaluate the Effectiveness of Different Pricing Mechanisms for Content Distribution Over Peer-to-Peer Networks." Americas Conference on Information Systems. 2005.
- [7]. Lechner, U. and Hummel, J. "Business Models and System Architectures of Virtual Communities: From a Sociological Phenomenon to Peer-to-Peer Architectures", International Journal of Electronic Commerce, 6, 3,2002. pp.41-53.
- [8] E. Bonsma, C. Hoile. "A distributed implementation of the SWAN peer-to-peer look-up system using mobile agents". In Proc. of the AAMAS'02 Workshop on Agents and Peer-to-Peer Computing, Italy, 2002.
- [9] Bibliography containing references on Distributed Computing can be found at: <ftp:ftp.cs.umanitoba.ca/pub/bibliographies/Distributed/Oss er.html>

- [10]. Bibliographies containing references on *Distributed Systems* can be found at: [www.wikipedia.org](http://www.wikipedia.org).

# TRIBOLOGICAL BEHAVIOUR OF EN8 STEEL IN PRESENCE OF ZnO NANOFUID

Dr.Sanjay Shrivastava<sup>1</sup>, Rupesh Kumar Malviya<sup>2</sup>, Manish Verma<sup>3</sup>  
Dept of Mech Eng<sup>1</sup> Dept. of Mech Eng<sup>2</sup> Dept. of M.E.<sup>3</sup>  
MANIT, Bhopal (MP) AISECT University, Bhopal (MP) C.E.C., Bilaspur (C.G.)

## ABSTRACT

*The object of the present work is to the microstructure and tribological behaviour of EN8 steel in presence of ZnO nanofluid. For this purpose the microstructure of En8 steel after heat treatment were examined by optical microscopy and, scanning electron microscopy respectively. Thus heat treatment (heating and cooling) is used to obtain desired properties of steels such as improving the toughness, ductility or removing the residual stresses etc. It covers heat conduction ,and lubrication between two rubbing body..A technique tribological nanofluid has recently been developed to engineer the surfaces of flame hardened EN8 stainless steel to achieve combined improvement in wear and corrosion resistance. In order to evaluate the tribological behaviour of the layers produced on EN8 stainless steel dry sliding wear tests have been carried out in the present work.*

**Keywords:** Wavelet transforms, AWGN, Threshold, image denoising, wavelet thresholding

## I. INTRODUCTION

The term Tribology was first used in 1966 in a report of the UK Department of Education and Science. The word Tribology is derived from the greek word tribos which means rubbing. In a nutshell Tribology is “science of rubbing” It is the science and technology of interacting surfaces in relative motion and of related aspects and practices.

The economic aspects of tribology are significant. Investigations by a number of countries arrived at conclusion that saving of 1.0% to 1.4% of the GNPs(Gross National Product) is possible obtainable by the application of tribological principles, often with proportionally minimal

expenditure in Research and Development. The interaction taking place at the interface controls its friction, wear and lubrication behavior. In many technological applications, the surfaces used are mostly either sliding or rolling so understanding their Tribology is key to successful machine component.

## II. METHODOLOGY

Wear and friction of flame harden en8 steel in presence of Nanofluid. A pin-on-ring configuration utilized in earlier studies was used to simulate the sliding wear behavior between the sheave wheel and cable. A pin on disc apparatus Fig.1 was used to investigate the dry sliding wear characteristics of

the EN8 in flame hardening condition. The cylindrical test pin of 10 mm diameter and 40mm length were used against a hardened steel disc of 120 mm diameter.

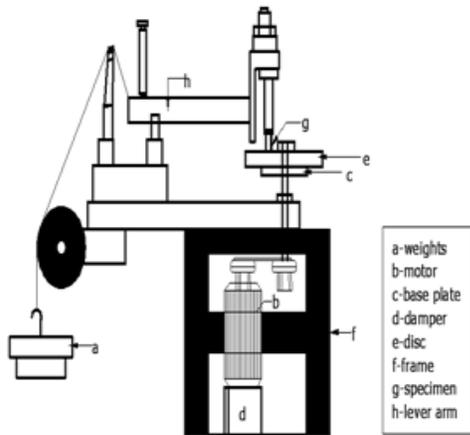


Fig.1.Schematic of pin on disc wears taking apparatus  
Wear specimens of 10 mm diameter and 40 mm height were cut from as steel samples and machined and polished for wear test. Wear test were also conducted with selected varying speeds and sliding distance ranging up to 50,000 meters. The initial weight of the specimen was determined in a digital balance with a precision of  $\pm 0.1$  mg. The pin was kept pressed against a rotating steel disc of hardness 58 HRc under loaded condition. Wear tests were conducted with a variable applied pressure of 14 Mpa and a sliding speed of 0.5 m/s with a constant sliding distance of 2500 meters.

### III. RESULT

#### (a) WEAR STUDIES

In steady state wear, it shows linear relationship between the wear volume and sliding distance.

Almost a linear relationship is observed in bulk wear and sliding distance i.e. steady state wear is observed after initial running-in period of 500-1000m in almost all the case irrespective of load or sliding velocity used. The bulk wear of steel sample decreases in presence of small amount of nanofluid at the surface of sliding disk.

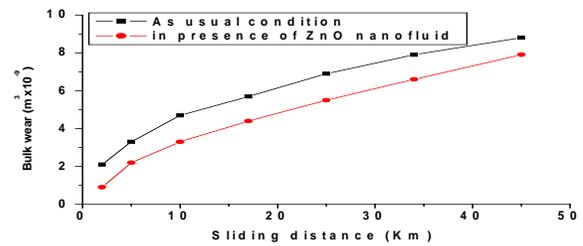


Fig.2.Variation of bulk wears with sliding distance at 3 kg load and 0.772 m/s sliding

velocity for EN8 stainless steel in flame hardening for 45 sec (a) in as usual condition and (b) in presence of nanofluid

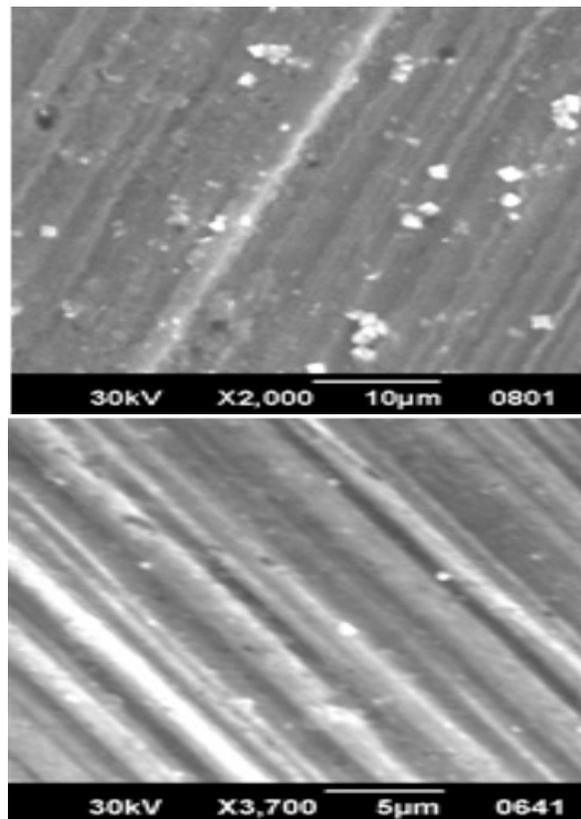


Fig 3. SEM micrographs of wear tracks of EN8 at 3 kg load and 0.772 m/s sliding velocity for EN8 stainless steel in flame hardening for 45 sec (a) in as usual condition and (b) in presence of nanofluid.

Nanofluid at the surface not only reduces the wear rate from the two contacting surface but also change the surface morphology of the rubbing surface.

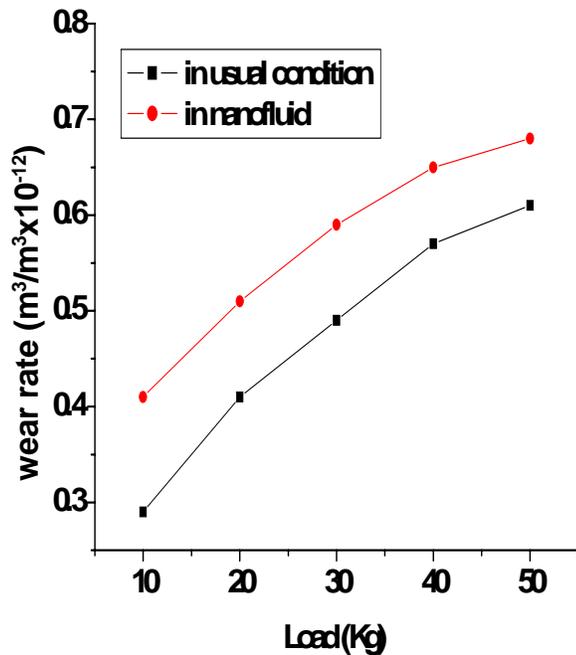


Fig 4. Variation of wear rate with load at 0.772 m/s sliding velocity for EN8 stainless steel in flame hardening for 45 sec (a) in as usual condition and (b) in presence of nanofluid.

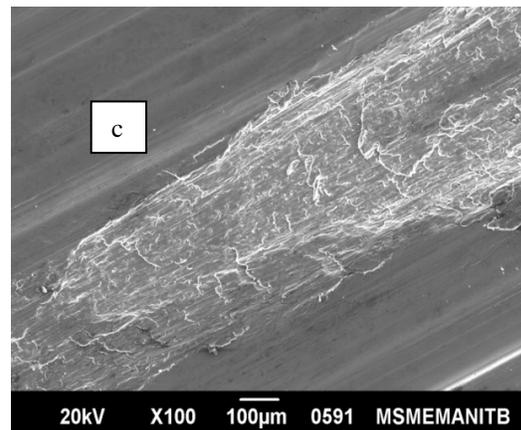
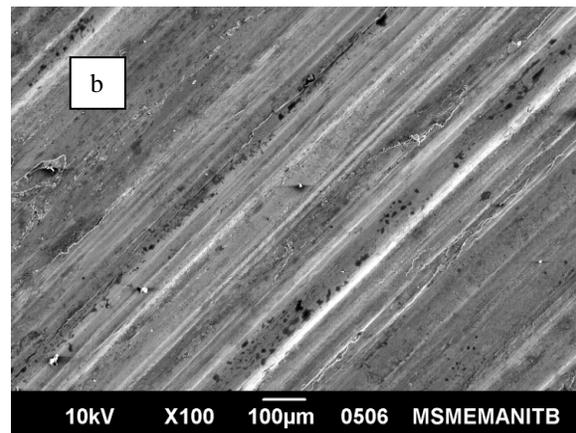
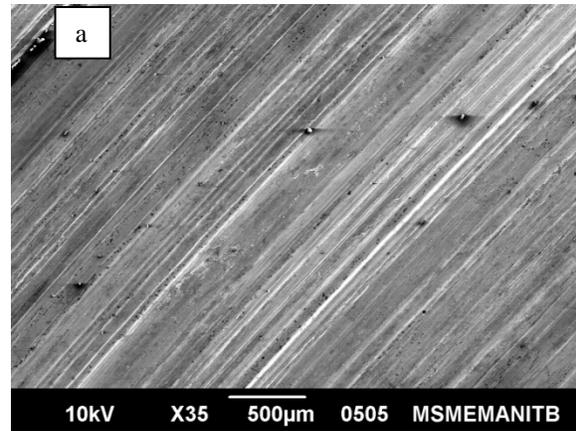


Fig 5. SEM micrographs of wear tracks of EN8 at as usual condition (a) 3 and (b) 5 kg load and 0.772 m/s sliding velocity for EN8 stainless steel in flame hardening for 45 sec (c) in presence of nanofluid.

(b) FRICTION STUDIES

(i) In dry condition

Heating the samples in acetylene flame environment materials get maximum harden and bears the maximum amount of the load during friction study. During the steady state period the friction coefficient is stabilizing.

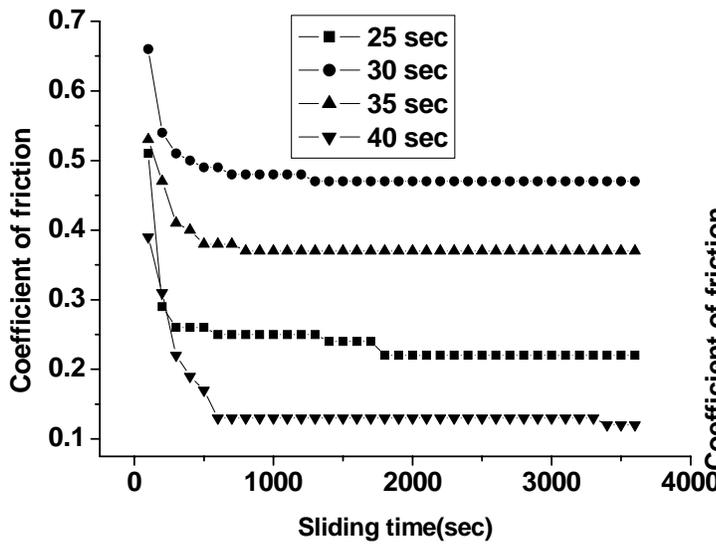
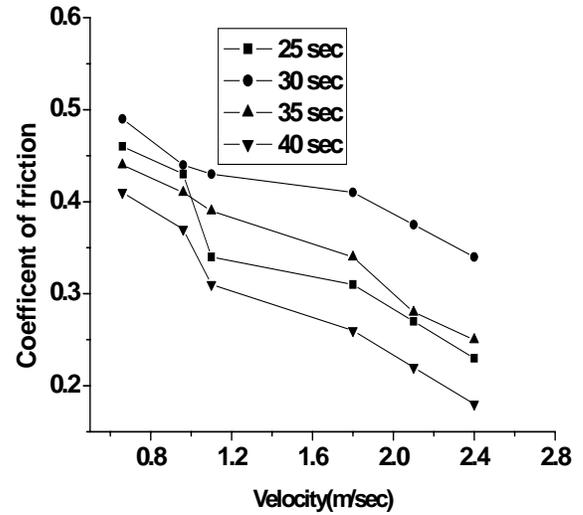


Fig.6. Friction coefficient variation

of EN8 sample in flame hardening condition during sliding time at fixed specific loads and sliding speeds.

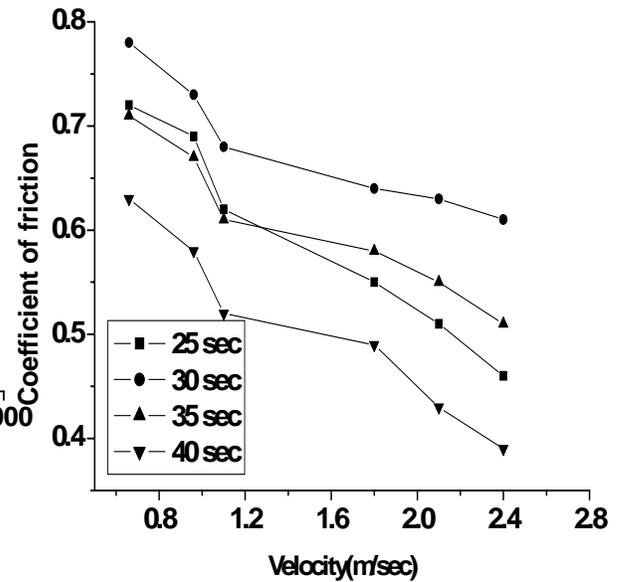


Fig8. Friction coefficient vs. sliding speed of EN8 steel at different applied loads: a) 10N (b) 50N.

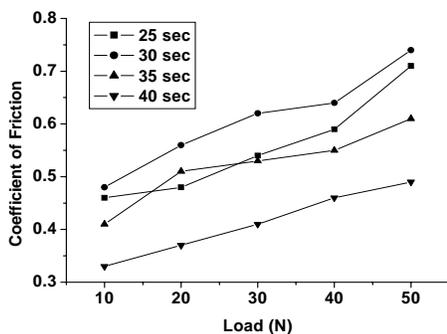


Fig 7. Coefficient of friction vs. applied load for EN 8 stainless steel

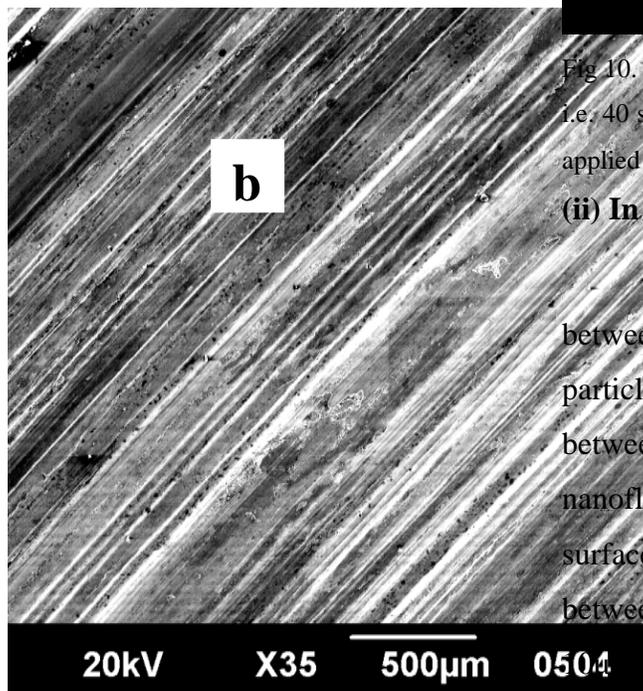
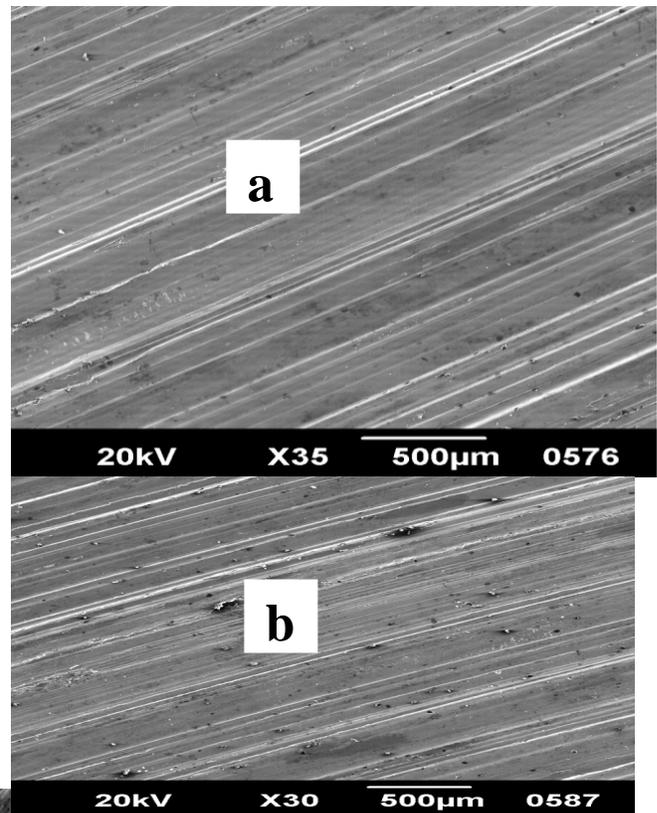
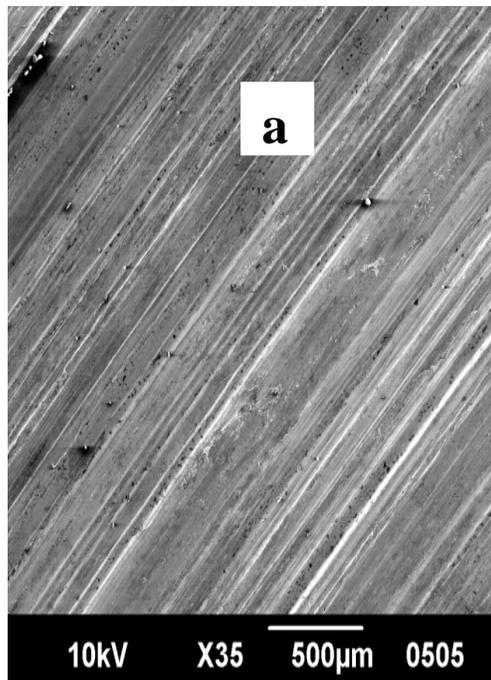


Fig. 9. Wear surface of the EN8 (in flame hardening condition i.e. 25 sec) in dry sliding condition for (a) 20N (b) 50 N of applied load and 0.26 m/s of sliding speed.

Fig 10. Wear surface of the EN8 (in flame hardening condition i.e. 40 sec) in dry sliding condition for (a) 20N (b) 50 N of applied load and 0.26 m/s of sliding speed

**(ii) In lubricated condition**

Lubrication reduce the frictional coefficient between the two mating surface. In this case, nano particles of ZnO in ethylene glycol act lubricant between the mating surface and known as nanofluid. The nanofluid between the mating surfaces provides the extra path to bear the load between the machining components. To say about the nanofluid was used during the investigation of the results. With increase the amount of the nanofluid between the machining components, the coefficients of friction starts to reduce from 0 to 100µmL. From the study of the whole results, it has been found that there are two type of the operative mechanism is responsible for the reduction of

coefficients of friction between the mating surfaces. The mechanisms responsible for reduction are to reduce the load between the machining components and high thermal conductive of used nanofluid.

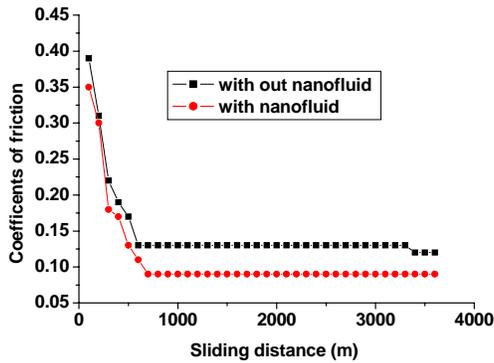


Fig.11: Friction coefficient variation of EN8 sample in flame hardening condition during sliding time at fixed specific loads and sliding speeds in presence of nanofluid.

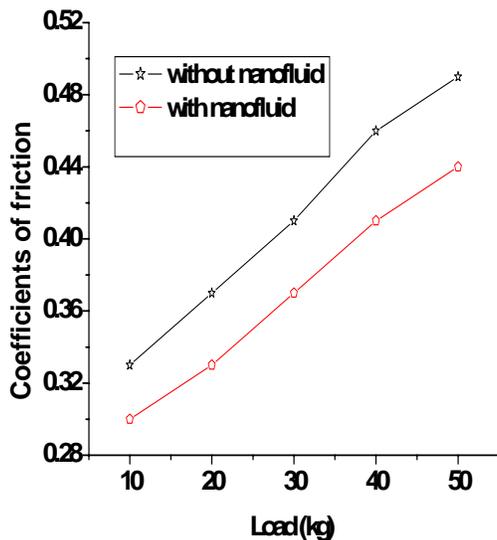


Fig. 12. Coefficient of friction vs. applied load for EN 8 stainless steel

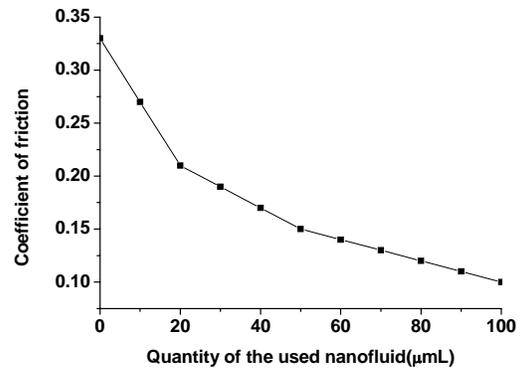


Fig. 13. Coefficient of friction vs. quantity of used nanofluid (µmL)

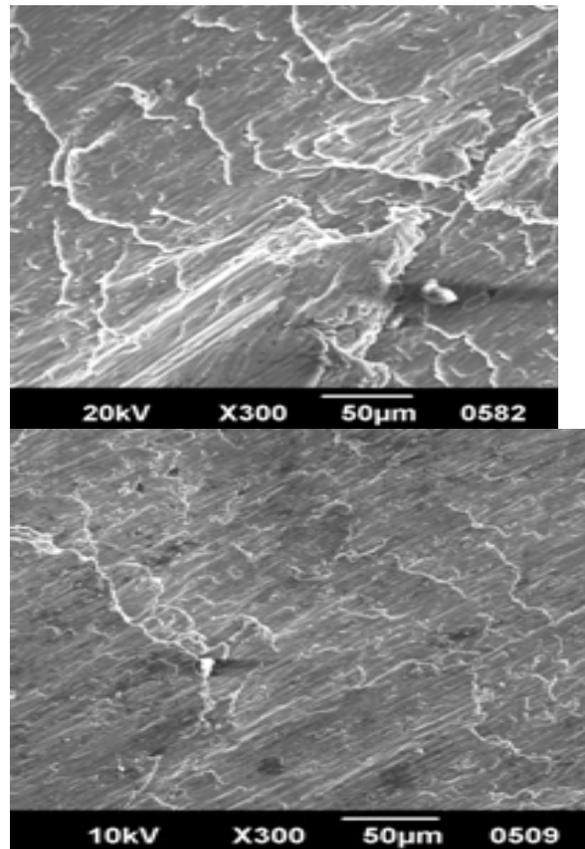


Fig 14. SEM image of Worn surface in presence of nanofluid at the different load (a) 3Kg (b) 5Kg.

#### IV. CONCLUSION

During this investigation, the applied load, sliding velocity and distance were constant. Initially the reduction increment in coefficients of friction is fast 50-60 $\mu$ mL, but later the reduction is very slow.

## V. FUTURE SCOPE

From the study of the whole results, it has been found that there are two types of operative mechanism are responsible for the reduction of coefficients of friction between the mating surfaces. The mechanism responsible for reduction is reduction of the load between the machining components and high thermal conductive of used nanofluid. This type of result is never obtained in case of lubricants. Lubricants only reduce the friction between the machining components not to convey the heat from the convention processes from the mating surface to the surrounding environments.

## REFERENCES

- [1] Y. Sun, X.Y. Li, T. Bell, Low temperature plasma carburising of austenitic stainless steels for improved wear and corrosion resistance, *Surf. Eng.* 15 (1999) 49.
- [2] .M. Gillham, R. van der Jagt, B. Kolster, New case hardening process for austenitic stainless steels, *Mater. World* 12 (1996) 460.
- [3] Bouda, A. Benchaala, K. Alem, *Ultrasonics* 38 (2000) 224-227. 4. Ryogo, K., *J. Phys. Soc. Jpn.*, 17 (16) (1962) pp. 876-880.
- [4] .Rohrer, H., *The Nanoworld: Chances and Challenges, Microelectronic Engineering*, 32 (1996) No. 1-4 pp. 5-14. Choi, S.U.S., *Enhancing Thermal Conductivity of Fluids with Nanoparticles: Developments and Applications of Non-Newtonian Flows*, American Society of Mechanical Engineers (ASME) 66 (1995) pp. 99.
- [5] .Masuda, H., Ebata, A., Teramae, K., Hishinuma, K., *Alternation of thermal conductivity and viscosity of liquid by dispersing ultrafine particles (dispersion of Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub> and TiO<sub>2</sub> ultrafine particles) Netsu Busei (Japan)* 4 (1993) pp. 227-233.
- [6] .Krishnamurthy, S., Bhattacharya, P., Phelan, P.E., Prasher, R.S., *Enhanced mass transport in nanofluids, Nano Letter* 6 (3) (2006) pp. 419-423.
- [7] Wasan, D.T., Nikolov, A.D., *Spreading of nanofluids on solids, Nature* 423 (2003) pp. 156-159. 10.S. U. S. Choi, Z. G. Zhang, W. Yu, F. E. Lockwood, and E. A. Grulke (2001) *Anomalously Thermal Conductivity Enhancement in Nanotube Suspensions. Applied Physics Letters* 79: 2252-2254.
- [8] .S. U. S. Choi (1995), *Enhancing Thermal Conductivity of Fluids with Nanoparticles*, in *Developments and Applications of Non-Newtonian Flows*, eds. D. A. Singer and H. P. Wang, vol. FED 231, pp. 99-105, American Society of Mechanical Engineers, New York.
- [9] .S. U. S. Choi (1995), *Enhancing Thermal Conductivity of Fluids with Nanoparticles*, in *Developments and Applications of Non-Newtonian Flows*, eds. D. A. Singer and H. P. Wang, vol. FED 231, pp. 99-105, American Society of Mechanical Engineers, New York.
- [10] .S. U. S. Choi (1995), *Enhancing Thermal Conductivity of Fluids with Nanoparticles*, in *Developments and Applications of Non-Newtonian Flows*, eds. D. A. Singer and H. P. Wang, vol. FED 231, pp. 99-105, American Society of Mechanical Engineers, New York.

# NUCLEAR ENERGY & NUCLEAR INSURANCE IN INDIA

Dr. T. K. Jain<sup>1</sup>, Amita Sharma<sup>2</sup>

<sup>1</sup>Gyanvihar International School of Business Management  
Gyanvihar University of Jaipur.

<sup>2</sup>Institute of Agri-Business Management  
Swami Keshvanand Agriculture University of Rajasthan, Bikaner.

## I. INTRODUCTION

India is a developing economy and it is heading to be among the developed economies' club. This Herculean Task requires lot of sustained infrastructure development. Energy production is most pivotal among all infrastructure needs. Energy supports the development activities and its price and supplies have cascading effects on almost all facets of development. Out of all types of energy, electricity generation has been on painful stretch in recent times. On one hand, political economy does not allow price revisions for electricity consumption, derailed coal supplies and ever-inflating fossil-fuels and on the other hand, increasing demand on account of population explosion and need for infra development, are spreading panic across the economy and it is delaying the break-evens of power generating companies.

India with GDP of more than USD 1.23 bn (PPP basis USD 2.3 bn), is tagged as fifth largest economy but per capita energy consumption is 530 Kg of Oil Equivalent

which is much below the world average of 1800 Kg of Oil Equivalent. India has been chiefly dependent on traditional thermal power generation while the alternative ways of power generation has gained importance in last decades because of depleting oil reserves. These alternative sources in nascent phase are hydro electric, wind energy, bio-mass, solar energy, geo-thermal and Nuclear energy. The Nuclear energy is found to be more efficient than others sources of power generation. Presently, power generation through nuclear facilities is around 4700 megawatt, which is 3% of total energy production. India aims to build nuclear energy production up to 20000 megawatt by 2020.

Nuclear Energy can be sourced from two types of plants—Nuclear Fission and Nuclear Fusion. The Energy released from Nuclear fusion and fission is highly productive than the thermal power energy. With benefits of no greenhouse gases release and high level of productivity, it is imperative for India to gain significant Nuclear energy establishment. On the other hand, as process involves highly risky nuclear reactions and radioactive radiations, the risks associated

with nuclear plants are much higher. The Nuclear plants use radioactive elements like Thorium or Uranium, which are highly dangerous to human life if exposed. Around 14 out of 19 nuclear power plants in India are operational and rests are in development phase.

(a) Nuclear Disasters: Structures

Nuclear facilities have two critical areas called as Hot Zone and Cold Zone. The Hot Zone is the area where nuclear reactions take place and nuclear fuels are preserved while the Cold Zone is non-nuclear reaction area in which people densely live and this area may be affected by nuclear disasters. The Hot Zone is congregation of nuclear assets, which are very costly and important for companies/ corporation to be covered.

Nuclear Disasters can destroy the hot zone's nuclear assets, which needs coverage by nuclear insurance. Secondly, it may expose nuclear fuel to contaminate environment and expose people to hazardous radiations, which may take decades to deplete to tolerable limits. The affected people may have following consequences:

- a) Deaths due to exposed radiations
- b) Spread of various types of fatal cancer like diseases,
- c) Evacuation of people, loss of employment and social structures

- d) Loss of natural resources due to contaminations and long run clean up exercises to reinstate the usability of resources,
- e) Traditional problems of rehabilitation and
- f) Reinstatement of power generation.

(b) Flashback: Nuclear Disasters

Chernobyl Nuclear Disaster in 1986 in Ukraine and recently, Fukushima Nuclear plant in Japan has awakened the world to the hazards of having Nuclear Power Plant. Chernobyl Disaster took place due to operational failure while Fukushima radiation threatened the coastal population of Japan due to exposed nuclear fuel in environment caused by intense earthquake. Nuclear facilities can be targets of terrorists or they can be used for amassing nuclear weapons. Release of nuclear wastes is highly unstable and it can cause fatal effects on life and health over very long periods i.e. more than 25-30 years. Break-even for nuclear facilities extends up to 15-20 years with heavy capital investments. Chernobyl Disaster affected the 500 km area and 335000 people in spite of the fact that it had one tenth of nuclear fuel in comparison to Fukushima Nuclear facility in Japan. The evacuation of people on large scale decamped the social structures and complicated the rehabilitation. Chernobyl was not covered through insurance. Fukushima Disaster was caused by damages to nuclear plant due to natural catastrophe i.e. Tsunami and earthquakes. The disaster led to exodus of around 130000 people from 30 km

area near the facility. Fact of appreciation is that nuclear fuel in Fukushima facility was ten times more than the Chernobyl facility. Owing to high culture in Japan, people handled the disaster with cooperation but the people deny returning to the prone area, as the tolerable limit of radiation set by government is contentious. The accumulated deficit of Japan is twice the total GDP of Japan is another deterring factor in recovery. The liability of damages in Fukushima was mainly indemnified by the state.

## II. CHALLENGES OF NUCLEAR INSURANCE AND POOLING

Wide variety of dimensions of risk associated with Nuclear power, Nuclear Insurance becomes inevitable and complicated. Each nuclear facility is unique in its structures hence traditional experience cannot be used in pricing the product and pooling the finances, which is possible in other form of insurance. The pricing of nuclear product depends on underwriters' inspections of plants, which is not allowed by many countries like India. The accumulation of nuclear experience is almost nil due to very few nuclear disasters occurred.

The Claim amounts can be so huge that single company cannot afford to offer nuclear insurance products and it may derail the company's solvency. The nuclear disasters can instigate cross-border issues which may fall in purview of international law which brings in more complexities in claim settlement process and estimating the nuclear liabilities. Nuclear

disasters have effects that last more than 2-3 decades and accommodating such liabilities is cause of disagreement between state and insurers. Natures of claims and claimants vary widely because of claim settlement process and legal frameworks have lot of grey areas. Contrary to this, there is demand for one-policy for all variety of claims and claimants. The common claim settlement process should also exclude need of proving the damages by claimants.

Generally, insurance policies have exclusions related to casualties resulting from catastrophe like war, natural calamities, radiations etc. The Chernobyl disaster's compensation for governments of affected countries had provided civil liabilities and it had exceeded sever times the total capacity of entire nuclear insurance industry. Nuclear insurance is low frequency and high cost event business in comparison to other classes of insurance businesses. Potentially unlimited claims and lack of accumulated experience and statistics make it difficult to price nuclear insurance product difficult.

The pooling has been effective tool for coverage to nuclear industry where in all insurers jointly contribute the resources under an agent/underwriter and make a financial pool. There are almost 26 nuclear pools are functioning world wide to cover the nuclear facilities though there resources are itself not sufficient to cover all nuclear facilities in the world. According to study, the mortality rate of

wind energy is 0.15 deaths per terawatt-hour production, which is much higher, and then the mortality rate of nuclear energy i.e. 0.0009 deaths per terawatt-hour production even after including the mortality of Chernobyl disaster. According to US Nuclear Regulatory Commission (USNRC), following model-Probabilistic Risk Assessment (PRA) can be used to profile various levels of events and risk associated with nuclear disasters. These levels are Level-1, Level-2 and Level-3.

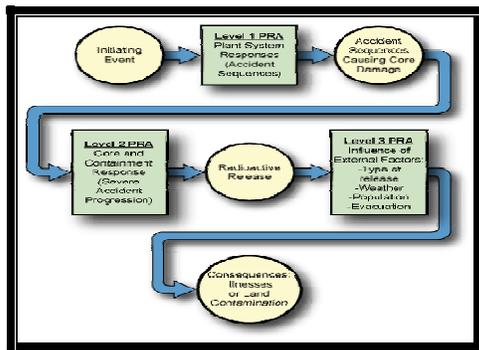


Fig.1 : Probabilistic Risk Assessment Model

Source: Website of US Nuclear Regulatory Commission, Probabilistic Risk Assessment

- A Level 1 PRA estimates the frequency of accidents that cause damage to the nuclear reactor core. This is commonly called core damage frequency (CDF).
- A Level 2 PRA, which starts with the Level 1 core damage accidents, estimates the frequency of accidents that release radioactivity from the nuclear power plant.

- A Level 3 PRA, which starts with the Level 2 radioactivity release accidents, estimates the consequences in terms of injury to the public and damage to the environment.

In USA, according to article by Insurance Information Institute-USA and regulations under Price-Anderson Act-1957, damages due to accidents arising from nuclear facilities are insured through two-tier system. The Tier-I of the system has pool by American Nuclear Insurer (ANI) to honor the private liability arising due to sabotage, theft, transportation of nuclear fuel, operational failures others that can cause casualties related to health, death, disease, evacuation, loss of employment etc. The Tier-2 responds to the accidents arising out of Earthquakes. The Tier-2 of the system has pool committed by nuclear operators. At the time of claims, the nuclear operator and insurer contest the amount of claim on the principle of indemnifying and assessing the eventual damage. So far, the Tier -2 pool has risen to USD 12.2 bn and only USD 78 mn have utilized for claims settlement. In spite of successful pooling, there are 2000 cases of injury claims pending in USA. These cases are difficult to settle as the radiations have long lasting effects, which are not visible instantly but erupts through genetic modifications in long run. In case of Japan, aftermath Tsunami disaster in March 2011, the quake caused damages to

Fukushima plant and such event was not covered hence the burden of compensation amounted on state. Japan Atomic Energy Insurance Pool provides indemnification against damages due to terrorist attacks, property, general liability and nuclear liability. According to a study, effects of damages are dependent on culture of the nation/society. If culture is weak then damages are more intense than that of a strong culture nation.

After Chernobyl disaster of Ukraine, Ukraine outsourced its nuclear reinsurance to Russia for its Nuclear Insurance requirements. Russian and Chinese nuclear insurance-pools swap their nuclear risk worth USD 10 million in 2008 that started the inter-country cooperation in mitigating nuclear risks.

### **III. NUCLEAR INSURANCE IN INDIA: CHALLENGES**

In Year 2011, IRDA initiated the draft discussions on creating nuclear insurance pool for accidental damages from nuclear disaster. The General Insurance Corporation has been given task of assessing the amount of risk pool required and definitions of damages from nuclear disasters. However, challenges are more diverse. As Indo-US nuclear deal is going to flood USD500 billion investments for nuclear facilities in India, the nuclear energy is going to experience great expansion phase. Presently around 3% of total power generation is contributed by Nuclear power in India.

