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## **MESSAGE FROM EDITORS' DESK**

It gives us an immense pleasure in bringing out the third volume of International Journal of Science and Humanities with your incessant support. International Journal of Science and Humanities being published by Islamiah College has been successfully marching towards its third year by providing a platform for authors in exhibiting their talents in the form of their research articles on various disciplines such as English, Chemistry, Bio-Chemistry, Commerce, Management, History, Sociology, Public Administration, Political Science, Physics, Economics and Mathematics.

Since it is the International Journal, we are invariably committed to do our best by ensuring that the articles published by the authors of various disciplines are free from error, plagiarism and biased. However, we will never compromise on the quality of journal as our journal is subjected to peer review. All the papers of different disciplines are thoroughly scrutinised by our peer review members who are employed in various reputed institutions all over the world.

Therefore, we humbly request you to provide your valuable suggestions in further strengthening this Journal and always extend your support by publishing your quality articles in our reputed International Journal of Science and Humanities.

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## **APPEAL**

I am delighted to introduce this issue of International Journal of Science and Humanities (IJSH) to the students and research community on behalf of Islamiah College (Autonomous), Vaniyambadi, a century old institution serving for the cause of education to socially, economically and educationally weaker sections of the society. The IJSH, is a peer reviewed research journal of interdisciplinary nature that cater the needs of the teaching and research society. The aim of the journal is not only to provide a space for leading research work but also provide a platform for the budding researchers to publish their maiden attempt in the field of science and humanities. The objective of IJSH is to publish up-to-date, high-quality and original research papers alongside relevant and insightful reviews.

The initiative to start this journal was taken by Janab L.M Muneer Ahmed, the Former Secretary & Correspondent of this College with an aspiration to keep the research vibrant in this campus. Now, the torch is handed over to me from June 2016 onwards to run this journal on non-profitable basis without compromising its aims and objectives. At this juncture, I appeal to all teaching and research communities to concentrate on both teaching and research relevant to society, which are symbolically related as the two faces of the same coin. I also appeal to all reviewers and editors not to compromise with the quality of the input and promote this journal to the next level with excellent output. Finally, I pray Almighty to provide guidance for development and success of this journal. Best wishes and thanks for your contribution to the IJSH.

**Dr. ANWARULLAH HAJEE**  
Secretary & Correspondent  
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# **Part A:**

# **Science**

**Information and Communication Technology and Human Resource  
Development in Academic Library and Information Centers in Chennai:  
A Study**

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**Abstract**

*The aim of this study is to investigate the information and communication technology and human resource development among academic Libraries and Information Centers in Chennai. Population studied in this research includes academic college Librarians and Knowledge Officers; sample size of the questionnaire was administered to 140, out of which 110 academic libraries and information centers. The response has been received from 110 libraries and information centers. Data collection tool was researcher made questionnaire of information communication technology and standard questionnaire of human resource development that their validity was confirmed. The data collected were analyzed using statistical methods. The results recommended an information communication technology and its impact on human resource development components professional skills, with the human resources development and Library users view and Suggestions. In view of this, this paper presents one such study which has been carried out by studying the application of ICT and HRD among academic Library and Information Centers (LICs) in and around Chennai. There are nearly 300 Academic institutions at graduate, post graduate (PG) and research levels in various disciplines. It also studies the areas of ICT application, Collection Development Policy (CDP), manpower development and attitudes of staff towards ICT application. Finally, concludes objectively that the application ICT in Academic library and information centers would certainly put an order and bring out a sequence of operations in view of knowledge discovery services in Library Information and Documentation Management Environment (LIME) without much of human intervention.*

**Keywords:** Information communication technology; human resource development; academic libraries & information centers; Chennai.

## **1. Introduction**

The recent advancements in ICT have changed the world scenario. This ICT now has affected each and every aspect of human society and has opened new opportunities and challenges for all. The developments have also imposed certain responsibilities and challenges on library and information management professionals to develop the need based skills and knowledge expertise in the ICT environment.

The application of Information Communication Technology (ICT) in different types of libraries in India has gained sufficient momentum and it is of continuing interest to the information knowledge managers in order to provide ICT based information knowledge management services and human resource development.

## **2. Definitions**

Information Technology can be defined as a collection of computer hardware, software, databases, networking and telecommunication devices that helps the organization to manage the information marketing related services more effectively and efficiently.

Human Resource Development is a holistic concept, incorporating intrinsically social, cultural and spiritual dimensions to build capacity and empower people.

## **3. Literature Review**

Chinwe Veronica Anuobi and Majesty Ignatius Ezeani (2011) have presented one of the ways of using the digital library technology for providing twenty-first century information services to an academic community in a developing country together with the challenges and prospects of such an application. Indicates that librarians with an insight into other developing countries understand apply digital technology to library operations and services. Provide other libraries and related institutions with an opportunity to learn from a concrete experience. Theresa Jefferson (2006) seeks to discuss the recommendations for handling future extreme events based on the response and mitigation effort. Discusses how information technology (IT) relates to these recommendations. Reviews recent recommendations for handling future extreme events and pinpoints the role of information system in supporting these recommendations. Provide use of IT for researchers and practitioners to focus on to support the Crisis and Emergency Management Community.

MatselisoMoshoeshoeChadzingwa (2010)<sup>15</sup> clear that Human Resource Management (HRM) in the selected, mainly academic libraries of Southern Africa. Seek to discuss the transition from the traditional personal administration to an HRM approach of focusing on humans as a valuable resource at workplace and the implications. VesnaZupan (2012)<sup>16</sup> aims to study for overcoming the attitude that information is most important for social development and to stress the ways to human resource development in the academic librarianship of Serbia. Attempt to provide for the librarians with an alternative method to achieving stronger professional skills from information literacy tutorials and to produce reporting without the need for conventional Learning Management System (LMS).

Stuart Maguire and Tom Redman (2006)<sup>17</sup> have examined the inherent weakness in the approaches that most organizations use to develop and implement information systems and the role of human resource management practices in information system development. Report a case of Information System (IS) implementation in a major public sector organization. Draw a data from multiple sources. Find a research gap in the literature role of Human Resource (HR) in information system management.

#### **4. Objectives of the Study**

The study has been conducted with the following objectives:

- i. To survey the library and information centers having Information Communication Technology and Human Resource Development activities in and around Chennai (Madras)
- ii. To study the nature of ICT applications in libraries under survey.

The study is significant in the following respects:

#### **5. Significance**

- i. The study of this nature brings the Stat-of-the-Art of the library and Information Centers in Chennai, projecting the application of ICT and HRD.
- ii. It also examines a comparison of ICT application sources in University and College libraries.

## 6. Sample Size

Although 300 academic library and information centers exist in Chennai, about 140 library and information centers has seen the application of ICT. Therefore, the questionnaire was administered to 140, out of which 110 academic libraries and information centers. The response has been received from 110 libraries and information centers. The response rate is 78.5%. Table 1 presents the data pertaining to the distribution of questionnaires and responses received from the sample.

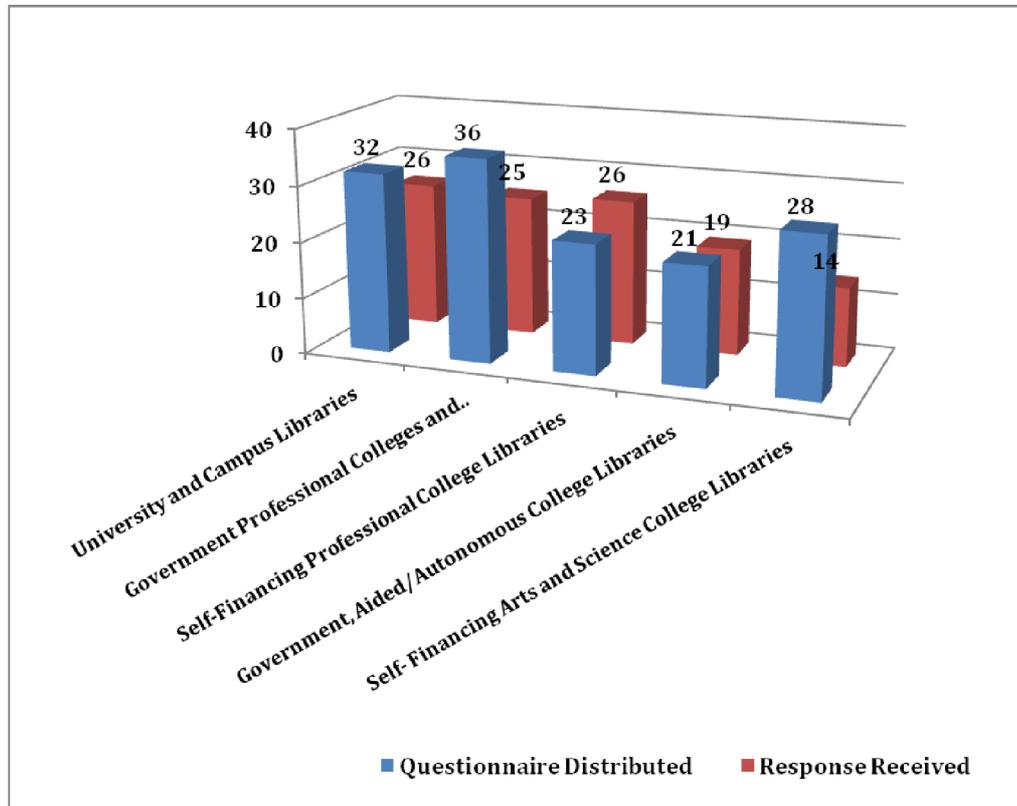
Table 1 - Total Number of Questionnaires Distributed and Responses Received

S. No.	Types of Libraries	Questionnaire Distributed	Response Received
1	University and Campus Libraries	32	26
2	Government Professional Colleges and Polytechnics Libraries	36	25
3	Self-Financing Professional College Libraries	23	26
4	Government, Aided/Autonomous College Libraries	21	19
5	Self- Financing Arts and Science College Libraries	28	14
	<b>Total</b>	<b>140</b>	<b>110</b>

Response rate is = 78.5%

It is seen from Table 1, that the sample of academic library and information centers are broadly classified into 5 groups. The sample of library and information centers are broadly classified into academic libraries and information centers. Under each category a further division of libraries has been made so as to form 5 groups of academic libraries and information centers category. However, at many points, the analysis has been focused academic libraries and information centers.

Figure1 - Total No. of Questionnaires Distributed and Responses Received



### 7. Use of Software Packages

Library and Information Centers used for housekeeping operations, in one of the following methods:

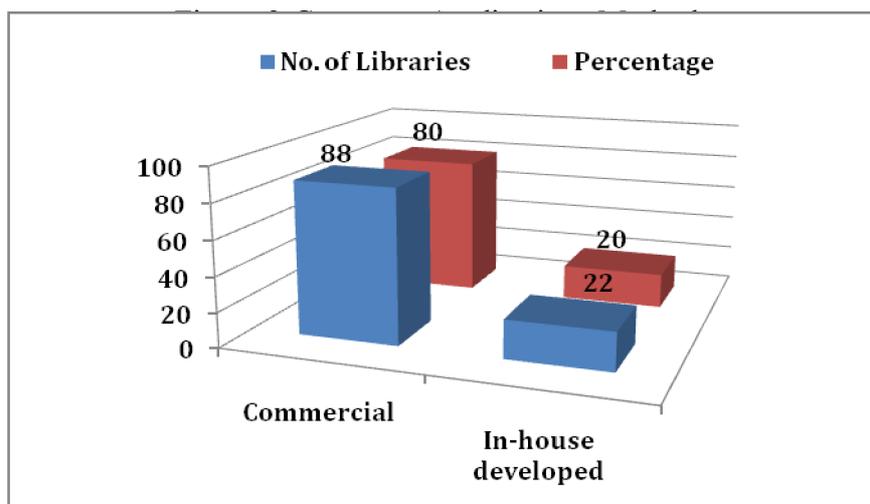
- i. In-house developed software
- ii. Commercial software

In this study, an attempt has been made to find out whether the libraries, under survey, are using In-house developed software or commercial software Table 2 provides details about the computer application methods used by academic library and information centers. The Table 2 deals with computer application methods.

**Table 2 –Computer Application Methods**

S. No	Name of the Software	No of Libraries	Percentage
1	Commercial	88	80%
2	In-house developed	22	20%
<b>Total</b>		<b>110</b>	<b>100.00%</b>

From the Table 2 it is clear that the academic libraries and information centers are interested in commercial software packages instead of acquiring developing In-house software. On the whole nearly 80 percent of the libraries are interested in using commercial software.

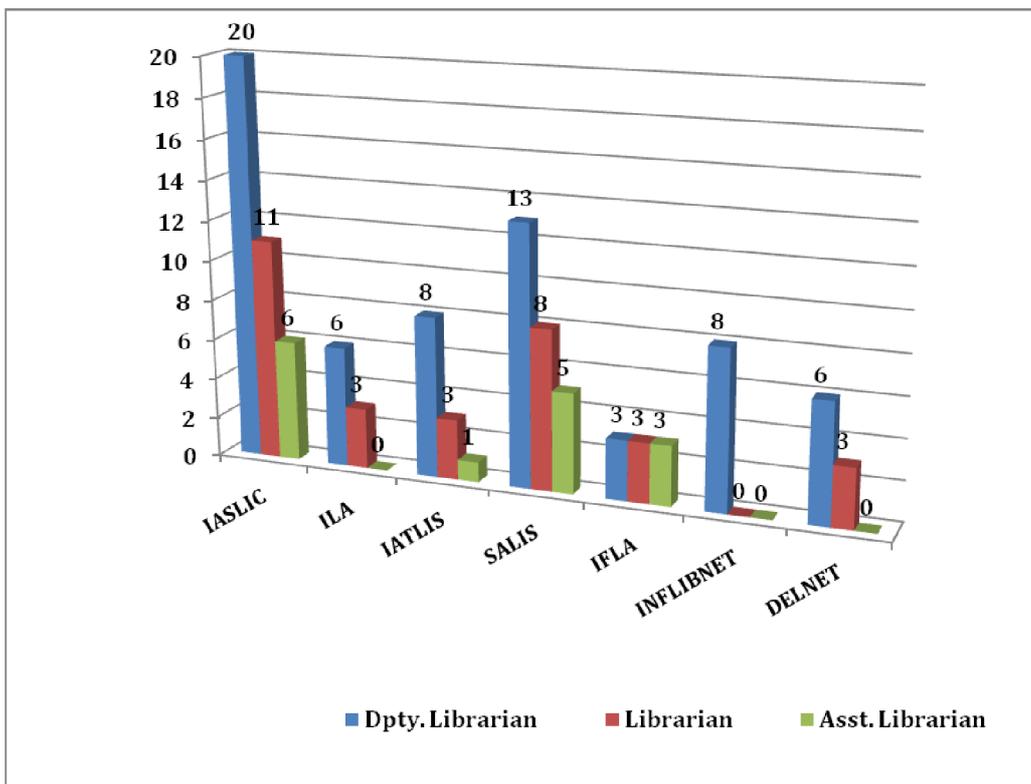


**8. Professional Associations Membership****Table 3–Professional associations Membership and Designation**

Types of Association Names	Designation			Total
	Deputy Librarian	Librarian	Assistant Librarian	
IASLIC	20	11	6	37
	31.3%	35.5%	40.0%	33.6%
ILA	6	3	0	9
	9.4%	9.7%	0.0%	8.2%
IATLIS	8	3	1	12
	12.5%	9.7%	6.7%	10.9%
SALIS	13	8	5	26
	20.3%	25.8%	33.3%	23.6%
IFLA	3	3	3	9
	4.7%	9.7%	20.0%	8.2%
INFLIBNET	8	0	0	8
	12.5%	0.0%	0.0%	7.3%
DELNET	6	3	0	9
	9.4%	9.7%	0.0%	8.2%
<b>Total</b>	64	31	15	110
	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Table 3 described that professional association membership and designation, the majority of respondents are from IASLIC 37 (33.6%) and followed by SALIS 26 (23.6%), IATLIS 12 (10.9%) and the same level of ILA, IFLA and DELNET 9(8.2%) and INFLIBNET 8(7.3%) respectively.

**Figure 3 -Professional Associations Membership and Designation**



## 9. Major Findings

Based on the analysis, discussion and interpretation of the data collected from the sample of the library and information centers the major findings observations are highlighted in this study.

- i. It is noted that 7 types of hardware sources are used in library and information centers.
- ii. On the whole nearly 88 (80%) of the libraries are interested in using commercial

software.

- iii. Commercial software dominates in the libraries, accordingly the data has been presented.
- iv. 22 Libraries (20%) are using that in house developed software.
- v. The personnel management attitude details are presented indicates that the authority wants to appoint a Computer Personnel for the operations of IT Products 104(Yes) and No (6) and followed by other statements respectively.
- vi. The professional association membership and designation, the majority of respondents are from IASLIC 37 (33.6%) and followed by SALIS 26 (23.6%), IATLIS 12 (10.9%) and the same level of ILA, IFLA and DELNET 9(8.2%) and INFLIBNET 8(7.3%) respectively.

## **10. Suggestions**

- vii. In modern view of the increased pressure on the knowledge and information centers for the provision of several of knowledge services, there are forced to depend on other library resources.
- viii. Realising the importance of man power in the process of information storage, retrieval and dissemination, it is recommended for launching of the programmes such as recruitment of experts in communication and information technology, Provision of online facilities, Use of the audio- visual and other modern aids in teaching, Exposure to information communication technology oriented library and information centers, Increasing of multi-disciplinary faculty, Increasing of an R & D training programmes in LIS, in the ICT era. Introduction to new technology and its used for serving maximum library services importance the staff in learning new skills through in- on the job and off the job training.

## **11. Conclusion**

The survey has achieved its aims, in that it has provided the summary of the ICT impact towards the Human Resource Development in academic library and information Centers in Chennai in LIS professionals. The awareness of IC T and level of IT/ICT processes were started in the year between 1980-1985.

None of these were possessed the ICT application based information handling services before 1980 and followed traditional approach to Information

Management(IM). It is only after 1995, 90% of these libraries and information centers are possessing ICT application based information handling services and 20% of these libraries and information centers are lacking.

This study has further witnessed that there is no alternative way except the ICT application based information handling services in libraries and information centers in near future in and around Chennai.

