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"Thinking is progress. Non-thinking is stagnation of the individual, organisation and the country. Thinking leads to action. Knowledge without action is useless and irrelevant. Knowledge with action, converts adversity into prosperity."

Dr. A P J Abdul Kalaam Azad

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"An Empirical Study on the Imperatives of Knowledge Management Practices in Selected Information Technology Enterprises of Delhi North India"

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***Abstract**: In today's world of increasingly uncertain and complex business environments, dynamically evolving outcomes are the key drivers of how "intellectual capital" uses "innovative ways" to leverage strategic opportunities and challenges. The last decade has seen the growth of knowledge companies and knowledge work. The ever increasing competition and change has made the companies understand the value of their corporate intellectual value and effective methods to use that knowledge. Knowledge has emerged as the most critical competence for any business to survive in this dynamic nature of the competitive global marketplace. Intellectual capital has become an important factor in determining the organizational effectives.*

Key Words: Knowledge, Knowledge management, Intellectual Capital

Introduction

In this global marketplace Knowledge has become the most critical resource and how an organization manages its knowledge resource, makes all the strategic difference. According to Nonaka (1995) an economy where the only certainty is uncertainty, one core source of lasting competitive advantage is knowledge. He also says, "Successful companies are those that consistently create new knowledge, disseminate it widely throughout the organization and quickly embody it in new technologies and products".

Managing knowledge has become a business imperative for those companies who want to guard their present market share, build future opportunities and stay ahead of competition (Natrajan and Shekhar, 2000).

In the words of Raman (2003), knowledge management basically involves acquisition, creation, dissemination, renewal and application of knowledge towards organizational sustenance and survival.

Effective knowledge management enhances the influence of innovation, improves customer service, shortens product life cycle, increases revenue (Massey and Weiss, 2002), thereby resulting in enhanced level of corporate performance.

Knowledge is categorized into two types: Explicit and Tacit (Nonaka and Takeuchi, 1995). Explicit knowledge is knowledge that can be articulated, codified, verbalized and stored in certain media. It can be readily transmitted to others. The information contained in encyclopedias is good examples of explicit knowledge.

Tacit knowledge refers to intuitive, insight based, hard to define knowledge that is largely experience based. It is context dependent and personal in nature, embedded in individual experience and involves intangible factors, such as personal beliefs, perspective, and the value system. Tacit knowledge is hard to communicate and deeply rooted in action, commitment and involvement (Nonaka, 1995).

Definition given by American Productivity and Quality Council (2002) highlights the same as, "Knowledge management is the systematic process of identifying, capturing and transmitting information and knowledge people can use to create, compete and improve".

Review of Literature

In the last decade, Knowledge management has emerged as a key area in today's business world. Right from the beginning of man's history, acquisition and sharing of knowledge has been important. KM is conceived as an important domain within the business as well as in the research field. A number of management experts have contributed to the evolution of knowledge management, among them are notables as Peter Drucker, Paul Starassmann and Peter Senge. This field had started emerging in the beginning of 1990s but it's important to note that the debate started much earlier (Havek, 1945, Bell,1978). Drucker (1988) was the first to coin the term knowledge worker. Several inputs have been pouring in ever since as to how knowledge can be created, utilized and transferred within the organizations and how this knowledge management leads to the transmission of innovation.

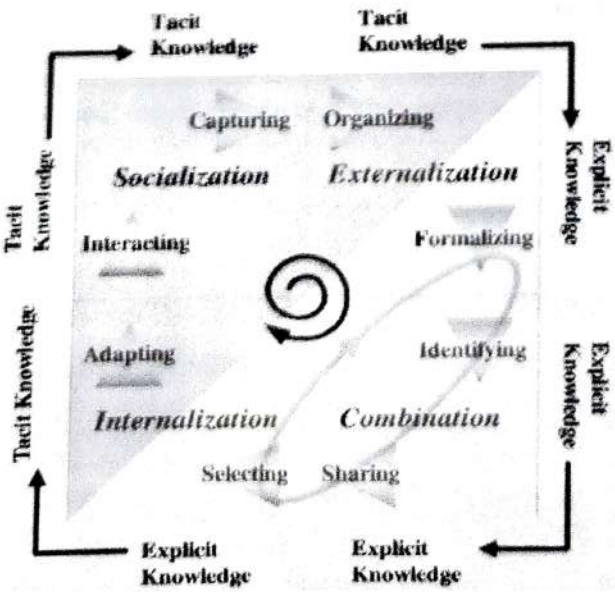
Knowledge management history started around World War II and in particular with the building of the fighter planes. Observers were led to note that building a second airplane took considerably less time and realized considerably less defects than the first. It was being noted that workers learned from their experiences. This phenomenon led enterprises in the fifties to begin to analyze and codify their observations. Organizations understood that the better and quicker they were able to manage the learning processes, the better equipped they were to pass on the tacit understandings that form the basis of how they operate. Organizations were beginning to understand that knowledge management is closely associated with the learning process.

Moving from knowledge management history to knowledge management today, many theorists are of the view that knowledge exists and grows within a composite structure of internal networks and research in this area has proved to be the most productive in terms of the development of knowledge management tools and techniques.

The recent curiosity in organizational knowledge has highlighted the issue of managing the knowledge to the organization's benefit. Knowledge management is purported to increase innovativeness and responsiveness (Hackbarth 1998). The majority of organizations believe that much of the knowledge they need exists inside the organization, but that identifying that it exists, finding it, and leveraging it remains problematic (Cranfield University 1998).

Nonaka and Takeuchi (1995) introduced the model of knowledge creation in their famous book "The Knowledge-Creating Company". According to Nonaka and Takeuchi, knowledge is created and transformed in an ascending process, or spiral, from the individual level to the group and organizational levels, and finally between organizations. This model talks about the interaction between tacit knowledge and explicit knowledge. A "knowledge spiral" is grounded in four complementary types of knowledge conversion: (a) from tacit knowledge to tacit knowledge, or socialization; (b) from tacit to explicit knowledge, called externalization; (c) from explicit to explicit knowledge, or combination; and (d) from explicit to tacit knowledge, or internalization.

Figure 1.1 – The Knowledge Spiral



Source: (Nonaka and Takeuchi 1995)

According to Schein (1999) the *future belongs to people who use their heads instead of their hands*. He points out how countries like *Korea and Singapore* are educating their workers to *new standards and how* international competition in *near future* will be defined in terms of advantage in knowledge, a *nation* creates.

In Tiwana's (2002) words the knowledge creation with the latest concept of CRM (Customer Relationship Management) in marketing with Knowledge Management and e-business. The author uses the term e-business because in today's world business is all about interned facilitated execution, coordination and management of business processes and activities.

Kumar and Mulchandani (2005) have made an effort to capture the innovation initiative launched by one of the leading information technology companies in India, Wipro. The paper discussed Wipro's innovation initiative, as a case study, explaining the contemplation behind the launch of the initiatives, the organizational preparations that preceded this launch and the structure and processes that were laid down for the pursuit of this initiative. Ten significant aspects of Wipro's experiences with the innovation initiative, highlighting areas of congruence with and departure from the existing knowledge in this domain were also discussed.

According to Liu and Tsi (2007) organizations that introduce knowledge management are able to improve 5 to 10 percent in performance in the customer, financial, and internal business process areas and 10 to 15 percent in the learning and growth areas which supports that knowledge management has a positive effect on operating performance. They concluded that organizations use knowledge management to improve upon the operating performance through shortened production processes, reduced costs, increased flexibility and improved product quality and service.

Hong, Kianto and Kylaheiko (2008) discussed the role played by organizational culture in knowledge creation. Culture is important because a good part of knowledge has been learned as culture from old generations. Also tacit knowledge consists mostly of culture. Culture is a highly non-linear field of forces, a very strong integrator that is able to influence organizational behavior and knowledge management activities at different levels.

Rationale of the Study

Practice and research in Knowledge Management have stressed upon the Human Capital as an important component of the organizations intellectual capital; but not much has been done towards understanding the value addition made by intellectual capital. Earlier studies have focused on financial variables and roles and behaviors of the human resources. A need was perceived towards the study and understanding of imperatives of knowledge management – the organizational factors that influence knowledge creation and dissemination. A literature review indicated that there is a paucity of studies in the area of knowledge management and also that performance and innovation are the natural outcomes of knowledge management. Empirical research has shown that knowledge management can lead to improved performance through strategies designed to create an organizational learning environment, employee development, knowledge sharing, better product /service quality and the involvement of top management, implementation of creating a business culture that embraces knowledge management as a core value of the organization. In light of the above motivations, this research seeks to review the imperatives of the knowledge management in the Information Technology Companies across Delhi (NCR).

Research Objectives

The principal objective of the study aims to have an insight on the imperatives of implementing the knowledge management practices.

Research Methodology

Research Methodology	Details
Qualitative Research	This work will have the basis of a critical review of literature available in the respective field to give an insight into the research done and developed theories. This includes the examination of the bandwidth of KM literature from the basis of the standard books to the new references and with including papers and resources available on the internet
Interviews	The author used interviews to get an insight on the topics related to the current state of capabilities in relation to knowledge sharing in the assessed organization
Quantitative Research	The collecting of primary data using self-administered questionnaires will be combined

	with the results conducted from the qualitative research. To gather the input for the assessment one survey was designed to gather the information about the capabilities for knowledge sharing in the team from the participating team members and to understand the outcomes of implemented solutions which are part of the framework for knowledge sharing
Experimentation	The experimentation was used to gather insights of solutions as part of the framework to knowledge sharing and to get feedback from the team members about the acceptance of such defined solutions. The experimentation was based on the previous research topics and especially also from outcomes based on qualitative research, interviews and quantitative research.
Observations	The method of observation and the insights of experts on this topic were used to gather information that is related to the evaluation of the outcomes of the experimentation phase of the project.

Data Analysis

To study the of knowledge management practices thirty organizations have been selected. The selected organizations have been classified in three categories. Companies with low turnover (upto 5000 crores) are categorized as Group A, companies with turnover ranging from 5001-20000 crores (medium level) have been categorized as Group B and companies with turnover of more than 20000 crores have been categorized as Group C. The sample size is 270 with 3 employees from top level management, 3 from middle level management and 3 from lower level management in each organization. The demographic factors such as size of the unit, total number of employees, product category and markets served were taken into consideration. Well structured questionnaire has been used to collect the data which has been designed after extensive study of literature. Five point Likert scale ranging from (5) 'strongly agree', (4) 'agree', (3) 'neither agree nor disagree' (4) 'disagree' and (5) 'strongly disagree' has been used to rate the response. The comparisons have been made using one way ANOVA. Based upon the annual turnover, the units were divided into three categories. During the study, following findings have been made:

Imperatives of implementing Knowledge Management Practices: There are various techniques that are being adopted by the organizations for knowledge creation. Effectiveness of each technique varies from organization to organization.

Table I – Imperatives of implementing Knowledge Management Practices

Imperatives	A		B		C		Overall		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F-ratio
Competition (market share)	4.62	0.49	4.29	0.70	4.75	0.44	4.54	0.58	1.67
Customer Relationship Management (changing needs of customer)	4.46	0.50	4.43	0.73	3.75	1.32	4.33	0.80	2.11
Organizational Performance (achievement of objectives)	4.38	0.63	4.43	0.50	5.00	0.00	4.50	0.58	1.58
Research & Development (Innovation, new product development)	4.38	0.74	3.86	1.00	4.25	0.84	4.21	0.87	1.10
Information & Communication Technology (latest technology)	3.47	0.93	3.17	0.93	3.85	1.25	3.45	1.01	3.01
Knowledge Sharing (collaborative work, best practices, reuse of knowledge)	4.56	0.56	4.37	0.49	5.00	0.00	4.58	0.53	3.29
Reduced Costs (appropriate pricing)	4.38	0.63	4.14	0.35	5.00	0.00	4.42	0.57	4.73
Employee Retention (avoiding loss of knowledge due to employees leaving)	4.31	0.72	3.86	1.00	4.25	0.84	4.17	0.85	1.08

Conclusions

From table I, a comparison regarding Imperatives of knowledge management in A, B and C can be drawn as under:

1. Ever increasing competition is most crucial imperative in group A companies, closely followed by Knowledge Sharing and customer relationship management. This group has rated advent of information technology as the seventh factor responsible for knowledge orientation of organizations.
2. Customer Relationship Management and Organizational Performance are the most important stimulants for knowledge management in group B companies. Research & development and employee retention have been considered as equally important imperatives of knowledge management practices. Information Technology has been rated as the last important stimulant in this group.
3. Organizational performance, reduced costs and knowledge sharing have been rated as the most and equally important imperatives of knowledge management in group C companies. Competition has been rated as the second important factor whereas research and development and employee retention have been rated as the third important imperative. Competition and customer relationship management have been considered as the least important factors in this group.

Depending upon the extent of the agreement it can be inferred that the variables with highest level of agreement show the current **imperatives of knowledge management practices in IT industry of Delhi (NCR).** The companies' business results from knowledge management initiatives and commitment towards the same has been impressive and the system can be further maintained so that the knowledge workers can fully leverage the collective expertise and output.

Limitations of the study: No research initiative is without certain limitations. This research will also have its own share of limitations. The possible limitations of research work can be:

1. The research study was conducted in 30 Information Technology companies across Delhi (NCR). This sample might not portray an accurate representation of the whole industry scenario on a national level.
2. The drawbacks like differences arising out of individual viewpoints, some biases on the part of the respondents have creeped in. 5% level of significance
3. Few respondents might have given incorrect information due to shortage of time, lack of interest or to conceal their identity.

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Evaluation of the effects of Green practices on the Performance of Indian Manufacturing industries using FAHP

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Abstract

Green Supply Chain Management is widely diffused practice in Indian industries that are seeking to improve environmental and economic performance of the manufacturing industries. This study defines the evaluation of Green supply chain practices and the effect of these practices on environmental and economic performance in manufacturing industries using Fuzzy AHP methodology. There are 2 main criteria i.e. Green practices and Green performance and 9 sub-criteria. The results shows that GSCM in industries focus more on Green practices and environmental performance. The most important criteria are cooperation with customers, green packaging, internal recovery, green suppliers, minimum use of material for packaging, reduction of use of hazardous material and selling the waste scrape. The performance of industries has been improved after implementing these criteria.

Keywords: Green supply chain management, GSCM practices, GSCM performance, Fuzzy AHP

I. INTRODUCTION

In developing countries automobile manufacturing firms have started to implement green supply chain management because of increasing challenges and pressures to improve environmental and economic performance (Ali Asghar Anvary Rostamy 2013). It's not only reduces environmental issues but also improves positive and negative economic performance of industries. Green supply chain management focuses to maximize environmental profit by implementing a life cycle approach through material selection, product design, manufacturing, sales and recovery, and therefore helps the industry to realize its improvement and sustainable development (Ali Asghar Anvary Rostamy 2013). The late 1990s, and encloses the reactive monitoring of environmental management programs, moves to more proactive practices such as the reclamation, recycling, remanufacturing and RL (reverse logistics), as well as incorporating innovations (Zhu & Serkis 2004). For the last 20 years, Green supply chain has been adopted by the industries to lower environmental problems and improve ecological efficiency, therefore to gain profit and increase market share (Van Hoek 1999). Green supply chain policies are necessary for proactive strategic, reactive regulatory and competitive advantages (Rajesh kumar et al. 2012). GSCM practices are implemented to improve the GSCM performances. Organization should follow GSCM practices like internal environmental management system, green purchasing, green packaging, internal recovery and eco designing to improve green performances such as environmental performance, positive and negative economic performances. Zhu and Sarkis(2004) developed four categories of green supply chain practices, i.e. internal environmental management system, external GSCM, eco design (design for environment practices) and investment recovery. The relationship between the green practices and environmental and economic performances were analyzed through empirical studies in the Chinese manufacturing firms (Ying & Liz 2012). However, GSCM is considered as a relatively new idea, so with current data and experiences it is very difficult to find if in practice GSCM is providing better results to the industries involved (Zhu and Sarkis, 2004). In today's world scenario of high competition and environmental uncertainty, there should be flexibility in supply chain for the existence of any supply chain business in industry. (Rituraj Chandraker et al. 2012).

In this paper Fuzzy AHP Methodology is applied to evaluate the Green supply chain practices and performance. Multi criteria decision making (MCDM) approach is conducted to analyze the collected data. The reason of selection of method is easy understandable logics of Fuzzy AHP and MCDM.

II. LITERATURE REVIEW

Zhu and Sarkis (2004) state that GSCM supply chain is called closed-loop supply chain because it involves from manufacturers to suppliers, customers and reverse logistics (RL) throughout. Hervani et al.(2005) indicates that there are many activities involving in GSCM such as remanufacturing, reuse and recycling which are embedded in green procurement practices, green design, total quality environmental management, transportation,

environmentally friendly packaging and various product end-of-life practices. Wee and Quazi(2005) indicate there are seven critical criteria in their research on environmental management: total involvement of employees; top management commitment; training; supplier management; green products/process design; information management and measurement. Chandraker *et al.* (2013) evaluate and measure the performance of GSCM in Chhattisgarh manufacturing industries. In this paper Multi Criteria decision making method (MCDM) is used to determine green performance with the help of the parameters related to GSCM performance. Sarkis (2010) in this paper discussed components and elements of GSCM (green supply chain management). The decision framework was designed and solved as an ANP (analytical network process). Hu and Hsu(2010) identify factors that are critical for adopting green supply chain practices in Taiwanese electrical and electronics industries i.e. relative to European Union directives, and extract twenty critical factors along with four dimensions (supplier management, organization involvement, product recycling and life cycle management). L.K.Tokeet. all. This study aims to interactions, rank and weightage of CSF (critical success factors) of the green supply chain management in manufacturing firms. PANG Yan et. all. (2011) combined with supply chain management practices in Hunan Valin Xiangtan Iron and Steel Limited Corporation, by applying the green supply chain theory, on the basis of demonstrating the implication of environment-friendly green supply chain management, and constructs the corresponding index evaluation model by applying level fuzzy comprehensive appraisal.

A. *Fuzzy Analytic Hierarchy Process*

Analysis Hierarchical Process (AHP) is a MCDM (multi-criteria decision making) tool first proposed by Saaty (Saaty 1980). Since it was discovered, AHP is the most powerful MCDM (multi-criteria decision making) software for researchers. Conventional AHP is confusing. It is unable to reflect the way human thinks. AHP is criticized for using asymmetrical judgmental scales and its was unable to properly consider the carelessness and inherent uncertainty of pairwise comparisons (Wang & Chang ,2007). FAHP was developed to resolve these issues. Decision makers find out that distanced judgment is more effective than rigid judgments because the individual often cannot fully express his preferences regarding fuzzy nature of comparison process (Rostamy *et. el.* 2013).

Fuzzy logic method is introduced for decision making in ambiguous and uncertain situations, using this method one can increase the effectiveness of decisions made and reduce ambiguities (Ertugrul & N. Karakasoglu 2009).

B. *FAHP Methodology*

In this paper, Extent Analysis method is used, originally proposed by Chang(1996). In this method, the amount of Sk (triangular number), is calculated for each pair rows of pairwise comparison matrix (Hu & Hsu 2010):

$$s_k = \sum_{j=1}^{n} m_{gi}^{j} \otimes \sum_{i=1}^{n}\sum_{j=1}^{m} m_{gi}^{j} \qquad (1)$$

K represents number of rows and columns. I and j represent alternatives and indicators respectively. The large degree compared with each other must be calculated after Sk calculation in EA analysis. A large degree on M1 with M2 is indicated as (M1 ≥ M2).

$$V(M_1 \geq M_2) = \sup \min(\mu_m(x), \mu_{m,}(y)) \qquad (2)$$

We also have:

$$\begin{cases} 1 & m_2 \geq m_1 \\ 0 & l_1 \geq u_2 \\ \text{Otherwise} & \\ \dfrac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)} & \end{cases} \qquad (3)$$

The large degree is calculated as: $V(M \geq M1, M2, \ldots\ldots, Mk)$

$$= V[(M \geq M_1) \text{ and } (M \geq M_2) \text{ and } \ldots (M \geq M_k)]$$

$$I = 1, 2, \ldots\ldots, k$$

Suppose that d (Ai) = min V (Si ≥Sk), k=1, 2, 3,…, n, k≠ i. Then the following weight vector is obtained.

$$Ai\ (I=1, 2, \ldots\ldots n) \tag{4}$$

That Ai(1,2, ……n) are n element. The normalized weight vector :

$$W = (d(A_1), d(A_2, \ldots, d(A_n)))^T \tag{5}$$

III. PROPOSED METHODOLOGY

In this study Fuzzy AHP model is used for evaluation of Green supply chain in manufacturing industries.

The methodology expresses in following way:

1. Establish GSCM practices and performances factors on the basis of literature review.
2. Design the questionnaires which cover all the factors of GSCM practices and performances.
3. Collect the data from expert interviews.
4. Analyze the collecting data using Fuzzy AHP method.
5. Determine the priority weight of all the factor.

The proposed model has two criteria Green practices and Green performance. Each criteria has some sub criteria. There are 9 sub-criteria. Internal environmental management system, green purchasing, green packaging, eco designing, cooperation with customers and internal recovery are the sub-criteria of Green practices. Environmental, positive and negative economic are sub-criteria of Green performance.

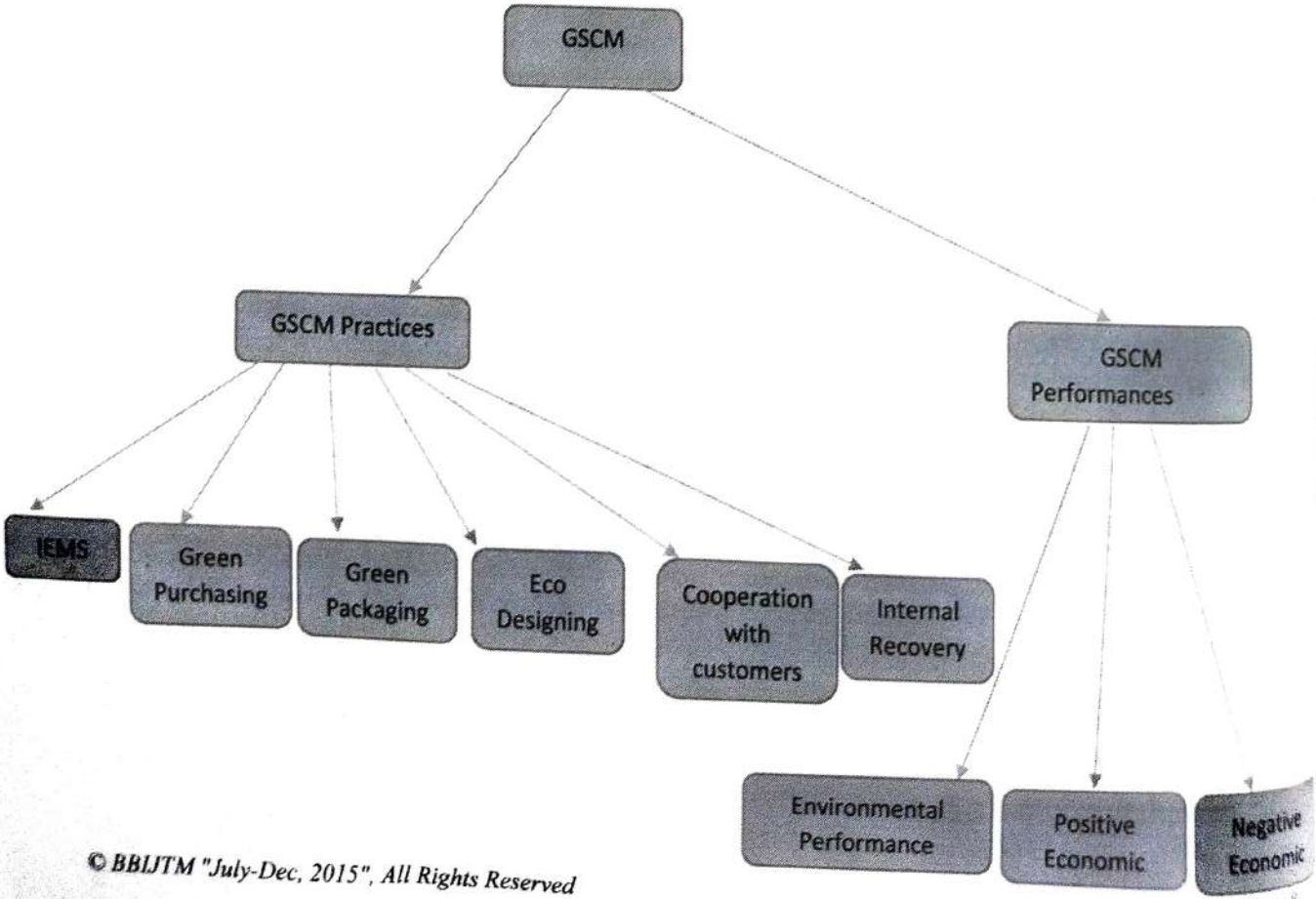

Fig 1 Proposed Model for Green Supply Chain Management

IV RESULTS

In this section using Fuzzy AHP method, Evaluation of Green practices and Green performance has been done. Main factors and sub factors of Green supply chain management are compared in Table 1-11

TABLE 1 PAIRWISE COMPARISON MATRIX OF GREEN PRACTICES

	IEMS	Green Purchasing	Green Packaging	Eco Designing	Cooperation with customers	Internal Recovery
IEMS	(1,1,1)	(3,4,5)	(1/5,1/4,1/3)	(1/3,1/2,1)	(1/6,1/5,1/4)	(1/4,1/3,1/2)
Green Purchasing	(1/5,1/4,1/3)	(1,1,1)	(1/6,1/5,1/4)	(1/5,1/4,1/3)	(1/6,1/5,1/4)	(1/4,1/3,1/2)
Green Packaging	(3,4,5)	(4,5,6)	(1,1,1)	(1,2,3)	(1/3,1/2,1)	(1,1,1)
Eco Designing	(1,2,3)	(3,4,5)	(1/3,1/2,1)	(1,1,1)	(1/4,1/3,1/2)	(1/3,1/2,1)
Cooperation with customers	(4,5,6)	(4,5,6)	(1,2,3)	(2,3,4)	(1,1,1)	(1,2,3)
Internal Recovery	(2,3,4)	(2,3,4)	(1,1,1)	(1,2,3)	(1/3,1/2,1)	(1,1,1)

TABLE 2. PAIRWISE COMPARISION MATRIX OF INTERNAL ENVIRONMENTAL MANAGEMENT SYSTEM (IEMS)

	Support of Managers	ISO14001 Certified company	Makes Eco Labeled products	Team to solve Environmental issues	Publish white paper	Training for Environmental Management
Support of Managers	(1,1,1)	(1/4,1/3,1/2)	(3,4,5)	(1/4,1/3,1/2)	(4,5,6)	(1,2,3)
ISO14001 Certified company	(2,3,4)	(1,1,1)	(5,6,7)	(1,1,1)	(5,6,7)	(2,3,4)
Makes Eco Labeled products	(1/5,1/4,1/3)	(1/7,1/6,1/5)	(1,1,1)	(1/7,1/6,1/5)	(1,1,1)	(1/5,1/4,1/3)
Team to solve Environmental issues	(2,3,4)	(1,1,1)	(5,6,7)	(1,1,1)	(5,6,7)	(2,3,4)
Publish white paper	(1/6,1/5,1/4)	(1/7,1/6,1/5)	(1,1,1)	(1/7,1/6,1/5)	(1,1,1)	(1/6,1/5,1/4)
Training for Environmental Management	(1/3,1/2,1)	(1/4,1/3,1/2)	(3,4,5)	(1/4,1/3,1/2)	(4,5,6)	(1,1,1)

TABLE 3. PAIREWISE COMPARISION MATRIX OF GREEN PURCHASING

	Purchase raw material from ISO14000 Certified suppliers	Cooperate with supplier for Environmental issues	Environmental audit for internal management of suppliers	Purchase Environmental Friendly product	Consider Environmental Criteria for suppliers selection
Purchase raw material from ISO14000 Certified suppliers	(1,1,1)	(1/6,1/5,1/4)	(1/3,1/2,1)	(1/5,1/4,1/3)	(1/4,1/3,1/2)
Cooperate with supplier for Environmental issues	(4,5,6)	(1,1,1)	(3,4,5)	(1,1,1)	(2,3,4)
Environmental audit for internal management of suppliers	(1,2,3)	(1/5,1/4,1/3)	(1,1,1)	(1/5,1/4,1/3)	(1/4,1/3,1/2)
Purchase Environmental Friendly product	(3,4,5)	(1,1,1)	(3,4,5)	(1,1,1)	(1,2,3)
Consider Environmental Criteria for suppliers selection	(2,3,4)	(1/4,1/3,1/2)	(2,3,4)	(1/3,1/2,1)	(1,1,1)

TABLE 4. PAIREWISE COMPARISION MATRIX OF GREEN PACKAGING

	Recycle & Reuse of outer packaging	Use ecological material for packaging	Minimum use of material for packaging
Recycle & Reuse of outer packaging	(1,1,1)	(1,1,1)	(1/4,1/3,1/2)
Use ecological material for packaging	(1,1,1)	(1,1,1)	(1/3,1/2,1)
Minimum use of material for packaging	(2,3,4)	(1,2,3)	(1,1,1)

TABLE 5. PAIREWISE COMPARISION MATRIX OF ECODESIGN

	Reduction of consumption of material for manufacturing	Reuse recycle and recover the components parts material	Design product to reduce use of hazardous material	Minimum use of natural resources	Less energy consumption use during manufacturing	Use renewable energy resources for manufacturing
Reduction of consumption of material for manufacturing	(1,1,1)	(1,2,3)	(1/4,1/3,1/2)	(1,1,1)	(1,1,1)	(3,4,5)
Reuse recycle and recover the components parts material	(1/3,1/2,1)	(1,1,1)	(1/4,1/3,1/2)	(1/3,1/2,1)	(1/3,1/2,1)	(3,4,5)
Design product to reduce use of hazardous material	(2,3,4)	(2,3,4)	(1,1,1)	(2,3,4)	(2,3,4)	(4,5,6)
Minimum use of natural resources	(1,1,1)	(1,2,3)	(1/4,1/3,1/2)	(1,1,1)	(1,1,1)	(3,4,5)
Less energy consumption use during manufacturing	(1,1,1)	(1,2,3)	(1/4,1/3,1/2)	(1,1,1)	(1,1,1)	(3,4,5)
Use renewable energy resources for manufacturing	(1/5,1/4,1/3)	(1/5,1/4,1/3)	(1/6,1/5,1/4)	(1/5,1/4,1/3)	(1/5,1/4,1/3)	(1,1,1)

TABLE 6. PAIREWISE COMPARISION MATRIX OF COOPERATION WITH CUSTOMERS

	Cooperation with customers for Eco designing	Cooperation with customers for clean production	Cooperation with customers for green packaging	Cooperation with customers for green logistics	Cooperation with customers for reverse logistics
Cooperation with customers for Eco designing	(1,1,1)	(1/3,1/2,1)	(1,1,1)	(1,1,1)	(2,3,4)
Cooperation with customers for clean production	(1,2,3)	(1,1,1)	(1,2,3)	(1,2,3)	(3,4,5)
Cooperation with customers for green packaging	(1,1,1)	(1/3,1/2,1)	(1,1,1)	(1,1,1)	(2,3,4)
Cooperation with customers for green logistics	(1,1,1)	(1/3,1/2,1)	(1,1,1)	(1,1,1)	(1/4,1/3,1/2)
Cooperation with customers for reverse logistics	(1/4,1/3,1/2)	(1/5,1/4,1/3)	(1/4,1/3,1/2)	(1/4,1/3,1/2)	(1,1,1)

TABLE 7. PAIREWISE COMPARISION MATRIX OF INTERNAL RECOVERY

	Sell excess inventory	Sell waste scrape	Sell excess equipment
Sell excess inventory	(1,1,1)	(1/6,1/5,1/4)	(1/4,1/3,1/2)
Sell waste scrape	(4,5,6)	(1,1,1)	(3,4,5)
Sell excess equipment	(2,3,4)	(1/5,1/4,1/3)	(1,1,1)

TABLE 8. PAIREWISE COMPARISION MATRIX OF GREEN PERFORMANCES

	Environmental	Negative economic	Positive economic
Environmental	(1,1,1)	(4,5,6)	(2,3,4)
Positive economic	(1/6,1/5,1/4)	(1,1,1)	(1/3,1/2,1)
Negative economic	(1/4,1/3,1/2)	(1,2,3)	(1,1,1)

TABLE 9. PAIREWISE COMPARISION MATRIX OF ENVIRONMENTAL PERFORMANCE

	Reduction of gas emission	Reduction of waste water emission	Reduction of solid waste emission	Reduction of use of toxic material	Decrease in environmental disaster
Reduction of gas emission	(1,1,1)	(1/3,1/2,1)	(1,2,3)	(1/4,1/3,1/2)	(1/3,1/2,1)
Reduction of waste water emission	(1,2,3)	(1,1,1)	(1,2,3)	(1,1,1)	(1,1,1)
Reduction of solid waste emission	(1/3,1/2,1)	(1/3,1/2,1)	(1,1,1)	(1/4,1/3,1/2)	(1/4,1/3,1/2)
Reduction of use of toxic material	(2,3,4)	(1,1,1)	(2,3,4)	(1,1,1)	(1,1,1)
Decrease in environmental disaster	(1,2,3)	(1,1,1)	(2,3,4)	(1,1,1)	(1,1,1)

TABLE 10. PAIREWISE COMPARISION MATRIX OF POSITIVE ECONOMIC PERFORMANCE

	Decrease in material purchasing cost	Decrease in energy consumption cost	Decrease in waste treatment cost	Decrease in waste discharge fee	Decrease in fine for environmental disasters
Decrease in material purchasing cost	(1,1,1)	(1/6,1/5,1/4)	(1/3,1/2,1)	(1,1,1)	(1/4,1/3,1/2)
Decrease in energy consumption cost	(4,5,6)	(1,1,1)	(3,4,5)	(4,5,6)	(1,2,3)
Decrease in waste treatment cost	(1,2,3)	(1/5,1/4,1/3)	(1,1,1)	(1,1,1)	(1/3,1/2,1)
Decrease in waste discharge fee	(1,1,1)	(1/6,1/5,1/4)	(1,1,1)	(1,1,1)	(1/4,1/3,1/2)
Decrease in fine for environmental disasters	(2,3,4)	(1/3,1/2,1)	(1,2,3)	(2,3,4)	(1,1,1)

TABLE 11. PAIREWISE COMPARISION MATRIX OF NEGATIVE ECONOMIC PERFORMANCE

	Increase in investment	Increase in operational cost	Increase in training cost	Increase in cost of purchasing green material
Increase in investment	(1,1,1)	(4,5,6)	(3,4,5)	(1,2,3)
Increase in operational cost	(1/6,1/5,1/4)	(1,1,1)	(1/4,1/3,1/2)	(1/5,1/4,1/3)
Increase in training cost	(1/5,1/4,1/3)	(2,3,4)	(1,1,1)	(1/3,1/2,1)
Increase in cost of purchasing	(1/3,1/2,1)	(3,4,5)	(1,2,3)	(1,1,1)

To identify the computation clearly, the pairwise comparison matrix from Table 1 is evaluated as follows.