The Civil Liability for Nuclear Damage Bill 2010 caps the liability of nuclear operator at Rs. 500 Crore, and damage exceeding up to SDR 300 mn is to be paid by Government of India. All private operators/ partner in PPP are required to cover their liabilities through nuclear insurance. The liability cap on the operator (a) may be inadequate to compensate victims in the event of a major nuclear disaster; (b) may block India's access to an international pool of funds; (c) is low compared to some other countries. The cap on the operator's liability is not required if all plants are owned by the government. It is not clear if the government intends to allow private operators to operate nuclear power plants. The government will notify the extent of environmental damage and consequent economic loss. This might create a conflict of interest in cases where the government is also the party liable to pay compensation. The right of recourse against the supplier provided in the Bill is not compliant with international agreements India may wish to sign.

The time limit of ten years for claiming compensation may be inadequate for those suffering from nuclear damage, which takes decades to overcome. Though the Bill allows operators and suppliers to be liable under other laws, it is not clear which other laws will be applicable. Different interpretations by courts may unduly constrict or expand the scope of provisions. On the model of Russia and China swaps of nuclear insurance risks, India may find

it difficult to have alliance for such swaps with its neighboring countries and at the same time, weak culture of handling disaster may aggravate the disasters. As nuclear power has been domain of government only, there was hardly any effort of covering the liability as government is supposed to pay compensation from its own resources so it is redundant that government should have extra burden of paying premium. Individual companies have never built up its capacities and expertise for nuclear insurance pool as there was no demand of nuclear insurance. The opaqueness in legal framework for handling claims, exclusion of reactor plate-form damages is also deterrent in attracting private players in nuclear energy. Only cold zone i.e. outside the reactor zone is covered by nuclear insurance is not amicable to private players. In absence of scientific mechanism of pricing and pooling of nuclear insurance, the inclination of insurer towards high price is obvious and it will make nuclear insurance unattractive and costly. Owing to high population density, the damage of nuclear accident may exceed the compensation available under Civil Liability on Nuclear Damage Bill 2010 and for the accesses; India must be member of international conventions to draw additional claims. As India adopts protectionism policy on nuclear development, India is unlikely to get membership of international conventions on nuclear energy, as it requires mandatory disclosures and inspection of

nuclear facilities and membership of UN's Non Proliferation Treaty.

General Insurance Corporation Re of India has been successful in creating pool through insurers up to \$78 million and Nuclear Civil Liability Bill is covering up to \$342 million per event per reactor, which is the balance GIC Re is looking to offload to overseas reinsurers. Owing to reservation of India about inspections of nuclear plants by international underwriters, GIC Re is finding it difficult to convince the overseas reinsurers and suitable pricing of nuclear insurance.

#### IV. CONCLUSION

The main problems of nuclear insurance in India are creating adequate pool, pricing of product and legal framework. The creation of sufficient nuclear pool requires reinsurance to overseas, capital infusion in insurance companies through public issues, jointly making pools with neighboring countries, collecting energy cess from individual taxpayers and corporate taxpayers, charging inbound nominal tax on FIIs etc. Creation of pool through reinsurance requires international nuclear underwriters to visit the hot zone of nuclear facility which can be modeled as per China and Russia also allow the underwriter/inspector visits to their nuclear facilities. On the lines of education cess, nuclear cess can be added in tax brackets. Presently, total tax collection of Government of India is

estimated to Rs.9.3 lac Crore. Adding even 0.25 %, nuclear cess would bring great amount and that can be routed to nuclear pool. FIIs activities can also be taxed minimally to finance to nuclear pool.

As there is lack of experience and statistical data for pricing the nuclear insurance products, the pricing can be devised by understanding the market value of property and health expenses, which may arise due to nuclear catastrophe. An indexing agency can be formed to index the variations in the market values of above-mentioned expenses, it should revise its standards and indexing methods to be relevant to the real situation, and accordingly, insurance companies can price the products.

The population density in and around the nuclear plant should be regulated with due diligence so that it does not reach to a critical level where it can aggravate the nuclear disaster. The rehabilitation areas should be identified and the families residing near the nuclear facilities should be informed about rehabilitation areas so that they have clear idea of where to go in the event of evacuation. Medical facilities should be regularly updated about the medications required in the case of nuclear disaster and the stock of medications and diagnosis equipments should be readily available.

All these measures and many others will help in reducing the aftereffects of nuclear catastrophe and will help in pricing the nuclear insurance products.

## REFERENCES

- [1] Dr Manisha Singh and Dr Renu Verma, "Nuclear Insurance in India", IRDA Journal, Volume X No.6, June 2012
- [2] Roberta C. Barbalace. Chernobyl Nuclear Disaster Revisited. [EnvironmentalChemistry.com](http://EnvironmentalChemistry.com). 1999. Accessed on-line: 6/30/2012, <http://EnvironmentalChemistry.com/yogi/hazmat/articles/chernobyl1.html>.
- [3] IAEA [Worldatom web site](http://www.iaea.org)
- [4] G.C.Warren, "Nuclear Risks", British Nuclear Insurers, 2000 (now: [Nuclear Risk Insurers](http://www.bni.co.uk))
- [5] Brown, O.F. 2004, Nuclear Liability paper at
- [6] Brain, S. 2006, personal communication (former chairman of the Australian Nuclear Insurance Pool from 1985 to 1997) re initial section.
- [7] NRC factsheet on Nuclear Insurance, May 2005.
- [8] Website of World Nuclear Association, "Liability for Nuclear Damage", Updated March 2012.
- [9] Wikipedia contributors. "Comparison of Fukushima and Chernobyl nuclear accidents."
- [10] Wikipedia, The Free Encyclopedia. Wikipedia, The Free Encyclopedia, 30 Jun. 2012. Web. 1 Jul. 2012.
- [11] Myles Gough, "Early estimates of Fukushima's toll", Cosmos Online, 21st September 2011, <http://www.cosmosmagazine.com/news/4764/www.cosmosmagazine.com>.
- [12] Acton J.M. & Hibbs M, "Why Fukushima was preventable", March 2012 Carnegie Paper.
- [13] "GIC Re Mobilizes \$78 m for nuclear pool", The Financial Express, 1<sup>st</sup> July 2012. "India may have

to look abroad for N-cover”, The Times of India,  
14<sup>th</sup> December 2011.

# AN EMPIRICAL ANALYSIS OF BOTTOM'S UP MARKETING IN BHOPAL CITY WITH SPECIAL REFERENCE TO DOMINOS PIZZA

<sup>1</sup>Dr. Vikas Saraf, Prof. Divya Tiwari, Prof. Akash Tiwari

<sup>1,2</sup>Vidyasagar Institute of Management, Bhopal

<sup>3</sup>SIRT- Excellence, Bhopal - 462 022

## ABSTRACT

*Bottom up marketing is a phenomenon which has gained particular importance in the modern market. The reason for which the concept of bottom up marketing gained significance, is quite simple and relies on the fact that it ensures how any organization can focus on sustainable competitive advantage while ensuring consumers wants, both of individuals and that of the industry, as well as achieving the selling organizational objectives. The objectives of the study is to identify the impact of bottom up marketing strategies on customer satisfaction and the potential of this strategy in making consumer satisfied along with converting the immediate revenue into long term gains.. The study is based upon primary and secondary data. To analyze the customer experience, 100 sample respondents were selected in Bhopal town by adopting convenient sampling method. The statistical tools such as percentage analysis, average, Likert Scaling technique etc were used to derive the appropriate results from the study. The outcome of the research paper will provide the suggestions to the organizations about the customer's outlook in the city of Bhopal about Bottom up marketing and the future expectations with the concept.*

**Keywords:** Bottom Up Marketing, organizational objectives, Dominos, marketplace, commercial areas, customer-centric.

## I. INTRODUCTION

Bottom-up Marketing is an investment strategy in which companies are considered, based simply on their own merits, disregarding the sectors, as they are a part of, or the current economic conditions. Followers of this strategy believe that some companies are superior to their peer groups, and will therefore outperform regardless of industry and economic circumstances. The purpose of bottom-up investing is to identify such companies.

This marketing strategy is having its biggest impact these days in more consumer-oriented, tech-savvy sectors, such as music, technology,

electronic gadgets, etc. Most industry professionals don't have the time to read blogs or write their own[1,3]. It's very crucial for marketers to find a thoughtful, intelligent and ultimately influential way to introduce them into this ultimate approach. Strategy used in corporate planning whereby information is gathered from sales personnel, product managers, advertising personnel, and other members working in the organizational unit to set goals and create a marketing plan.

Fig.1 Bottom-up planning leads to corporate planning



Bottom-up planning is considered good for morale because it fosters employees to participation in corporate planning. However, the strategy is sometimes difficult to coordinate because many different assumptions about the same concept must be considered as shown in Fig. 1 For example; there may be conflicting ideas [2] about the impact of advertising on the sales of a particular product, making the establishment of a consistent and integrated plan quite difficult.

Bottom-up approach provides high deployment coverage in early phases of marketing. It provides return on investment on an early basis. It also leads to the high visibility of changes at organizational level. It also helps in making higher impact to organization [3, 8].

In this paper, section 2 represents the research problem, section 3 provide the objective of study, section 4 represents fundamental concepts of bottom up marketing, section 5 focus the hypothesis of the study, section 6 represent the

research methodology of our work, section 7 represent the observation and finding..

## II. RESEARCH PROBLEM

The major limitation of this study is that it is based upon a review of the responses of interviewees selected through random and convenient sample. But it has been tried during the sample collection could be done from that very places which are the favorites of tech- loving consumers like malls and famous markets of Bhopal city and they are mainly taken into account[4]. Further, we believe that the study should have many important implications for researchers, particularly in terms of where future studies of Bottom's up Marketing might best be positioned.

## III. OBJECTIVE OF THE STUDY

The primary aim of this paper is to critically review the responses given by the respondents belonging to diverse age- group, income, and background and buying habits along with the literature that explicitly addresses the adoption and application of various marketing strategies adopted by Dominos. In particular, this research paper seeks to present a holistic and critical review of Bottom's up Marketing and its consumer preference in Bhopal city, in order to help and establish the gaps that will need to be addressed in its future research studies.

## IV. BOTTOM UP MARKETING AS A CONCEPT

Bottom-up marketing is a concept with no single definition, but a few distinct components that set it apart from traditional top-down marketing strategies. Unlike traditional marketing, where executives create a marketing plan and a strategy to promote a company's products and services, bottom-up marketing is mainly driven by the employees of a company[5]. Employees recognize one specific customer need the company can meet and create a marketing strategy around that single idea.

Employees know more about the needs of customers than senior management does. This means it makes more sense for your employees to develop the company's marketing strategy, because they are the people who are interacting with your customers and understand what they want and need from you.

In a bottom-up marketing strategy, the employees are tasked with finding the one thing that competitors are not doing that customers need as shown in Fig.2 [6,13]. In addition to listening to customer feedback, employees must also analyze the competition. They should look at the strategies competitors are following that work and those that have not been so successful. This will help them to find a gap in the market that your company can fill. The marketing strategy can then be built around this one concept.

(a) Bottom up Marketing- An Evolving Success Mantra

The marketing plan needs to be flexible in order to stay relevant. A bottom-up marketing strategy allows one to adjust the marketing efforts according to new initiatives in the marketplace and challenges from competitors. If one's company has multiple locations, one can tailor the marketing strategies to meet the different needs of the customers in each location. Instead of having to completely rewrite the existing marketing plan if faced with an unexpected situation, one can simply adjust it as needed[7]. This is more flexible than a top-down marketing strategy, where senior management first decides on the goals they want the company to achieve and then marketers are left to find a way to achieve them as shown in Fig.3[8].

(b) Bottom up Marketing and Dominos

This is the process of developing a marketing strategy within an organization by finding a workable tactic and then building on the tactic to create a powerful strategy.

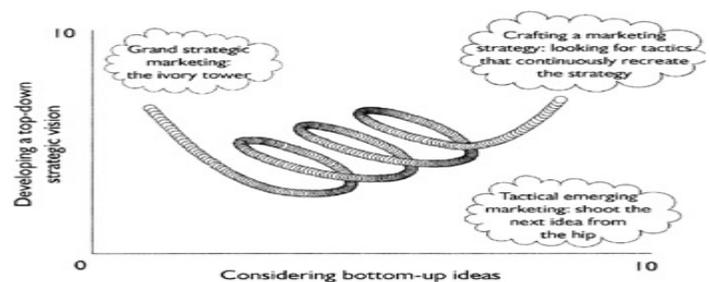


Fig.2 Considering bottom-up idea

Marketers involved in a firm's marketing strategy development should recognize the potential for a bottom-up approach to provide the firm with insights into ways the firm can develop and achieve a sustainable competitive advantage that

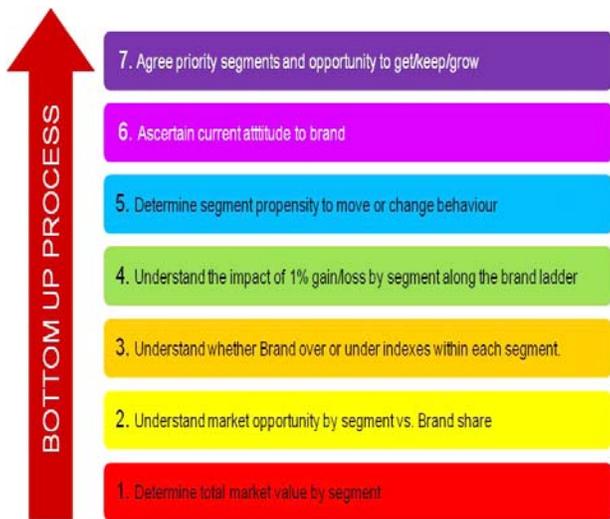


Fig.3-Bottom up process

may not be as evident with a top-down marketing strategy development approach. While there are multiple approaches to developing marketing strategies within an organization and arguably no single best prescriptive approach, the bottom-up approach is certainly consistent with the view that marketers should seek to understand current and prospective customers, competitors, as well as the broader marketing environment and identify ways it can provide customers with offerings of value that are superior in some way relative to competitive offerings[9,11,12]. The approach further suggests the need for marketers to focus their efforts in identifying and meeting customer needs to avoid diluting organizational resources which may include the firm’s brand itself.

Domino's Pizza is a classic example of successful bottom-up marketing. The company took one marketing tactic, to guarantee that pizza will be delivered in 30 minutes, and built a very successful marketing strategy around it. Further, in conceptualizing the approach, the considered

tactics to be ‘competitive mental angles’ and strategies as ‘coherent marketing directions.’

“Exceptional people on a mission, to be the best pizza delivery company in the world”.

(C) Advantages of Bottom up Marketing

- (i) User and business awareness of the product. Benefits are realized in the early phases.
- (ii) Organization can replace many manual processes with early automation.
- (iii) Organization can implement password management for a large number of users.
- (iv) Organization does not have to develop custom adapters in the early phases.
- (v) An organization broadens identity management skills and understanding during the first phase.
- (vi) The Identity Manager is introduced to the business with less intrusion to business operations.

(d) Disadvantages of Bottom up Marketing

- (i) The organizational structure as established might have to be changed in a later roll-out phase.
- (ii) Because of the immediate changes to repository owners and the user population, the roll-out will have a higher impact earlier and require greater cooperation.
- (iii) The strategy is driven by the existing infrastructure instead of the business processes.

**V. HYPOTHESIS OF THE STUDY**

The study focuses on the impact of Bottom’s up Marketing used by Domino on the customers. It is presumed in the study that the customers are preferring the resultant strategies of Bottom’s up Marketing specially in the case of Dominos.

**VI. RESEARCH METHODOLOGY**

(a) Research design

The research design for the study is descriptive. Consumers of various socio economic groups have been interviewed for the research survey using a structured questionnaire. The study period was September 2012 to October 2012.

(b) Data collection

Table 1

The data is collected through schedule prepared and personally contacted to the respondents. The data is collected through primary and secondary sources both. Major commercial areas of Bhopal

Attributes	Frequency	Percent
Dominos	56	56
Pizza Hut	44	44
<b>Total</b>	<b>100</b>	<b>100.0</b>

are chosen to collect the sample of 100 respondents on random and convenient sampling basis.

(C) Data Analysis

The data so collected is analyzed with the help of statistical techniques like percentage, average etc. The major findings for the study are:

(i) Which one is your favorite Fast food?. This table 1 reveals that most of the respondents are in favor of Mc Donald.

Attributes	Frequency	Percent
Dominos Pizza	27	27
Mc Donald	29	29
Pizza Hut	10	10
KFC	13	13
Any other	7	7
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 2 Favorite Fast Food Joint

(ii) How frequent you visit any Fast food joint? This table 2 reveals that majority of the respondents visit any Fast Food Joint on a monthly basis.

Attributes	Frequency	Percent
Daily	23	23
Once in a Week	20	20
Twice in a Week	21	21
Once in a Fortnight	07	07
Once in a Month	29	29
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 3 Frequent Visit of any Fast Food Joint

(iii) Which one is your favorite Fast food joint for **Pizza?**. This table 3 reveals that majority of the respondents prefer Dominos over Pizza Hut.

(iv) How do you rate Dominos on your preference scale? From the table 4, researchers infer that the respondents are pretty in favor of Dominos.

**1- Most & 5- Least**

Attributes	Frequency	Percent
Most	71	71
Least	29	29
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 4 Rate Dominos on a Scale-

(v) Dominos Services as Value for Money. Table 5 show that out of the 100 respondents, 53 percent opines that Dominos services provide the value of their money.

Attributes	Frequency	Percent
Excellent	57	57
Very Good	20	20
Good	13	13
Average	08	08
Below Average	02	02
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 5 Delivery Service of Dominos as a Value for Money

(VI) What is the best thing you like about Dominos? This table 6 reveals that majority of the respondents agrees on the point that offers & fastest product delivery is best on the part of Dominos.

Attributes	Frequency	Percent
Services	57	57
Ambience	20	20
Availability of Food	10	10
Extra	13	13
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 6 Best Thing about Dominos

(VII) Does Dominos offer of fastest delivery of Pizza attract you? Yes or No. Table 7 shows that the respondents reflect a mixed response about the fastest delivery service offered by the Dominos.

Attributes	Frequency	Percent
Yes	51	51
No	49	49
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 7 Fastest Delivery attracts the Customer

(VIII) Do you think, this marketing strategy is beneficial for Dominos? Table 8 infers that the marketing strategy used by the Dominos is considered beneficial by majority of the respondent

Attributes	Frequency	Percent
Yes	53	53
No	47	47
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 8 Bottom's up marketing is beneficial for Dominos

(IX) Age group of the respondent. Table 9 shows that out of the 100 respondents, most of the respondents are of the age group of 15-30 yrs.

Attributes	Frequency	Percent
Below 15	32	32
15-30 yrs	38	38
30-45 yrs	28	28
Above 45	02	02
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 9 Age group of the Respondent

(X) Income group of the respondent. Table 10 shows that out of the 100 respondents, most of the respondents are Earners.

Attributes	Frequency	Percent
Below 1 Lac	29	29
1 Lac-3 Lac	21	21
3 Lac- 5 Lac	18	18
5 Lac- 10 Lac	13	13
Above 10 Lac	20	20
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 10 Income group of the Respondent

(XI) Occupation of the respondent. Table 11 shows that out of the 100 respondents, most of the respondents are of the Student and Professional segment.

Attributes	Frequency	Percent
Student	32	32
Self-Occupied	28	28
Professional	28	28
Government Officer	02	02
Any Other	10	10
<b>Total</b>	<b>100</b>	<b>100.0</b>

Table 11 –Occupation of the Respondent

## VII. OBSERVATIONS AND FINDINGS

It has been observed by the study that consumers believes and opines that Bottom's up Marketing is very much useful for Dominos in making their brand image and of course making it favorite of various segments. Dominos services are

considered to be as a value for money by the customers and their various offers and fastest delivery mode is considered to be the best thing about them. So, Bottom's up Marketing is making the Dominos a successful market leader.

### VIII. CONCLUSION

As we all know, majority of the companies are gradually moving from top-down marketing to bottom up marketing. Now, every organization is focusing on customer needs and preferences in order to become customer-centric organization. Today, customer is a King and every company just wants to make their first priority to satisfy the king only. This is the competitive era and Dominos is efficiently working because of its Bottom's up marketing strategy. This is the strategy which makes the customer's needs and wants satisfied as per their own terms and conditions. Their fastest delivery mode and various offers are making them an undisputed king of the market. So, Bottom's up Marketing is just doing justice to the Dominos.

### REFERENCES

[1]. John R. Hall (October 18, 2004). "Marketing guru talks about differentiation: Jack Trout holds court with a packed audience at AirTime 500 Fall Expo". *Air Conditioning, Heating & Refrigeration News*. Retrieved April 13, 2012 (subscription required).

[2]. Debbie Blossom (March 18, 2006). "Marketing wizard due in Tulsa: Internationally known Jack Trout will address the Tulsa Advertising Federation". *Tulsa World*. Retrieved April 13, 2012(subscription required).

[3]. Noel C. Paul (March 24, 2003). "Selling war: a review of the campaign; Darts at Hussein as an exercise in 'repositioning the competitor'? Marketers weigh

in". *Christian Science Monitor*. Retrieved April 13, 2012 (subscription required).

[4]. Lute Harmon Sr. (September 1, 2009). "Get healthy in Cleveland". *Inside Business Magazine*. Retrieved April 13, 2012 (subscription required).

[5]. Joseph F. McKenna (March 1, 2008). "Catching up with Jack". *Tooling & Production*. Retrieved April 13, 2012 (subscription required).

[6]. Lewis Lazare (December 4, 2002). "Book lists marketing sins". *Chicago Sun-Times*. Retrieved April 13, 2012 (subscription required).

[7]. Sue Westcott Alessandri (January 1, 2004). "The Fall of Advertising & the Rise of PR / Big Brands, Big Trouble: Lessons Learned the Hard Way". *Journalism & Mass Communication Educator*. Retrieved April 13, 2012 (subscription required).

[8]. K. T. Chelvi (October 29, 2001). "Jack Trout advises on retaining, capturing bigger market share" *New Straits Times*. Retrieved April 13, 2012 (subscription required).

[9]. Donna Petrozzello (February 12, 1996). "Jack Trout pushes the 'power of sound'(marketing guru on the importance of sound in advertising)". *Broadcasting & Cable*. Retrieved April 13, 2012 (subscription required).

[10]. John Ramsay (March 4, 1999). "The Power of Simplicity". *Supply Management*. Retrieved April 13, 2012 (subscription required).

[11]. Dina Bunn (January 11, 1998). "Marketing Is War And Winner Gets The Sales, Consultant Says". *Rocky Mountain News*. Retrieved April 13, 2012 (subscription required).

[12]. Tracy Doyle (May 1, 2004). "Tactical Switch". *Medical Marketing & Media*. Retrieved April 13, 2012(subscription required).

[13]. [www.hbcse.tifr.res.in/jrmcont/notespart1/node45.html](http://www.hbcse.tifr.res.in/jrmcont/notespart1/node45.html)

[14].

[www.12manage.com/description\\_bottom\\_up\\_approach.html](http://www.12manage.com/description_bottom_up_approach.html)

# EFFECTIVENESS OF VIDEO INSTRUCTIONAL MATERIAL IN EDUCATIONAL PSYCHOLOGY FOR B.Ed STUDENTS OF MADHYA PRADESH

Hitesh Sharma,

NSDC,  
AISECT University, Bhopal (M.P.)

## ABSTRACT

*The present study is related with development and effectiveness of Video Instructional Material in Educational Psychology. It was an attempt to find out whether the Video Instructional Material is effective in compare to Traditional Lecture Method. Keeping in mind to improve teaching learning process in Educational Psychology and due to need and importance of Video Instructional Material in Educational Psychology, Scarcity of researches in using Video Instructional Material in classroom, Scarcity in study of interactional effect of various variables like Intelligence, Adjustment, Personality, Gender, socioeconomic Status, Educational Discipline, Caste, Residential background and Marital status when Video Instructional Material (Method Of Teaching) was an independent variable and Achievement was dependent variable. Scarcity of quality teachers in Educational Psychology, Scarcity of quality instructional material in Educational Psychology, inconsistency in findings of different researches on Video Instructional Material and due to very few numbers of researches conducted on Video instructional Material present study need to be undertaken Video Instructional Material method of teaching Educational Psychology was found to be significantly superior to Traditional Method in improving Achievement in Educational Psychology when groups were matched with respect to Pre Achievement in Educational Psychology and Intelligence.*

## I. INTRODUCTION

The present study “Effectiveness of Video Instructional Material in Educational Psychology in terms of Achievement and Reactions towards Developed Material of B.Ed students of Madhya Pradesh” was Experimental in nature and related to two areas that is Educational Technology and Educational Psychology. In this study investigator was tried to explore the application of Video films of Educational Psychology in classroom teaching. Investigator attempted to find out how a teacher can use video films for teaching his effectively. More precisely, it is related with development and

effectiveness of Video Instructional Material in Educational Psychology. It was an attempt to find out whether the Video Instructional Material is effective in compare to Traditional Lecture Method. In teaching new technologies are adapting to bring change in existing System for fulfillment of predetermined educational objectives. In twentieth century books are only source of instruction material for Individualized teaching. Today the type have expanded to include diversification like text books, Supplementary reading books, workbooks, magazines, booklets, comics, programmed books, motion pictures, photographic slides, filmstrips,

videodiscs, audio discs, audio tapes, charts, graphs, photographs, drawings, simulation games, radio, television, e-learning, Video Instructional Material, Web Based Instructions, Computer Aided Learning etc. Within each of these type a growing collection of materials is being produced to suit individual students, levels of achievement and learning styles, There is however a striking difference between nations in the types and amounts of materials available. Individualized instruction is training tailored to meet the individual trainee's needs and abilities and to accommodate the differences between trainees. An instructional package is a collection or Programmes of learning materials put together around a topic or skill and used to facilitate the process of training and learning (Wilson, 1987). Instructional films had immense potentialities of vicarious visual experiences which in turn made the lessons more vital and further made the language used in lessons more meaningful (Muddu, 1978). Audiovisual materials supply concrete basis for conceptual thinking, they give rise to meaningful concepts enriched by meaningful association; hence they offer the best antidote for the disease of verbalism (Dale, 1985). A brief description of Video Instructional Material and Educational Psychology is given as follows.

## II. VIDEO INSTRUCTIONAL MATERIAL

Video Instructional Material is a systematically planned, skillfully arranged and effectively controlled Video instruction for providing individualized instruction or learning experiences to the learners. The subject matter is logically

sequenced into small segments. It is an application of the principles of behavioral sciences and technology in the field of education. In the Video Instructional Material the video lecture films were developed on specific criteria, on the basis of scripts which were examined by subject experts as well as video technology experts. In Video Instructional Material concepts were made more comprehensive with the help of daily life examples and pictures. Students were free use facilities provided in video software like pause, rewind, forward etc. Students are free for discussion after study with Video Instructional Material. Students may also clear his or her doubts by discussion with teacher after study through Video Instructional Material. In conventional teaching, most of the time is consumed for Input-Output and less time left for process, but in teaching with Video Instructional Material, the input and output time may reduced and process time is increased. When the process time is increased, the time of students activities, discussion, correlation with other subjects, brain storming, learning etc may be increased (Singh & Dahiya,2007). Video Instructional Material in Educational Psychology was developed on the basis of common syllabus of Educational Psychology for B.Ed. Video Instructional Material is produced in form of lecture CD's in classroom environment which facilitate concept learning easy. Video Instructional Material covers five units of common syllabus of Educational Psychology for B.Ed. The investigator reviewed Video Instructional Material in other subjects and discussed with subject expert

and technical experts for development of Video films. Data related to components of Video Instructional Material was collected by the investigator. Students can see number of times to same film but a teacher may face difficulty to deliver a lecture exactly same in second time.

### III. EDUCATIONAL PSYCHOLOGY

Education Psychology is the study of the learners the teaching learning process in its various ramifications directed towards helping the child come to terms with society with a maximum of security and satisfaction (**Encyclopedia of Education, 2004**). In this branch of psychology, psychological principles and techniques are applied to study the teaching learning process, evaluation of learning performance, guidance for exceptional children and various educational problems.

**Skinner (1958)** Educational Psychology is that branch of Psychology which deals with teaching and learning. It means psychology is applied in the field of education for improving the methods and products of the teaching learning process.

**Crow & Crow (1973)** Educational psychology describes and explains the learning experience of an individual from birth to old age. It means development an individual in terms of learning achievement is judged through his life span. Therefore what we do in the process of learning is the role of educational psychology.

### IV. RATIONALE

Number of students increasing in higher education and due to it there is shortage of teachers and adequate facilities. It is difficult to meet these needs by conventional means hence it is necessity of time to use media in field of education. Video provides facility of picture viewing which is many times made imagined by teacher in classroom. Students get better understanding of concepts when lecture is accompanying by motion pictures which is only possible through Video. It will enable teaching to be undertaken privately at home or at work place in a group, in the remote areas or in the city. Technology is revolutionizing teaching. Quality of education should be improved for all round development of the child. Different Individualized instructional materials like module, Programme learning material, and computer aided instruction, web based instructions, video instructional materials etc found very useful in individualized learning and distance learning (Wilson, 1987). Students can learn by own pace & interest with the help of Video Instructional Material. Video instructional material facilitates students to learn even in absence of teacher. Motion pictures, color, sound adjustment, facility of forward, rewind and zooming made video a powerful tool of communication between teacher and student. This Video Instructional Material can be upload on website and n numbers of students may benefited by it without any constraints of Distance, Time, Money and Energy. There is scarcity of quality teachers & quality books in field of Educational Psychology. Education Psychology

is a compulsory subject at B.Ed as well as M.Ed level. In India number of Educational College increasing day by day but enough number of teacher Educators is not produced to fulfill their requirements so there is a gap exists between demand and supply. Video Instructional Material in Educational Psychology was developed on the basis of common syllabus of B.Ed Educational Psychology of Universities of Madhya Pradesh. Those B.Ed. colleges who are having sufficient teaching staff sometimes found that they are not having conceptual clarity in Educational Psychology. Keeping these problems in mind the present study will need to undertake. A lot of adequacy observed in present teaching learning process such as consistency of lectures, passive role of learners, lack of opportunities for self pacing study, absence of flexibility etc. To eradicate these adequacy many changes are require such as renovation of traditional teaching learning method, use of various psychological principles, meaningful learning, proper feedback etc. For fulfillment of these Video Instructional Material is required. Researchers developed different types of video instructional materials and studies their effectiveness on the basis of achievement in subject. The effect of VIM on achievement is one of the innovations in field of teaching and learning. Jeyachandran (1980), Andrews (1985), Barve (1986), Clarke (1986), Yadav (1988), James (1988), NCERT and DAVV Project (1989), Narayanasamy (1991), Idayavani (1991), Kalimuthu (1991), Sinnathambi (1991), Napapong (1993), Pandya

(1994), Joshi (1995), Lal (1996), Joshi (1997), Tiwari (1997), Shukla (2003), Shinde (2007) and Gupta (2011) studied the effectiveness of Video Instructional Material and found that Video Instructional Material significantly improved achievement of students. After going through related literature, the investigator realized that there are very few research studied conducted related to the use of video Instructional Material in classroom at B.Ed level and probably no study conducted for teaching Educational Psychology for B.Ed students through Video Instructional Material Keeping in mind to improve teaching learning process in Educational Psychology and due to need and importance of Video Instructional Material in Educational Psychology, Scarcity of researches in using Video Instructional Material in classroom, Scarcity in study of interactional effect of various variables like Intelligence, Adjustment, Personality, Gender, socioeconomic Status, Educational Discipline, Caste, Residential background and Marital status when Video Instructional Material (Method Of Teaching) was an independent variable and Achievement was dependent variable. Scarcity of quality teachers in Educational Psychology, Scarcity of quality instructional material in Educational Psychology, inconsistency in findings of different researches on Video Instructional Material and due to very few numbers of researches conducted on Video instructional Material present study need to be undertaken.

## V. STATEMENT OF PROBLEM

The problem was worded as given below:

“Effectiveness of Video Instructional Material in Educational Psychology in terms of Achievement in Educational Psychology of B.Ed. students of Madhya Pradesh”

## VI. OBJECTIVES

The following were the objectives of the present study:

- (a) To compare mean scores of Achievement in Educational Psychology of students belonging to Video Instructional Material Group at Pre and Post Test stages.
- (b) To compare adjusted mean scores of Achievement in Educational Psychology of students belonging to Video Instructional Material Group and Traditional Method Group by considering Pre Achievement in Educational Psychology and Intelligence as covariate.

## VIII. HYPOTHESES

The following were the hypotheses of the present study:

- (a) There is no significant difference between mean scores of Achievement in Educational Psychology of Video Instructional Material Group at Pre and Post Test stages.
- (b) There is no significant difference between adjusted mean scores of Achievement in Educational Psychology of students belonging to Video Instructional Material Group and Traditional Method Group by

considering Pre Achievement in Educational Psychology and Intelligence as covariate

## XI. DELIMITATIONS

There were some of the specific restrictions with respect to sample, content, duration of treatment and tool for measuring the variables were made these are

- (a) The study was confined to the two cities four B.Ed. colleges and one university teaching department only.
- (b) The content of Video Instructional Material in Educational Psychology was prepared by taking common B.Ed syllabus of Madhya Pradesh.
- (c) Video Instructional Material covers only five units of common syllabus of M.P.
- (d) The Treatment was continuing for one academic year that is 2011-12 only. Video Instructional Material treatment was given for 15 days only.
- (e) Achievement in Educational Psychology was assessed with the help of unstandardized tool developed by the investigator.

## VIII. SAMPLE

The population comprised of B.Ed students of Madhya Pradesh. There were approx 500 B.Ed colleges in Madhya Pradesh affiliated by NCTE and Govt. of Madhya Pradesh.. The two cities, namely, Indore and Dewas were selected purposively for taking sample. From two cities of Madhya Pradesh Three B,Ed colleges and three sections of School of

Education, DAVV Indore were selected randomly as Sample of study from forty six B.Ed colleges of Indore and Dewas. Sample comprised of 177 B.Ed students out of which 75 were Males and 102 are females of session 2011-12 (Table1.1). The treatment assigned randomly to two groups from six selected groups (Table1.2) which was Section 'A' and Section 'C' of School of Education, DAVV Indore. There are 74 students in Video Instructional Material Group who were get treatment through Video Instructional Material. There are 103 students in Traditional Method Group who were get treatment through traditional method (Table1). Members of both the groups represented Student's qualification were graduate and postgraduate. Their age was from 22 years to 45 years. Group wise and

**Table 2: Name of College/Department wise number of Males and Females**

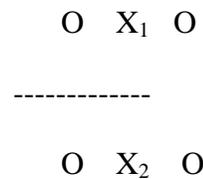
College wise distribution of sample is given in table1.1 and 1.2

Group	Males	Female	Total
<b>Video Instructional Group</b>	22	52	74
<b>Traditional Method Group</b>	53	50	103
<b>Total</b>	75	102	177

**Table:1 Groupwise Number of Males and Females and total number of students**

**XI. EXPERIMENTAL DESIGN**

The present study was experimental in nature. In present study the Non Equivalent pre test Posttest control Group Design was used. The experimental group were exposed to the independent variable that is treatment and both groups were tested at pre and post test stages by same achievement test in Educational Psychology, Scores are then compared to determine the effectiveness of the treatment.



S.No.	Name of College/Department	Gender		Total
		M	F	
		01	Section 'A' School of Education.DAVV Indore	
02	Section 'B' School of Education, DAVV Indore	17	13	30
03	Section 'C' School of Education DAVV Indore	16	26	42
04	Christian Eminent B.Ed College of Education Indore	00	13	13
	New Era College of Education Dewas, Vikram University Ujjain	7	12	19
06	Govt.College of Education Dewas Vikram University Ujjain	28	12	40
	Total	75	102	177

Table.2 Name of college/Dep.wise no.of M/F

(Campbell and stanely ,1963)

X<sub>1</sub>= Video Instructional Material Treatment

X<sub>2</sub>= Traditional Method Treatment

O = Observation test

In it one group received a new or unusual treatment that is teaching by Video Instructional Material the other receives a Traditional or usual treatment that is Traditional Method Group and both groups are

tested at pre and post stages. Both groups are comparison groups. (X<sub>1</sub>) group were taught by Video Instructional Material and the (X<sub>2</sub>) Traditional Method Group was taught by traditional Lecture Method. The posttest achievement of both the groups was compared by considering their Pre Test Achievement in Educational Psychology as covariate.

## XII. TOOLS

In the present Study data were collected in respect of Achievement in Educational Psychology by criterion test developed by the investigator in Educational Psychology. Intelligence of students were assessed with the help of Raven's standard progressive matrices test. Intelligence test developed by J.C. Raven this test for the target group belonging to age of 12 years to adult H.K. LWEIS AND Co. Ltd. published it in 1960.

## XIII. PROCEDURE OF DATA COLLECTION

The investigator reviewed Video Instructional Material in other subjects and discussed with subject expert and technical experts for development of Video Instructional Material. Data related to components of Video Instructional Material was collected by investigator. Investigator collected syllabus of B.Ed Educational Psychology from all the universities of Madhya Pradesh. The common syllabus of Educational Psychology was prepared by the investigator and it was validated by subject teachers of different universities in Madhya Pradesh. On the basis of common syllabus Scripts

were prepared by investigator and it was examined by subject experts. On the basis of approved scripts the video films were produced. Prepared film was edited and was converted into digital mode with the help of non linear editing system. Permission was taken from Head of the Department/Principal/Director for administration of Pre Test of Achievement in Educational Psychology which was developed by the investigator then the pre test was administered. The two groups were selected as a experimental group randomly from six groups. Permission was taken from Principle and Head of the department for treatment through video instructional material in Educational Psychology for B.Ed Students of Madhya Pradesh. Section 'A' and section ' C' of School of education, Devi Ahilya Vishwavidyalaya, Indore were selected randomly in experimental group. After establishing rapport with students Investigator gave all necessary instructions then students of experimental group were taught by Video Instructional Material and Traditional Method Group Students by their respective teachers with traditional Lecture Method. The Treatment was run for fifteen days and six months respectively for experimental group and traditional group. After completion of treatment the post test was administered on both groups who were taught by video instructional material and traditional lecture method. After that each test was scored. The procedure for scoring was adopted as decided by investigator for criterion test. The data were computed & Analyzed by applying suitable statistical technique.

**XIV. DATA ANALYSIS**

The objective wise data analysis was as given below: Comparision of mean scores of achievement in educational psychology of video instruction material group at pre and post test stagesThe first objective was to compare mean scores of achievement in Educational Psychology of video Instruction Material Group at pre and post test stages.The data related to this objective were analzed with the help of Correlated t test. The results are given in table 3

<i>Test</i>	<i>M</i>	<i>N</i>	<i>SD</i>	<i>Correlation</i>	<i>t-value</i>
Pre Test	37.98	75	8.89	0.59	11.47**
Post Test	49.20	75	9.71		

Table 3: Testing wise M, N, SD, Correlation and Correlated t-value of achievement in Educational Psychology of VIM Group

Significant at .01 level of significance

From table 3 it is evident that correlated t-value is 11.47 that is significant at 0.01 level of significance with degree of freedom 74. It indicates that the mean scores of achievement in Educational Psychology at pre and post stages of subjects treated through Video Instructional Material differ significantly. In this light the null hypothesis that there is no significant difference in mean scores of achievement in Educational Psychology before and after treatment is rejected. Further the mean score of achievement in Educational Psychology after the

treatment was found to be 49.20 that is significantly higher than that before the treatment whose mean scores of achievement in Educational Psychology is 37.98. It may therefore, be said that the Video Instructional Material on Educational Psychology was found to enhance the achievement of B.Ed students.