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## **Fingerprint Scanner System Using Support Vector Machine**

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### **ABSTRACT**

*Efficient fingerprint verification system is needed in many places for personal identification to access physical facilities, information etc. This paper proposes robust verification system based on features extracted from human fingerprints and a pattern classifier called Support Vector Machine (SVM). Three set of features are fused together and passed to the classifier. The fused feature is used to train the system for effective verification of users fingerprint images. The result obtained after testing 100 fingerprints is very encouraging.*

Keywords-fingerprint, fused feature, Support Vector Machine and verification

### **INTRODUCTION**

Personal identification based on fingerprint image is one of the most important research areas in the field of pattern recognition. Fingerprint image is a viable biometric physiological feature and it had been used by many researchers to develop recognition systems. Each person has unique fingerprint pattern. Fingerprint images can be obtained using ink impression on substances or through scanning using biometric sensor connected to a computer.

A fingerprint image can be described as pattern of interleaved ridges and valleys lines. In grayscale fingerprint image the valleys are shown as white lines while the ridges are the black lines. These lines form various types of pattern. The pattern can be classified as left loop, right loop, arch, whorl and tented arch. The ridges are characterized by unique feature called minutia. Minutia points occur at ridges ending or bifurcation. Bifurcations are points at which a ridge split into two lines.

Fingerprint recognition systems had been developed by many researchers using combination of different feature extraction methods and pattern classifiers. In some cases features are extracted from the whole fingerprint image [1][2][3][4][5]. On other hand it involves extraction of minutia points from ridges. Matching of test

features with user template is achieved using prominent classifiers like Support Vector Machine (SVM), Artificial Neural Network (ANN), Hidden Markov Model (HMM) and Euclidean distance[2][3][4].

In [2] fingerprint recognition system based on embedded Hidden Markov Model is proposed. Feature in form of orientation angle is extracted from image block matrix by scanning with sampling window from left to right and top to bottom of the whole image. Whereas in [5] fingerprint recognition system using combination of feature extracted from sectorized cepstrum fingerprint image and Euclidean distance is presented. In many cases features are extracted from fingerprint minutia points and thereafter used as input to template matching algorithm [6][7][8][9][10][11][12].

The feature extraction method proposes in this paper is different from the one that had been done before. In many existing systems false minutiae are wrongly treated as true minutiae. In this paper the whole pattern points are used to obtain the features. Three features are extracted from fingerprint block images. These features capture the trait of human fingerprint at local and global level.

The rest of the paper is organized as follows: section 2 provides detail information on the proposed system which includes image preprocessing, feature extraction method, training and classification algorithm based on Support Vector Machine. Section 3 shows the experimental results and finally conclusion is presented in section 4.

## **PROPOSED FINGERPRINT VERIFICATION SYSTEM**

### **A. Description of Proposed System**

The proposed fingerprint verification algorithm flow chart is as shown in Fig.1. The first component of the system is the biometric input sensor. It is used to acquire digital image from human fingerprint. The acquired grayscale fingerprint image is sent to preprocessing stage. The third stage is the feature extraction algorithm where robust features are extracted from the preprocessed image. The next stage is the training process, where

model is generated for each of the users. The last component is the verification algorithm based on Support Vector Machine.

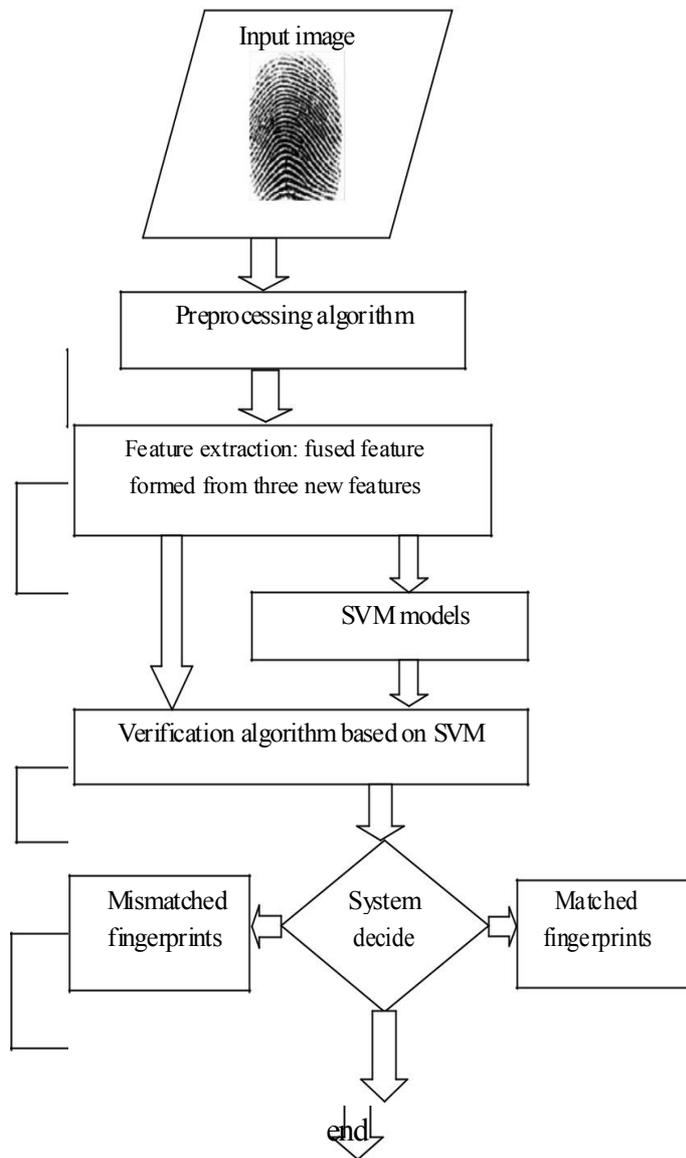


Figure 1. Proposed fingerprint verification system flow chart

## B. Fingerprint Image Acquisition Device

The fingerprint capture device used in this work is Secugen Hamster Plus Fingerprint Scanner produced by SecuGen Biometric Solutions. The device is as shown in Fig2. It uses an advance technique called Surface Enhanced Irregular Reflection (SEIR) . It produces an 8-bit grayscale image of size 260x300pixels. It has an effective resolution of 500 dpi +0.2%. The Secugen sensor features auto-on and smart capture technology. The auto-on feature automatically switches on the scanner whenever a finger is detected. The smart capture technology improves the quality of the images captured [13]. Samples of fingerprint images captured by the device are as shown in Fig.3.

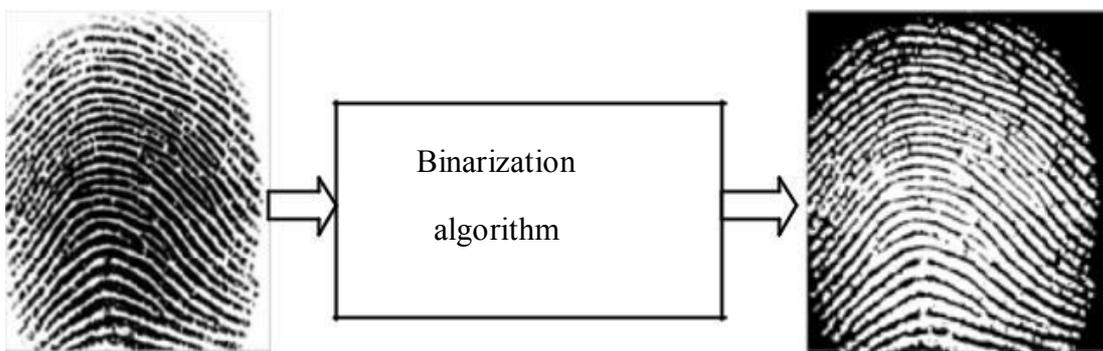
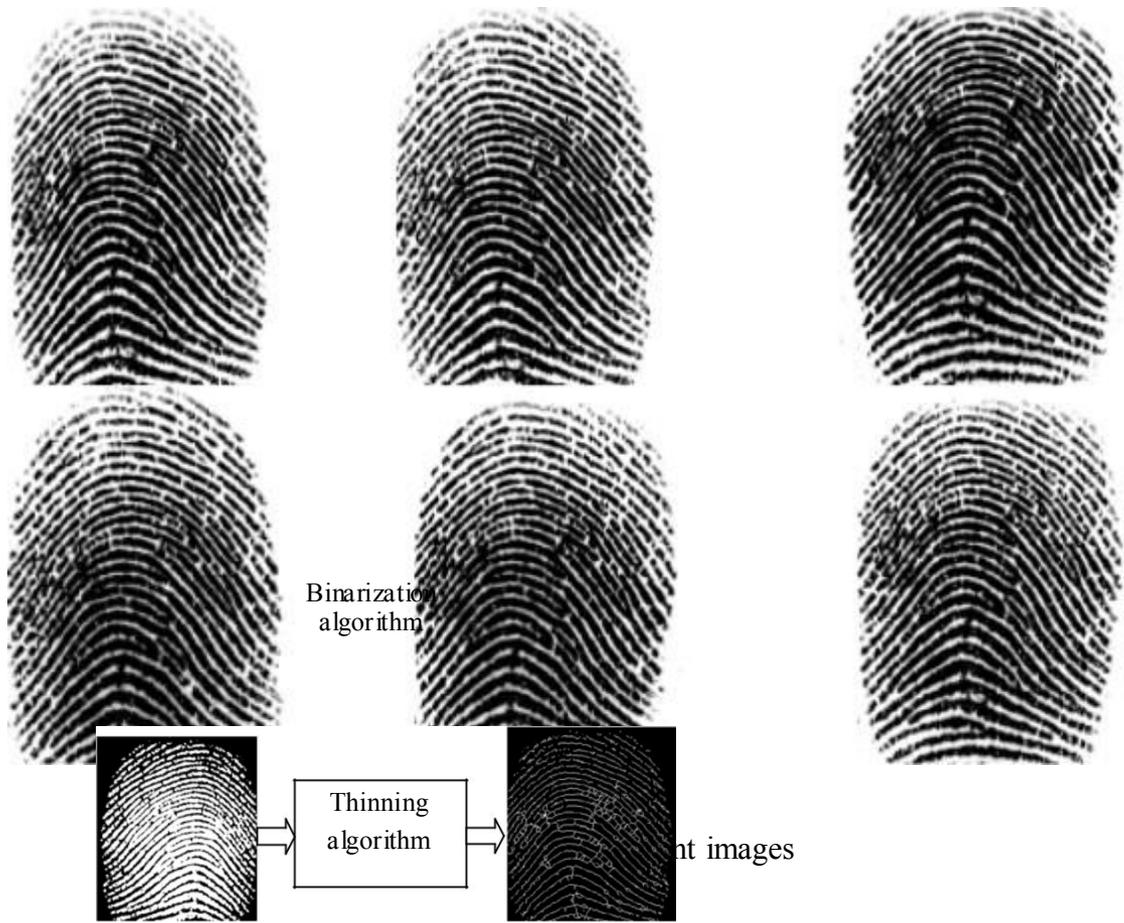
## C. Preprocessing of Fingerprint Image

Two morphological operations are performed on the input grayscale fingerprint image. The first operation is called binarization. Binarization is used to separate the foreground information from the

background. That is it converts the grayscale image to binary image by setting the threshold value so that gray value below the threshold is change to '0' and those value above the threshold is change to '1'. After then the binary fingerprint images are passed to the thinning algorithm. The thinning operation help to rind the foreground pixels from the ridges until each of the ridges is at least one pixel wide. The preprocessing operation is as shown in Fig.4.



Figure 2. Biometric fingerprint senso



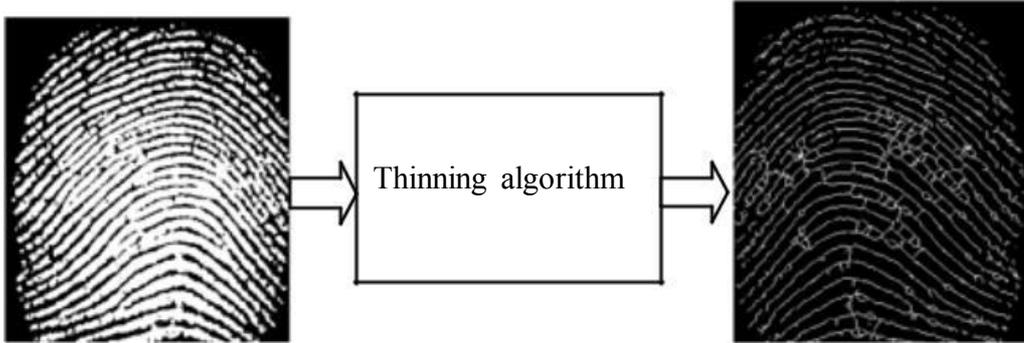


Figure 4. Preprocessing operation.

#### D. Feature Extraction Algorithm

In this paper, three set of new features are extracted from thinned fingerprint image blocks. The whole fingerprint image pattern is partitioned into smaller image blocks. The extracted features are used to capture position and direction of pixels in fingerprint image. The algorithm for the feature extraction is as follows:

- (i) Calculate centre of gravity of the thinned fingerprint image using (1).

$$x = \frac{1}{A} \sum_{i=1}^n \sum_{j=1}^m I(1, i)$$

$$y = \frac{1}{A} \sum_{i=1}^n \sum_{j=1}^m I(1, j)$$

- (ii) Partition the fingerprint image into four smaller image blocks
- (a) Through point x and y make a vertical and horizontal splitting across the image.
- (b) Obtain four block images B1, B2, B3 and B4.
- (iii) Calculate the centre of gravity of block images B1, B2, B3 and B4 using (1).
- (a) Through point x and y make a vertical and horizontal splitting across each of the block images.

(b) Obtain sixteen smaller block images from B1, B2, B3 and B4 as shown in Fig. 5.

(iv) Extract three set of features named:

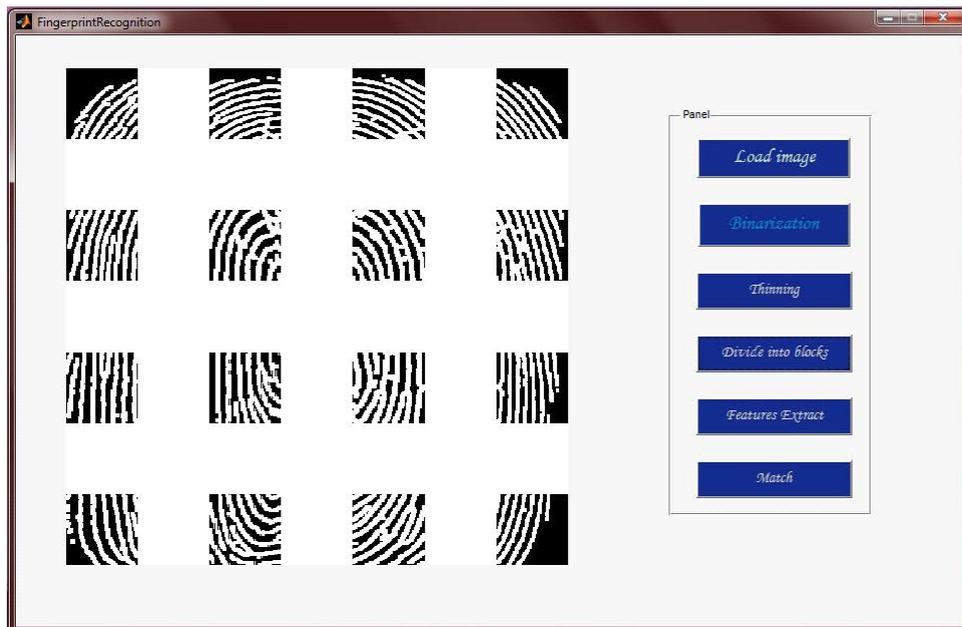
(a) The number of connected pixels (C) in the fingerprint block image.

(b) City-block distance (D) of the pixels in the fingerprint block image. The city block distance between points (x1,y1) and (x2,y2) :

(c) The area (A) of each of the sixteen fingerprint block images :

$$A = \sum_{x=1}^m \sum_{y=1}^n \mathbb{1}(1,1) \quad (3)$$

(v) Fuse the three features (C, D and A) to obtain 48dimensional feature vector (F).



**Figure 5. Graphical User Interface shows sixteen fingerprint image blocks.**

### **E. Support Vector Machine for Verification**

Support Vector Machine (SVM) is a feature classification technique. It has ability to split feature space into two major classes, via optimal hyper plane such that the expected generalization error is minimized. An optimal hyper plane is represented by the largest margin of separation between the two classes. The training feature vectors have to lie outside the margin, a small subset of the feature vectors that lie exactly on the margin are the support vectors. Application of SVM in fingerprint image classification problem consists of two phases: training and testing. During training, the SVM takes as input fingerprint image data that consist of positive and negative samples and the problem of separating a set of training vectors belonging to two separate classes is solved by training algorithm. The algorithm searches for an optimal hyper plane such that the distance to the support vectors is maximized. Verification of query fingerprint image is determined by classify each of user query fingerprint feature as belong to any of the two classes. The decision is based on the distance of the query data from the hyper-plane.

## **EXPERIMENTAL RESULT**

Experiments are performed to determine the effectiveness of the proposed system. Training and testing of the system algorithm are carried out using our database. Six fingerprint images are collected from each of the fifty students of Covenant University Ota, Nigeria. Four fingerprint images are used during training to produce model for each of the users. 100 fingerprint images are tested, 80 fingerprint images are correctly matched while 20 fingerprint images are mismatched. Fig.6 shows the stem plot of test feature of a particular user and corresponding matched user detail. The implementation of the system algorithms is carried out using MATLAB R2012a platform [14].