From Table 1

SIEMS = (4.949, 6.283, 8.083) • (1/76.249, 1/58.849, 1/43.515) = (0.064, 0.106, 0.185)
SGP1 = (1.983, 2.233, 2.666) • (1/76.249, 1/58.849, 1/43.515) = (0.026, 0.037, 0.061)
SGP2 = (10.333, 13.5, 17) • (1/76.249, 1/58.849, 1/43.515) = (0.135, 0.229, 0.39)
SED = (5.916, 8.333, 11.5) • (1/76.249, 1/58.849, 1/43.515) = (0.077, 0.14, 0.264)
SCC = (13, 18, 23) • (1/76.249, 1/58.849, 1/43.515) = (0.170, 0.305, 0.528)
SIR = (7.333, 10.5, 14) • (1/76.249, 1/58.849, 1/43.515) = (0.096, 0.178, 0.321)

Therefore weight vector is calculated as
After determining these results
V (SIEMS ≥ SGP1) = 1
V (SIEMS ≥ SGP2) = 0.289
V (SIEMS ≥ SED) = 1.21
V (SIEMS ≥ SCC) = 0.07
V (SIEMS ≥ SIR) = 0.552
V (SGP1 ≥ SIEMS) = 0
V (SGP1 ≥ SGP2) = 0
V (SGP1 ≥ SED) = 0
V (SGP1 ≥ SCC) = 0
V (SGP1 ≥ SIR) = 0
V (SGP2 ≥ SIEMS) = 1
V (SGP2 ≥ SGP1) = 1
V (SGP2 ≥ SED) = 1
V (SGP2 ≥ SCC) = 0.743
V (SGP2 ≥ SIR) = 1

V (SED ≥ SIEMS) = 1
V (SED ≥ SGP1) = 1
V (SED ≥ SGP2) = 0.594
V (SED ≥ SCC) = 0.364
V (SED ≥ SIR) = 0.819
V (SCC ≥ SIEMS) = 1
V (SCC ≥ SGP1) = 1
V (SCC ≥ SGP2) = 1
V (SCC ≥ SED) = 1
V (SCC ≥ SIR) = 1
V (SIR ≥ SIEMS) = 1
V (SIR ≥ SGP1) = 1
V (SIR ≥ SGP2) = 0.784
V (SIR ≥ SED) = 1
V (SIR ≥ VCC) = 0.543

Therefore the weight vector of Green practices are (0.025, 0.273, 0.133, 0.367, 0.199) The same systematic approach is considered to calculate priorities weight of all the factors. The normalized weight vectors are shown in Table 12.

TABLE 12. RESULTS OF NORMALIZED PRIORITIES WEIGHT OF GREEN PRACTICES FACTORS AND SUBFACTORS

Factors	Weightage	Sub Factors	Weightage
IEMS	0.025	Support of managers	0.170
		ISO14001 certified company	0.357
		Makes eco labeled products	0
		Team to solve environmental issues	0.357
		Publish white paper	0
		Training for environmental management	0.115
Green Purchasing	0	Purchase raw material from ISO14000 certified suppliers	0
		Cooperate with supplier for environmental issues	0.433
		Environmental audit for internal management of suppliers	0
		Purchase environmental friendly product	
		Consider environmental criteria for suppliers selection	0.367
			0.198
Green Packaging	0.273	Recycle & Reuse of outer packaging	0
		Use ecological material for packaging	0.122
		Minimum use of material for packaging	0.877
Eco Designing	0.133	Reduction of consumption of material for manufacturing	0.159
		Reuse recycle and recover the components parts material	0.073
		Design product to reduce use of hazardous material	0.447
		Minimum use of natural resources	0.159
		Less energy consumption use during manufacturing	0.159
		Use renewable energy resources for manufacturing	0
Cooperation with customers	0.367	Cooperation with customers for Eco designing	0.204
		Cooperation with customers for clean production	0.387
		Cooperation with customers for green packaging	0.204
		Cooperation with customers for green logistics	0.204
		Cooperation with customers for reverse logistics	0
Internal Recovery	0.199	Sell excess inventory	0
		Sell waste scrape	0.990
		Sell excess equipment	0.087

TABLE 13. RESULTS OF NORMALIZED PRIORITIES WEIGHT OF GREEN PRACTICES FACTORS AND SUBFACTORS

Factors	Weightage	Sub Factors	Weightage
Environmental	0.945	Reduction of gas emission	0.116
		Reduction of waste water emission	0.213
		Reduction of solid waste emission Reduction of use of toxic material	0.143
			0.278
		Decrease in environmental disaster	0.247
Positive Economic	0.054	Decrease in material purchasing cost	0
		Decrease in energy consumption cost	0.680
		Decrease in waste treatment cost	0
		Decrease in waste discharge fee	0
		Decrease in fine for environmental disasters	0.319
Negative Economic	0.001	Increase in investment	0.570
		Increase in operational cost	0
		Increase in training cost	0.095
		Increase in cost of purchasing green material	0.334

V. CONCLUSION

The results show the current level of Green supply chain management in Indian manufacturing industries. The most important Green practices are cooperation with customers, green packaging and internal recovery. Industries focus more on cooperation with suppliers for environmental issues, purchase environmental friendly product, team to solve environmental issues, minimum use of material for packaging, design product to reduce use of hazardous material, less energy consumption, minimum use of material, cooperation with customers for clean production, green logistics & green packaging and selling waste scrape. The performance of industries has been improved after adopting Green practices. There is a reduction of use of toxic material, waste water emission and environmental disasters. There is a decrement of energy consumption cost and fine for environmental disasters. There is a little increment in negative economic but the increment in positive economic is more than the increment in negative economic. Hence the overall performance is improved after implementing GSCM.

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Student Absenteeism – Causes, Remedies and Consequences

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Abstract

Absenteeism is the practice of regularly staying away from the work without any good reason. It is a serious issue and has to be taken care of to create a dynamic teaching and learning environment [4]. It has been observed that students are in a habit of missing classes which affects their career in a major way. Research shows that the average attention span of a student in classroom is only 15 minutes. Student psychology combined with various other factors has accentuated the issue of their absenteeism from classroom. Students who are not motivated end up missing classes frequently. As a result, this has become a crucial issue for educational institutions. Keeping this in mind, this research paper focuses on identifying the reasons leading to student absenteeism, its consequences for the students and educational institutions and strategies that can be adopted to combat absenteeism. It has been seen that the culture which prevails in the educational institution directly influences the issue of absenteeism.

Key Words

Authorized absenteeism, unauthorized absenteeism, willful absenteeism, organizational culture

1. INTRODUCTION:

There is a general thinking that students should have a multi dimensional and wholesome personality. We expect them to be extraordinary in their studies and equally good in extracurricular activities. Such traits of personality can develop in a conducive environment of learning. A student should generally be strongly attached to the institute. This bonding between the student and institute should grow deeper with time. The essential ingredients of such environment are availability of excellent faculty, top-notch infrastructure facilities at the institute, maintenance of good discipline and adequate sports-cum-cultural facilities. In the conventional system of education, knowledge was assumed to follow a unilateral flow of ideas from top to bottom; it may not be true today. Well informed, dedicated students may suggest alternative methods which quite fit in. The problem of absenteeism in educational institutions arises due to the fact that some categories of students find themselves out of tune with the system.

1.1. Absenteeism: What ails the system?

The absence of students from lectures and tutorials has become one of the utmost encumbrances in accomplishment of objectives of educational institutions. It is a matter of concern because it can lead to inadequate learning on the part of those not present and a degree of agitation on the conduct of the classes for those who are present. Non-attendance has become a common problem to universities and colleges. It refers to the conduct of students not attending scheduled meetings in terms of classes, lectures, tutorials, workshops or seminars without prior consent from the faculty or against default college policy on absenteeism.

Student absence is a problem that extends much further than the university. It affects the student, the family and the community. In an environment of stiff competition for jobs, graduates should possess high integrity and capabilities to win themselves a secured career. As such, absenteeism is detrimental to students' accomplishment, promotion, graduation, self-esteem, and employment

potential.

Chronic absenteeism (frequent unexcused absence) is a strong predictor of adverse outcomes in adolescence, including academic failure, dropping out of school, substance abuse, gang involvement, and unlawful activity. Family health or financial concerns, poor institute climate, drug and alcohol use, transportation problems, and differing community attitudes towards education are among the conditions that are often associated with a student's frequent absence from the institute.

Many students are not mature and committed enough to realize what they are missing by not showing up for class. Creating knowledge and problem-solving skills across all types of students is a challenge. It is easy to get the high-tier, motivated students to attend class and learn, but bringing the rest is difficult. Professors will have to be proactive if they want less-motivated students to attend classes and reap the benefits thereof.

1.2. Types of Absenteeism:

In order to take up the issue of student absenteeism, it is important to understand the types of absenteeism first. The types of absenteeism have been explained below:

- Authorized Absenteeism:
  It is referred to as the leave from study (with or without valid reason) whereby absence from the institute /college is granted by the requisite authorities.
- Unauthorized absenteeism:
  In case of Unauthorized absenteeism, absence from the institute/college (with or without valid reason) is neither reported to the requisite authorities [3], nor permission is sought before availing one.
- Willful absenteeism:
  Under willful absenteeism, a student absents himself from class at his own discretion, without any valid reason. This leads to consistent evasion of work.
- Absenteeism originating from circumstances beyond control:
  In case a student faces such circumstances which cannot be regulated by him, such as sickness, diseases, accidents, etc, it is referred to as Absenteeism originating from circumstances beyond control. Typically, the student cannot be held responsible in such cases.

When we closely observed the issue at hand, we identified some important questions which need to be addressed.

1.3. Questions and issues creating uncertainty in the minds of students

Once teachers start identifying the types of absenteeism, it becomes important to think upon the following questions in the mind of students which reflect their disinterest in attending classes:

i. I just want to pass in exams. Why should I attend classes?
ii. If other students do not attend classes, then why should I?
iii. Is there any reason to attend classes if I can study better at home?
iv. If distraction during classes degrades my efficiency then is it not better to remain out of class anyhow?

Once teachers understand the answers to these questions they will be able to provide logic and reasons to students in order to convince them to attend classes. So educational institutions should comprehend the causes, consequences and remedies of absenteeism. Only then they will be able to deal with the issue of absenteeism in a better way.

In many institutes and colleges absenteeism is a common problem and there are familiar reasons for students not attending the classes (for e.g. personal problems, peer pressure, etc.). In our quest to solve this problem we realize that the role of the institution and teacher is significant.
As students are supposed to communicate with teachers regularly, teachers can be expected to play an active and regular role in overcoming the problem of absenteeism

A teacher is a one who creates a warm learning experience, give a personalized touch to his teaching so that the students find themselves being nurtured with not only knowledge, but also with empowerment and emotional support. To master the art of teaching a teacher should be able to pass on knowledge to students and at the same time identify the elements of extraordinary relevance and those calling for improvement. At various points in time a teacher will find himself combining valuable features like honesty, integrity, courtesy, politeness, equity, cooperation, commitment, trust, respect, patience, friendliness, firmness and diligence. Without any of these, the art cannot be mastered by any individual, no matter how exceptionally intelligent.

There is no mathematical formula for a teacher to ensure that what he is doing is right and that the result of what he will do will be checked with the

help of a formula. This happens because the human factor involved all through the process of teaching makes the entire experience dynamic, ever changing and rich. Hence, it is important for teachers to consider what all are the factors which lend this quotient of dynamism to teaching.

After understanding basic nature of absenteeism problem, we can identify the reasons for or objectives behind conducting the research.

2. OBJECTIVES OF THE STUDY:

i. To identify the factors which lead to student absenteeism

ii. To understand the consequences of student absenteeism

iii. To identify creative methodology for teaching in classrooms so as to reduce absenteeism

iv. To give suggestions for reducing student absenteeism

3. IMPLEMENTATION:

Following is the implementation scheme used in our research:

3.1 Research design:

Descriptive Research: Descriptive research is preplanned and structured in design so the information collected can be statistically inferred on a population. The main idea behind using this type of research is to better define an opinion, attitude, or behavior held by a group of people on a given subject.

3.2 Sampling Plan:

i. **Sample size:** For the analysis, we have taken the sample of 74 students

ii. **Sampling technique:** For selecting the sample convenience sampling method has been used. Convenience sampling is a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher [1].

iii. **Sample area**: Sample area for research is colleges in Rohini

iv. **Sample unit:** B tech and MBA students

3.3 Data collection methods:

For conducting the research we have used both primary and secondary data.

- **Primary data:** Primary data for the purpose of this research has been collected with the help a Structured Questionnaire containing 4 open ended questions, 1 closed ended question and 5 closed ended statements.
- **Secondary data:** Internet

3.4 Tools and techniques used in analysis:

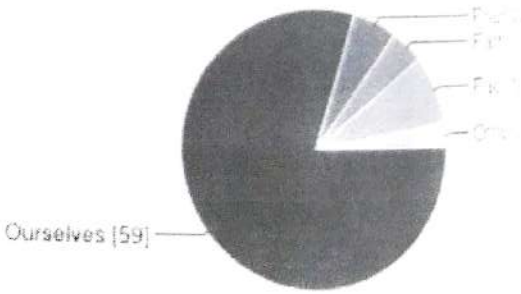
Percentage analysis through pie charts and bar graphs has been done.

4. ANALYSIS AND INTERPRETATION:

In this study responses have been taken from under graduate and post graduate students with a view to understand students' perception of absenteeism and related factors. 39 undergraduate and 35 post graduate students participated in this survey, providing some interesting as well as informative insights into student absenteeism.

i. 47% respondents reveal that they believe absence from class can be without a valid reason

ii. It is interesting to note that 79%respondents accept the responsibility for their absence from class. They believe that they themselves are responsible for managing absence from classes.



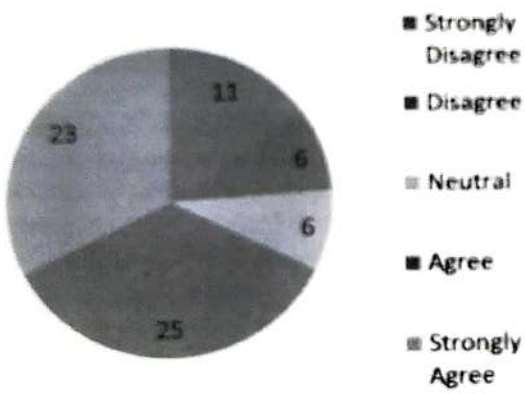
iii. A very small proportion of 7% says that they lack the basic skills that enable them to learn. Though a small number, but it is important to attend to this issue as poor knowledge of basic skills might reduce the

self confidence of these respondents and de-motivate them from attending classes at times.

iv. 48% respondents find it difficult to stick to their routine when they are emotionally upset. This is an important factor affecting students, also because they are vulnerable during this phase of life. As a result they will miss classes when emotionally upset.

v. Negative events in the lives of 36% respondents interfere with their learning.

vi. 64% respondents miss classes of subjects which are not of their interest.



vii. 60% respondents believe that absence from class will affect their academic performance

viii. 54% respondents disagree with the fact that their liking of the instructor can be a factor in determining if they will attend a class or not. To the contrary, 30% respondents say that they miss class if they do not like the instructor.

ix. Only 33% respondents say that they do not miss classes if their friends insist.

5. LIMITATION OF THE STUDY:

i. Sometimes biasness on the part of students.

ii. The sampling technique used was convenience sampling and hence the results are expected to vary if different sample is taken.

6. RECOMMENDATIONS AND SUGGESTIONS:

i. The habit of informed leave should be inculcated in educational institutions to create accountability on part of students.

ii. As some students lack the basic skills to interact in a group which leads to habit of not being at the institution without a valid reason. To avoid such problems, grooming and development sessions should be organized.

iii. As some students are emotionally weak which makes it difficult for them to stick to their routine, counseling should be provided in order to ensure emotional support.

iv. Sometimes absenteeism is due to peer pressure, to overcome this group tasks should be assigned in order to ensure total participation willingly and wholeheartedly.

v. Some students don't attend classes due to less interest in the subject. So to improve attendance technology should be introduced and integrated in classrooms to make lectures more interesting and creative.

vi. Students have the perception that self study is suffice to attain good marks. But through self study and not attending classes they can get only average marks not excellence and to remove this perceptual error, special lectures on career development and motivation should be organized as a part of their curriculum so that their academic performance does not suffer.

vii. Students are not expected to miss their classes only because of their like or dislike towards the instructor.

viii. There should be awards for the regular students.

ix. Message about student being absent for more than one week without prior intimation should be conveyed to the parents.

x. Extracurricular activities should be there in the colleges so that students feel enthusiastic.

xi. Internal marks weightage should be there for the regular students in the classes.

xii. In colleges some guest lectures should be inculcated as a culture to boost the confidence of the students.

xiii. Parents should not pamper the students for not attending classes; they should understand the value of education.

xiv. For overcoming the problem of absenteeism and making teaching effective there should be a culture in an educational organization. Key elements that contribute to a college or university's culture include mission and goals of the institution, governance structure and leadership style of administrators, curricular structure and academic standards, student and faculty characteristics, student-faculty relations and physical surroundings. The characteristics of each element and their interactions with each other create a unique culture for each college/university.

7. CONCLUSION:

Student absenteeism is a significant problem which many colleges are facing now a days and can be solved with the efforts of students themselves, institute, teachers and parents altogether. Improving student attendance involves a blend of techniques. Focusing class methodology of academic topics through real-world exercises engages committed, high-tier students and makes them keen to attend lectures. Students should be motivated to attend lectures to take advantage of the unique learning opportunity provided by their professors. Based on our research we can find out the reasons responsible for absenteeism of students i.e. friends, family, lack of confidence e.t.c. This problem has to be handled cautiously; otherwise it will affect the academic performance of the students, their career growth and the institute as well. To manage absenteeism problem in professional institutions, motivation should be provided to students to ensure their attendance. Effective communication should take place between the students and the institute in order to introduce the system of informed leave. Not reporting on part of students should lead to penalties. Students should be made aware of consequences of not meeting the attendance criteria. Moreover, creative and innovative methodology should be inculcated as part of the institute culture. It is an essential step in an organization's journey to becoming a safe, high reliability organization that provides a supportive and nurturing environment. It is bound to create a workplace that enables everyone to engage wholeheartedly in their work, in order to bring about permanent positive change. It is therefore important for students, parents, institute and teachers to understand their role and responsibility in managing absenteeism.

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BBIJTM

HEALTH INDEXING OF POWER TRANSFORMERS

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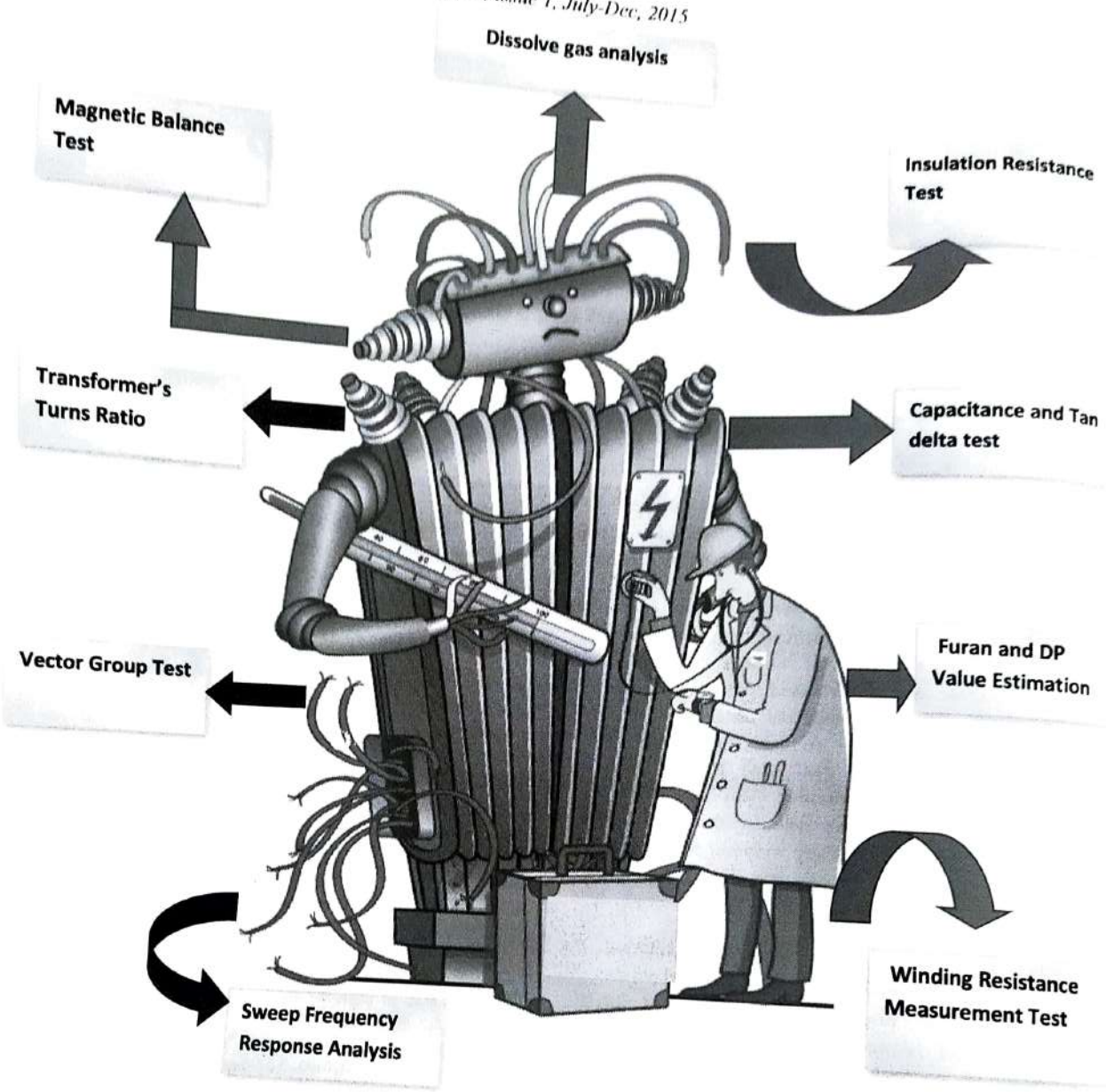
ABSTRACT

Power transformer is the major asset of any power system. Transformers represent **extensive investment** in any power delivery system, and because of the notable effect of a transformer outage on system reliability, **careful management** of this type of **asset** is **critical**. In many cases, **unexpected transformer outages can be catastrophic** and cause both direct and indirect costs to be incurred by industrial, commercial, and residential sector. So it becomes **mandatory to assess** the **health and remaining lifetime** of a **working power transformer**. This information plays a very important role in the planning strategies of power delivery systems and in the avoidance of the potentially appalling effects of unexpected transformer outages.

This paper presents different condition monitoring methods and condition assessment techniques which include various electrical tests and oil analysis of power transformer. Finally the **flowchart** for health indexing and evaluation of remaining life of a power transformer **considering the year of its manufacturing is presented taking into consideration the cumulative effect of the tests performed.**

It is a **new approach** to health indexing and estimating its percent residual life. **Traditionally** health indexing is done on the basis of results of **one or two tests** which may give **false results**. Now it is proposed that transformer should be **monitored** for two to three months **according to the flowchart** before taking it out from the network for maintenance.

INTRODUCTION: Health index is a practical tool that combines the results of routine inspections, and site and laboratory testing to estimate the aging or health condition of power transformers. It can be defined as number from 0 to 100 or in the form of zones as **red**, **yellow** and **green** depending upon the aging condition of a power transformer. Tests necessary for **health Indexing** and estimating percent residual power transformer are: Insulation resistance test, dissipation factor test, dissolve gas analysis, furan test and DP value estimation, SFRA.



VARIOUS TESTS PERFORMED ON POWER TRANSFORMER

Absorption index (AI) = (IR value after 60 seconds) / (IR value after 15 seconds)

Polarization index (PI) = (IR value after 600 seconds) / (IR value after 60 seconds)

LIMITATION OF I.R. TEST:

When IR value is greater than 5 Giga ohms then PI may not be the indicator of the insulation condition and is therefore not recommended as the life assessment tool for the transformer.

Source: IEEE standard no. 43-2000

HEALTH INDEXING BY POLARISATION INDEX (PI) CRITERION Table 1.3

Serial no.	PI limits	Health zone	Remarks
1.	<1	RED	Insulation has reached its life
2.	1.0-1.3	YELLOW	Accelerated aging. Conduct test frequently
3.	1.3-2.0	GREEN	Normal aging. Continue testing at regular defined frequency
4.	>2	GREEN	Healthy

PERMISSIBLE TAN DELTA (DISSIPATION FACTOR) VALUES: Table 2.1

Serial no.	Age of transformer in years	Tan delta limit (DF %)
1.	0-4	<0.8
2.	5-10	0.8-1.0
3.	>10	1.0-2.0

*allowance of 100 % is provided in case of older transformers (reference TPDDL testing manual)

Table 2.2

Serial no.	Case	Remarks
1.	Tan delta value in UST mode exceeds limit	Problem in oil insulation. Confirm by oil analysis.
2.	Tan delta value in GST L-guard mode exceeds limit	Problem in HV winding insulation. Confirm by IR test and Furan test
3.	Tan delta value in GST H-guard mode exceeds limit	Problem in LV winding insulation. Confirm by IR test and Furan test
4.	Tan delta values in limit for all the modes.	Transformer is healthy. Continue testing at regular defined interval.

Note:

1. After test if tan delta value(s) exceed limits it is recommended that test should be performed again after inductive heating of transformer because moisture in oil can largely affect the tan delta values.
2. If the tan delta values exceed limits even after inductive heating then we can conclude that there is problem in oil or paper insulation.
3. Any further comment on the health or residual life of insulation can only be made after oil analysis, Furan and DP value estimation.
4. No doubt the correction factor table for dissipation factor is given but it is recommended to perform the test at temperature around 20 degrees Celsius only.