Comparison of adjusted mean scores of achievement in educational psychology of students belonging to video instructional material group and traditional method group by considering pre achievement in educational psychology and intelligence as covariate

The second objective was to compare the adjusted mean scores of achievement in Educational Psychology of Video Instructional Material Group and Traditional Method Group by considering pre achievement in Educational Psychology and Intelligence as covariate. The data related to this objective were analyzed with the help of Analysis of Covariance. The results are given in table 4

<i>Source of Variance</i>	<i>df</i>	<i>SS<sub>Y.X</sub></i>	<i>MSS<sub>Y.X</sub></i>	<i>F<sub>Y.X</sub></i>
<b>Treatment</b>	1	573.08	573.08	10.59**
<b>Error</b>	173	9355.05	54.07	
<b>Total</b>	177			

Table 4: Summary of ANCOVA of achievement in Educational Psychology by considering pre achievement in Educational Psychology and Intelligence as covariate

Significant at 0.01 level of significance

From table 4, it can be seen that the adjusted F-value is 10.59, which is significant at 0.01 level of

significance with  $df=1/173$ . It indicates that the adjusted mean scores of achievement in Educational Psychology of Video Instructional Material Group and Traditional Method group differ significantly when pre achievement in Educational Psychology and Intelligence was taken as covariates. In the light of this, the null hypothesis that “There is no significant difference in adjusted mean scores achievement in Educational Psychology of Video Instructional Material Group and Traditional Method Group by considering their pre achievement in Educational Psychology and Intelligence as covariate” is rejected. Further, the adjusted mean score of achievement in Educational Psychology of Video Instructional Method Group is 48.44, which is significantly higher than that of Traditional Method Group whose adjusted mean score of achievement in Educational Psychology was 44.76. It reflects that the treatment of Video Instruction was found to be significantly superior to the Traditional Method of teaching Educational Psychology when both groups were matched with respect to pre achievement in Educational Psychology and Intelligence. It may, therefore be concluded that Video Instructional Material was found to be superior to Traditional Method in facilitating achievement in Educational Psychology of students when groups were matched with respect to Pre Achievement in Educational Psychology and Intelligence.

### **XIII. FINDINGS**

The followings were the findings of the experimental study.

- (a) Video Instructional Material method of teaching Educational Psychology was found to be significantly superior to Traditional Method in improving Achievement in Educational Psychology when groups were matched with respect to Pre Achievement in Educational Psychology and Intelligence.
- (b) The Achievement in Educational Psychology of both Males and females was found to be same extent when pre achievement in Educational Psychology and Intelligence were taken as covariates.

**REFERENCES**

[1] **Aggarwal, J.C. (2004):** *Psychology of learning and Development* Delhi: Shipra Publication. New Delhi: Prentice Hall, 1994.

[2] **Buch M. B. (Ed.)(1991):** *Fourth Survey of Research in Education* (1983-88). Volume I & II, NCERT, New Delhi.

[3] **Buch, M. B. (Ed.) (1979):** *Second Survey of Research in Education.* (1972-78) Society for Educational Research and Development, Baroda.

[4] **Buch, M. B. (Ed.) (1986):** *Third Survey of Research in Education* (1978-83). NCERT, New Delhi,.

[5] **Buch, M. B. (Ed.)(1974):** *A Survey of Research in Education.* Centre of Advance Study in Education, Baroda.

[6] **Fletcher, J.D. (1992):** *Individualized System of Instruction, In Marrin,* Encyclopedia of Educational Research. Macmillan Publishing Company, New York.

[7] **Gay, L.R. (1996):** *Educational Research Competencies for analysis and Application* New Jersey: Prentice Hall.

[8] **Kerlinger, F. N. (2000):** *Foundations of Behavioural Research.* Delhi: Surjeet Publications

[9] **Mouly, G.J.(1960):** *Psychology for Effective Teaching* New York: Holt Rinehart and Winston, Inc.

[10] **NCERT (2000):** *Fifth Survey of Educational Research (1983-88). Volume I & II,* NCERT New Delhi.

[11] **NCERT (2006):** *Sixth Survey of Educational Research (1993-2000). Volume I ,* NCERT, New Delhi.

[11] **Parson, R.D. Hisnson, S.E. and Brown, D.S.(2001):** *Educational Psychology* United Kingdom: Wadsworth Thomas Learning, 2001

[12] **Postlethwaite, S.N.(1985):** Module Approach. In Husen, T. and Postlethwaite T.N. (eds.): *The International Encyclopedia of Education* (Vol. 5&6) Pergamon Press, New York.

[13] **Sansanwal, D.N. (ed.) (2007):** *Sixth Survey of Research in Education* (1993-2006). <http://www.dauniv.ac.in>

[14] **Wilson, B. (ed.) (1887):** *Training Technology Programme- Method of Training Individllalised Instructions* (Vol. 3). Parthenon Publishing house, England.

# ALRAMING TREND OF RADIATIONS DUE TO CELL PHONE AND PROJECTIONS FOR 2050

Appreciate  
d'Work,  
for social  
cause

<sup>1</sup>K Parandham, <sup>2</sup>RP Gupta and <sup>3</sup>VK Verma

Dedicated Satellite Control Centre, Ayodhanagar, Bhopal  
<sup>2,3</sup> Aisect University, Bhopal-Chiklod Road, Raisen, Bhopal, India

## ABSTRACT

Research, development and usage of wireless technology products have altered the landscape of modern human beings in countless ways, in office, at home and on mobility. However, they have created and added a new pollution in the environment i.e. electronic pollution due to EMF radiation. In spite of recent studies indicating possible harmful effects of EMF radiation on environment, there is no long term data available on the amount of power density radiation by cell phones. The aim of this research work is to experimentally measure the EMF radiation by cell phones during on / Idle mode, Rx and Tx modes. The experiments were conducted using Nardas 8718B radiation survey meter at the centre frequencies of 800 MHz and 1800 MHz. Population and cell phones projections for India, China, USA and the whole world are also included in this research work. An attempt is made to indicate EMF levels radiated into environment from 2020 to 2050.

**Keywords :** Electromagnetic Field (EMF) Radiation; Radiation Survey meter ; probe ; Mobile Telephony ; Environmental EMF exposures; Wireless Technology

## I. INTRODUCTION

Environment represents the totality of physical, chemical, biological, behavioural and socio-economic factors. The galloping developments in the field of wireless technology products in the last two decades have increased the modern human involvement, its related ecological, biological and physical systems resulting in various undesirable and unintentional negative impacts on environment and human health. The most pervasive environmental exposure in industrialized as well as developing countries to day is the Electro Magnetic Fields (EMF) exposures created by the vast array of wireless technologies. The EMF radiation pervading

the environment is now increasingly realised and this has added to a new pollutant to the list of pollutants into the environment.

Rapid development and usage of electronic products in all walks of life, electronic pollution has become a great concern to entire world community. In this electro-magnetic pollution has assumed prominent importance which is in limelight in recent times for all negative reasons. The intensity of manmade electromagnetic radiation has become so ubiquitous and it is now increasingly recognised as a form of invisible and insidious pollution which

is affecting human health and environment alike in different ways [1].

Recent studies have indicated that mortality at communication towers over 200ft, may be a threat to the healthy population of birds and the EMF radiation from cell phone towers may probably be the reasons for the vanishing butterflies, bees, insects and sparrows. Studies have also shown that there seems to be effects on birds exposed to the EMF radiation and loosing navigational ability. They get disoriented and fly in different direction [2]-[3].

Electromagnetic radiations are not easily recognised and detectable,. However their impacts are being felt on human health hazards such as blood barrier resulting in neuronal damage, risk to children/pregnant women, DNA damage, skin problems, ringxeity including ear damage, cause for tumour in the eye, sleep disorders, headaches, increase in cancer causes which have been attributed by World health Organization(WHO) and other researchers. WHO has conducted study in 13 countries has reported 5117 brain tumour cases[4]-[6]. Professor Girish Kumar of IIT, Bombay has in his research quoted saying there are 200 research papers contributing to effects of EMF radiation to human health problems [7] &[8]. The impact of EMF radiation on environment further escalates on forests, birds, bees and wildlife [7] & [9]. The cello phone operators association and government of India reject these allegations due to lack of evidence. Thus the conflict among designers,

manufacturers, corporate, distributors, government and consumers need to be controlled and resolved. In such a situation there is a great demand for determination of quantum of EMF radiation into environment and society.

Every year, hundreds of thousands of new cell phones are introduced into market. Mobile telecom revolution in the modern world has triggered not only the growth of world economy but has changed the life style of millions of people. Mobile telephony is growing exponentially in India and across the world. At present there are about 800 million mobile subscribers in India and over 4.03 billion in the world.

The population projections for India[10], China[11], USA[12] and the entire world[13]-[16] are as shown in the table.1 below till 2050.

Country	2020 Popln (Billions)	2030 Popln (Billions)	2040 Popln (Billions)	2050 Popln (Billions)
India	1.326	1.460	1.571	1.657
China	1.423	1.454	1.376	1.320
USA	0.325	0.351	0.392	0.438
World	7.900	8.800	9.800	10.60

Table 1. population projections for 2050

The growth of cell phone numbers and their estimated projections for India, China, USA and the entire world [17] for 2050 are as shown in the table below.

Country	2020 Cell Phones (Millions )	2030 Cell Phones (Millions)	2040 Cell Phones (Millions)	2050 Cell Phones (Millions)
India	994.5	1460	1178	1242
China	1071.8	1454	1045	1003

USA	338	365	408	456
World	6873	7656	8526	9222

Table 2. Cell phones projections for 2050.

Due this exponential growth of population, urbanization, consumer electronics products concern for environment and human health hazards is growing throughout the world. There is a great need to know what are the EMF emissions into environment by cell phones for 2050. Hence, measurement and estimation of EMF emissions into environment and society are required to be determined through experiments. II Experimental Methodology

In spite of the recent studies indicating possible harmful impact of EMF on several species, there are no long-term data available on the environmental impacts of EMF radiations as of now. Studies on impact of cell phones and cell phone towers and EMF radiations on birds and other wildlife are almost non-existent in India. Moreover pollution from EMF radiations being a relatively new environmental issue. In this research work EMF radiations of 30 randomly selected cell phones and their EMF emissions were measured on, receiving and transmitting modes.

For this research work Narda 8718 B Radiation Survey Meter was used. These 8700 series EMF measurement system offers a very broad selection of probes. 8700D series probe has a quick release, eight pin connector that allows the probe to attach directly to 8718B Radiation Survey meter and hence it was used. The 8718 B Radiation Survey

meter can store up to 6 probes. The procedure illustrated in Narda EM Radiation Survey Meter 8718B [18] & [19] was followed in measuring the direct digital readings for selected six mobiles in three conditions, i.e.; ON, Receiving and Transmitting conditions. The auto-zeroing with international calibration and spatial averaging facility of this radiation Survey meter were utilized for this research work. The Narda 8718 B radiation Survey meter and 8700 D antenna probe are as shown in figure 1. Below.



Figure 1: Radiation Survey Meter 8718B with 8710 Probe

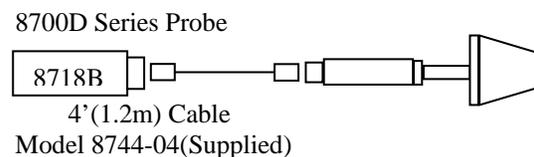


Figure 2: Radiation Survey Meter 8718B Connectivity with 8710 Probe

The following salient features and steps were followed in the research work for EMF emissions measurement.

- (a) Connecting the antenna probe 8710 D with the Radiation Survey Meter.
- (b) Placing the probe inside the radiation free storage case.
- (c) Switching on the meter.

- (d) Selecting the exact probe model from the list of probes.
- (e) Selecting the test frequency.
- (f) Auto zeroing with inbuilt features of the meter.
- (g) Reading the back ground EMF level.
- (h) Measure the EMF levels in different modes (on/Tx/Rx) placing different models of mobiles at the same distance from the probe.
- (i) Subtracting the back ground levels from the respective readings.
- (j) Tabulating the EMF data according to the modes and the models.

population will be having cell phone connectivity, though not included in this research work. Table 3 indicates the experimentally measured and averaged EMF radiation levels at 800 and at 1800 MHz centre frequencies. These measurements are for 30 selected cell phones during On, receiving and Transmitting conditions at centre frequencies of 800 MHz and at 1800 MHz.

The table 4 and 5 illustrate the EMF radiated power densities of India, China, USA and the entire world due to different statuses of cell phones alone such as on, receive and transmit conditions at 800 MHz and 1800 MHz centre frequencies for 2020 to 2050.

### III Results , Analysis and Discussion

The EMF radiation levels of 6 randomly selected cell phones were experimentally measured using Narda Radiation Survey meter 8718 B along with probe 8700D. The EMF levels were determined under three specific conditions on cell phones, namely ON, Receiving and Transmitting conditions. These measurements were carried out at centre frequencies of 800 MHz and 1800 MHz.

The table 1 shows the population projections for 2050 and table 2 indicates the cell phones projections for 2050 for India, China, USA and the entire world. In this research work for calculating cell phones projections for India, China, USA and the world for 2050, it is assumed that 74.71%, 75.32, 103.9% and 87% of respective countries population will be owning the cell phone connectivity. It is seen that 154% of Russian

#### (a) EMF Radiation projections for India

In 2020 when India is asleep and all cell phones are in on(sleep) mode, India emits EMF power density of 27.14 and 79.56 million watts per square meter at 800 MHz, 1800 MHz into environment respectively. By 2050 these figures would increase to 33.91 & 99.36 million watts per square. These figures for 2030 and 2040 are as shown in tables 4 and 5 respectively. The radiated power densities when all cell phones of India are in receiving and transmitting modes are also shown in tables 4 & 5 at stated frequencies for 2020,2030,2040 and for 2050. The cell phones radiated power densities in on, receive and transmit modes by India at 800 MHz, 1800 MHz shown in bar charts in figures 3 and 4 for 2020, 2030, 2040 and 2050 respectively.

Assuming that 50% of cell phones of India are transmitting and 50% are receiving which is most realistic, in 2020 India will contribute 2517 and 3257.5 million watts per square meter into environment at 800 MHz and at 1800 MHz respectively at any given time. These quantities will increase to 3140 and 4068 million watts per square meter by 2050 respectively at 800 and 1800 MHz at any given time by India.

(a) EMF Radiation projections for China

In 2020 when China is asleep and all cell phones are in on(sleep) mode, China emits EMF power density of 29.26 and 84.74 million watts per square meter into environment at 800 MHz and at 1800 MHz respectively. By 2050 these figures would reduce to 27.38 & 80.24 million watts per square at the above stated frequencies. The radiated power densities when all cell phones of China are in receiving and transmitting modes are shown in tables 4 & 5 at stated frequencies for 2020, 2030, 2040 and for 2050. The cell phones radiated power densities in on, receive and transmit modes by China at 800 MHz, 1800 MHz are shown in bar charts in figures 5 & 6 for 2020, 2030, 2040 and for 2050 respectively. Assuming that 50% of cell phones of China are transmitting and 50% are receiving which is most realistic, at any given time by 2020 China will radiate 2709 and 4633 million watts per square meter into environment at 800 MHz and at 1800 MHz respectively. These quantities will reduce to 2535 and 3285 million

watts per square meter by 2050 at 800 MHz and at 1800 MHz respectively.

(c) EMF Radiation projections for USA

by 2020 when USA is asleep and all cell phones are in on(sleep) mode, USA emits EMF power density of 9.227 and 27.04 million watts per square meter at 800 MHz, 1800 MHz into environment respectively. By 2050 these figures would be at 12.45 & 36.48 million watts per square meter at the above stated frequencies. The radiated power densities when all cell phones of USA are in receiving and transmitting modes are shown in tables 4 & 5 at stated frequencies for 2020, 2030, 2040 and for 2050. The cell phones radiated power densities in on, receive and transmit modes by USA at 800 MHz, 1800 MHz are shown in bar charts in figures 7 and 8 800 MHz

Frequency	Average Rad Power Density- On mode (w/m <sup>2</sup> )	Average Rad Power Density- Rx mode (w/m <sup>2</sup> )	Average Rad Power Density- Tx mode (w/m <sup>2</sup> )
800 MHz	0.0273	2.319	2.738
1800 MHz	0.08	3.198	3.354

Table 3. Average EMF radiation of a cell phone

Country	2020 Rad Power Density			2030 Rad Power Density		
	ON	Rx	Tx	ON	Rx	Tx
India	27.14	2306	2723	39.86	3385	3997
China	29.26	2485	2934	39.69	3371	3981
USA	9.227	783.8	925.4	9.964	846.4	999.3
World	187.6	15938	18819	209.8	17754	20962

Table 4(a) Cell phone EMF Radiation projections for 2030 at 800 MHz

Country	2040 Rad Power Density			2050 Rad Power Density		
	ON	Rx	Tx	ON	Rx	Tx
India	32.15	2731	3225	33.91	2880	3401
China	28.53	2423	2861	27.38	2423	2861
USA	11.13	946.2	1117	12.45	1057	1248
World	232.8	19771	23344	251.8	21385	25249

Table 4(b) Cell phone EMF Radiation projections for 2050 at 800 MHz

Country	2020 Rad Power Density			2030 Rad Power Density		
	ON	Rx	Tx	ON	Rx	Tx
India	79.56	3180	3335	116.8	4669	4896
China	84.74	3427	3594	116.3	4649	4876
USA	27.04	1080	1133	29.20	1167	1224
World	549.8	21979	23052	612.5	24484	25678

Table 5(a) Cell phone EMF Radiation projections for 2030 at 1800 MHz

Country	2040 Rad Power Density			2050 Rad Power Density		
	ON	Rx	Tx	ON	Rx	Tx
India	94.24	3767	3951	99.36	3971	4165
China	83.60	3341	3504	80.24	3207	3364
USA	32.64	1304	1525	36.48	1458	1704
World	682.1	27266	31870	737.8	29491	30930

Table 5(b) Cell phone EMF Radiation projections for 2050 at 1800 MHz for 2020, 2030, 2040 and for 2050 respectively.

Assuming that 50% of cell phones of USA are transmitting and 50% are receiving which is most realistic at any given time by 2020 USA will contribute 854.6 and 1106.5 million watts per square meter into environment at 800 MHz and at 1800 MHz respectively. These quantities will increase to 1152 and 1494 by 2050 at 800MHz and at 1800 MHz respectively

EMF Radiation projections for Entire WorldBy 2020 when entire world is asleep and all cell phones are in on(sleep) mode, entire world emits EMF power density of 187.6 and 549.8 million watts per square meter at 800 MHz and at 1800 MHz into environment respectively. By 2050 these figures would increase to 251.8 & 737.8 million watts per square meter respectively at the above stated frequencies. The radiated power densities when all cell phones of USA are in receiving and transmitting modes are shown in tables 4 and 5 at stated frequencies for 2020, 2030, 2040 and for 2050. The cell phones radiated power densities in on, receive and transmit modes by entire world at 800 MHz and at 1800 MHz are shown in bar charts in figures 9 and 10 for 2020, 2030, 2040 and for 2050 respectively.

Assuming that 50% of cell phones of entire world are transmitting and 50% are receiving which is most realistic at any given time, by 2020 entire

world will be radiating EMF power density of 17379 and 22516 million watts per square meter at 800 MHz and at 1800 MHz into environment respectively. These quantities will increase to 23317 and 30211 million watts per square meter by 2050 at the stated frequencies respectively.

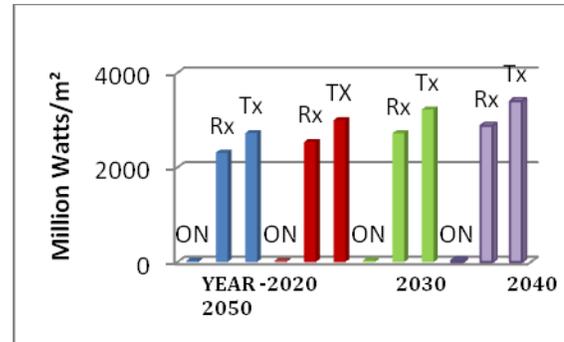


Fig3:Cell Phone EMF Radiation pollution projection for INDIA at 800MHZ

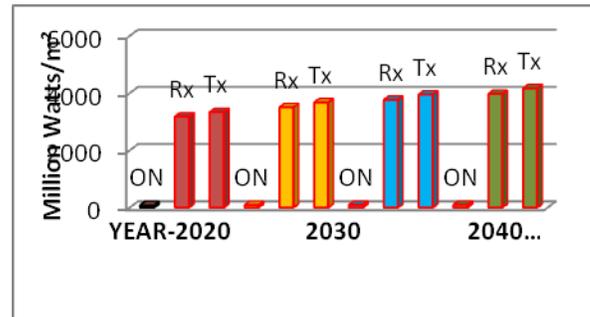


Fig4:Cell Phone EMF Radiation pollution projection for INDIA at 1800MHZ

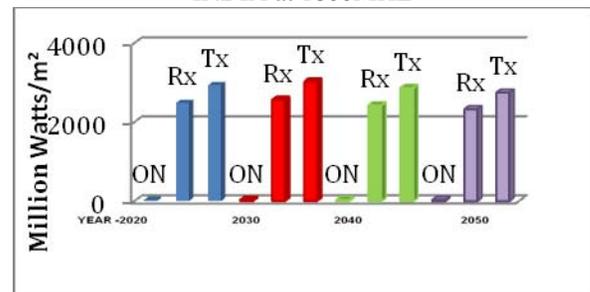


Fig5:Cell Phone EMF Radiation pollution projection for CHINA at 800MHZ

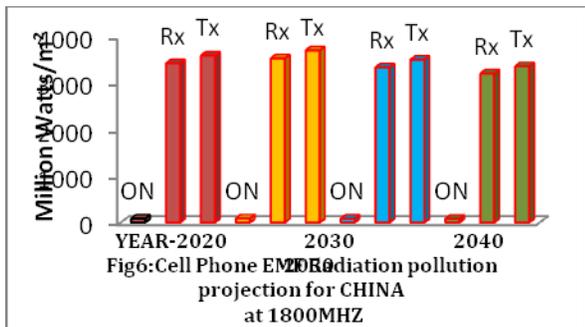


Fig6: Cell Phone EMF Radiation pollution projection for CHINA at 1800MHZ

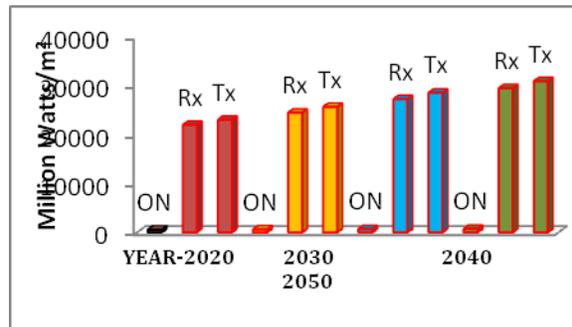


Fig10: Cell Phone EMF Radiation pollution projection for World at 1800MHZ

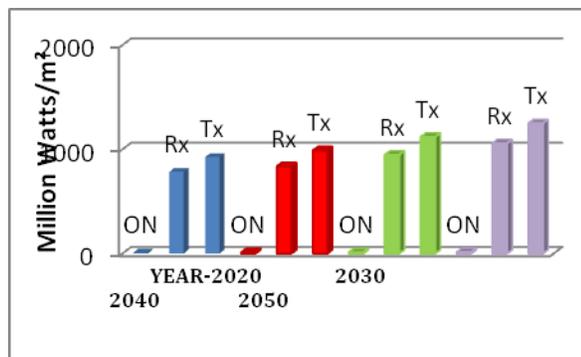


Fig7: Cell Phone EMF Radiation pollution projection for USA at 800MHZ

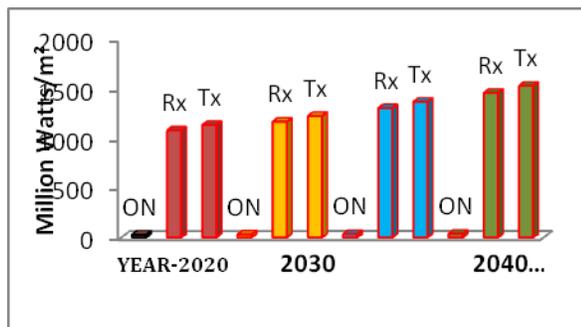


Fig8: Cell Phone EMF Radiation pollution projection for USA at 1800MHZ

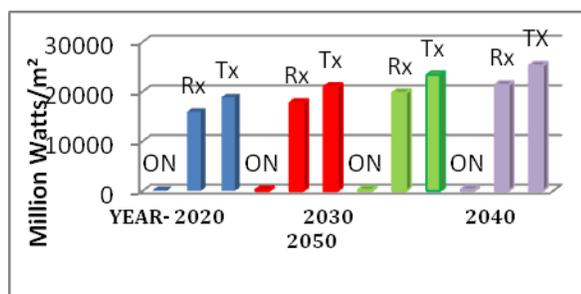


Fig9: Cell Phone EMF Radiation pollution projection for World at 800MHZ

#### IV. CONCLUSION

The cell phones connectivity in modern society have altered the land scape of human beings in countless beneficial ways, however created the environmental exposures to Electromagnetic fields. As technology progresses and data demands have increased on mobile network, towns, cities and even rural villages have seen sharp increase in the cell phone numbers as projected in table 2 for India, China, USA and the entire world. Further as the costs of mobile technology and the cell phones have fallen, their uses have multiplied dramatically and the overall levels of exposure of the population and environment as a whole have increased drastically. The RF sources emit EMF radiation continuously. The level of EMF from sources has risen exponentially, by soaring popularity of wireless technology. As of now there are no long term data available on environmental impacts of EMF radiation, in spite of the recent studies indicating possible harmful effects on several species. Moreover, electronic pollution from EMF radiation being a relatively new environmental issue. There is a lack of established standard procedures and protocols to

study and monitor the EMF effects especially among wildlife/ environment, which often make the comparative evaluation between studies difficult. In addition the uncoordinated research in this field, the necessary regulatory policies and their poor implementation mechanism also have not kept pace with growth of wireless technology.

There had already been some warning bells sounded in the case of bees and birds, which probably heralds the seriousness of this issue and indicates the vulnerability of other species as well. The EMF radiations are being associated with the observed decline in the population of sparrow in London and several other European cities[20]. In this research work Population and cell phones projections have been stated for India, China, USA and the world for 2020 to 2050.

A cell phone that is 'ON', but not in use also radiates EMF energy. The EMF radiations from 30 randomly selected cell phones were measured using 8718B radiation survey meter with antenna probe 8710D. This meter has auto zeroing and spatial averaging facility to determine radiated power density. Based on this measurements and determination the projection of EMF radiated quantities in to environment for India, China, USA the whole world have been successfully projected with bar charts at three different status of cell phones such as on, receive and transmit modes. These projections are included for two different frequencies for 2020, 2030,2040 and for 2050.

These measurements were carried out at 800 MHz and at 1800MHz respectively.

It is seen that when the entire world sleeps and cell phones are in on(sleep) mode it radiates power densities of 549.8, 612.5, 682.1 and 737.8 millions of watts per square meter 2020,2030,2040 and 2050 at 1800 MHz respectively. Realistically assuming 50% of world is asleep at any given time the world radiates EMF power densities of 274.9, 306.25, 341and 361 millions of watts per square meter into environment by 2020, 2030, 2040 and 2050 respectively. Similarly, assuming that 50% of the world is awake and is transacting routine business, the world will radiate power densities of 22575.5, 25081, 27931 and 30211 millions of watts into environment at any given time by 2020, 2030,2040 and 2050 at 1800 MHz respectively. This assumption of 50% of the world transacting business means 50% of cell phones are in transmitting mode and rest 50% are in receiving mode.

The power density quantities measured for 2013 and projected for 2050 call for immediate uniform EMF radiation policies. This is more so when referred to International Exposure Standards, in this it is seen that USA, Canada and Japan have  $12\text{W}/\text{m}^2$ , ICNIRP [21] and European recommendation 1998-adopted in India has  $9.2\text{w}/\text{m}^2$  (Reduced by 10 times in 2012by India), exposure limit in Austria is  $0.001\text{w}/\text{m}^2$ . The EMF radiation projected in this research paper expected to be approximately correct and will be same into the environment across the world. It cannot recognize the Geography of any

country. There is a strong case in point to have a uniform EMF radiation policy across the world. This is more so because of the reason that cell phones can work in Austria with exposure limit of  $0.001\text{w/m}^2$  and in USA, Canada and Japan with the exposure limit of  $12\text{W/m}^2$ , there is a strong message from this research paper to advocate that entire world needs a single exposure policy. The EMF projections due to cell phones alone along with other EMF sources must be used as the precautionary principle and should prevail to better the standards of EMF radiation limits to match the best in the world to sustain the environmental safety.

### REFERENCES

- [1] Hardell L. Carlberg M, Mild KH, pooled analysis of two case controlled studies on the use of cellular and cordless tele2 phones and the risk of benign brain tumours diagnosed during 1997-2003 Journal Int J Oncol ; 28: 509-518.
- [2] Gavin.G.Shire, Karen Brown, Gerald Winegard, Communication Towers : A deadly hazard to Birds, June 2000.www.abcbirds.org.
- [3] Joris Everaest & Birk Banwens, Possible effect of electromagnetic Radiation from mobile phone base stations on the number of breeding house sparrow.2007 www.informaworld.com.
- [4] WHO/Electromagnetic Fields & Public Health. www.who.int.docstore/peh-emf/publications/fact-press/effects193.html.
- [5] www.nytimes.com/2011/04/17/--/mag-17 cellphones.
- [6] Brain Tumour-wikipedia, the free encyclopedia- www.wikipedia.org/wiki/Brain\_Tumour.
- [7] Report of the Inter-Ministerial committee on EMF radiation- www.dot.gov.in/miscellaneous/mc%20 Report.
- [8] www.ee.iitb.ac.in/--/GK.
- [9] Wildlife and Environment-Citizens for safe Technology- citizensfortechology.org/electromagnetic-pollution-from-phone--.
- [10] "World Bank Census ", data.worldbank.org
- [11] www.China-profile.com/data/fig\_pop\_wpp2006.htm
- [12] www.pewsocialtrends.org/us-population-projections-2005-2050.
- [13] List of countries by population-Wikipedia, the free encyclopedia.
- [14] www.worldometers.info/world-population.
- [15] www.Census.gov/main/www/popclock.html.
- [16] United Nations-Dept of Economic & social affairs, www.un.org
- [17]http://en.wikipedia.org/wiki/List\_of\_countries\_by\_number\_ofmobile\_phones\_in\_use.
- [18] Operations manual-Narda Safety Test Solutions, www.narda.sts.us/pdf\_files/--/8715-EMRSurveymeter.pdf.
- [19] Narda Model 8718 Operational Manual-Narda Safety Solutions.
- [20] Alfonso Balmori & orjan Halberg, The urban decline of house sparrow : A possible link with Electromagnetic radiation, June 2007, Electromagnetic Biology & medicine, informa Healthcare, www.informaworld.com.
- [21] ICNIRP Guidelines for RF exposures, en.wikipedia.org/-/International Commission\_on\_Ioniing Radiation---
- [22] Bio-initiative report published in US 2007.
- [23] WHO/Electromagnetic Fields & Public Health, www.who.int/docstore/peh-emf/publications,fact-press/efactefs193.html.



# SOFT SKILLS COMPETENCY TOOL FOR SECONDARY TEACHERS IN STRENGTHENING EFFECTIVE COMMUNICATION AND INTERPERSONAL COMPETENCE- A CASE STUDY

Ku Kali Clara Anand

## ABSTRACT

*It is said that a mediocre teacher tells, a good teacher explains, a superior teacher demonstrates and a great teacher inspires. A great teacher can make a student feel inspired; as though h/she can do anything in the world if h/she sets his/her mind to it. The objectives of this research are to examine the level of soft skills among secondary school teachers on the basis of gender. Two research questions are to examine in this paper: (1) what is the relationship between male and female and their level of communication skills. (2) What is the relationship between male and female and their level of inter personal relationship skills . The analysis is based on survey method of 6 different secondary school male female teachers of Lohardaga Dist. Jharkhand. Random sample was drawn from 92 secondary school teachers to collect the data self- constructed and standardized tool was developed and used to administer the test. Pearson Product moment correlation and t - test were used to analyses the data. Findings of the study revealed that there is no significant difference in the level of communication skills in male and female secondary school teachers and also there is no significant difference in the level of interpersonal relationship skills in the male and female secondary school teachers.*

**Key Words:** *Soft skills, Secondary Teachers, Interpersonal Competence, Effective Communication, Gender.*

## I. INTRODUCTION

Committed thinkers and reformers can be centers of dissent in education circles and become harbingers of change. Where education has lost its balance in favor of information Communication and development of interpersonal relationship, new emphasis has been shifted towards humanistic development or personal formation. The United Nations development Report of (1999) talks about the development of a human faces and need for caring Professions. The schools& homes are surely the place of humanistic development. It needs to

develop some human skills, people's skills or soft skills, which can help in bringing people together in love. A teacher who plays the role of teacher in the class room and yet remains an educator outside the class room needs to wear soft skills in her/his personality and transmit it in the life of the students. Kothari commission (1964-66) observed rightly when it dealt with quality of education that 'quality, competence and character' of the teachers are of significant importance. A teacher with some set of qualitative skills may enhance teaching efficiency and progress in quality of education. Skill is defined as a practiced ability or expertise in given ability.

Roffins and Hunsaker (1996) defined skill” as a system of behavior that can be applied in a wide range of situations”. Basically skills are of two types, hard skills & soft skills. Hard skills is meant to perform the function of a specific work, it gains technical ability through Education both theory and practice. However hard skills alone might not be sufficient, it needs soft skills to Complement successfully in Job or classroom. Soft skills are called human skills, people skills, life skills. They are generally interpersonal competencies, a diverse range of abilities. e.g.: communication skills, interpersonal relationship skills, Team building skills, leadership skills, Time management skills and problem solving skills etc. The present education system is greatly in need of soft skills, formation of buildings and equipment may bring modernization in infrastructure but will always lack persons as human beings with love, care understanding and other ethical values. Soft skills are important for they handle: -interpersonal relations, -take appropriate decisions,-communicate effectively,-gain professional development

Relationships are the keys of human life. A teacher who has problems with interpersonal relationship and effective communication suffer from lack of soft skills. Hence a continuous renewal of soft skills through teaching and training of teachers is a must.

## II. OBJECTIVES

**Need and purpose of the study** . Present paper is an attempt to use soft skills as a tool for Interpersonal competence and effective communication and to examine the level these skills

in male and female secondary teachers of Lohardaga Dist. Jharkhand

## III. METHODOLOGY

The investigator has adopted the ‘survey method’ to investigate the soft skills(a)**Population and sample**  
The population of the present study consists of 6 secondary school teachers of Lohardaga, Jharkhand .The sample consists 90 male and female secondary teachers.

### (b)Administration of tools

The tools were distributed to the randomly selected secondary teachers. They were given 5 days’ time to respond the 32 items of inventories. All the teachers responded.

### (c)Data analysis

The data were analyzed by using mean, Sd, t – test & correlation

### (d)Objectives

The present study is concerned with Soft skills in the secondary school teachers of Lohardaga Dist. By this study the investigator wants to find out the level of soft skills among male and female teachers.

## IV. HYPOTHESES

- (a) There is no significant difference in the level of soft skills among male and female secondary teachers.
- (b) There is no significant difference in the level of communication skills in the secondary teachers both male and female.
- (c) There is no significant difference in the level of interpersonal relationship skills in the secondary teachers both male and female.

## V. RESULT

Significance of difference between mean scores of communication skill for

**Male and Female secondary Teachers**

Gender	N	Mean	SD	df	t-test	Level of significant (At 5% L S )
Male	46	62.95	7.34	90	1.08	Ns
Female	46	64.54	6.61			

Table – 1 (For 90 df, at 5 % Level of significance the table value of t - test is = 1.66)

It is inferred from the above table that calculated t-ratio between male female secondary teachers is 1.08 which is less than the table value of t- ratio 1.66 at 5% level of significant. Therefore the Null hypothesis is accepted. Hence there is no significant difference in communication skills of secondary teachers on the basis of gender.

Significance of difference between mean scores of Interpersonal skills for

**Male and Female secondary Teachers**

Gender	N	Mean	SD	df	t.v	Level of significant (At 5 % LS)
Male	46	53.13	6.45	90	1.49	Ns
Female	46	55.10	6.22			

Table – 2 (For 90 df, at 5% Level of significance the table value of t – test is = 1.66)

It is inferred from the above table that calculated t-ratio between male female secondary teachers is 1.49 which is less than the table value of t- ratio 1.66 at 5% level of significant. Therefore the Null hypothesis is accepted. Hence there is no significant difference in interpersonal relationship skills of secondary teachers on the basis of gender. There is no significant relationship between communication skills of male and female secondary teachers.

Table: 1

Communication Skill of Male		Communication Skill of Female		Σxy	Number	Correlation Value (r)	Level of Significance (At 5% LS)
Σx	Σx <sup>2</sup>	Σy	Σy <sup>2</sup>				
289	18476	296	19369	187423	92	0.230	Significant

Table-3 (For 90 df, at 5% level of significance the table value of ‘r’ is 0.205)

It is inferred from the above table that the calculated value of correlation is 0.230, which exceeds from the table value of correlation 0.205 at 5 % level of significant. Therefore Null hypothesis is rejected. Hence there is significant relationship between the interpersonal skills of male and female secondary teachers.

There is no significant relationship between interpersonal relationship of male and female Secondary teachers.

Interpersonal Relationship Skill of Male		Interpersonal Relationship Skill of Female		Σxy	Number	Correlation Value (r)	Level of Significance (At 5% LS)
Σx	Σx <sup>2</sup>	Σy	Σy <sup>2</sup>				
244	13174	253	14145	135073	92	0.214	Significant

Table: 4 (For 90 df, at 5% level of significance the table value of ‘r’ is 0.205)

It is inferred from the above table that the calculated value of correlation is 0.214, which exceeds from the table value of correlation 0.205 at 5 % level of significant. Therefore Null hypothesis is rejected. Hence there is significant relationship between the communication skills of male and female secondary teachers.

## VI. INTERPRETION

Mean scores of communication skills is less than the table value of t-ratio. Therefore the findings reveal that there is no difference in communication skills of secondary teachers. Teachers s/he must have good command over communication skills. They need to work hard to be able to share their knowledge fluently and freely to the students. The teacher training program gives full opportunities for skills development and in-service also teachers get many chances to attend seminars and workshops. This skill is the back bone for teacher's career and a help in personality development. Through practice teachers can become excellent and effective.

Mean scores of Interpersonal relationship skills is less than table value of t-ratio. Therefore findings reveal that there is no difference in IPR skills of secondary teachers. Teachers need to improve in building up mutual understanding between teacher and taught and with others in society IPR Relationship will built trust and healthy environment in the class-room teacher learning situation.