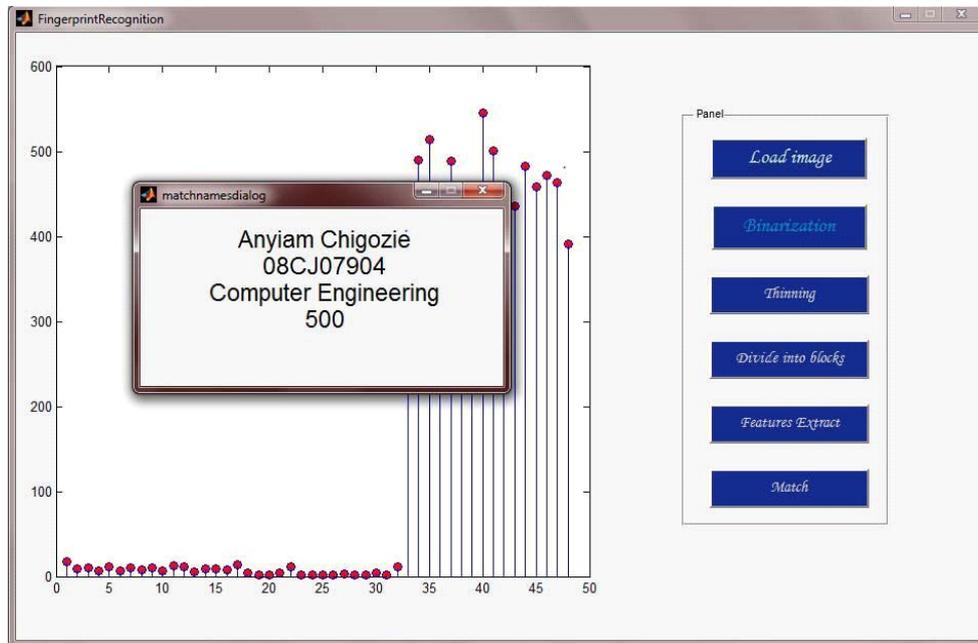


Figure 5. Graphical user interface shows matched result.

## CONCLUSION

Fingerprint verification system based on Support Vector Machine is proposed for effective personal identification. Fingerprint image is partitioned into smaller blocks at moderate resolution in order to capture predominate feature at local and global level. The performance of the proposed system which depends majorly on the robust features extracted from the whole fingerprint pattern is very encouraging.

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## **A Comparative study on Intuitionistic Fuzzy HX Ring and Intuitionistic Anti-Fuzzy HX Ring**

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**Abstract:** *In this paper, the main purpose of this dissertation is to discuss about intuitionistic fuzzy and Anti-Fuzzy HX Rings.*

**Keywords:** Intuitionistic Fuzzy HX Ring, Intuitionistic Anti Fuzzy HX Ring

### **1. Introduction**

In 1965, Zadeh introduced the concept of fuzzy subset  $\mu$  of a set  $X$  as a function from  $X$  into the closed unit interval  $[0,1]$  and studied their properties. Fuzzy set theory is a useful tool to describe situations in which the data or imprecise or vague and it is applied to logic, set theory, group theory, ring theory, real analysis, measure theory, etc. In 1967, Rosenfeld defined the idea of fuzzy subgroups and gave some of its properties. Li Hong Xing introduced the concept of HX group. In 1982 Wang-jin Liu introduced the concept of fuzzy ring and fuzzy ideal. With the successful upgrade of algebraic structure of group many researchers considered the algebraic structure of some other algebraic systems in which ring was considered as first. In 1988, Professor Li Hong Xing proposed the concept of HX ring and derived some of its properties, then Professor Zhong gave the structures of HX ring of a class of ring. R.Muthurajet. al introduced the concept of fuzzy HX ring. In this dissertation we define a new algebraic structure of an intuitionistic fuzzy sub HX ring of a HX ring and investigate some related properties. We define the necessity and possibility operators of an intuitionistic fuzzy subset of an intuitionistic fuzzy HX ring and discuss some of its properties. Also we introduce the image and pre-image of an intuitionistic fuzzy set in an intuitionistic fuzzy HX ring and discuss some of its properties.

### **2. Intuitionistic Fuzzy HX Rings**

In 1965, Zadeh introduced the concept of fuzzy subset  $\mu$  of a set  $X$  as a function from  $X$  into the closed unit interval  $[0,1]$  and studied their properties. Fuzzy

set theory is a useful tool to describe situations in which the data or imprecise or vague and it is applied to logic, set theory, group theory, ring theory, real analysis, measure theory, etc. In 1967, Rosenfeld defined the idea of fuzzy subgroups and gave some of its properties. Li Hong Xing introduced the concept of HX group. In 1982 Wang-jin Liu introduced the concept of fuzzy ring and fuzzy ideal. With the successful upgrade of algebraic structure of group many researchers considered the algebraic structure of some other algebraic systems in which ring was considered as first. In 1988, Professor Li Hong Xing proposed the concept of HX ring and derived some of its properties, then Professor Zhong gave the structures of HX ring of a class of ring. R.Muthurajet. al introduced the concept of fuzzy HX ring. In this dissertation we define a new algebraic structure of an intuitionistic fuzzy sub HX ring of a HX ring and investigate some related properties. We define the necessity and possibility operators of an intuitionistic fuzzy subset of an intuitionistic fuzzy HX ring and discuss some of its properties. Also we introduce the image and pre-image of an intuitionistic fuzzy set in an intuitionistic fuzzy HX ring and discuss some of its properties.

## 2.1 Preliminaries

In this section, we site the fundamental definitions that will be used in the sequel. Throughout this dissertation,  $R = (R, +, \cdot)$  is a Ring,  $e$  is the additive identity element of  $R$  and  $xy$ , we mean  $x, y$ .

**Definition 2.1.** Let  $R$  be a ring. In  $2^R - \{\phi\}$ , a non-empty set  $\vartheta \subset 2^R - \{\phi\}$  with two binary operation '+' and ' $\cdot$ ' is said to be a HX ring on  $R$  if  $\vartheta$  is a ring with respect to the algebraic operation defined by

$$(i). A + B = \{a + b / a \in A \text{ and } b \in B\}, \text{ which its null element is denoted by } Q, \text{ and the negative element of } A \text{ is denoted by } -A.$$

$$(ii). AB = \{ab / a \in A \text{ and } b \in B\}$$

$$(iii). A(B + C) = AB + BC \text{ and } (B + C)A = BA + CA$$

**Definition 2.2.** Let  $R$  be a ring. Let  $\mu$  be a fuzzy ring defined on  $R$ . Let  $\vartheta \subset 2^R - \{\phi\}$  be a HX ring. A fuzzy subset  $\lambda^\mu$  of  $\vartheta$  is called a fuzzy HX ring on  $\vartheta$  or a fuzzy ring induced by  $\mu$  if the following conditions are satisfied. For all  $A, B \in \vartheta$ ,

$$(i). \lambda^\mu(A - B) \geq \min\{\lambda^\mu(A), \lambda^\mu(B)\}, \lambda^\mu(AB) \geq \min\{\lambda^\mu(A), \lambda^\mu(B)\},$$

$$\text{where } \lambda^\mu(A) = \max\{\mu(x) / \text{for all } x \in A \subseteq R\}.$$

## 2.2 Properties of an Intuitionistic Fuzzy HX Subring

**Definition 2.3.** Let  $R$  be a ring. Let  $\mu$  be a fuzzy ring on  $R$  and a nonempty set  $\vartheta \subset 2^R - \{\emptyset\}$  is a HX ring. An intuitionistic fuzzy subset  $\psi = \langle A, \lambda^\mu(A), \lambda^\nu(A) \rangle$  of a HX ring  $\vartheta$  is said to be an intuitionistic fuzzy HX (IFHX) subring of  $\vartheta$  if the following conditions are satisfied. For all  $A, B \in \vartheta$ .

$$(i). \lambda^\mu(A - B) \geq \min\{\lambda^\mu(A), \lambda^\mu(B)\}$$

$$(ii). \lambda^\mu(AB) \geq \min\{\lambda^\mu(A), \lambda^\mu(B)\}$$

$$(iii). \lambda^\nu(A - B) \leq \max\{\lambda^\nu(A), \lambda^\nu(B)\}$$

$$(iv). \lambda^\nu(AB) \leq \max\{\lambda^\nu(A), \lambda^\nu(B)\}$$

$$\text{where } \lambda^\mu(A) = \max\{\mu(x) / x \in A \subseteq R\}, \quad \lambda^\nu(A) = \min\{\nu(x) / x \in A \subseteq R\}$$

**Definition 2.4.** Let  $R$  be a ring. Let  $\mu$  be a fuzzy ring on  $R$  and a nonempty set  $\vartheta \subset 2^R - \{\emptyset\}$  is a HX ring. An intuitionistic fuzzy subset  $\psi = \langle A, \lambda^\mu(A), \lambda^\nu(A) \rangle$  of a HX ring  $\vartheta$  is said to be an intuitionistic anti fuzzy HX (IAFHX) subring of  $\vartheta$  if the following conditions are satisfied. For all  $A, B \in \vartheta$ .

$$(i). \lambda^\mu(A - B) \leq \max\{\lambda^\mu(A), \lambda^\mu(B)\}$$

$$(ii). \lambda^\mu(AB) \leq \max\{\lambda^\mu(A), \lambda^\mu(B)\}$$

$$(iii). \lambda^\nu(A - B) \geq \min\{\lambda^\nu(A), \lambda^\nu(B)\}$$

$$(iv). \lambda^\nu(AB) \geq \min\{\lambda^\nu(A), \lambda^\nu(B)\}$$

$$\text{where } \lambda^\mu(A) = \min\{\mu(x) / x \in A \subseteq R\}, \quad \lambda^\nu(A) = \max\{\nu(x) / x \in A \subseteq R\}$$

**Property 2.1.** If  $\psi_1$  and  $\psi_2$  be two intuitionistic fuzzy HX subrings of a HX ring  $\vartheta$

then  $\psi_1 \cap \psi_2$  is also intuitionistic fuzzy HX subrings of a HX ring  $\vartheta$ .

**Property 2.2.** Let  $\psi$  be an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$  if and only if  $\psi^c$  is an intuitionistic anti fuzzy HX subring of a HX ring  $\vartheta$ .

**Definition 2.5.** Let  $\psi = \{\langle A, \lambda^\mu(A), \lambda^\nu(A) \rangle / \forall A \in \vartheta\}$  be a intuitionistic fuzzy subset of a HX subring of  $\vartheta$ . We define the following ‘‘necessity’’ and ‘‘possibility’’ operations:

$$\Box\psi = \{\langle A, \lambda^\mu(A), 1 - \lambda^\nu(A) \rangle / A \in \vartheta\} \quad \Diamond\psi = \{\langle A, 1 - \lambda^\mu(A), \lambda^\nu(A) \rangle / A \in \vartheta\}$$

**Property 2.3.** If  $\psi$  is an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$  then  $\Box\psi$  is an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$ .

**Property 2.4.** If  $\psi$  is an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$  then  $\Diamond\psi$  is an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$ .

**Property 2.5.** An IFS  $\psi = \{\langle A, \lambda^\mu(A), \lambda^\nu(A) \rangle / A \in \vartheta\}$  is an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$  if and only if the fuzzy subsets  $\lambda^\mu(A), (\lambda^\nu)^c(A)$  are fuzzy HX subring of a HX ring  $\vartheta$ .

**Property 2.6.** An IFS  $\psi = \{\langle A, \lambda^\mu(A), \lambda^\nu(A) \rangle / A \in \vartheta\}$  is an intuitionistic fuzzy HX subring of a HX ring  $\vartheta$  if and only if the fuzzy subsets  $(\lambda^\mu)^c, (\lambda^\nu)$  are anti-fuzzy HX subring of a HX ring  $\vartheta$ .

**Definition 2.6.** Let  $\vartheta_1$  and  $\vartheta_2$  be any two HX rings. Then the function  $f: \vartheta_1 \mapsto \vartheta_2$  is said to be a homomorphism if it satisfies the following axioms:

$$(i). f(A + B) = f(A) + f(B)$$

$$(ii). f(AB) = f(A)f(B), \text{ for all } A, B \in \vartheta_1$$

**Definition 2.7.** Let  $\vartheta_1$  and  $\vartheta_2$  be any two HX rings. Then the function  $f: \vartheta_1 \mapsto \vartheta_2$  is said to be an anti homomorphism if it satisfies the following axioms:

(i).  $f(A + B) = f(B) + f(A)$

(ii).  $f(AB) = f(B)f(A)$ , for all  $A, B \in \vartheta_1$

**Definition 2.8.** Let  $R_1$  and  $R_2$  be any two rings. Let  $\vartheta_1 \subset 2^{R_1} - \{\phi\}$  and  $\vartheta_2 \subset 2^{R_2} - \{\phi\}$  be any two HX rings. Let  $A = \{(x, \mu_A(x), \gamma_A(x)) \mid x \in R_1\}$  and  $B = \{(y, \alpha_B(y), \beta_B(y)) \mid y \in R_2\}$  be any two intuitionistic fuzzy sets on  $R_1$  and  $R_2$  respectively.

Let  $C = \{(U, \lambda_C^\mu(U), \theta_C^\gamma(U)) \mid U \in \vartheta_1\}$  and  $D = \{(V, \eta_D^\alpha(V), \psi_D^\beta(V)) \mid V \in \vartheta_2\}$  any two intuitionistic fuzzy sets in  $\vartheta_1$  and  $\vartheta_2$  respectively. Let  $f$  be a function from  $\vartheta_1$  into  $\vartheta_2$  then the image of  $C$  on  $\vartheta_1$  under  $f$  is defined as

$$\eta_D^\alpha(V) = \begin{cases} \max\{\lambda_C^\mu(U) : U \in f^{-1}(V)\}, & f^{-1}(V) \neq \phi \\ 0 & , \text{otherwise} \end{cases}$$

and

$$\psi_D^\beta(V) = \begin{cases} \min\{\theta_C^\gamma(U) : U \in f^{-1}(V)\}, & f^{-1}(V) \neq \phi \\ 1 & , \text{otherwise} \end{cases}$$

Where  $\eta_D^\alpha = f(\lambda_C^\mu)$  also pre-image of  $D$  on  $\vartheta_2$  under  $f$  is defined as

$$(f^{-1}(\eta_D^\alpha))(U) = \eta_D^\alpha(f(U)), \quad (f^{-1}(\psi_D^\beta))(U) = \psi_D^\beta(f(U))$$

**Property 2.7.** Let  $R_1$  and  $R_2$  be any two rings. Let  $A = \{(x, \mu_A(x), \gamma_A(x)) \mid x \in R_1\}$  and  $B = \{(y, \alpha_B(y), \beta_B(y)) \mid y \in R_2\}$  be any two intuitionistic fuzzy sets on  $R_1$  and  $R_2$  respectively.

Let  $C = \{(U, \lambda_C^\mu(U), \theta_C^\gamma(U)) \mid U \in \vartheta_1\}$  and  $D = \{(V, \eta_D^\alpha(V), \psi_D^\beta(V)) \mid V \in \vartheta_2\}$

any two intuitionistic fuzzy sets in  $\vartheta_1$  and  $\vartheta_2$  respectively. Let  $f$  be a onto homomorphism from  $\vartheta_1$  to  $\vartheta_2$ . If  $C$  be the intuitionistic fuzzy HX subring of  $\vartheta_1$  then  $f(C)$  is a intuitionistic fuzzy HX subring of  $\vartheta_2$ .

### 3. Intuitionistic Anti-Fuzzy HX Ring

In 1965, Zadeh introduced the concept of fuzzy subset  $\mu$  of a set  $X$  as a function from  $X$  into the closed unit interval  $[0,1]$  and studied their properties. Fuzzy set theory is a useful tool to describe situations in which the data or imprecise or vague and it is applied to logic, set theory, group theory, ring theory, real analysis, measure theory, etc. In 1967, Rosenfeld defined the idea of fuzzy subgroups and gave some of its properties. Li Hong Xing introduced the concept of HX group. In 1982 Wang-jin Liu introduced the concept of fuzzy ring and fuzzy ideal. With the successful upgrade of algebraic structure of group many researchers considered the algebraic structure of some other algebraic systems in which ring was considered as first. In 1988, Professor Li Hong Xing proposed the concept of HX ring and derived some of its properties, then Professor Zhong gave the structures of HX ring of a class of ring. R.Muthurajet. al introduced the concept of fuzzy HX ring. In this dissertation we define a new algebraic structure of an intuitionistic fuzzy sub HX ring of a HX ring and investigate some related properties. We define the necessity and possibility operators of an intuitionistic fuzzy subset of an intuitionistic fuzzy HX ring and discuss some of its properties. Also we introduce the image and pre-image of an intuitionistic fuzzy set in an intuitionistic fuzzy HX ring and discuss some of its properties.

#### 3.1 PRELIMINARIES

In this section, we site the fundamental definitions that will be used in the sequel. Throughout this dissertation,  $R = (R, +, \cdot)$  is a Ring,  $e$  is the additive identity element of  $R$  and  $xy$ , we mean  $x \cdot y$ .

**Definition 3.1.** Let  $R$  be a ring. In  $2^R - \{\phi\}$ , a non-empty set  $\vartheta \subset 2^R - \{\phi\}$  with two binary operation '+' and ' $\cdot$ ' is said to be a HX ring on  $R$  if  $\vartheta$  is a ring with respect to the algebraic operation defined by

- (i).  $A + B = \{a + b / a \in A \text{ and } b \in B\}$ , which its null element is denoted

by  $Q$ , and the negative element of  $A$  is denoted by  $-A$ .

(ii).

$$AB = \{ab / a \in A\} \quad A(B + C) = AB + BC \text{ and } (B + C)A = BA + CA.$$

### 3.2 Intuitionistic Anti-Fuzzy Hx Subring Of A Hx Ring

In this section we define the concept of an intuitionistic anti fuzzy HX subring of a HX ring and discuss some related results.

**Definition 3.2.** Let  $R$  be a ring. Let  $H = \{(x, \mu(x), \eta(x)) / x \in R\}$  be an intuitionistic fuzzy set defined on a ring  $R$ , where  $\mu : R \mapsto [0,1]$ ,  $\eta : R \mapsto [0,1]$  such that  $0 \leq \mu(x) + \eta(x) \leq 1$ . Let  $\mathfrak{R} \subset 2^R - \{\emptyset\}$  be a HX ring. An intuitionistic fuzzy subset  $\lambda^H = \{(A, \lambda^\mu(A), \lambda^\eta(A)) / A \in \mathfrak{R} \text{ and } 0 \leq \lambda^\mu(A) + \lambda^\eta(A) \leq 1\}$  of  $\mathfrak{R}$  is called an intuitionistic fuzzy HX subring on  $\mathfrak{R}$  or an intuitionistic fuzzy subring induced by  $H$  if the following conditions are satisfied. For all  $A, B \in \mathfrak{R}$ ,

(i).

$$\lambda^\mu(A - B) \geq \lambda^\mu(AB) \geq \lambda^\eta(A - B) \leq \lambda^\eta(AB) \leq \max\{\lambda^\eta(A), \lambda^\eta(B)\}$$

where  $\lambda^\mu(A) = \max\{\mu(x) / \text{for all } x \in A \subseteq R\}$  and  $\lambda^\eta(A) = \min\{\eta(x) / \text{for all } x \in A \subseteq R\}$ .