HEALTH INDEXING ON THE BASIS OF ROGER'S RATIO TEST RESULTS Table 3.5

Serial no.	Roger's ratio result	Health zone	Remarks
1.	In limits	GREEN	Transformer is healthy
2.	CH4/H2 ratio violates limit	YELLOW	Retesting required within 2 mon
3.	C2H2/C2H4 ratio violates limit	RED	Maintenance required (onsite o offsite accordingly)
4.	CH4/H2 and C2H2/C2H4 ratios violate limits	RED	Maintenance required (onsite o offsite accordingly)

ACCEPTANCE LIMITS OF DISSOLVED GASES Table 3.1

Sr.no	P.TRANSFORMER AGE → / TYPE OF GAS ↓	0-4 years	5-10 years	More than 10 years
1.	H2	150	300	500
2.	CH4	30	80	130
3.	C2H2	15	30	40
4.	C2H4	30	50	150
5.	C2H6	30	50	110
6.	CO	300	500	700
7.	CO2	4000	5000	10000

DETECTION OF FAULT ON THE BASIS OF ROGER'S RATIO TEST RESULTS (Table 3.3)

Case	Characteristic fault	C2H2/C2H4	CH4/H2	C2H4/C2H6
PD	Partial discharge	NS	<0.1	<0.2
D1	Discharge of low energy	>1	0.1-0.5	>1
D2	Discharge of high energy	0.6-2.5	0.1-1.0	>2
T1	Thermal fault T< 300	NS	>1	<1
T2	Thermal fault 300<T<700	<0.1	>1	1.0-4.0
T3	Thermal fault T>700	<0.2	>1	>4

PERMISSIBLE LIMITS OF ROGER'S GAS RATIOS (Table 3.4)

Roger's ratio	0-4 years	5-10 years	More than 10 years
C2H2/C2H4	<0.50	<0.60	<0.27
CH4/H2	>0.20	>0.27	>0.27

Sr. no.	Gas	Generation rate of gas limit (ppm/month)
1.	H2	10
2.	CH4	8
3.	C2H2	3
4.	C2H4	8
5.	C2H6	8
6.	CO	70
7.	CO2	700

RATE OF GAS GENERATION LIMITS: table (3.6)

HEALTH INDEXING ON THE BASIS OF FURAN CONTENT AND DP VALUE

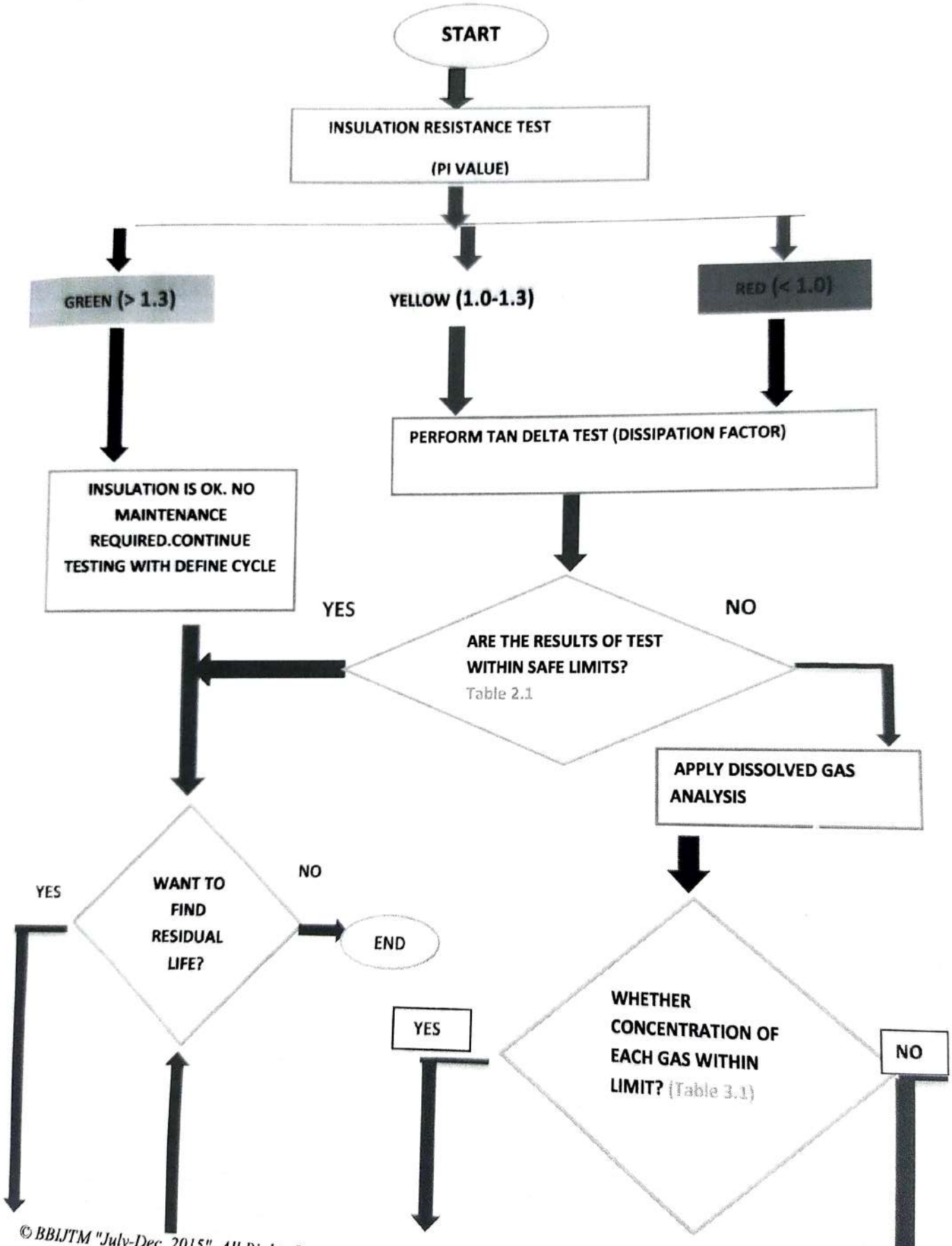
Table 4.1

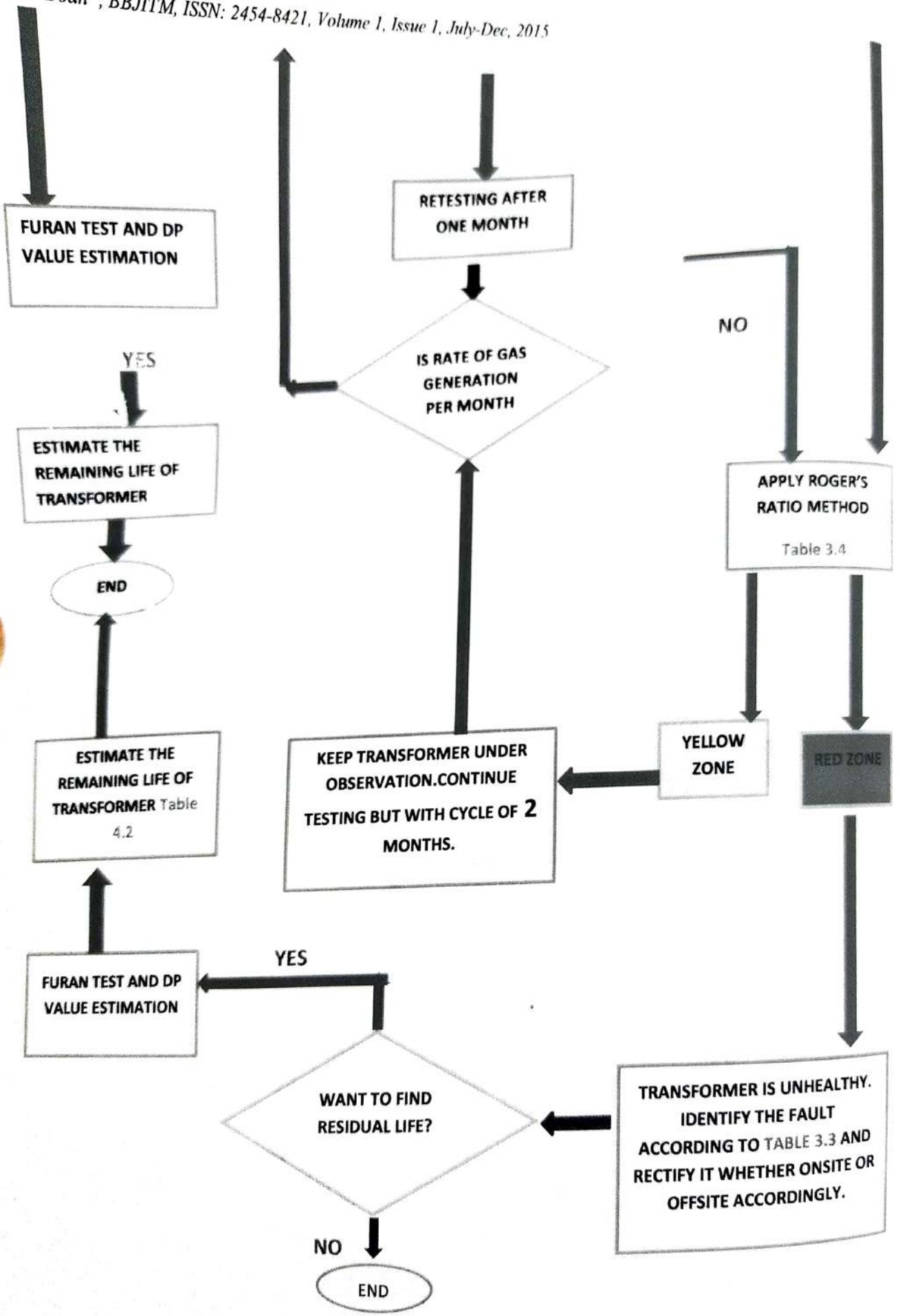
2-FAL(ppb)	DP value	Health zone	Remarks
50-500	>600	GREEN	Healthy
500-2000	350-600	GREEN	Normal aging. Continue testing at define cycle of 1 year
2000-4000	200-350	YELLOW	Excessive aging. Do testing within 6 months.
>4000	<200	RED	Transformer should be sent for repair

REMAINING LIFE ESTIMATION ON THE BASIS OF FURAN CONTENT AND DP VALUE: **Table 4.2**

2-FAL(ppb)	DP value	Estimated % remaining life	Interpretation
50-300	>600	100-70	Normal aging
350-2000	500-350	70-40	Accelerated aging rate
2000-3000	340-300	40-24	Excessive aging (danger zone)
3000-4500	300-250	25-20	High risk of failure
>5000	<200	<1	End of expected life

*2-FAL is 2-Furaldehyde compound





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Modern Vehicles Technology –Advanced Emergency Braking System

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Abstract - Advanced Emergency Braking System (AEBS) is a software implemented on the hardware of the commercial vehicles to avoid road accidents. This new technique would bless the lives of many people that occurs due to the road accidents. The AEBS is basically a system which detects the possibility of collision with any obstacle, alerts the driver and in case no action is taken, it decelerates the vehicle. Its algorithm is used to send the warning signals to alert the driver when the probability of collision with the obstacle ahead is high in order to reduce the impact speed. In case of a truck, the collision is avoided with the help of the components of AEBS such as Wave Radar Sensor and CCD Camera.

Keywords: Road Safety, Traffic accidents, Accident avoidance, Sensor system

I. INTRODUCTION

The AEBS is the modern braking technology equipped in a vehicle along with the Adaptive Cruise Control (ACC) which basically measures and maintains the driver preset moving forward to the vehicle ahead by the automatic modulation of the engine control, and if required, automatically applies brakes up to a deceleration of 0.3g (where 'g' is the acceleration due to gravity and its value is 9.8 m/s^2). If no vehicle is ahead, the vehicle is set at a particular speed due to ACC. For the safety of road is a major issue nowadays, the safety systems have been developed keeping in mind the augmentation in the number of accidents. Three categories of safety systems used to avoid accidents are:

Collision Avoidance in which a potential collision is detected by the sensors and the immediate action is taken, taking control away from the driver. The vehicle can be brought to a standstill before the collision by applying emergency braking.

Collision Mitigation Braking Systems in which sensors detect a potential collision but no immediate action is taken to avoid it. Once it is detected that the collision is unavoidable, the emergency braking is automatically applied to reduce the collision speed and severe injuries.

Forward Collision Warning in which sensors detect a potential collision and the action is taken to warn the driver [1].

In order to determine how much safety impact of the AEBS is, a safety index is needed which results in simulation and analysis leading to the enhancement of the vehicle's safety in the dangerous driving situation which can lead to the destructive accidents. The goal of the research is developing the AEBS algorithm for the commercial vehicle and the methods of evaluation of the AEBS by the safety index.

The control algorithm of AEBS comprises of two parts. First, is the Obstacle Detection Part and second is the Main Controller Part. The Obstacle Detection Part measures and collects the front obstacle information for the main controller's decision. The two stages for the main controller are

upper and lower level controller. The collected obstacle information is used for deciding the control mode by the upper level controller and the warning and braking level by the lower level controller to maintain the safety. When the deceleration is calculated by the control algorithm, the brake pressure is generated by the braking part.

To formulate the safety level, Longitudinal Safety Index is derived by a warning index and an inverse Time-To- Collision (TTC^{-1}). Also, the Total-Warning-Time (TWT) and Total Longitudinal Safety Value (TLV) are defined.

II. SAFETY INDEXES FOR DEVELOPMENT OF THE AEBS ALGORITHM

Several authors have derived safety indexes for the evaluation of vehicle's safety systems. The parameters in Adaptive Cruise Control (ACC) system and Collision Warning/Collision Avoidance Systems are:

1. TTC (Time-To-Collision, defined as the time left to a collision)

$$TTC^{-1} = \frac{v_{rel}}{p_{dist}} \quad (1)$$

where v_{rel} is the relative velocity between the subject vehicle and the preceding vehicle and p_{dist} is the longitudinal vehicle spacing for the subject's driving direction.

2. Warning index

The Warning index represents that the physical collision in the current driving situation is in danger and it is formulated as:

$$x = \frac{p_{dist} - d_{br}}{d_w - d_{br}} \quad (2)$$

where d_{br} and d_w are the braking-critical and the warning-critical distances. If p_{dist} exceeds d_{br} and d_w, then the warning index is greater than unity and indicates that the current driving situation is in a safe region. If p_{dist} is below d_{br}, then the warning index is negative and the current driving situation can be dangerous.

$$d_{br} = v_{rel} \times t_d \quad (3)$$

where t_d is the time which is calculated by the radar system controller. Now d_{br} can be calculated using relative velocity and the time calculated by the radar controller.

III. TECHNICAL PERFORMANCE OF AEBS

3.1. Systems in Production Vehicles

The following refers to the characteristics of systems that were identified as being in current production vehicles. Information obtained describing the technical performance of the main components of current production collision mitigation emergency braking systems may be summarized as:

a) Sensor System

Sensor range ahead of vehicle (m): long range 100 to 200, short range 30

Horizontal field of view (°): 16, 9, ±3, 80 (short range sensor).

Vertical field of view (°): 4, ±1.5.

Sensor Scanning Rate (Hz): 10 to 25.

b) Analysis/Processing System

Collision Scenarios identified: Front to rear shunt accidents on straight roads, potentially front to rear shunt collisions on curves depending on geometry.

Obstacles recognized: All moving vehicles, including large motorcycles travelling centrally in lane, excluding two wheeled vehicles (cycles) moving in edge of lane, stationary vehicles, pedestrians not recognized.

Operative velocity range (km/h): either >10, >15, 10 to 180, or <70, if approaching stationary obstacle (depending on system).

Relative velocity between vehicle/obstacle for activation (km/h): >10 or >15.

Collision risk judgement algorithm update frequency (Hz): approximately 50.

c) Autonomous Braking

Passenger car:

Deceleration (g): 0.2 to 0.4, >0.5 >0.6, >0.8g or maximum achievable (full ABS braking) depending on surface conditions.

Brake System Reaction Time (s): 0.2, 0.2 to 0.3, 0.12 to 0.20 with pre-filled circuits.

Heavy vehicle deceleration (g): maximum achievable (full ABS braking) depending on surface conditions,

d) System deactivated when

Sensor view is blinded during periods of heavy precipitation (heavy rain, snow etc).

The sensor head is impaired because of debris build-up (dirt, snow etc).

When a system fault is detected.

e) System ineffective when

There is a sudden encounter such as a vehicle cutting immediately in front or an emerging at a junction.

Sudden acceleration is applied and the vehicle ahead is coming too close.

The distance between vehicles is extremely short.

The overlap with obstacle ahead is short.

It can be seen that the circumstances these systems are expected to be effective is quite limited. Effectively, the systems will only function fully in front to rear collisions where both vehicles are

travelling within the same lane on reasonably straight roads in good weather conditions.
Some systems are capable of functioning effectively in a wider range of collision circumstances, including head on and front to side collisions on straight roads and curves and pedestrian collisions. This was achieved using a range of different sensors (radar, camera image technology, infra-red, far infrared, laser etc)
AEBS alone would have limited abilities in collisions and junctions because of restricted line of sight and more complex situations. So that is why, vehicle to vehicle communications are added to develop the functions in this collision type.

IV. OUR PROPOSED ALGORITHM

The AEBS algorithm is developed to avoid or mitigate a real end collision of the commercial vehicle. As brought out above, the AEBS algorithm is a two step process : obstacle detection part and the main controller part [3]. The complete AEBS algorithm is shown in Fig.1 below.

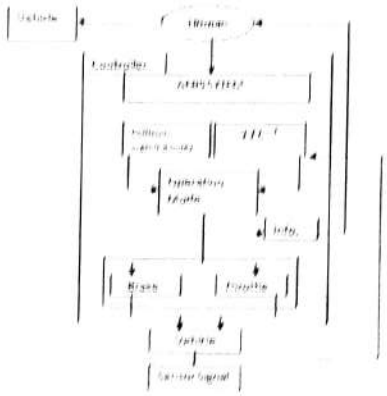

Fig 1. AEBS Algorithm Flowchart

4.1 Obstacle Detection

In the Obstacle Detection part, front obstacle information was measured and collected for the main controller's decision. Vision sensor can provide the classification of objects. However, range and speed measurements are less accurate. On the other hand, radar sensor has a high accuracy in measuring of range and speed. Therefore, these two types of sensors are used to detect the front obstacle information [2]

4.2 Main Controller

The Main Controller of AEBS algorithm consists of two control stages: upper and lower level controller.

4.2.1 Upper level controller

By using the collected obstacle information, the upper level controller of the main controller decides the control mode. To decide the control mode of the AEBS algorithm, warning index and time to collision inverse parameters are considered. In case of the warning index beyond the threshold value and the inverse Time To Collision (TTC^{-1}) below a threshold value, it indicates that the current driving situation is in a safety region. Otherwise, the current driving situation can be dangerous. Therefore, vehicles' safety level can be defined in the warning index as shown in Fig 2.

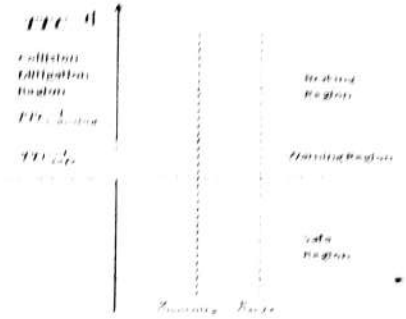

Fig 2. Safety Mode in the warning index

To divide the control model, threshold value for each parameter is set two levels: 'Safety Threshold' and 'Warning Threshold'. The Safety Threshold means the value of which driver starts feeling fear for driving situation. When the parameter near the Warning Threshold value, it means that the driver should start braking to avoid rear-end collision. By using these two levels, Threshold value of these parameters, control mode can be defined in four phases: 'Safety Region', 'Warning Region', 'Braking Region' and 'Collision Mitigation Region'. In case of the 'Braking Region' and 'Collision Mitigation Region', it is important that the assurance assessing approach whether a collision with an observed object is avoidable or not.

4.2.2 Lower Level Controller

Upper level controller decides the control mode, the lower level controller determines the warning level and the braking level to maintain the safety.

i) Warning Phase

If the vehicle isn't in the 'Safe Region', lower-level controller gives the warning signal to the driver. The warning level is classified in two levels. When the driving state is in 'Warning Region', the first level of warning starts running. If the driving state is in 'Braking Region' or 'Collision Mitigation Region', the second level warning is operated.

2. Braking Phase:
If the vehicle is in 'Braking Region' or 'Collision Mitigation Region', inspite of the driver does not give a braking instruction, autonomous braking is necessary until the vehicle's control mode returns to 'Safety Region'. The braking system is shown in Fig.3.

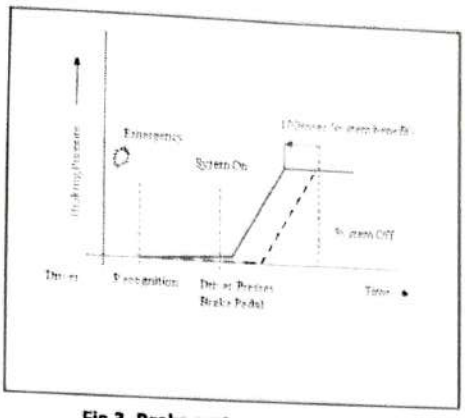

Fig 3. Brake system reaction

Also when the driver gives a brake instruction/action, the driver's braking intention should influence to the AEBS braking level. Therefore, the braking level of the AEBS algorithm are based on the control mode and braking instruction.

In case of 'Braking Region', the lower-level controller gives first level brake operation. When the lower level controller decides the collision mitigation region, the second level brake starts operating. Only if collision mitigation mode is decided and driver's braking instruction is in operation, the full braking action is triggered.

V. PHASES OF COLLISION MITIGATION IN AEBS

There are four phases in the collision mitigation systems. These phases are Normal Driving Phase, Preparation Phase, Braking Phase and Post-Collision Braking Phase as shown in [4].

The vehicle first enters the Normal Driving Phase in which the vehicle is normally moving ahead with a particular speed without any emergency situation and hence there is no need of the AEBS operation to happen in this phase.

Next is the Preparation Phase. In this phase, there are two cases after coming out of the normal driving phase, i.e. collision likely and collision unavoidable. Before the collision likely phase, the Time To Collision (TTC) is calculated. After the collision likely phase, the collision warning is sent to the driver and the system and they get prepared for reacting to the emergency situation and thus the vehicle enters the safety margin situation.

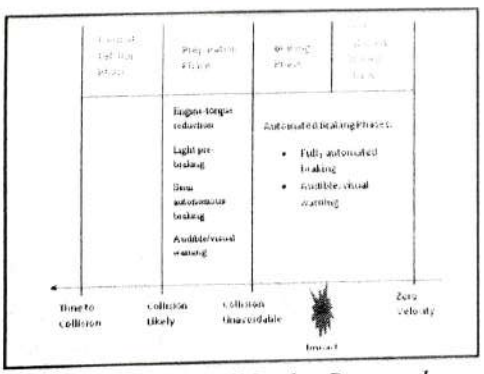

Fig 4. Collision Mitigation Phases

At the end, when it appears that the collision is unavoidable, the vehicle enters the automated braking phase, i.e. the fully automated phase and the audible/visual warning. And once the impact occurs, the vehicle is finally at standstill with the zero velocity.

VI. CONCLUSIONS

In this paper, the AEBS algorithm for the commercial vehicles is proposed. The proposed AEBS algorithm consists of obstacle detection part and the main controller part. In the obstacle detection part, front obstacle information is measured by the vision sensor and the radar sensor. The main controller of the AEBS algorithm is composed of two control stages, upper and lower level controller. The upper level controller decides the control mode based on collected obstacle information and the lower level controller determines warning level and braking level to avoid the collision.

Finally, closed loop simulation is conducted to demonstrate the proposed algorithm by using vehicle model and sensor model. From the simulation result and analysis, it is shown that proposed AEBS algorithm can enhance the commercial vehicles' safety in the dangerous driving situation which can occur in rear-end collision.

Also, AEBS, in production, mitigate two vehicle shunt accidents as well as some collisions with fixed objects and motorcycles with the help of ACC (Adaptive Cruise Control) and forward collision warning systems. Substantial difficulties have been encountered in trying to define the benefits of AEBS in terms of casualty reduction. It is not possible to establish detailed and accurate estimates of the costs of system because of commercial sensitivity. AEBS is highly likely to be a very effective measure in saving the innocent lives.

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Haptic Technology: The Next Big Revolution

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***Abstract*— The haptics technology is a feedback technology which uses the sense of touch of the humans. This in turn helps to human being to come in contact with the objects that are not present in real. And it is achieved by applying various forces, motions and vibrations by the haptic device as instructed by the computer systems. So human beings are able feel the objects which are present in the virtual environment. This paper proceeds with what is haptics technology, how does it work, the various devices used and major area of application.**

Keywords—Haptics; Rendering; Actuators; Feedback.

I. INTRODUCTION

The field of computers has evolved from room big size computers to computers as small as palm size. But what's next in the field of computer science? It is haptics the science of touch and feel[1]. Till date we were able to use the sense of sight, sense of hearing but with the help of haptics we can use the sense of touch i.e. we can feel what we are viewing on the computer screen. With the help of haptics interface devices a new revolution in the computer technology can be bought, which indeed would change the experience or the way of using the computers we have been using till date. The computers in the modern world have been an integral part for the survival of human beings, as it is used in each and every field of work and area of application. With the help of haptics we can take the computer technology to the next high level, which would be very helpful in enhancing the use of computer technology.

II. HOW DOES HAPTICS TECHNOLOGY WORK?

As we know our body is controlled by the brain. It is the one which gives out the messages to all the muscles for the functioning of the body parts. When a human body comes in contact with any physical object then with the sense of touch we are able to feel that object and the muscle below the skin send out a message to the brain for recognizing that object. In the similar way when human wants to feel an object using haptic device, which is not present in the real world then this process takes place; as the human comes in contact with the haptic device, this device uses its sensors to sense the force applied by the touch and sends out this information to the computer. Then the computer processes this information and gives out results to the device. Now this device gives a feedback force to the human. This feedback force felt by the human body on the surface of the skin and then interpreted by the human brain helps in feeling the virtual object. This process has been explained in Fig. 1. Here haptics uses the concept of virtual reality. Virtual reality allows humans to interact with computer simulated environment.[4]

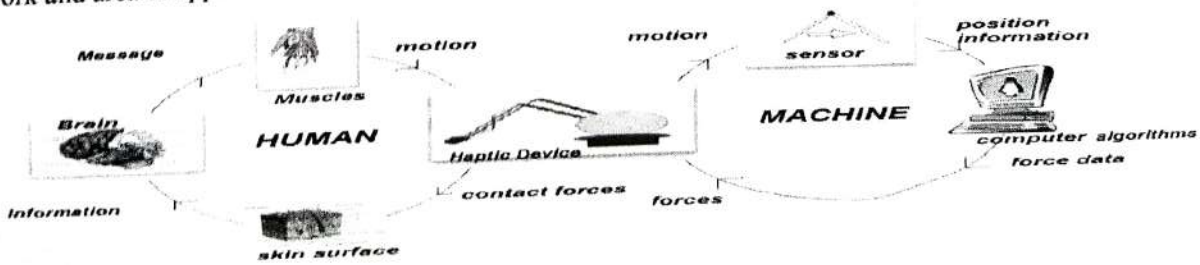

Fig .1. Working of haptics

The process used by computer system to perform the calculation for the haptic device is known as haptic rendering[3]. This process mainly consists of three algorithms:

- Collision detection algorithms: This algorithm uses information collected by the sensors to find collision between objects and human beings to give the degree of penetration.
- Force response algorithms: This algorithm reckons interaction forces between human beings and virtual objects involved in a collision.
- Control algorithms: This algorithm collects interaction force information from force response and applies them on the haptic device [2].

III. Haptic Devices

Haptic devices or haptic interface are the devices that stimulate the sense of touch and provide communication between the user and the computer [5]. Haptic devices sensen the physical manipulations of the user and provide pragmatic touch sensations through the input/output devices [12]. By using the haptic devices, the user can also retrieve information from the computer in the form of sensations and not only feeding the data and information to the computer. Haptic devices are complex devices in which the user manipulates the end effector of the haptic device and the encoded output is transmitted to an interface controller where it is processed to calculate the position and orientation of the end effector. This information is sent to the computer and the feedback force is determined which is then applied through actuators to provide desired touch sensations.

A. Geomagic haptic devices

Fig. 2. Geomagic Haptic device[14]

Geomagic, a professional engineering software brand provides Geomagic haptic devices that incorporate a sense of touch into commercial applications and 3 D modeling systems. These devices as shown in Fig. 2.can accurately measure the position and the different alignments of the input devices used [6]. These devices interact with the virtual objects and simulate the touch with the help of the motors being used in the devices. The series of Geomagic haptic devices that are available are Geomagic Touch, Geomagic Touch X, Geomagic Phantom Premium. There are wide variety of Geomagic haptic devices to fit any set of requirements such as range of motion, position and forces. The range of motions supported by Geomagic Touch and Geomagic Touch X are identical to that of motion of the hand pivoting at the wrist [7]. Whereas range of motions supported by Geomagic Phantom Prem is analogue to that of the hand movement pivoted at the elb or the shoulder. These devices allow user's hands to feel virtual objects.

B. Novint Falcon

Novint Falcon of Novint Technologies allow peo to experience a sense of touch on their comp modifying the way they interact with it. It repres remarkable 3D touch technology and accessib [8]. Novint Falcon that added third sense to computers empowered an evolution in vari products like video games. Novint Falcon enhan the 3D touch for the consumers. Novint Fal devices have remarkable control due to the mo connected to the arm of the device that updates position one thousand times in a second. The mot are strong enough to provide strong sensations of interacted objects [9]. The quality and stability of device is highly impressive. This device has b shown below in Fig. 3.

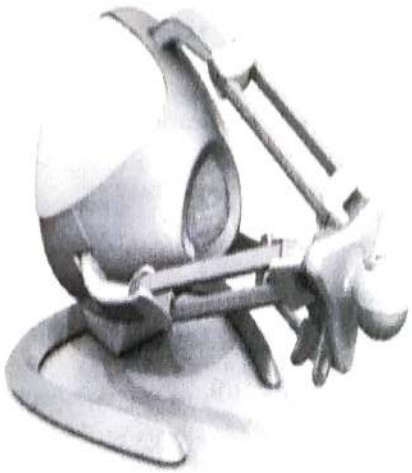

Fig. 3. Novint Falcon[15]

C. Force Dimension Haptic Devices

Force Dimension haptic devices includes sigma omega.x and delta.x. Sigma.7 is uniquely identif for its 7 degrees of freedom that include h precision active grasping capability. It covers whole array of movement of human hand. Sigma the most accomplished master devices avail Omega.x series includes Omega.3, Omeg Omega.7 haptic devices. Omega.3 haptic device renowned for the high-end force feedback. The effectors of the Omega.x family can be upgrade the user depending upon their application. De series includes delta.3 and delta.6 haptic device

superior mechanical stiffness, great precision and the highly efficient performance of the delta.x series make it remarkable. Some of the Force dimension haptic devices have been shown in Fig. 4., Fig. 5. , Fig. 6. & Fig. 7 [13].

Fig .4. Sigma.x haptic device[16]

Fig. 5. Omega.3 haptic device[17]

Fig. 6. Delta.3 haptic device[18]

Fig . 7. Delta.6 haptic device[19]

. *Haptic gloves*

Haptic gloves as shown in Fig. 8. are a type of wearable device that enables the user to sense what they see in the virtual world. The device does not rely on vibration motors and external cables. This device provides sensation of touch by applying pressure on the user's hands with the help of the small bladders that are placed in the gloves [11]. When the user grabs an object in the virtual world, the device inflates the selective bladders which in turn apply pressure on the user's hands. The bladders present at the fingertip inflate and deflate independently depending upon the type of the interacted object.