The (r) test shows that female teacher are better in communication skills than male teachers. Female teachers are more effective in listening, Presentation and delegation which is very positive for student's academic excellence on the other hand male teachers need to practice more fluent in language, inculcate listening power and delegation to be more effective in class-room.

The (r) test for Interpersonal relationship skills in female teacher shows their attitude to support and encourage students. They are trustworthy that's why student can solve their entire problem without any hesitation and grow in their behavior pattern. Male teachers need to develop in these skills, by giving and receiving constructive criticism and conveying his/her point clearly to the students.

## VII. CONCLUSION:

Teachers have a great responsibility in developing the society and its values and good culture. They are the transmitters of culture. Soft skills as communication skills and interpersonal relationship skills are needed at different level in the class-room and in society to, communicate effectively and built relationship deeply. Hence, it is essential that the teachers equip themselves with these soft skills in order to carry out the teaching profession efficiently, effectively and meaningfully and in turn to shape the future generation into a quality human capital with knowledge, understanding, values and skills which would envisage a sustainable development of self, society and world at large.

## REFERENCE

- [1] Siddiqi,N, & Gaur,p (2000) Educational Technology and teaching skills, Doabha House, New Delhi.
- [2] Bharti,T(2004) PersonalityDevelopment, Neelkamal Publications Pvt.Ltd, Hydrabad.
- Rao,VSP.(2010) Managerial skills, Excel Books, New Delhi.
- [4] Maurus J. (1996) The Art of Communicating Effectively, Better yourself Books, Bandra Mumbai. Pinto L. (2003) Holistic Education, Dharma Bharthi National

Movement of Value Education for peace, 100, saket Nager,  
Indore.Articles

[5] Pathak,& Pathak “Integration of life skills in the pre-service teacher Education: Lessons from a Experiment.”Researching wholstic Education, CASE, Faculty of Edu.& Psy. The M.S. university of Baroda, P.P. 53-62Journals:

[6] Priya, R. Sasi and Raja, P. Anna., Soft skills for prospective teacher”. Edutracks, Vol.10,no.7, March2011Web.“How to Improve Yoaur Soft Skills at Work” [www.rediff.com](http://www.rediff.com), 09 Jan. 2007, Web.21 Jan.2013“Importance of Soft Skills Development in Education” [www.schoololofeducators.com](http://www.schoololofeducators.com), Feb. 2009, web. 21 Jan 2013

[7] Lee, Li-Tze and Lee, Tien-Tse., “Investigating Soft Skills for Success in the Work Force: Perception of Elementary School Teacher” International Review of Social Sciences and Humanities, Vol.1, No.2, 2011, [www.irssh.com](http://www.irssh.com), n.d., web.05 Jan.2013

# COMPARATIVE ANALYSIS OF DIFFERENT THRESHOLD ESTIMATORS FOR NOISE REDUCTION

M. Zahid Alam<sup>1</sup>, Dr. Ravishankar Sharma<sup>2</sup>, Dr. A.S Zadgoankar<sup>3</sup>.

AISECTUniversityBhopal<sup>1</sup>, SISTEC Bhopal<sup>2</sup>

CV Raman University, Bilaspur (CG)<sup>3</sup>

## ABSTRACT

*The choice of threshold in wavelet based image denoising is very important. It has been seen that wavelet thresholding methods had better results than classical methods. However estimation of threshold and selection of thresholding function are still the challenging tasks. Threshold determination depends on the pixel characteristics and not on the size of image to be denoised. Different Threshold estimators are applied to image corrupted with Gaussian, poisson & speckle noise. Finally all the images are compared on the basis of PSNR & MSE.*

**Keywords:** Wavelet transforms, AWGN, Threshold, image denoising, wavelet thresholding

## I. INTRODUCTION

Noise in an image is a very critical problem. Estimation of threshold is very important in image denoising. Noise may be classified as substitutive noise and additive white Gaussian noise. In this paper, White Gaussian, Poisson & Speckle Noise are applied to different images. Wavelet domain based noise removal techniques need some threshold value for removing small coefficients because small coefficients are usually noisy and large coefficients contain main features of image. Therefore, estimating threshold and determining thresholding rules are still challenging problems in wavelet denoising. Removal of noise is very important area of research. An image gets corrupted with different types of noise during the processes of transmission, reception, and storage & retrieval. Image denoising is usually required to be performed before display of image or further processing like image analysis, image recognition, image

segmentation etc. Recently, various nonlinear and various adaptive filters have been suggested for the purpose. The objectives of wavelet schemes are to reduce noise as well as to retain the edges and fine characteristics of the original image in the restored image as much as possible. Thus we have developed an adaptive threshold determination technique based on spatial context modeling of different wavelet coefficients. Here the image has been broken down into different blocks of images. Noise of different variance level has been added and it is passed to wavelet denoising techniques for noise suppression. The proposed algorithm is evaluated in terms of mean square error, peak signal to noise ratio and processing time.

## II. PREVIOUS WORK

Turgay Celik [1] proposes a novel technique for unsupervised change detection in multi temporal satellite images using principal component analysis and k-means clustering. The image is partitioned

into different blocks. Ortho normal eigen vectors are extracted through PCA of  $n \times n$  non overlapping block set to create an eigenvector space. Simulation results show that the proposed algorithm performs quite well on combating both the zero-mean Gaussian noise and the other noise, which is quite attractive for change detection in optical and SAR images. S.Sudha, G.R.Suresh and R.Sukanesh [2] presents a wavelet-based thresholding scheme for noise suppression in ultrasound images. The results obtained by the proposed method with the results achieved from the other speckle noise reduction techniques demonstrate its higher performance for speckle reduction. T.Ratha Jeyalakshmi and K.Ramar [3] they described and analyzed an algorithm for cleaning speckle noise in ultrasound medical images. Mathematical Morphological operations are used in this algorithm. This algorithm is based on Morphological Image Cleaning algorithm (MIC). The algorithm uses a different technique for reconstructing the features that are lost while removing the noise. For morphological operations it also uses arbitrary structuring elements suitable for the ultrasound images which have multiplicative noise. Pierrick Coup'e, Pierre Hellier, Charles Kervrann and Christian Barillot [4] proposed a Bayesian Non Local Means-Based Speckle Filtering. In their proposal, a new version of the Non Local (NL) Means filter adapted for US images is proposed. Originally developed for Gaussian noise removal, a Bayesian framework is used to adapt the NL means filter for noise. Experiments were carried out on

synthetic data sets with different speckle simulations. Nonlocal Means-Based Speckle Filtering for Ultrasound Images is presented by [5]. In this method, an adaptation of the nonlocal (NL) means filter is proposed for speckle reduction in ultrasound (US) images. Originally developed for additive white Gaussian noise, we propose to use a Bayesian framework to derive a NL-means filter adapted to a relevant noise model. Results on real images demonstrate that the proposed method is able to preserve accurately edges and structural details of the image. M. I. H. Bhuiyan, M. Omair Ahmad, Fellow, IEEE, and M. N. S. Swamy [6] presented Wavelet-Based Despeckling of Medical Ultrasound Images with The Symmetric Normal Inverse Gaussian Prior. In their proposal, an efficient wavelet-based method is proposed for despeckling medical ultrasound images. A simple method is presented for obtaining the parameters of the SNIG prior using local neighbors. Thus, the proposed method is spatially adaptive. Jeny Rajan and M.R. Kaimal [7] In their paper they discuss the speckle reduction in images with the recently proposed Wavelet Embedded Anisotropic Diffusion (WEAD) and Wavelet Embedded Complex Diffusion (WECD). Both these methods are improvements over anisotropic and complex diffusion by adding wavelet based bayes shrink in its second stage. Both WEAD and WECD produce excellent results when compared with the existing speckle reduction filters. Philip Langley proposed a denoising method for hyperspectral data cubes. Experimental results demonstrated that the

proposed denoising methods produces better denoising results in terms of PSNR. Ioana Firoiu, Corina Nafornta [11] proposes the use of a recently introduced hyperanalytic WT (HWT), in association with filtering techniques already used with the discrete wavelet transform. The result is a very simple and fast image denoising algorithm. Lei Zhan& Rastislav Lukac [12] proposes a principle component analysis based spatially-adaptive denoising algorithm, which works directly on Colour Filter Array data using a supporting window to analyze the local image statistics. By exploiting the spatial and spectral correlations existed in the CFA image, the proposed method can effectively suppress noise while preserving color edges and details. Experiments using both simulated and real CFA images indicate that the proposed scheme outperforms many existing approaches, including those sophisticated demosaicking and denoising schemes, in terms of both objective measurement and visual evaluation.

### III. WAVELET THRESHOLDING

Here we have considered different threshold estimation algorithm . Different Gaussian ,Poisson and speckle noise is applied to different threshold estimators such as rigrsure, heursure minimaxi & Sqrtwolog.Comparision of different threshold estimators have done on classical grey scale lena image and the results have been compared on the basis of Peak signal to Noise Ratio and Mean Square Error. Sure shrink method is widely used as orthonormal wavelet transform for wavelet thresholding. The idea behind SUREshrink is to set

to zero all coefficients below a certain threshold value T, while shrinking the remaining ones by this same value; this technique is thus also called soft thresholding.

$$f(y) = \text{sign}(y)(|y| - T)^+$$

The soft thresholding function has been shown to be near optimal value. The threshold value T is then selected so as to minimize the risk level. The mean squared error (MSE) in the image domain is preserved in the wavelet domain. Hence, we can write it as follows:

$$\text{MSE(Image Domain)} = \frac{1}{N} \sum_{i=1}^N \sum_{j=1}^J (c_{ij} - f_{ij})^2 \tag{1}$$

$$= \frac{1}{N} \sum_{j=1}^J \sum_{i=1}^{NJ} (c_{ij} - f_{ij})^2 \tag{2}$$

$$= \text{MSE (Wavelet Domain)}$$

Where N is the number of samples;

J is the number of channels;

NJ is the number of samples in the channel j.

I is the it sample of the jet channel.

As the non-noisy wavelet coefficients are unknown, we need to estimate the MSE using Stein’s unbiased risk estimator (SURE).Its minimization according to our particular estimator  $\hat{x} = \square(y)$  leads to:

$$\text{SURE}_j(t,y) = \sigma^2 - 1/N_j (2 \sigma^2 \cdot \#\{i:|y_i| \leq t\} + \sum_{i=1}^{N_j} \min(|y_i|, t^2)) \tag{3}$$

The resulting threshold is thus:

$$T_j = \text{argmin} (\text{SURE}_j(t,y)) \tag{4}$$

To better adapt to image discontinuities, we need to select a new threshold for each wavelet sub-band of successive scales, except the low-pass residual. This method is thus known as adaptive with respect to the sub-bands.The SURE principle can also be used

to optimize the  $(\alpha, \beta)$ -parameters of the fractional B-spines. To estimate the noise variance  $\sigma_n^2$  from the noisy wavelet

coefficients, a robust median estimator is used from the finest scale wavelet coefficients.

$$\sigma_n^2 = \text{Median}(|y_i|) / 0.6745 \quad (5)$$

Where  $y_i$  is element of sub band  $HH_1$ .

Donoho's has proposed the fixed thresholding based reduction of noise in images. Here, the value of threshold  $(t)$  is computed as:

$$t = \sigma \sqrt{2 \log(n)} / n \quad (6)$$

where  $\sigma = \text{MAD} / 0.6745$  where MAD is the median of wavelet coefficients and  $n$  is the total number of wavelet coefficients.

**(a) Global Thresholding ( $w_{tq}$ )**

This is known as fixed threshold or global thresholding method and it is calculated as:

$$w_{tq} = \sqrt{2 \log(n)} \quad (7)$$

where  $n$  is the total number of wavelet coefficients.

**(b) Rigrsure( $w_{tsu}$ )**

Steins unbiased risk estimator (SURE) or rigrsure is an adaptive thresholding method which is proposed by Donoho and Jonstone.

**(c) Heursure ( $w_{th}$ )**

Heursure threshold is a combination of SURE and global thresholding method. If the signal-to noise ratio of the signal is very small, then the SURE method estimation will account for more noises. In this kind of situation, the fixed form threshold is selected by means of global thresholding method.

*Minimax* ( $w_{tm}$ ) Minimax threshold is also used fixed threshold and it yields minmax performance for Mean Square Error (MSE) against an ideal

procedures. Because the signal required the denoising can be seen similar to the estimation of unknown regression function, this extreme value estimator can realize minimized of maximum mean square error for a given function.

IV. COMPARATIVE ANALYSIS OF IMAGE FOR DIFFERENT THRESHOLD ESTIMATORS

Gaussian Noise								
Variance	Rigrsure		Heur sure		Sqrtwolog		Minimaxi	
	PSNR	MSE	PSNR	MSE	PSNR	MSE	PSNR	MSE
0.005	27.3	86.2	25.4	133.1	133	25.5	25.6	144
0.003	28.8	75.5	28	77.5	27.5	77.9	27.3	85.6
0.001	28.1	68.7	33.1	23.7	32.9	23.77	32.4	26.7
0.02	21.6	321.2	19.2	558	19.1	557	19.01	585
0.01	25.7	125.1	22.2	275	22.3	276	22	293

Table I: Comparison of different threshold estimators for classical Lena image distorted by Gaussian Noise

Poisson Noise								
Variance	Rigrsure		Heur sure		Sqrtwolog		Minimaxi	
	PSNR	MSE	PSNR	MSE	PSNR	MSE	PSNR	MSE
0.005	28.2	69.9	29.8	48.8	29.9	48.9	29.4	53.5
0.003	28.4	67.7	29.8	48.4	29.6	48.1	29.3	54
0.001	28.3	68.4	29.6	47.6	29.8	48	29.4	53.1
0.02	28.3	68.9	29.9	47.6	29.8	48	29.3	53.2
0.01	28.36	68.01	29.91	47.8	29.7	47.1	29.4	54.5

Table II: Comparison of different threshold estimators for classical Lena image distorted by Poisson Noise

Speckle Noise								
Variance	Rigrsure		Heur sure		Sqrtwolog		Minimaxi	
	PSNR	MSE	PSNR	MSE	PSNR	MSE	PSNR	MSE
0.005	28.6	63.6	31.4	33.5	31.2	33.1	30.9	37.5
0.003	28.9	59.4	33.7	19.7	33.5	25.1	33.27	21.4
0.001	29.2	55.8	38.8	7.14	38.1	10.1	38.15	7.14
0.02	26.8	96.4	24.9	147.9	24.91	151	24.6	159.9
0.01	27.9	74.2	28.8	71.2	29.3	76	27.8	77.1

Table III: Comparison of different threshold estimators for classical Lena image distorted by Speckle Noise

## V. EXPERIMENTAL RESULTS

The algorithms are programmed in MATLAB and the simulated results for PSNR(Peak signal to noise ratio) & MSE(Mean Square Error) are compared with different threshold estimators With Gaussian , poisson & speckle noise. Table I, II & III shows the values of PSNR and MSE for different threshold estimators. Different wavelet functions and four threshold rules have considered in analyzing the performance of denoising the images using soft thresholding method. From the literature, we have seen that, wavelet transform shows a good performance on denoising classical lena images. However, the selection of appropriate wavelet functions and number of wavelet different decomposition level is still an important issue to remove the various kinds of noises from the images.

## VI. CONCLUSION AND FUTURE PROSPECTS

In this work, different wavelet estimators are compared for noise reduction. Four thresholds estimators rigrsure, heursure, sqtwolog and minimaxi are respectively used in the process of wavelet denoising . Simulation results show that different selection of the wavelet thresholds estimators have significant impact on the de-noising results. The evaluation indexes include Peak signal to noise ratio (PSNR), and mean square error (MSE). As future work, we would like to work further on the comparison of different denoising techniques. We would also like to reduce mean

square error with less processing time. Besides, the complexity of the algorithms we would also like to improve Signal to Noise ratio. These points would be considered as an extension to the present work done.

## REFERENCES

- [1] Turgay Celik , "Unsupervised Change Detection in Satellite Images Using Principal Component Analysis and k-Means Clustering" IEEE Geoscience and Remote Sensing Letters, Vol. 6, No. 4, October 2009
- [2] S. Sudha, G.R Suresh and R. Suknesh, "Speckle Noise Reduction in Ultrasound images By Wavelet Thresholding Based On Weighted Variance", International Journal of Computer Theory and Engineering, Vol. 1, No. 1, PP 7-12, 2009
- [3] T.Ratha Jeyalakshmi and K.Ramar "A Modified Method for Speckle Noise Removal in Ultrasound Medical Images" International Journal of Computer and Electrical Engineering, Vol. 2, No. 1, February, 2010 1793-8163.
- [4] Pierrick Coupe, Pierre Hellier, Charles Kervrann and Christian Barillot "Bayesian Non Local Means-Based Speckle Filtering" 2008 IEEE.
- [5] Pierrick Coupe, Pierre Hellier, Charles Kervrann, and Christian Barillot "Nonlocal Means-Based Speckle Filtering for Ultrasound Images" IEEE Transactions On Image Processing, Vol. 18, No. 10, October 2009.
- [6] M. I. H. Bhuiyan, M. Omair Ahmad, Fellow, IEEE, and M. N. S. Swamy "Wavelet-Based Despeckling Of Medical Ultrasound Images With The Symmetric Normal Inverse Gaussian Prior" 2007 IEEE.
- [7] Jeny Rajan and M.R. Kaimal "Speckle Reduction in Images with WEAD and WECD" ICVGIP 2006, LNCS 4338, pp. 184-193, 2006.
- [8] Y.Norouzzadeh, M.Rashidi, "Denoising in Wavelet Domain Using a New Thresholding Function" International IEEE Conference on Information Science and Technology March 26-28, 2011 Nanjing, Jiangsu, China
- [9] Jin Quan, William. G. Wee and Chia "A New Wavelet Based Image Denoising Method" Data Compression Conferece 2012 IEEE

- [10] Mr. Sachin Ruikar ,Dr. D.D Doye “*Image Denoising Using Wavelet Transform*”IEEE International Conference on Mechanical and Electrical Technology (ICMET 2010)
- [11] Ioana Firoiu, Corina Naornita, Jean-Marc Boucher, Alexandru Isar, “*Image Denoising Using a New Implementation of the Hyperanalytic Wavelet Transform*”IEEE Transactions on Instrumentation and Measurement ,Vol.58,Aug’2009.
- [12] Lei Zhang, Rastislav Lukac , Xiaolin Wu, and David Zhang, “*PCA-Based Spatially Adaptive Denoising of CFImages for Single-Sensor Digital Cameras*”, *IEEE Transactions on Image Processing*, Vol.18 , No.4 April’2009
- [13] J.-L. Starck, J. Fadili, and F. Murtagh, “The undecimated wavelet decomposition and its reconstruction,” *IEEE Trans. Imag. Process.*, vol. 16, no. 2, pp. 297–309,February 2007.
- [14] R. Coifman and D. L. Donoho, “Translation-invariantde-noising,” in *Lecturer Notes in Statistics : Waveletsand Statistics*. Springer-Verlag, 1995, pp. 125–150.
- [15] C. S. Anand and J. S. Sahambi, “Wavelet Domain Non-Linear Filtering for MRI Denoising,” *Magnetic ResonanceImaging*, vol. 28, no. 6, pp. 842–861, 2010.
- [16] S. G. Chang, B. Yu, and M. Vetterli, “Spatially Adaptive Wavelet Thresholding with ContextModeling for Image Denoising,” *IEEE Trans. Image Process.*, vol. 9, no. 9,pp. 1522–1531, September 2000.
- [17] C. Tomasi and R. Manduchi, “Bilateral filtering for gray and color images,” in *Proc. 6th Int. Conf. Computer Vision*,1998, pp. 839–846.
- [18] Z. Wang, A. C. Bovik, H. R. Sheikh, and E. P. Simoncelli,“Image quality assessment: From error visibility to structural similarity,” *IEEE Trans. Image Process.*,vol. 13, no. 4, pp. 600–612, April 2004.

# USE OF INFORMATION TECHNOLOGY IN DECISION MAKING: AN ORGANIZATIONAL STUDY OF JORHAT CITY

**Mokhalles M Mehdi**

The Assam Kaziranga University,  
Jorhat, Assam.

## ABSTRACT

*In the present world, which is dynamic and knowledge based, organizations have much wider role to play in creating, preserving, organizing, transmitting and applying knowledge. The physical locations and facilities have been less important in defining an organization due to the easy on-line access of the resources. The report aims to identify the IT infrastructure and the software used in decision making. The study is related to the IT infrastructure of organizations in Jorhat city. The responses were obtained by in-depth interviews with the employees of different organizations in Jorhat city. Results from in-depth survey indicate about the use of hardware, application software, operating systems, database and backup devices in the organization. The study brings forth that information systems (IS) application like payroll, accounting, billing, invoicing, inventory management and MIS report are the main resource of running an organization in decision making. The research concludes that the use of company's IT infrastructure and IS applications smoothens the top level management's decision making process because it provides information on mottled format and structure.*

**Keywords:** Ethics, Electronic, Security, On-line, Transferred, Damage, Hacking, Viruses.

## I. INTRODUCTION

Information Technology (IT), as defined by the Information Technology Association of America (ITAA) is “the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware.” IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and securely retrieve information. Today, the term information technology has ballooned to encompass many aspects of computing and technology, and the term is more recognizable than ever before. The information technology

umbrella can quite large, covering many fields. IT professionals perform a variety of duties that range from installing applications to designing complex computer networks and information databases. A few of the duties that IT professionals perform may include data management, networking, engineering computer hardware, database and software design, as well as the management and administration of entire systems. When computer and communications technologies are combined, the result is information technology, or “InforTech”. Information Technology (IT) is a general term that describes any technology that helps to produce, manipulate, store, communicate, and/or disseminate

information. Presumably, when speaking of information technology (IT) as a whole, it is noted that the use of computers and information are associated.

(a) Use of Information Technology in organizations  
IT offers many benefits to organizations, customers and society and these are as follows:

(i) IT expands a company's market place to national and international markets. With minimal capital outlay, a company can quickly locate more customers, the best suppliers and the most suitable business partners worldwide.

(ii) IT decreases the cost of creating, processing, distributing, storing and retrieving information by digitizing the process.

(iii) IT lowers telecommunications costs because the internet is cheaper.

(iv) IT helps small businesses compete against large companies.

(v) IT delivers relevant and detailed information in a second.

(b) Need for Information Technology in organizations

Organizations need to be involved in information technology (IT) – the amalgamation of hardware, software, data, people and procedures – because:

(i) The sheer magnitude of the dollars spent on IT must be managed to ensure business value.

(ii) Research has consistently shown that when managers are involved in IT, IT enables a number of business initiatives, such as gaining a competitive advantage, improving business processes,

expanding globally, and even starting new businesses. Senior managers must also understand how IT innovations may alter industry structures, such as IT's impact on the music industry.

(iii) Research has consistently shown that when managers are not involved in IT, systems fail, dollars are wasted – or at the extreme, companies can fail as a result of poorly managed IT.

Thus, IT enables or inhibits business objectives depending on management's involvement in IT. The big challenge IT managers are facing is: how do we get general managers involved?

Research has shown that involvement is highly correlated with personal experience with IT and with IT education, including university classes and IT executive seminars. Once general managers understand IT through experience and education, they are more likely to be involved in IT, and more likely to lead their organizations in achieving business success through IT.

(c) Effect of IT in a society

The information technology becomes boosted in today's generation from the field of business, educational institution down to the field of entertainment. Though IT work performance are boosted with less effort and greater productivity by using various operations. Learning has minimized because of different media that are being developed which are all interactive which brings learning experiences to the next level. Business have grown and expanded because of breakthroughs in advertising. Communication has been brought also to the next level because it can find new ways to be able to communicate

with love ones here and abroad from the internet. The information technology has become a widespread in today's generation. It lessens the productivity performance of the workers because of the modern technology uses.

## II. OBJECTIVES

The key objective of the study is to identify the use of Information Technology in different organizations. The study also aims to identify several issues such as organizational management decision making using Information Technology, Information Technology infrastructure, Information Systems and Use of E-Commerce to increase the customer base are the major ones.

## III. METHODOLOGY

Data collection is the process of obtaining valuable, reliable and relevant information from past and present serving as basis for study as well as analysis. The present study is based on 15 in-depth interviews of 10 organizations of Jorhat town. Initially, researcher has chosen the organizations randomly by dividing the city in to five areas. Sample size for interview was identified conveniently in the company based on the availability of the executives. All the peoples were interviewed with the help of a structured discussion guide. The survey was conducted in Jorhat city during the months of September to October 2012.

In the secondary research data was collected through newspapers, annual reports and websites of those selected organization. People interviewed in the organizations are from different levels of

hierarchy includes managerial levels (6 employees) and executives' levels (9 employees). The respondents were between the age of 20 to 50 years.

### (a) Organizations Visited

Name of the organizations visited were listed below:

- (i) Adidas AG, Adidas Showroom, Jorhat, Assam
- Reliance life insurance company limited, Regional office RLIC – Jorhat
- (ii) Epitome- institute of Vocational and Professional Studies, J.B.Road, Jorhat, Assam.- 785001
- (iii) SBI Main Branch, Jorhat – 785001
- (iv) Retailed Asset Small & Medium City Credit Centre (RASMECCC) and Stressed Account Resolution Centre (SARC), Jorhat
- (v) Bharti Infratel Limited, Jorhat
- (vi) Paramount Services, A franchisee of **TATA SKY Limited** (main authorised TATA SKY Distributor), Jorhat
- (vii) Cox and Kings Ltd. Jorhat, Pragati tours and travels, Jorhat
- (viii) United Colors of Benetton, Jorhat
- (ix) Bee Honda is a Honda Motorcycle, Jorhat

## IV. FINDINGS OF THE STUDY

Research has revealed that the IT division in the organization is performing its various functions with different kinds of hardware and software available in the branches of the organizations. The research has indicated about different types of IT infrastructure in the organizations and are follows

(a) Hardware: Desktops, Laptops, Scanners and Printers. Majority systems of the organizations are from HP and Lenovo.

(b) Operating systems: Windows XP, Windows 2000 are used because it is compatible with the application software and easy to use. Service pack 3 licensed versions is used by the many organization.

(c) Application Software: Shoper 9, Microsoft office 2003, SIBEL are the different software used by the organizations for their operations. Bancs24 is an Information System is used in the State Bank of India bank branch to do different accounting and MIS activities of the banks.

(d) Networks: LAN, WAN and different types of cable is used to organize the network connectivity.

(e) Databases: Oracle Database is used by the organizations in their offices and branches. Oracle database is used to store and retrieve various kinds of information.

(f) Backup Software: Data backup in the organization is done by using external hard drives.

## V. INFORMATION SYSTEM APPLICATIONS IN ORGANIZATIONS

In today's scenario information systems are the main source of business transaction in any organization. Information systems (IS) application like payroll, accounting, billing, invoicing, inventory management and MIS report are mainly controlled by classic information technology (CIT) in the organizations. Research has identified about various information systems as follows:

(a) Payroll: Payroll system is used to process the monthly salary of the employees based on their attendance during the entire month.

(b) Billing: The billing option captures varied information like customer details, sales person details, payment options, add-ons/deductions, etc. It supports the selection of offers/discount schemes for billing. Features required by your retail business for suspending and recalling bills, recording sales returns and exchanges are also available. Other features available are the options to record customer walk-ins, changing payment modes in bills, etc. The billing option is integrated with inventory data to communicate stock status.

(c) Accounting & Billing:

In many organizations billing of the organization is entirely done in Tally.ERP 9. The institute also provides courses related to accounting which is entirely done in tally. 'Perfect Accounting' includes introduction to DBMS and MS-Access, Tally.Net, E-TDS, payroll, point of sales, Fringe Benefit Tax (FBT), Data Synchronization, advance configuration, inventory ageing analysis.

(d) Invoicing: Bills are generated in two copies for customer and the retail outlet each along with Head Office updating after the sell takes place.

(e) Inventory Management: Shoper 9 is designed to handle a high volume of SKUs (items) and transactions. Organizations can use the effective and flexible inventory options in Shoper 9 to ensure the smooth functioning of your retail business.

**Shoper 9 uses SIS (Shoper Integration Server)  
for MIS reporting**

SIS is used to extract data from Shoper 9 without the hassles of understanding the database structure or writing time-consuming extract programs etc. Organization do analysis, reporting, printing, interface to other applications and other needs are easily handled using SIS.

### **What is Shoper Integration Server (SIS)?**

SIS is a simple and user-friendly data extraction server provided by Tally which simplifies extraction of data from Shoper 9 database.

### **Benefits of Shoper Integration Server (SIS):**

User can write any type of application to extend the functionality of Shoper 9 or integrate to other applications

- Simple and user-friendly
- Easy and faster extraction
- Enhanced performance
- Minimal training and technical knowledge
- Reduced cost of customization

### **E-Commerce Site**

Research has indicated that many organizations have e-commerce site available.

### **Excerpts from In-depth Interviews**

The process of study has highlighted some factual details during the time of interview with individual employees of the organizations those have visited by the interviewer for the research purpose at the time of data collection.

### **Organization (Tata Sky)**

#### **Is the company benefited due to online trading**

All the respondents agreed that online trading has helped the company gain more revenue.

Respondents inform that the customer base is increasing in great proportion because of online trading.

#### **Is the outlet losing out customers due to the gaining popularity of the Company's online websites.**

67% of the respondent told that online trading has not affected their business at the outlet. They informed that the more and more customers are availing the services and the outlet is gaining more loyal customers. 33% of the interviewed employee was not sure about its effects.

#### **Is the SIBEL software user-friendly**

All the respondents told that they have been trained properly by the company on the use of the SIBEL software. They informed that it's a bit complex but with daily usage, now they are comfortable operating it.

From the above information provided by the employees of the Paramount Services, it can be concluded that TATA SKY online trading website is only acting a booster in increasing the customer base and not drying up the business of the retailers and distributors. The employee satisfaction was also found.

### **Organizations (Cox and Kings Ltd. Jorhat, Pragati tours and travels)**

#### **How IS/IT have benefitted the Organization?**

Pragati Tours and Travels have different tour packages that are released on the website and have facilities for travelers:

(a) Ticketing is totally online.

- (b) Whole business is based on IT
- (c) Local suppliers give the quotations of their packages through e-mails and
- (d) MS Office platform is used for coordination with suppliers

### **How do they do the decision making including the sales figure estimation?**

Organizations get targets of packages to sell in a particular year which they need to sell. Since tourism has now become an affordable luxury. The reasons for such a buoyant rise are many, from disposable income of the middle class to healthy senior citizens opting to travel and also high adrenaline travelers. It can be safely said that finally the industry has come of an age.

## **VI. CONCLUSION**

The application of the information technology in the organization has an indisputable impact on and priority among other processes such as decision making, production, collection and control of information; and in the increased effectiveness of operations, the enhanced quality of services for clients, and the increased control of all its activities. The information technology plays a crucial role in the institution whose activity is generally oriented towards information. The technology of information helps ensure maximum use of this means of communication and contributes to the integration of the internal functions of the institutions, while the internal sources are being adjusted to bring about improvements in the technological infrastructure. The company's IT infrastructure and IS applications functioning smoothens the top level strategic

management's decision making process as it provides information on varied format and structure.

SIS provides the basis of MIS. The Application software (Shoper 9) is feasible and has flexibility. The Application software (Shoper 9) presents differentiated reports for decision making. The data of the application software is compatible with universally used generic application software Tally ERP 9. The online website has immensely added new dimensions to their business's growth in recent past. The online system shows every detail about all the policy holders as well as different insurance plans available. The Shoper9 software helps them to take various management decisions. They have made most of the use of the latest technology, which has enabled them to run the retail very efficiently.

## **VII. LIMITATION OF THE STUDY**

- (a) Study conducted on a small franchisee and not on a large corporate office of organizations itself, where findings could have been more reliable.
- (b) Respondents are not willing to give information.

## **REFERENCES**

- [1] [www.adidas.co.in](http://www.adidas.co.in)
- [2] [www.marketshare.com](http://www.marketshare.com)
- [3] [www.Reliancelife.com](http://www.Reliancelife.com)
- [4] [www.sbi.co.in\(27/9/2012\)](http://www.sbi.co.in(27/9/2012))
- [5] Annual report SBI
- [6] [www.sbi.co.in](http://www.sbi.co.in)
- [7] [www.Bharti-infratel.com](http://www.Bharti-infratel.com)
- [8] [www.benettongroup.com](http://www.benettongroup.com)
- [9] [www.tallysolutions.com](http://www.tallysolutions.com)

# DISPERSION MODELLING OF MICRO STRUCTURED OPTICAL FIBRES FOR TELECOMMUNICATIONS DEPLOYMENT

Prof G Kumar<sup>1</sup>, Dr R P Gupta<sup>2</sup>

NRI group of institutions<sup>1</sup>, Bhopal, Radharaman group of institutions, Bhopal<sup>2</sup>

## ABSTRACT

Chromatic dispersion is a critical issue in the design of optical fibers due to pulse spreading. It is related to the variation in group velocity of optical signals in a fiber. The term "chromatic" emphasizes its wavelength dependent nature. Chromatic dispersion limits the maximum distance, to which a pulse can be transmitted without the necessity of regeneration of its shape, timing, and amplitude. Pulse broadening can deteriorate performance of a high bit rate systems. Hence it is essential to either prevent the occurrence of dispersion or provide adequate compensation for it. In this regard Micro structured optical fibers [MOFs] or Photonic Crystal Fibers (PCF) or Holy Fibers [HFs] display tailor able unique dispersion properties in comparison to conventional silica optical fibers. This paper presents a systematic study of dispersion properties of PCFs along with its dependence on structure and material used. An overview of current innovations on this issue also is mentioned.

**Keywords:** PCF, MOF, Group velocity, dispersion, chromatic

## I. INTRODUCTION

PCFs are characterized by the refractive index periodicity, with the arrangement of air holes around the core. The core acting as a defect and guiding and confining light can be either solid or another hole. Many rings around the core help to trap light well inside the core minimizing the confinement loss.

Based on structure PCFs can be either a] solid core high-index guiding fibres or b] hollow core low-index guiding fibers. The Index Guiding PCF guides light in a solid core by Modified Total Internal Reflection (M-TIR) similar to the conventional optical fibers. The solid core can be silica and the lower effective index material is

provided by air holes in the cladding.

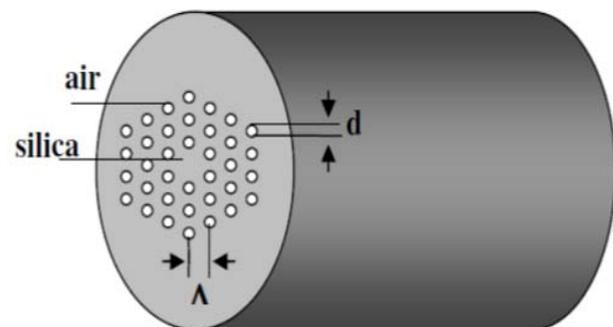


Fig.1 PCF cross section d- dia of hole &  $\Lambda$  - pitch

Hollow Core Photonic Crystal Fiber guides light by the Photonic Band Gap (PBG) effect. Light is confined in the low-index core, as the distribution of energy levels in the structure makes the propagation in the cladding region impossible.

## II. NOVEL PROPERTIES ACHIEVABLE IN PHOTONIC CRYSTAL FIBERS

For a simplified analysis the effective index of a PCF fiber can be modeled as that of a standard step-index fiber, with a high-index core and a low-index cladding. However it is to be noted that the refractive index of a micro structured cladding in PCFs is wavelength dependent. Hence PCFs can be designed with a new set of remarkable features like a) endlessly single mode [ESM] PCF and b) unusual spectral characteristics.

## III. ENGINEERING OF CHROMATIC DISPERSION IN PCFS

Chromatic dispersion consists of two components. The first one comes from bulk material dispersion  $D_{mat}$ . The second one comes from waveguide dispersion  $D_w$ . The material and the waveguide dispersion are expressed as given below.

$$D_{mat} = -\frac{\lambda}{c} \frac{d^2 n_m}{d\lambda^2} \quad (1)$$

$$D_w = -\frac{\lambda}{c} \frac{d^2 [\text{Re} n_{eff} | n_{m[\lambda]=const}]}{d\lambda^2} \quad (2)$$

The dispersion slope is expressed as

$$S_0[\lambda] = \frac{dD}{d\lambda} \quad (3)$$

Where  $c$  is the speed of light,  $\text{Re}(n_{eff})$  is the real part of the effective index and  $n_m$  is dependent on  $\lambda$  in dispersive media. In the case when  $n_{m[\lambda]} = \text{const.}$ , material dispersion is neglected.

Fig2 shows the dispersion components of conventional silica fibres in the wavelengths range

of interest. When the chromatic dispersion coefficient is less than zero, the dispersion regime is said to be anomalous. The shorter wavelengths propagate faster than longer wavelengths. The pulse is said to be negatively chirped. When dispersion coefficient is greater than zero, the dispersion regime is said to be normal. Long waves are guided faster than the short ones.

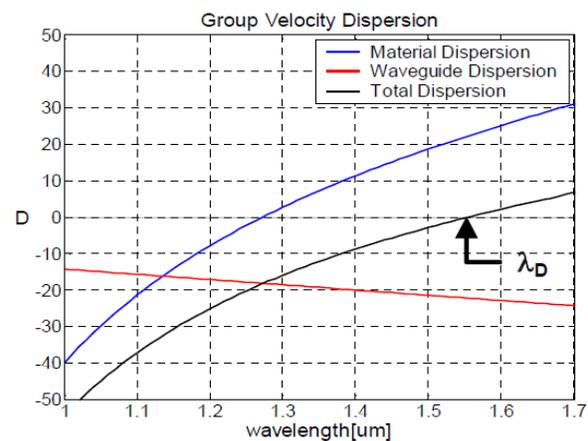


Fig 2. Total dispersion and dispersion shifting in conventional silica fibres

As the waveguide dispersion can be anomalous and material dispersion normal, optimal dispersion design can be achieved balancing dispersion components. Hence with a proper design it is possible to have a zero dispersion wavelength [ZDW]. Beyond this, the fiber exhibits a region of anomalous dispersion.

In order to obtain a specific value of total dispersion, one must compensate material dispersion  $D_{mat}$  with waveguide dispersion  $D_w$ . The slope of  $D_w$  should be adjusted by optimizing the fiber's geometry in order to make it parallel to  $-D_{mat}$ . To obtain a flattened dispersion over a

desired wavelength interval, one must control  $D_w$  to make it follow a path parallel to that of  $-D_{mat}$ .

PCFs are highly flexible for engineering and/or tailoring dispersion. This mainly arises from the highly controllable waveguide dispersion. In conventional fibres the parameters to be adjusted are limited. For PCFs, however, there are many degrees of freedom. By adjusting the size of the hole-to-hole pitch,  $\Lambda$ , and the hole diameter,  $d$ , one can control the air filling ratio easily to change the core-cladding index difference and the core size so that desired dispersion is achieved. In addition the option of infiltrating the holes with suitable liquids also is available.