**Definition 3.3.** Let  $R$  be a ring. Let  $H = \{(x, \mu(x), \eta(x)) / x \in R\}$  be an intuitionistic fuzzy set defined on a ring  $R$ , where  $\mu : R \mapsto [0,1]$ ,  $\eta : R \mapsto [0,1]$  such that

$0 \leq \mu(x) + \eta(x) \leq 1$ . Let  $\mathfrak{R} \subset 2^R - \{\emptyset\}$  be a HX ring. An intuitionistic fuzzy subset  $\lambda^H = \{(A, \lambda^\mu(A), \lambda^\eta(A)) / A \in \mathfrak{R} \text{ and } 0 \leq \lambda^\mu(A) + \lambda^\eta(A) \leq 1\}$  of  $\mathfrak{R}$  is called an intuitionistic anti fuzzy HX subring on  $\mathfrak{R}$  or an intuitionistic anti-fuzzy subring induced by  $H$  if the following conditions are satisfied. For all  $A, B \in \mathfrak{R}$ ,

(i).

$$\lambda_\mu(A - B) \leq \max\{\lambda_\mu(A), \lambda_\mu(AB)\} \leq \max\{\lambda_\mu(A), \lambda_\eta(A)\} = \max\{\mu(x) / \lambda_\eta(AB) \geq \min\{\lambda_\eta(A), \lambda_\eta(B)\}$$

for all  $x \in A \subseteq R$  and  $\lambda^\eta(A) = \min\{\eta(x) \mid \text{for all } x \in A \subseteq R\}$ .

**Remark 3.1.** For an intuitionistic anti-fuzzy HX subring  $\lambda_\mu$  of a HX ring  $\mathfrak{R}$ , the following result is obvious. For all  $A, B \in \mathfrak{R}$ ,

- (i).  $\lambda_\mu(A) \leq \lambda_\mu(0)$  and  $\lambda_\mu(A) = \lambda_\mu(-A)$
- (ii).  $\lambda_\mu(A - B) = 0$  implies that  $\lambda_\mu(A) = \lambda_\mu(B)$
- (iii).  $\lambda_\eta(A) \geq \lambda_\eta(0)$  and  $\lambda_\eta(A) = \lambda_\eta(-A)$
- (iv).  $\lambda_\eta(A - B) = 0$  implies that  $\lambda_\eta(A) = \lambda_\eta(B)$

**Property 3.1.** If  $H$  is an intuitionistic anti-fuzzy subring of a ring  $R$  then the intuitionistic fuzzy subset  $\lambda_H$  is an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$ .

**Property 3.2.** Let  $G$  and  $H$  be any two intuitionistic fuzzy sets on  $R$ . Let  $\gamma_G$  and  $\lambda_H$  be any two intuitionistic anti-fuzzy HX subrings of a HX ring  $\mathfrak{R}$  then their intersection,  $\gamma_G \cap \lambda_H$  is also an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$ .

**Property 3.3.** Let  $G$  and  $H$  be any two intuitionistic fuzzy sets on  $R$ . Let  $\gamma_G$  and  $\lambda_H$  be any two intuitionistic anti-fuzzy HX subrings of a HX ring  $\mathfrak{R}$  then their union,  $\gamma_G \cup \lambda_H$  is also an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$ .

**Definition 3.4.** Let  $G = \{\langle x, \alpha(x), \beta(x) \rangle \mid x \in R\}$  and  $H = \{\langle x, \mu(x), \eta(x) \rangle \mid x \in R\}$  be any two intuitionistic fuzzy sets defined on a ring  $R$ . Let  $\mathfrak{R}_1 \subset 2^{R_1} - \{\emptyset\}$  and  $\mathfrak{R}_2 \subset 2^{R_2} - \{\emptyset\}$  be any two HX rings. Let  $\gamma_G = \{\langle A, \gamma_\alpha(A), \gamma_\beta(A) \rangle \mid A \in \mathfrak{R}\}$  and  $\lambda_H = \{\langle A, \lambda_\mu(A), \lambda_\eta(A) \rangle \mid A \in \mathfrak{R}\}$  be any two intuitionistic fuzzy subsets of a HX ring  $\mathfrak{R}$ , then the Cartesian anti-product of  $\gamma_G$  and  $\lambda_H$  is defined as

$$(\gamma_G \times \lambda_H) = \{(A, B), (\gamma_\alpha \cup \lambda_\mu)(A, B), (\gamma_\beta \cap \lambda_\eta)(A, B)\} / (A, B) \in \mathfrak{R}_1 \times \mathfrak{R}_2\},$$

Where  $(\gamma_\alpha \cup \lambda_\mu)(A, B) = \max\{\gamma_\alpha(A), \lambda_\mu(B)\}$ , for all  $(A, B) \in \mathfrak{R}_1 \times \mathfrak{R}_2\}$ ,

$$(\gamma_\beta \cap \lambda_\eta)(A, B) = \min\{\gamma_\beta(A), \lambda_\eta(B)\} \text{ for all } (A, B) \in \mathfrak{R}_1 \times \mathfrak{R}_2\}.$$

**Property 3.4.** Let  $G$  and  $H$  be any two intuitionistic fuzzy sets of  $R_1$  and  $R_2$  respectively. Let  $\mathfrak{R}_1 \subset 2^{R_1} - \{\phi\}$  and  $\mathfrak{R}_2 \subset 2^{R_2} - \{\phi\}$  be any two HX rings. If  $\gamma^G$  and  $\lambda^H$  are any two intuitionistic anti-fuzzy HX subrings of  $\mathfrak{R}_1$  and  $\mathfrak{R}_2$  respectively then,  $\gamma^G \times \lambda^H$  is also an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}_1 \times \mathfrak{R}_2$ .

**Property 3.5.** Let  $H$  be an intuitionistic fuzzy set defined on  $R$ . Let  $\lambda^H$  be an intuitionistic fuzzy HX subring of  $\mathfrak{R}$  if and only if  $(\lambda^H)^c$  is an intuitionistic anti-fuzzy HX subring of  $\mathfrak{R}$ .

**Definition 3.5.** Let  $H$  be an intuitionistic fuzzy set of  $R$ . Let  $\mathfrak{R} \subset 2^R - \{\phi\}$  be a HX ring. Let  $\lambda_H$  be an intuitionistic fuzzy set of  $\mathfrak{R}$ . We define the following “necessity” and “possibility” operations:

$$\square \lambda_H = \{(A, \lambda_\mu(A), 1 - \lambda_\mu(A)) / A \in \mathfrak{R}\} \diamond \lambda_H = \{(A, 1 - \lambda_\eta(A), \lambda_\eta(A)) / A \in \mathfrak{R}\}$$

**Definition 3.5.** Let  $H$  be an intuitionistic fuzzy set of  $R$ . Let  $\lambda_H$  be an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$  then  $\square \lambda_H$  is an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$ .

**Definition 3.6.** Let  $H$  be an intuitionistic fuzzy set of  $R$ . Let  $\lambda_H$  be an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$  then  $\diamond \lambda_H$  is an intuitionistic anti-fuzzy HX subring of a HX ring  $\mathfrak{R}$ .

### Conclusion

In this paper we have discussed the concept of intuitionistic fuzzy HX ring and discussed the basic results on intuitionistic HX subring. Also we have discussed the concept of intuitionistic anti-fuzzy HX ring and discussed the basic results on intuitionistic anti-fuzzy HX ring. Also we discussed some of its properties.

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## STUDIES ON THE KINETICS AND MECHANISM OF OXIDATION OF PROLINE

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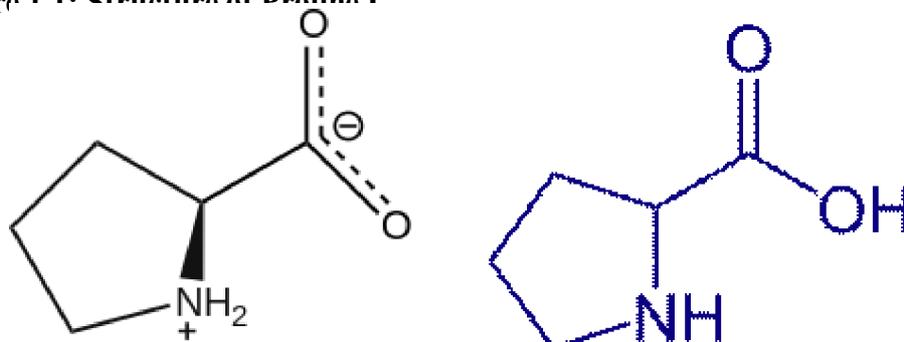
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### Abstract

*Kinetics of oxidation of Proline by chromium trioxide  $\text{CrO}_3$  has been studied in aqueous acetic acid medium at 27°C. The reaction follows pseudo first order kinetics. Earlier studies on oxidation reaction involved mainly Cr(IV) as oxidant and Proline as the substrate. In the present study the kinetics is investigated in acetic acid medium and the effect on solvent composition is also studied. Oxidation of Proline has been achieved due to formation of the complex between the substrate and the oxidant. The reaction is found to be increasing with the increase in the concentration of acetic acid. Acetic acid being a weak organic acid is able to catalyze the reaction and the reaction follows pseudo first order kinetics. The rate constant values were calculated using the decreased trends of volume of this solution. Further, rate constant values for the oxidation of Proline were calculated by varying the percentage of acetic acid% (20, 30, 40, 50 and 60). The effect of HCl on the oxidation kinetics is also studied.*

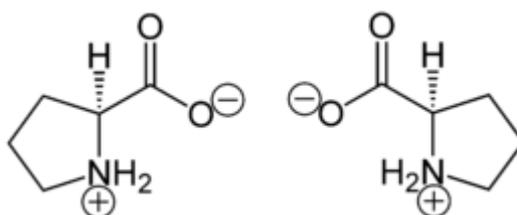
**Keywords:** Proline, Chromium trioxide, Oxidation, Mechanism, Acetic Acid.

Figure 1.1: Structure of Proline I



## BIOSYTHESIS

Proline is biosynthetically derived from the amino L-glutamate 5-semialdehyde which is first formed by glutamate 5-kinase (ATP-dependent) and glutamate-5-semialdehyde dehydrogenase (which requires NADH or NADPH). This can either spontaneously cyclize to form 1-pyrroline-5-carboxylic acid which is reduced to proline by pyrroline-5-carboxylate reductase.



**Figure 1,2 Zwitterionic Structure of both Proline enantiomers:(S)-Proline(Left) and (R)-Proline**

### Biological activity

Proline has been found to act as a weak agonist of the glycine receptor and of both NMDA and non-NMDA ionotropic glutamate receptors. It has been proposed to be a potential endogenous excitotoxin. In plants proline accumulation is a common physiological response to various stresses but is also part of the development program in generative tissues (e.g. pollen).

### Properties in protein structure:

The distinctive cyclic structure of proline's side chain gives proline an exceptional conformational rigidity compared to other amino acids. It also affects the rate of peptide bond formation between proline and other amino acids. When proline is bound as an amide in a peptide bond, its nitrogen is not bound to any hydrogen, meaning it cannot act as a hydrogen bond donor, but can be a hydrogen bond acceptor.

Peptide bond formation with incoming pro-tRNA<sup>Pro</sup> is considerably slower than with any other tRNAs, which is a general feature of N-alkylamino acids. Peptide bond formation is also slow between an incoming tRNA and a chain ending in proline-proline bonds slowest of all. Proline acts as a structural disruptor in the middle of regular secondary structure elements such as alpha helices and beta sheets

.however, proline is commonly found as the residue of an alpha helix and also in the edge strands of beta sheets. Proline is also commonly found in turns (another kind of secondary structure), and aids in the formation of beta turns. This may account for the curious fact that proline is usually solvent-exposed, despite having a complete aliphatic side chain.

Proline and its derivatives are often used asymmetric catalysis in proline organocatalysis reactions. In brewing, proteins rich in proline combine with polyphenols to produce haze (turbidity).

Proline is an osmoprotectant and therefore is used in many pharmaceutical, biotechnological applications.

The growth medium used in plant tissue culture may be supplemented with proline. This can increase growth, perhaps because it helps the plant tolerate the stresses of tissue culture. Proline is the amino acid necessary for the production of collagen and cartilage for healthy joints, ligaments and tendons.

Joints are complicated structure that connects bones to allow for movement. There are different types of joints, including hinge, ball and socket, saddle and pivot joints. They are bound on the outside by fibrous bands, called ligaments. Each ligament contains fibrous tissue of collagen, in a capsule, which surrounds the joint. The lining of the capsule is a thin membrane called the synovium that continuously produces a small amount of fluid for lubrication.

Cartilage is a smooth, flexible tissue that covers the surface where the bones meet, and acts as a shock absorber and reduces friction. While heredity and obesity effect the incidence of Osteoarthritis, it may also develop due to overuse or injury to the joints. The particular cartilage, which is the smooth lining of the joint, begins to deteriorate, and may eventually affect the bone. Without sufficient cartilage, movement of the joint becomes restricted and painful.

Proline and Hydroxyproline make collagen, which is a component of skin tissue. Proline along with other amino acids such as Glycine, help create new cell formation and can contribute to maintaining younger looking skin.

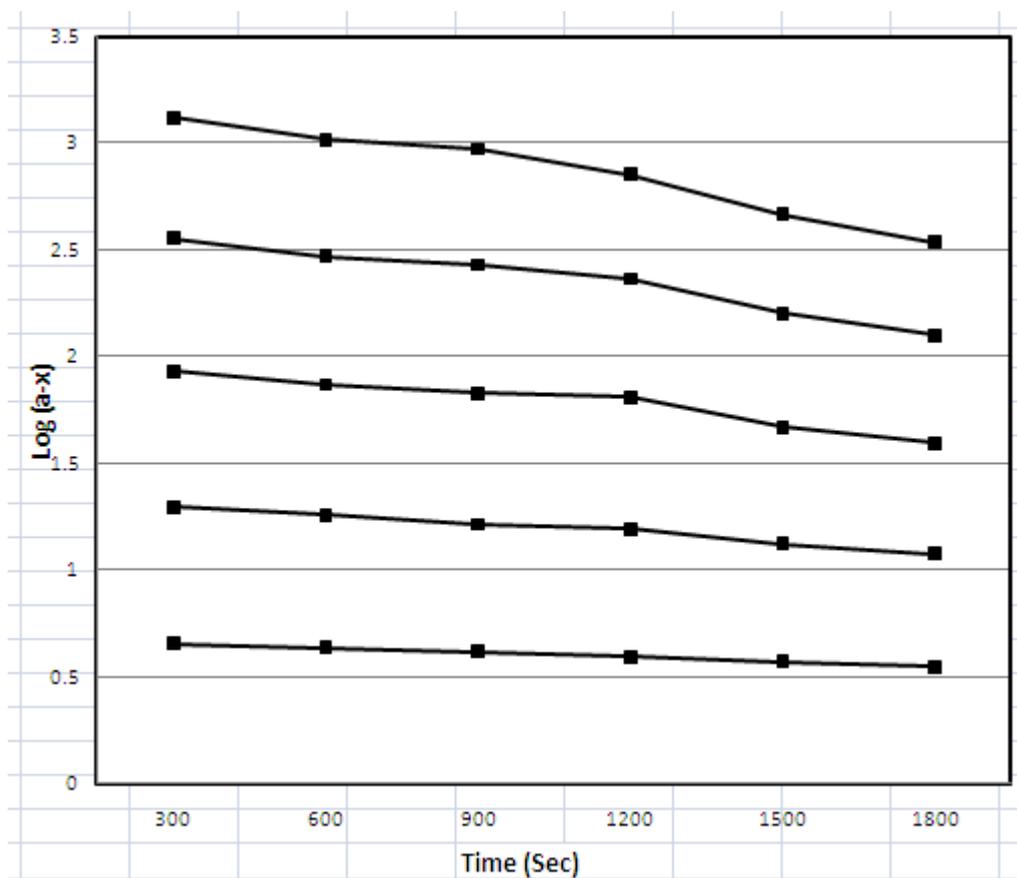
## **2. Experimental Work**

The 5 ml of test solution was titrated against thio solution under pseudo first order reaction conditions. The rate constant values were calculated using the de-

creased trends of volume of thio solution and thus obtained rate constants values were calculated for the variation of acetic acid % (20,30,40,50 and 60) and it was given in Table. The obtained rate constants revealed that 10% acidic acid solution showed lesser rate constants value. On increasing the percentage of acetic acid, the rate constant values also increased

**Effect of Acetic acid %(20,30,40,50,60)**

Time (Sec)	300	600	900	1200	1500	1800
Log (a-x)	0.6532	0.6334	0.6127	0.5911	0.5682	0.5441
	0.6435	0.6232	0.6021	0.6021	0.5563	0.5315
	0.6335	0.6128	0.6128	0.6128	0.5441	0.5185
	0.6232	0.6021	0.5998	0.5563	0.5315	0.5051
	0.5682	0.5441	0.5441	0.4914	0.4624	0.4314



### 3. Results and Discussion

In most of the chemical reactions, it is only the disappearance of starting materials and the appearance of final products that can be detected. In general, however, the net reaction is not the whole story, but simply represents a summation of all the changes that occur. The net change may actually consist of several consecutive reactions each of which constitutes a step in the formation of final products.

The mathematical models that describe chemical reaction kinetics provide chemists and chemical engineers with tools to better understand and describe chemical processes such as food decomposition, microorganism growth, stratospheric ozone decomposition, and the complex chemistry of biological systems. These models can also be used in the design or modification of chemical reactors to optimize product yield, more efficiently to separate products, and to eliminate environmentally harmful by-products. In this study, preparation of amino acids titrated against thio solution at the rate of time. The obtained volume of thio solution used to calculate the rate constants and tabulated.