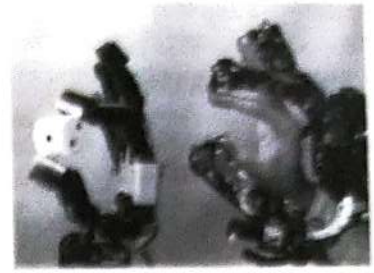

Fig .8. Haptic Gloves[20]

E. Magnetic levitation haptic device

Magnetic levitation haptic devices have 3 degree of freedom haptics interface [10]. Maglev haptics is a new technology for the high-fidelity interaction for the virtual objects. This device has been illustrated in Fig. 9. Maglev systems involve the principles of Lorentz levitation. To interact with the virtual environments, the user has to grab a levitated tool handle. These devices have high potential for precise positioning. The device contains large coils that are wounded around the handle. Current in the coils interact with magnetic fields and generate forces and torques to provide haptic feedback.

Fig. 9. Magnetic levitation haptic device[21]

IV. Areas of Applications

A. In Military operations

So many soldiers in India and across the world lose their lives every year because of the wars on the borders due various social and economical issues prevailing in the society. With the help of haptic devices we can save the lives of the soldiers, as with these devices the soldiers can operate the arms from the control rooms. Also the haptic device can be quite utilitarian for training the new candidates in the army.

B. In Astronomy study

As we know that till date Earth is the only planet in the solar system to have life on it, so to be able to study all other planets in the solar system i.e. find life on them the haptics technology can be serviceable for the astronomers for operating the space ships. As it is not feasible for human beings to survive in the space-

ship for hundreds of days, also in the climate of the other planet. While sitting in the space station the astronomers can feel the ground and examine the soil of the other planet [5].

C. *Medicine*

Introduction of haptics in medical field will be very beneficial. Practitioners and doctors would be able to perform operations and telesurgery with better accuracy. Haptic interfaces in medical devices enable doctors with haptics alerts and feedbacks that act as a guidance while performing surgical operations. The advanced technology helps in increasing clinical expertise and minimise medical errors. Haptic devices are also used to monitor critical signs in the medication process [4].

D. *In online shopping*

Till date we are able to just view the products that we are buying from the e-commerce portals but with the incorporation of the haptic device customers can also touch and feel the products that they are going to buy. This technology would give a big boost to this sector [2].

E. *Virtual Education*

Many researchers have revealed that a large amount of people understand and learn better when along with the visual and auditory learning, education involves movement and touch. Till now the traditional method of education involves only reading and hearing. With the introduction of haptics in the education, students get better opportunity for better understanding. For example, physics can be taught to students by providing them an opportunity to experience the different forces exerted on the objects. Various forces can be tested and sensory feedback gives students an improved way of learning [2].

V. CONCLUSION

Haptics technology is very behooveful for the military, medical purpose and other areas [3]. Also it is the next big step in the field of computer system as it is a powerful technology as it uses the sense of touch. This technology can change the experience of using computer systems as they are being used till date. Various researches have been done and are being done to achieve the optimal results. The haptic devices made till date are also being modified to give more and more realistic experience with minimal hardware possible and at low cost to be able to make it commercially viable. Hence haptic devices would soon become the part of our daily lives.

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Measurement of Employee's Motivation Level in Private Banks of Haryana

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INTRODUCTION

Management's basic job is the effective utilization of human resources for achievements of organizational objectives. The personnel management is concerned with organizing human resources in such a way to get maximum output to the enterprise and to develop the talent of people at work to the fullest satisfaction. Motivation implies that one person, in organization context a manager, includes another, say an employee, to engage in action by ensuring that a channel to satisfy those needs and aspirations becomes available to the person. In addition to this, the strong needs in a direction that is satisfying to the latent needs in employees and harness them in a manner that would be functional for the organization.

Employee motivation is one of the major issues faced by every organization. It is the major task of every manager to motivate his subordinates or to create the 'will to work' among the subordinates. It should also be remembered that a worker may be immensely capable of doing some work; nothing can be achieved if he is not willing to work. A manager has to make appropriate use of motivation to enthuse the employees to follow them.

SIGNIFICANCE OF THE STUDY

A good motivational program procedure is essential to achieve goal of the organization. If efficient motivational program of employees are made not only in this particular organization but also any other organization; the organizations can achieve the efficiency also to develop a good organizational culture.

Motivation has variety of effects. These effects may be seen in the context of an individual's physical and mental health, productivity, absenteeism and turnover. Employee delight has to be managed in more than one way. This helps in retaining and nurturing the true believers "who can deliver value to the organization. Proliferating and nurturing the number of "true believers" [1]is the challenge for future and present HR managers.

This means innovation and creativity. It also means a change in the gear for HR policies and practices. The faster the organizations nurture their employees, the more successful they will be. The challenge before HR managers today is to delight their employees and nurture their creativity to keep them a bloom.

The study is intended to evaluate motivation level of employees in private banking sector of Haryana. This study helps the researcher to realize the importance of effective employee motivation. This research study examines types and levels of employee motivational programmes and also discusses management ideas that can be utilized to innovate employee motivation. It helps to provide insights to support future research

regarding strategic guidance for organizations that are both providing and using reward/recognition programs.

REVIEW OF LITERATURE

Stringer et.al. (2011) worked on Motivation, pay satisfaction, and job satisfaction of front-line employees with an objective to explore the complex relationships between intrinsic and extrinsic motivation, pay satisfaction and job satisfaction at the retailer that uses a pay-for-performance plan for front-line employees. It is based on *a* single organization case study across seven stores, and used a survey, archival documents, open-ended questions and researcher interaction with employees and managers. The results provide some support for the complementary nature of intrinsic and extrinsic motivation. Intrinsic motivation was positively associated with pay and job satisfactions, whereas extrinsic motivation was negatively associated with job satisfaction, and not associated with pay satisfaction. The qualitative insights indicate that pay fairness is important, and those who perceived pay was not fair generally made comparisons with others or felt that pay did not reflect their effort. It is also found that the majority of employees perceived that goals were clear.

Audhesh K. Paswan (2005) worked on Perceived managerial sincerity, feedback-seeking orientation and motivation among front-line employees of a service organization *with an objective to explore the* Literature on the services industry's front-line employees has largely focused on the relationships between service providers and customers. However, there is increasing approbation that managers influence the front-line employees' motivation, ultimately impacting service quality. This study investigates the relationship between front-line employees' perceived managerial sincerity, need for feedback, and role motivation.

Antonios Panagiotakopoulos (2013) worked on the impact of employee learning on staff motivation in Greek small firms: the employees' perspective with an objective to explore and to try to understand the main motivational forces, from the employees' point of view, that direct staff behavior in small firms within a country that suffers from a severe financial crisis. The study will identify the main factors affecting staff motivation at a period where the financial rewards are kept to the minimum, with the purpose of helping small firm owners create working environments that stimulate employee performance.

J. Hetty van Emmerik *worked on* the route to employability: Examining resources and the mediating role of motivation with an objective to explore the Drawing from the job characteristics model and the job demands-resources model, this study aims to examine the associations of resources (i.e. feedback, autonomy, and variety) with intrinsic and extrinsic motivation, and employability.

Islam Rafikul and Hj Zaki Ahmad (2008) worked on Employee motivation: a Malaysian perspective with an objective to know the motivating factors of employees working in various Malaysian organizations. An ordered set of motivating factors for employees working in Malaysian organizations. Demographic factors like gender, race, education, etc. were found to have impact on the ranking of the factors.

Catherine Chovwen and Emilia Ivensor (2009) worked on Job insecurity and motivation among women in Nigerian consolidated banks with an objective to know the predictors of perceived job insecurity and motivation. The results of the research indicated joint significant influence of job characteristics and organizational justice in women's perceived threat of job loss and motivation. Specifically, organizational justice (procedural justice) exerted a strong influence on the dependent variables for women in both acquired and merged banks.

George Babu P. and Hegde Purva G. (2004) worked on Employee attitude towards customers and customer care challenges in banks with an objective to know about offers a fresh look at the paradigmatic shifts being experienced by the traditional, government supported banking establishments, especially those in the erstwhile socialist and mixed economies, in the newly embraced context of liberalization- privatization-globalization. It attempts to fill a great void in debates that consistently neglected every voice except that of the triumphant customer by giving some room for the managerial viewpoint as well. This mission is undertaken in the context of customer complaints regarding failure in the delivery of banking services. The article makes a case for the delicate aspect of employees' attitudes, their satisfaction and motivation, which are posited as prerequisites for customer satisfaction, which is, again, sine qua non for the competitive sustenance of the organization.

Jain Ravi Kumar and Natarajan Ramachandran (2011) worked on Factors influencing the outsourcing decisions: a study of the banking sector in India with an objective to investigate the impact of factors which influence the decision makers' attitude towards outsourcing. The impacts of perceived benefits, perceived roadblocks, and perceived criticality on the attitudes towards outsourcing were found to be strong and statistically significant. The impact of perceived risk was weak and statistically insignificant. The model explaining the combined

impact of these four factors on outsourcing attitudes was also statistically significant.

Motivation is an important function which very manager performs for actuating the people to work for accomplishment of objectives of the organization. Issuance of well conceived instructions and orders does not mean that they will be followed. A manager has to make appropriate use of motivation to enthuse the employees to follow them. Effective motivation succeeds not only in having an order accepted but also in gaining a determination to see that it is executed efficiently and effectively.

OBJECTIVES AND RESEARCH METHODOLOGY

This study is mainly conducted to identify the factors which will motivate the employees of Private sector Banks in Haryana. The data required for the study has been collected from the employees of private sector banks in Karnal, Panipat, Sonepat, Rohtak and Kurukshetra through structured questionnaire. Analysis and interpretation has been done by using the statistical tools and data's are presented through tables and charts. This study is exploratory cum descriptive in nature and is based on primary as well as secondary data. The sample size for the present study is 100. To make the analysis meaningful, certain simple and advanced statistical tools were used. The data has been summarized with the help of frequency distribution. For testing the hypothesis, Chi square test has been used. The chi-square was conducted at 95 per cent confidence level or 5 per cent level of significance.

The main objectives of the study are:

1. To study the level of motivation in Private banking sector in Haryana.
2. To examine the effect of monetary and non-monetary incentives on the employee's performance.
3. To study the impact of gender on employee motivation.

The study aims at testing the following hypotheses.

H1: There is no association between gender and types of incentives preference.

H2: There is no association between gender and demotivating factors.

H3: There is no association between gender and overall satisfaction level.

DATA ANALYSIS

Table 1: Demographic Description of Samples

	GENDER		Total
	Male	Female	
Top	3	2	5
Middle	29	22	51
Lower	23	21	44
Total	**55**	**45**	**100**

Out of 100 respondents 55 were males and 45 respondents were females and 5, 51 and 44 are from top, middle and lower levels of management.

Table 2: Association of the Respondents with their current organization

	GENDER		Total
	Male	Female	
0-5 Years	25	30	55
5-10 Years	19	6	25
10 Years and Above	11	9	20
Total	**55**	**45**	**100**

Out of 100 respondents 55 employees have 0-5 years of association 25 have 5-10 years and 20 have 10 years and above association with their banks.

Table 3: Gender and Type of Incentives

	GENDER		Total
	Male	Female	
Monetary Incentives	27	17	44
Non-Monetary Incentives	7	10	17
Both	21	18	39
Total	**55**	**45**	**100**

(*Chi*-square (x2) = 2.05313, degree of freedom=2, 5% level of significance, p-value=5.991)
The table value (p-Value) of x2 for 2 degree of freedom at 5 per cent level of significance is 5.991. The calculated value of x2 is less (2.05313) than the table value and hence the hypothesis (H1) gets accepted.

Table 4: De-motivate factors

	GENDER		Total
	Male	Female	
Low Salary	30	25	55
Lack of Growth and Advancement opportunities	10	5	15
Monotony	12	10	22
Poor working environment	3	5	8
Total	**55**	**45**	**100**

(*Chi*-square (x2) = 1.8211, degree of freedom=3, 5% level of significance, p-value=7.81473)
The table value (p-Value) of x2 for 3 degree of freedom at 5 per cent level of significance is 7.8147. The calculated value of x2 is less than the table value and hence the hypothesis (H1) gets accepted.

Table 5: Overall satisfaction level

	GENDER		Total
	Male	Female	
Highly Satisfied	17	21	38
Satisfied	28	18	46
Average	9	-	9
Dissatisfied	1	5	6
Highly Dissatisfied	-	1	1
Total	**55**	**45**	**100**

(*Chi*-square (x2) = 14.8523 , degree of freedom=4, 5% level of significance, p-value=9.4877)
The table value (p-Value) of x2 for 4 degree of freedom at 5 per cent level of significance is 9.4877. The calculated value of x2 is greater than the table value and hence the hypothesis (H1) gets rejected.

Table 6: Employees response towards various motivational policies of the Bank

Statement	Response					Mean	S.D.
	SA	A	N	D	SD		
Top Management is interested in motivating the employees	36	47	12	3	2	4.11	0.905
I am well compensated for my services	21	33	14	18	14	3.29	1.352
The management provide us with adequate benefits, besides compensation	26	37	11	12	14	3.49	1.360
My bank provides effective development opportunities to its employees	29	35	8	16	12	3.53	1.360
The management maintains an open communication with its employees	36	19	9	25	11	3.44	1.459
I have a good professional relationship with my superiors	29	27	19	14	11	3.49	1.330
The promotional opportunities in job are fair	18	35	16	17	14	3.26	1.319

It is evident from the table that the overall motivation level among the private banking sample employees is quite good. More than one-half of the respondents believe that the top management of the banks are interested in motivating the employees and feel well compensated for their services. About sixty three percent of the employees responded that management provides them with adequate benefits. More than fifty percent of the employees feel that they have been provided ample development opportunities and agreed that they have open communication with their management.
They also confirmed to enjoy good professional relations with their seniors and are convinced that fair promotional opportunities are provided to them.

RESULTS AND DISCUSSION
The main findings of the study are follows:

- The employees in private sector banks in Haryana are quite motivated.
- They feel that the corporate culture in their bank is good
- The employees are satisfied with the present incentive plan of the company.
- Most of the employees agreed that the bank always recognize and acknowledge their work and efforts.
- The study reveals that the employees share good relations with their peers, juniors and seniors. Though there are some differences but all the conflicts are handled in a proper manner.
- From the study it is clear that most of employees agree to the fact that support

from the coworkers in helpful to get motivated.

- The study reveals that increase in the salary will motivates the employees more.
- The incentives and other benefits will influence the performance of the employees.

CONCLUSION

The study concludes that, the motivational program procedure in various Private sector Banks is found effective but not highly effective. The study on employee motivation highlighted so many factors which will help to motivate the employees. The study was conducted among 100 employees and collected information through structured questionnaire. The study helped to findings which were related with employee motivational programs which are provided in the organization.

The performance appraisal activities really play a major role in motivating the employees of the organization. It is a major factor that makes an employee feels good in his work and results in his satisfaction too. The banks can still concentrate on specific areas which are evolved from this study in order to make the motivational programs more effective. Only if the employees are properly motivated- they work well and only if they work well the organization is going to benefit out it. Steps should be taken to improve the motivational programs procedure in the future. The suggestions of this report may help in this direction.

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Database optimization and Novelty Mining of News articles

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***Abstract*— With rapid advances in Information Technology, the normal way for people to obtain information has changed. However, the current available search engines, like Google, cannot tell whether a newly posted article contains fresh content or not, as compared to all the previous posted articles. Thus, people may sometimes waste time reading articles which are about old or have known information. The solution to this problem is Novelty mining; it is a new and exciting area of computer science research that tries to solve the crisis of information overload by combining techniques from data mining, text mining, natural language processing, information retrieval, and knowledge management.. In this paper, we have illustrated the various steps involved in the miming of the dataset. The objective of this research was to find an optimal way to scan through large databases and detecting relevant information efficiently. The results show that proposed novelty mining framework can detect novelty on a set of news articles with very high accuracy.**

***Key words* — Novelty Mining; Database optimization; Preprocessing; Information retrieval; Indexing**

I. INTRODUCTION

In today's information age, it is easy to store large amounts of data. However, although the amount of data available to us is continuously growing, our ability to gather this information and use it remains constant. Imagine the time savings if we are only presented with novel information to read, while the old or redundant information is filtered out. Thus, novelty mining [1] helps to extract novel information out of a huge set of text documents. The term novelty (derived from Latin word Novus for "new") is the quality of being new, or following from that, of being striking, original or unusual. In novelty mining, users are able to send different documents to be tested for its relevance and novelty. Due to the millions of data in the database, the insertion and selection of data have to be kept at optimum.

A novelty mining system [2] is able to discover novel, yet relevant information based on context and reader's preference. It is helpful in personal newsfeeds, information filtering, as well as many other fields where duplicate information may be returned to the users. In general, a novelty mining system consists of three main parts, namely preprocessing, classification and novelty mining. Firstly, new documents are input into the system for preprocessing, where models will be built by using various machine learning algorithms. Then, the system will determine relevant documents for a given topic and filter out the non-relevant documents in the classification stage. Finally, based on historical articles, the system will determine whether the input article is novel or not. The contributions of this paper are twofold. Firstly, to design and develop the optimization techniques for SQL SERVER 2005 database for retrieval of relevant information, which has not been well-studied before and secondly, to study the novelty mining system which involves pre- processing as its first phase followed by classification and novelty mining techniques to detect novel data from a dataset. This paper spans across the three major emerging research areas of databases that include database indexing and information retrieval by query processing, pre-processing of dataset and knowledge management.

This paper is organized as follows. In the first section, brief introduction about the motivations for the research and development of novelty mining system is presented. In the second section literature review of various optimization and novelty mining systems is described. The third section comprises of the framework that we have proposed for our entire Novelty Mining system. In sections four details about the dataset used i.e. Reuters 21578 is explained. In section five and six the experiments conducted and subsequent performance evaluation is shown. Finally, at the end of this paper we conclude and give suggestions for future work in this field.

II. RELATED WORK

The major contribution in the field of optimization and novelty mining is by Flora S. Tsai. Other authors have also contributed in this area. In [1], authors have explored the importance of novelty mining and database optimization technique on a dataset of business blogs, with a very high accuracy. Previous research on novelty detection have stressed on the task of finding novel material, given a set of documents on a certain topic. Authors in [2] studied the

part task defined by TREC 2002 novelty track that is firstly, finding the relevant sentences from the documents and then identifying the novel sentences from the collection of relevant ones. The research here shows that the former step appears to be more difficult part of the task. In [3], authors have analysed web logs posts for various categories of cyber security threats related to detection of cyber attacks, cyber crime and terrorism. They have used Latent Semantic models such as Latent Semantic Analysis (LSA) and Probabilistic LSA, to detect keywords from cyber security web logs. LSA is also discussed in another paper [6]. In another work [5], authors have proposed experimental results on APWSJ data set. They have shown that Document to Sentence(D2S) framework outperforms standard (document level) novelty detection in terms of redundancy-precision (RP) and redundancy-recall (RR). However they have suggested that D2S shows a strong capability to detect redundant information. Also, in [8] authors aim to explore the performance of redundancy and novelty mining in the business domain. They have adopted the mixed metric approach which combines symmetric and asymmetric metrics.

Different researchers have contributed in the area of database optimisation, but either they have focused on B–Trees or indexing techniques by LSA method. None has given attention to pre processing and optimisation using indexes. In our paper, we have proposed a framework which converts unstructured data of news articles to a structured form (tables) and there after indexing is performed and performance comparison is observed. This will also form basis for our future work of novelty mining, keeping in mind the constraints and challenges in natural text.

III. Proposed Framework

The framework of Novelty Mining system is shown in figure 1. It is divided into four phases:-i. Pre-processing ii. Database Optimization iii. Novelty Mining iv. Information Retrieval. The detailed explanation of these phases is given below.

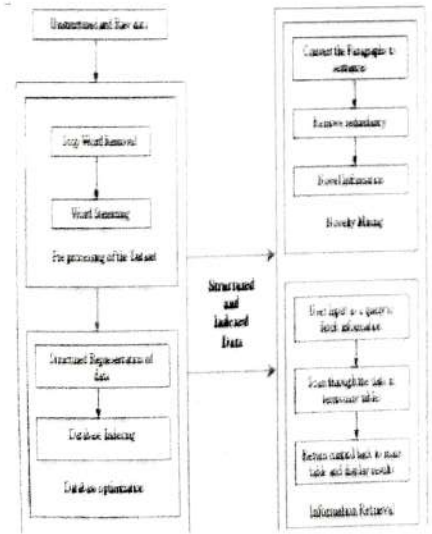

Fig. 1. Proposed Framework

A. Pre- processing

There are various pre-processing techniques that infer or extract structured representations from raw unstructured data sources. There are different operations under pre processing like stop word removal and word stemming. Stop Word Removal aims to remove stop words like 'is', 'an', 'the' etc. Word Stemming is the process of reducing inflected (or sometimes derived) words to their stem, basic root form-generally a written word form. E.g. running-> run, Drinks-> drink, Mangoes-> mango

1.) Algorithm Used For Word Stemming

We have used a modified form of Porter Stemmer Algorithm [10]. The Porter stemming algorithm (or 'Porter stemmer') is a process for performing stemming i.e., reducing the word to its root form. It is mainly used as a part of term pre-processing, that is usually done when setting up Information Retrieval systems. The algorithm stems the data using a set of rules. There are 60 rules in 6 steps of porter stemmer algorithm. These steps are:-

1. Removes plurals of the words.
2. Turns terminal y to i when there is another vowel in the stem.
3. Maps double suffixes to single ones, eg-'ization', 'ational' etc
4. Deals with suffixes –full, -nests etc.
5. Takes off –ant, -ence etc.
6. Removes a final –e.

In our modified porter stemmer algorithm, we remove stop words like 'is', 'an', 'the' etc along with above suffix removal. We have used java as a programming language for implementing our algorithm. The benefit of implementing porter stemmer is to enhance search process in the large pool of data and moreover to increase the efficiency of the entire system.

B. Database optimization

Database optimization is a technique to improve the query performance with indexing and statistics. It can be defined as the optimization of resources used to increase throughput and minimize contention, enabling the largest possible CPU workload to be processed. In our paper we have used indexing to optimize the dataset.

There are two types of indexes that have been built on the data namely clustered index and non clustered index. The two types of indexes are as explained below:

1) Non-clustered index

The data is present in random order [12], but the index specifies the logical ordering. The index keys are in sorted order, with the pointer to the record contained in the leaves of the tree. There can be more than one non-clustered index on a database table. Non-Clustered indexes have structures that are different from the data rows. A non clustered index key value o points to data rows that contain the key value. This is called as row locator. Its structure is determined on the basis of the type

of storage of the data pages. A heap table [11] by definition is a table that doesn't have any clustered indexes.

Another case arises when no index is defined for a table at all. In that case the address of the first IAM page of the heap table itself is stored in the sysindexes table with indid = 0 as shown in figure 3. So, the full form of IAM is a little misleading; it would be better called as SAM (Storage Allocation Map or Space Allocation Map).

2) CLUSTERED INDEX

Clustering modifies the data block [12] into a certain specific order to match the index. Therefore, only one clustered index can be created on a given database table. Clustered indices greatly increases the overall speed of retrieval, but usually only if the data is accessed sequentially in the same or reverse order of the clustered index.

Fewer data block reads are required as the physical records are in the sort order on disk, the next row item in the sequence is immediately before or after the last one, and so on. Some databases separate the data and index blocks into separate files, others put two completely different data blocks within the same physical file(s). An object is created where the physical order of rows is the same as the index order of the rows and the bottom (leaf) level of clustered index contains the actual data rows.

C. NOVELTY MINING

Novelty mining is the identification of new or unknown information from a given set of text documents. It is useful in personal newsfeeds, information filtering, as well as many other fields where duplicate information may be returned to the users.

The approach followed to perform Novelty mining in our project is Document to sentence. The document (or paragraph) of information is fragmented into sentences to remove duplicity or redundancy. Temporary tables are created on the fly to accomplish the task. Moreover the search is also carried out in these tables for patterns as specified by the user, but the information is displayed from the main table.

A Cursor makes it possible to perform complex logic in SQL. A cursor can be viewed as a pointer to a row. It can only refer one row at a time.

Two Cursors have been used in this project for the following purposes:

(1) For removing redundancy/duplicity.

(2) For implementing search in the temporary tables.

Cursor is a server side tool. It is giving row-wise solution to the result set.

D. INFORMATION RETRIEVAL

Retrieval of information is also an integral part while designing a system, so as to provide the user relevant information according to the query input by him. If the results obtained are relevant and correct, then the system developed is said to be efficient. The various steps for retrieval of information from the structured tables are as follows:

(1) User inputs the request through query.

(2) Search is carried out in temporary tables through pattern matching.

(3) Transfer of control from temporary tables to the main table.

(4) Output generated from the main table.

IV. DATASET

A. REUTERS 21578

We have used Reuters 21578 dataset [9] in our work. The documents in the Reuters-21578 collection appeared on the Reuters newswire in 1987. We have used a subset of this complete dataset for our study. The dataset is divided into six categories namely companies, exchanges, organizations, people, exchanges and topics.

B. TOOL USED

The database software that we have used is MICROSOFT SQL SERVER 2005.Microsoft SQL Server 2005 is a relational database management system developed by Microsoft. SQL Server 2005 (formerly codenamed "Yukon") was released in October 2005. It included native support for managing XML data, in addition to relational data.

V. EXPERIMENTS CONDUCTED

The various phases under the project such as pre processing, database optimization and novelty mining were carried out as under. Performance evaluation is a key step to examine a project. We have evaluated our work and calculated the efficiency of our work. But before discussing the various cases of execution, we first give an overview of the work done and then its relevant efficiency.

Step 1: Creation of tables

Figure 2: Creation of tables

The above figure shows the query executed to create the table in SQL Server for converting unstructured raw data to structured tabular form. The different attributes for the data are chosen keeping in mind the various categories present in the actual dataset.

Step 2: Insertion of data into the tables

Figure 3 : Insert query

The above figure shows the query which is executed to enter the data into the tables. The various attributes are assigned vales accordingly.

Figure 4 : Table contents

The above figure shows the content of the table. This is only a portion of the complete database. The table consists of 255 records in all pertaining to different categories.

Step 3: Creation of indexes

Following figure 2 is the list of indexes that we have created on out database:-

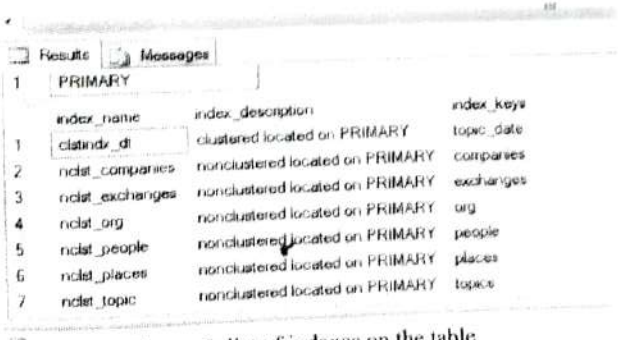

Figure 5: list of indexes on the table

As it can be seen from the above figure, we have made a total of 7 indexes on our dataset (table). One of them is a clustered index while all the others are non clustered index. The significance of using such indexes has already been discussed.

Step 4: Applying queries on the dataset for comparison

The various execution plans for different queries are given in a tabular form for easy understanding and comparison. The numerical values depicted in the table are in the form of CPU cycles required to perform the task. As can be noticed from table 1, the execution times in case of "clustered index seek" are lowest. The query execution is optimum in this case. Also the values for "index seek" and "table scan" are similar, this is due to the fact that in both the cases the indexes are not used.

Step 5: Converting paragraph (or document) level to sentence level.

Figure 6: Sentence level fragmentation of data

The output depicted above in the figure 6 is obtained after executing the first code which is written to convert the paragraph level data to sentence level. This step is carried out in order to apply novelty mining techniques on the dataset at the sentence level rather than document level. The above output is of a temporary table which has only two attributes namely title and the text.

Step 6: Applying Novelty Mining on the dataset.

In the next step the application of novelty mining technique is

carried out. In this step the redundancy or the duplicacy in the data if present is removed by using the code developed in the

form of cursors. Each sentence in the dataset is compared to the pool of existing data already present in the data and thus redundant data is ommitted and never added to this temporary table. The purpose of removing redundancy is to increase the effectiveness of search queries as the data needs not to be checked in redundant data again and again, as this consumes time and thereby degrading performance.

Step 7: Applying a search query on the dataset prior to conversion of document to sentence.

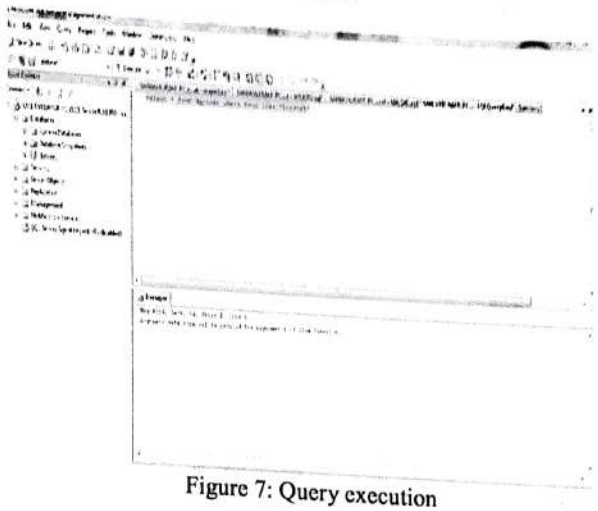

Figure 7: Query execution

As can be seen from the above figure 7 that the search of patterns is not applicable to the data directly as the data in the table is of XML form. And pattern search or text phrase search is not possible in the case of Xml attribute type. So we need to cast this data to another type such that we are able to perform search queries on the text attribute as well. The alternative solution to this problem is described in the next step.

Step 8: Casting the XML data to NVARCHAR.

The figure 8 illustrates the casting of XML data attribute to a NVARCHAR type data. The purpose of this conversion is to apply text search or pattern searches to this attribute. As depicted by the figure a search query is executed searching for the presence of phrase 'COCOA' in the dataset. And at the bottom of the figure the successful execution of the query is shown. The detailed execution times have been shown by another figure 9 shown below.

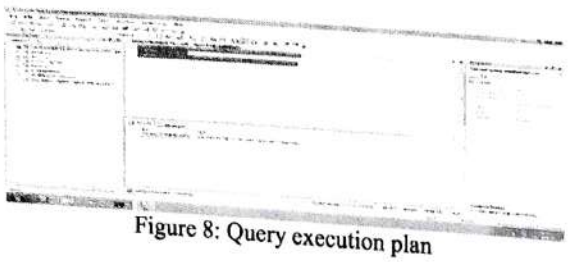

Figure 8: Query execution plan

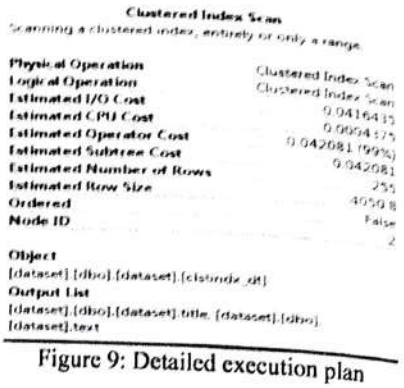

Figure 9: Detailed execution plan

Step 9: Application of second code to perform search in sentence level data.