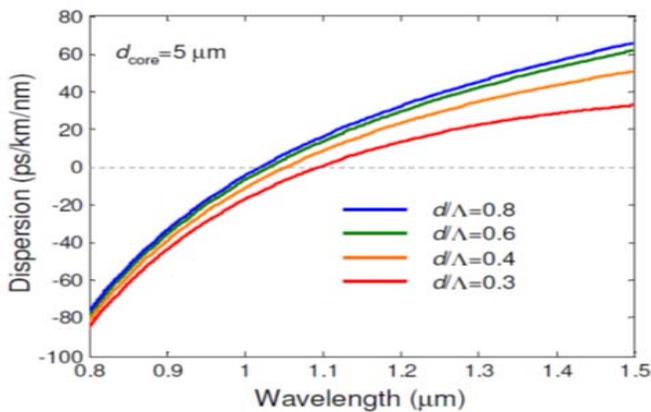


Fig 3. Calculated GVD for fixed core dia  $D$  and different  $d/\Lambda$  ratio

The Fig 3 shows that the zero-dispersion wavelength (ZDW) of a PCF can be shifted to shorter than  $1.27\mu\text{m}$ , the ZDW of bulk silica. When the holes get bigger, the ZDW gets shifted to further shorter wavelengths. The ZDW shift is due to the large waveguide dispersion contribution to the total group velocity dispersion [GVD]. Large air holes increase the core-cladding index step resulting in a

large anomalous waveguide dispersion, which can cancel the normal material dispersion at  $\lambda < 1.27\mu\text{m}$  or even overcome it to yield anomalous net dispersion there. However, the ZDW shift becomes slower with the increasing of  $d/\lambda$ . If we want to shift the ZDW of PCFs to even

shorter wavelengths, we need to consider altering the fibre core diameter.

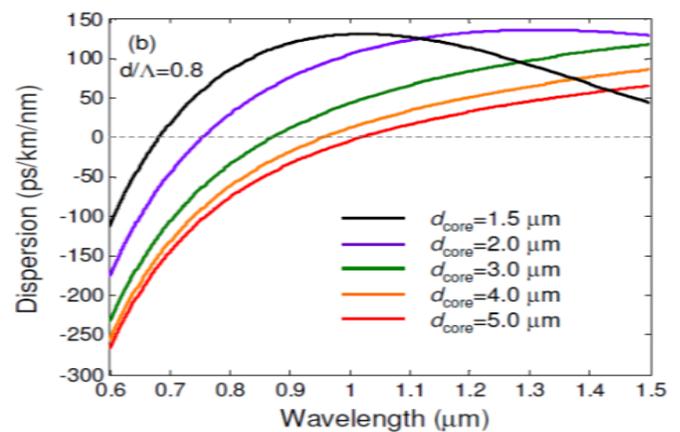


Fig 4. Calculated GVD for fixed  $d/\Lambda$  and different core dia

In order to study how the GVD of PCFs varies with the fibre core diameter  $d_{core}$ , the GVD curves of the fundamental mode are calculated for PCFs with different core diameters but having a fixed  $d/\Lambda$  and plotted in Fig.4. It can be seen that when  $d/\Lambda$  is fixed, decreasing  $d_{core}$  can also shift the ZDW to shorter wavelengths. This is because when fibre core becomes smaller whilst core-cladding index difference keeps constant, the  $V_{eff}$  [normalized frequency] will be smaller. As a result, the fibre mode will expand more into the cladding. This will lead to large anomalous waveguide dispersion at  $\lambda < 1.27\mu\text{m}$  as well. However, when  $d/\Lambda$  is not very

big,  $d/\Lambda = 0.4$ , for example, simply decreasing  $d_{core}$  cannot shift the ZDW further once  $d_{core} < 3\mu\text{m}$ . Instead, a second ZDW appears at a longer wavelength. If we want to achieve an even shorter ZDW, we need to increase  $d/\Lambda$  when decreasing  $d_{core}$ . Figure also shows that the ZDW can be as short as 680 nm when  $d/\Lambda = 0.8$  and  $d_{core} = 1.5\mu\text{m}$ . Such PCFs with high  $d/\Lambda$  and small  $d_{core}$  are normally used for nonlinear applications.

### III. DISPERSION COMPENSATING FIBERS

Zero dispersion is useful for low-speed systems, but undesirable in high data rate communications systems, as the phase match of all the frequency components can result in certain nonlinear effects. Another method of keeping a constant pulse width is to retain small normal dispersion in optical fibers and compensate it by using Dispersion Compensation Fiber (DCF) with strong anomalous dispersion, added at signal repeater.

Dispersion compensating fiber is used to nullify the dispersion caused by that fiber. The terms of broadband dispersion compensation,

$$DSMF \cdot LSMF + DDCF \cdot LDCF = DT \quad (4)$$

Where  $DSMF$ ,  $DDCF$ ,  $LSMF$ , and  $LDCF$  are, respectively, the dispersion coefficients and the lengths of the single-mode and the dispersion compensating fibers. If the total compensation of the dispersion is required, the length of the DCFs  $LDCF$  is chosen so that total residual dispersion  $DT = 0$ . However, due to nonlinear effects and possible

chirp in transmitter, full compensation is not always optimum.

For multichannel high-speed WDM systems, dispersion compensation over a broad wavelength range is necessary. This means that besides the dispersion, it is also necessary to compensate for the dispersion slope. The total dispersion slope is

$$S_{slope} = SSMF \cdot LSMF + SDCF \cdot LDCF \quad (5)$$

Where  $SSMF$ ,  $SDCF$  are the dispersion slopes of the SMFs and the DCFs respectively. As seen from Eq. (5), a negative dispersion slope of the DCFs is necessary in order to achieve slope compensation ( $S_{slope} = 0$ ). If the length of the DCFs is chosen to give full compensation ( $D_{res} = 0$ ), then the condition for full slope compensation is that the relative dispersion slope (RDS) of the DCFs shall be equal to the relative dispersion slope of the standard SMFs

$$RDSDCF = RDSSMF \quad (6)$$

The relative dispersion slope is defined as the ratio of dispersion slope to dispersion

$$RDS = S/D \quad (7)$$

Again from Eq. (6) and Eq. (7), we can write

$$SSMF / DSMF = SDCF / DDCF \quad (8)$$

It is noticed that RDS value of standard SMFs is about  $0.0036 \text{ nm}^{-1}$  at  $1.55 \mu\text{m}$ .

Various techniques have been reported for dispersion compensation like [a] Dual core fibres [b] Ge doped core [c] Erbium doped fibre [d] central defected core etc. PCFs can offer solutions without doping as well.

Fig 5 depicts the transverse cross-section of typical DC-PCFs which contains six air-hole rings. The material of the studied PCF is taken to be silica. The cladding is formed by a triangular-lattice of air holes. It has a pitch  $\Lambda$ , two types of air hole diameters  $d_1$  and  $d_2$ . In the proposed structure, the diameter of the first air-hole ring  $d_{1i}$  is less ( $d_2 > d_1$ ) to obtain large negative dispersion. The diameter of other air hole rings  $d_2$  is selected large for keeping low confinement loss level in the targeted region. The total number of air-hole rings is chosen to be six in order to simplify as much as possible the structural composition of the PCF.

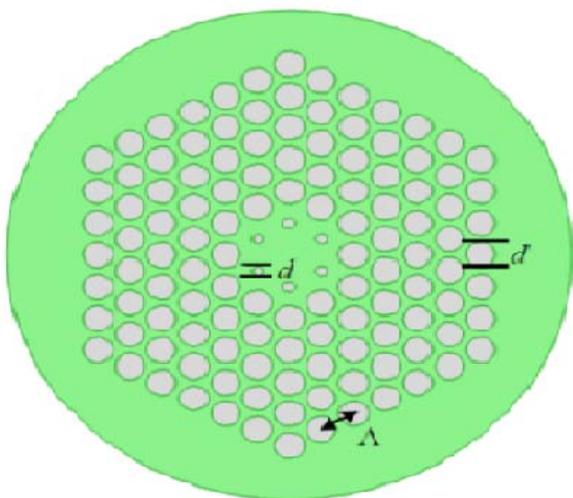


Fig 5. Cross section of a typical DC PCF

#### IV. DISPERSION FLATTENED PHOTONIC CRYSTAL FIBERS

The narrow bandwidth of operating wavelengths is a limitation, in particular for WDM systems. Broadband telecommunications systems demand same minimum dispersion over a large range. Dispersion flattened PCFs meet this condition. It is established now that an ultra-flattened dispersion curve could be achieved by a] modifying the form of the hole into ellipse, or b] gradually increasing

the diameter of the hole from inner ring to the outer, c] selectively filling the PCF with liquids d] application of double cladding, etc. Combinations of one or more of these techniques also provide desired variation. These techniques besides reducing or flattening the dispersion help to reduce confinement loss also.

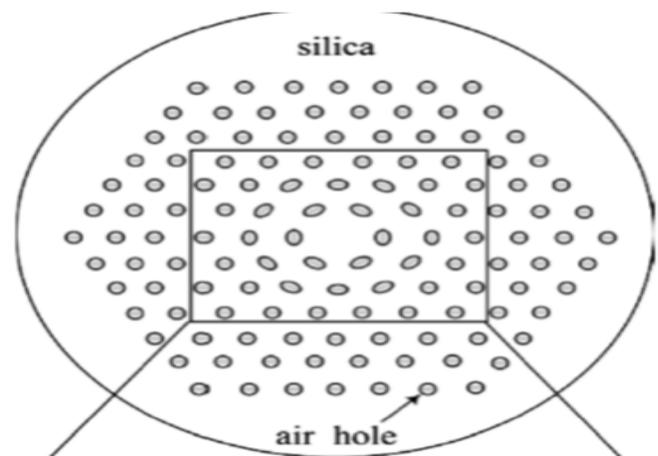


Fig.6. Cross section of PCF with elliptical holes

A typical optimized design of a PCF for example can be made over ultra-wide band by replacing two rings of inner circular air holes with elliptical air holes. In index guiding PCF, the holes closer to the core have a stronger impact on dispersion. However their effect on confinement loss is quite negligible.

A lower ratio of  $d/\Lambda$  in the cladding reduces the dispersion and its slope, therefore in this design the holes of the inner rings are chosen to be smaller. On the other hand, increasing the  $d/\Lambda$  results in reduction of the confinement loss, hence the choice of larger diameter for the holes in outer rings.

The permitted dispersion fluctuation is 0.6–1.0 ps/nm/km within a broad band from 1000 nm to 1900 nm, covering S, C, and L bands. The design process requires high attention to all important parameters such as flattened chromatic dispersion curve, effective mode area, confinement loss over broad bandwidth. In addition, designers should keep in mind the complexity of fabricating new structure.

## V. ENHANCING THE DISPERSION PROPERTIES

(a) Doped cores can be used to enhance dispersion properties of IGPCF. The technique is based on doping of the central part of the SiO<sub>2</sub> core by the GeO<sub>2</sub> material. The germanium dioxide raises the refractive index of the doped region and hence modifies the waveguide properties of the PCF.

(b) Fibers can be filled with appropriate liquids also for tailoring and tuning dispersion. For example fibres can be filled with CCl<sub>4</sub> or toluene, or nitrobenzene, or CS<sub>2</sub> etc. The guiding mechanism is the modified total internal reflection because the refractive index of CCl<sub>4</sub> ( $n = 1.4503$  at a wavelength of 1.03 $\mu\text{m}$ ) and of toluene, nitrobenzene, or CS<sub>2</sub> is slightly higher than that of fused silica ( $n = 1.4497$  at a wavelength of 1.03 $\mu\text{m}$ ). The filled liquid strand acts as the core and the

surrounding photonic structure as the cladding. Even for chloroform with a refractive index marginally below the refractive index of fused silica ( $n = 1.4365$  at a wavelength of 1.03 $\mu\text{m}$ ) guiding is preserved in this structure because of the high air filling fraction in the cladding. This reduces the effective refractive index of the holey region to close to one. Guiding is therefore possible due to modified internal reflection for all kinds of liquids.

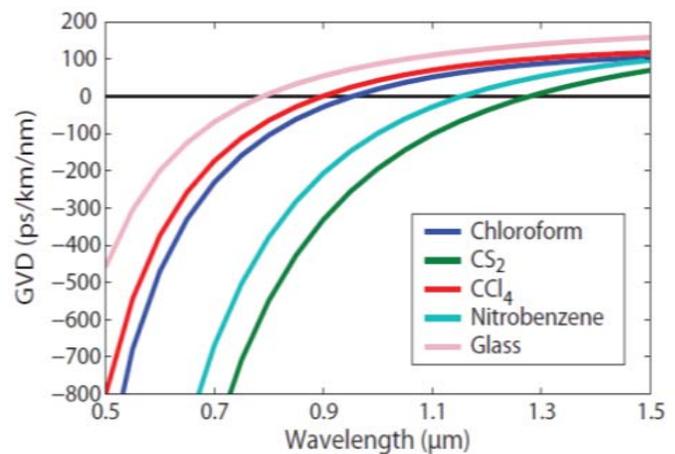


Fig 7. GVD of fibre filled with different liquids

By changing the filled strand medium or the geometry of the fiber, the dispersion properties of the fiber device can be tailored. If an additional temperature change or mixtures of different liquids are allowed, another degree of freedom is added to engineer the dispersion properties almost continuously. Just by replacing the liquid in a single filled strand of a typical PCF one can shift the ZDW from 900nm for CCl<sub>4</sub> to 1300nm for CS<sub>2</sub> over almost 400 nm. The dispersion curves for different liquids inside the PCF chosen are plotted in Fig 7

(c) Despite excellent physical and optical properties silica has [a] low nonlinearity and [b] strong absorption features in mid IR region [beyond 2  $\mu\text{m}$ ].

Hence there is a need to develop alternate materials to overcome these shortcomings.

Chalcogenide glasses [ $As_2S_3$ ] based on Sulphur, Selenium, Tellurium and the addition of other elements such as Arsenic, Germanium, Antimony, and Gallium. They are well known for their large infrared transmission window as well as for their large non linearity besides relatively higher refractive index. It has been demonstrated that  $As_2S_3$  glass PCF provides much higher negative dispersion compared to silica PCF of the same structure, in wavelength range 1.25 –1.6 $\mu m$  and hence such PCFs have high potential to be used as a dispersion compensating fiber in optical communication systems.

Similarly tellurium dioxide [ $TiO_2$ ] based family of glasses collectively known as tellurites also have high non linearity and optical transmission up to as high as 5 $\mu m$ . However, the dispersion of tellurite holey fiber is difficult to tailor because of the difficulties in fabrication. Tellurite glass shows a low viscosity at the fiber drawing temperature. Moreover the viscosity decreases sharply with increasing temperature. Tellurite holey fiber with a complex microstructure could be subject to heavy deformation during fabrication process. So far most tellurite highly nonlinear holey fibers just have a simple structure with just one ring, which results in an unflattened dispersion.

Since the holey structure is simple, to improve the flexibility in tailoring dispersion, two [or more at times] kinds of composite tellurite glasses which have different refractive-indices are used. By using

such structure the dispersion is engineered to be the most flattened for the highly nonlinear soft glass fibre within 1.5-1.6 $\mu m$ .

The Chalcogenide and tellurite fibres have a] high linear and nonlinear refractive index b] high transparency from near to mid infrared region c] low photon energy and d] higher rare earth solubility. Hence these materials are very attractive for short active new fibre devices, for mid infrared transmission and many non linear applications involving all futuristic optical signal processing. Low Interaction length, low power levels and low dispersion are the key requirements in all optical signal processing. Tailoring tellurites to zero dispersion is an issue. Hence current trend is to use the combination of Chalcogenide and tellurites with the former making the core and the later the cladding.

## VI. CONCLUSION

Various design and methods to tailor dispersion in the telecommunication window for PCFs were discussed in this paper. The effects of core and pitch sizes and liquid infiltration are mentioned. The current developments of using materials other than silica also detailed. PCF structure thus we see is very suitable to achieve suitable zero dispersion, flattened dispersion and even to provide negative dispersion for compensation.

## REFERENCES

- [1] Foster Mark A., Turner Amy C., Lipson Michal, and Gaeta Alexander L., "Nonlinear optics in photonic nanowires", Optics Express, 16(2), 1300-1320 (2008).

- [2] Magi E. C., Fu L. B., Nguyen H. C., Lamont M. R. E., Yeom D. I. and Eggleton B. J., "Enhanced Kerr nonlinearity in subwavelength diameter As<sub>2</sub>S<sub>3</sub> chalcogenide fiber tapers", *Optics Express*, vol. 15(16), 10324-10329 (2007).
- [3] Florea Catalin, Bashkansky Mark, Dutton Zachary, Sanghera Jasbinder, Pureza Paul, and Aggarwal Ishwar, "Stimulated Brillouin scattering in single-mode As<sub>2</sub>S<sub>3</sub> and As<sub>2</sub>Se<sub>3</sub> chalcogenide fibers", *Optics Express*, 14(25),12063-12070 (2006).
- [4] Lamont Michael R., Sterke C. M. de, and Eggleton Benjamin J., "Dispersion engineering of highly nonlinear As<sub>2</sub>S<sub>3</sub> waveguides for parametric gain and wavelength conversion", *Optics Express*, 15(15), 9458-9463 (2007).
- [5] Reeves W., Knight J., Russell P., Roberts P., and Mangan B., "Dispersion-flattened photonic crystal fibers at 1550 nm," *Proc. OFC*, (2003).
- [6] Liao Meisong, Chaudhari Chitrarekha, Qin Guanshi, Kito Chihiro, Suzuki Takenobu, Ohishi Yasutake, Matsumoto Morio, Misumi Takashi, "A highly nonlinear fiber with chalcogenide-tellurite composite microstructure", *Proc.OECC*, Hong Kong, July 13-17, (2009).
- [7] Agrawal G. P., [Nonlinear Fiber Optics], Academic Press, Elsevier, 11, (2007).
- [8] Begum, F. et al. (2009). Design and analysis of novel highly nonlinear photonic crystal fibers with ultra-flattened chromatic dispersion. *Optics Communications*, Vol. 282, No. 7, pp. 1416-1421.
- [9] Begum, F. et al. (2009). Design of broadband dispersion compensating photonic crystal fibers for high speed transmission systems, *Proceeding of the Conference on Optical Fiber Communication 2009 (OFC 2009)* 22-26 March 2009, San Diego, USA, pp. 1-3.
- [10] Birks, T. et al. (1999). Dispersion compensation using single-material fibers. *IEEE Photonics Technology Letters*, Vol. 11, pp. 674-676.
- Chen, M. & Xie, S. (2008). New nonlinear and dispersion flattened photonic crystal fiber with low confinement loss. *Optics Communications*, Vol. 281, pp. 2073-2076.
- [11] Chen, W. et al. (2009). Dispersion-flattened Bragg photonic crystal fiber for large capacity optical communication system. *Front. Optoelectron. China*, Vol. 2(3), pp. 289-292.
- [12] Ferrando, A. & Silvestre, E. (2000). Nearly zero ultraflattened dispersion in photonic crystal fibers. *Opt. Lett.*, Vol. 25, pp. 790-792.
- Hai, N. et al. (2007). A Novel Ultra-flattened Chromatic Dispersion Using Defected Elliptical Pores Photonic Crystal Fiber with Low Confinement Losses. *Proceedings of Antennas and Propagation Society International Symposium*, pp. 2233-2236, ISBN: 978-1-4244-0877-1, 9-15 June 2007.
- [13] Hansen, K. (2003). Dispersion flattened hybrid-core nonlinear photonic crystal fiber. *Opt. Express*, Vol. 11, No. 13.
- [14] Haxha, S. & Ademgil, H. (2008). Novel design of photonic crystal fibers with low confinement losses, nearly zero ultra-flattened chromatic dispersion, negative chromatic dispersion and improved effective mode area. *Optics Communications*, Vol. 281, No. 2, pp. 278-286.
- [15] Hoo, Y. et al. (2004). Design of photonic crystal fibers with ultra-low, ultra-flattened chromatic dispersion. *Optics Communications*, Vol. 242, No. 4-6, pp. 327-3.
- [16] Huttunen, A. & Torma, P. (2005). Optimization of dual-core and microstructure fiber geometries for dispersion compensation and large mode area. *Opt. Express*, Vol. 13, No. 2, pp. 627-635.
- [17] Leong, J. et al. (2006). High-Nonlinearity Dispersion-Shifted Lead-Silicate Holey Fibers for Efficient 1- $\mu$ m Pumped Supercontinuum Generation. *J. Lightwave Technol.*, Vol. 24, p. 183.
- [18] Lou, S. et al. (2009). Photonic crystal fiber with novel dispersion properties. *Front. Optoelectron. China*, Vol. 2, pp. 170-177.
- [19] Liu, J. et al. (2006). Enhanced nonlinearity in a simultaneously tapered and Yb<sup>3+</sup>-doped photonic crystal fiber. *J. Opt. Soc. Am. B*, Vol. 23, pp. 2448-2453.

- [20] Liu, Z. et al. (2007). A broadband ultra-flattened chromatic dispersion micro structured fiber for optical communications. *Optics Communications*, Vol. 272, No. 1, pp. 92-96.
- [21] Matsui, T. et al. (2007). Dispersion Compensation Over All the Telecommunication Bands With Double-Cladding Photonic-Crystal Fiber. *J. Lightwave Technol.*, Vol. 25, pp. 757-762.
- [22] Ni Y. et al. (2004). Dual-Core Photonic Crystal Fiber for Dispersion Compensation. *IEEE Photonics Technol. Letters*, Vol. 16, No. 6.
- [23] Poli, F. et al. (2003). Dispersion and nonlinear properties of triangular photonic crystal fibers with large air-holes and small pitch. *Proc. European Conference on Optical Communication ECOC 2003*, Rimini, Italy, Sept. 21–25 2003.
- [24] Razzak, S. et al. (2007). Ultra-flattened dispersion photonic crystal fibre, *Electron. Lett.* Vol. 43, No. 11, pp. 615-617.
- [25] Veng, M. et al. (2000). Dispersion compensating fibers. *Opt. Fiber Technol.* Vol. 6, 164–80.
- [26] Wang, Y. et al. (2009). Ultra-flattened chromatic dispersion photonic crystal fiber with high nonlinearity for supercontinuum generation *SPIE-OSA-IEEE*, Vol. 7630, 76301F-1.
- [27] Wu, M. et al. (2008). Broad band dispersion compensating fiber using index-guiding photonic crystal fiber with defected core. *Chin. Opt. Lett.*, Vol. 6, pp. 22-24.
- [28] Yang, S. et al. (2006). Theoretical study and experimental fabrication of high negative dispersion photonic crystal fiber with large area mode field. *Opt. Express*, Vol. 14, No. 7.
- [29] Yu, Ch. et al. (2008). Tunable dual-core liquid-filled photonic crystal fibers for dispersion compensation. *Opt. Express* 4443, Vol. 1617. , No.

# ONE WAY TOLLS – NON-STOP GO

**Raja Sekhar Reddy**  
AISECT University, Bhopal

## ABSTRACT

*India has allocated almost over Rs.20,000 Cr towards Road development in the year 2012-13 alone. Most roads already have tolls to provide for partial recovery of this expenditure. These tolls, apart from the collections, also cut down the throughput speed with which one can move on highways introducing a waiting time of almost 3-4 minutes each way. This paper discusses a comparison of international toll booths and how most of them have migrated to a one way toll collection and thereby cutting down this 3-4 minutes wait by over 75%, thereby saving precious time, fuel consumption and collection costs, while keeping revenue collections intact. This is therefore going to reduce the overall public expenditure, public discomfort while keeping the state revenue intact.*

**Keywords:** Public Policy, Traffic, Roads, Environment, Infrastructure.

## I. INTRODUCTION

The Roads are improving fast. The traffic is growing even faster. So how does one keep the road infrastructure growing faster than the traffic rate itself, so that we can materially benefit. As our road infrastructure is growing, the money spent in creating these roads is collected through Toll charges at various places. The toll charges that are collected are indeed used for further infrastructure development of our cities and towns. The toll booths that we have in India are for various purposes. Typically they are:

- Maintenance of a bridge or a portion of a highway, typically 20-50 km
- Entry toll into a city, region or state that uses funds for development & maintenance.

In all these cases, we observe that toll is collected, typically on both sides of the road, with toll varying from Rs.10, to Rs.100 for a car, and going upwards for a multi axle vehicle. For the purpose of this paper, we will consider the second type of tolls, while the same can be applied to the first type of toll booths as well.

## II. THE CASE: ENTRY TOLLS IN MUMBAI

Typically, in a metro city, like Greater Mumbai or NCR, one has to pay a toll at least twice a day, which averages to anywhere between Rs.50 – Rs.70 a day. On an intercity travel, one has to pay toll 3-4 times for a 6 hour travel, ranging from Rs.100-Rs.200 if one passes through roads that have been managed well. So when will the tolls leave us behind? Maybe never. Several Toll plazas

carry a 15-20 year contract for recovery of toll charges.

A look at what happens at a Toll: For the purpose of this article we will consider a metro toll, and specifically tolls in Mumbai. Mumbai has five toll booths that enable entry into the city. These five booths create a closed area with restricted road access. With the already thrown open flyovers, the sea link and several more upcoming flyovers and development links in progress, this toll collection is going to continue. A typical toll booth has a wider road than normal that can accommodate about 6 lanes to get into Mumbai and another 6 lanes to get out of Mumbai. At peak hours, the toll takes about three minutes to cross over while during off peak hours maybe one minute, and rare happy hours takes 30 seconds. If you are not a pass holder, the stress of taking out currency, handing it over, and collecting the change, and moving on, apart from the blaring horns all around asking you to speed up are a constant push. So at the end of the day, one spends almost 6 minutes (3 each way) during peak hours.

### III. AN INTERNATIONAL COMPARISON

A look at some of the prominent international tolls reveal that while some of them have two way toll, most popular ones have one way tolls only. Google maps images are displayed below:

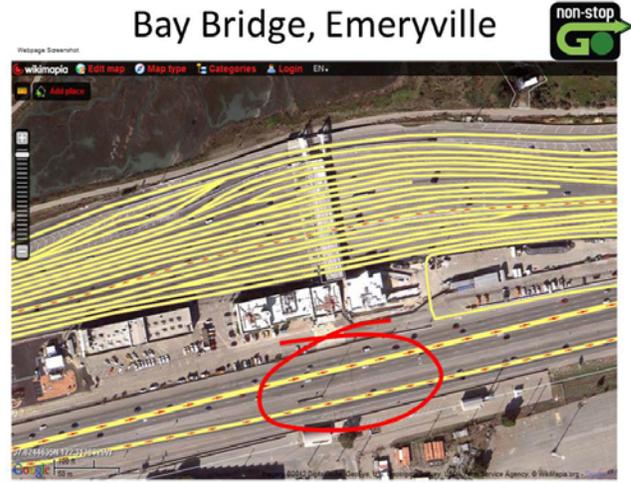


Fig.1 Bay brige,Emeryville



Fig.2Holland,tunnel,NY

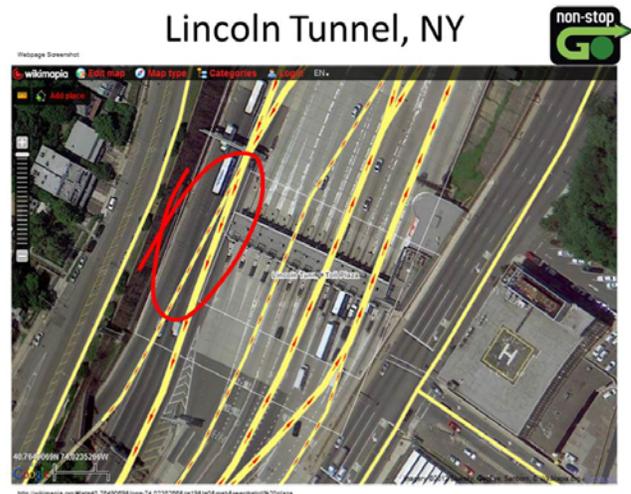


Fig.3Linvol tunnrl,ny



Fig.4 Richmond-san rafeal,MD

**IV. THE PROPOSAL**

What if we collect toll just one way and leave the other way free? Collect double the toll amount, and collect only inward into Mumbai, and keep outward free.

So how does this happen. It's simple. No change in infrastructure needed. No change in process needed. The only change is in the toll amount. Just charge double the amount but collect just one way. So what are the concerns:

(a) The Money?

Collect double the toll charges one way, leave the other way free. So this keeps the total collections for the toll collector same. This keeps the traveler spending the same amount. Because, every traveler, that comes into Mumbai goes out at some time or the other. So overall, it's even.

(b) So what's the catch?

We save. We save. We save. What? Time, Energy, Fuel, Sound pollution, Manpower. How?

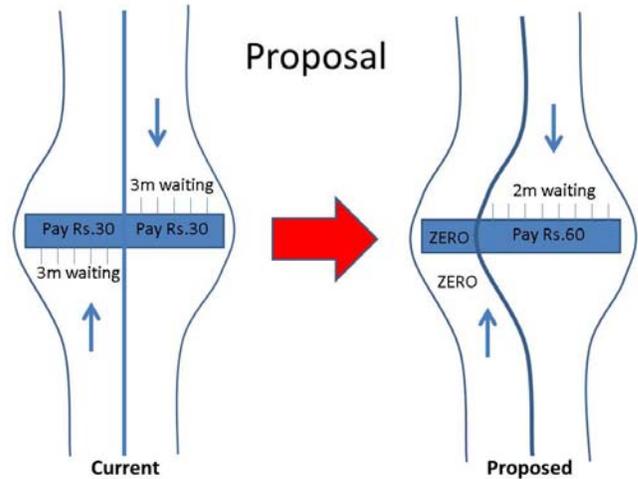


Fig5 Proposal

*Time:* One way toll time of 3 minutes is directly saved as the return is open. Besides, since there is space for 6 lanes on the return path while we need only 3, we can use 3 additional lanes to collect onward toll, thus increasing toll collection lanes for inward journey to 9 booths instead of 6. This will save an additional 1 minute. So 4 minutes peak-time saved per vehicle.

*Energy:* Human energy, stress, blowing horns, finding change, dealing with the toll window, is all an inherent saving. So many man-hours.

*Fuel:* Four minutes fuel saved in stalling-1<sup>st</sup> gear can run your car almost 4 kilometers at 60 kmph which may amount to definitely 100ml of fuel per car per day. So national fuel saving is imminent.

*Sound pollution:* A toll booth is one of the noisiest places next to 4 way crossing signals. So half the noise pollution is gone.

*Manpower:* A typical toll in Mumbai employs over 100 people, which includes toll collection agents, bouncers, relievers, assistants, officers, etc., as this is a 24 hour operation. So once the lanes become half, or even  $3/4^{\text{th}}$  this manpower reduced to 50 or 75. So toll collection costs reduces by half.

So whats the total saving? Add up all these. Isnt this a WIN-WIN ? Rather a WIN-WIN-WIN ?

**Traffic**, or general public wins as it gets smoother. **Government** wins as there is no change in earnings. **Collection** agent wins as collection costs are lower.

So what are we waiting for!!!

## V. CONCLUSION

So now going back to the types of toll gates, the three types.

- (a) First the toll gates which cover maintenance of a bridge or a stretch of highway. We can identify, one direction, say, northward and charge toll only for the northbound traffic. Some of our roads also have non-toll alternatives. So this may increase northbound traffic on the non-toll roads. But this is a minor challenge.
- (b) Second, for city entry tolls, it's much simpler. Choose just the entry for toll charges.
- (c) The return can be left free of toll.

# PREPARATION AND CHARACTERIZATION OF ZINC OXIDE NANOFLUID IN ORGANIC COMPONENTS

Rupesh Kumar Malviya<sup>1</sup>, Manish Verma<sup>2</sup>, Vinay Yadav<sup>3</sup>  
Dept of Mech Engg, Dept. of M.E., Dept. of Mech Engg.  
AISECT University, Bhopal (MP)<sup>1</sup> C.E.C., Bilaspur (C.G.)<sup>2</sup> AISECT University, Bhopal (MP)<sup>3</sup>

## ABSTRACT

*The object of the present work is to the preparation of ZnO nanofluid. This work summaries characterization of ZnO nanofluid. Nanofluid is a stable colloidal suspension of low volume fraction of ultrafine solid particles in nanometric dimension dispersed in conventional heat transfer fluid to offer a dramatic enhancement in conductivity. A approach of synthesis of ( ZnO) nanoparticles by chemical precipitation method nanofluids has been adopted here. Nano particles were characterized by x-ray diffraction (XRD), scanning electron microscopy (SEM),dynamic light scattering particle size analyzer, UV-visible characterization.*

I.

## I. INTRODUCTION

Nanofluids are a new class of fluids engineered by dispersing nanometer-sized materials (nanoparticles, nanofibers, nanotubes, nanowires, nanorods, nanosheet, or droplets) in base fluids. In other words, nanofluids are nanoscale colloidal suspensions containing condensed nanomaterials. They are two-phase systems with one phase (solid phase) in another (liquid phase). Nanofluids have been found to possess enhanced thermophysical properties such as thermal conductivity, thermal diffusivity, viscosity, and convective heat transfer coefficients compared to those of base fluids like oil or water. It has demonstrated great potential applications in many fields. In this dissertation work will review the progress in the methods for preparing stable nanofluids and summarize the stability mechanisms.

## II. METHODOLOGY

Zinc oxide (ZnO) nanoparticles were synthesized by chemical precipitation method. Homogeneous solutions of zinc nitrate and sodium hydroxide were prepared in an aqueous media. The soluble starch was added as stabilizing agent. Soluble starch (0.5%) was dissolved in 500 ml of distilled water and treated in microwave oven (domestic oven) for complete solubilization. Zinc nitrate, roughly 15.00 g (0.1 mol), was added in the above solution. Then the solution was kept under constant stirring at room temperature using magnetic stirrer for one hour. After complete dissolution of zinc nitrate, 300ml (0.2 mol), of sodium hydroxide solution was added under constant stirring, drop by drop touching the walls of the vessel. The reaction was allowed to proceed for 2 hrs after complete addition

of sodium hydroxide. After the completion of reaction, the solution was allowed to settle for overnight and the supernatant solution was then discarded carefully. The remaining solution was centrifuged at 10,000g for 10 min and the supernatant was discarded. Thus produced nanoparticles were washed three times using distilled water. Washing was carried out to remove the byproducts and the excessive starch that were bound with the nanoparticles. After washing, the nanoparticles were dried at 80°C for overnight. During drying, complete conversion of Zn (OH)<sub>2</sub> into ZnO takes place.

As a capping agent poly (N-vinyl-2pyrrolidone) (PVP) was also added to the reaction medium i.e. for controlling the particle size. First, no surface-capping agent has been used for the stabilization of the nucleated particles; instead, the nanoparticles are allowed to interact freely in the aqueous medium. In the second attempt PVP (2 % at. wt) was added in 0.5 molar zinc acetate and then 0.5 M sodium hydroxide was added drop wise. The precipitate appears soon after the addition of sodium hydroxide. The stirring was further allowed for 15 minutes at room temperature using a magnetic stirrer. The precipitated particles were filtered using whatman 40 filter paper. To remove the last traces of adhered impurities, the particles were washed several times using double distilled water. The washed particles were dried at 60°C in air.

### III. RESULT

#### (i) XRD-Characterization

X-ray diffraction patterns were taken to examine the crystal structure of the products. Fig.1 (a) and (b) shows a typical XRD pattern of the pattern of synthesized capped and uncapped ZnO nanoparticle. Due to the crystal symmetry and related face geometry, the common crystal habit of ZnO is hexagonal in shape. The width of the peaks in case of ZnO nanoparticles has increased due to the quantum size effect. Both shows three broad peaks corresponding to the (101), (002) and (100) along with (102) planes.

#### (ii) SEM-Characterization

Fig.2(a) shows the general morphology of the uncapped ZnO nanoparticles. This image was taken at the different magnification. The image clearly shows the formation of irregular shape of ZnO nanoparticle. Careful examination of the individual formed of nanoparticle ZnO indicates that the diameters of the particles vary from 15-40 nm. The higher magnification view is shown in Fig.2(b). It is interesting to observe a irregular hexagon-shaped pyramid like nanoparticles grown in the chemical bath. The SEM results of the synthesized capped powders are shown in Fig.3 (a) and (b) at the different magnification. It is clear that PVP capped ZnO nanoparticles are un-agglomerated and uncapped are agglomerated .

#### (iii) Dynamic light scattering particle size analyzer

The Fig.4. shows the particle size distribution of the ZnO samples. Statistically data was optimized and plotted in terms of volume fraction with sizes. After analyzing data, it was found that only 57 %

ZnO nanoparticle size were in this range of 12-15nm. 21 % particles were in the range of 40-50 nm and only less than 5% particles in the 80-90 nm sizes.

(iii) UV-Visible characterization

As the energy band structure and band gap reflects on the optical properties of the semiconductors, optical absorption spectroscopy is one of the important tool to probe the energy band gap. The UV-Vis spectra of ZnO nanoparticles prepared with 0.5% concentration of soluble starch was shown in Fig.5. The absorption peak of the prepared nano ZnO was found at around 333.78nm. Uncapped ZnO nanoparticles have absorption edge (Fig.5) at 333.78 nm and PVP capped ZnO nanoparticles have absorption edge at 296.95 nm. So band gap of PVP capped ZnO nanoparticles comes out to be 4.42 eV and for uncapped ZnO nanoparticles it is 4.17 eV Band gap of the nanoparticles is calculated from  $E = hc/\lambda$  Where E is Band gap energy, h is planck's constant, c is velocity of light,  $\lambda$  is wavelength of absorption edge in reflectance spectra.

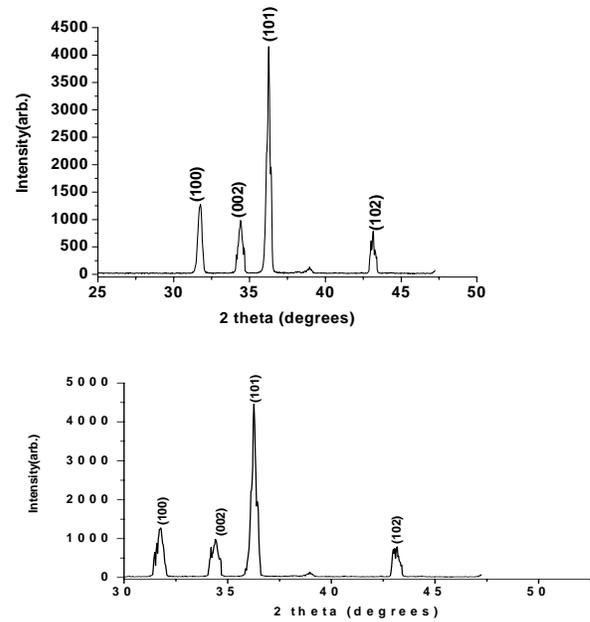


Fig-1- XRD pattern of and uncapped (a) and (b) PVP capped ZnO nano-particles.