#### Product analysis

1. The product are analyzed after purification of the reaction mixture and tested for the presence of -COOH group with a saturated solution of  $\text{NaHCO}_3$ . A negative test confirms the decarboxylation in the reaction.
2. Elemental analysis (lassagine's test) confirmed the presence of nitrogen in the product.
3. The absence of a yellow precipitate with Borsche's reagent rule out the presence of a keto compound as the product.
4. Free radicals are formed. Radical formation is confirmed by test with acrylonitrile.
5. Based on the above facts a suitable mechanism has been proposed for the oxidation of proline.

### 4. Conclusions

Earlier studies on oxidation reaction involved mainly Cr(IV) as oxidant and Proline as the substrate. In the present study the kinetics is investigated in acetic acid medium and the effect on solvent composition is also studied. The oxidation of

Proline by chromium trioxide in aqueous acetic acid medium leads to the formation of decarboxylated compounds as the products. Oxidation of Proline has been achieved due to formation of the complex between the substrate and the oxidant. The reaction is found to be increasing with the increase in the concentration of acetic acid. Acetic acid though a weak organic acid, is able to catalyze the reaction and the reaction follows pseudo first order kinetics.

Further, the reaction is catalyzed by inorganic acid i.e., the reactions were carried out with added HCl by varying the concentration from 0.005N to 0.025N. Based on the experimental observations and product formation, a probable mechanism is suggested.

After thorough analysis from the obtained results, the following conclusions are arrived.

1. The oxidation of amino acids namely Proline, using chromium trioxide was studied and the kinetics was found to be pseudo first order.
2. The rate constant values were calculated using the decreased trends of volume of this solution.
3. Further, rate constant values for the oxidation of Proline were calculated by varying the percentage of acetic acid% (10, 20, 30, 40, 50 and 60). The obtained results revealed that rate constant values increased with increasing the percentage of acetic acid.
4. Further, it is observed that increase in the concentration of HCl (0.005N, 0.01N, 0.015N, 0.02N and 0.025N), in the reaction kinetics showed enhanced rate constant values.

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## LIBRARY AND INFORMATION SERVICES AND ICT RESOURCES IN UNIVERSITY

### LIBRARIES

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### ABSTRACT

*A university is usually described as a community where scholars and teachers are the head, students are the body and the library its heart. If the body is to perform its functions properly and efficiently its heart must be strong and efficient in its functioning. ICT has long standing influence in almost all areas of human activity. It acts as a catalyst in all spheres of science and technology. ICT has become within a short time one of the basic building blocks of a modern society. The impact has been rather well-known in case of service activities such as banking, health, transportation, education and libraries. ICT is significant to the libraries to achieve its goals for management of information, effective services and extension of boundaries from the four-walls to the globe.*

**Keywords:** India, University libraries, Library and information services, Information and communication technology (ICT).

### INTRODUCTION

The library is the heart of all the University's work; directly so, as regards its research work, and indirectly as regards its educational work which derives its life from research work. Scientific research needs a Library as well as its laboratories, while for humanistic research the library is both library and laboratory in one. Training in higher branches of learning and research is mainly a question of learning how to use the tools, and if the library tools are not there, how can the student learn to use them? President Truman's Commission on Higher Education says, "The Library is second only to the instructional staff in its importance for high quality instruction and research." Both for humanistic and scientific studies, a first class library is essential in a university. ICT is significant to the libraries to achieve its goals for management of information, effective services and extension of boundaries from the four-walls to the globe. Information and communications technology have changed the academic library in a profound way. Computers and networked electronic resources had become an integral part of the academic library the past decade. Information and Communications Technology (ICT) have transformed Library and Information services globally.

**OBJECTIVES OF UNIVERSITY**

Robert Gaudino stated that “A university is what a nation wants it to make of it, what it is able to make of it, what it has made of it.”

India has been a cradle of culture, civilization, and centre of teaching, learning and research since the ancient times; the prominent examples being universities of Taxila and Nalanda. But the emergence of modern universities, on the Western model, began in 1857 when three universities were established at Calcutta (now renamed as Kolkata), Bombay (renamed as Mumbai) and Madras (renamed as Chennai). From about 20 universities in India at the time of Independence in 1947, the total number has gone up to 620 universities as recognized by the University Grants Commission.

The sector boasts of **45** Central Universities of which **40** are under the purview of Ministry of Human Resource Development, **318** State Universities, **185** State Private universities, **129** Deemed to be Universities, **51** Institutions of National Importance (established under Acts of Parliament) under MHRD. These universities have established their university libraries to cater not only to the information needs of their students, teachers, and other staff member but also to support their objectives and programmes to promote their mission.

**OBJECTIVES OF UNIVERSITY LIBRARIES**

1. Conservation of knowledge amassed from times immemorial .
2. Dissemination of knowledge through teaching learning, publication and extant ion programs.
3. Extenuation of the bounds of knowledge through research work by teachers and other researchers.
4. Helping the faculty and students to achieve highest academic honor and lifetime good reading.
5. Adopting new technologies.
6. Establishing information centers and render reader’s advisory service
7. Acquiring process of resources and make them available to the readers / users.

**FUNCTIONS OF UNIVERSITY LIBRARY**

The Radhakrishnan Commission, in its Report on University Education (1948-49), while realising the importance of libraries in the fulfillment of the objectives, observed that

“the library is the heart of all the university’s work; directly so, as regards its research work, and indirectly as regards its educational work...” Later, the Kothari Commission in its Report on Education and National Development (1964-66), laid emphasis on the proper development of university library system. It defined the functions of the university libraries as under:

- provide resources necessary for research in fields of special interest to university;
- aid the university teacher in keeping abreast of developments in his field;
- provide library facilities and services secondary for success in all formal programmes of instruction
- open the doors to the wide world of books, that lie beyond the borders of one’s own field of specialization; and
- bring books, students and scholars together under conditions which encourage reading for pleasure, self discovery, personal growth and sharpening of intellectual curiosity.

## **COLLECTION AND SERVICES PROVIDED TO USERS**

### **COLLECTION**

The library is required to provide varied, authoritative and up-to-date resources that support its mission and fulfill the needs of its users. Resources may be provided in a variety of formats, including print or hard copy, online, electronic text or images, and other media. A college library needs to have the quantity of resources as prescribed by government, UGC, AICTE and other governing bodies. The collection of a college library may answer the following, for maintaining the quality of the resources.

1.Mention the total collection of Documents

- (i) Books
- (ii) Text Books
- (iii) Reference Books
- (iv) Current Journals

A. Indian B.Foreign

- (v) Peer reviewed Journals
- (vi) Back Volumes of Journals
- (vii) Magazines
- (viii) E- Information Resources
  - CD's /DVD's
  - Databases
  - Online Journals
- (ix) Special collection
  - Competitive Examinations
  - Braille materials/Rare collection
  - AV Materials
- (x) Book Bank

2. Ratio of the library books to the number of students enrolled

## **II. SERVICES**

The library has a key role in supporting the academic activities of the institutions by establishing, maintaining and promoting library and information services, both quantitatively and qualitatively. The library offers a wide range of services from reference to electronic information services. College libraries may answer the following basic questions for ensuring appropriate services to the academic community.

I) Does the library provide the following basic services?

- a. Circulation Services
- b. Clipping services
- c. Bibliographic compilation
- d. Information display and notification services
- e. Reference/referral services

- f. Photocopy and printing services
- g. User Orientation/Information Literacy
- h. Resource sharing/ILL
- I. Internet / digital resources availability
- j. Any others

### **C. EXTENT OF THE USE OF SERVICES**

Performance evaluation of college libraries needs to be carried out at regular intervals in order to sustain and enhance their quality. Normally, the evaluation can be made on compilation of use statistics. The following parameters would help in assessing the extent of use of library and its services.

- a) Average number of books issued/returned per day. [ ]
- b) Number of reference enquiries (users) on an [ ]
- c) Number of services delivered per capita per month [ ]
- d) Average no. of users who visited/documents consulted [ ]  
per month.

### **D. BEST PRACTICES FOR COLLEGE LIBRARIES**

Listed below are some of the best practices that can enhance the academic information environment and usability.

1. Computerization of library with standard digital software.
2. Inclusion of sufficient information about the library in the college prospectus.
3. Compiling student/teacher attendance statistics and locating the same on the notice board.
4. Displaying newspaper clippings on the notice board periodically.
5. Career/Employment Information/ Services.
6. Internet Facilities to different user groups.

7. Information literacy programs.
8. Suggestion box and timely response.
9. Displaying new arrivals and circulating a list of those to academic departments.
10. Conducting book exhibitions on different occasions.
11. Organizing book talks.
12. Instituting Annual Best User award for students.
13. Organizing competitions annually.
14. Conducting user surveys periodically.

### **INFORMATION RESOURCES**

Wilson and Tauber have suggested that besides books and periodicals, the university library must satisfy demands for materials which is neither books in the generally accepted sense nor periodicals. It includes materials such as dissertations, newspapers, rare books and manuscripts, maps, fugitive materials of many kinds, music, archives, films, micro reproductions, and museum objects.

The information resources as mentioned above and any other such resource must be acquired by a Library Committee of the university as appointed by the university authority. The Library Committee must formulate an acquisition policy for this purpose. It will help in developing a well-balanced, unified and definite programme of collection development, and make a sufficient and suitable provision for all categories of users in their academic and research activities. It has been recommended by the UGC Library Committee (1957-59) that the limit for document collection for a university library may be set as 300, 000 volumes. In the present times when the number of subjects and departments, as well as students and faculty in the universities have gone up, the limit of documents may go at least up to 500, 000 volumes. This may in addition to the non-book material and the new age documents in electronic formats.

#### ***1. COLLECTION MAINTENANCE***

The various types of collections as described above need adequate storage space, proper shelving, and preservation. For the preservation of books university libraries generally follow the traditional methods of pest control, etc. Some of them may need binding, others may require lamination, and still others may need to be kept in the fumigation chambers. But for the non-document and electronic documents special preservation techniques need to be adopted. Similarly, rare books and manuscripts also require special handling

with care, and now these two types of documents are being digitized all over the country to preserve them for posterity. For the preservation of such collections as serial publications, theses and dissertations, manuscripts and rare books, newspapers and reports, and even books, many programmes for digitization are in place. These include, among others, Digital Library of India, National Mission for Manuscripts Digitization, Traditional Knowledge Digital Library, Electronic Theses and Dissertations Project of India, and so on.

However, the following activities may form part of collection maintenance:

- a. Stock verification
- b. Weeding
- c. Preservation
- d. Binding, etc.

The university libraries generally maintain and control their collections by following method of weeding out the worn, mutilated, and documents remaining unused for a long period. It is estimated that about 80-90% of the total collections of our university libraries are a kind of dead stock, which is neither used nor is useful for study and research. The existing collections therefore must be replenished and any documents not useful may be discarded. There is another aspect of maintenance in university library system. It concerns the maintenance of various items of furniture and equipments installed in the library. Maintenance of furniture items may be looked after from time to time as needed, but for the maintenance of computer hardware and software a better option is the annual maintenance contract with the company.

## **MANPOWER RESOURCE**

One of the most essential components of a university library is manpower resource. The performance of manpower plays a vital role in the success or failure of a university library. For ensuring effective and efficient library and information services, there is need to employ competent personnel with proper training and education. The university library manpower must match the quality of the teaching and research community in terms of academic and professional qualifications, experience, and expertise. The constant interaction of university library manpower with students, faculty, research scholars, computer experts, management experts of the university should ensure credibility and appreciation from the user community.

### **1. CATEGORIES OF MANPOWER**

The following categories of manpower are employed in a university library:

- i. Professional staff

- ii. Technical or paraprofessional staff
- iii. Administrative staff

## **FINANCIAL RESOURCES**

Financial resources are the soul of an institution and so of a university library. It is like a heart which circulates blood to all parts of human body. Therefore, finance is all important for the effective functioning, organization, and management of a university library. A university library is a spending, and not a revenue generating institution. It has to employ qualified and experienced manpower, purchase various types of reading material, furniture and other equipments, and maintain library building, and so on for its users. For all these functions, library needs financial resources. It is incumbent on the university authority to ensure adequate supply of funds to render the library services efficiently and effectively.

### ***1. SOURCES OF FINANCE***

University libraries receive funds in various proportions from the following sources:

- i. Grants from the UGC
- ii. Grants from Central and State government
- iii. Grants allocated from the university budget
- iv. Endowments and gifts
- v. Library Fee (such as development fee, security, etc)
- vi. Fines and miscellaneous sources like sale of publications or information products, sale of waste paper, charges for reprographic, micrographic, and other such services.

The university libraries, in addition to regular grants, also receive ad hoc grants from time to time from various sources such as UGC, and such other institutions as Asia Foundation, Ford Foundation, Rockefeller Foundation, etc. The UGC Library Committee observed that in view of the renaissance in the country and its needs, the university libraries should provide adequate library services to promote research. For this purpose, an annual grant alone will not be sufficient, and a generous non-recurring grant should be given to each university library.

### ***2. RECOMMENDED STANDARDS***

The UGC Library Committee has recommended that for the time being library grant may be at the rate of Rs 15 per student and Rs 200 per teacher and research fellow. The

Kothari Commission recommended in its report that the library grant may at the rate of Rs 25 per student and Rs 300 per teacher. This is per capita method of determination of library finance. In percentile terms, the Education Commission (1964-66) recommended that a university should spend 6.5% to 10% of its total budget on its library.

## **PHYSICAL RESOURCES**

University libraries are generally developed for the use of the faculty, research workers, and post-graduate students. In order to provide them intensive information services, the building should have many unique features. Therefore, a functional design of library building is the most important requirement of the university library system keeping in view the design of inner lay-out, utilization of inner space, etc. The architectural design of university libraries must take into consideration the implication of the Fifth Law of Library Science, ie, the library is a growing organism. The university libraries grow in terms of information resources, users, manpower, furniture and other equipments.

The description of the university library as a heart of the university should be reflected in its geographical location, while constructing the library building. It will also satisfy the requirements of at least the first four laws of library science as enunciated by S.R. Ranganathan. Now a days, the emerging information technologies and their application to library house keeping operations is further necessitating the designing and redesigning of library buildings suitable for current requirements. An example of such a change is the replacement of old catalogue cabinets meant for users of university libraries by the new generation Online Public Access Catalogue (OPAC).

### ***1. STANDARDS***

The Bureau of Indian Standards, in its earlier avatar, had prepared some standards for the design of library buildings for architectural guidance. These were developed to increase, among other things, the usefulness of libraries. These include the following:

IS : 1553-1960 *Code of practice relating to primary elements in the design of library building.*

IS: 1172-1957 *Code of basic requirements for water supply, drainage and sanitation.*

These lay down the standards for basic elements only. For example, the first code mentioned above lays down standards for number of rooms to be provided, depending upon the size of library (ie, collection, users, staff, etc), floor area, circulation space, relative positions of the rooms, etc.

**2. FURNITURE AND EQUIPMENTS**

The following items of furniture and equipments are required in a university library:

- a. Book racks
- b. Catalogue cabinets
- c. Reading tables and chairs
- d. Circulation counter furniture and other counters
- e. Display racks
- f. Tables and chairs for technical staff
- g. Office tables and chairs
- h. Computer tables and chairs
- i. Racks for display and storage of periodicals
- j. Newspaper stands
- k. Book trolley, and so on

**2.1. EQUIPMENTS**

The following items of equipments are required in a university library:

- a. Computers systems, printers, and communication links
- b. Telephones
- c. Fax machine
- d. Photocopying machines
- e. Telex machine
- f. Microform readers
- g. CD ROM readers
- h. Multimedia equipments

- i. Fumigation chamber
- j. Fire extinguishers

### **LIBRARY AND INFORMATION SERVICES**

All the activities of university libraries revolve round the concept of services to users. The university libraries are established to provide various services to students, research scholars, faculty and others. the university library could be defined as the heart of the institution it serves, the library and information services can conveniently be described as the heart of the library.

Although the nature and efficiency of services provided vary from one university library to another, yet traditionally they have all been offering the following to their clientele:

- Circulation / lending services
- Reference services
- Current awareness services

At the same time, university libraries, perhaps for lack of adequate funds and professional manpower, cannot provide the whole range of intensive information services offered by the special libraries/ information centres. However, with the coming of computers and their application in housekeeping operations university libraries are in a position to offer a wide variety of services over a wide range of areas. Of late, the professional manpower of university libraries is developing new skills and competence considered necessary to provide a range of computer-based services.

The services (traditional and new) offered by university libraries include the following:

1. Circulation services and Interlibrary loan
2. User education and information literacy
3. Literature / Information search
4. Circulation of lists of new additions
5. Display services
6. Reference service

7. Referral service
8. Current Awareness Service
9. Selective Dissemination of Information
10. Indexing and abstracting services
11. Reprographic services
12. Maintenance of newspaper clippings
13. Internet access
14. Access to e-journals

It is through these library and information services that the university libraries can ensure the effective use of their information resources. This is what reflects the suggestions of the UGC (UK) Committee that “each university library should do all that it can to ensure that its resources are fully known”. On the other hand, the UGC (India) Library Committee went a step further and suggested that in a university library there should be a documentation section and a reference section charged with the responsibility of providing various services to teachers, research workers and students.

### ***RESOURCE SHARING AND CONSORTIA***

With the emerging electronic information environment, the library users are changing and they are becoming more demanding and IT savvy. As a result university libraries are also changing from stand-alone entities to networks, and their services moving from document-based to information-based. The university libraries are now ready to share their resources with users of other libraries as well. It provides 13 a wider access to information resources and limitation of poor document collection is overcome through this technique. Libraries have formed networks and consortia to share even the human and electronic resources to satisfy users' expectations.

In India also some of the academic libraries have formed consortia. Few examples are given below:

- INDEST
- FORSA
- UGC-INFONET

- CSIR E-CONSORTIA

- IIM CONSORTIA

Of these UGC-INFONET was an ambitious project of the UGC to cover all the universities in India. It has covered about 200 university libraries so far when the project was closed on 31 March 2012 and has since been replaced with another project called UGC-INFONET 2.0.