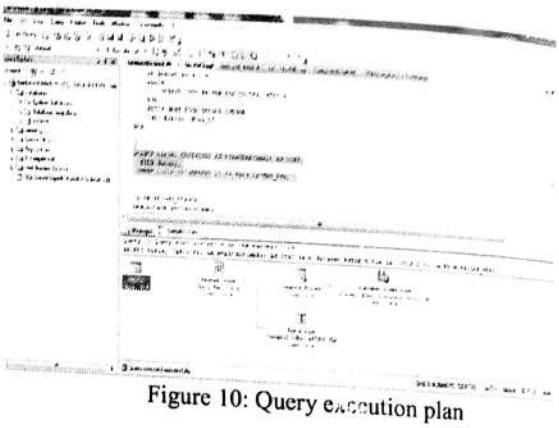

Figure 10: Query execution plan

The above figure 10 shows the application of the search in XML form data. The highlighted text in the figure is the query which is executed to display the relevant data. This method is also an alternative to the search procedure described in the previous step. The difference in this approach is that the search operation is carried out only on non redundant data; thereby overall execution time is reduced if the dataset is having redundancies present in the text. The execution plan of the query is shown above which shows the actual working of the query and transfer of control amongst the tables to display relevant data to the user.

Figure 11: Detailed execution plan

VI. Conclusion and Future Work

The proposed work uses a large dataset of news articles. An efficient way to optimize database has been proposed with indexing technique. The experimental results obtained show that the work optimizes the database with the execution time in clustered index seek and as can be noticed is lowest out of all other attributes. Also the values of Index seek and Table scan are similar, as both do not consider indexes. With the proposed work the effectiveness of optimization has been studied experimentally. Further investigation to the topic reveals that novelty mining with database optimization can give good results.

The results obtained from the experiments conducted show that the execution time in case of sentence level search as well as cast search is similar. This is due to the fact that the dataset does not contain redundancies Moreover the Document to sentence conversion is also successfully carried out with the help of the proposed algorithm. Thus the proposed optimization and novelty mining algorithms are efficient. Mining of documents for novel information is successfully accomplished by removing redundancy or duplicity from the data.

VII. Acknowledgements

We take this opportunity to express our sincere thanks and deep gratitude to all those who extended their wholehearted co-operation and have helped us in completing this work successfully. We express our sincere thanks to Mr. Suyash Gupta, DBA (HCL Technologies) for his encouragement and valued suggestions.

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Water quality status of River Hindon in Ghaziabad with particular reference to presence of pesticides

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Abstract: Physiochemical **assessment of surface water samples of river Hindon for presence of contaminants degrading quality of water and for presence of organic pesticides is being reported in this paper. Water pollution parameters like pH, turbidity, Conductivity, COD, DO etc for 10 samples collected from selected points near agricultural fields from Hindon river pre and post monsoon were analysed. The sampling zone was stretched across 10sq.k.m .Pesticides were analysed by GLC and identified by comparing with standard reference compounds .Traces of Various pesticides were found in all samples. All the analysis parameters including Pesticide content was found beyond prescribed limit. Organochlorine pesticides content was found more in post monsoon samples suggesting entry route of pesticides into river water is mainly run off water from nearby fields during monsoon months. An urgent plan need to be formulated to prevent sedimentation of river and for improving the quality of river water.**

Keywords – *Pesticides; surface water; ground water ; COD; DO; pH; Hindon*

I. Introduction

The Hindon river is very important river of Western Uttar Pradesh. The river is purely rain fed. The river basin is the part of indo gangetic plain and covers an area of about 7083 sq km. The Hindon flows through the sugarcane belt of Western Utter Pradesh. The river along with its two main tributaries, the Kali (west) and Krishna rivers, had industrial manufacturing units consisting of pulp and paper, steel, rubber, ceramic, plastic, dairy, laundry, and sugar industries discharging largely untreated effluent directly into water making water unfit for any use [1] The river basin is purely the agricultural field due to which water and sediment of the river got polluted by pesticides and agricultural field discharge [2-3].

Among various organic, inorganic and biological water pollutants, pesticides are considered to be most toxic because of their carcinogenicity and long existence in the environment. Most of the pesticides are toxic, not only to the pests which they are used, but also to non target organisms. Long term and rampant use of pesticides results in persis bioaccumulation and long range transport [2] of hazardous chemicals. Contamination of aquatic enviro due to excessive use and runoff from agricultural fields marine life and reduces fish production. The toxicants entire ecological balance and result in severe health haza human beings. These changes occur so slowly, the problem becomes visible only after it has taken a serious making it very difficult to reverse the trend.

A. The Impact

Over the last few years, the water quality of Hindon further deteriorated. There has been substantial cha observed in the COD, BOD and DO parameters as wel coliform count. Alteration of water chemistry incl increase in turbidity, acidity, electrical conducti temperature, free ammonia, dissolved chloride and pesti content due to agricultural and industrial discharge whic toxic to fish and microorganisms. The increase concentration of chemical nutrients subsequently result anoxia, severely affecting water quality. The water qu below the bathing standards and is considered practic unfit for any use.

TABLE I: PARAMETER OF WATER QUALITY FOR BATHIN STANDARD

Parameter	*Prescribed limit*
Dissolved Oxygen (DO)	Not less than 5mg per liter
Biochemical Oxygen Demand	Not more than 3 mg per liter
Total Coliform (TC)	Not more than 500 per 100 ml

Source: Report on Government of NCT Delhi 2005

A. OBJECTIVE OF THE STUDY

There is an urgent need for continuous monitoring of water pollution, so that some corrective measures can be taken before its too late. Recently there has been a growing interest in environmental monitoring [8-9] and regulatory activities [10-11] world over, resulting in signing of protocols and agreements globally but the situation can only be controlled by working at ground level and continuous monitoring. The objective of present study is to carry out physico-chemical analysis of river water to ascertain the load of organic pollutants and to determine the concentration levels of organic pesticides in water, to understand the cause and effect, there by suggest suitable corrective measures.

II. MATERIALS AND METHODS

Surface water samples were drawn from 10 points over a stretch of 10 km from river Hindon near Mohan Nagar and Hindon Airforce Base. The sampling was carried out in two phases. The first phase of sampling was carried out in May 2014 while the second phase of sampling was done in October 2014. River water samples were collected from the agricultural fields near the river bed, total area covered is around 10sq. km . The attempt was made to find out the pesticides used by farmers in their fields. It was found that mostly lindane and different isomers of other organochlorine pesticides were used. In this study post monsoon samples from the Hindon river were collected by grab sampling and analysed for various pollution parameters.

TABLE II PHYSIOCHEMICAL ANALYSIS OF HINDON RIVER WATER

	Parameter	***Average amount in post monsoon Sample***	***Average amount in pre monsoon sample***
1.	pH	5.9 – 7.9	6.4 - 8.4
2.	Turbidity (in NTU)	2-24 NTU	0-1 NTU
3.	Conductiviy	0.600 m MHo/m	0.400 m Mho/m
4.	DO	2 - 6	1.1 - 5
5.	COD	260 - 500 ppm	3.1-15.4ppm

For Chemical analysis, all the solutions are prepared as per APHA standard methods [12]. For COD determination, open reflux method using COD digestor from Spectralab was used. For pH, Conductivity and Turbidity measurements digital desktop meters of Labtronics Instruments were used.

Solid Phase Extraction (SPE)

A water sample of 500ml was taken in a one litre separatory funnel and 10 g NaC1 was added to it. The funnel was shaken to dissolve NaC1 and then 50ml of 15% dichloromethane in n-Hexane was added and the pesticide extracted. The lower aqueous layer was drawn into a fresh one litre separatory funnel and re- extracted twice with fresh portions of 50ml of 15% dichloromethane in n-Hexane. The three extracts were combined and dried by passing through an absorbent column containing a 5cm layer of anhydrous Na_2SO_4 over a small pad of glass wool at the bottom. The extracts were concentrated to remove the traces of dichloro- methane and finally taken in n-Hexane for GLC analysis. Analysis of pesticides was carried out by using a Nucon- Amil 5700 Gas chromatograph, with high bore column. The temperature was maintained at 220 ^{0}C with nitrogen as carrier gas and FID detector connected to a computerised recorder system. The compounds were identified by comparing their chromatographs with those of standard compounds.

III . RESULT AND DISCUSSION

Analysis of surface water sample shows presence of traces of pesticides like HCH, including those already banned like Heptachlor, Aldarin, Endosulphansulphate in all samples under investigation. Concentration and retention time of pesticides found is given in Table 3 and Table 4 respectively. The concentration of β HCH is found more than any other isomer, which may be attributed to stability of this isomer especially to microbial degradation. In all samples the concentration of pesticides is more in post monsoon samples.

Agricultural activities within the vicinity of the river have affected quality of surface water due to run off from these fields. Industrial and domestic use of pesticides also contributes to entry of these hazardous chemicals into water bodies. Absence of DDT and DDE suggests growing awareness among farmers about its ill effects, as it is already under restricted use in our country. Presence of lesser amounts of Aldrin, Endosulphansulphate and Heptachlor as compared to HCH may due to banning of these pesticides since 1996.[9,10]

Excess of pesticide contaminants in post monsoon sample may be due to presence of pesticide residue in soil [10], which ultimately get carried away by run off water and contaminate the receiving river water . [13-15]

TABLE -III AVERAGE CONCENTRATION OF VARIOUS PESTICIDES IN HINDON RIVER WATER

S.No	***Compound***	***Conc. in water µg/l (pre-monsoon)***	***Conc. In water µ g/l (post monsoon)***
1.	α-HCH	0.250	9.2
2.	β –HCH	0.518	10.0
3.	Y- HCH	ND	7.1
4.	Aldrin	0.083	0.298
5.	Heptachlor	0.019	0.201

6.	Endosulphansulphate	0.892	12.0
7.	DDT,DDE	ND	ND
8.	Lindane	ND	0.45
9.	Malathion	ND	ND

TABLE -IV RETENTION (RT) TIME OF VARIOUS PESTICIDES UNDER GIVEN CONDITIONS

S.No	Compound	Retention time(min)
1.	α-HCH	14.8
2.	B-HCH	18.5
3.	Y-HCH	18.9
4.	Aldrin	34.0
5.	Heptachlor	24.0
6.	Endosulphansulphate	55.0
8.	Lindane	12.0

IV. CONCLUSION

The assessment clearly shows that the river water is contaminated with toxic pesticides. The amount of pesticides increases manifold in river post monsoon as the river basin is surrounded by agricultural fields. The amounts exceed WHO and Bureau of Indian standards parameters. There is utmost need to have more awareness as well as stricter monitoring of unauthorized use of synthetic organic pesticides for agriculture activities. Regulations on waste disposal and management should be strictly implemented along-with regular monitoring of hotspots and raising awareness about the health effects will towards cleaning Hindon river. Use of alternative pesticides and adopting cleaner technologies needs to be promoted to avoid further pollution.

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A Study on Recent Trends in Training Programmes of Petroleum PSUs in India

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Abstract

Having strategic importance and being one of the six core industries in India, the oil and gas sector (petroleum sector) plays a pivotal role in influencing decisions across other important spheres of the economy. The India is the fourth-largest energy consumer (2013) of oil & gas in the world, accounting for 37 per cent of total energy consumption. The oil consumption is estimated to reach four million barrels per day by FY16, expanding at a compounded annual growth rate of 3.2 per cent during FY08-16. By 2025, India is expected to overtake Japan to become the third-largest consumer of oil. In India there are 19 refineries in the public sector and three in the private sector. In FY14, public sector refineries accounted for 53.4 per cent of total refinery crude throughout.

The total contribution of oil and gas sector to the Gross Domestic Product (GDP) is 15%. The immensity of this sector is corroborated by the fact that there were a total of 130,000 people employed in the petroleum industry in 2009-2010 and now further increased. It requires 25,000 additional professionals in the next five years due to business growth and retirement or attrition in the sector. Almost 80 percent companies reported that technical skills were a key shortage area and half stated that management skills were in short supply. In order to fill the gap, there is a greater need of trained and skilled manpower in this sector. Considering significance of the training, the PSUs have invested significant share of their profit on training. Having this background, this paper explores on training practices/programs instigated by public sector petroleum companies in India, their comparative analysis and amount spent on training activities.

(Key Words: Training Programs, Investment, Human Capital etc.)

Title: "A Study on Recent Trends in Training Programmes of Petroleum PSUs in India"

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I. Introduction:

The India has been among the world's fastest growing economies. With expanding economy comes an increasing demand for energy and, if current trends continue, India will be the world's third largest energy consumer by 2020. Due to the expected strong growth in demand, India's dependency on oil imports is likely to increase further. The rapid economic growth is leading to greater outputs, which in turn is increasing the demand of oil for production and transportation. The National Gas Hydrate Programme (NGHP) Expedition-02 and 03 are under advanced stage of planning and are due in the period 2014 - 2017. The oil and gas sector plays a key role in economic development of India, since it fuels the growth of all other sectors. The total contribution of oil and gas sector to the Gross Domestic Product (GDP) is 15%. The oil consumption in India is projected to enhance by 4%-5% per annum to 2015, indicating a demand

of 4.01 million b/d by 2015. (Source: Ministry of Petroleum and Natural Gas, Govt. of India).

The vastness of this sector is corroborated by the fact that there were a total of 130,000 people employed in the petroleum industry in 2009-2010 and further increased. The India's oil and gas sector will require 25,000 additional professionals in the next five years due to business growth and retirement or attrition in the sector. This is equivalent to around 48% of the current employee strength (Source: Report on Ernest and Young's Manpower demand and supply study for oil and gas sector, 2009). But at the other end, the industry currently identifies shortage in a wide range of skilled occupations including technical, management, finance, marketing and leadership. Almost four out of five oil and gas companies reported that technical skills were a key shortage area and half stated that management skills were in short supply (Source: International Labor Organization, Global dialogue forum on future needs for skills and training in the oil and gas industry, Geneva 12-13 Dec. 2012). In order to fill the gap, there is a great need of trained and skilled manpower in this sector. Considering significance of the training, the PSUs in India have invested a share of their profit on training.

The training has become an integral and important part of every organization. It is the process for providing required skills to the employee for doing the job effectively, skillfully and qualitatively. The Improved capabilities, knowledge and skills of the talented workforce proved to be a major source of competitive advantage. Today, organizations are investing more in effective training and development programs to make the best use of human resource capital. The training enables employees to develop skills and competencies necessary to enhance bottom line results of the organization. It increases the job knowledge and skills of the employees at each level and helps to expand the horizons of human intellect and an overall personality of the employees. It is an attempt to improve current or future performance of the employee.

The training enhances employees' initiative and quality of work thereby assisting them to be more committed to achieve organizational goals and objectives and in turn enhance employees' initiative within the organization. The recognition of the importance of training in recent years has been heavily emphasized. The Indian organizations have realized that the employees are the most valuable asset. The organizations invest a lot in effective training and development of human resource to achieve both short and long term goals. The training has become a tool to achieve strategic goals. It is not viewed by the organization as an expense but as an investment. The Hindustan Petroleum Corporation Ltd. (HPCL) believes in harnessing the full potential of all employees for becoming a world class energy company. The Indian Oil Corporation Ltd. (IOCL) always made special efforts to polish and develop its human capital. At Bharat Petroleum Corporation Ltd. (BPCL), commitment of its employees is a major resource. It realized that only a happy employee will put his best foot forward with customers.

II. Literature Review:

V.S.Rama Rao (2010) found that training helps in increasing the knowledge and skills of employees and further improves their performance. The training enables the employees to work more efficiently at the present while preparing themselves for the higher level of jobs in the future. **Srinu (2012)** studied the training and development programs related to executive level, supervisory level and workmen level employees and their influence on implementation of an appropriate system to suit the needs of the organization and further studied about opinions of the trainees and trainers of staff at NTPC Ltd. The author found that training and development program were effective and added value to the job. **Singh and Mohanty (2012)** concluded that training has a significant role to play on productivity as productivity per employee has a direct relationship with training imparted in the employees across sectors. The firms can develop and enhance the quality of current employees by providing comprehensive training and development programs. The training gives employees a chance to learn their job virtually and perform it more competently hence increasing firm's productivity.

Chahal (2013) found that training and effectiveness boost the morale of the employee, upgrade skills, improve their performance and gives them the opportunity to get lucrative job and excel in their jobs also. The training aims at providing the trainee the opportunity of changing their behavior and contribute to their effectiveness and upgrade their skills. **Bhatt (2013)** concluded that organizational performance is significantly determined by training imparted to the employee or in other words training is an important antecedent of performance. The author found that the performance of an organization relies on the employee commitment which in turn depends on the HR policy of Training and Development. **Subbulakshmi and Tamilasaran (2013)** concluded that training has positive effect on the employee performance and helps the employees to build their personality better to face the challenging business environment.

Palanichemy and Rajeshwari (2014) identified that training is important in making the organization gainful as most of the organizations conduct appropriate training program on regular basis to meet current demands. However, the main purpose of the training is to increase the employee's skills which eventually make the organization more

gainful. **Singh and Singh (2014)** concluded that training and development of all human resources is a continuous process and must not be treated as nonproductive activity. The competitive edge for being successful and to become the market leader is ultimately provided by the quality of human resources that an organization retains and maintains and naturally it becomes the deciding factor for the organization's success, growth, sustainability and profitability in the long run. The training and development as a global phenomenon is needed in all concerns domestic or international.

Dassler (2000) suggested that the primary role of any training is fundamentally improving the employee's inherent skills for the present and future assignments and responsibilities because it helps the employees to change themselves with all possible aspects of technology changes and mounting competitions. **Kole (2002)** recommended that training helps the employees to learn new concepts, refreshes their skill sets, improves their work attitude and ultimately boost the productivity and quality of services to attain maximum customer satisfaction.

III. Objectives of the Study:

1. To study the Training practices/programs instigated by public sector petroleum companies in India, viz. HPCL, IOCL and BPCL.
2. To make comparative analysis of different programs at different levels initiated by these companies.
3. To make analysis of the amount invested in human capital (for training) by these companies.

IV. Research Methodology:

The present research paper is based on exploratory research, considering secondary data sourced from journals, company reports, company websites and articles. In view of the objectives of the study, the descriptive research design is employed to have greater accuracy and in depth analysis of the available statistics. Different articles, journals, company reports and websites were used which are enumerated and recorded properly.

V. Discussion and Analysis:

In the present study, three public sector petroleum companies, viz. The Hindustan Petroleum Corporation Ltd. (HPCL), The Indian Oil Corporation Ltd. (IOCL), Bharat Petroleum Corporation Ltd. (BPCL) have been taken to explore on their training practices. The different projects and programs on training started by these companies are studied and then comparative analysis of these programs is made.

A. Training practices/programs instigated by Public Sector Petroleum Companies:

a. The HPCL is a Government of India enterprise with a Navratna status and a Forbes 2000 and Global Fortune 500 company. The HPCL has earned the 'Top Performer' status for two consecutive years FY 2011-12, 2012-13, as the topper in the MOU ratings, in the oil industry. The HPCL has bagged the Award 'Organization with best HR strategy in line with business' and also got 'Greentech Best HR Strategy gold award'. It believes in harnessing the full potential of all employees for becoming a world class energy company, to arouse passion and emotional involvement of employees around a common purpose. With this objective, the HPCL embarked upon a process of organizational transformation called Project ACE (Achieving Continuous Excellence). The Project ACE was conceived to develop a co-created vision shared by the organizational members at large, thereby transforming HPCL into an innovative and learning organization where employees continuously acquire new skills and capabilities to excel, and achieve outstanding business results.

It also has a state of the art learning center at Nigdi, Pune called HPMDI which is a certified ISO 9002 institute where a wide range of Functional/ Behavioral/ Managerial programs are conducted. Carefully designed and developed, these programs are conducted by experts drawn from reputed academic institutes to management consultants. The HPCL also developed an e-learning portal using which employees can enhance their technical and behavioral competencies. Besides this, it also started project Samavesh in 2006 to build a sense of belongingness among employees. In this program new officer/officer trainees have been inducted by the organization and they are provided exposure to different SBU's of corporation.

The Project Akshaypath started in 2013 for development of leadership qualities among employees. The employees are exposed with principles of management with focus on leadership development. The Advanced Management Programs (AMP) are organized for officers of levels DGM and above, by reputed Business Schools like ASCI-Hyderabad, MDI- Gurgaon, ISB- Hyderabad and IIM-Kolkata, including visit to select foreign countries. The HPCL also sponsors Study Tours for employee groups to enrich their knowledge and skills, in the form of select foreign training. Various e-learning programs on defined competencies, including online certification courses on Project Management, Supply Chain Management, and different e-learning resources on various behavioral areas are facilitated.

b. The IOCL is India's flagship national oil company having Maharatna status with business interest from refining, pipeline, transportation and marketing of petroleum products to exploration and production. It is the leading Indian corporate in the Fortune 'Global 500' listing, ranked at the 96th

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Neural Network Activation Functions for Image Compression

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Abstract- **Neural Network has been a fascinating area now-a-days. There are various applications in neural network like system identification and control , game-playing and decision making (backgammon, chess, racing), pattern recognition, sequence recognition, medical diagnosis, financial applications, data mining etc. The activation functions used in neural networks can be non-differentiable or discontinuous functions and Differentiable or continuous functions. In this Paper, discontinuous functions and continuous functions are applied on an image to modify it. Then the simulation results show that the continuous function is more efficient than the discontinuous function. Also, a Lena Image is taken on which the modifications are done.**

I. INTRODUCTION

Neural networks take a different approach to problem solving than that of conventional computers [1]. Conventional Computers restricts the solving capability of the problems that is understandable by the user. The operations are predictable in Conventional Computers and unpredictable in Neural Networks but a large number of tasks, require systems that use a combination of the two approaches (normally a conventional computer is used to supervise the neural network) in order to perform maximum efficiency. A neural network is a massively parallel distributed processor made up of simple processing units (neurons) that has a natural propensity for storing experiential knowledge and making it available for use [8-10]. It resembles the brain in two respects: i) Knowledge is acquired by the network through a learning process, and ii) Interneuron connection strengths, known as synaptic weights, are used to store the knowledge. Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques [3]. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze.

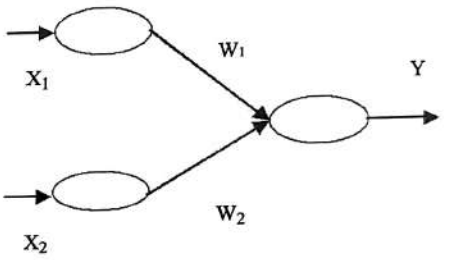

Fig 1Architecture of Simple Artificial Neuron

Figure 1 shows a simplified artificial neural net with two input neurons (X1, X2) and one output neuron(Y). The interconnected weights are given by W1 and W2. The model of ANN is specified by the three basic entities namely: i) model's synaptic interconnections; ii) training or learning rules adopted for updating and adjusting the connection weights; and iii) activation functions.

When creating a functional model of the biological neuron, there are three basic components of importance. First, the synapses of the neuron are modeled as weights. The strength of the connection between an input and a neuron is noted by the value of the weight [6 -8]. Negative weight values reflect inhibitory connections, while positive values designate excitatory connections. The next two components model the actual activity within the neuron cell. An adder sums up all the inputs modified by their respective weights. This activity is referred to as linear combination. Finally, an activation function controls the amplitude of the output of the

neuron. An acceptable range of output is usually between 0 and 1, or -1 and 1.

II. RELATED WORK

Many image compression techniques have been proposed in the literature. Image compression is a technique which requires the viewing and storing of images to be standardized. Banerjee and Halder [2] proposed their own algorithm for image compression and compare the results of their proposed algorithm with the JPEG standard and existing BOBC algorithm and report an elegant and simple image compression/decompression algorithm to identify the spatial and spectral redundancy without appreciably sacrificing the quality. Image compression is the application of data compression on digital images. Dhandawate and Joshi [3] discussed the results of image compression with the conventional method for VQ design using SOM and their proposed technique. The main aim was to focus on an efficient VQ design, which will be well applicable to all kind of images in order to improve the quality of reconstructed image. Various quality measures are used for evaluation of performance of compression/decompression. The simulation results in three times less file size when compared with JPEG. Pandian and Anitha [4] proposed a scheme for designing a transform VQ for color image compression using KSOM. The compression of color images is performed by converting color images from RGB to HSV color space. The compression scheme for designing VQ for color image compression using generic codebooks produce reconstructed image with good quality. The image compressed using the DCT transform provide better compression rate with good PSNR values. Tsai, Jhuang and Liu [5] present a new hierarchical SOM to solve the image compression problem. NHSOM uses an estimation function to adjust members of maps dynamically, and reflects the distribution of data efficiently. Kumar, Rai and Shakti [1] show that SOM has been successfully used as a way of dimensionality reduction and feature selection for image compression. SOM may be one dimensional, two dimensional or multidimensional, but most common are either one dimensional or two dimensional maps and the number of input connections depends on the number of attributes to be used in the classification. Wallace [6] proposed the JPEG standard which includes two basic compression methods, each with various modes of operation. A DCT based method is specified for lossy compression and a predictive method for lossless compression. Lu and Shin [7] implemented VQ for image compression based on neural networks. VQ provides high compression ratios and simple decoding processes but implementation of VQ has revealed some major difficulties such as edge integrity and codebook design efficiency. KSOM is known by the ability to form clusters from training samples for pattern classification applications without supervision. Sonal and Dinesh [8] implemented the Image Compression for Self-Organizing Feature Maps which has been used to compress various types of Gray scale images. The PSNR value obtained is 26.89 dB and the time taken for convergence is 320seconds. By adopting the proposed approach the PSNR achieved is 29.79 dB and the time taken for convergence is 185 seconds. The time taken for simulation has been reduced to nearly 50%. The performance of the Self-Organizing Feature Maps has been substantially improved by the proposed approach.

III. LEARNING PROCESS

The main property of an ANN is its capability to learn. Learning or training is a process by means of which a neural network adapts itself to a stimulus by making proper parameter adjustments, resulting in the production of desired response. The learning in an ANN can be generally classified into three categories as:

A. Unsupervised learning

In this process, the learning process is independent and is not supervised by a teacher. In ANN's following unsupervised learning, the input vectors of similar type are grouped without the use of training data to specify how a member of each group looks or to which group a number belongs [9]. In the training process, the network receives the input patterns and organizes these patterns to form clusters. When a new input pattern is applied, the neural network gives an output response indicating the class to which the input pattern belongs. If for an input, a pattern class cannot be found then a new class is generated. The block diagram of unsupervised learning is shown in figure2:

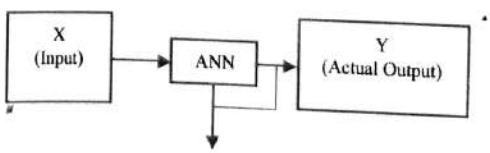

Fig 2 Block Diagram of Unsupervised learning

Features of Unsupervised Learning:

1. No help from the outside.
2. No training data, no information available on the desired output.
3. Learning by doing.
4. Used to pick out structure in the input.
5. Clustering.
6. Reduction of dimensionality and compression.

B. Supervised learning

Supervised learning is fairly common in classification problems because the goal is often to get the computer to learn a classification system that we have created [9] Digit recognition is a common example of classification learning. The block diagram of supervised leaning is shown in Figure3:

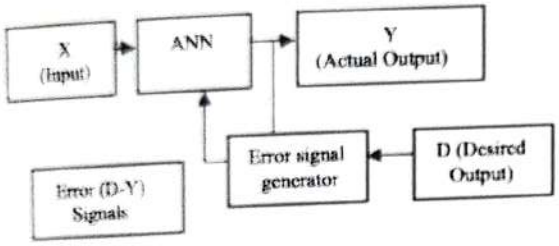

Fig 3 Block Diagram of Supervised learning

Supervised learning is the most common technique for training neural networks and decision trees. Both of these techniques are highly dependent on the information given by the pre-determined classifications. In the case of neural networks, the classification is used to determine the error of the network and then adjust the network to minimize it, and in decision trees, the classifications are used to determine the attributes, provide the most information that can be used to solve the classification puzzle.

C. Reinforcement learning

This learning process is similar to supervised learning. In the case of supervised learning, the correct target output values are known for each pattern. But, in some cases, less information might be available [9]. For example, the network might be told that its actual output is only "50% correct" or so. Thus, here only critic information is available, not the exact information. The learning based on this critic information is called reinforcement learning and the feedback sent is called reinforcement signal. The reinforcement learning is shown in figure4:

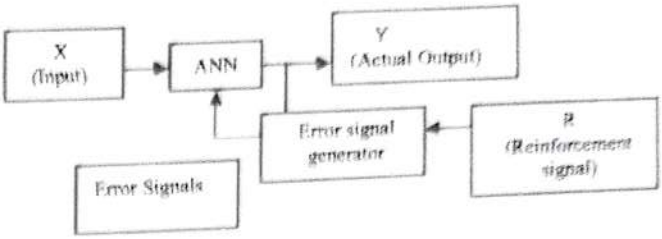

Fig 4 Block Diagram of Reinforcement Learning

Generally, the neural network is formed in three layers, called the input layer, hidden layer, and output layer. Each layer consists of one or more nodes, represented in figure5 by the small circles. The lines between the nodes indicate the flow of information from one node to the next. In this particular type of neural network, the information flows only from the input to the output. Other types of neural networks have more intricate connections, such as feedback paths. The nodes of the input layer are passive, meaning they do not modify the data. They receive a single value on their input, and duplicate the value to their multiple outputs. In comparison, the nodes of the hidden and output layer are active. This means they modify the data . The variables: X1(1)...X1(6) hold the data to be evaluated. For example, they may be pixel values from an image, samples from an audio signal, stock market prices on successive days, etc. Each value from the input layer is duplicated and sent to all of the hidden nodes. This is called a fully interconnected structure.

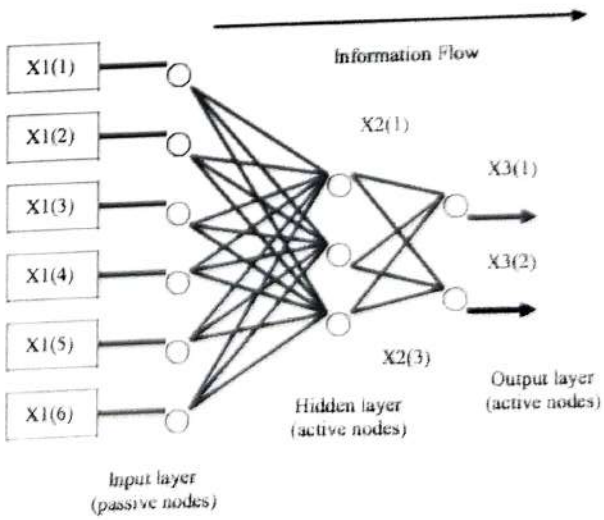

Fig 5 Feed forward Network

The outputs from the hidden layer are represented in the flow diagram of Figure 5, by the variables: X2(1), X2(2), and X2(3). The active nodes of the output layer combine and modify the data to produce the two output values of this network, X3(1) and X3(2). Neural networks can have any number of layers, and any number of nodes per layer. Most applications use the three layer structure with a maximum of a few hundred input nodes. The hidden layer is usually about 10% the size of the input layer. In the case of target detection, the output layer only needs a single node. The output of this node is threshold to provide a positive or negative indication of the target's presence or absence in the input data. As an example, imagine a neural network for recognizing objects in a sonar signal, the values entering a hidden node are multiplied by weights, a set of predetermined numbers stored in the program. The weighted inputs are then added to produce a single number. This number is passed through a nonlinear mathematical function called a sigmoid. This is an "s" shaped curve that limits the node's output. That is, the input to the sigmoid is a value between -∞ and +∞, while its output can only be between 0 and 1.