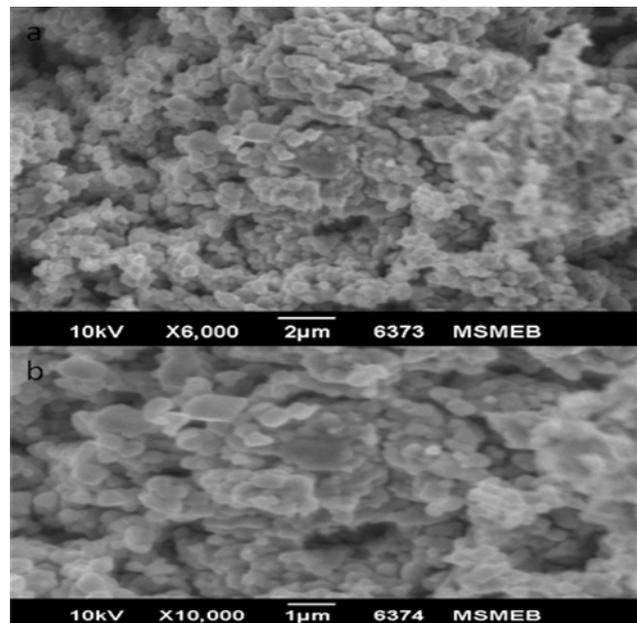


Fig.2. SEM micrograph of uncapped ZnO nano-particles synthesized by chemical precipitation method.

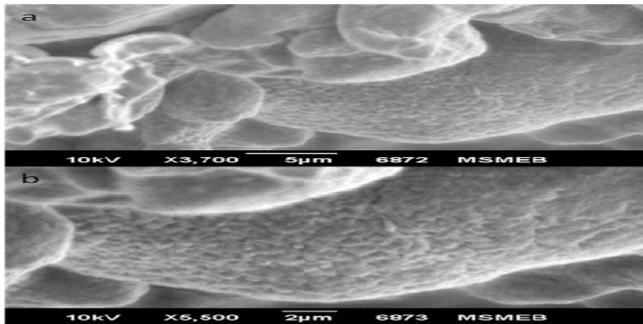


Fig.3. SEM micrograph of Capped ZnO nano-particles synthesized by chemical precipitation method.

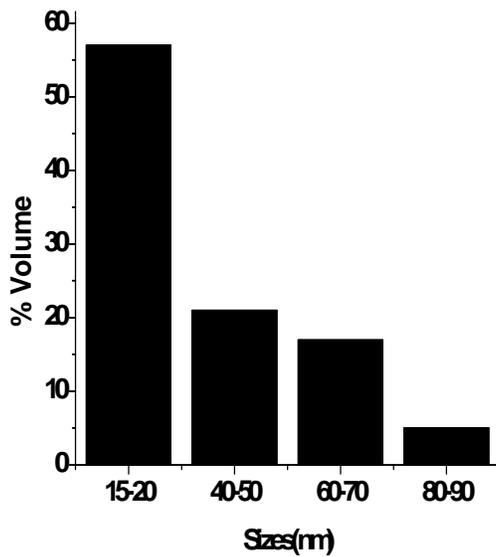


Fig.4. Particle size distribution of ZnO nano-particles synthesized by chemical Precipitation method

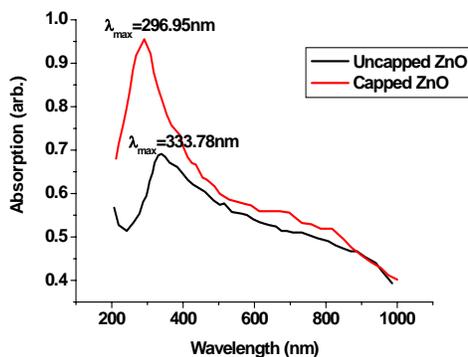


Fig.5. UV-Vis spectra of the ZnO prepared with 0.5% of soluble starch

#### IV. CONCLUSION

The following conclusions can be drawn from the present investigation:

1. It is possible to synthesize ultrafine ZnO nanoparticles through chemical precipitation.

2. Observed in the XRD patterns match well with those of the ZnO reported in the JCPDS Powder Diffraction. Intensities of the three most important peaks of ZnO, namely <101>, <100> and <002> reflections corresponding to 36.36°, 31.84° and 34.30° respectively do not deviate from the Powder Diffraction File intensities.

3. General morphology of the uncapped ZnO nanoparticles through SEM. This image was taken at the different magnification. The image clearly shows the formation of irregular shape of ZnO nanoparticle. It is clear that PVP capped ZnO nanoparticles are un-agglomerated (Fig.4.3a) and uncapped are agglomerated (Fig.4.3b)

6. Dynamic light scattering particle size analyzer analyzing data, it was found that only 57 % ZnO nanoparticle size were in this range of 12-15nm. 21 % particles were in the range of 40-50 nm and only less than 5% particles in the 80-90 nm sizes.

7. The UV-Vis spectra of ZnO NP prepared with 0.5% concentration of soluble starch was shown in Fig 4.5. The absorption peak of the prepared nano ZnO was found at around 333.78nm. Uncapped ZnO nanoparticles have absorption edge (Fig-4.5) at 333.78 nm and PVP capped ZnO nanoparticles have absorption edge at 296.95 nm.

## V. FUTURE SCOPE

The present work leaves a wide scope for future investigators to explore many other aspects like study of thermal conductivity, viscosity and convective heat transfer of nanofluids. The electrokinetic phenomena of nanofluids like long term stability and particle interactions in the base fluids can also be studied.

## REFERENCE

- [1] Ryogo, K., *J. Phys. Soc. Jpn.*, 17 (16) (1962) pp. 876–880.
- [2] Rohrer, H., *The Nanoworld: Chances and Challenges*, *Microelectronic Engineering*, 32 (1996) No. 1-4 pp. 5-14.
- [3] Choi, S.U.S., *Enhancing Thermal Conductivity of Fluids with Nanoparticles: Developments and Applications of Non-Newtonian Flows*, *American Society of Mechanical Engineers (ASME)* 66 (1995) pp. 99.
- [4] Masuda, H., Ebata, A., Teramae, K., Hishinuma, K., *Alternation of thermal conductivity and viscosity of liquid by dispersing ultrafine particles (dispersion of Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub> and TiO<sub>2</sub> ultrafine particles)* *Netsu Busei (Japan)* 4 (1993) pp. 227-233.
- [5] Krishnamurthy, S., Bhattacharya, P., Phelan, P.E., Prasher, R.S., *Enhanced mass transport in nanofluids*, *Nano Letters* 6 (3) (2006) pp. 419–423.
- [6] Wasan, D.T., Nikolov, A.D., *Spreading of nanofluids on solids*, *Nature* 423 (2003) pp. 156–159.
- [7] U. S. Choi, Z. G. Zhang, W. Yu, F. E. Lockwood, and E. A. Grulke (2001) *Anomalous Thermal Conductivity Enhancement in Nanotube Suspensions*. *Applied Physics Letters* 79: 2252–2254.
- [8] S. U. S. Choi (1995), *Enhancing Thermal Conductivity of Fluids with Nanoparticles*, in *Developments and Applications of Non-Newtonian Flows*, eds. D. A. Singer and H. P. Wang, vol. FED 231, pp. 99–105, American Society of Mechanical Engineers, New York.

# ICT ENABLED EDUCATION FOR REACHING THE UNREACHED – AN EXPERIENCE OF THE JABALPUR BASED RAJIV GANDHI PROJECT FOR ELEMENTARY EDUCATION

Sampat Ray Agrawal<sup>1</sup>, Manoj Roy V.<sup>2</sup> Dr Ajay Kumar Gupta<sup>3</sup> Dr Chinmoy Kumar Ghosh<sup>4</sup>

Netaji Subhas Open University, Kolkata, West Bengal,<sup>1,2</sup>

Computer Centre, Rani Durgavati<sup>3</sup>

Vishwavidyalaya Jabalpur,

Madhya Pradesh - 482002

Indira Gandhi National Open University, New Delhi-110068<sup>4</sup>

## ABSTRACT

*Universalisation of elementary education is beset with constraints even sixty five years after India got independence. From among those who join some schools there are dropouts at the elementary and secondary levels to the extent of about 60% and the effect is pronounced at the marginalised sectors. Inadequacy in respect of training of the teachers at the primary level is construed as one of the reasons for non-attainment of the goal of 'Education for All'. Information and Communication Technologies (ICT) have opened vistas of opportunities as regards increasing the outreach of education, a vital component of which is the use of satellite based communication in teaching-learning transactions. The Rajiv Gandhi Project for EduSat Supported Elementary Education (RGPEEE) is a satellite based communication project dedicated for the purpose of increasing the outreach of elementary education from the students' point of view and for providing sophisticated training to the teachers at the elementary level. The paper presents a profile of the project with an analysis of the impact created by it on the learners, teachers, guardians and the society at large.*

**Keywords:** *marginalised, experiential learning, community-learning, trans-learning, joyful learning, assimilated-learning, learner-centric*

## INTRODUCTION

The UNESCO Commission for Education (1996) for the twenty first century<sup>(1)</sup> chaired by Mr. Jacques Delor recommended that there are four pillars of learning – *learning to know, learning to be, learning to do and learning to live together*. The fourth pillar seems to be most significant in the context of the Indian education scenario. Here we have the IIMs, IITs or research institutes like the Tata Institute of Fundamental Research, Indian Institute of Science which give us international pride, but there are primary and elementary schools in the remote villages where water will squeeze through the roofs during monsoon. We have to organise our educational schemes in this scenario of extreme inequity. If we can do that, then only we shall be doing justice to the fourth pillar of learning. Many efforts,

both governmental and non-governmental have been made to bring every child to the school, but the target has not been achieved primarily because of lack of facilities. Moreover, the attrition rate is quite pronounced for pupils located remotely or belonging to socially and economically backward classes. The knowledge society paradigm tends to lead us to the era of ERA (*Enrolment, Retention and Achievement*). So along with enrolment, we need to have concern for retention and achievement and for that the motivation for learning of the pupils is to be kept alive. This calls for providing sophisticated training to the teachers. The training programmes available through the conventional system are not adequate enough to meet the demands of the teachers who in general, lack the desired professional competence. ICT intervention is capable of providing a

solution. Again, many primary level schools would be handling pupils of four classes or even eight classes whereas the total number of teachers and classrooms will be less than four. The schools would not be having minimal furniture, blackboard, etc. Some of the possible consequences are listed below.

- A single teacher handling more than one class.
- Pupils reach school but classes are not held. They just loiter around in the premises of the school completely uncared for.
- The teacher at a single-teacher institution may be handling the cooking of the mid-day meal himself.
- Inability on the part of the teacher to handle the situation due to lack of proper infrastructure and support staff leads to frayed temper as a consequence of which the students become the victims. The children get psychoemotional shocks for getting scolded or beaten mindlessly and feel completely demotivated.
- The teachers concerned become instruments for giving political mileage to the local leadership opposing their counterpart who hold the power.

The situation may not be as dismal as depicted above at every village school. But there the teachers may not be properly trained. An untrained teacher is generally incapable of generating interest about study in the child. Even there are instances of trained teachers not being able to imbibe the child-centric spirit of teaching-learning transactions. How will then the child feel motivated? If such a child hails from a marginalised family and he narrates his experience of dissatisfaction back home, his parents will rather ask him to help them in their household work or whatever little family business they run instead of going to the school. Thus, a prospective learner who could be a significant human resource becomes a dropout.

Thus, we are confronted with a double prong problem:

- (i) To cope with the limitations caused by extreme inadequacy of infrastructure.

- (ii) To create capabilities for the teachers at the primary level.

Technology provides solutions to both the problems. RGPEEE is a landmark initiative in that direction.<sup>(2)</sup>

### BACKGROUND OF THE PROJECT

The state of Madhya Pradesh (*MP*) in India has taken several initiatives towards ICT enablement of its people, the most significant among them being the steps taken for the spread of education.<sup>(3)</sup> The salient features of the initiative are as under:

- Use of ICT as a vehicle for improving the quality of teaching-learning transactions and providing social support to schools.
- Increase of educational access to teachers and students by application of technology and thereby meeting the needs of the marginalised sector.
- Increase of outreach of experts.
- Inculcation of the spirit of experiential learning.
- Establishment of linkages between students and teachers from different social, cultural, economic background.
- Under the auspices of the *Sarva Shiksha Abhiyan (Drive for Universal Education)*<sup>(4)</sup> and the District Primary Education Programme, a computer-enabled education programme called “*Head start*” has been initiated. It uses computer as a teaching-learning tool at the elementary level.
- “*Fund-a-school*” – A website for Global Partnership in Education is a very innovative programme which aims at using “the internet to bridge the gap between the connected and the isolated, familiar and the non-familiar and between accessed and the remotest”.
- “*GIAN*” – A General Information Access Network for the citizens is a project which provides computer and internet facilities at each district library and these have been running on a self sustainable model.
- Last but not the least, MP is one of the few states which has realised the potential of EduSat. 65 Satellite Interactive Terminals are being established to get access to a teaching end at the *Rajya Shiksha Kendra (State*

*Educational Centre*) at Bhopal, its capital. An Integrated Project Monitoring System (*IPMS*) has been created to regularly monitor the activities.

- Teleconferencing has been a regular feature for direct interaction with district and sub-district functionaries. The DRS in Extended C-Band are located in 38 District Institutes of Education and Training.<sup>(5)</sup> The facility is used for the purpose of teachers' training and related activities.

The above said initiative has created the desired sensitivity among the common public about the use of ICT for education dissemination. The tribal dominated state of MP has experienced success stories of ICT like e-Choupal, Gyandoot, etc.<sup>(6)</sup> Hence, they could accept the interventions of ICT in respect of addressing the two problems raised above. One can appreciate the manner in which the issues were resolved through the words of the then Union Minister of HRD, Shri Arjun Singh while delivering the keynote address at the International Conference on Distance Education, hosted by IGNOU in 2005. *Inter alia* he mentioned the following "... with the successful launch of *EduSat* by the ISRO a dedicated satellite for education we are into an era where both internet and intranet can be used for transmission, interactions, dialogue, digital repositories, digital multimedia content, and for virtual education and research. .... We are committed to improve the quality of school education and provide access to the disadvantaged communities in the rural and tribal areas through RGPEEE. Launched in the Hindi medium, this Project shall develop value-added ICT enabled educational software and ensure its dissemination for improving the quality of education of children and teachers, and support literacy and adult education programmes".

With the above background, the Project came into existence as a direct-to-home (*DTH*) network through a national beam in the Ku-band having coverage across India with 3.8 m antenna and 16-watt power amplifier at the Hub and operationalised with a studio at Prantiya Shiksha

Mahavidyalaya, Jabalpur, Madhya Pradesh which records and telecasts programmes by uplinking to the satellite 'EduSat'. The network consists mainly of Receive Only Terminals (*RoT*) supported by Solar Panels, a colour television set, set-top box, battery (*UPS*) and inverter to ensure continuous connectivity at the primary and elementary schools through which the dual purpose is served. The aspect of non-availability of teacher gets compensated by way of tele-teachers who teach via the network through live and recorded sessions. Such sessions are held on working days of the schools. During the vacations the same network is used for training of the teachers.

### A BRIEF PROFILE OF THE PROJECT

Table 1: ROT's under the RGPEEE Network  
(Here we have picked up data of three formative years)

State *	No. of ROTs
Madhya Pradesh ( <i>MP</i> )	**739
Chhattisgarh	60
Uttar Pradesh ( <i>UP</i> )	65
Bihar	65
Rajasthan	65
Uttarakhand	50
Jharkhand	46
Haryana ( <i>proposal</i> )	32
Total	1122

\* Initially, it started with schools in the districts of Sidhi, Jabalpur, Bhopal, Ujjain and Gwalior of MP. Later, it got expanded to some of the adjoining states.

\*\* 695 in the districts of Sidhi

Table 2: Class and subject wise summary of transmitted tele-lessons since the inception of the project till 31 December 2007. (Here we have picked up data of three formative years)

Academic Session: 2005-06					
Class	Hindi	English	Math	#EVS	Total
I	11	10	15	0	36
II	14	7	10	0	31
III	1	22	12	3	38
IV	5	18	13	18	54
V	3	11	18	9	41
Total	34	68	68	30	162

Academic Session: 2006-07						
Class	Hindi	English	Math	#EVS	Science	Total

<b>I</b>	18	12	23	0	0	53
<b>II</b>	23	7	11	0	0	41
<b>III</b>	20	27	19	8	2	76
<b>IV</b>	24	30	24	10	0	89
<b>V</b>	22	26	28	8	2	86
<b>VI</b>	10	14	24	7	14	70
<b>VII</b>	5	11	32	12	18	78
<b>VIII</b>	6	9	24	5	16	60
<b>Total</b>	<b>128</b>	<b>136</b>	<b>185</b>	<b>50</b>	<b>52</b>	<b>553</b>
<b>Teachers' Programme</b>						50

#### Academic Session: 2007-08

Class	Hindi	English	Math	#EVS	Science	Total
<b>I</b>	5	3	3	0	0	11
<b>II</b>	2	1	4	0	0	7
<b>III</b>	3	10	4	2	0	19
<b>IV</b>	4	5	6	2	0	17
<b>V</b>	6	11	7	2	0	25
<b>VI</b>	0	2	4	2	3	11
<b>VII</b>	1	3	8	2	4	18
<b>VIII</b>	1	1	6	0	3	11
<b>Total</b>	<b>22</b>	<b>36</b>	<b>42</b>	<b>10</b>	<b>10</b>	<b>119</b>

#### # Environmental Studies

In addition to above, 99 training programmes for tele-teaching were also held.

The programmes were planned on the basis of feedback received from the teachers and guardians. They identified the hard spots in the above subjects from the given curriculum and these became the focus in respect of selection of topics. For example, the meanings of some poems in Hindi, idea about Definite and Indefinite Articles in English Grammar, concept of Prime Numbers in Mathematics are some of the topics which emerged out of the feedback and became the need-base of the students. Topics on societal issues were also chosen, like 'The Village Market', 'Water as a Resource', 'Internet as a Mode of Communication', etc. These programmes which are of 40 minutes' duration are telecast live and are again repeat telecast. Moreover, these programmes have been archived in the form of CDs. These are sent to other state governments on their request. Preparation of all the programmes is preceded by training of the teachers in the aspect of tele-teaching. This is essential because the teachers are not used to teaching, facing the camera.

#### IMPACT OF THE PROJECT

The Project presents a different dimension about teaching-learning transactions to the academic world and drew the attention of the educational administrators towards the use of ICT in primary and elementary education. The impact can be observed from the extract of a communication from Shri Anand Sharma, Director, Elementary Education, Haryana & Special Secretary to Government of Haryana to Dy. Director, RGPEEE Project, Jabalpur vide his d.o. letter No.PS/DEE-07/346 dated, Chandigarh, the 27-04-2007 which read "*I am grateful to you for looking after my teachers while they were in Jabalpur and giving them an important feedback regarding preparation of educational contents to be broadcast through EDUSAT. I would also like to convey my thanks to you for giving them 16 DVDs which had been re-edited by you. These DVDs had been seen by group of our Resource Persons engaged in script writing for the educational contents to be broadcast by Haryana. They have liked the contents prepared by you. I would like to congratulate you and your team for preparing these contents which were the need of the day. I would like to request you to send us any other DVDs which have been finalised by you after re-editing so that children studying in primary classes in Haryana Government Schools can benefit from your successful venture.*"

To know further, we visited a number of schools where RoTs are installed. Separate questionnaires in vernacular Hindi meant for students, their guardians and the teachers were distributed and the feedback were obtained. We also interacted with the stakeholders face-to-face. The responses are quite encouraging. It is understood that the Project has been able to create some kind of impact on the marginalised sector, especially because of use of ICT and have adequately instilled a sort of enthusiasm among the students, teachers and the guardians, as well.

#### Impact on students

There has been a remarkable increase in the attendance of the students to learn through television. The difficult chapters and hard spots are explained with visual aids, in the form of stories and experiential learning. As such, in the remote villages the marginalised children having very poor background are happy to be in school supported by mid-day meal and ICT-mix education and thereby tuned to the new experience of learning. They are getting repeat telecast and thereby getting opportunity to view the lesson who have missed the earlier one. It was observed that the tele-lessons facilitated information retention among the students. A community-learning and trans-learning is also experienced by clubbing the students of nearby school having no RoT and that of different Classes I to V together in a large classroom to view the tele-lessons. The students of different schools presented the feel of a miniature community and the fact that they were from different classes led to a situation where some element of learning could take place cutting across the levels of different classes. The authors, while visiting some schools for practical experience, were quite overwhelmed to see that the impact of ICT enabled learning has been a joyful learning for those students who would have perhaps not hitherto been to school.

#### ***Impact on teachers***

The outcome of the study shows that RGPEEE had quite a significant impact on the teachers who have taken oath to retain the value of spreading education among the unreached longing to see the light of knowledge. The Project has been understood an impetus for capacity building, training, re-orientation and changing the mindset with regard to ICT intervention in teaching. They have come out of the thought prevailing two decades back that ICT would replace human force. They have understood that technology-blended teaching-learning is a sort of panacea to be practiced for explaining the hard spots for which they would have struggled otherwise. Hence, it is considered to be a good practice. An important aspect of assimilated-learning is experienced out of this study. The tele-lessons are products emerging out of discussions and thoroughly introspected

knowledge that enriches the students and the teachers as well. Otherwise, the teacher at a rural and remote place would have taught the child within the limitations of his restricted capabilities without the fillip of any updated knowledge. They have accepted the fact that learning is now empowered with ICT. Now, the paradigm has got changed. Using ICT as a vehicle the teaching-learning transaction has become more learner-centric than teacher-centric.

#### ***Impact on parents and guardians***

The Project created tremendous impact on the parents and guardians who have in a way contributed to the success of the initiative by sending their wards to the school instead of engaging them in household work. They have been progressive in their outlook towards ICT enabled learning. They have realised the potential of ICT in providing new experiences to their children. While visiting the schools, the authors felt very happy to see some parents who had come to pick their children peeping through holes in the windows and doors to watch the tele-lessons.

In this connection, the correlation between some of the responses is quite remarkable. Some examples have been provided below:

- 100% of the students say that they *like to come to the school*; 98.6% of the teachers find the *programmes useful* and 97.6% of the guardians feel that their wards are *taking more interest in attending school*.
- 94.3% of the students say that their *teachers also watch the programmes* and 98.6% teachers feel that the *programmes are related to the curriculum* followed at the schools and 95.1% of the guardians feel that the *learning capability of their wards has got improved* after introduction of tele-teaching.
- 89.8% of students say that *they are briefed about the programmes before the telecast* and 87% of the teachers say that *they brief the programme before the telecast* and 100% teachers *discuss the contents after the telecast*.

The above correlations indicate that the responses have been reasonably consistent and the Project stakeholders have valid reasons to feel encouraged.

### EXPERIENCES WITH UNREACHED

Here we are talking about the students, teachers and the guardians and the society who all are 'unreached' in real terms of geographical locations. The relevant experiences that have emerged out of our findings are given in *question-answer form* below:

#### *Experience with students*

Do you like to come to school?	100% said 'Yes'
Do you attend school regularly?	100% said 'Yes'
Do you know that these days television is being used for teaching at your school?	82.9% said 'Yes'
Do your teachers also watch the programmes with you?	86.3% said 'always' and 8% said 'sometimes'
Do your teachers brief you about a programme before it is telecast?	86.4% said 'always' and 3.4% said 'occasionally'
Do your teachers discuss with you the contents of the tele-teaching programmes?	71.6% said 'always' and 19.4 said 'occasionally'
To what extent you understand the contents of the tele-teaching programme?	65.9% said 'most of them' and 27.3% said 'a few'
Does your attention get diverted elsewhere while a tele-teaching programme is on?	81.8% said 'No'
Can you retain for long the contents delivered through tele-teaching programmes?	94.3% said 'Yes'
Could you follow every bit of what is explained in a film?	78.4% said 'Yes'
If not, could your teacher explain what you did not understand?	89.8% said 'Yes'
Do you once again study the lessons already taught through tele-teaching?	78.4% said 'Yes'
Do your teachers handle all the follow-up activities suggested through the tele-teaching programmes?	58% said 'more or less, all' and 34.1% said 'a few'
Do the teachers discuss about the programme after telecast?	48.9% said 'always' and 46.6% said 'occasionally'
Where do you perform the activities demonstrated during the tele-teaching programmes?	51.1% said 'at home' and 46.4% said 'at school'
Would you like to watch this television lesson again?	85.2% said 'Yes'

What is that disturbs you most when you watch a tele-lesson?	<ul style="list-style-type: none"> <li>• Mosquito bite.</li> <li>• The television gets off frequently.</li> <li>• Sound of the vehicles.</li> <li>• Movements of people.</li> <li>• Television sounds not clear.</li> <li>• Talking with friends.</li> <li>• Sometimes signals.</li> <li>• Transmission is not clear.</li> </ul>
Has your teacher ever told you that he/she can not show you tele-lessons in classroom due to some reason?	53.4% said 'Yes'
If 'Yes', what was the reason?	<ul style="list-style-type: none"> <li>• Because of mid-day meal.</li> <li>• Battery is out of order.</li> <li>• Satellite problem.</li> <li>• No signal.</li> </ul>
Which one do you like most?	<p>(a) Teacher taking a lesson in the classroom and writing on the board.</p> <p>(b) Learning the lesson through television and then</p>

	<i>asking your teacher in the classroom your doubts.</i>
If your answer is '(a)', why?	<ul style="list-style-type: none"> <li>• If we do not understand, we ask the teacher.</li> <li>• Teacher explains well.</li> <li>• We can see and listen well.</li> <li>• Teacher explains in the blackboard in the middle of the teaching.</li> <li>• Teacher explains repeatedly.</li> <li>• We can ask the teacher in the middle of teaching.</li> <li>• Problem is solved immediately.</li> <li>• We learn quickly from the blackboard.</li> <li>• Blackboard teaching is good.</li> </ul>
If your answer is '(b)', why?	<ul style="list-style-type: none"> <li>• The teacher explains us after the television programme which enables us to understand the lesson better.</li> <li>• After watching the television lessons, the teacher explains the problems in the lessons which are very helpful to us for remembering the lesson.</li> <li>• The television lessons are more useful.</li> <li>• We like teaching and solving the problems through tele-lessons.</li> <li>• Television lessons are explained better which we do not forget.</li> </ul>
What do you prefer? Teaching by your classroom teachers or Teaching through television?	70.4% said ' <i>both</i> ' and 27.3% said ' <i>teachers</i> '
Do you feel more inspired to go to your school after introduction of the facility of teaching through television?	100% said ' <i>Yes</i> '

***Experience with teachers***

Like to enhance academic/professional qualification	95.7% said ' <i>Yes</i> '
Reason for opting teaching as profession	86% said ' <i>noble profession</i> '

As a teacher, what steps would you take to improve the quality of life of your village?	<ul style="list-style-type: none"> <li>• To uplift the lifestyle of the villagers.</li> <li>• Would try to educate all the children in the village and create interest within the parents to educate their wards.</li> <li>• Create awareness among people on the benefits of education and make sure that each and every child is sent to school.</li> <li>• Uplift the status/level of education.</li> <li>• Would motivate children of 5-14 years to go to school.</li> <li>• To encourage children to go to school and would emphasise on the importance of education in one's life.</li> <li>• To educate villagers about cleanliness, caring the nature and benefits of leading a healthy life.</li> <li>• To make teaching more efficient.</li> <li>• Contacting parents, I would convince them to send their children to school and imbibe value education within them.</li> </ul>
---	--

	<ul style="list-style-type: none"> <li>• Would advise parents to educate their children for fruitful employment.</li> <li>• Create interest within the children and parents to be literate.</li> <li>• Will ensure that children of all sections of the society get basic education.</li> <li>• Every child is the future for his parents. The child should be sent to the school daily.</li> <li>• The children of the weaker sections of the society to be given the benefits (<i>mid-day meal/free books/free education/scholarship, etc.</i>) of the government schemes to lure them to school.</li> <li>• The women at home must be encouraged to send their wards to school.</li> <li>• Imbibing truthfulness, responsibility through education.</li> <li>• Would try for 100% literacy in the village.</li> <li>• Would ensure that villagers are aware of all the policies of the government and welfare measures meant for them.</li> <li>• To create the awareness among students for paving the way for development of society as a whole.</li> <li>• Adult education, learning and teaching activities to be taken up for the upliftment of the village.</li> <li>• Educating all the girls in the villages.</li> </ul>
Are the tele-teaching programmes useful?	49.3% said ' <i>highly</i> ' and 49.3% said ' <i>moderately</i> '
Are the tele-teaching programmes related to the curriculum followed at the schools?	98.6% said ' <i>Yes</i> '
Are the duration of the programmes adequate?	72.5% said ' <i>Yes</i> '
Has the tele-teacher been able to explain the contents clearly?	98.6% said ' <i>Yes</i> '
Has the tele-teacher undertaken any activity based teaching?	95.7% said ' <i>Yes</i> '
Has the tele-teacher assigned any activity to be done after viewing the programme?	81.2% said ' <i>Yes</i> '
Has the tele-teacher substantiated his presentation with relevant examples?	98.6% said ' <i>Yes</i> '
Have the students faced any difficulty in deciphering the contents?	49.3% said ' <i>No</i> '
Were the demonstration materials used in the tele-teaching programmes adequate?	97.1% said ' <i>Yes</i> '
Your overall impression about the quality of the tele-teaching programme?	42.1% said ' <i>very good</i> ' and 56.5% said ' <i>good</i> '
Could the students follow the language used in the tele-teaching programmes?	66.7% said ' <i>fully</i> ' and 33.3% said ' <i>partially</i> '
Were the contents suitable with reference to the knowledge level of the students?	100% said ' <i>Yes</i> '
Were the students attentive during the telecast?	100% said ' <i>Yes</i> '
Are the students briefed about the tele-teaching programmes before the telecast?	87% said ' <i>Yes</i> '
Are the contents of the tele-teaching programmes being discussed after the telecast?	100% said ' <i>Yes</i> '
Did you enquire with the students regarding their opinion about the tele-teaching programmes?	100% said ' <i>Yes</i> '
Normally, how many students ask about the tele-teaching programmes before the telecast?	24.6% said ' <i>more than 10</i> ', 58% said ' <i>4 to 9</i> ' and 17.4% ' <i>less than 4</i> '

How many students normally ask questions after each telecast?	58% said <i>'more than 5'</i> , 36.2% said <i>'2 to 4'</i>
How many times parent-teacher interactions take place?	30.4% said <i>'frequently'</i> , 50.8% said <i>'once in two months'</i> and 17.4% said <i>'once in six months'</i>
Integrating tele-teaching into classroom teaching is convenient or cumbersome?	98.6% said <i>'convenient'</i>
The tele-teaching lessons that are being used in the class room are	47.8% said <i>'the real substitutes for classroom teaching'</i> and 52.2% said <i>'supplementary &amp; complementary teaching material'</i>
The content of the tele-teaching materials should be only supplementary materials to the existing teaching modes like pictures, demonstrations, presentation of models, graphs, audio and visuals which are otherwise not easy to make available in the classrooms. How do you react to this?	<ul style="list-style-type: none"> <li>• Helping materials should be supportive to the classroom-learning.</li> <li>• The tele-lessons should include pictorial models, stories and happenings.</li> <li>• Tele-lessons are definitely helpful to increase the standard of the children.</li> <li>• The learning aids (<i>assistive technology</i>) are available if one tries. But making an aid is difficult task, especially, for a physically challenged, visually and hearing impaired and voice impaired student.</li> <li>• In the present scenario, it is very helpful if we assimilate pictures, practical experiments, models, scenes and materials as learning aids.</li> <li>• The learning materials and the curriculum should be supportive/matching each other.</li> <li>• The tele-lessons help in explaining a situation with ease.</li> <li>• The learning aids can easily be collected from the natural resources and our surroundings. Tele-lessons would further enrich the teaching-learning process and instill creativity, interest and concentration among the children.</li> <li>• Providing learning aids in all the subjects is not possible in classroom-teaching. So it is easy to explain through tele-lessons.</li> <li>• It enhances logical thinking, knowledge skills. We should help in solving the problems in making available such learning-aids to the learners.</li> <li>• It is quite helpful but the time-slots for the telecast should be planned quite meticulously.</li> <li>• Tele-lessons are useful. But classroom-teaching has its own value and more effective.</li> <li>• Learning aids can be made available easily on little effort but time is a major constraint in preparing learning aids.</li> <li>• Children do learn easily seeing the pictures and supportive materials through television.</li> <li>• Tele-lessons should be livelier and relevant to the subject.</li> <li>• The tele-lessons should be used. It motivates the child to sit through the total duration of the lesson.</li> <li>• I do fully agree. The children get influenced for informative &amp; technology-based learning.</li> </ul>
What do you think about tele-teaching?	23.2% said <i>'Tele-teaching be encouraged at school level'</i> , 18.8% said <i>'We confine to the traditional mode of teaching and rarely use television for teaching in classrooms at school level'</i> and 50.7% said <i>'Both'</i>

<p>Do you think teaching-learning transaction does not take place effectively through tele-teaching and believe that traditional mode is the most appropriate in school?</p>	<ul style="list-style-type: none"> <li>• Tele-lesson is more effective. The children like those lessons.</li> <li>• The intelligent students learn the lesson easily by way of entertainment.</li> <li>• It helps in enhancing the imagination of the children.</li> <li>• Both are effective.</li> <li>• It is by and large effective.</li> <li>• Tele-lesson is effective only with classroom-teaching.</li> <li>• Tele-lesson is not so useful in comparison to classroom teaching.</li> <li>• There is no proper order in presentation. Sometimes, it is out of syllabus. So it is not so effective.</li> <li>• In tele-lesson, there is no provision of question-answer system. So the learning is more effective in classroom-teaching.</li> <li>• More awareness should be created on tele-lesson.</li> </ul>
<p>If 'Yes', what suggestion can you give on integration of technology which is imminent at higher education and easily accepted by students during his/her studies?</p>	<ul style="list-style-type: none"> <li>• Experienced teachers should be engaged in preparation &amp; presentation of tele-lessons.</li> <li>• There should be sound along with pictures and scenes wherever required to make it livelier.</li> <li>• The subject-based real photographs, videos &amp; recordings should be shown for example, while showing a volcano, a live video of the eruption of volcano should be shown for better understanding.</li> <li>• New learning materials should be utilised in tele-lessons.</li> <li>• Lessons to be prepared more interestingly.</li> <li>• The tele-lessons should be updated after understanding the requirements &amp; loopholes in the lessons.</li> <li>• The timings of the tele-lessons should be increased.</li> <li>• The tele-lessons should be more elaborative.</li> <li>• Pictures, scenes, live presentations, models &amp; symbols should be included as far as possible.</li> <li>• New skills and new technological innovations should be shown.</li> <li>• The tele-lessons would be more effective if the lessons follow exactly the prescribed syllabus.</li> <li>• There should be continuity in presentation.</li> <li>• It can be shown in groups.</li> <li>• The presentation should be to the point according to syllabus/subjects.</li> <li>• Tele-lessons would be more successful if the teachers are motivated, aware, interested and enthusiastic.</li> <li>• There should be question-answer sessions following the tele-lessons.</li> <li>• Yoga lessons should be taught through tele-lessons.</li> <li>• It is better to teach with the locally available learning aids.</li> <li>• Adequate teachers should be available in the</li> </ul>

	school in comparison to the students.
In your point of view why is training required for the teachers?	29% said ' <i>Enrichment point of view</i> ', 17.4% said ' <i>Pedagogic point of view</i> ' and 2.9% ' <i>Content point of view</i> '
What do you know about teachers' training?	<ul style="list-style-type: none"> <li>• The training programmes should be arranged periodically for refreshment of knowledge.</li> <li>• It creates interest for teaching.</li> <li>• It helps to explain the subject lessons easily.</li> <li>• It helps in understanding the difficult aspects of the lesson easily and know newer knowledge on the subject and activities.</li> <li>• It helps in upgrading the knowledge within the teachers.</li> <li>• The thoughts and knowledge are exchanged which helps in new ideas and learning for better teaching.</li> <li>• It helps in better teaching-learning process and mastering a subject.</li> <li>• New knowledge is explored out of training.</li> <li>• Training is given how to create interest within the learners.</li> <li>• It is like giving water to the plants.</li> <li>• It creates interest in teaching and enhancing the quality of teaching.</li> <li>• The resource teacher should be subject expert and should have more knowledge on the subject and activities.</li> </ul>
What are the types of teachers' training?	<ul style="list-style-type: none"> <li>• Skill-based training.</li> <li>• In-service training.</li> <li>• Refresher courses.</li> <li>• Development of skill of questioning.</li> </ul>
Training on which other mode, apart from the present mode of training you think would be more viable?	<ul style="list-style-type: none"> <li>• The new technologies should be used compulsorily.</li> <li>• Subject-based training should be given.</li> <li>• Training should be based on the pre-identified difficult areas of the subject.</li> <li>• Master trainer should be properly trained and train others.</li> <li>• Training is more required to make the teaching-learning more effective.</li> <li>• Training should cover all the subjects.</li> <li>• Periodical training should be organised for familiarising with new knowledge &amp; skills.</li> <li>• Continued upgradation in training modules.</li> <li>• Scientific models &amp; practical knowledge-based programmes should be included in training.</li> <li>• Seminars can be organised.</li> <li>• Training schedule should place during 10 am to 2 pm.</li> <li>• Good teachers should be chosen as trainers.</li> </ul>
What was the duration of Orientation Programme provided through RGPEEE?	11.6% said ' <i>one week</i> ', 24.6% said ' <i>more than two days</i> ', 14.5% said ' <i>two days</i> ' and 8.7% said ' <i>one day</i> '
How many spells of training have you attended to?	29% said ' <i>more than two spells</i> ', 34.8% ' <i>two spells</i> ' and 11.6% said ' <i>one spell</i> '
Was this duration of training sufficient to enhance your teaching skills?	36.2% said ' <i>sufficient</i> ' and 13% said ' <i>insufficient</i> '
In what ways does the programme meet your needs?	<ul style="list-style-type: none"> <li>• It enhances knowledge along with quality teaching</li> </ul>

	<p>skills.</p> <ul style="list-style-type: none"> <li>• It enriches, refreshes, fertilises and develops our mind according to the need.</li> <li>• Through orientation, we refresh our lives.</li> <li>• It is required to make the teaching skill more effective.</li> <li>• All the subject-based required knowledge &amp; skills are being trained in the training which enrich us further.</li> <li>• It brings constructive changes in the teaching process.</li> <li>• It helps us to understand how to bring development in a child.</li> <li>• Some new knowledge is being acquired.</li> <li>• We learn the easy way to teach. Hence, the teaching activity becomes easier.</li> <li>• In training we are tuned to new technologies.</li> <li>• Proper utilisation of resources is known out of training.</li> <li>• It helps in understanding Mathematics very well.</li> </ul>
What difficulties did you face while undertaking the training programme?	<ul style="list-style-type: none"> <li>• The purpose gets defeated in absence of skilled trainers.</li> <li>• Lack of best trainers/resource persons.</li> <li>• The resource persons do not have control over the trainees.</li> <li>• The training materials are not as per new syllabus.</li> <li>• During the training programmes, lot many problems arise like non-availability of drinking water, proper meeting arrangements and lack of good resource persons.</li> <li>• Adequate training tools not available.</li> <li>• Sometimes, some sessions are not clearly understood.</li> <li>• The course materials are being covered very hurriedly and bookish language is used.</li> </ul>
Did you find the trainers skilled, competent and energetic and could arouse interest in you in undertaking the Orientation Programme?	18.8% said 'Yes' and 29% said 'No'
Do you think the training session(s) has/have helped you in performing your classroom tasks better and meet the desired objectives?	24.6% said 'Yes' and 11.6% said 'To some extent'
Was at any instant your training session affected due to technical snag?	37.7% said 'No' and 13% said 'Yes'
Are you willing to undergo more such training sessions in the future?	31.9% said 'Yes' and 2.9% said 'No'
Rate your overall satisfaction level of the training you received through the RGPEEE	7.2% said 'very satisfied', 15.9% said 'satisfied' and 11.6% said 'average'
Any suggestion/comment you wish to make on RGPEEE	<ul style="list-style-type: none"> <li>• The weekly/monthly schedule of the tele-lessons should be transmitted in advance</li> <li>• The tele-lessons should be made compulsory.</li> <li>• The untrained teachers at school should be trained.</li> <li>• The teaching-learning should be based on new/latest technologies so that the students can learn the lessons easily.</li> <li>• The tele-lessons should be revised with the change in the syllabus.</li> </ul>

	<ul style="list-style-type: none"> <li>• The subject &amp; course that are telecast should be made known well before through the schedule.</li> <li>• More orientation programmes should be organised periodically which helps the participants to upgrade his own knowledge and skills.</li> <li>• We should stress upon the all-round development and value education for the children.</li> <li>• The tele-lessons are being telecast during 1030 to 1400. It should be extended up to 1630 to benefit the students.</li> <li>• The tele-lessons should be made as a compulsory component of the curriculum.</li> <li>• The orientation programmes &amp; trainings are required for the teachers and should be organised periodically to update &amp; upgrade the knowledge levels &amp; skills.</li> <li>• The tele-lessons should be based on stories and songs for better understanding.</li> <li>• If we really want to enrich our education system with technology then two-day orientation programme should be organised every month based on the Unit.</li> <li>• The tele-lessons on English and Mathematics should be repeated so that the children understand the lessons easily.</li> <li>• Science, English &amp; Mathematics tele-lessons should be aided with supportive materials and prepared in the way of poetic form to make it more effective.</li> </ul>
--	--

**Experiences with Parents/Guardians**

Are you aware of the tele-teaching facility available at the school of your ward?	90.2% said 'Yes'
If 'Yes', then, wherefrom did you get the information?	65.9% said 'Children', 14.6% said 'Teacher' and 13% said 'Headmaster'
Have you been invited by anyone among the school authorities to come and watch the programmes?	82.9% said 'Yes'
Have you seen any programme by now?	85.4% said 'Yes'
If 'Yes', how many?	36.6% said 'more than 5', 2.4% said '3 to 5' and 46.4% said '1 to 2'

Do you feel that the learning capability of your ward has improved after introduction of tele-teaching?	95.1% said 'Yes'
Is your ward taking more interest in his/her study at home after the introduction of the tele-teaching programmes?	97.6% said 'Yes'
Does your ward discuss the tele-teaching programmes with you?	87.8% said 'Yes'
Does your ward take greater interest in going to school after the introduction of the tele-teaching programmes?	53.6% said 'Remarkably Yes' and 44% said 'Moderately Yes'
Does your child most often talk about at home about the big happening at school?	87.8% said 'Yes'
Does your child at any time say at home about television lessons he gets at school?	85.4% said 'Yes'

Do you think these tele-teachings are appropriate for your child?	97.6% said 'Yes'
Have you ever been told by your child's teacher what is tele-teaching and your child is experiencing a new mode of learning, i.e. tele-teaching at school?	85.4% said 'Yes'
Your suggestions/comments, if any, on tele-teaching system in your ward's school	<ul style="list-style-type: none"> <li>• Interest is created in our children for studies. They become more creative &amp; intelligent.</li> <li>• More such lessons be taught to the students.</li> <li>• Children always like to watch television. So tele-teaching is useful.</li> <li>• The children learn very quickly with this system.</li> <li>• The children are very happy after watching such lessons.</li> <li>• The programme should be continued for the betterment of children.</li> <li>• The school management should take care about maintenance of the RoTs.</li> </ul>

**MATTERS CAUSING CONCERN**

The terminals and the solar power packs (*SPP*) are quite costly devices. In a school while the television sets and the related accessories remain under lock and key, the terminals and the *SPPs* remain exposed on the rooftop and there have been cases of thefts. Due to paucity of resources the schools have not been able to provide adequate security. However, the Home Department of the state has been informed about the matter. While they are taking steps as per their provisions, the stakeholders have embarked on the task of sensitising the communities so that they feel that such thefts are losses to the society and to the marginalised children who get deprived of the benefits of technological advancement.