### **IMPACT OF IT ON UNIVERSITY LIBRARIES**

In this information age, India is evolving into an Information Society where information and knowledge have been recognized as capital. In this changing scenario of 21st century, one who is able to possess information and knowledge leads the path of success. A huge and large variety of information has been made available through Internet in the form of databases, multimedia, displays, etc. To keep up with the times, many educational and research institutions around the globe have been engaged in creating their own homepages to describe academic activities and programmes as a part of their mission and vision.

In order to provide efficient and effective information to their users, university libraries are building up their information resources and other infrastructure. They can easily share their resources and increase utilization of information not only in India but all over the world by linking their webpages and resources with other websites.

As a result of these developments, university libraries shall have the following functions:

1. To provide Internet facility to all users to access global information in their specific disciplines.
2. To create and maintain library websites.
3. To maintain OPAC to provide access to its collection to its users through campus networks as well as to the users worldwide.
4. To take part in establishing e-journal consortia to share journal resources through UGC-Infonet.
5. To provide access to wide variety of information resources including reference sources, indexes, full-text articles, etc.
6. To build specific electronic collections of the library with CD-ROM collections and in-house databases.

7. To promote the use of Information Technology, and speed up the information retrieval.
8. To take up digitization projects to preserve the manuscripts and other rare documents.

### **CHANGING ROLES OF LIBRARIANS**

The computerization process has helped significantly to improve the quality of library and information services in university libraries thereby benefitting the users. The librarians need to work as Drake said, “with faculty in the classroom to inform students about the library’s electronic resources, how to access them, and how to use them. Faculty / librarian collaborations deliver great dividends to librarians and library users”. According to a study, quoted by Drake, many see the future of the library transforming into “a more electronic hub offering a variety of services to support campus needs for research, teaching, and learning”.

### **ICT RESOURCES AND SERVICES IN INDIAN UNIVERSITY LIBRARIES**

The development and availability of information and communication technologies (ICTs) in libraries have today not only increased and broadened the impact of information resources at their doorsteps, but also placed more emphasis on effective and efficient services. Their applications in libraries, commonly known as library automation, have indeed continued to ease & promote quick & timely access to and transfer of information resources that are found dispersed round the globe. The various services provided in the libraries are complimented by available facilities, some of which are technology driven. Chisenga (2004) quoted that ICT came about as a result of the digital convergence of computer technologies, telecommunication technologies and other media communication technologies. Some library users are adopting electronic habits, making increasing use of the new ICT including computers, the Internet, the Web, Intranet, Extranet and other technologies. As a result, library users are placing new demands on their libraries. They require access to the latest information, updated information resources and access to ICT facilities that they could use in their work (Islam and Islam, 2006: 814).

The following are some of the ICT facilities or resources that can be used for effective library operations and services:

#### **1. BAR –CODING TECHNOLOGY:**

A barcode reader (or barcode scanner) is an electronic device for reading printed barcodes. Using barcode equipments for circulation and stock verification is becoming more common, efficient and time saver.

#### **2. BULLETIN BOARD SERVICES:**

A Bulletin Board System, or BBS, is a computer system running software that allows

users to connect and log in to the system using a terminal. Once logged in, a user can perform functions such as uploading and downloading software and data, reading news and bulletins, and exchanging messages with other users, either through electronic mail or in public message boards.

### **3.CAS & SDI SERVICES:**

A selection of current-awareness services in the form of Table of contents' (TOC) alerts, List of new arrivals of journals and Books, Press Clippings, Research Digest, including Abstracting and Indexing Service have been started by the library. Selective Dissemination of Information refers to tools and resources used to keep a user informed of new resources on specified topics.

### **4.CHAT SERVICES:**

Online chat may refer to any kind of communication over the Internet, which offers an instantaneous transmission of text-based messages from sender to receiver. In Libraries, it can be used for online reference service and real time consulting service. Online chat may address as well point-to-point communications as well as multicast communications from one sender to many receivers.

### **5.COMPUTER TECHNOLOGY:**

The dramatic development in the information transmission process in every field of human endeavour has been made by the widespread use of computer technology. Computer can be referred to as the backbone, nucleus or hub of ICT application. In virtually all ICT applications, the computer is interfaced with other devices in order to function effectively.

### **6.DATABASE SERVICES:**

A database is an organized collection of data for one or more purposes, usually in digital form. Libraries provide access to a variety of bibliographical databases and full-text resources that are typically organized to model relevant aspects of reality, in a way that supports processes requiring the information.

### **7.DOCUMENT SCANNING SERVICES:**

Scanner is important equipment in modernization of library. It is useful for scanning text, image and content pages of books and providing great help for establishing digital and virtual library.

### **8.ELECTRONIC BOOKS:**

The elements that are considered as important for the use of E-books in an academic library are the Content, Software and Hardware Standards, Protocols, Digital Rights Man-

agement, Access, Archiving, privacy, market, pricing and features. Electronic books (e-Books) are one way to enhance the digital library with global 24-hours-a-day and 7-days-a-week access to authoritative information, and they enable users to quickly retrieve and access specific research material easily, quickly, and effectively.

### **9. ELECTRONIC DOCUMENT DELIVERY SERVICES:**

At present, a document delivery service typically involves a combination of paper, digital and electronic media; document delivery is a “hybrid” medium. Libraries are implementing ICT based interlibrary lending system using electronic networks to deliver copies of journal articles and other documents in digital format [mainly in Portable Document Format (PDF)] to library users’ desktops.

### **10. ELECTRONIC JOURNALS:**

Electronic journal may be defined broadly as any journal, magazine, newsletter or type of electronic serial publication which is available over the internet and can be accessed using different technologies such as World Wide Web, Gopher, ftp, telnet, e-mail or listserv. Many publishers who offer subscriptions to print journals, sometimes also offer subscription to the electronic version of the journal free of charge. Some of the publishers who are providing e-journals include Emerald Elsevier, Kluwer, Springer, Highwire, John Wiley, etc.

### **11. ELECTRONIC MAIL (E-mail):**

This medium can also be used to send and receive emails. This is commonly and widely used with the internet facilities. E-mail is very useful for sending messages to and from remote areas with enhanced network. Further, it is also useful in various aspects of library environment. Thus, it may be stated that e-mail may play a significant role in information dissemination services.

### **12. ELECTRONIC RESOURCES:**

The e-Resources on magnetic & optical media have a vast impact on the collections of university libraries. The commonly available electronic resources are accessed electronically through traditional media like CDROMs, or through internet as electronic journal, online database databases, ebook, or in the form of OPACs, blogs, wikis, podcasts, etc.

### **13. FAX (FACSIMILE TRANSMISSION/ TELE FAX):**

It is used in some academic libraries for document delivery and other scholarly communications. It is a method of converting an image into electronic signals that can be transmitted over a communication link and converted back into an image at the receiving end.

#### **14.INDEXING AND ABSTRACTING SERVICES:**

An indexing and abstracting service is a service that provides shortening or summarizing of documents and assigning of descriptors for referencing documents.

#### **15.INSTITUTIONAL REPOSITORIES:**

An institutional repository is an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution. For a university, this includes materials such as journal articles, both before (pre-prints) and after (post prints) undergoing peer review, as well as digital versions of these and dissertations.

#### **16.INTERNET:**

As a source of serious subjects of the universe of knowledge, has become information super highway and opened the floodgates for scholarly communication. Internet is truncated version of internetworking, which refers to interconnecting two or more computer networks. Internet is described as a worldwide network of computer and people. It is an important tool for global on line services. The emergence of Internet offers very high bandwidth, which will widen the scope for information processing and dissemination as never before. Internet connects universities, colleges, schools and other educational institutions for information sharing and exchange. Access to information through Internet has changed the total scenario of librarianship.

#### **17.LIBRARY MANAGEMENT SOFTWARE PACKAGE:**

Software consists of the step-by-step instructions that tell the computer what to do. In a University Library, the most common computer software used are library automation software, database management software, antivirus software and application software. Many software packages for various applications in the field of library & information services and management are CDS/ISIS, SOUL, LIBSYS, KOHA etc. used for automation purposes.

#### **18.LIBRARY RETRIEVAL SYSTEMS:**

This involves using Compact Disc Read Only Memory (CDROM) technological mechanism of acquisition of specialized CD-ROM databases in various courses such as sciences, law, technology, agriculture, social sciences, medicine, humanities etc. They are available commercially.

#### **19.LIBRARY WEBSITE:**

A library website provides a library with a website to offer its services and to tell its story to its community. In most of the library website online catalogue is included. A library

web page or Universal Resource Locator (URL) facilitates single window access to various web enabled library services.

#### **20. MICROGRAPHIC & REPROGRAPHIC TECHNOLOGY:**

These technologies are still widely used technology in libraries globally. Most of the research libraries have reprographic machine and provide photocopies of any document on demand.

Microform is a generic term for all information carriers which use microfilm or similar optical media (including study) for the high-density recording and storage of optically encoded information in the form of micro images of printed document, bit patterns or holograms.

#### **21. NETWORKED ELECTRONIC INFORMATION RESOURCES:**

Networked electronic information resources are new vision of information of the future. These are the mainstay and life blood of present day information centres. Libraries are providing their users with access to networked information resources, i.e. databases, electronic scholarly journals, encyclopaedias, public government information, etc, provided by various publishers or suppliers.

#### **22. NETWORKING TECHNOLOGY:**

The important function of network is to interconnect computers and other communication devices so that data can be transferred from one location to another instantly. Networks allow many users to share a common pathway and communicate with each other. The networks include the local area network (LAN) in library housekeeping and resource sharing and wide area network (WAN) that covers wide geographic area such as a country or state, that covers limited geographic area such as campus, or building e.g. - DELNET, INDONET, INFLIBNET, MALIBNET, NICNET, ADINET etc are major WAN in India.

#### **23. NPTEL SERVICES:**

NPTEL provides E-learning through online Web and Video courses in Engineering, Science and humanities streams. The mission of NPTEL is to enhance the quality of engineering education in the country by providing free online courseware.

#### **24. ONLINE FULL TEXT SERVICE:**

A full-text database is a compilation of documents or other information in the form of a database in which the complete text of each referenced document is available for online viewing, printing, or downloading.

### **25.ONLINE INSTRUCTIONS:**

Libraries are also implementing online based bibliographic or library use programs. These include online tutorials on searching online resources and virtual tours of library collections.

### **26.ONLINE PUBLIC ACCESS CATALOGUE (OPAC):**

It is the computer form of library catalogue to access materials in the library. It is an online database of materials held by a library or group of libraries. It is a computerized library catalog available to the public. Most OPACs are accessible over the Internet to users all over the world.

### **27.ONLINE READERS' ADVISORY SERVICES:**

Libraries are implementing Web based versions of readers' advisory services and reference services. It helps to find the right information/reading material for the right person at the right time and provide the best information that matches their needs, interests, and reading level.

### **28.OPEN SOURCE SOFTWARE:**

Open Source Software or the OSS is freely available computer software, which allows altering the source code and customizing the software to anyone & for any purpose. In the last few years we have seen the development of a number of ILS products in the open source world such as Integrated Library Systems (ILSs) like Koha; Digital library software, like Greenstone; Digital Repository Software, like DSpace; Content Management Software, like Moodle, etc.

### **29.PRINTING TECHNOLOGY:**

A printer is a device that converts computer output into printed images. There are a number of different kinds of printers used in libraries such as Dot Matrix Printers, Laser printer, Inkjet, Bubble-Jet, etc.

### **30.RFID TECHNOLOGY:**

RFID (Radio Frequency Identification) is the latest technology being used in modern libraries to prevent theft of the library materials. Radio frequency identification is a term used for technologies utilizing radio waves for identifying individual items automatically. It is a fastest, easiest, most efficient way to track, locate & manage library materials and being used in the libraries for automatic check-in and check-out circulation process and also in stock management. It is an emerging, more effective, convenient, and cost efficient technology in library automation and security. RFID is used very similar to bar codes. Develop-

ments inRFID technology continue to yield larger memory capacities, wider reading ranges,and faster processing.

### **31.SMART CARD FOR MEMBER IDENTIFICATION:**

A Smart Card is a polyvinylplastic card (like a regular credit card) with an embedded chip on which data isstored. Smart cards can provide identification, authentication, data storage and application processing. Smart card readers are used to read smart cards. It can storemulti applications and can be used for services like electronic purse/ debit card/ creditcard/ health/ insurance/ loyalty etc.

### **32.STORAGE TECHNOLOGY:**

Optical disc storage technology is the most recentcomputer technology to enter the library community. CD ROM developed in 1985has ability to represent various media such as text, graphics and animation, videoclips and sound files into a digital environment. Digital video disk or digital versatiledisk (DVD) is the next generation of CD. The main feature of DVD is thecompression technology and storing data on multi layer sides, stores 17 GB data is currently the only credible true multimedia format.

### **32.TELE TEXT SERVICES:**

Tele text is a television information retrieval servicedeveloped in the United Kingdom in the early 1970s. It offers a range of text-basedinformation, typically including national, international and sporting news, weatherand TV schedules. Teletext information is broadcast in the vertical blanking intervalbetween image frames in a broadcast television signal.

### **33.TELECONFERENCING:**

Teleconferencing is a generic term that denotes thecombined use of telecommunication and electronic technologies as an alternative toin-person meetings.

### **34.VIDEO CONFERENCING:**

Videoconferencing is a method of holding conferencesby transmitting and data communication networks, so that participants can both seeand hear each other. It is convenient and less expensive for conducting a conferencebetween two or more participants situated at different remote locations.

### **35.VIDEOTEXT SERVICES:**

Videotext is a newer technology, but as in the on-lineinformation retrieval, the information is stored in computer files and accessed througha telecommunication link. Video-

text is any system that provides interactive content and displays it on a visual device, typically using modems to send data in both directions.

### **36.VOICE MAIL:**

Voice mail is also known as voice mail, voice message or voice bank is a computer based system that allows users and subscribers to exchange personal voice messages. Voice mail acts like a telephone machine that digitizes the incoming voice message and store for retrieval later. It is an alternative system of e-mail.

### **37.WEB TECHNOLOGY:**

The World Wide Web was developed in 1989 by Tim Berners Lee and by 1995 web has expanded to global proportions. The World Wide Web (WWW) is a client server based, distributed hypertext, and multimedia information system on the Internet.

### **CONCLUSION**

In this Module, the objectives of university libraries in support of university education have been discussed. The fundamental function of university library is to serve as a dynamic instrument of education, and how with the application of information technology the functions of the university libraries are also undergoing a change to keep up with the changing information environment. It describes the backbone of the university libraries in the variety of information services they offer to their clientele. For this purpose libraries have to build adequate information resources, physical resources such as building, furniture and other equipments required to serve the users better.

Information and communications technology (ICT) have brought unprecedented change and transformation to university library and information services. It has created an environment where rapid continuous change had become the norm. Gone are the days when the library's collection was its pride and determined its value. ICT has reduced the library from its stature as custodian of our literary heritage to being a competitor among many others in the information society. The concept of the university library as a physical entity is being eroded by online access and the rise of virtual university libraries. Access has replaced ownership and the Internet has made remote access to databases possible 24 hours 7 days per week. The university library finds itself in a time of tremendous challenge but it is also a time of boundless opportunity to use ICT creatively to enhance service delivery to the user.

University librarians should through research and consultation with their users find ways to add value to the user's information retrieval experience. Until a few years ago the automation of libraries was a great dream for many libraries in the third world. Now more and more libraries in developing countries are working with online and/or CD-ROM databases, the Internet and OPACs. Libraries can collaborate with each other more than before and can exchange information much more easily and faster. Internet usage has grown in the

whole country, and at the university libraries students are able to use the Internet whenever they please.

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## **LIBRARY AND INFORMATION SERVICES AND ICT RESOURCES IN UNIVERSITY LIBRARIES**

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RESEARCH GUIDE

**Dr. S.A.S. SAMBATHKUMAR**

### **ABSTRACT**

*The data mining approaches are marked as important to health care and data warehousing which we used in this paper. The current healthcare system was designed for a fee-for-service business model; it isn't up to the task of delivering optimal care, reducing costs, and improving patient satisfaction. To move to a value-based care model, a significant transformation needs to occur. So, here the data mining paper approach Evidence-based medicine (EBM). It is a new direction in modern healthcare. Its task is to prevent, diagnose and medicate diseases using medical evidence. Here in this paper propose a data warehouse based approach as a suitable solution for the integration of external evidence-based data sources into the existing clinical information system(CIFS) and data mining techniques for finding appropriate therapy for a given patient and a given disease. Data Warehouse is today's biggest need so it's very important to health care system, and it is trying to give our best to make people understand about evidence based medicine by this paper.*

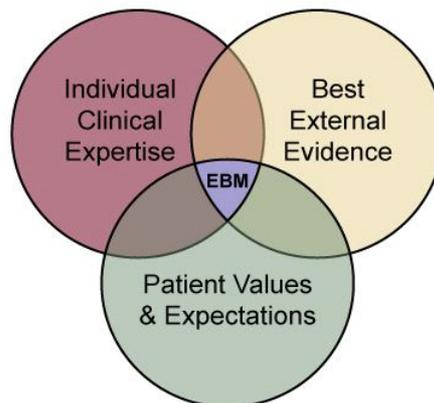
**KEYWORDS:** Data mining, Data warehousing, EBM, CIFS, OLAP, Decision Support System.

### **INTRODUCTION**

Data warehouses may be relatively new to the healthcare provider environment, but they have been in use in other industries here the paper use for evidence based medicine to support healthcare data warehousing relevance. The evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The task of the evidence-based medicine is to complement the existing clinical decision making process with the most accurate and most efficient research evidence. For example, when treating a diabetes patient suffering from a progressive liver disease, his (her) clinician has to find the most efficient therapy, which does not conflict with the

patient's ongoing diabetes treatment. best evidence for treating liver diseases and verifies if the proposed method fits into the diabetes patient's health risks. The term data warehouse was coined with the definition of Inmon: "A warehouse is a subject-oriented, integrated, time variant and non-volatile collection of data in support of management's decision making process" The combination of data warehousing and data mining technology and evidence-based medicine as a new direction in modern health care commences an innovative application field of information technology in health care industry.