IV. ACTIVATION FUNCTIONS

To make the work more efficient and to obtain exact output, some force or activation may be given. This activation helps in achieving the exact output. In a similar way, the activation function is applied over the net input to calculate the output of an ANN. The information processing element can be viewed as consisting of two major parts: input and output [10]. An integration function (say f) is associated with the input of a processing element. This function serves to combine activation, information or evidence from an external source or other processing elements into a net input to the processing element. A typical type of activation function like threshold function is shown in figure6:

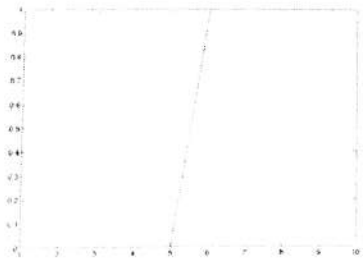

Fig 6 Threshold Function

Activation functions for the hidden units are needed to introduce non-linearity into the networks. The reason is that a composition of linear functions is again a linear function. However, it is the non-linearity (i.e., the capability to represent nonlinear functions) that makes multi-layer networks so powerful. Almost any nonlinear function does the job, although for back-propagation learning it must be differentiable and it helps if the function is bounded.

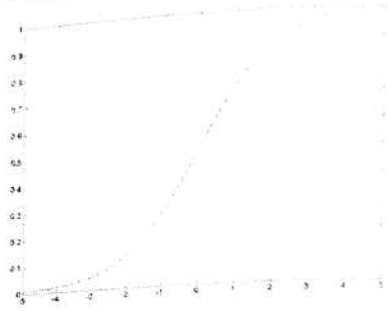

Fig 7 Sigmoid Function

The sigmoid functions shown in figure7, are the most common choices. For the output units, activation functions should be chosen to be suited to the distribution of the target values. For continuous-valued targets with a bounded range, the sigmoid functions are again useful, provided that either the outputs or the targets to be scaled to the range of the output activation function. But if the target values have no known bounded range, it is better to use an unbounded activation function, most often the identity function (which amounts to no activation function). If the target values are positive but have no known upper bound, an exponential output activation function can be used. An Error Signal originates at an output of the network, and propagates backward (layer by layer) through the network. This is said as an error signal because its computation by the network involves an error dependent function in one form to another.

Each hidden or output of a neuron of a multilayer perceptron is designed to perform two computations:

1. The computation of the function signal appearing at the output of a neuron, which is expressed as a continuous nonlinear function of the input signal and synaptic weights associated with that neuron.
2. The computation of an estimate of the vector which is needed for the backward pass through the network.

The error signal at the output of neuron j at iteration n is defined by equation 1:

$$e_j(n) = d_j(n) - y_j(n) \quad (1)$$

where,
ej(n) is the error energy,
dj(n) is the desired response, and
yj(n) is the actual output.

V. OUTPUTS

Fig 8 Original Image

Fig 9 Conversion of the original Image into Gray Scale

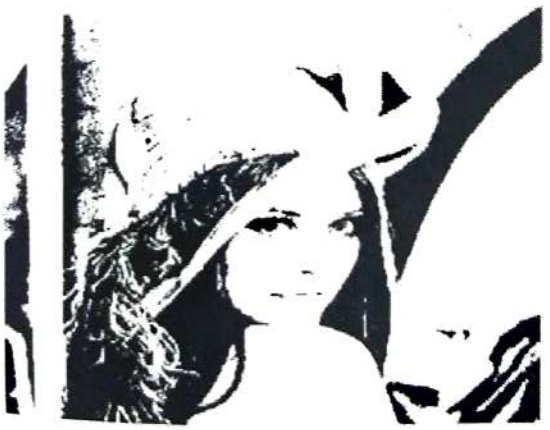

Fig 10 Resultant Image after applying Threshold Function on a Gray Scale Image

Fig 11 Resultant Image after applying Sigmoid Function on a Gray Scale Image

VI. OBSERVATIONS

In this Paper, the desired response d is the mean of all the matrix values obtained from the gray scale image. And the actual output y is the mean of all the matrix values obtained from the resultant image, which is further obtained after applying the functions.

The mean value obtained from the matrix of gray scale image is 5323.34, which is the value of desired response.

Observation 1: Average Error Value by Threshold Activation Function

The mean value obtained from the matrix of resultant image obtained by applying the threshold activation function is 3544.29, which is the value of desired response.

The Error value obtained from this result is
5323.34-3544.29 = 1779.05

i.e., the Percentage of error is 17.79%.

Observation 2: Average Error Value by Sigmoid Activation Function

The mean value obtained from the matrix of resultant image obtained by applying the sigmoid activation function is 5108.29, which is the value of desired response.

The Error value obtained from this result is
5323.34-5108.29 = 215.05

i.e., the percentage of error is 2.15%

VII. CONCLUSION

From the implementation, it has been concluded that the Sigmoid Function is good to compress the image than the Activation Function. As the Sigmoid Activation Function is continuous and Differentiable, so the value of Mean Square Error is less in case of Sigmoid Function. As a result, the modification of an image done by the Sigmoid Activation Function gives better Performance than Threshold Activation Function.

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Optimal Control of CSTR

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Abstract— **Sometimes conventional feedback controllers may not perform well online because of the variation in process dynamics due to nonlinear actuators, changes in environmental conditions and variation in the character of the disturbances. To overcome the above problem, this paper deals with the designing of a controller for a second order system with optimal design of PID control based on particle swarm optimization.The mathematical model of experimental system had been approximate near the operating point for the PSO algorithm to adjust PID parameters for the minimum integral square of error (ISE) condition. The results show the adjustment of PID parameters converting into the optimal point and the good control response base on the optimal values by the PSO technique.**

Keywords— PIDControl,optimal control,particle swarm optimization(PSO)

I. INTRODUCTION

During the past decades, great advancement has been made in the process control. Numerous control methods such as PID Control,Adaptive control, neural control, fuzzy control and optimal control have been studied. Among them, the best known is the proportional-integral-derivative (PID) controller, which has been widely used in the industry because of its simple structure and robust performance in a wide range of operating conditions. Unfortunately, it has been quite difficult to tune properly the gains of PID controllers because many industrial plants are often burdened with problems such as high order, time delays, and nonlinearities.

Over the years, several heuristic methods have been developed for the tuning of PID controllers. The first method used the classical tuning rules proposed by Ziegler and Nichols. Generally, it is always hard to determine optimal or almost optimal PID parameters with the Ziegler-Nichols method in many industrial plant..Other than original works done by Ziegler and Nichols, a great number of methods have been proposed to obtain optimal gains of the PID such as by Cohen and Coon in 1953, Åström and Hägglund in 1984 or by Zhuang and Atherton in 1993.To obtain the optimal parameter tuning, it is highly desirable to increase the capabilities of PID controllers by adding new features.

Many Artificial Intelligence (AI) techniques have been employed to improve the controller performance for a wide range of plants while retaining their basic characteristics. Artificial Intelligence techniques such as Neural Network, Fuzzy Logic have been widely applied to proper tuning of PID control parameters.

Particle swarm optimization (PSO), first introduced by Kennedy and Eberhart, is one of the modern heuristic algorithms. It was developed through simulation of a simplified social system, and has been found to be robust in solving continuous nonlinear optimization problems. The PSO technique can generate a high-quality solution within shorter calculation time and stable convergence characteristic than other stochastic methods. PSO method is an excellent optimization methodology and a promising approach for solving the optimal PID controller parameters. Therefore, this study develops the PSO-PID [1,2,3,12].

II. DEVELOPMENT OF MATHEMATICAL MODELLING

The examined reactor has real background and graphical diagram of the CSTR reactor is shown in Figure 1. The mathematical model of this reactor comes from balances inside the reactor. Notice that: a jacket surrounding the reactor also has feed and exit streams. The jacket is assumed to be perfectly mixed and at lower temperature than the reactor. Energy passes through the reactor walls into jacket, removing the heat generated by reaction. The control objective is to keep the temperature of the reacting mixture T, constant at desired value .The only manipulated variable is the coolant temperature [4, 5].

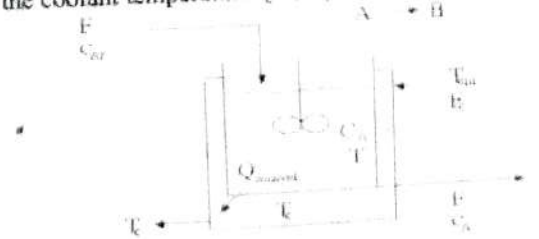


Fig. 1. Continuously Stirred Tank Reactor

Following assumptions has been made for CSTR:

- Perfect mixing (product stream values are the same as the bulk reactor fluid)
- Constant volume
- Constant parameter values

A. *State Variable form of Dynamic Equations*

In state variable form equations can be written as

$$f_1(C_A, T) = \frac{dC_A}{dt} = \frac{F}{V}(C_{Af} - C_A) - r \qquad (1)$$

$$f_2(C_A, T) = \frac{dT}{dt} = \frac{F}{V}(T_f - T) + \left(\frac{-\Delta H}{\rho c_p}\right) r - \frac{UA}{V \rho c_p}(T - T_j) \qquad (2)$$

The reaction rate per unit volume (Arrhenius expression) is

$$r = k_o \exp\left(\frac{-\Delta E}{RT}\right) C_A$$

Where it is assumed that the reaction is first-order [5,6,7].

B. *Steady-State Solution*

The steady-state solution is obtained when $\frac{dC_A}{dt} = 0$ and $\frac{dT}{dt} = 0$, that is

$$f_1(C_A, T) = 0 = \frac{F}{V}(C_{Af} - C_A) - k_o \exp\left(\frac{-\Delta E}{RT}\right) C_A$$

$$f_2(C_A, T) = 0 = \frac{F}{V}(T_f - T) + \left(\frac{-\Delta H}{\rho c_p}\right) k_o \exp\left(\frac{-\Delta E}{RT}\right) C_A - \frac{UA}{V \rho c_p}(T - T_j)$$

The linear model of the system is obtained as:

$$X = \begin{bmatrix} -\frac{F}{V} - k_s & -C_{AS} k'_s \\ \frac{-\Delta H}{\rho c_p} k_s & -\frac{F}{V} - \frac{UA}{V \rho c_p} + \left(\frac{-\Delta H}{\rho c_p}\right) C_{AS} k'_s \end{bmatrix} \begin{bmatrix} C_A \\ T \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{UA}{V \rho c_p} \end{bmatrix} [T_j] \qquad (3)$$

TABLE I. REACTOR PARAMETERS

Reactor Parameter	Description	Values
F/V(hr-1)	Flow rate*reactor volume of tank	1
K_o(hr-1)	Exponential factor	$10e^{15}$
-ΔH (kcal/kmol)	Heat of reaction	6000
E(kcal/kmol)	Activation energy	12189
ρC_p (BTU/ ft^3)	Density*heat capacity	500
Tf(°K)	Feed temperature	312
C_{Af}(lbmol/ft^3)	Concentration of feed stream	10
$\frac{UA}{V}$	Overall heat transfer coefficient/reactor volume	1451
Tj(K)	Coolant Temperature	300

III. PID CONTROLLER

The PID controller is used to improve the dynamic response as well as to reduce or eliminate the steady-state error. The Derivative controller adds a finite zero to the open-loop plant transfer function and improves the transient response. The integral controller adds a pole at the origin, thus increasing system type by one and reducing the steady state-error due to a step function to zero.

The continuous form of a PID controller, with input $e(.)$ and output $(.)u_{pid}$, is generally given as :

$$u_{pid}(t) = k_p \left[e(t) + \frac{1}{T_i} \int_0^t e(\tau)\, d\tau + T_d \frac{d}{dt} e(t) \right] \qquad (4)$$

where *kp* is the proportional gain, *Ti* is integral time constant and *Td* is the derivative time constant. We can also rewrite as

$$u_{pid}(t) = k_p e(t) + k_i \int_0^t e(\tau)\, d\tau + k_d \frac{d}{dt} e(t) \qquad (5)$$

where ki = *kp* / *Ti* is the integral gain and *kd* = *kpTd* is the Derivative gain.In simple form, the PID controller transfer function is

$$C(s) = k_p + \frac{k_i}{s} + k_d s \qquad (6)$$

A. *Ziegler Nichols Tuning*

In 1942, Ziegler and Nichols [9], described simple mathematical procedures, for tuning the PID controllers.Both the techniques make a priori assumption on the system model, but do not require the system model to be specifically known. Ziegler-Nichols formulae for specifying the controllers are based on the plant step response.

1) *Open Loop Response*

The open-loop method is typical for a first-order system with transportation delay. The response is characterized by 2 parameters, L the time-delay and T the timeconstant.These are found by drawing a tangent to the step response at its point of inflection and noting its intersections with the time axis and steady-state value.

2) Closed Loop Response

The closed-loop method targets plant that can be rendered unstable under proportional control. The technique is designed to result in a closed loop system with 25% overshoot [8,12].

IV. PARTICLE SWARM OPTIMIZATION(PSO)

Particle swarm optimization is an extremely simple algorithm that seems to be effective for optimizing a wide range of functions. It is viewed as a mid-level form of A-life or biologically derived algorithm, occupying the space in nature between evolutionary search, which requires cons, and neural processing, which occurs on the order of milliseconds. Social optimization occurs in the time frame of ordinary experience - in fact, it *is* ordinary experience. In addition to its ties with A-life, particle swarm optimization has obvious ties with evolutionary computation. Conceptually, it seems to lie somewhere between genetic algorithms and evolutionary programming. It is highly dependent on stochastic processes, like evolutionary programming.

PSO is derived from the social-psychological theory, and has been found to be robust in complex systems. Each particle is treated as a valueless particle in g-dimensional search space, and keeps track of its coordinates in the problem space associated with the best solution (evaluating value) and this value is called *pbest.* The overall best value and its location obtained so far by any particle in the group that was tracked by the global version of the particle swarm optimizer *gbest.* The PSO concept consists of changing the velocity of each particle toward its pbest and gbest locations at each time step. As example, the jth particle is represented as $x_j = (x_{j.1}, x_{j.2}, \ldots, x_{j.g})$ in the g-dimensional space. The best previous position of the jth particle is recorded and represented as $pbest_j = (pbest_{j.1}, pbest_{j.2} \ldots pbest_{j.g})$. The index of best particle among all particles in the group is represented by the $gbest_g$. The rate of the position change (velocity) for particle j is represented as $v_j = (v_{j.1}, v_{j.2} \ldots v_{j.g})$. The modified velocity and position of each particle can be calculated using the current velocity and distance from $pbest_{j.g}$ to $gbest_g$ as shown in the following formulas:

$$v_{jg}^{(t+1)} = w.v_{jg}^{(t)} + c_1 * \text{rand}\,() * (pbest_{jg} - x_{jg}^{(t)}) + c_2 * \text{rand}\,() * (gbest_g - x_{jg}^{(t)}) \quad (7)$$

$$x_{jg}^{(t+1)} = x_{jg}^{(t)} + v_{jg}^{(t+1)} \quad (8)$$

j=1, 2..... n; g=1, 2... m

Where

n	number of particles in a group;
m	number of members in a particle;
t	pointer of iterations(generations);
$v_{jg}^{(t)}$	velocity of particle *j* at iteration *t*,
W	inertia weight factor;
c_1, c_2	acceleration constant;
rand ( )	random number between 0 and 1;
$x_{jg}^{(t)}$	current position of particle *j* at iteration *t*;
$pbest_j$	pbest of particle j;
gbest	gbest of the group

The parameter v_g^{max} determined the resolution, or fitness, with which regions were searched between the present position and the target position. If v_g^{max} is too high, particles might fly past good solutions but if v_g^{max} is too low, particles may not explore sufficiently beyond local solutions.

The constant c_1 and c_2 represent the weighting of the stochastic acceleration terms that pull each particle toward *pbest* and *gbest.* c_1 and c_2 were often set to be 2.0 according to past experience. This because low values allow particle to fly far from the target region before being tugged back while high values result in abrupt movement toward or past target regions. Generally, the inertia weight *w* is set according to equation (8) below. Suitable selection of *w* provides a balance between global and local explorations, thus requiring less iteration on average to find a sufficiently optimal solution.

$$w = \frac{w_{max} - w_{min}}{iter_{max}} * \text{iter} \quad (9)$$

Where $iter_{max}$ is the maximum number of iterations or generations and iter is the current number of iterations.

It is a very simple concept, and paradigms can be implemented in a few lines of computer code. It requires only primitive mathematical operators, and is computationally inexpensive in terms of both memory requirements and speed. Early testing has found the implementation to be effective with several kinds of problems[8,9,10].

A. Optimal Tuning of PID Controller Using PSO

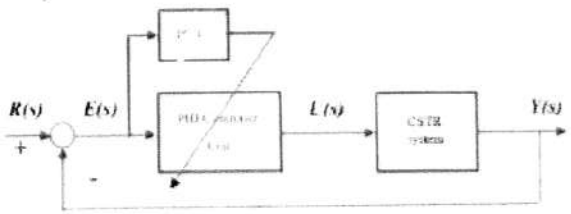


Fig.2 Block diagram of optimal PID controllers with PSO for CSTR

The control system with a set of optimal PID parameters can obtain an excellent response output show in Fig.2.The value

of fitness function defined by optimization algorithm would be the minimum.

Performance characteristic of evaluation function includes overshoot, rise time, settling time and static error time. The evaluation function as in (9), to compute the evaluation value of each particle in swarm according to control performance. can obtain an excellent response output.

The sequence of steps to study the PSO for the CSTR system is given below:

STEP 1: Specify the lower and upper bounds of Kp,Ki,Kd ·Initialize randomly the particles of the swarm including swarm size, iteration, acceleration constant, inertia weight factor, the position matrix x_j and the velocity matrix v_j and so on.

STEP 2: Calculate the evaluation value of each particle using the evaluation function given.

STEP 3: Compare each particle's new fitness value with its personal best position's fitness value, and update the personal best position pbest.

STEP 4: Search for the best position among all particles personal best position, and denote the best position as gbest·

STEP 5: Update the velocity v_i1 of each particle according to equation (3), and update the particle position matrix according to equation (4).

STEP 6: Update control parameter.

STEP 7: If the number of iterations reaches the maximum, then stop. The latest gbest is regarded as the optimal PID controller parameter. Otherwise, go to step 2[11,12].

B. Performance Indices

A performance index is a quantitative measure of the performance of the system. A system is considered an optimal control system when the system parameters are adjusted so that the index reaches an extreme value, commonly a minimum value [12].

A suitable performance index is the integral of the square of the error, ISE, which is defined as

$$ISE = \int_0^T e(t)^2 dt$$

ISE is more suitable to minimize initial large amount of errors. The squared error is mathematically more convenient for analytical and computational purposes.

Another readily instrumented performance criterion is the integral of the absolute magnitude of the error, IAE,which is written as:

$$IAE = \int_0^T |e(t)| dt$$

This index is particularly useful for computer simulation studies. To reduce the contribution of the large initial error to the value of the performance integral, as well as to emphasize errors occurring later in response, the integral of time multiplied by absolute error, ITAE has been proposed, which is defined as:

$$ITAE = \int_0^T |e(t)| t dt$$

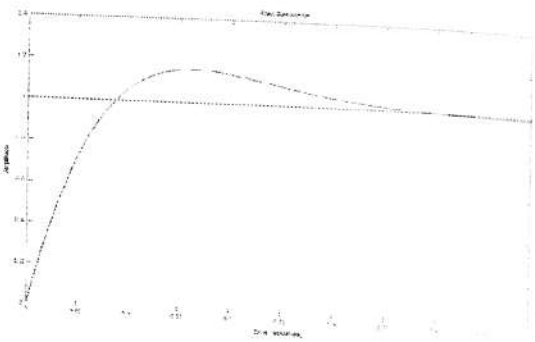
Other performance criteria include evaluation of rise tim settling-time and peak overshoot. Rise time is the time tak for the response to rise from 0 to 100% for the first tim Settling time is defined as the time taken by the response reach and stay within specified error limit. Peak Oversho is the ratio of maximum peak value measured fro maximum value to the final value [12].

V. SIMULATION RESULTS

A. PID Controller

TABLE II. PID TUNING PARAMETERS USING ZEIGLER-NICHOLAS METHOD

Tuning Method	K_p	K_i	k_d
ZNT	9.2675	37.911	-.678



B. Particle Swarm Optimization

1) PSO Parameters

Weight / Inertia of the system - 0.5.

Acceleration constants, C_1 and C_2 - 1.5.

Swarm population - 100.

Dimension of the search-space - 3 (K_p, K_i, K_d)

2) Calculation of fittness function

A set of good control parameters *P, I* and *D* can yield a good step response that will result in performance criteria minimization in the time domain. These performance criteria in the time domain include the overshoot, rise time, settling time, and steady-state error. Therefore, the performance criterion is defined as follows

$$\min_{K\text{stablizing}} W(K) = (1 - e^{-\beta}).(M_p + E_{ss}) + e^{-\beta} .(t_s - t_r) \quad (10)$$

Where K is [P, I, D], and β is the weightening factor. The performance criterion W (K) can satisfy the designer requirement using the weightening factor β value.weightening factor is chosen as 1 in this application.

The fitness function is reciprocal of the performance criterion, in the other words:

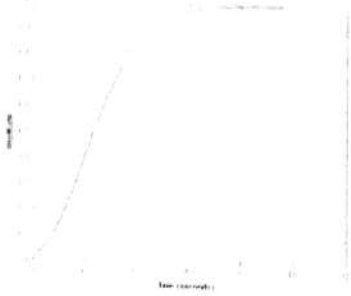
$$f = \frac{1}{W(K)}$$

3) Robustness of PSO Algorithm

To check the robustness of PSO-PID controller, values of PID controller is calculated for different iterations and conclude
which among these gives the best fitness function [15].

TABLE III. OPTIMIZATION OF PID TUNING PARAMETERS OF PSO

K_p	K_i	K_d
0978	.9075	-.1375



C. Comparitive Analysis of Performance Indices[15]

TABLE IV. OPTIMIZATION OF PID TUNING PARAMETERS OF PSO

Performance Index	Z-N tuned PID Controller	PSO-PID Controller
Rise time (sec.)	.36	4.47
Peak time (sec.)	1.0	17.0
Maximum Overshoot (%)	7.1	0
Settling time (sec.)	1.4	8.65
ISE	.16	.003

VI. CONCLUSION

A thorough comparative analysis has been carried out on CSTR performance with different controllers. It has been shown that the individual controllers have their own merits and demerits. The choice of selection of controller for a particular application should be based on typical requirement. When the requirement is of simplicity and ease of application, a Z-N tuned PID controller is of a good choice. When the requirement is of both intelligent response and good steady state performance with minimum overshoot and least error, optimization based PSO-PID controller is a better choice. The major impact of PSO is on integral square error and peak overshoot. Both are minimized by PSO-PID controller. In future the same problem can be solved by adopting other evolutionary algorithms like ant colony algorithm, bacteria foreaging algorithm etc [15].

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A NEWAPPROACH TOWARDS K-MEANS ALGORITHM USING SEGMENTATION

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Abstract*— Nowadays data mining is used in many fields for the extraction of similar information from the large data volumes. The data before information extraction contains noise which is then removed such that the predictive information can be extracted. The predictive information so produced helps in the business analysis of an organization. Clustering is one of the techniques applied for knowledge discovery to group the data on the basis of similarities and dissimilarities among the data elements and generally for this purpose K-Means Algorithm is applied. In this paper, a new data clustering approach called enhanced K-Means algorithm is proposed where improvement is made on the initial selection of centroids for the clusters. The centroids are chosen such that the whole space is divided into different segments of precise range and then calculates the frequency of data points in each segment thereby assigns the data point to their appropriate cluster. This process works more efficiently as it reduces the time complexity, the effort of numerical calculation and retains the easiness of implementing the K-mean algorithm.

Keywords— ***K-means, data clustering, centroid, segment***

I. INTRODUCTION

A basic problem that frequently arises in different fields like data mining and knowledge discovery [1], data compression and vector quantization [2], and pattern recognition and pattern classification [3] is the clustering problem. It also has been applied in a great variety of applications, such as image segmentation, document retrieval, object and character recognition [4]. The importance of data mining is rising exponentially since last decade. There is a large amount of data available in real world which makes it very difficult to access the useful information from this vast database and provide the information which is required within time limit and in required outline. So data mining provides the way to remove the noise from data and extract information from large database and give it in the form in which it is required for each specific job. The use of data mining is very immense in today's scenario [5].

Cluster analysis of data is widely used in knowledge discovery and data mining. It aims to group data on the basis of similarities and dissimilarities among the data elements so that we have high intra class similarity and low inter class similarity and can be performed in a supervised or unsupervised way.

II. LITERATURE REVIEW

Although the work has been done by various authors on the initial selection of cluster centroids in which centroid selection is an independent initialization, to optimize the clustering approach? The most notable work has been briefly discussed in this section.

In paper [5] author defined a threshold distance for each cluster's centroid to compare the distance between data point and cluster's centroid with this threshold distance through which they could reduce the computational effort while the calculation of distance between data point and cluster's centroid. It is shown that how the modified K-mean algorithm will lessen the complexity & the effort of numerical calculation, preserving the easiness of implementing the K-mean algorithm. It assigns the data point to their appropriate class or cluster more efficiently.

In paper [6] author define a modified K-mean algorithm in which it has been discussed about the limitations of K-mean algorithm and improvement has been done to increase the speed and efficiency of K-mean algorithm. Their algorithm removes the need of specifying the value of K in advance which is practically very difficult. Our proposed algorithm is better in two ways as compared to the others as discussed above. First, it results in optimal number of cluster and second it reduces computational complexity and remove dead unit problem.

III. PROPOSED ALGORITHM

The K-means algorithm is a well-known partitioning method for clustering. K-means clustering method, groups the data based on their closeness to each other according to the Euclidean distance. In this clustering approach the user decides that how many cluster should be, but the clusters are incremented dynamically in phase 1. For each data vector this algorithm calculate the distance between data vector and each cluster centroid using equation (1).

$$D(Zp, Mj) = \sqrt{\sum(Zp, k - Mj, k)} \quad \text{.....(1)}$$

Z_p is p^{th} data point

M_j is centroid of j^{th} cluster.

The centroid is recalculated each time respectively after addition of data point in cluster j. It is calculated using equation (2)

$$M_j = 1/N_j \sum Zp, \forall Zp \in Cj \quad \text{.....(2)}$$

where N_j is the number of data point in cluster j.

The present work has overcome the limitations that were in the paper [5]. Enhancement has been done in modified K-mean algorithm by dividing the whole space is divided into different segments of precise range. The segment which shows maximum frequency will have the highest probability to have the centroid of the cluster. The number of cluster's centroid (K) will be provided by the user in the same way like the traditional K-mean algorithm but will be dynamically increased under some conditions and the number of division will be k*k ('k' vertically as well as 'k' horizontally). If the highest frequency of data point is same in different segments and the upper bound of segment exceeds the threshold 'k' then merging of different segments become compulsory and then take the highest k segment for calculating the initial centroid of clusters. In this paper we define a threshold distance for each cluster's centroid in which we compare the distance between data point and cluster's centroid with this distance by which we can lessen the computational effort. Although, after addition of data point to the cluster the centroid is recalculated by taking mean of all data points in that cluster.

As we know that K-mean is widely used in many areas because of its simplicity and easiness to implement. It requires less computation but there are some limitations:-

1. Initial selection of the number of cluster should be previously known and specified by the user.
2. Results directly depend on the initial centroid of cluster.
3. It can contain the dead unit problem.

Our proposed work will provide the solution for the above limitations. The first limitation can be minimized by running the algorithm for different number of K- values and increasing them dynamically after analyzing the density of data points. The proposed algorithm is based on density of different regions which eventually minimizes 2nd limitation and hence will solve the problem of dead unit point because the centroid of cluster is located in the first iteration pertaining to the maximum density of the data points. In this approach data points are taken from UCI dataset. After taking the data set as input, user defines the 'k' value, where 'k' denotes the number of clusters. Suppose the value of k defined by user is 4, this means user has defined 4 clusters. Then the space will be partitioned into k*k segments.

Phase 1:

In this approach 67 data points are taken and subsequently plotted as in Fig 1. After taking the data set as input, user defines the 'k' value, where 'k' denotes the number of clusters.

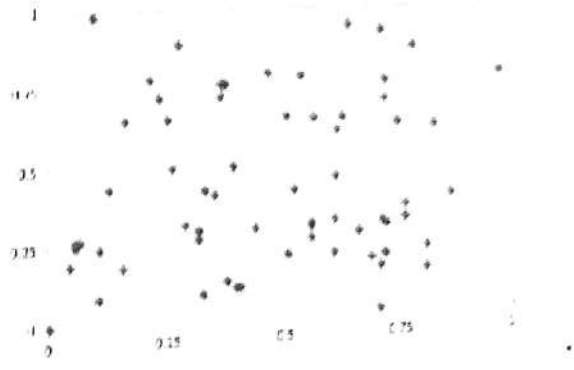

Chart 1: Data Set

Suppose the value of k defined by user is 4, i.e. user defines 4 clusters. Then the space will be divided into k*k segments, as showif in fig 2.