At the initial stages the Insurance Companies were not agreeing to come forward and insure the equipments. However, now they stand convinced. But, more surprisingly, the authorities of some of the schools from where theft has taken place have shown reluctance in lodging complaints with the local Police Stations. They may be scared about the culprits who are local hoodlums and are known to the school authorities. Again, the solution to such a crisis lies in making the local agencies and local people aware of the social cause being served by the Project. A move in the said direction has been

taken on the part of the Project which has been yielding the desired results slowly.

The problems stated above are administrative and operational in nature. More important than these, are the academic problems being faced by the Project. The response has been fairly positive at 60-70% of the schools having the RoTs. In the remaining institutions, the impact of the Project is very insignificant. This is because of lack of interest shown by the in-house teachers. They are supposed to create an atmosphere which makes the students feel inspired about the scheme of teaching at a distance via satellite. They should take effort to bring the child to the tele-teaching sessions. Unfortunately, they behave in the contrary. Steps are being taken by the Project to identify retired teachers, who are physically and mentally fit to take up the task of monitoring the activities at the schools, i.e. the receiving ends. They will be visiting each school at least once a month and interact with the in-house teachers, students and parents and suggest remedial measures in case of any kind of default. These retired teachers will be the link between the RoT Stations and the Hub at Jabalpur.

**CONCLUSION**

Technology has advanced by a great degree during the last decade and its impact can be seen in every sphere of

our life. However, its use for dissemination of education has not picked up to the extent desired. This is primarily because of the problem of the mindset. Still, we have the hangover of the traditional system and are used to seeing the teacher live in front of us. Introspection into the problems like theft of equipments due to lack of security or its malfunctioning due to improper maintenance would reveal that the prime cause is the issue of insensitivity on our part about the effective use of technology for education. Thus, some repairing is necessary at the level of the mindsets of mainly the

teachers and the guardians. Otherwise, the performance of the Project during the first three years and thereafter remained reasonably steady to the extent that, there is no need to look back.

We may conclude by saying that RGPEEE has adequately done justice to the four pillars of learning - *learning to know, learning to be, learning to do* and *learning to live together*, as recommended by Delor Commission, that is, *Learning – the Treasure Within*.

## REFERENCES

1. <http://www.unesco.org/delors/utopia.htm> - last accessed on 05.11.2012
2. Gupta K. Ajay & Ghosh K. Chinmoy (2008), **Literacy Elementary Education and Teachers' Training in the State of Madhya Pradesh by Effective Use of ICT**, University News, Volume 46, No.40, pg.11-15, October 06-12, 2008, Association of Indian Universities, New Delhi
3. <http://www.mapit.gov.in/ICTprograms.asp> - last accessed on 05.11.2012
4. <http://www.ssa.mp.gov.in/ict.htm> - last accessed on 05.11.2012
5. *ibid.*
6. Harris Roger & Rajora Rajesh (2006) **Empowering the Poor, ICT for Governance and Poverty Reduction – A Study of Rural Development Projects in India**, Elsevier Publications, p.63-87

## SELECTED REPORTS AND DOCUMENTS

1. **Right to Education**, Ministry of Human Resource Development, Government of India <http://righttoeducation.in/> - last accessed on 05.11.2012
2. **Selected Educational Statistics, 2004-05**, Ministry of Human Resource Development, New Delhi, India
3. **District Level Household and Facility Survey, 2007-08**, Madhya Pradesh conducted by International Institute for Population Sciences, Mumbai and Ministry of Health and Family Welfare, New Delhi, 2010
4. <http://www.rchiips.org/pdf/rch3/report/MP.pdf> - last accessed on 05.11.2012
5. **RGPEEE: Teachers' Guidelines**, ISRO-IGNOU-MHRD EduSat Project, DEP-SSA, February 2006, New Delhi

# INVESTIGATIONS ON WASTE DEGRADATION IN A PARTIALLY ANAEROBIC FLUSHED REACTOR

Umadevi. B<sup>1</sup>, Dr. N. Balasubramanya<sup>2</sup>

Department of Civil Engineering  
MSRIT, Bangalore<sup>1</sup>

Professional Institute Of Engineering & Technology,  
Raipur, Chhattisgarh<sup>2</sup>

## ABSTRACT

*Industrialization and population increase in India has lead to the generation of large quantities of Municipal solid waste and the impact of this is severe. In order to minimize the severity, extensive research work is being carried out, all over the world. An in-situ extensive fermentation cell in the form of a flushing bio-reactor in which biological, chemical & physical process can be controlled through moisture infiltration or leachate recirculation was used in the present investigations. Organic solid waste collected from the college hostel & canteen mixed with 2% by weight of cow-dung was used in the two column reactors. Leachate samples were collected at regular intervals upto 185 days, and these samples were analyzed for various parameters. A detailed analysis of various parameters indicated definite trends with excellent correlation coefficients. It was also observed that addition of cow-dung enhanced the degradation process.*

**Keywords:** Wavelet transforms, AWGN, Threshold, image denoising, wavelet thresholding

## I. MATERIALS & METHODS

In the present investigations solid waste samples were collected from the college hostel & canteen. Plastic & metallic substances were removed from the so collected waste, there onwards the solid waste was shredded and was mixed with 2% by weight of cow-dung. Finally the matrix was thoroughly mixed in order to obtain a homogenous mix. Two columns with all the arrangements to measure the temperature, to collect the leachate and also to collect the gas were filled with the above matrix. In one of the columns leachate was recirculated. Leachate samples were collected at regular intervals upto 185 days and every time the samples were subjected to quantitative analysis as

per the Standards Methods of Examination, 2005 (1).

## II. RESULTS & DISCUSSIONS

The results of leachate analysis for the two partially anaerobic reactors namely control reactor & recirculation reactor are presented in Tables 1 & 2.

A detailed study of these tables reveal the following:

(a) Variation of temperature with time: The recirculation reactor records a higher temperature as compared to the partially anaerobic control reactor indicating higher microbial activity during the acetogenic phase. Changes in temperature reflect the enhanced degree of waste degradation in the

partially anaerobic control & partially anaerobic recirculation reactor.

(b) Variation of pH with time: It was observed that the partially anaerobic control reactor enters neutral pH range on the 106<sup>th</sup> day, while the recirculation reactor on 92<sup>nd</sup> day, thus indicating its earlier attainment of stabilization phase. Similar trends were reported by Rendra, S., et.al, [2] Sinan Bilgili, M., et al., [3] and Francois, V., et al., [4], in the experimental studies on aerobic and anaerobic waste degradation of solid wastes.

(c) Variation of Alkalinity with time : Tables 1 & 2 indicate that, upto 62 days both the reactors were in acetogenic phase & due to recirculation of leachate, nutrients and moisture supplement increase the activity of the microbial population leading to enhanced waste degradation. Alkalinity greater than 2000 mg/lit in the both the reactors indicated adequate alkalinity was present to maintain optimum conditions for methanogenesis. Similar high alkalinity profiles are reported by Simon Bilgili, M (3).

(d) Variation of chloride with time: Chloride being a non-degradable parameter & change in its concentration indicates the leachate dilution. There was a decrease in chloride concentration initially upto 39 days in both the reactors followed by decrease in chloride concentration. During the methanogenic phase the change in chloride concentration was insignificant.

(e) Variation COD with time: Due to hydrolysis of organic matter, COD concentration increased upto 21 days, there on it started decreasing continuously. Considering the initial COD value of 40650 mg/lit on 2<sup>nd</sup> day, the COD reduction at the end of 185<sup>th</sup> day, in the partially anaerobic control reactor was 79.8%, similarly in the partially anaerobic recirculation reactor the reduction was 95.3%.

Similar trends of COD reduction with 80% COD removal was reported by Dong Jun, et.al, 2007 [5], average COD removal of 90.60% was reported by Sanphoti, N., et al., 2006 [6], COD removal of 93% was reported by Sinan Bilgili, M., 2007 [3] and COD removal of 88% was reported by Obuli P. Karthikeyan, et al., 2007 [7] and above 90% COD removal was reported by Giannis, A., et al., 2008 [8] during their experimental studies on landfill bioreactors.

(f) Settlement of waste with time: The rate and magnitude of settlement depends on the waste composition, operational practices & factors affecting biodegradation of landfill waste. The partially anaerobic control reactor records a total settlement of 31.4% and partially anaerobic recirculation records a total settlement of 51.5% at the end of 185 days. Higher settlement in the recirculation reactor indicates that the biodegradation process was affected by the leachate recirculation.

### III. CORRELATION OF PARAMETERS

The entire data collected for 185 days from the two reactors was subjected to a simple statistical

analysis in order to know the relationship between them. Table 3 gives the details of the equation fitting the data & the corresponding R<sup>2</sup> value.

Parameter	Partially anaerobic control reactor		Partially anaerobic recirculation reactor	
	Equation	R <sup>2</sup>	Equation	R <sup>2</sup>
Time vs pH	$pH = 4.559 e^{0.0003t}$	0.835	$pH = 4.73 e^{0.0003t}$	0.878
Time vs Alkalinity	$Alk = 18260 e^{-0.0007t}$	0.897	$Alk = 19548 e^{-0.0008t}$	0.851
Time vs Chloride	$Chl = 8270 t^{-0.33}$	0.882	$Chl = 6395 t^{-0.19}$	0.855
Time vs COD	$COD = 63769 e^{-0.002t}$	0.913	$COD = 10079 e^{-0.002t}$	0.955
Time vs Vol. reduction	$Vol.red = [8.661 \ln(t) - 17.1]$	0.867	$Vol.red = [12.93 \ln(t) - 17.1]$	0.903
Alk vs pH	$pH = 11.65 e^{-5E(Alk)}$	0.851	$pH = 13.24 e^{-6E(Alk)}$	0.849
Chl vs pH	$pH = 8.135 e^{-1E.0(Ch)}$	0.923	$pH = \{0.002 (vol.red) + 5.734\}$	0.964
Volume reduction vs pH	$pH = \{0.007 (vol.red) + 5.595\}$	0.892	$Vol.red = 53.55 e^{-2E.0(COD)}$	0.860
COD vs vol.red	$Vol.red = 37.06 e^{-2E.0(COD)}$	0.929	$Vol.red = [-0.002(Alk) + 5.734]$	0.806
Alk vs vol.red	$Vol.red = [-0.002(Alk) + 5.734]$	0.909	$Vol.red = 341.4 e^{-8E.0(Ch)}$	0.916
Chl vs vol.red	$Vol.red = [99.88 e^{-8E.0(COD)}]$			

Table 3 correlation of parameters

#### IV. CONCLUSION

Temperature of the partially anaerobic recirculation reactor varies from 26°C to 33.5°C, and that of the partially anaerobic control reactor varies between 24°C to 30.5°C, where as the pH varies from 4.34 to 8.1 in the control reactor and from 4.9 to 8.4 in the recirculation reactor. Thus the partially anaerobic recirculation reactor operates at higher temperature

and pH range without external control indicating enhanced biodegradation process.

(a)Partially anaerobic recirculation recorded higher alkalinity range than the control reactor indicating enhanced waste degradation process.

(b)Partially anaerobic recirculation reactor recorded a higher percentage of COD reduction when compared to the controlled reactor, indicating the waste degradation in faster in the earlier reactor.

(c)Partially anaerobic recirculation reactor recorded 51.5% settlement when compared to 31.4% recorded by the control reactor, indicating enhanced waste degradation in the recirculation reactor.

(d)Statistical analysis indicated good to excellent correlation between the various parameters analyzed.

#### REFERENCES

- [1] Standard Methods of Examination of Water and Waste Water, 21<sup>st</sup> Edition, (2005), American Public Health Association, Washington, DC 20001-3710.
- [2] Rendra, S., Fernandes, L.,and Warith, M.A., (2003). Degradation of municipal solid waste in simulated aerobic and anaerobic bioreactor landfills, Journal of Solid waste technologies and management, 29 (3):145-53.
- [3] Sinan, Bilgili.M., Ahmet, Demir., and Bestamin, Ozkaya., (2007). Influence of leachate recirculation on aerobic and anaerobic decomposition of solid wastes, Journal of Hazardous Materials, 143, 177-183.
- [4] Francois, V., Feuillade, G., Matejka, G., Lagier, T., and Skhiri, N., (2007). Leachate recirculation effects on waste degradation: study on columns, Waste Management, 27, 1259-1272.
- [6] Dong Jun., Zhao Yongsheng., Rotich. K., Henry., and Hong Mei., (2007). Impacts of aeration and

active sludge addition on leachate recirculation bioreactor, *Journal of Hazardous Materials*, 147, 240–248.

- [7] Sanphoti, N., Towprayoon, S., Chaiprasert, P., and Nopharatana, A., (2006). The effects of leachate recirculation with supplemental water addition on methane production and waste decomposition in a simulated tropical landfill, *Journal of Environmental Management*, 81, 27-35.
- [8] Giannis, A., Makripodis, G., Simantiraki, F., Somara, M., and Gidakos, E., (2008). Monitoring operational and leachate characteristics of an aerobic simulated landfill bioreactor, *Waste Management*, 28, 1346-1354.
- [9] Obuli. P. Karthikeyan., Kurian Joseph., and Nagendran, R., (2007). Municipals of solid waste treatment in simulated bioreactor landfills operated with high Ammonia-N, *Proceedings of the International conference on Sustainable solid waste management, Chennai, India*, 466-473.

Appreciate  
d Work  
for social  
cause

# THE NEED TO INTRODUCE & PROMOTE LOW COST AFFORDABLE SANITARY NAPKINS IN RURAL INDIA

Umesh Shrivastava  
AISECT University Bhopal

## ABSTRACT

*India is a country with many cultures, diverse ethnicities and different sub sections of castes. But one thing which remains unchanged throughout the world is the menstruation cycle of a woman. India is no exception. Though India is now considered to be a developing economy, there are many social taboos which surround the otherwise culturally "rich" country. Ignorance towards female hygiene is one of them. Not only males but females too of rural India still do not recognize or lay importance to the fact that poor sanitation habits may lead to devastating consequences. Furthermore, a menstruating female is barred from entering temples or even kitchens, and adding to this misery they are not allowed to take bath sometimes. The other problem is affordability. This paper tries to analyze and take an overview to suggest ways and means for rural mass for adopting hygienic sanitation measures.*

## I. BACKGROUND

Before starting, let us examine the results of a survey carried out by AC Nielson and endorsed by NGO Plan India. Salient points are:-

- (a) About 68 per cent rural women cannot afford sanitary napkins available in the market.
- (b) On the issue of affordability of quality sanitary care, the survey found that 81 per cent rural women use unsterilized cloths since they are cheaper and 68 per cent said they cannot afford to buy sanitary napkins.
- (c) Poor financial condition does not allow majority of the women to buy quality sanitary napkins, the survey said, adding of cloth users, 45 per cent reuse cloth and 70 per cent dry them in shade, increasing chances of infections.
- (d) According to gynecologists, use of alternative sanitary care measures such as unsterilized cloths,

sand and ash make women susceptible to infections and diseases.

- (e) The study found that awareness on basic health and feminine hygiene is very low, with 75 per cent rural women lacking adequate knowledge on menstrual hygiene and care.
  - (f) Adolescent girls in rural India are unable to attend up to 50 days of schooling in a year due to inadequate menstrual care, the report said.
  - (g) Research shows Reproductive Tract Infection was 70 per cent more common among those with unhygienic sanitary practices.
- Of the 355 million menstruating women in India, only 12 per cent use sanitary napkins. The figure is abysmal, compared to countries like China, where majority of women use sanitary napkins, the survey maintained.

(h) The survey said among the adolescent rural girls, 23 per cent (aged 12-18 years) discontinue studies due to inadequate sanitary facilities in schools.

The above figures are really shocking, but somewhat true and representative of the entire nation.

## II. MOTIVATION

It can be seen that the non-usage of sanitary napkins may lead to health hazards and sometimes death too. Till date no or insufficient steps have been taken by the Govt. to address this very basic but uncomfortable problem of the females. Is it because we have mostly males in our Govt.? Also, the topic of menstrual hygiene is considered so taboo that even if there are women in our Govt., they will not talk about it in an open forum. Furthermore, the society is not open to talk about menstrual hygiene. There is a dire need to change this attitude and mental frame of mind because only with an open mind of the educated society can this problem be brought into light.

MNC'S who are involved in the production of napkins also have their eyes set on the urban India. They have clarity on their target market and will not venture out to cater to the needs of rural India as the margins would significantly drop. Add to this, the ignorance of rural Indian females, it will be a daunting task for the mnc's to convey them the idea of usage of napkins.

The above points are more monetary in nature. The next point is more value oriented . It is about adolescent girls who are going to be the future of this nation. Menstruation is a subject which a girl discusses only with her mother and a rural Indian mother has been taught by her mother to use a piece of cloth and so on and so forth. So she passes on the same set of values to her daughter without giving it much thought as she thinks that her mother and herself have also been doing this since ages and so there is no harm if my daughter uses a piece of cloth. Hence, the daughter already petrified with menstruation starts using that nonsanitised piece of cloth and finds solace in it.

This is a grave situation. As it is, in Rural India education is not given much importance. An adolescent girl, as her menstruation starts, stops going to school till the cycle lasts and after some time stops going to the school altogether.

During recent surveys of mine, it was found that about 70% of the females didn't even know what sanitary napkin is, forget about its usage. After knowing about it they were willing to shell out 20INR a month for its purchase. This raises a very important point. Till now it was believed that probably lack of affordability is the major factor in non-usage of sanitary napkins in rural areas of India. But no it's not that, it's the lack of awareness and knowledge which stops them from using it.

## III. LOW COST SANITARY NAPKINS PRODUCTION

The author has designed low cost sanitary napkins and carried out field tests through social service

group of AISECT University in three villages. The design was quite suitable to rural environment and women folk were quite satisfied and happy to use them.

It was found that using disposable sanitary napkins creates a sense of hygiene in general amongst rural women. The new design of napkin reduces the cost to an extremely low level which is easily affordable by poor rural women but there is still need to subsidised it further by Govt/social groups to make it almost free. This will give a big boost to health and hygiene mission of the country. AISECT University has taken a initiative and introduced it in villages in close vicinity of university campus.

#### IV. CONCLUSION

Following can be some of the action area to educate women, particularly rural section of India about the necessity of using sanitary napkins:

- (a) It is the mother who needs to be educated so that she can educate her daughter and so on and so forth.
- (b) The Govt. can be of great help in creating awareness about the usage of napkins and distributing it for free or at a subsidized rate.
- (c) By promoting ssi's to manufacture napkins locally and in the process generating employment too.
- (d) The males of this section of the society should also be made aware of the advantages of use of sanitary napkins so that they encourage the practice of the same.
- (e) Universities and educational institutes can come up and adopt a few villages and start a drive on

rural hygiene. This may include a health check-up camp and free distribution of sanitary napkins.

(f) There can be weekly classes on sanitary hygiene for adolescent girls wherein a doctor can teach these girls the usage and proper disposal of napkins.

(g) The NGO'S and NPO's can be of great help in distribution of sanitary napkins and creating awareness about it.

(h) The village head or the Sarpanch should play the key role to ensure that the females of his/her village are being provided with sanitary napkins and hygienic lifestyle.

(i) Education of menstrual hygiene at a primary level will play a key role in the usage of sanitary napkins by rural females in the years to come.

There is a vast untapped rural market still to be explored, only if there is a willingness to contribute to the society, by compromising a wee bit on the margins and a vision to see rural women also at par with the other strata of the society. It will also help these women to live respectfully and with confidence and the future generations would be deeply benefitted by today's actions.

#### REFERENCE

- [1]articles.timesofindia.indiatimes.com > Collections > Women
- [2]www.youthkiawaaz.com/.../dismal-female-health-scenario

# TO IDENTIFY THE LOCATION THROUGH DATA MINING ALGORITHM BY USING VERTICAL DATA FORMAT

V.K. Singh

Bansal College of Engineering  
Mandideep Raisen(MP), India

## ABSTRACT

*To deal with very large database in supply – chain management is very crucial issue. The important factor of supply chain management is to find the particular location where a group of items are frequently required or consumed. As we know that the emerging technology gives the facility to collect tremendous amount of data. The data about customers , distributors , wholesalers , suppliers to the different cities are available . so it becomes necessary to manage the data. The selection of different locations is a big problem from the data. There are many items supplied to different locations and a single location may required many items. In this paper I am going to discuss the problem of selection of those locations which require group of items frequently and the solution of the above is proposed with the help of data mining technique. For this I assumed the data about items and locations. The proposed method includes the Association Rule mining. Vertical Data Format has been used to find out the frequent item sets required or consumed by the location. That item set is used to find primary and secondary locations.*

**Keywords:** *Supply – chain management , Location selection , Data Mining , Association Rule , Apriori Algorithm.*

## I. INTRODUCTION

Changing market condition and technological innovation are forcing the business to adaptive and competitive with these changes. At present most of the companies are trying to identify and optimize their supply chain to different locations.

Now a days the main and basic challenges in supply chain are to plan a strategy to manage the resource and meet the demand , to select the desired location where the company will supply the group of items and services whenever and wherever require.

To attain a good performance for remaining competitive the selection of the location can be

important. Briefly , data mining is referred as knowledge discovery in database or mining of knowledge from a large amount of data. Mining is an important backend process for deriving business intelligence. by applying data mining approach we can identify a subset of items from thousand of database transactions. Association rule is a widely used data mining technique that searches through an entire data set for rules relating the nature and frequencies of relationship or association between entities , in this paper, association rules are used to identify a subset of key locations.

(a) Location selection

In general , most companies especially manufacturer , enterprises , wholesalers suppliers are consisted of supplier network. The selection of particular location is multi attribute decision making problem.

How to choose a particular location of group of items is an imperative issue in the management of modern business organization. Understanding a group of items require is important to ensuring a well functioning supply network. The selection of particular location problem is a multi – criterion problem which includes both quantitative and qualitative. Quantitative in terms of location , means the number of items required and qualitative means quality of items required.

In this paper I have assumed all the location posses qualitative factors and emphasis on development of potential subset of items supplied which can efficiently smooth. The supply chain process of the organization.

#### (b) Association Rule

If we think of the universe as the set of items available at the store , then each item has a Boolean variable representing the presence or absence of the item. The Boolean vectors can be analyzed for buying patterns that reflect items that are frequently associated. These patterns can be represented form of Association Rule. For example , the information that customers who purchase computers also tend to buy printers at the same time is represented in association rule

Computer => printer [ support = 2% , confidence = 60% ]

Rule support and confidence are two measures of rule interestingness. They respectively reflect the usefulness and certainty of discovered rules. A support of 2% for association rule means that 2 % of all the transactions under analysis show that computer and printers are purchased together. A confidence of 60% means that 60 % of the customers who purchased a computer also bought the printers. Typically , association rules are considered interesting if they satisfy both minimum support threshold and minimum confidence threshold. Such thresholds can be set by users or domain experts.

#### (c) Frequent Item sets

Let  $I = \{ I_1 , I_2, \dots, I_m \}$  be a set of items. Let  $D$  , the task relevant data be a set of database transaction where each transaction  $T$  is set of items such that  $T$  subset of  $I$  each transaction is associated with an identifier , called TID. Let  $A$  be a set of items. A transaction  $T$  is said to contain  $A$  if and only if  $A$  is subset of  $T$ . An association rule is an implication of the form  $A \Rightarrow B$  , where  $A$  is subset of  $I$  and  $A \cap B = \emptyset$ . The rule  $A \Rightarrow B$  holds in the transaction set  $D$  with support  $s$  , where  $s$  is the percentage of transactions in  $D$  that contain  $A \cup B$ . This is taken to be the probability ,  $P(A \cup B)$  the rule  $A \Rightarrow B$  has confidence  $c$  in the transaction set  $D$  , where  $c$  is the percentage of transaction in  $D$  containing  $A$  that also contain  $B$ . This is taken to be the conditional probability ,  $P(B|A)$

$$\text{Support}(A \Rightarrow B) = P(A \cup B)$$

$$\text{Confidence}(A \Rightarrow B) = P(B/A)$$

Two major steps of the Apriori algorithm are the join and prune steps. The join step is used to construct new candidates sets. Higher level candidate item sets ( $C_i$ ) are generated by joining previous level frequent item sets are  $L_{i-1}$  with itself. the prune step helps in filtering out candidate item sets whose subsets are frequent. This is based on the anti – monotonic property as a result of which every subset of a frequent item set is also frequent. Item set not supporting to the minimum threshold must be discarded before further joining.

The main notation for association rule mining that is used in Apriori algorithm is following

(1) A k- item set is a set of K items (2) the set  $C_k$  is a set of candidate k item set that are potentially frequent (3) the set  $L_k$  is subset of  $C_k$  and is the set of k item set that are frequent.

(d) Algorithm

1.  $L_1$  = frequent items of length 1.
2. For (  $k = 1$  ;  $L_k \neq 0$  ;  $K++$ ) do.
3.  $C_{k+1}$  = candidates generated from  $L_k$
4. For each transaction t in database D do.
5. Increment the count of all candidates in  $C_{k+1}$  that are contained in t.
6.  $L_{k+1}$  =, candidates in  $C_{k+1}$  with minimum support
7. End do
8. Return the set  $L_k$  as the set of all possible frequent item set.

## II. PROPOSED METHOD

The market trends are based on the concept of demand and supply. If the chain of supply and demand get disturbed deadlock like condition occurs. Such as a particular location is suffering from irregular demand. If we find out the particular location which require particular items or a group of items are frequent consumed in the location , then we can avoid the deadlock condition. The designed approach helps to identify clusters of location.

I have divided the approach in to two phases includes identification of item set which are very frequently used and then with the technique of association rule , classifies location. In the second phase I have identified the primary and secondary locations. The primary location set has a cluster of items which used frequently and secondary locations used remaining items.

(a) Vertical Data Format

Mining can be performed on the data set intersecting the transaction data set of every pair of frequent single item. Here we can understand the process of mining frequent item set by explaining the vertical data format.

First , we transform the horizontally formatted data to the vertical format by scanning the data set once. The support count of an item set is simply the length of the transaction set of item. Starting with  $k = 1$  , the frequent k-item set can be used to construct the candidate (k+1) item set based on the Apriori property. The computation is done by intersection of the transaction set of frequent k – item set to compute the transaction set of the corresponding (

k+1) item set. This process repeats , with k incremented by 1 each time , until no frequent item set

And second table has the details of locations in the city Bhopal.

(b) Phase – 1 : Identify frequent item set

- (i) Apply the Apriori algorithm using vertical data format on Location database in order to identify k – frequent item set
- (ii) Identify the location of these k frequent item set and then take the intersection first and then union among location of the frequent k item set in order to find out locations.
- (iii) Calculate the probability factor :

$Pf = \text{count}(A) \text{ “}C_j\text{”} / \text{count}(A)$  where A includes all items and  $C_j$  refer to supply items in location set.

(c)Phase -2 : identify primary and secondary

Location set

- (i) Identify all the distinct items which are supply to the different locations
- (ii) Identify the missing items.
- (iii) Find out the primary locations where a group of items supplied.
- (iv) Take the rest locations set as secondary locations.

**III. CASE STUDY**

A case is shown here to describe the proposed method.

The table 1 consist of location id and items supplied to the locations. There are 12 locations and 8 items.

L_id	Items supplied to the Location
L <sub>1</sub>	I <sub>1</sub> , I <sub>4</sub> , I <sub>5</sub> , I <sub>3</sub>
L <sub>2</sub>	I <sub>2</sub> , I <sub>7</sub> , I <sub>6</sub>
L <sub>3</sub>	I <sub>1</sub> , I <sub>3</sub> , I <sub>5</sub> , I <sub>4</sub>
L <sub>4</sub>	I <sub>2</sub> , I <sub>5</sub> , I <sub>6</sub>
L <sub>5</sub>	I <sub>3</sub> , I <sub>4</sub> , I <sub>8</sub> , I <sub>2</sub>
L <sub>6</sub>	I <sub>1</sub> , I <sub>5</sub> , I <sub>57</sub>
L <sub>7</sub>	I <sub>2</sub> , I <sub>6</sub> , I <sub>8</sub>
L <sub>8</sub>	I <sub>5</sub> , I <sub>7</sub> , I <sub>2</sub> , I <sub>4</sub>
L <sub>9</sub>	I <sub>2</sub> , I <sub>1</sub> , I <sub>3</sub>
L <sub>10</sub>	I <sub>4</sub> , I <sub>6</sub> , I <sub>7</sub> , I <sub>2</sub>
L <sub>11</sub>	I <sub>1</sub> , I <sub>4</sub> , I <sub>8</sub>
L <sub>12</sub>	I <sub>1</sub> , I <sub>2</sub> , I <sub>3</sub> , I <sub>5</sub>

Table – 1

Location_id	Location name in the City
L <sub>1</sub>	Jahangirabad
L <sub>2</sub>	Bittan Market
L <sub>3</sub>	New Market
L <sub>4</sub>	Shaapura
L <sub>5</sub>	Anand Nagar
L <sub>6</sub>	Barkheda Market
L <sub>7</sub>	Saket Nagar
L <sub>8</sub>	Shakti Nagar
L <sub>9</sub>	Nishatpura
L <sub>10</sub>	Bag Sewaniya
L <sub>11</sub>	Misrod
L <sub>12</sub>	Koh-e-Fiza

Table – 2

Now I am going to identify the maximum frequent item set. Here I assumed the threshold  $\text{min\_sup} = 3$ . In the table below I have use “X” to show pruning of the item set which does not follow the threshold of  $\text{min\_sup}$ . The process of finding frequent k – item set is as follows :

Items	Locations	Support
I <sub>1</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>6</sub> ,L <sub>9</sub> ,L <sub>11</sub> ,L <sub>12</sub>	6
I <sub>2</sub>	L <sub>2</sub> ,L <sub>4</sub> ,L <sub>5</sub> ,L <sub>7</sub> ,L <sub>8</sub> ,L <sub>10</sub> ,L <sub>12</sub>	7
I <sub>3</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>5</sub> ,L <sub>9</sub> ,L <sub>12</sub>	5

I <sub>4</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>5</sub> ,L <sub>8</sub> ,L <sub>10</sub> ,L <sub>11</sub>	6
I <sub>5</sub>	L <sub>1</sub> ,L <sub>4</sub> ,L <sub>6</sub> ,L <sub>8</sub> ,L <sub>12</sub>	5
I <sub>6</sub>	L <sub>2</sub> ,L <sub>4</sub> ,L <sub>7</sub> ,L <sub>10</sub>	4
I <sub>7</sub>	L <sub>2</sub> ,L <sub>6</sub> ,L <sub>8</sub> ,L <sub>10</sub>	4
I <sub>8</sub>	L <sub>5</sub> ,L <sub>7</sub> ,L <sub>11</sub>	3

Table - 3 Frequent 1 – item set

Items	Locations	Support
I <sub>1</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>6</sub> ,L <sub>9</sub> ,L <sub>11</sub> ,L <sub>12</sub>	6
I <sub>2</sub>	L <sub>2</sub> ,L <sub>4</sub> ,L <sub>5</sub> ,L <sub>7</sub> ,L <sub>8</sub> ,L <sub>10</sub> ,L <sub>12</sub>	7
I <sub>3</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>5</sub> ,L <sub>9</sub> ,L <sub>12</sub>	5
I <sub>4</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>5</sub> ,L <sub>8</sub> ,L <sub>10</sub> ,L <sub>11</sub>	6
I <sub>5</sub>	L <sub>1</sub> ,L <sub>4</sub> ,L <sub>6</sub> ,L <sub>8</sub> ,L <sub>12</sub>	5
I <sub>6</sub>	L <sub>2</sub> ,L <sub>4</sub> ,L <sub>7</sub> ,L <sub>10</sub>	4
I <sub>7</sub>	L <sub>2</sub> ,L <sub>6</sub> ,L <sub>8</sub> ,L <sub>10</sub>	4
I <sub>8</sub>	L <sub>5</sub> ,L <sub>7</sub> ,L <sub>11</sub>	3

Table - 4 After Pruning

Items	Locations	Support
I <sub>1</sub> ,I <sub>2</sub>	L <sub>12</sub>	1 x
I <sub>1</sub> ,I <sub>3</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>9</sub> ,L <sub>12</sub>	4
I <sub>1</sub> ,I <sub>4</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>11</sub>	3
I <sub>1</sub> ,I <sub>5</sub>	L <sub>1</sub> ,L <sub>6</sub> ,L <sub>12</sub>	3
I <sub>1</sub> ,I <sub>6</sub>	Nil	0 x
I <sub>1</sub> ,I <sub>7</sub>	L <sub>6</sub>	1 x
I <sub>1</sub> ,I <sub>8</sub>	L <sub>11</sub>	1 x
I <sub>2</sub> ,I <sub>3</sub>	L <sub>5</sub> ,L <sub>12</sub>	2 x
I <sub>2</sub> ,I <sub>4</sub>	L <sub>5</sub> ,L <sub>8</sub> ,L <sub>10</sub>	3
I <sub>2</sub> ,I <sub>5</sub>	L <sub>8</sub> ,L <sub>12</sub>	2 x
I <sub>2</sub> ,I <sub>6</sub>	L <sub>2</sub> ,L <sub>4</sub> ,L <sub>7</sub> ,L <sub>10</sub>	4
I <sub>2</sub> ,I <sub>7</sub>	L <sub>2</sub> ,L <sub>8</sub> ,L <sub>10</sub>	3
I <sub>2</sub> ,I <sub>8</sub>	L <sub>5</sub> ,L <sub>7</sub>	2 x
I <sub>3</sub> ,I <sub>4</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>5</sub>	3
I <sub>3</sub> ,I <sub>5</sub>	L <sub>1</sub> ,L <sub>12</sub>	2 x
I <sub>3</sub> ,I <sub>6</sub>	Nil	0 x
I <sub>3</sub> ,I <sub>7</sub>	Nil	0 x
I <sub>3</sub> ,I <sub>8</sub>	L <sub>5</sub>	1 x
I <sub>4</sub> ,I <sub>5</sub>	L <sub>1</sub> ,L <sub>8</sub>	2 x
I <sub>4</sub> ,I <sub>6</sub>	L <sub>10</sub>	1 x
I <sub>4</sub> ,I <sub>7</sub>	L <sub>8</sub> ,L <sub>10</sub>	2 x
I <sub>4</sub> ,I <sub>8</sub>	L <sub>5</sub> ,L <sub>11</sub>	2 x
I <sub>5</sub> ,I <sub>6</sub>	L <sub>4</sub>	1 x
I <sub>5</sub> ,I <sub>7</sub>	L <sub>6</sub> ,L <sub>8</sub>	2 x
I <sub>5</sub> ,I <sub>8</sub>	Nil	0 x
I <sub>6</sub> ,I <sub>7</sub>	L <sub>2</sub> ,L <sub>10</sub>	2 x
I <sub>6</sub> ,I <sub>8</sub>	L <sub>7</sub>	1 x

I <sub>7</sub> ,I <sub>8</sub>	Nil	0	x
--------------------------------	-----	---	---

Table - 5 Frequent 2 – item set

Items	Locations	Support
I <sub>1</sub> ,I <sub>3</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>9</sub> ,L <sub>12</sub>	4
I <sub>1</sub> ,I <sub>4</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>11</sub>	3
I <sub>1</sub> ,I <sub>5</sub>	L <sub>1</sub> ,L <sub>6</sub> ,L <sub>12</sub>	3
I <sub>2</sub> ,I <sub>4</sub>	L <sub>5</sub> ,L <sub>8</sub> ,L <sub>10</sub>	3
I <sub>2</sub> ,I <sub>6</sub>	L <sub>2</sub> ,L <sub>4</sub> ,L <sub>7</sub> ,L <sub>10</sub>	4
I <sub>2</sub> ,I <sub>7</sub>	L <sub>2</sub> ,L <sub>8</sub> ,L <sub>10</sub>	3
I <sub>3</sub> ,I <sub>4</sub>	L <sub>1</sub> ,L <sub>3</sub> ,L <sub>5</sub>	3

Table - 6 After Pruning

Items	Locations	Support
I <sub>1</sub> ,I <sub>4</sub> ,I <sub>5</sub>	L <sub>1</sub> ,L <sub>3</sub>	2 x
I <sub>1</sub> ,I <sub>3</sub> ,I <sub>4</sub>	L <sub>1</sub>	1 x
I <sub>2</sub> ,I <sub>4</sub> ,I <sub>7</sub>	L <sub>8</sub> ,L <sub>10</sub>	2 x
I <sub>2</sub> ,I <sub>4</sub> ,I <sub>6</sub>	L <sub>10</sub>	1 x

Table - 7 Frequent -3 item set

After pruning frequent item set in nil, Thus , the following method of vertical data format , we try to find out the maximum k-item set i.e. 3 – item set but it does not satisfy min\_sup = 3 thus maximum k- item set that satisfy min\_sup = 3 is 2 – item set.