It means integrating individual clinical expertise with the best available external clinical evidence from systematic research. The integration of clinical expertise, patient values, and the best research evidence into the decision making process for patient care. It is consider the following diagram:



Evidence-based health care is the conscientious use of current best evidence in making decisions about the care of individual patients or the delivery of health services. Current best evidence is up-to-date information from relevant, valid research about the effects of different forms of health care, the potential for harm from exposure to particular agents, the accuracy of diagnostic tests, and the predictive power of prognostic factors.

Evidence-based clinical practice is an approach to decision-making in which the clinician uses the best evidence available, in consultation with the patient, to decide upon the option which suits that patient best.

Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

## **LITERATURE REVIEW**

Organizations that participate in accreditation confirm their commitment to quality improvement, risk mitigation, patient safety, improved efficiency, and accountability; it sends a powerful message to key decision-makers and the public. This performance measure contributes to the sustainability of the health care system. In the current era of heightened fiscal responsibility, transparency, accountability, and escalating health care complexity and risk, accreditation contributes to ensuring that care meets the highest standards of health care decision-making and provision. Accreditation can serve as a risk mitigation strategy, and it can also measure performance; it provides key stakeholders with an unbiased, objective, and third-party review.

## **EXISTING SYSTEM**

Despite the benefits being offered by Clinical Information Systems, they are not without the barriers that prevent them from being rolled out in every hospital. These include some of the following.

### **Initial cost of acquisition**

The high cost of basic infrastructure of clinical information technology can be a stumbling block to many healthcare organizations.

### **Privacy and Security**

There are still huge concerns in the healthcare industry about the privacy of patient data on computer systems and how to keep such information secure.

### **Clinician Resistance**

Clinicians usually have 10-20 minutes to see their patients and if their interactions with these sessions proves to be counterintuitive by taking up more time than is necessary, there is bound to resistance to its use.

Integration of Legacy Systems:

This poses a stiff challenge to many organizations.

## **PROPOSED SYSTEM**

The proposed medical data warehouse contains data from all organizational departments as well as evidence-based guidelines. This data is prepared and offered

to be queried and analyzed in any desired way. Clinical management is often interested in finding out, which treatments and medications led to more rapid and more economic patient convalescence.

Data mining and OLAP analytical functions support business decision makers in creating the most effective business strategies that satisfy both patients' expectations and financial potential. If administrative data is available in the data warehouse, it can be combined with evidence-based medicine recommendations in order to give advice about the right number of skilled staff needed for particular medical treatments. This information can further be used for work and treatment scheduling and so to support medical decision makers in the area of human resources.

EBM With rapid changes taking place in the field of health care, decision support systems play an increasingly important role.

Health care institutions are deploying data warehouse applications as decision support tools for strategic decision making relevant data sources for the clinical decision support

systems for evidence-based medicine purposes are:

- Evidence-based guidelines (in form of rules)
- Clinical data (patient data, pharmaceutical data, medical treatments, length of stay)
- Administrative data (staff skills, overtime, nursing care hours, staff sick leave)
- Financial data (treatment costs, drug costs, staff salaries, accounting, cost-effectiveness studies)
- Organizational data (room occupation, facilities. equipment)

The most relevant application fields for data warehousing in the area of evidence-based medicine are utilized to support:

1. The generation process of the evidence-based guidelines
2. The clinicians at the point of care delivery, by making evidence-based rules available
3. The controlling of clinical treatment pathways.

4. The administrative and management tasks, by providing evidence-based knowledge as well as diverse organizational and financial data.

Figure illustrates the use of data warehouse facilitating evidence-based medicine, at the point of care. Firstly, clinician defines a clinical question based on the disease patient is suffering from. It uses an OLAP tool in order to query the data warehouse. Standard, predefined reports as well as adhoc queries can be used. After that, selected tables are joined inside the data warehouse on the fly. For example, advised medical treatments and drugs, coming from evidence-based guidelines, are matched with patient health history data, existing clinical equipment and available qualified staff, residing in the warehouse. Finally, relying on all the available data, the best fitting rule is chosen and presented to the clinician by the OLAP tool in an illustrative manner.

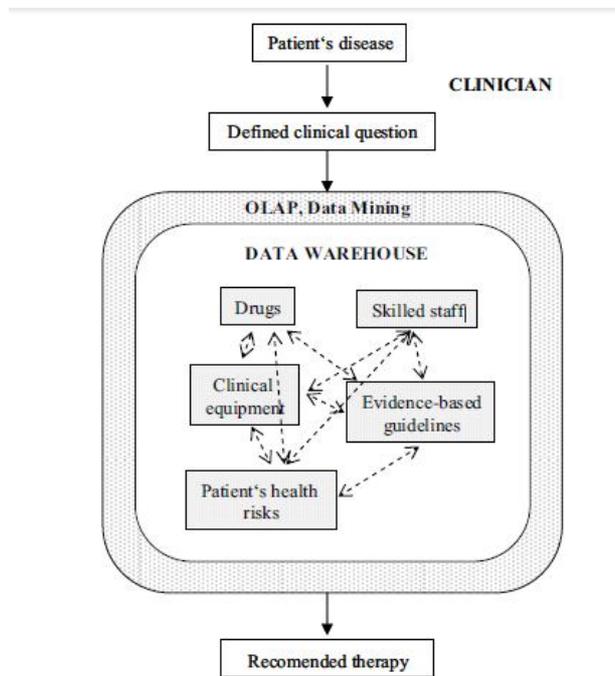


Fig: Data warehouse at the point of care

**FURTHER ENHANCEMENT**

Integrated Clinical Evidence System designed to augment the typical literature-based clinical evidence with additional technology-mediated clinical evidence. They propose a technology-enriched strategy to exploit advance computer

technologies – knowledge management, data mining, case based reasoning strategies and internet technology – within traditional evidence based medicine systems to derive all-encompassing clinical evidence derived from heterogeneous clinical evidence modalities.

## **CONCLUSION**

In this work we have shown the role of data warehousing and data mining technique for the use of evidence-based medicine.

The consequence of not applying evidence-based medicine is the time loss in a patient treatment process. But, even when applying it, it needs to be presented to decision makers in a proper and useful manner. Only external, evidence-based knowledge is not enough for efficient treatment of individual patients.

This knowledge always needs to be adjusted to the patient's health condition and preferences. Development of evidence-based guidelines, support of the clinicians at the point of care and controlling of clinical pathways are undertakings, which can hardly be fulfilled without IT-support. Because of immense data volumes and extremely complex knowledge discovery procedures, we consider data warehouse with its OLAP and data mining tools to be a very suitable solution for accomplishment of this task.

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## COMPUTATIONAL STUDIES OF 5-AMINO-2-HYDROXYBENZOIC ACID AND ITS DERIVATIVES

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### ABSTRACT

*This paper describes a large scale study of 5-amino salicylic acid (5-ASA) and its derivatives. To calculate the semi-empirical quantum chemical properties of 5ASA were optimised and characterised with quantum chemical methods. Modern semi empirical methods involve the generation of self consistent field. In this the electron distribution is made a function of kinetic and potential energy of the electron. The usage of MOPAC 2016 software its prediction of pharmacological classification of the drug 5ASA based on HPLC and non-empirical structural parameters was studied. And the stability of the molecules arising from hyperconjugative interactions, charge delocalization, and the natural atomic charges have been analysed using natural bond orbital analysis. The results obtained from experimental and molecular modelling showed that 5-ASA and its important substituents may be synthesised for biologically important active compounds.*

**KEYWORDS: MOPAC2016, mesalazine, ionisation potential, enzyme inhibitor**

### 1.1 INTRODUCTION

Semi-empirical quantum chemistry methods are based on the Hartree-Fock formalism, but make many approximations and obtain some parameters from empirical data. They are very important in computational chemistry for treating large molecules where the full Hartree-Fock method without the approximations is too expensive. The use of empirical parameters appears to allow some inclusion of electron correlation effects into the methods.

Modern semi empirical models are based on the Neglect of Diatomic Differential Overlap.<sup>[5][6][7]</sup> (NDDO) method in which the overlap matrix  $S$  is replaced by the unit matrix. This allows one to replace the Hartree-Fock secular equation  $|H-ES| = 0$  with a simpler equation  $|H-E|=0$ .

Austin Model 1, AM1<sup>[1]</sup> (by Dewar and co-workers) takes a similar approach to MNDO in approximating two-electron integrals but uses a modified expression for nuclear-nuclear core repulsion.

Semi-empirical calculations have been most successful in the description of organic chemistry, where only a few elements are used extensively and molecules are of moderate size. However, semi-empirical methods were also applied to solids and nanostructures<sup>[2]</sup>, but with different parameterization.

### **Availability, Applicability, and Accuracy of Semi empirical Methods**

The semi empirical models MNDO, AM1, and PM3 are available in many computational chemistry programs while the more recent PDDG/PM3 model has been implemented in the program BOSS.<sup>[3]</sup> Some freely available computational chemistry programs that include many semi empirical models are MOPAC 6, MOPAC 7, and WinMopac.

1. Computational modelling of structure-activity relationships to gain insight about reactivity or property trends for a group of similar compounds.
2. Design of chemical synthesis or process scale-up, especially in industrial settings where getting a qualitatively correct answer today is more important than getting highly accurate answer next week.
3. Development and testing of new methodologies and algorithms, for example development of hybrid quantum mechanics / molecular mechanics (QM/MM) methods for modelling of biochemical processes.

### **2.0 History of mesalazine**

5 amino salicylates have had a dramatic effect on the management of patients with inflammatory bowel disease<sup>[7]</sup>. Their success in reducing the frequency of flare-ups in ulcerative colitis laid the foundations of long-term disease control in gastroenterology. As a result the concept that medication should be taken to prevent disease episodes was present at the beginning of therapeutic gastroenterology.

5 amino salicylates were amongst the first disease specific therapeutic agents of the twentieth century. They were conceived as drugs that could be targeted at the cause of disease. original idea of dealing directly with infection and inflammation through the combining of sulphonamides and aspirin derivatives was a re-fection of the growing belief of the 1930s that treatment should be targeted.

### **3.0 COMPUTATIONAL METHODS**

#### **3.1 Hardware**

The programs were run on a CPU supported by -INTEL® CORE(tm) 2 DUO , E7200 processor clocking @ 2.53GHZ , running on Microsoft windows 7 professional SP2 with 64 bit support over a RAM of 2.00 GB. The graphics were visualized using the embedded graphical processor in the mother board.

#### **3.2 Software**

##### **3.2.1 Chems sketch**

The molecule was drawn on chemsketch and was subjected to 2D optimization. It was saved in PDB and 'mol' format to be later retrieved to other GUI programs. The fragments were incrementally changed according to desired substituents. The Chems sketch program also provided the interface for naming the compounds according to IUPAC nomenclature. All the derivatives were drawn using chemsketch and named on the IUPAC format and saved as 'PDB' and 'mol' format files.

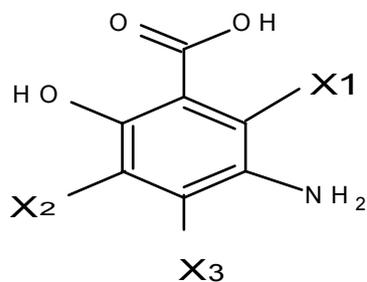
##### **3.2.2 Winmostar**

Winmostar<sup>[4]</sup> is graphical user interface software which supports molecular modelling, execution of computation programs and visualization of the results. Winmostar uses Z-matrix format (internal coordinate) for molecular modelling. The program is designed to provide simple and intuitive working environment to construct and edit molecules without knowing Z-matrix method. But still Z- matrix was written in order to gain first hand insight into the geometry. Any modification or rotation of an atom or group of atoms on display automatically was transferred and converted into Z-matrix table conserving original bond relationships among the atoms. The Z-matrix table in this program allowed direct editing.

##### **3.2.3 MOPAC2016**

MOPAC<sup>[5]</sup> (Molecular Orbital Package) is a semi-empirical quantum chemistry program based on Dewar and Thiel's NDDO approximation. MOPAC2016 is MOPAC2012 plus the PM7 and PM7-TS methods. The keywords used were RM1, VECTORS, BOND, SYMMETRY, PRECISE and the output generated was visualized using Winmostar. CNDO command was later invoked from the OUT file.\

## 5.2 RESULT AND DISCUSSION STRUCTURES OF MESALAZINE: structures of 5-amino-2-Hydroxy benzoic acid and its substituent



SINO	EMPIRICAL FORMULA	X1	X2	X3
ME00	C7H7NO3	H	H	H
ME01	C7H8N2O3	NH2	H	H
ME02	C7H6N2O5	NO2	H	H
ME03	C7H7NO4	OH	H	H
ME04	C8H9NO4	OCH3	H	H
ME05	C8H6N2O3	CN	H	H
ME06	C7H6NO3Cl	Cl	H	H
ME07	C7H6NO3Br	Br	H	H
ME08	C7H6NO3I	I	H	H
ME09	C8H7NO4	CHO	H	H
ME10	C7H6N2O4	NO	H	H
ME11	C7H8N2O3	H	NH2	H
ME12	C7H6N2O5	H	NO2	H
ME13	C7H7NO4	H	OH	H
ME14	C8H9NO4	H	OCH3	H
ME15	C8H6N2O3	H	CN	H
ME16	C7H6NO3Cl	H	Cl	H
ME17	C7H6NO3Br	H	Br	H
ME18	C7H6NO3I	H	I	H
ME19	C8H7NO4	H	CHO	H
ME20	C7H6N2O4	H	NO	H
ME21	C7H8N2O3	H	H	NH2
ME22	C7H8N2O3	H	H	NO2
ME23	C7H8N2O3	H	H	OH
ME24	C7H8N2O3	H	H	OCH3
ME25	C7H8N2O3	H	H	CN
ME26	C7H8N2O3	H	H	Cl
ME027	C7H8N2O3	H	H	Br
ME28	C7H8N2O3	H	H	I
ME29	C7H8N2O3	H	H	CHO
ME30	C7H8N2O3	H	H	NO

Table A few computed properties of the derivatives

S.NO	EMPIRICAL FORMULA	IONISATION POTENTIAL	HOMO LUMO ENERGY DIFF (eV)	SOFTNESS	HARDNESS	COSMO AREA (A <sup>2</sup> )	LOG P	ENZYME INHIBITOR
ME00	C7H7NO3	8.0586	7.745	0.258	3.872	170.7	0.92	-0.18
ME01	C7H8N2O3	8.4024	8.611	0.116	4.305	183	0.32	0.05
ME02	C7H6N2O5	8.9877	7.959	0.125	3.979	192.8	0.39	0.18
ME03	C7H7NO4	9.117	9.054	0.11	4.527	181.41	0.62	-0.15
ME04	C8H9NO4	8.2683	8.218	0.121	4.109	196.21	0.89	0
ME05	C8H6N2O3	8.7155	7.992	0.125	3.996	190.93	0.59	0.08
ME06	C7H6NO3Cl	8.3641	8.149	0.122	4.074	187.03	1.51	-0.21
ME07	C7H6NO3Br	8.3459	8.193	0.122	4.096	191.73	1.65	-0.27
ME08	C7H6NO3I	8.4214	8.08	0.123	4.042	193.71	0.97	-0.21
ME09	C8H7NO4	8.5827	8.137	0.122	4.068	188.76	0.74	0
ME10	C7H6N2O4	8.6355	7.648	0.13	3.824	185.32	0.43	-0.06
ME11	C7H8N2O3	7.9698	8.094	0.123	4.047	185.22	0.13	-0.16
ME12	C7H6N2O5	8.7499	7.46	0.134	3.735	198.03	0.2	0.06
ME13	C7H7NO4	8.3944	8.193	0.122	4.096	181.48	0.2	-0.08
ME14	C8H9NO4	8.4021	8.161	0.122	4.08	199.85	0.5	-0.14
ME15	C8H6N2O3	8.6206	7.933	0.126	3.966	196.1	0.4	0.15
ME16	C7H6NO3Cl	8.4081	8.083	0.123	4.041	190.56	1.32	-0.22
ME17	C7H6NO3Br	8.3764	8.093	0.123	4.046	195.88	1.45	-0.27
ME18	C7H6NO3I	8.218	8.77	0.114	4.385	198.46	1.73	-0.34
ME19	C8H7NO4	8.4466	7.842	0.127	3.921	194.08	0.54	-0.01
ME20	C7H6N2O4	8.4722	7.375	0.135	3.687	191.36	0.24	-0.18
ME21	C7H8N2O3	7.9698	8.094	0.12	4.047	185.26	0.74	-0.03
ME22	C7H6N2O5	7.9698	8.094	0.123	4.047	185.26	0.81	0.07
ME23	C7H7NO4	8.3944	8.193	0.122	4.096	181.48	1.04	-0.12
ME24	C8H9NO4	8.4024	8.161	0.122	4.08	199.92	1.31	-0.17
ME25	C8H6N2O3	8.6205	7.933	0.126	3.966	196.1	1.01	-0.09
ME26	C7H6NO3Cl	8.4081	8.082	0.123	4.041	190.56	1.94	-0.25
ME27	C7H6NO3Br	8.3764	8.093	0.123	4.046	195.88	2.07	-0.35
ME28	C7H6NO3I	8.218	7.666	0.13	3.833	198.48	2.34	-0.2
ME29	C8H7NO4	8.4465	7.842	0.127	3.921	194.06	1.16	-0.08
ME30	C7H6N2O4	8.4741	7.375	0.135	3.687	191.29	0.86	-0.17

Mesalazine, also known as Mesalamine or 5-aminosalicylic acid (5-ASA), is an amino salicylate anti-inflammatory drug<sup>[2]</sup> used to treat inflammatory bowel disease, including ulcerative colitis,<sup>[3][4][5]</sup> or inflamed anus or rectum,<sup>[6]</sup> and to maintain remission in Crohn's disease.

It is a kind of metabolic activity whose mechanism of action has not been clearly understood. However a lot of kinetics and pharmacokinetics work have been done and the nature of activity has been established. It has been found to be oxidative metabolism. However the value of Mesalazine and the test of drug metabolism capacity are still controversial. These derivatives are also found to have promising property for optical communications and opto-electric compounds.