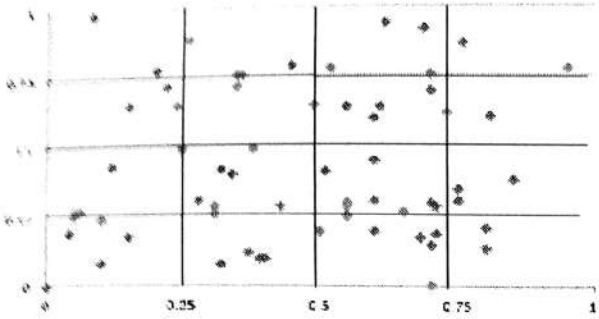

Chart 2: XY plane partitioned into different segments

Segment(rectangle)	No. of data points (frequency)
(0,0)-(.25, .25)	11
(.25,0)-(0.5,0.25)	0
(.5,0)-(0.75,0.25)	7
(.75,0)-(1,0.25)	6
(0,0.25)-(0.25,0.50)	6
(0.25,0.25)-(0.5,0.5)	8
(0.5,0.25)-(0.75,0.5)	2
(0.75,0.25)-(1,0.5)	3
(0,0.5)-(0.25,0.75)	3
(0.25,0.5)-(0.5,0.75)	5
(0.5,0.5)-(0.75,0.75)	6
(0.75,0.5)-(1,0.75)	10
(0,0.5)-(0.25,1)	4
(0.25,0.75)-(0.5,1)	1
(0.5,0.75)-(0.75,1)	3
(0.75,0.75)-(1,1)	4

Table 1: Group Frequencies

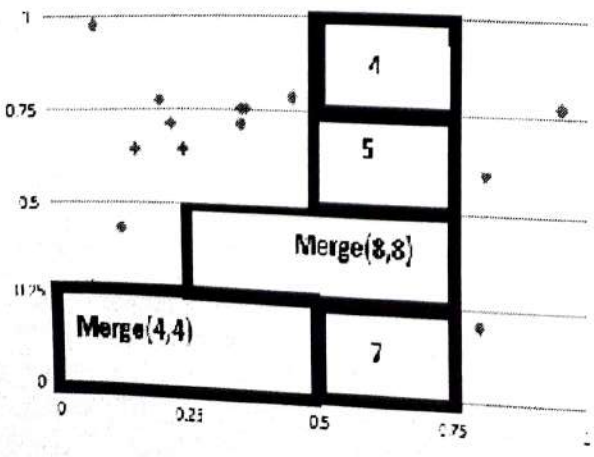

Fig 1: Segments with highest frequencies

The adjacent segments with the same frequencies are merged into one segment. Then the mean of all data points is taken which are coming in that segment. If the segments with same frequency are not adjacent, then a new cluster is generated. This makes the clusters dynamic. Thus, initial centroids are calculated.

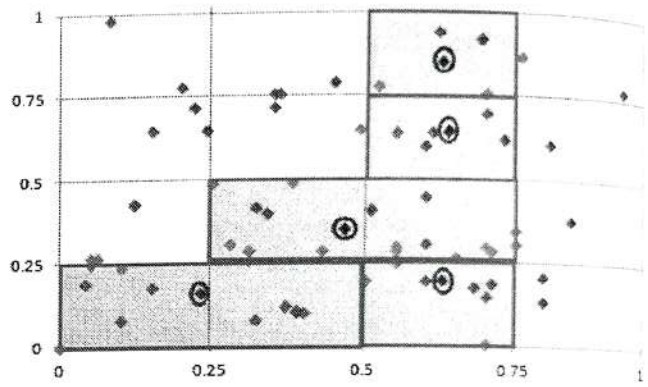

Fig 2: Initial centroids

Phase 2:

To assign the data point to appropriate cluster's centroid we calculate the distance between each cluster's centroid and for each centroid take the minimum distance from the remaining centroid and make it half, denoted by DC (i) i.e. half of the minimum distance from ith cluster's centroid to the other cluster's centroid. Now take any data point to calculate its distance from ith centroid and compare it with DC(i). If it is less than or equal to DC (i) then data point is allocated to the ith cluster or else calculate the distance from the other centroid. Repeat this process until that data point is allocated to any of the remaining cluster. After assigning the data point to that cluster, mean is calculated, and centroid keeps on moving in contrast to previous algorithm where centroid was calculated after the complete iteration. If data point is not assigned to any of the cluster then the centroid which shows the minimum distance with data point becomes the cluster for that data point. Repeat this process for each data point. Repeat phase 2 until termination condition is achieved.

No: Number of data points
K: Number of clusters' centroids
C_i: i^{th} cluster
Equations used in algorithm are:

$|C_i, C_j| = \{d(m_i,m_j) : (i,j) \in [1,k] \ \& \ i \in j\}$.....(3)

Where $|C_i, C_j|$ is the distance between cluster C_i and C_j

$DC_{(i)} = 1/2(\min \{|C_i,C_j|\}$ .....(4)

Where $DC_{(i)}$ is half of the minimum distance from i^{th} cluster to any other remaining cluster.

1. Input the data set and value of k.
2. If the value of k is 1 then Exit.
3. Else
4. /*divide the data point space into k*k, means k vertically and k horizontally*/
5. For each dimension {
6. Calculate the minimum and maximum value of data points
7. Calculate range of group (R_G) using equation ((min+max)/k)
8. Divide the data point space in k group with width RG
9. }
10. Calculate the frequency of data points in each partitioned space.
11. Choose the k highest frequency group.
12. If same frequency segments are adjacent
13. Merge the segments
14. Go to step 17
15. Else
16. k=k+1(Make new cluster)
17. Calculate the mean of selected group. /* This will be the initial centroid of cluster.*/
18. Calculate the distance between each clusters using equation (3)
19. Take the minimum distance for each cluster and make it half using equation (4)
20. For each data points p= 1 to No {
21. For each cluster j= 1 to k {
22. Count the number of data points in Cj
23. if (count==1)
24. Calculate d(Zp,Mj) using equation (1)
25. If (d(Zp,Mj) < DCj){
26. Then Zp assign to cluster Cj
27. Break
28. }
29. Else if
30. Take the mean of all data points in Cj
31. Go to step 24
32. Else
33. Continue;
34. }
35. If Zp does not belong to any cluster then
36. Zp ∈ min (d(Zp , Mi)) where i∈ [1, Nc]
37. }
38. Check the termination condition of algorithm if satisfied
39. Exit.
40. Else
41. Go to step 13.

In the above algorithm steps 5-17 is one time execution step and it ensures the non existence of dead unit problem and optimizes the selection of initial centroid of cluster by using the most .densely populated area as the centroid of cluster. This takes unit time for execution, so elapsed time will not increase rather it will decrease because initial centroid location is improved. As a result, number of iterations will decrease therefore overall execution time will decrease. Steps 12 to 16 define a new cluster whenever same frequency segments are not adjacent. Steps 13 to 27 ensure the minimum execution time during the allocation of data points to respective cluster because each time the modified algorithm tests from threshold. This ensures that outliers will be minimised. Also when number of cluster increases manifold the modified algorithm will take less time compared to the traditional algorithm because traditional algorithm calculates distance from data points with each cluster wasting significant amount of time. Step 30 calculates mean of data points in the specified clusters, this reduces the number of iterations. Thus, making convergence criteria achieve easily. In our approach it is not required to calculate the distance from data point to each cluster rather in best case we are required to calculate distance for each data point to only one cluster therefore increase in the number of clusters would prove to be more significant. Also in average case the elapsed time will be less than the traditional k-means algorithm for the same reason.

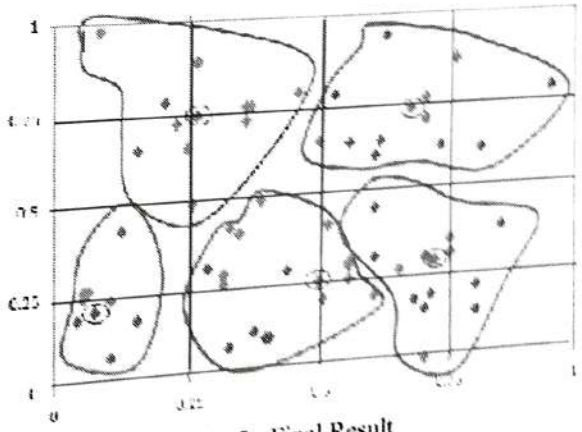

Fig 3: Final Result

IV. CONCLUSION

Data clustering is a process of keeping similar data together which means similarity among data within the cluster will be maximum and among the clusters would be minimum. K-Means is a very important method for data clustering. We have defined an improved version of this K-Means which increases the number of clusters dynamically according to the density of data points and it does not depend on the ordering of data. The computational efforts are minimized by incorporating the threshold value and calculating the mean of all data points in

the cluster at each step, thus, minimizing the occurrence of outliers.

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BBIJTM

Range Monitoring cum Theft Detection System

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Abstract— **In today's age of modernization, man has increased his dependence on daily routine items. Even the small household items play an important part and one cannot think life without any of these items. Life will become miserable if these items are lost or misplaced somewhere. To pose a solution to this problem, this paper presents a low cost range monitoring cum theft detection system which intends to keep a track of the items in the house and prevent their theft. This system is based on Radio Frequency technology working on a band of 434 MHz. The system developed in this paper deploys a simple yet effective technique which is different from the conventional RFID technology in which tags containing information are attached to the objects and are used for object identification. It consists of a transmitter and receiver with distinct addressing modes. The centralized receiver is connected with the different transmitters which are attached with the household items and monitors the response of these items. Each item is assigned a different address and atmost 256 different items can be tracked one at a time with this system. It monitors whether the item is within range or not, if the item is out of range which might be due to theft also, an alarm is triggered. The system works wirelessly and the range of operation has been set to 40-60 m which is the normal house range. The coefficient of determination (R^2) for the system has been found to be close to one, which accurately approximates the real data points and validates the accuracy of the system.**

Keywords— Range Monitoring; Theft; Alarm; Radio Frequency; Wireless

I. INTRODUCTION

Thefts are increasing at an alarming rate and necessary steps are being taken to prevent them. There are plenty of systems which are present to detect thefts and burglary. Large systems are installed in shops and houses to prevent intrusion and robbery. With advancement in technology, Radio Frequency Identification (RFID) tags have come into play and every item inside any store has a tag or barcode associated with it to prevent its theft by others [1-3]. There are large number of applications and systems in which RFID technology is employed. Such applications include biometric applications, parking systems, pharmaceutical industries, automobile tracking and many more [4-7]. In RFID systems, tags containing electronic information are attached to the objects which are used for object identification [8]. A duplex transmitter-receiver sends an inquiry signal to the tag and its response is read. However, using RFID tags for object identification is quiet expensive which limits their use to only large industries. In today's age, it is not uncommon to misplace things and forget where we placed them. Humans have a tendency to forget, and nothing much can be done to avoid this as it involves complex neurological functions and processes. Sometimes the loss of such items creates havoc in one's life. To address this problem and to pose a solution, this paper presents a low cost and efficient range monitoring cum theft detection system which tracks the items inside the house and also prevents their theft. The system consists of a transceiver with distinct addressing modes which can track 256 items one at a time. It is well suited according to modern day needs and is economical. It can track items inside a house with a centralized receiver. Also, for an instance, if such a system is put on our suitcases while travelling in a train, the theft while passenger is asleep will trigger an alarm due to the set range and the criminal could be caught red-handed without even before fleeing the compartment. This situation could otherwise leave the bag untracked. Several such important items could be saved using the system which is handy, inexpensive and worth all the money.

II. RADIO COMMUNICATION

Radio communication employs radio frequencies of band ranging from 3 kHz to 300 GHz [9-10]. The radio signals are received and transmitted by an antenna of proper length [11]. The transmitted power depends upon the distance between the receiver and transmitter unit and varies inversely with it [12-15]. The system developed in this paper works on a frequency range of 434 MHz. The range of operation for the system has been set to 40-60 m by choosing the proper antenna length. This range is appropriate for monitoring the range of the items within a house and preventing their theft. Fig.1 shows the relationship between length of antenna and the working range of the system.

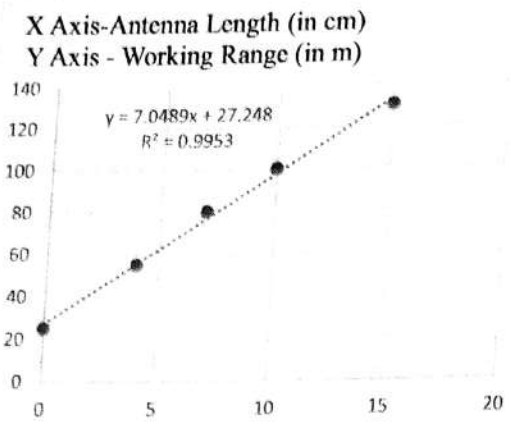

Fig.1. Antenna length vs Working range

The trend line between length of antenna and working range of the system shows that coefficient of determination R^2 is 0.9953. By varying the length of antenna, the working range of the system can be increased. The system developed in this paper works within a range of 40 to 60 m and length of the antenna used is 6 cm. The value of R^2 ranges from 0 to 1, and it gives the proportional fluctuation of one variable that can be predicted from the other variable. Here the value of R^2 is close to 1 and it fairly approximates the real data points. As the trend line passes through all the data points quite accurately it is easy to explain the variations. Fig.2 shows the transmitter and receiver unit of the developed system and the range of operation.

III. SYSTEM ARCHITECTURE

The system consists of a transmitter and a receiver unit which works on a frequency band of 434 MHz and transmits accordingly. The system works in such a way that both the units always remain connected. To keep a track of the items and monitor their range, the transmitter is attached to a particular item and it is in the range of the receiver. The receiver unit has a display module attached with it which shows a message "The item is in range", if the transmitter unit is in range with the receiver. If the connection between both these units is lost, which is due to burglary, the system triggers an alarm and displays "The item is out of range". At most 25 items can be tracked one at a time with this system.

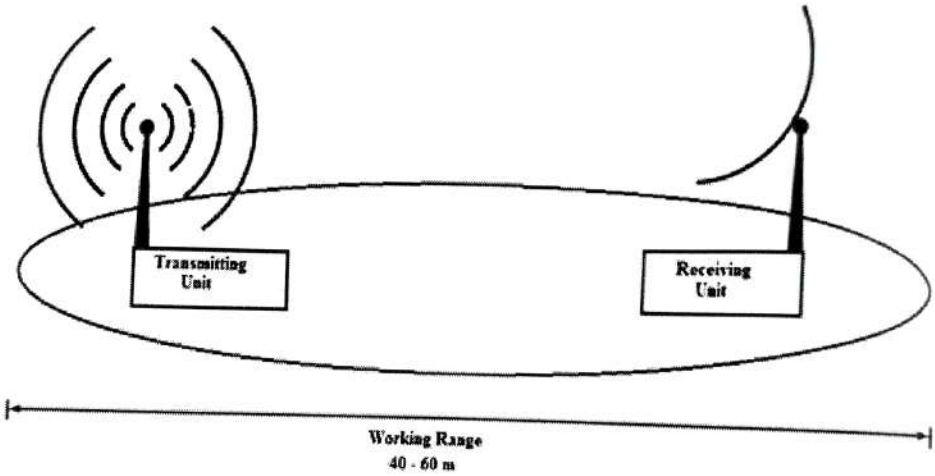

Fig.2. Working range of the system

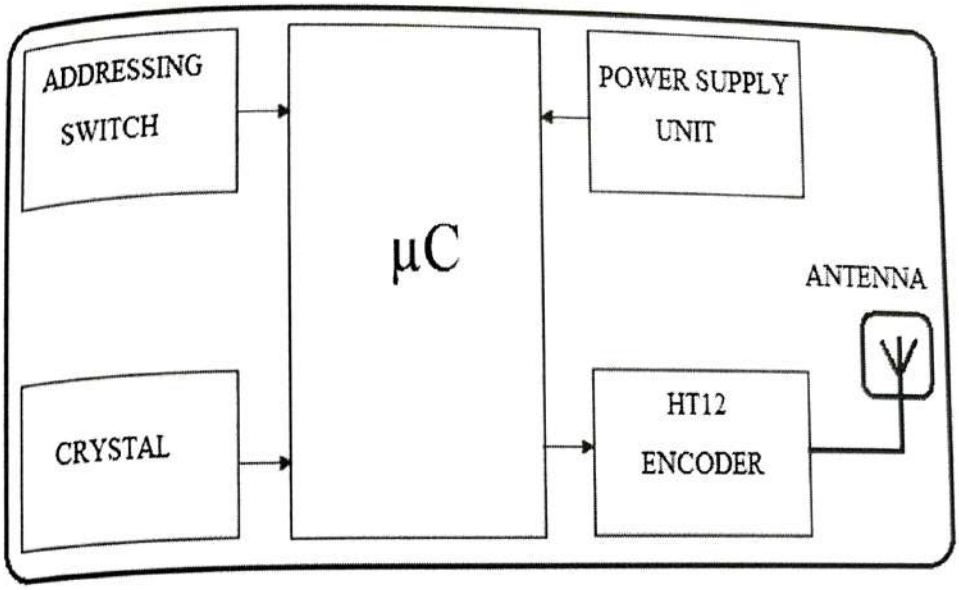

Fig.3. Block design of transmitter

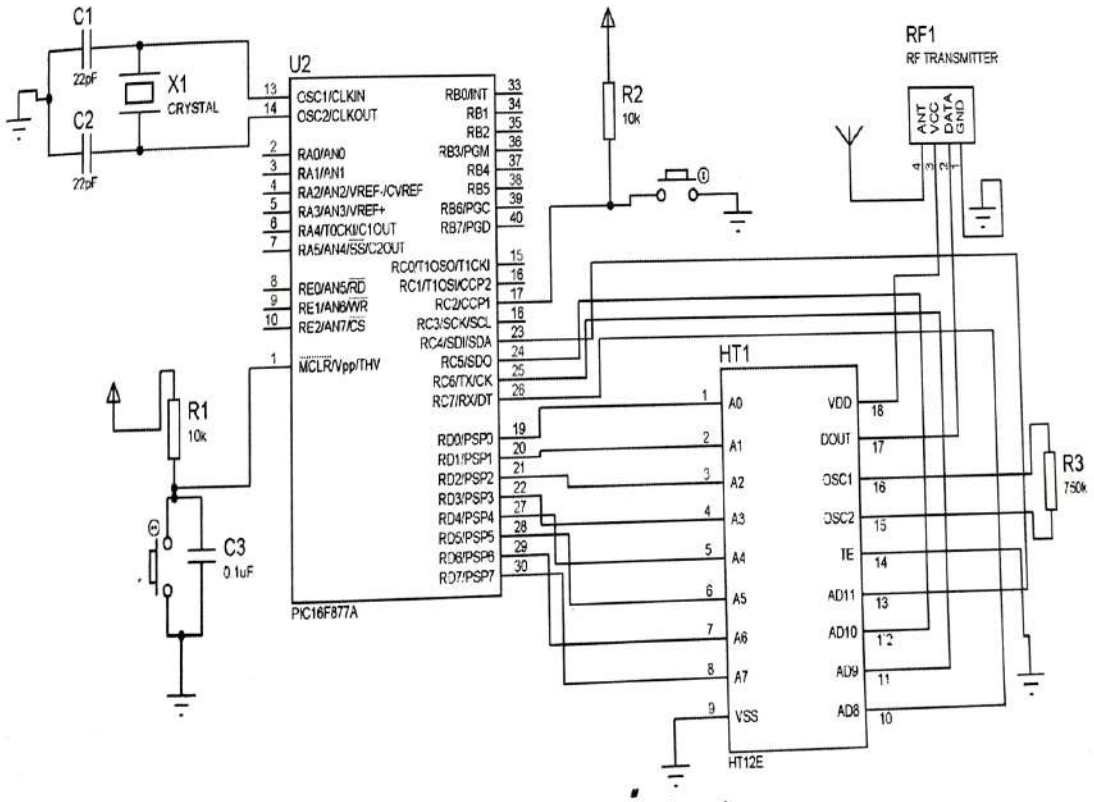

Fig.4. Simulation schematic of transmitter unit

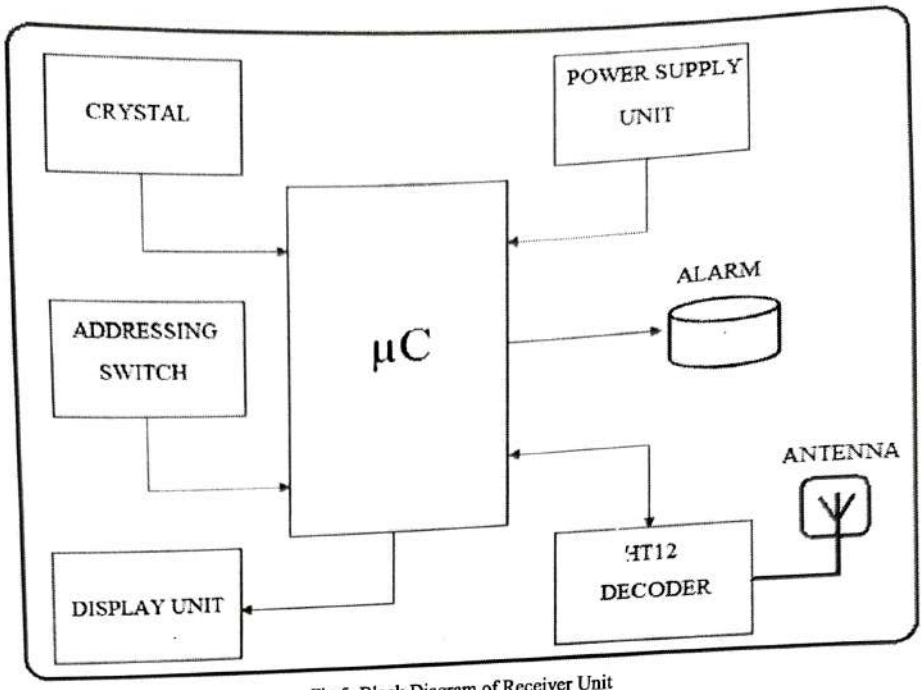

Fig.5. Block Diagram of Receiver Unit

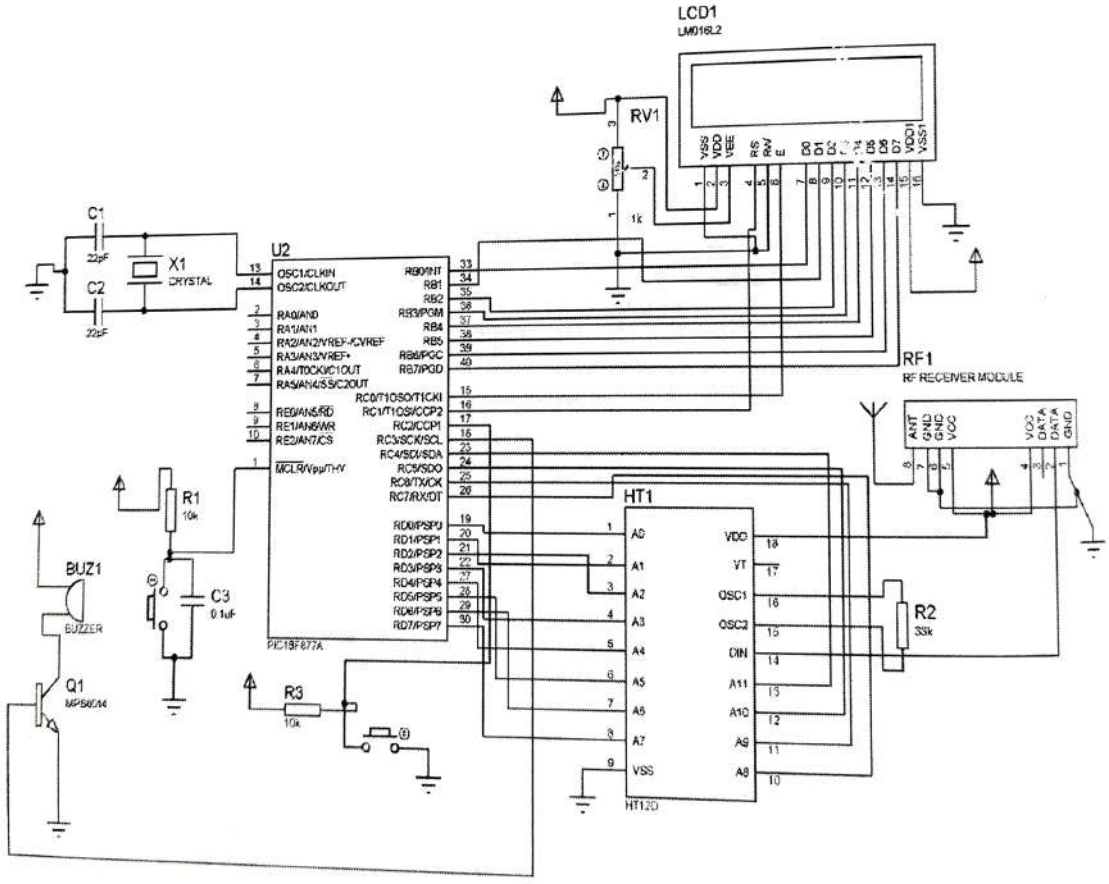

Fig.6. Simulation Circuit for Receiver

A. Transmitter Unit Design

The block design of the transmitter unit has been shown in Figure 3. It consists of a microcontroller, addressing switch, power supply unit, encoder, crystal and an antenna. The addressing switch sets the address for a particular item which is an 8-bit data and 2^8 items can be tracked. Each transmitter fitted with an item is assigned a particular 8-bit address which can be changed according to the requirements. The transmitter section works on a 5V which is supplied by power supply unit and the crystal provides clocking to the microcontroller. The encoder encodes the data to be sent. Fig.4 shows the simulation schematic of the transmitter unit.

B. Receiver Unit Design

The block diagram for the receiver unit is shown in Fig.5. It consists of a microcontroller, crystal, display unit, alarm, addressing switch, decoder and antenna. There is a centralized receiver unit for the system which can have 256 addressing modes set by the addressing switch. On adjusting the addressing modes, the receiver is connected to a particular transmitter fitted with a particular item, thus the item can be tracked easily and one can find that whether the item is within range or not. The display unit consists of a liquid crystal display which shows the message regarding the status of a particular item. The decoder decodes the data sent in the encoded form by a transmitter unit and this decoded data is processed by the microcontroller unit to take proper actions. The transmitter unit fitted with an item always remain connected with the centralized receiver and if the transmitter goes out of range, an alarm is triggered indicating that the item has been stolen.

Receiver section also requires 5V for its operation which is supplied by the power supply unit .The crystal oscillator provides clocking to the microcontroller. The simulation circuit for the receiver section is given in Fig.6.

IV. FLOWCHART OF THE SYSTEM

The logical representation of the software algorithm that has been developed for the system is given in Fig.7. The system initializes its peripherals on starting. If the item is within range i.e. the transmitter and the receiver are in range, a message showing the status "Item is in range" is displayed on the display unit. If the connection between receiver and transmitter is lost that means the item has been stolen, in this case the alarm is triggered and status updates to "Item out of range".

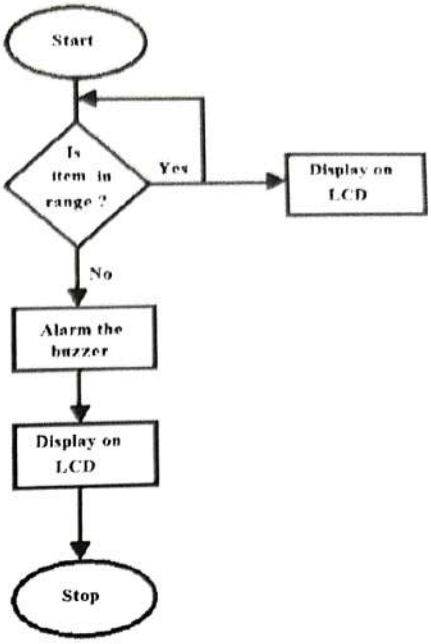

Fig.7. Flowchart of the system

V. RESULTS AND CONCLUSIONS

In this paper, a range monitoring cum theft detection system has been presented and implemented on hardware. The system has been set to a working range of 40-60 m and employs a radio frequency of 434 MHz band. The signal density decreases as the distance between the transmitter and receiver unit is increased. This system employs a simple yet efficient technique as compared to conventional RFID technology. It provides a cheap and powerful solution to the most common problem.

A. Residual plot

Residual plot is a plot between an output and input variables which is used to show whether the given regression model is appropriate according to your data. There should not be any recognizable pattern for the plotted residuals and they must be random in nature. Uncorrelated residuals are generally obtained by good regression models. The residual plot for the developed system has been plotted and shown in Fig.8.

B. Normal Probability Plot

Normal Probability Plot is graphical method which is used to check the normal distribution of the data. In this case, an approximately linear pattern is formed which shows that normal distribution is a decent model for a given set of data. The normal probability plot for the system is plotted and shown in Fig.9.

The normal probability plot and residual plot for the system has been plotted and they validate that the regression model

obtained is appropriate and thus accuracy of the system is verified. The system is fairly accurate and found to be working properly. It is appropriate according to the modern day needs.

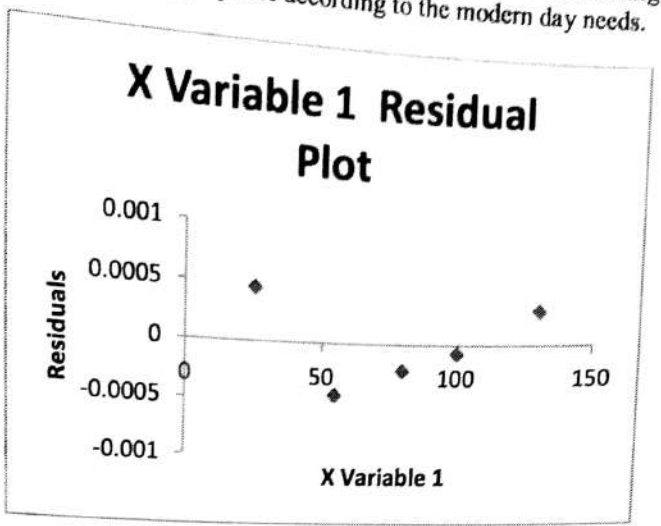

Fig.8. Residual Plot

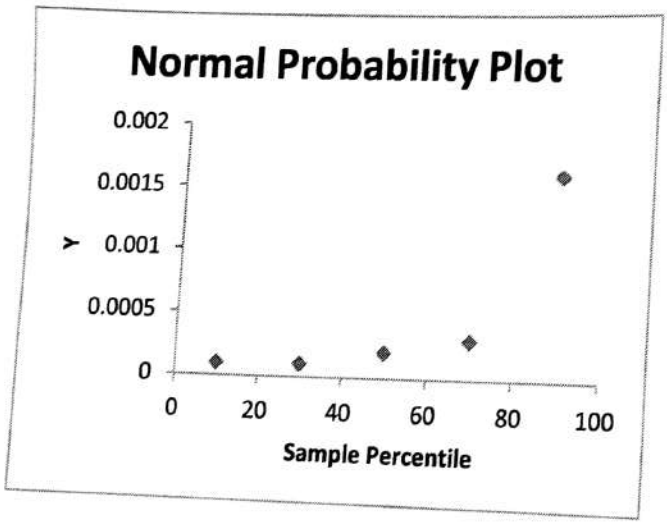

Fig.9. Normal Probability plot

VI. FUTURE SCOPE

Future implications of this product could be worked on and be improvised for more accuracy and inbuilt as a Mobile-App for convenience.