So from above table we got six item set which are as follows :

(I<sub>1</sub>,I<sub>3</sub>) , (I<sub>1</sub>,I<sub>4</sub>) , (I<sub>1</sub>,I<sub>5</sub>) , (I<sub>2</sub>,I<sub>4</sub>) , (I<sub>2</sub>,I<sub>7</sub>) , (I<sub>3</sub>,I<sub>4</sub>)

Now we transform the above maximum 2 item set into a location , so that it can help to identify our primary location. To spot out the primary location from above item set. Probability factor ( Pf value) is to be calculated for each location set.

Location probability factor.

Maximum frequent Location set j  
Item set Pfj



suppliers. An organization must have a cluster of key locations so that it can monitor relationship with them for supplying the required items.

It is a challenging task to develop an approach for the selection of potential locations. This paper proposed a model using the concept of association rule which can be used in sorting of potential locations In the city. The vertical data format has its limitations and disadvantages during the association process I have assumed 10 items and 12 locations , which is quite easy and feasible task. But the actual database may contain thousand of transactions and may be some hundreds of locations within the city. It may be possible to handle but it is quite time consuming task.

### REFERENCES

- [1] R. agarwal and R. Srikant , Fast algorithm for mining association rules in Proc 1994 int. conf very large database (VLDB '94) , sep 1994.
- [2] Simon Fong , serena chan “Mining online user’s access records for web bussines intelligence” in proceedings of ICDM ‘ 2002 , PP 759 – 762.
- [3] Data mining concept and Techniques , 2<sup>nd</sup> edition , Jiawei Han and Micheline Kamber.
- [4] Data mining Introductory and advanced topics , Margret H. Dunham eight edition , Pearson Publications.

# DEGRADATION OF ORGANOPHOSPHORUS COMPOUNDS BY HYDROLYSIS IN PRESENCE OF METAL CATIONS

Vaishali Naik<sup>1</sup> C. P. Shinde<sup>2</sup>

Department of Chemistry,  
Mata Gujri Mahila Mahavidyalaya,  
Jabalpur 482001<sup>1</sup>  
School of Studies in Chemistry,  
Jiwaji University,  
Gwalior 474011<sup>2</sup>

## ABSTRACT

*Hydrolysis of Ethyl-cyanophos (organophosphorus compounds) has been studied in acidic medium with catalysts such as Zr<sup>4+</sup>, Ce<sup>4+</sup>, Hf<sup>4+</sup> and Th<sup>4+</sup> cations and the rate maxima observed were at around pH 2.0. Since the metal aquo complexes are known to exist in equilibrium with deprotonated species and therefore, metal bound OH nucleophile might be available abundantly even in acidic aqueous solutions. Thus an interaction of sulphur of P=S group with metal cation followed by an intramolecular nucleophilic attack of hydroxy anion at the ester phosphorus atom would results in cleavage of P-O bond.*

**Keywords:** organophosphorus, hydrolysis, tetravalent, metal cations

## I. INTRODUCTION

*The development of new methods for accelerating hydrolysis of organophosphorus esters under the mild acidic conditions is an important area of industrial and academic research<sup>[1]</sup>. Phosphorus triesters (e.g. Paraoxon etc.) are accepted as suitable mimics of G-type nerve agents (eg. Sarin, Soman etc) <sup>[2,3]</sup>. These compounds are not only highly toxic but also highly persistent in the environment. A significant body of information on the effect of divalent<sup>[4-6]</sup> and trivalent<sup>[7-10]</sup> ions on the hydrolysis of diesters like DNA and RNA has already been reported. Recent work has demonstrated extraordinary catalytic effect of tetravalent<sup>[11-14]</sup> cations on the hydrolysis of phosphate diester as well as nucleotides. Ethyl-cyanophos, being an important insecticide could control rice stem borer, cotton ball worm, cabbage*

*worm and aphids<sup>[15]</sup>. Moreover ECP is highly toxic to mammals; the oral LD<sub>50</sub> for rats is about 43 mg/kg <sup>[16]</sup> and besides toxicities. Although, it is detoxified quickly in alkaline solutions, but persist under neutral and slightly acidic conditions, typical in surface water, soil etc. In order to avoid accidental exposure to birds, animals and humans from the spillage and used containers etc. all these sources of contamination must be decontaminated by economically viable methods. This study includes hydrolysis of ethyl-cyanophos, catalyzed by Zr (IV), Ce(IV) , Hf (IV) and Th(IV) in mild acidic aqueous solutions.*

## II. EXAMINATION

(a) Synthesis of PCP-DCHA salt: PCP (5 gm, 0.036 M) was dissolved in acetone (50 ml) by

stirring in a 250 ml round bottom flask. To the stirred solution dicyclohexyl amine (0.036 M) was added. A slight exothermic reaction occurred. This stirred mixture was boiled for about 30 min and rapidly cooled by keeping RBF in ice water mixture for about 1 hr (till crystallization ceased). The crystals were filtered and washed 2-3 times with acetone. Excess solvent was removed under reduced pressure. White crystals of PCP-DCHA salt obtained were stored in air tight container in a desiccator.

#### (b) Synthesis of crude ethyl - cyanophos

A solution of dicyclohexylammonium salt of cyanophenol (5.5 g, 20 mM) in benzene (25 ml) was slowly added to a stirring solution of diethyl thiophosphoryl chloride (4.2 g, 20 mM) in benzene (25 ml) maintained at reflux temperature. The reaction mixture was kept under reflux and stirred further for 3 hrs. It was then cooled, filtered and solvent was removed along with unreacted chloride under vacuum. The residue on distillation at 150-152°C (0.01 mm Hg) gave a colorless oily liquid.

Yield =85% (3.2 gms)

(c) Purification of ethyl cyanophos Ethyl cyanophos obtained from above process was subjected to TLC (Adsorbent: Silica Gel-G, Eluent: Chloroform, Developing Agent: Iodine vapors). The TLC showed two spots, one at higher level of suspected compound and one at lower level of PCP-DCHA salt. The compound was then purified by column. A column of height 30 cm was made by filling Silica-G (mesh size: 60-120) as a slurry in

chloroform. About 1.0 ml of ethyl-cyanophos was dropped in column with the help of pipette and column was allowed to run. The fraction of 10 ml each was collected and monitored by TLC. Fraction no 3, 4 and 5 contained compound. These fractions were mixed and the solvent was removed first by distillation on a water bath under reduced pressure. The left pure compound, as seen by single spot in TLC, was then collected in sample holder, properly stoppered with the help of PTFE tape and kept in refrigerator.

#### (d) Spectral data of ethyl-cyanophos

The compound thus obtained was then subjected to UV, FT-IR and GC-MS analysis.

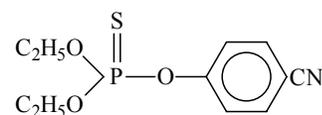
UV :  $\lambda_{\max}$  - 232 nm,  $\epsilon = 40000$

IR (Neat) = 2983, 2229, 1602, 1498, 1224, 1166, 1022, 923, 846, 553

GC : Single peak

Mass  $M^+$  (m/z) = 271( $M^+$ ), 196, 166, 137, 135, 119 (Base Peak), 109, 97, 90.

The spectral data were in good agreement with reported values which confirmed the structure of the compound as O,O-diethyl, O-p-cyanophenyl phosphorothioate (ethyl-cyanophos).



**Ethyl cyanophos**

Fig.1- ethyl-cyanophos

(e) Preparation of stock solution of ethyl - cyanophos Stock solution of ethyl-cyanophos ( $5 \times 10^{-3}$  M) in dioxan was prepared by dissolving 0.068gm in minimum quantity of dioxan in 50 ml

amber colored VF. The solution was then made up to mark by further addition of dioxan. The solution was mixed well, stoppered with the help of PTFE tape and stored in refrigerator.

A typical kinetic run was made by adding KCl (0.037g, 10mM), ZrCl<sub>4</sub> (0.004g, 3×10<sup>-4</sup> M) in water in 50ml flask to which approximately 40-45 ml water was added. The pH of the medium was adjusted by using 0.1 N HCl or 0.1 N KOH. HEPES buffer (0.122, 10mM) was used to maintain pH ≥6.0. The solution was chilled and 0.15 ml of solution of ethyl- cyanophos in dioxan (5×10<sup>-3</sup> M) was added to it. It was made upto mark with chilled water, mixed well and equal volume of this was then quickly transferred to separate test tubes for the convenience of our measurements. The properly stoppered test tubes were placed in a digital water bath maintained at 83<sup>0</sup>C (±0.5<sup>0</sup>C), such that the temperature inside the test tubes were at 80<sup>0</sup>C. The test tubes were withdrawn one by one at definite time intervals and the measurement of liberated p-cyanophenol was made as p-cyanophenolate anion as described earlier. All other runs (i.e., pH 1.0-5.0) were carried out in unbuffered aqueous solutions, as metal salt solutions acts as self buffers<sup>[17]</sup>. Similar kinetic runs were performed for varied [Substrate/Metal] ratio e.g., 1:30, 1:15, 1:10, 1:5 and 1:1 at pH value 2.0.

### III.RESULTS AND DISCUSSON

All reactions were observed for more than three half lives and plots of  $\log A_{\infty}-A_o / A_{\infty}-A_t$ , (where

$A_o$ ,  $A_t$  and  $A_{\infty}$  are absorbance of p-cyanophenolate anion at time zero, t and infinity respectively) versus time were linear indicating that the hydrolysis occurs via first order kinetics with respect to the parent compound. All runs were performed in duplicate and found reproducible within ±5% (max.) and the mean value of pseudo-first order rate constant obtained has been given in Table-1. Our experiments showed that all the metals require at least 20 fold excess over [substrate] for showing maximum catalysis. All the metal cations showed rate maxima at pH 2.0 which indicates the presence of catalytically more active species around this pH. The Rate constants for Zr(IV), Ce(IV), Hf(IV) and Th(IV) at pH 2.0 were  $10.4 \times 10^{-5} \text{ sec}^{-1}$ ,  $7.6 \times 10^{-5} \text{ sec}^{-1}$ ,  $5.5 \times 10^{-5} \text{ sec}^{-1}$  and  $4.9 \times 10^{-5} \text{ sec}^{-1}$  respectively showed the enhancement of 43, 31, 22 and 20 fold compared to those of uncatalyzed reactions. The decreases in  $k_{\text{obs}}$  values with increasing pH, suggested a reduction in the concentration of catalytically active species, and which might happens due to the precipitation of the metal ion as their hydroxide above pH 5.0<sup>[18]</sup>. The literature reports indicated that at around pH 2.0, Zr(IV) exists as coordination complex of water {e.g. Zr<sub>8</sub> (OH)<sub>20</sub>(H<sub>2</sub>O)<sub>24</sub>Cl<sub>12</sub>}, whose geometry has been determined to be octameric<sup>[19]</sup>, and under similar conditions Hf(IV) has been reported to exhibit a similar chemistry<sup>[18]</sup>. These octameric species may be formed by bridging of two tetramers via four single OH<sup>-</sup> bridges and each metal cations of the octamer would bind to three H<sub>2</sub>O molecules. Ce(IV) at pH 2.0 exists as dimeric Ce(IV) - hydroxo

species  $\{Ce_2(OH)_4(H_2O)_2\}^{4+}$ , which has been found to be a more reactive entity<sup>[20]</sup>. However, the geometry of aquo complex of Th(IV) has been proposed to be more or less similar to that of Ce(IV)<sup>20</sup>. The rate equation for ester hydrolysis including metal catalysis may be given by the Eq. 1

$$d [p-cp]/dt = ( k_a [ H^+ ] + k_n [H_2O] + k_b [OH^-] + k_m [Metal hydroxo species] ) [Parent ] \text{----- (1)}$$

Where  $k_a$ ,  $k_n$ ,  $k_b$  and  $k_m$  are the rate constants for the hydrolysis of ethyl-cyanophos by acid, water, base and the metal ion present as hydroxo complex, respectively. Moreover the hydroxide ion  $[OH^-]$  is stronger nucleophile, but its concentration in neutral and acidic solutions being low, have negligible contribution to the reaction rates and at the same time the reaction rate at around pH 6.5-7.0 are very small (table-1), therefore  $k_n$  &  $k_b$  terms can be dropped out from the equation 1 .

Again we found that metal catalyzed reaction rates are much greater than the acid catalyzed rates, thus, contribution of  $k_a[H^+]$  term appears to be negligible and hence the final form of the rate equation may be written as equation 2.

$$\text{Rate} = k_m [Metal hydroxo complex] [Parent] \text{-----} \\ \text{- (2)}$$

In all our reactions metal hydroxo species being present in large excess; hence the rate is governed by first order kinetics. It has been reported that, because of increasing Lewis acid strength and deprotonation ability of metal bound water

molecule, due to increasing positive charge on metal cation, the tetravalent metal cations like  $Zr^{4+}$ ,  $Ce^{4+}$ ,  $Hf^{4+}$  and  $Th^{4+}$  are found to be highly reactive towards activated phosphodiester like bis(p-nitrophenyl phosphate)<sup>[11,18]</sup>, dimethyl phosphate<sup>[14]</sup>, hydroxyethyl p-nitrophenyl phosphate<sup>[18]</sup> etc. and neutral triesters like methyl parathion.<sup>[21]</sup> The metal ester binding constant  $K_M$  obtained, dividing intercept by the slope of the linear plots between  $1/k_{obs}$  vs.  $1/[M^{4+}]$  are  $4.1 \times 10^{-3}$ ,  $3.8 \times 10^{-3}$ ,  $3.5 \times 10^{-3}$  and  $2.6 \times 10^{-3}$  for  $Zr^{4+}$ ,  $Ce^{4+}$ ,  $Hf^{4+}$  and  $Th^{4+}$  respectively. Since, the  $pK_a$  values of the metal bound water molecule for  $Zr^{4+}$ ,  $Ce^{4+}$ ,  $Hf^{4+}$  and  $Th^{4+}$  are found to be around  $\sim 0.6$ <sup>[22]</sup>,  $\sim 0.7$ <sup>[22]</sup>,  $\sim 1.1$ <sup>[22]</sup> and  $\sim 2.3$ <sup>[11]</sup> respectively which explains that deprotonation of  $H_2O$  molecule attached to  $Zr^{4+}$  and  $Ce^{4+}$  occurs faster than  $H_2O$  molecules linked to  $Hf^{4+}$  and  $Th^{4+}$  in acidic solutions. From the magnitude of  $K_M$  and  $pK_a$  values, it became evident that hydroxo species formed from  $Zr^{4+}$  would bind more efficiently to esters molecules than those with other metal ions and additionally might facilitate intramolecular nucleophilic attack by metal bound hydroxide ion at phosphorus atom initiating the formation of a six membered ring intermediate. Thus the reaction appears to follow a push-pull mechanism as described in the case of bivalent metal ion catalyzed hydrolysis of phosphorus compounds<sup>[22,23-27]</sup>. Therefore, considering the above facts it has been proposed that, electrons of sulfur atom of the P=S bond binds with complexed metal ions making phosphorus an electron deficient centre, which subsequently being attacked by  $OH^-$

ion of the adjacent metal ion to liberate the cyanophenol as shown by the Scheme -1.

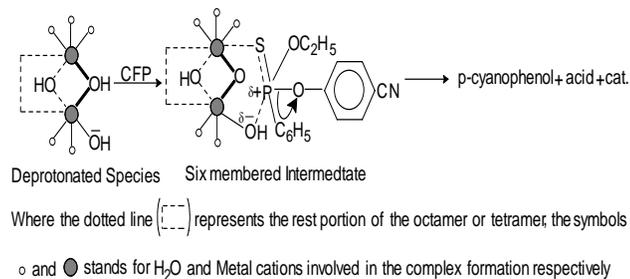


Fig.2

## REFERENCES

- [1] Klinkel K. L., Kiemele L. A., Gin D. L. and Hagadron J. R. (2006) *Chem. Comm.* 2919.
- [2] Y. C. Yang, J. A. Baker, J. R. Ward, *Chem. Rev.* 92 (1992) 1729.
- [3] Y. C. Yang, *Acc. Chem. Res.* 32 (1999) 109.
- [4] J. R. Morrow, C. William, *J. Inorg. Chem.* 27 (1988) 3387.
- [5] T. H. Fife, P. Pujari, *J. Am. Chem. Soc.* 103 (1988) 7790.
- [6] R. A. Moss, P. K. Gong, H. Morlas-Rojas, *Org. Lett.* 4 (2002) 1835.
- [7] M. Komiyama, K. Matsumura, Y. Matsumoto, *J. Chem. Soc. Chem. Comm.* (1992) 640.
- [8] B. K. Takasaki, J. Chin, *J. Am. Chem. Soc.* 116 (1994) 1121.
- [9] R. A. Moss, B. D. Park, P. Scrimin, G. Ghirlanda, *J. Chem. Soc. Chem. Comm.* (1995) 640.
- [10] R. A. Moss, K. Braken, J. Zang, *Chem. Comm.* (1997) 563.
- [11] R. A. Moss, J. Zang, K. Braken, *Chem. Comm.* (1997) 1639.
- [12] R. A. Moss, H. Morales-Rojas, *J. Am. Chem. Soc.* 123 (2001) 7457.
- [13] J. Sumaoka, S. Miyama, M. Komiyama, *J. Chem. Soc., Chem. Comm.* (1994) 1639.
- [14] R. A. Moss, K. G. Rangunathan, *Chem. Comm.* (1998) M. Eto, *Organophosphorus Pesticides Organic and Biological Chemistry*, CRS Press Inc, Cleveland, 1974.
- [15] Joint meeting on FAO Panel of Experts on Pesticides Residues in Food and Environment and the WHO Expert Group Pesticides Residues Rome, October (1980) 6.
- [16] R. Kramer, R Ott, *Angew. Chem. Int. Ed. Eng.* 37 (1999) 1958.
- [17] R. A. Moss, J. Zang, K. G. Rangunathan, *Tet. Letts.* 39 (1998) 1529.
- [18] A. Singhal, L. M. Toth, J. S. Lin, K. Affholter, *J. Am. Chem. Soc.* 118 (1996) 11529.
- [19] R. A. Moss, H. M. Rojas, S. Vijayraghavan, J. Tian, *J. Am. Chem. Soc.* 126 (2004) 10923.
- [20] T. A. Algiwale, C. P. Shinde, Purnanand, I. J. *Chem.* 46A (2007) 269.
- [21] J. Burgess, "Metal Ions in Solutions", Halsted Press, New York (1978) 267.
- [22] J. M. Smolen, A. T. Stone, *Environ. Sci. Technol.* 31(1997)1664.
- [23] P. A. Sutton, D. A. Buckingham, *Acc. Chem. Res.* 20 (1987) 357.
- [24] J. Chin, *Acc. Chem Res.* 25 (1992) 273.
- [25] J. R. Morrow, W. C. Trogler, *Inorg. Chem.* 28 (1989) 2330.
- [26] S. H. Gellman, R. Peter, R. Breslow, *J. Am. Chem. Soc.* 108 (1986) 2388.

# ANALYSIS OF ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING FOR WIRELESS COMMUNICATION SYSTEM

Vikas Sakalle<sup>1</sup>, Anoop Chaturvadi<sup>2</sup>, Chandra Prakash Dwivedi<sup>3</sup>

Dept. Computer Science & Engg., AISECT University<sup>1,3</sup> Dept. Computer Science & Engg. LNCT Bhopal<sup>2</sup>,

## ABSTRACT

*Nowadays- Orthogonal frequency division multiplexing is the transfer of two signals it means that the two coexisting signals are independent of each other in a time interval. OFDM is a multi-carrier modulation technique with densely spaced sub-carriers that has gained a lot of popularity among the broadband community in the last few years. OFDM has been shown to be an effective technique to combat multipath fading in wireless communications. It has been successfully used for HF radio applications. OFDM has chosen as the standard for digital audio broadcasting and high-speed wireless local areas networks. In this Paper, we present different literature including introduction to OFDM Modulation its advantages and demerits, and some applications of OFDM. OFDM Techniques for peak-to-average power ratio reduction, time and frequency synchronization, and channel estimation will be discussed. We conclude with a brief overview of current application areas.*

**Keywords:** Diversity, fading, PAR .

## I. INTRODUCTION

In past years, Technology and system requirements in the telecommunications field are changing very fast. Over the previous years, since the transition from analog to digital communications, and from wired to wireless, different standards and solutions have been adopted and implemented. Wireless communications is a rapidly growing piece of the communications manufacturing, with the potential to provide high-speed high-quality information exchange between the portable devices located anywhere in the world [1][2]. Potential applications enabled by this technology include multimedia Internet-enabled, Global System for Mobile (GSM), smart homes, automated highway systems, video teleconferencing and distance learning, and autonomous sensor networks, just to name a few. However, supporting these applications using

wireless techniques creates a significant technical challenge[3].The motion in space of a wireless receiver operating in a multipath channel results in a communications link that experiences small-scale fading. The rapid fluctuations of the received power level due to small sub-wavelength changes in receiver position are described as small-scale fading [4]. Basically, mobile radio communication channels are time varying, multipath fading channels [3], [4]. In a radio communication system, there are many paths for a signal to pass through from a transmitter to a receiver. Sometimes there is a direct path where the signal travels without being obstructed, which is known as a Line Of Sight (LOS) path. In most cases, components of the signal are refracted by different atmospheric layers or reflected by the ground and objects between the transmitter and the receiver such as vehicles,

buildings, and hills, which is known as Non Line Of Sight (NLOS) paths. These components travel in different paths of different length and combine at the receiver. Thus, signals on each path suffer different transmission delays and attenuation due to the finite propagation velocity. The combination of these signals at the receiver results in a destructive or constructive interference, depending on the relative delays involved. In fact, the environment changes with time which leads to signal variation. This is called time variant environment. Also, the motion of the object influences signals. A short distance movement can cause an obvious change in the propagation paths and vary the strength of the received signals. OFDM has been shown to be an effective technique to combat multipath fading in wireless communications. OFDM is a modulation scheme that allows digital data to be efficiently and reliably transmitted over a radio channel, even in multipath environments. OFDM transmits data by using a large number of narrow bandwidth carriers. These carriers are regularly spaced in frequency, forming a block of spectrum. The separation of the subcarriers is such that there is a very compact spectral utilization. With OFDM, it is possible to have overlapping sub channels in the frequency domain, thus increasing the transmission rate. The attraction of OFDM is mainly because of its way of handling the multipath interference at the receiver. Multipath phenomenon generates two effects (a) Frequency selective fading and (b) Inter symbol interference (ISI). The "flatness" perceived by a narrowband channel overcomes the frequency selective fading. On the other hand, modulating symbols at a very low rate makes the

symbols much longer than channel impulse response and hence reduces the ISI. Use of suitable error correcting codes provides more robustness against frequency selective fading. The insertion of an extra guard interval between consecutive OFDM symbols can reduce the effects of ISI even more. The frequency spacing and time synchronization of the carriers is chosen in such a way that the carriers are orthogonal, meaning that they do not cause interference to each other [5].

## **2. Serial to Parallel Conversion of OFDM System :**

As wireless communication evolves towards broadband systems to support high data rate applications, we need a technology that can efficiently handle frequency selective fading. The OFDM system is widely used in this context. The key idea of OFDM is to divide the whole transmission band into a number of parallel sub channels (also called subcarriers) so that each sub channel is a flat fading channel [11]-[13]. In this case, channel equalization can be performed in all sub channels in parallel using simple one-tap equalizers, which have very small computational complexity.

In this case, channel equalization can be performed in all sub channels in parallel using simple one-tap equalizers, which have very small computational complexity.

It is important feature of OFDM is the orthogonal relationship between the subcarrier signals. Orthogonality allows the OFDM subcarriers to overlap each other without interference. OFDM uses FH to create a spread spectrum system. FH has several advantages over DSSS, for example, no

near-far problem, easier synchronization, less complex receivers.

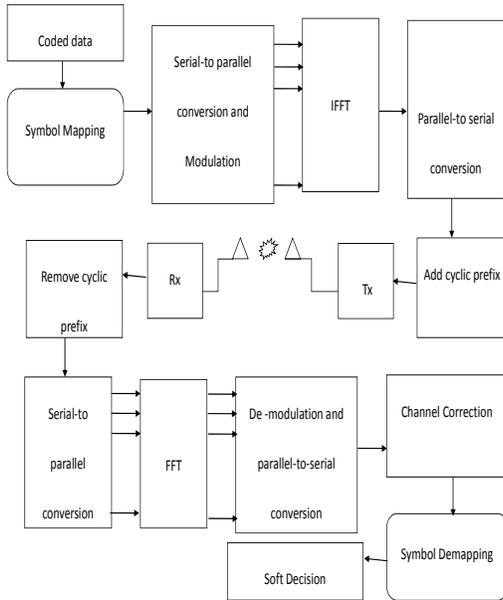


Figure (1) Block diagram of an OFDM system.

A block diagram of an OFDM system is depicted in *fig.1* Here, for simplicity and clearness of illustration, channel coding block is left out. The incoming digital data are first passed to a serial to parallel converter (S/P) and converted to blocks of  $N$  data symbols. Each block is called a frequency-domain OFDM symbol and  $N$  is the number of sub channels.

OFDM the input information sequence is first coded data send to symbol mapping than converted into serial to parallel conversion and modulation data sequences and output is multiplied with spreading code. Data from all subcarriers is modulated in baseband by inverse fast Fourier transform (IFFT) and converted back into parallel to serial conversion data. The guard interval is inserted

between symbols to avoid ISI caused by multipath fading and finally the signal is transmitted after RF up-conversion. At the receiver, after down-conversion, the  $m$ -subcarrier component corresponding to the received data is first coherently detected with FFT and then multiplied with gain to combine the energy of the received signal scattered in the frequency domain. The subcarriers are combined using an IFFT and transmitted. At the receiver, the carrier is converted back to a multicarrier lower data rate from using FFT. The lower data subcarriers are combined to form a high rate data unit.

### 3. Different types of Diversity Techniques

Diversity techniques have been developed in order to improve the performance and reliability 'of mobile wireless communication systems. Basic diversity techniques can be divided into three schemes.

#### 3.1 Time Diversity:

When the same data are sent over the channel at different time slots, the received signals can be uncorrelated if the time separations are large. The required time separation is at least as great as the reciprocal of the fading and width, which is two times the speed of the mobile station divided by the wavelength. Hence, the time separation is inversely proportional to the speed of the mobile station. When the mobile station is time diversity (temporal diversity) in terms of multiple transmissions of the same symbol is not as useful.

This is in contrast to all of the other diversity types listed above, because they are independent of the speed of the mobile station.

### 3.2 Frequency Diversity:

When Signals with different carrier frequencies far apart with each other are possibly independent. The carrier frequencies must be separated enough so that the fading associated with the different frequencies are uncorrelated. For frequency separations of more than several times the coherence bandwidth, the signal fading would be essentially uncorrelated.

### 3.3 Space Diversity:

When the receiver or transmitter has multiple antennas, then distance between the antennas is made large. so which type of fading is independent fading.

Then independent fading is called space diversity. Space separation of half of the wavelength is sufficient to obtain two uncorrelated signals.

## 4. OFDM in Peak Power Problem:

One of the most serious problems with OFDM transmission is that, it exhibits a high **peak-to-average ratio**. In other words, there is a problem of extreme amplitude excursions of the transmitted signal. The OFDM signal is basically a sum of  $N$  complex random variables, each of which can be considered as a complex modulated signal at different frequencies. In some cases, all the signal components can add up in phase and produce a large output and in some cases, they may cancel each other producing zero output. Thus the peak-to-

average ratio (PAR) of the OFDM system is very large.

The problem of Peak-To-Average Ratio is more serious in the transmitter. In order to avoid clipping of the transmitted waveform, the power-amplifier at the transmitter frontend

must have a wide linear range to include the peaks in the transmitted waveform.

Building power amplifiers with such wide linear ranges is a costly affair. Further, this also results in high power consumption. The DAC's and the ADC's must also have a wide range to avoid clipping.

There has been a lot of research put into the study of overcoming the PAR problem in OFDM [7,8,9]. The following sections discuss some of the most common and important of those techniques as well as other issues.

### 4.1. Power Amplifier Linearity

Practical Power Amplifiers have an input power range over which they have a linear transfer curve. Usually the linearity of non-ideal power amplifiers is measured using a term called the **1 dB compression point**. It is defined as the input power at which the output power of the amplifier is 1 dB less than the output power obtained with an ideal amplifier. The figure(power) shows a typical response curve of a non-ideal power amplifier.

### 4.2. Clipping

One important feature of the peak-to-average ratio in the OFDM is the fact that the percentage of symbols have a very large peak-power is less (and the percentage decreases with an increase in the

number of sub-carriers). Thus in this case, the simplest possible solution to the peak-power problem would be **Clipping**, i.e., limiting the peak amplitude to some maximum level. Although simple, this method has a few disadvantages.

Clipping produces a kind of self-interference that causes some degradation in the BER performance.

The non-linear distortion caused due to clipping increases the amount of out-of-band radiation. The increase in the out-of-band radiation is basically because of the fact that the clipping operation is a multiplication of the OFDM symbol with a rectangular function that is 1 if the amplitude is below a threshold and a smaller value if the amplitude is above the threshold. This rectangular waveform increases the out-of-band radiation, and as a result, the spectrum has a roll-off that is inversely proportional to the frequency.

The problem of slow spectrum roll-off can be overcome to some extent, by **windowing** the rectangular clipping waveform. Several windows are proposed in literature. Some of the most common ones are Gaussian, Cosine, Hamming, Kaiser etc. Simulation results show a slight degradation in BER with clipping. When windowing is applied the BER performance is still worse, since a large portion of the signal is affected by windowing than by clipping alone.

The required back-off for the power amplifier can be determined by specifying the amount of attenuation for the out-of-band spectral components, relative to the in-band spectral components. It has been shown that windowing offers a 3-dB gain in

the required back-off when compared to clipping alone.

### 4.3. Error-Control Coding

One of the problems with clipping is the degradation in BER. Specifically, the symbols that have a large PAR ratio are vulnerable to errors. To reduce this effect, forward error correction (FEC) can be applied across several OFDM symbols. When FEC is applied, the errors caused due to large PAR in particular symbols can be corrected by the surrounding symbols.

### 4.4. Peak Cancellation

Another method of removing the peaks in a OFDM signal is to **subtract** a time-shifted and scaled reference function such that each subtracted reference function reduces the peak power of at least one signal sample. It is desirable to choose a signal with approximately the same bandwidth as the transmitted signal. The most commonly used peak-canceling function is the sinc function because of its desirable frequency-domain properties. The sinc function can be time-limited by multiplying by a raised-cosine window. It can be shown that the peak cancellation technique will result in a lesser outof-band interference than the clipping and windowing techniques. A further advantage of the peak-cancellation technique is the fact that it can be digitally implemented, following the IFFT in the transmitter.

### 4.5. PAR Reduction Codes

A more elegant solution to the PAR problem is the use of coding techniques. The PAR can be reduced by using a code that only produces OFDM symbols for which the PAR is below some desired level. The more the reduction in the PAR, the smaller is the coding rate. It is possible to construct codes with a code rate of  $\frac{3}{4}$  that provides a maximum PAR of 3 dB. Another interesting result in this direction is that the correlation properties of complementary sequence can translate into a relatively small PAP ratio of 3-dB when these codes are used to modulate an OFDM Symbol. All these results have lead to the usage of Golay-Complementary sequences for generating these codes. Golay complementary sequences are sequence pairs for which the sum of auto-correlation function is zero for all delay shifts that are not equal to zero. A lot of research papers have been published on the usage of Golay Codes for OFDM transmission, that deal with the efficient generation of these code and the optimal and sub-optimal decoding and other interesting properties.

#### 4.6. Symbol Scrambling Techniques

The basic idea of these techniques is that, for each OFDM symbol, the input sequence is scrambled by a certain number of scrambling sequences. The output signal with the smallest PAR is transmitted. If the PAR for one OFDM symbol has a probability  $p$  of exceeding a certain level without scrambling, the probability that it will exceeding with scrambling (given a set of  $k$  scrambling codes) is  $p^k$ . Thus scrambling hopes to reduce the

*probability* of occurrence of high PARs, rather than *reducing* the levels of these PARs.

#### 5. Merits and Demerits of OFDM :

- 1) The OFDM is a promising transmission scheme, which has been considered extensively, as it has the following key advantages [5-6]
- 2) OFDM makes efficient use of the spectrum.
- 3) OFDM becomes more resistant to frequency selective fading than single carrier systems by converting the frequency selective fading channel into narrowband flat fading sub channels.
- 4) OFDM eliminates Inter Symbol Interference (ISI) and Inter Frame Interference (IFI) through use of a Cyclic Prefix (CP). OFDM recovers the symbols lost due to the frequency selectivity of the channel by using adequate channel coding and interleaving.
- 5) OFDM makes channel equalization simpler than single carrier systems by using adaptive equalization techniques.
- 6) OFDM seems to be less sensitive to sample timing offsets in comparison with single carrier systems.
- 7) OFDM provides good protection against co-channel interference and impulsive parasitic noise. OFDM makes it possible to use Maximum Likelihood (ML) decoding with reasonable complexity.

8) OFDM is computationally efficient with FFT techniques.

The several advantages of the OFDM systems could only appear if the main three drawbacks were treated carefully. OFDM has the following negative aspect:

9) OFDM signal has a noise like amplitude with a very large dynamic range; therefore, it requires RF power amplifiers with a high peak to average power ratio, which may require a large amplifier power back off and a large number of bits in the Analog to Digital (A/D) and Digital to Analog (D/A) designs. OFDM is very sensitive to Carrier Frequency Offset (CFO) caused by Doppler Effect. Hence, CFO should be estimated and cancelled completely.

10) OFDM receiver suffers from the difficulty to make a decision about the starting time of In this case, channel equalization can be performed in all sub channels in parallel using simple one-tap equalizers, which have very small computational complexity.

## 6. Conclusion

In this paper we analyzed several interesting properties that use Wireless channels its also used OFDM for *modulation* and *multipleaccess*. There are various methods of generation and demodulation of OFDM and synchronization were analyzed. We can under -stand merits and demerits of OFDM and different types of diversity techniques.

## REFERENCE

- [1] A. Goldsmith, *Wireless Communications*, Cambridge University Press, 2006.
- [2] R. Prasad, *OFDM for Wireless Communications Systems*, Artech House, 2004.
- [3] J. G. Proakis, *Digital Communications*, 4<sup>th</sup>Ed. New York, McGraw- Hill, Inc., 2001.
- [4] T. S. Rappaport, *Wireless Communications: Principles and Practice*, Englewood Cliffs, NJ: Prentice Hall, 1996.
- [5] Upena Dalal, *Wireless Communications: 3<sup>rd</sup> impression*, Oxford University press, 2010
- [6] J. A. C. Bingham, "Multicarrier Modulation for Data Transmission: An idea whose time has come," *IEEE Communications Magazine*, vol.28, no.5, pp.5-14, May 1990.
- [7] May T., Rohling H, "Reducing the Peak to Average Power Ratio of OFDM Radio Transmission Systems", *Proceedings of IEEE VTC '98*, Ottawa, Canada, pp. 2474-2478, May 18-21, 1998.
- [8] Li X., Cimini L. J., "Effects of Clipping and Filtering on the performance of OFDM", *Proceedings of IEEE VTC '97*, pp. 1634-1638, 1997.
- [9] Wilkinson T. A, Jones A. E., "Minimization of the Peak-To-Mean Envelope Power Ratio of Multi-Carrier Transmission Schemes by Block Coding", *Proceedings of the IEEE VTC*, Chicago, pp. 825-829, July 1995.
- [10] K. Sathananthan, and C. Tellambura, "Probability of Error Calculation of OFDM Systems with Frequency Offset," *IEEE Transactions on Communications*, vol. 49, no. 11, pp. 1884- 1888, Nov. 2001.
- [11] F. Yang, and K. H. Li, "A Carrier Frequency Offset Estimator with Minimum Output Variance for OFDM Systems," *IEEE Communications Letters*, vol. 8, no.11, Nov. 2004.
- [12] L. Hanzo, and T. Keller, *OFDM and MC-CDMA: A Premier*, 1st Ed. Wiley-IEEE Press, ISBN: 0470030070, July 2006.
- [13] J. Armstrong, *OFDM*, John Wiley and Sons Ltd., January 2007.
- [14] K. Fazel, and S. Kaiser, *Multi-Carrier and Spread Spectrum System*, John Wiley & Sons, Inc., 2003.
- [15] Russell, and M. Stuber, "Interchannel Interference Analysis of OFDM in a Mobile Environment", *IEEE Vehicular Technology Conference*, vol.2, pp. 820-824, July 1995.
- [16] J. Heiskala, J. Terry, *OFDM Wireless LANs: A Theoretical and Practical Guide*, Sams Publishing 2002.

- [17] K.Sathananantan , and R. M. A. P. Rajatheva, "Analysis of OFDM in presence of Frequency Offset and method to reduce performance degradation," *Proceedings IEEE Global Conference, Telecommunication* vol.1, pp.72-76, Nov. 2000.
- [18] T. Pollet, M. V. Bladel, and M. Moeneclaey, "BER sensitivity of OFDM systems to carrier frequency offset and wiener phase noise," *IEEE Transactions on Communications*, vol. 43, no. 234, pp. 191-193, Feb./Mar./Apr. 1995.