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RESOURCE MOBILIZATION OF REGIONAL RURAL BANKS IN INDIA

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Abstract:

Regional Rural Banks are established under the provisions of an ordinance promulgated on the 26th September, 1975 and the RRB Act, 1976 with an objective to ensure sufficient institutional credit for agriculture and other rural sectors. Reforms and mergers introduced by the Government of India in consultation with Reserve Bank of India (RBI) and National Bank for Agriculture and Rural Development (NABARD) in the years 1994-95 to 2005-06 have yielded positive results in respect of key performance indicators such as number of banks and branches, capital composition, deposits, loans, loans and the trend of investments. The objective of this paper is to investigate whether the merger/amalgamation of Regional Rural Banks in India. Several committees have emphasized the need to improve the performance of these banks in terms of resource mobilization, which play an important role in the rural credit market in India. The study is diagnostic and exploratory in nature and makes use of secondary data. The study finds and concludes that performance of rural banks in India has significantly improved after amalgamation process which has been initiated by the Government of India.

Keywords: *RRBs, Resource Mobilization, Rural Credit Market, State Governments, Sponsor, Reserve Bank of India.*

RESOURCE MOBILIZATION OF REGIONAL RURAL BANKS IN INDIA INTRODUCTION

Banks play an important role in mobilization and allocation of resources in an economy. The gains to an economy depend on how efficiently the banks perform. Like other commercial organization, the efficiency of banks is also judged among others by their profitability. In India, the priorities in banking operations underwent far reaching changes since the banking sector reforms have been set in motion. There had been a shift of emphasis form development or social banking to commercially viable banking. Profitability became the main consideration and the prime mover of the financial strength and performance of banks. Unlike in the past, all banking operations gradually came to be measured in terms of their ability to generate profits.

Regional Rural Banks (RRBs) were established in our country in 1975 essentially for taking banking to the doorsteps of rural masses, particularly in areas without banking facilities. RRBs, were expected to operate as State sponsored, region based and rural-oriented commercial banks. RRBs were expected to mobilize resources from rural areas and play a significant role in developing agriculture and rural economy by deploying mobilized resources in rural sectors for the needy not conversed by other formal credit institutions.

In the wake of introduction of financial sector reforms in 1991-92, the commercial viability of RRBs emerged as the most crucial factor in deciding about their desired role due to their limited business flexibility with hardly any scope of expansion/diversification, smaller size of loans with higher exposure to risk-prone advances and professional inefficiency in financial deployment. To strengthen RRBs and improve their performance many initiatives have been taken by the Government and the Reserve Bank of India. As a part of comprehensive restructuring programme, recapitalization of RRBs was initiated in the year 1994-95. The process continued till 1999-00 and covered 187 RRBs with aggregate financial support of Rs. 2188.44 crore from the shareholders, viz. Government of India, State Governments and sponsor banks in the ratio of 50:15:35. Further, the branch licensing policy for RRBs has been liberalized.

Under the new norms, empowered committees at the regional offices of RBI clear RRB application to open new branches. The branches of RRBs may undertake government business including conducting foreign exchange business with the prior approval of the concerned Government authority and RBI. These banks have also been allowed to open extension counters at the premises of the institutions of which they are principal bankers after obtaining license from the concerned regional office of the RBI. The RRBs need not to obtain permission of RBI for installation of ATMs at branches and extension counters for which they hold licenses issued by RBI. They are also permitted to open off site ATMs after assessing the cost and benefit. As against the earlier policy of opening a large number of branches in far flung rural areas, RRBs have been permitted to merge close down their unviable branches and the branch licensing policy for RRBs is almost at par with that for commercial banks.

Regional Rural Banks were established under the provisions of an Ordinance promulgated on the 26th September 1975 and the RRB Act, 1976 with an objective to ensure sufficient institutional credit for agriculture and other rural sectors. The RRBs mobilize financial resources from rural / semi-urban areas and grant loans and advances mostly to small and marginal farmers, agricultural labourers and rural Artisans. The area of operation of RRBs is limited to the area as notified by Govt. of India covering one or more districts in the State. RRBs are jointly owned by Govt. of India, the concerned State Government and Sponsor Banks (27 scheduled commercial banks and one State Cooperative Bank); the issued capital of a RRB is shared by the owners in the proportion of 50%, 15% and 35% respectively

REVIEW LITERATURE

The literature available in the working and performance of RRBs in India is a little limited. The literature obtained by investigators in the form of reports of various committees, commissions and working groups established by the Union Government, NABARD and Reserve Bank of India, the research studies, articles of researchers, bank officials, economists and the comments of economic analysts and news is briefly reviewed in this part. **Patel and Shete (1980)** of the National Institute of Banking Management made a valuable analysis of performance and prospects of RRBs. They also gave a comparative picture of performance in deposits, branch Expansion and credit deployment of the co-operative banks, commercial banks and RRBs in a specified area. **NABARD (1986)** published "A study on RRBs viability", which was conducted by Agriculture Finance Corporation in 1986 on behalf of NABARD. The study revealed that viability of RRBs was essentially dependent upon the fund management strategy, margin between resources mobility and their deployment and on the control exercised on current and future costs with advances. The proportion of the establishment costs to total cost and expansion of branches were the critical factors which affected their viability. The study further concluded that RRBs incurred losses due to defects in their systems as such, there was need to rectify these and make them viable. The main suggestions of the study included improvement in the infrastructure facilities and opening of branches by commercial banks in such areas where RRBs were already in function. **Kalkundrickars (1990)** in his study on "Performance and Growth of regional Rural Banks in Karnataka" found that these banks had benefited the beneficiaries in raising their income, productivity, employment and use of modern practices and rehabilitate rural artisans.

Kumar Raj (1993) carried out a study on the topic "Growth and Performance of RRBs in Haryana". On the basis of the study of RRBs of Haryana, it is found that there was an enormous increase in deposits and outstanding advances. The researcher felt the need to increase the share capital and to ensure efficient us of distribution channels of finance to beneficiaries. A. **K. Jai Prakash (1996)** conducted a study with the objective of analyzing the role of RRBs in Economic Development and revealed that RRBs have been playing a vital role in the field of rural development. Moreover, RRBs were more efficient in disbursal of loans to the rural borrowers as compared to the commercial banks. Support from the state Governments, local participation, and proper supervision of loans and opening urban branches were some steps recommended to make RRBs further efficient. **L.K Naidu (1998)** conducted a study on RRBs taking a sample of 48 beneficiaries of rural artisans in Cuddapah district of Andhra Pradesh state under Rayale Seen Gramin Bank. In this study, it was concluded that the beneficiaries were able to find an increase in their income because of the finance provided by the bank. According to **Nathan, Swami (2002),** policies of current phase of financial liberalization have had an immediate, direct and dramatic effect on rural credit. There has been a contraction in rural banking in general and in priority sector ending and preferential lending to the poor in particular.

Chavan and Pallavi (2004) have examined the growth and regional distribution of rural banking over the period 1975-2002. Chavan's paper documents the gains made by historical

underprivileged region of east, northeast and central part of India during the period of social and development banking. These gains were reversed in the 1990s: cutbacks in rural branches in rural credit deposits ratios were the steepest in the eastern and northeastern states of India. Policies of financial liberalization have unmistakably worsened regional inequalities in rural banking in India. Professor **Dilip Khankhoje and Dr. Milind Sathye (2008)** have analysed to measure the variation in the performance in terms of productive efficiency of RRBs in India and to assess if the efficiency of these institutions has increased post-restructuring in 1993-94. As none of these studies analyze the performance after amalgamation took place in the year 2006, there is a need for carrying out the present study. **Customer Service in Regional Rural Banks (2014)** Reserve Bank, as the regulator of Regional Rural Banks (RRBs), has been actively engaged from the very beginning in the review, examination and evaluation of customer service in RRBs by means of various guidelines issued from time to time to the RRBs. On review it is felt necessary to issue additional instructions to RRBs on other areas of customer service aligning with those issued to Scheduled Commercial Banks. These guidelines would be required to be complied by RRBs in addition to instructions already issued on Customer Service from time to time.

I. SCOPE OF THE STUDY

The present study will analyzed the resource mobilization of Regional Rural Banks in India through the growth of deposits.

II. OBJECTIVES OF THE STUDY

The Following are the Objectives of the Study.

- To analyze the source outline of RRBs in India
- To study the Time and Demand Deposits of RRB'
- To offer suitable suggestions on the basis of the findings of the study.

III. METHODOLOGY

The study is purely based on the secondary data only. The data required for the study are collected from the Reports on Trends and Progress of the Banking in India, Government publications, Books, Journals, Websites and so on.

IV. PERIOD OF THE STUDY

The study covers a period of fourteen years from 2000-01 to 2013-14.

V. PLAN OF ANALYSIS

The researcher has used the statistical tools like percentage, Growth rate, compound growth rate, trend analysis

VI. CLASSIFICATION OF TOTAL DEPOSITS OF RRBs IN INDIA

Table 1 shows the classification of total deposits of RRBs in India during the study period.

From the Table 1, it is understood that the total deposits of RRBs in India has increased from Rs.37027 crores in 2000-01 to Rs.241791 crores in 2013-14. The proportion of demand deposit of RRBs in India varied between 17.55 per cent in 2000-01 and 53.78 per cent in 2013-14 and the highest proportion of time deposit of RRBs in India has decreased from 82.45 per cent in 2000-01 to 46.22 per cent in 2013-14.

VII. GROWTH OF DEMAND DEPOSITS OF RRBs IN INDIA

The detail regarding the growth of demand deposits in RRBs in India is presented in Table 2.

Demand deposits of RRBs and its growth rates are shown in Table 2. The demand deposits increased from Rs.6499 crores to Rs.130040 crores between 2000-01 and 2013-14. The growth rate of demand deposits has varied between 18.73 per cent and 9.36 per cent during the study period. The compound growth rate of demand deposits is 36.24 per cent over the study period.

VIII. GROWTH OF TIME DEPOSITS OF RRBs IN INDIA

Table 3 given below presents the growth rate of time deposits of RRBs during the eleven years period of the study.

From Table 3, it is found that the time deposits of RRBs witnessed an increasing trend during the study period except in the year 2005-06. During the study period, it have ranged between Rs.30528 crore and Rs.111751 crore. The growth rates of Time deposit have varied between 16.29 per cent and 20.37 per cent. The compound growth of time deposits of RRBs in India is 5.40 per cent during the study period.

IX. GROWTH OF TOTAL DEPOSITS OF RRBs IN INDIA

Table 4 presents the growth of Total deposits mobilized by RRBs during the study period.

It is clear from Table 4 that the total deposits increased from Rs.37027 crores to Rs.241791 crores, between 2000-01 and 2013-14.The compound growth rate of total deposits is 16.10 per cent. The growth rate of total deposits have varied between16.73 per cent and 14.46 per cent during the research period.

X. ANALYSIS OF DATA

XI.I. TREND ANALYSIS

The deposits and advances of RRBs in India have been analyzed by the method of least square and predicted for the future year 2025. The trend values of RRBs have been estimated by using a linear trend equation as given below.

$Yc = a+bx$

Where Y = Deposits and advances of RRBs in crores.

X = Time variable

'a' and 'b' are parameters to be estimated.

Yc computed trend figure for period x.

The above trend equation has been estimated by the method of least squares. The value of 'a' and 'b' are determined by solving the following two normal equation:

$$\sum y = Na + b\sum x \quad \text{-----} \quad (1)$$

$$\sum xy = N\sum x + b\sum x^2 \text{-----} \quad (2)$$

Where N=Number of years of which data are given that is 14 years.

The x values for the year 2000 to 11 are -5,-4,-3,-2,-1, 0, 1,2,3,4 and 5.

Since $\sum x=0$ the above two normal equations are

$$\sum y = Na$$

$$a = \sum y/N$$

$$b = \sum xy/\sum x^2$$

With the help of the above linear trend equations the trend values of deposits and advances of RRBs in India have been computed.

Equation to straight line trend is

$Yc=a+bx$

Since $\sum x = 0$

$a = \sum y/N = 1532893/13$

$a = 117915$

$\sum xy = b\sum x^2$

$b = \sum xy/\sum x^2 = 3017587/182$

$b = 16580$

$Y_c = 84597+12431X$

The equation to the straight line trend is

$Y\ 2025 = 117915+ 16580(17) = 399775$

total deposit in the year 2025 would be Rs. 399775 crores.

XI. FINDINGS

The Total deposits of RRBs comprises Demand deposits and Time deposits

1. The growth rate of demand deposits has varied between 18.73 per cent and 9.36 per cent during the study period. The compound growth rate of demand deposits is 36.24 per cent over the study period.
2. The growth rates of Time deposit have varied between 16.29 per cent and 20.37 per cent. The compound growth of Time deposits of RRBs in India is 5.40 per cent in during the study period.

XII. SUGGESSSIONS

a. To increase the deposits, the bank should organize "Deposits Week" and take steps to mobilize deposits.
b. As regards deposits, the current deposits carry zero rate of interest. Therefore the banks have to concentrate on mobilizing current deposits.
c. To maintain a steady growth rate of deposits, it is recommended that the banks should come forward to offer

some subsidiary services like marketing assistance, technological assistance, and insurance facilities, export facilities and so on, to the customers.

d. The share capital of the banks must be increased in order to make themselves competitive.

e. There is a need for proper planning with specific objective after considering the potential and peculiar characteristics of people in the area of operation. RRBs should make it a policy to exploit the potential available for deposits.

XIII. CONCLUSION

The performance of deposits of RRBs has showed a decreasing trend. The trend value of total deposit of RRBs for the year 2025 would be Rs. 399775 crores.

Table 1: Classification of Total Deposits of RRBs in India (Rs in crores)

Year	Demand Deposits	Time Deposit	Total Deposit
2000-01	6499	30528	37027
	(17.55)	(82.45)	(100)
2001-02	7716	35504	43220
	(17.85)	(82.15)	(100)
2002-03	8802	39544	48346
	(18.21)	(81.79)	(100)
2003-04	11019	45991	57010
	(19.33)	(80.67)	(100)
2004-05	17330	44813	62143
	(27.89)	(72.11)	(100)
2005-06	42186	29143	71329
	(59.14)	(40.86)	(100)
2006-07	50886	32261	83147
	(61.20)	(38.80)	(100)
2007-08	59059	40036	99095
	(59.50)	(40.40)	(100)
2008-09	73124	44860	117984
	(61.98)	(38.02)	(100)
2009-10	83971	61064	145035
	(57.90)	(42.10)	(100)
2010-11	100326	65906	166232
	(60.35)	(39.65)	(100)
2011-12	108900	77400	186300
	(58.45)	(41.55)	(100)
2012-13	118904	92339	211243
	(56.29)	(43.71)	(100)
2013-14	130040	111751	241791
	(53.78)	(46.22)	(100)

Table 1, Source: *RBI Report on Trend and Progress of banking in India*

Note: The figures in the brackets are per cent to total

Table 2: Growth of Demand Deposits of RRBs in India *(Rs in crores)*

Year	Demand Deposits	Increases/	Growth Rate (%)

		Decrease	
2000-01	6499	-	-
2001-02	7716	1217	18.73
2002-03	8802	1086	14.07
2003-04	11019	2217	25.19
2004-05	17330	6311	57.27
2005-06	42186	24856	143.42
2006-07	50886	8700	20.62
2007-08	59059	8173	16.06
2008-09	73124	14065	23.81
2009-10	83971	10847	14.83
2010-11	100326	16355	19.48
2011-12	108900	8574	8.55
2012-13	118904	10004	9.19
2013-14	130040	11136	9.36
Compound Growth Rate=36.24 %			

Source: RBI Report on Trend and Progress of banking in India

Table 3: Growth of Time Deposits of RRBs in India (Rs. in crores)

Year	Time Deposits	Increases/ Decrease	Growth Rate (%)
2000-01	30528	-	-
2001-02	35504	4976	16.29
2002-03	39544	4040	11.38
2003-04	45991	6447	16.30
2004-05	44813	1178	-2.56
2005-06	29143	-15670	-34.97
2006-07	32261	3118	10.69
2007-08	40036	7775	24.10
2008-09	44860	4824	12.05
2009-10	61064	16204	36.12
2010-11	65906	4841	7.93
2011-12	77400	11494	17.44
2012-13	92339	14939	19.30
2013-14	111751	18812	20.37
Compound Growth Rate =5.40%			

Source: *RBI Report on Trend and Progress of banking in India*

Table 4: Growth of Total Deposits of RRBs in India (Rs in crores)

Year	Total Deposits	Increases/ Decrease	Growth Rate (%)
2000-01	37027	-	-
2001-02	43220	6193	16.73
2002-03	48346	5126	11.86
2003-04	57010	8664	17.92
2004-05	62143	5133	9.00
2005-06	71329	9186	14.78
2006-07	83147	11818	16.57
2007-08	99095	15948	19.18
2008-09	117984	18889	19.06
2009-10	145035	27051	22.93
2010-11	166232	21197	14.62
2011-12	1,86300	20068	12.07
2012-13	211243	24943	13.38
2013-14	241791	30548	14.46
Compound Growth Rate = 16.10%			

Source: *RBI Report on Trend and Progress of banking in India*

Table 5: **COMPUTATION OF STRAIGHT LINE TREND OF TOTAL DEPOSIT OF RRBS IN INDIA** (Rs. in Crores)

Year	Total Deposit	X	X^2	XY
2001-2002	43220	-6	36	-259320
2002-2003	48346	-5	25	-241730
2003-2004	57010	-4	16	-228040
2004-2005	62143	-3	9	-186429
2005-2006	71329	-2	4	-142658
2006-2007	83147	-1	1	-83147
2007-2008	99095	0	0	0
2008-2009	117984	1	1	117984
2009-2010	145035	2	4	290070
2010-2011	166232	3	9	498696
2011-12	1,86300	4	16	745200
2012-13	211243	**5**	**25**	**1056215**
2013-14	241791	**6**	**36**	**1450746**
Total	**1532893**	**0.00**	$\sum x^2$= **182.00**	$\sum xy$ = **3017587**

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Network Security Issues with ECC and El-Gamal based Threshold Cryptography

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ABSTRACT: ***Network security issues with EL-Gamal and ECC based Threshold Cryptography is a comparative analysis of the various cryptographic algorithms that provide efficient security to a network and guarantees delivery of data with reinforced encrypted security. A comprehensive study of these algorithms provides us with the selective information regarding their characteristics and appropriate applications. In this paper we have collaborated the encryption decryption and key generation techniques required for the operation of aforementioned cryptographic algorithms. In this paper we study diverse security issues to cloud and variety of cryptographic asymmetric key encryption algorithms adoptable to better security for the cloud & a detailed study of these encryption techniques over each other***

Keywords: ECC: Elliptic Curve Cryptography, TC: Threshold Cryptography, GMP: GNU Multiple Precision. Cloud Computing Technology (CCT)

I. INTRODUCTION

Issues in relation of network security have largely been addressed as the topmost priority whenever the installation of any network is completed. The optimal functional capabilities of network are enhanced by the employment of a security system which includes cryptographic characteristics. Elliptic Curve Cryptography (ECC) and El-Gamal cryptosystem are the most primer algorithms that can be incorporated in any network system. Further for meliorating the security of these algorithms, their integration with threshold cryptography schemes is essential. With the advent of threshold cryptography as an integral part of these algorithms the difficulty of these algorithms has increased substantially. Further this integration leads to the development of assorted algorithms such as RSA, Elliptic Curve Cryptography and El-Gamal based on Threshold Cryptography algorithms consisting of significant and critical properties which can cater extensive number of applications.

In the field of applied cryptography, Asymmetric key cryptography is most preferred because of its distinctive approach towards provision of hard to break security to various platform independent softwares. To secure the data the cryptographic algorithms are developed under the various standards which are previously set by researchers of elite internationally famed and recognized organizations and institutions.

Thus, development and application of any cryptographic algorithm is done taking the regard of these standards or the algorithms are taken as flawed and breakable. Since there has been a large number of algorithms developed by a numerous esteemed researchers with proper testing and reverse engineering, the formulation of any new algorithm to be accepted by the International standards is bound to be made keeping in mind the rules and regulations which are mandated by them. Failing to abide by the standards will not lead to the acceptance of the algorithm as it will be reverse engineered or broken

efficiently. A correct and approved algorithm only provides a system or data with the required security to protect it. [1]

II. CRYPTOGRAPHY IN NETWORK SECURITY

Network security issues are making a tremendous increase in the various dynamic, static or ad-hoc networks. These issues can be very well contained and handled by employing many cryptographic based algorithms schemes into the key generation, encryption and decryption of various sensitive data that need to be provided with efficient security. Broadly these cryptographic algorithms are classified into three sub-groups namely RSA, ECC and Threshold. The diverse domain of the network security issues pave way for the application of these algorithms with respect to the degree of security required. The comprehensive analysis and comparison of these cryptographic algorithms are essential for the determination of specific applicable algorithm to be employed to the respective network issues faced by the network.

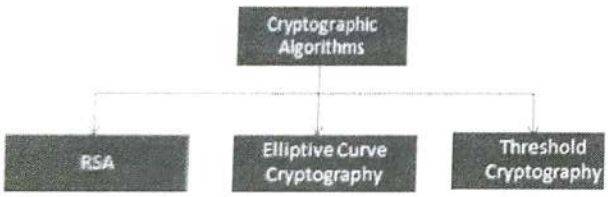

Fig 1: Classification of Cryptographic algorithms

A. Distributed Cryptography and Threshold Cryptosystems

Threshold cryptosystems are based on the alteration of the information. These alterations in the information to be transmitted are done such that it is fragmented into a number of information and distributed among bunch of collaborating computers.

The formulation of threshold cryptographic systems is such that the generation, computation and the distribution of the secret key required for the encryption and the decryption process is to be done in such a fashion that only certain number of trusted parties among all the parties is required to perform the same. This marks as a necessity for the generation of appropriate secret keys which are intended for the purpose of distribution. Advantage of such a cryptographic scheme allows the greater reliability towards the security of the data and protection from malicious party whose intent is to disrupt a significant data transaction. [2]

In order to share and distribute a secret among a category of trusted parties, there are regulations which are to be abided; the secret is carefully distributed to t+1 parties and only the honest t parties can formulate the secret. The condition is met such that no group of dishonest parties can deduce the secret even if provided with credible information about the secret itself. Here the generation of the secret can be interchanged with the generation of a message or a digital signature of the system.[3][4]

B. El-Gamal Encryption

Taher's El-Gamal proposed a cryptosystem based upon Deffie-Hellman key exchange. It incorporates an encryption scheme described over a cyclic group 'G' whose difficulty is in direct correlation with a certain problem in 'G'. In order to have a plaintext encrypted with two prime numbers say a and b which satisfies the condition a=2b+1. The cyclic group 'G' mentioned above is taken as a subgroup of $Z^*_a = \{ 1 \leq i \leq a-1 \}$. Adding to this, g will be the generator of the group. This generator g provides for the development of the public key K. Here K = (a,b,g,c) where $c = g^k \bmod a$.

The plaintext m is converted to the El-Gamal cyphertext E(m) using the combination of the public and the private key. E(m) is often represented as a pair of (g^x , mc^x) . Here the x is chosen randomly from Z^*_a. The decryption of the cyphertext E(m) is done by the computation of (mc^x / g^x). [5]

III. CLOUD COMPUTING

Cloud computing technology (CCT) is the next stage in progression of the Internet. It's a web-based computing in which huge gatherings of remote servers are organized to permit the centralized information storage, and online access to computer services or resources [6].CC is an innovation in which we can use the IT related capacity (servers, system, resources, database servers etc) on interest

basis, and pay for just utilized services not for all as we do in paying any bill according to the utilization.

The fundamental objective of CCT is to offer financially savvy, high effectiveness, dependability, adaptability, accessibility of assets, on demand access, utilization of resources over web, their online control & setup. It doesn't oblige introducing a particular bit of programming to get to or controlling cloud application. Cloud assets are accessible over the system in a way that gives autonomous access to any kind of client.[7]

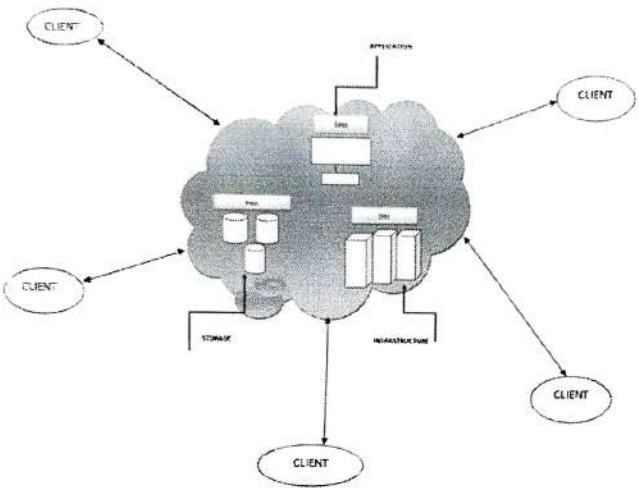

Fig.2 Basic architecture of Cloud Computing Technology

Guaranteeing the security of stored information is the most difficult issue in the cloud environment. This security has been separated to a few parts and a standout amongst the most essential parts is keeping up security in the servers of cloud computing suppliers. Hence, applying a cryptographic system for authorized client is the most famous existing answers for understanding security issues and expanding the reliability of the cloud environment.[8]

As indicated by essentialness of imparting ideas in cloud computing, Symmetric-key encryption calculations may not be suitable in these situations because of the private key offering in communication between clients. As indicated by this, Asymmetric-key (open key) cryptography calculations have been recommended by a few scientists for encoding information in cloud servers and Threshold cryptography is the most viable and prominent Asymmetric-key encryption system, when compared with others schemes that can be used for both encryption and digital signature schemes [9].

IV. GMP SOFTWARE FOR ENCRYPTION AND DECRYPTION

GNU is a free arbitrary precision arithmetic Library. It operates on signed integers, rational numbers and floating point numbers. As such, there is no particular limit to the precision except some which are imposed by the available memory we are working on. The main target applications of GMP are cryptography applications and research, Internet Security, etc.GMP uses highly optimized algorithms which results in very high speed of execution. It is designed to be as fast as possible for both small and huge operands. The speed is achieved by using full words as basic arithmetic type, also using highly optimized assembly code for the most common inner loops for a lot of CPUs.

GMP's main target platforms are Unix-type systems, such as GNU/Linux, Solaris, HP-UX, Mac OS X/Darwin, BSD, AIX, etc. It also is known to work on Windows in both 32-bit and 64-bit mode. GMP has a great set of functions which have a regular interface. The basic interface is for C but wrappers exist for other languages including Ada, C++, C#, OCaml, Perl, PHP, and Python. GMP is part of the GNU project (although its website being off gnu.org may cause confusion), and is distributed under the GNU Lesser General Public License (LGPL). GMP is used for integer arithmetic in many computer algebra systems such as Mathematics and Maple.

It is also used in the Computational Geometry Algorithms Library (CGAL) because geometry algorithms tend to 'explode' when using ordinary floating point CPU math.[10]

```
#include <stdio.h>
#include <stdlib.h>
#include <gmp.h>

int main(void)
{
 mpz_t x;
 mpz_t y;
 mpz_t result;

 mpz_init(x);
 mpz_init(y);
 mpz_init(result);

 mpz_set_str(x, "7612058254738945", 10);
 mpz_set_str(y, "9263591128439081", 10);

 mpz_mul(result, x, y);
 gmp_printf("\n"
            "     %Zd\n"
            "*\n"
            "     %Zd\n"
            "-----------------------\n"
            "%Zd\n"
            "\n", x, y, result);

 /* free used memory */
 mpz_clear(x);
 mpz_clear(y);
 mpz_clear(result);

 return EXIT_SUCCESS;
}
```

Fig 3. A program below computes the value of 7612058254738945 × 9263591128439081.

IV. CLOUD COMPUTING ISSUES IN NETWORK SECURITY

Cloud computing permits clients to accomplish the computing power not limited to their own particular physical space. Cloud computing faces generally as much security dangers that are presently found in the current stages of internet. These vulnerabilities come in different structures [11]:

Failure in cloud service provider Security: A Cloud is great when there is a decent security gave by the merchant to the clients. Supplier ought to make a decent security layer for the client and client and ought to verify that the server is generally secured from all the outer dangers it may run over.

A. Data Security Issues

Integrity: It embodies the accompanying cases, when some human blunders happen when information is entered, Lapses may happen when information is transmitted from one machine then onto another, Programming bugs or infections can likewise make infections. In this manner there is a need of some information respectability strategy in distributed computing.

- Confidentiality (Data Access Control): Some of the time private information can be illicitly accessed because of absence of secured information access control. Delicate information in a distributed computing environment develops as significant issues concerning security in a cloud based framework. Information exists for quite a while in a cloud, the higher the danger of unapproved access.
- Trust (Data theft): Distributed computing uses outer information server for cost effective and adaptable for operation. So there is a Chance of information can be stolen from the outside server.
- Availability (Data Loss/Leakage): Information misfortune loss is an intense issue in Cloud environment. Regardless of the possibility that everything is secure, imagines a scenario where a server goes down or crashes or assaulted by an infection, the entire framework would go down and conceivable information misfortune may happen. The clients won't have the capacity to get to those information's on the grounds that information is no more accessible for the client as the seller close down.

B. Hardware Related security issues:

- Hardware interruption: either as a consequence of wear-and-tear, maturity or unplanned harm.
- Hardware theft: Theft of hardware and/or information or its media
- Hardware modification: Many intruders cause change in the hardware configuration which resist the hardware to work normally [12].

C. Software related security issues:

- Insecure Application Programming Interfaces: Cloud services permit third party access by uncovering application programming interfaces; however numerous engineers and clients don't effectively secure the keys to the cloud and their data [13].
- Programming interface keys are utilized by cloud services to recognize third party applications utilizing the services. If suppliers are not watchful, an assailant with

access to the key can result in a denial of service

- Defacement: Defacement is a form of vandalism in which a website is stamped by hackers who are attempting to make their imprint.

VI. CONCLUSION AND FUTURE AREAS OF WORK

In conclusion, we address the benefits of employing an El-Gamal based Threshold Cryptographic (EG-TC) algorithm by carefully providing the implementation of the algorithm through the GMP to In order to achieve a network model which has sophisticated network security characteristics, it is important to have a structured cryptography based security protocol which lays emphasis on employment of impregnable and dynamic algorithms to counter attacks and preserve valuable data from being compromised.

A. Cryptographic Separation of Information:

All the threats have high effect on the security component of cloud computing. Here we just manage subtle element examination of data security issues of cloud computing which is Confidentiality of information for the cloud environment. The assurance of individual data or/and sensitive information, inside within cloud environment framework, constitutes a significant component for the fruitful deployment of Saas (Software as an administration) and Aaas (Application as an administration) models.

Cryptographic Separation, in which processes computations and data are concealed in such a way that they appear intangible to outsiders [14]. Confidentiality and integrity, privacy of data can be secured through encryption. Here our focus is to derive solution of cloud computing security issues "confidentiality", from asymmetric cryptography.

B. Asymmetric Cryptography for networks cloud computing provide following features:

- Authentication: The control of authenticity, identification process & exchange of information with electronic means.
- Authorization: The verified access to assets, database and informational frameworks, as per the client's consent rights and the roles.
- Confidentiality: The assurance of data either locally stored or during its transmission, from unauthorized access/users.
- Integrity: The assurance of data either locally stored or during transmission from unauthorized modification. [15]

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