In view of the above, it was found necessary to calculate the quantum chemical properties of this molecule. In this project Mesalazine and its derivatives were optimised and characterized using Quantum chemical methods<sup>[60]</sup>. The derivatives were chosen keeping in mind the important substituents (or) ligands in chemistry; for instance some substituents were taken from spectro-chemical series, where these ligands have inductive and other electronic effects. The main compound was first optimized and the properties such as ionisation potential, tabulated and compared with the derivative counterparts. The main molecule is given in below figure.

The substituents positions were chosen according to chemical intuition such as Ortho, Para and Meta states where substituent effect was felt at certain points and whose charges were calculated.

Out of the the ortho positions carbon atom 1 has the highest ionisation potential value followed by ME02 which had NO<sub>2</sub> in the ortho position to the carbon atom of the benzene ring. The third highest ionization potential was found to be ME12 which has "NO<sub>2</sub>" group in the para position to benzene ring. This suggests that compounds containing hyper-valent atoms such as chlorine and Nitrogen have great ionisation potential that may be useful places where electronic interaction with the receptor molecule is significant. Moreover there is pi-electron system, in both these molecules which may help in inductive (or) other similar electronic effects.

The ionisation potential of the next three compounds ME05, ME10 and ME15 also has CN and NO as the substituent ligands. Hence wherever such effect is needed these ligands may be incorporated at appropriate position and their effect studied. Some of the compound had less ionisation potential than the parent compound, these include ME11, ME21, and ME22 that were found from the ligands

such as  $\text{NH}_2$ ,  $\text{NO}_2$  which have +I effect and electron releasing in nature, have lesser ionization potential. Therefore at places where metabolic activities are dependent upon the ionisation potential of the molecule, these substituents should be avoided

### **enzyme inhibitor. Ionization potential**

Compounds with moderate ionization potential values were found to be with halogen atom such that the incorporation of electronegative atoms moderately affected the ionisation potential compared to those Hyper-valent atoms such as Sulphur, Nitrogen and those ligands with pi-electron releasing nature (nephleuxetic effect) wherever good ionisation potential is considered. Conductor like screening model (Cosmo) is a parameter that determines the area of the molecule in a different phases. The "Cosmo" procedure generally provides the polygen surface around the system at Van der Waals' distance which is very important for drug like interactions. This parameter was studied and the values were tabulated. Higher area was provided by ME24 followed by ME14 and ME28. This again showed that the presence of  $\text{OCH}_3$  and I derivative is influential. As a result of that one can expect very large amount of interactions with the receptor molecules (or) the solvent medium. The next three series of the compounds included ME18, ME12 and ME04.

These three molecules seem to have great surface area because of the presence of large atoms such as iodine, Nitrogen and the ligand  $\text{OCH}_3$ . Where such interactions are required, these kind of groups may be introduced to the parent compound that have the lowest "Cosmo" area. ME03, ME13 and ME23 had a moderate value which means that where there is less effect needed these can be incorporated.

Hardness of a molecule represents the property of resistivity to change. i.e. compounds with greater hardness in a series of molecules show their resistivity. In our series ME03 shows the higher hardness value followed by ME04 and ME01. It may be noted that the hardness is shown by molecule at substituents  $X_1$ . Therefore any substitution at position  $X_1$  is bound to increase the hardness of the molecule and is very useful in places where ligand docking with macro-molecule without changing the structure. These series of a molecules can be bound to the receptor without changing the shapes and carry out the metabolic activity. Therefore these three drugs may be prepared and tested for biological activity. These molecules are followed by ME09, ME07 and ME06. Again these are the molecules which have the substituent at  $X_1$ .

The softness represents the reactivity of a molecule, increasing order softness is present in the table no. 2 and it may be noted that the parent compound and the following derivatives ME30, ME20, ME12, ME10 and ME28 all, have very great

activity facts. This is followed by ME23, ME25, ME24. Here the reactivity may be attributed to the presence of pi-electron systems along the substituents. A study on the charges on the atoms on which the substituents are done i.e. ( $C_3$ ,  $C_4$ , and  $C_6$ ) is also tabulated.

This will help us to establish the attacking (or) binding site. If the reactivity is charge based, it can be seen from the table that charge on the X2 is contributing more to the charge on the  $C_8$  atom than the other two. Charge based descriptions may thus be studied further to establish reactivity pattern along with the softness and hardness parameters. To find out the reactivity two biological parameters like enzyme inhibitor, log P has been tabulated at table no.4 and table no.5 respectively.

The enzyme inhibitor capacity is more for ME02, ME15, ME22 and ME05. These four molecules have NO<sub>2</sub> and CN substituents in some or other positions. Therefore this ligand, effect the enzyme inhibitor capacity. These are followed by ME04 and, ME09, these have "CHO and OCH<sub>3</sub>" as the substituent. These value of enzyme inhibitor has zero. ME04 and ME09 is a biologically active small molecule and its substitution will definitely have deserved activity. Thus this class of change may also be tested for biological activity

Log P values which represent the ratio of distribution of the drug in aqueous and the organic layer were also computed. The three molecules ME15, ME12, and ME20 which had the highest enzyme inhibitor capacity have the lowest log P value, which means these drugs can be classified as important based on the semi empirical level calculation. However thorough Molecular Modelling has to be done to establish the credential properties shown by these values.

The highest log P value is shown by ME28, ME27 and ME26, which have iodine, chlorine and bromine atom alongside the benzene ring. So iodine derivatives may be studied separately for the distribution factor and must be compared with the other methods of finding out the distribution parameters.

## **CONCLUSION**

From the above discussion, it can be clearly established that the following compounds, viz: ME03, ME02, ME15, ME10, ME22, ME27, ME28, ME09, ME12, ME04, and ME05 may be synthesized, the biological activity and the parameters like log P and enzyme inhibitor be verified. The drug designing and modelling requires all the above techniques be adopted before a trial and medicinal or biological activity is carried out.

If the mechanism of the drug is known then some of the compounds may be subjected to docking studies or pharmacophore modelling. On the same grounds Structure-Activity, Structure-Property and Structure-Toxicity studies may be carried out and the efficient drug or medicine may then be evaluated.

## **7. ACKNOWLEDGEMENT**

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# **Part B:**

# **Humanities**



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## CRITICAL EVALUATION OF TRAINING AND DEVELOPMENT OF EMPLOYEES – A STUDY WITH REFERENCE TO BPO COMPANIES IN MALAYSIA

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### Abstract

*Training and Development is a mix of training as well as development. It focuses more on overall development of employees in the business concern. Training and Development is an effective tool through which performance of employees is improved besides improving group performance. Training has significant role in teaching employees of sharpening skills, concepts, changing of attitude and gaining more knowledge to enhance performance of the employees. Training should be efficient enough so that it would help the employees of their development subsequently a company can also improve in the long run.*

Key Words: Training and Development, One Sample Test, Bivariate Correlation

### Introduction

Training and Development is a mix of training as well as development. It focuses more on overall development of employees in the business concern. Training and Development is an effective tool through which performance of employees is improved besides improving group performance. Training has significant role in teaching employees of sharpening skills, concepts, changing of attitude and gaining more knowledge to enhance performance of the employees. Training should be efficient enough so that it would help the employees of their development subsequently a company can also improve in the long run.

Training helps you understand your pros and cons and an employee can identify his shortcomings at the work and he can subsequently improve himself in the organisation. Some experts defined the training as it is about knowing where you are in the present and where you have to be in the future. By training, people can learn new information, new technology and refresh their existing knowledge and skills. Because of this, there is much improvement and adds up the effectiveness at

work. The purpose of giving training is to create an impact that lasts beyond the end time of the training itself and employees gets updated with the new phenomenon. Training is thus, adding new skills to the employees and he is able to cope up with any crisis situation.

Development refers to those learning opportunities designed to help employees grow. Development is not primarily skill oriented. Instead, it provides general knowledge and attitude which will be helpful to employees in higher positions. Efforts towards development often depend on personal drive and ambition. Development activities such as those supplied by management developmental programmes are generally voluntary.

Training and Development by a formal definition is narrated as it is any attempt to improve current or future employee performance by increasing an employees' ability to perform through learning usually by changing the employee's attitude or increasing his or her skills and knowledge.

### **Training and Development in BPO industry**

BPO industry in India is steadily fast growing withit providing stable employment opportunities for the educated youth. It contributes a lot to the economy of our country by ensuring standard of living among the people besides alleviating unemployment problem. Training and development in BPO sector is the need of the hour as employees in such a sector have to undergo training constantly to face challenges at the work place. With economy ever changing, employees are forced to undertake complicated tasks. Without providing sufficient training to the employees, those challenges will paralyse the BPO industry in general and employees in particular. Training enables the employees learn new skills and new techniques thereby enabling employees face tremendous challenges with the BPO Market being driven by many uncontrollable forces.

### **Objectives of the Study**

1. To examine how training is provided to the employees of BPO Companies in Malaysia.
2. To review whether training provided to the employees is effective in meeting their tasks.

### **Statement of the Problem**

The study is concerned with Training and Development of the employees in BPO companies in Malaysia. There are invariably concerns over providing training to the employees of the BPO companies across the country. This does not mean that training should never be provided to the employees in BPO companies. Duration is a matter of concern as far as training is provided to the employees of the BPO companies. When work, family life, and a slew of other demands are draining employees' energy, there's a risk that training just adds to their stress. Worse still, intruding on employees' personal time with training sessions is a sure fire way to make them resist (and even resent) training.

A steady rise in shift work and a decentralized workforce has led to new challenges in training and development. Sometimes training is not imparted to the employees to deal with clients of foreign countries. As some employees work in night shift, they find it difficult to attend the training session. There is lack of attention on the part of employees which adds woes to the training and development program in the company.

Many training programs are too generic, and not personalized enough for specific roles or skills. Unfortunately, generic training can strain learners' time and patience by forcing them to engage with content that simply isn't relevant to them. You can bet this leads to further training challenges.

### **Significance of the Study**

Training and Development is very essential for the employees of BPO industries. Many people culminate in doing their routing work that does not allow them to learn any new skills and techniques. By training and development programme, employees are being shaped to accomplish the goals of the company. Training and Development brings about many changes among the employees thereby employees are getting skilled to carry out their day to day work under changing environment. The employees will progress well in their work. They learn many new things which are otherwise not available in their field. Training and Development make the employees feel job satisfied. They get to do their work with passion. They reach the goal of work in less span of time. If Training and Development program serves its purpose, employees resort to challenging task in the organisation.

## **Review of Literature**

According to the Michel Armstrong, “Training is systematic development of the knowledge, skills and attitudes required by an individual to perform adequately a given task or job”. According to the Edwin B Flippo, “Training is the act of increasing knowledge and skills of an employee for doing a particular job.”

The term ‘training’ indicates the process involved in improving the aptitudes, skills and abilities of the employees to perform specific jobs. Training helps in updating old talents and developing new ones. ‘Successful candidates placed on the jobs need training to perform their duties effectively’.

The principal objective of training is to make sure the availability of a skilled and willing workforce to the organization. In addition to that, there are four other objectives: Individual, Organizational, Functional, and Social.

## **Research Methodology**

This study is meaningful in nature as Researcher has listed out the objectives through which he has carried out his research work. As it is a survey based study, researcher has used descriptive research design for his study. Similarly, convenient sampling has been used for this study as the selection of sample has been done conveniently. Sample size for this study is 150 who are the employees of BPO companies in Malaysia. Those 150 employees are working for various BPO companies across Malaysia. These companies include VADS Berhad, ICT Services & BPO, VPO Services, and Chima Services. 50 employees are selected from each of these companies for the study. Researcher has collected data from both sources namely primary data and secondary data. Primary data have been collected by way of Circulation of well structure questionnaire while secondary data were constructed by referring to various viable sources such as newspaper, magazines, articles and respective websites.

## **Statistical Tools used for the study**

1. Descriptive Statistics
2. One Sample Test
3. Bivariate Correlation

**Data Analysis and Results Discussion**

<b>Table 1</b>				
<b>Descriptive Statistics for mode of training the employees</b>				
	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Variance</b>
Training is held at the work place of employees	150	.7800	.41563	.173
Company make batches to provide training to its employees	150	.7533	.43252	.187
Shift pattem is followed when training employees in BPO companies	150	.8133	.39095	.153

**Inference**

The above table indicates descriptive statistics for mode of training the employees. Mean value is highest towards shift pattern is followed when training the employees in BPO companies. Therefore, many employees express their opinion whether training is conducted based on shift pattern. Next higher mean score is .7800 which is observed at Training is held at the work place of employees. Therefore, many employees enunciate that training is held at their work place itself. The last mean score is .7533 that goes to company make batches to provide training to its employees. Likewise, as far as standard deviation is concerned, the highest value is witnessed for the second statement that is company make batches to provide training to its employees.

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Variance</b>
Skill set of employees is improved after training	150	.8067	.39624	.157
Changes in the results of the company after imparting training to its employees	150	.7733	.42008	.176
It leads to proper coordination of work among the employees	150	.7933	.40627	.165

**I****Inference**

From the above table, it is inferred that the highest mean score is given to the first statement named skill sets of employees improved after the training. Training plays important role in enhancing the skills of the employees. This study is evident of it. The next mean score seems to .7933 that indicates training leads to proper coordination of work among the employees. Employees are getting proper direction concerning training programme. At the same time, the last mean score is no way spared with changes in the results being witnessed after the training.

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Training is held at the work place of employees	22.984	149	.000	.78000	.7129	.8471
Company make batches to provide training to its employees	21.332	149	.000	.75333	.6836	.8231
Shift pattern is followed when training employees in BPO companies	25.480	149	.000	.81333	.7503	.8764

### **Inference**

From the above table, it is believed that there is greater significant difference among the variables defined in the mode of training is given by the company. The null hypothesis for mode of training the employees is accepted at 5% level of significance since calculated t value in all the cases is greater than table value.

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Skill set of employees is improved after training	24.934	149	.000	.80667	.7427	.8706
Changes in the results of the company after imparting training to its employees	22.547	149	.000	.77333	.7056	.8411
It leads to proper coordination of work among the employees	23.916	149	.000	.79333	.7278	.8589

### **Inference**

From the above table, it is believed that there is greater significant difference among the variables defined in the effectiveness of employees after the training. The null hypothesis for effectiveness of employees after training is accepted at 5% level of significance since calculated t value in all the cases is greater than table value.

Training is held at the work place of employees	Pearson Correlation	1	.032	.035
	Sig. (2-tailed)		.697	.673
	Sum of Squares and Cross-products	25.740	.860	.840
	Covariance	.173	.006	.006
	N	150	150	150
Company make batches to provide training to its employees	Pearson Correlation	.032	1	-.115
	Sig. (2-tailed)	.697		.160
	Sum of Squares and Cross-products	.860	27.873	-2.907
	Covariance	.006	.187	-.020
	N	150	150	150
Shift pattern is followed when training employees in BPO companies	Pearson Correlation	.035	-.115	1
	Sig. (2-tailed)	.673	.160	
	Sum of Squares and Cross-products	.840	-2.907	22.773
	Covariance	.006	-.020	.153
	N	150	150	150

### Inference

After performing bivariate correlation among the variables of mode of training conducted in the company, least correlation is observed in all the cases. Therefore, variables defined under mode of training employees are having weak correlation. Therefore, each variable defined herein should be given due significance in such a way that employees in all should be benefited by mode of training the employees.

Skill set of employees is improved after training	Pearson Correlation	1	.017	.042
	Sig. (2-tailed)		.834	.610
	Sum of Squares and Cross-products	23.393	.427	1.007
	Covariance	.157	.003	.007
	N	150	150	150
Changes in the results of the company after imparting training to its employees	Pearson Correlation	.017	1	-.001
	Sig. (2-tailed)	.834		.990
	Sum of Squares and Cross-products	.427	26.293	-.027
	Covariance	.003	.176	.000
	N	150	150	150
It leads to proper coordination of work among the employees	Pearson Correlation	.042	-.001	1
	Sig. (2-tailed)	.610	.990	
	Sum of Squares and Cross-products	1.007	-.027	24.593
	Covariance	.007	.000	.165
	N	150	150	150

### **Inference**

After performing bivariate correlation among the variables of effectiveness of employees after training in the company, least correlation and negative correlation are observed in all the cases. Therefore, variables defined under effectiveness of employees after training are having weak correlation of one variable over another. Therefore, each variable defined herein should be given due significance in such a way that effectiveness of employees should be improved further by changing the present system of training.

### **Findings**

1. From the above table1, it is found that variables underscored in mode of training the employees in the BPO industries are having highest positive mean score thereby it is learnt that employees should be trained by batches, on shift pattern and training at the work place itself.
2. Similarly, another finding indicates that effectiveness of employees after training enhances the quality of work among the employees thereby company achieves its target at the short notice.
3. As far as the finding based on one sample test, null hypothesis for mode of training employees is accepted. Thus there is greater significant difference observed among the variables of the mode of training the employees.
4. This finding is with regard to effectiveness of employees after having given the training to its employees. This too bring positive results of training improves efficiency of employees.
5. The finding made from bivariate correlation proves least correlation and negative correlation among the variable of mode of training the employees and effectiveness of employees after training themselves. Therefore, correlation is weak. While mode of training is followed, it is to be noted that proper schedules to be prepared to ensure that training does not affect any employee in the business concern.

### **Suggestions**

1. First of all, researchers have to put forth their valuable suggestions to improve the existing system of training. Before training schedule is prepared, it is advised to the company to consult its employees working on shift basis. Prepare the schedule of training during their free time.
2. In the same way, training should be conducted according to batches. But the present system of training in the company allows employees to undergo training in batches. But, they suffer a lot from many limitations such as training is designed only to specific class of employees. Therefore, rest of the employees fail to cope up with the training process.
3. Accordingly, this suggestion is all about medium of instructions should be followed whenever training the employees. Conduct the training especially in

the regional languages to make sure that employees really understand the purpose of training.

4. At last, employees should express their feedback after the training session is over. They have to rate the trainers using various parameters.

### **Conclusion**

This study is good but at the same time, there are some ifs and buts. There are some suggestions given by the researchers to improve the training process of BPO companies. Training the BPO employees should be taken up with utmost care with they come from different disciplines. Each employee should be regarded the most important in the organisation whereas organisation too should not be reluctant to offer the training every now and then that too after getting to know of the specialisation of employees. Training is in fact improving the ability and stability of employees in the BPO companies. Therefore, researchers conclude their study by saying that training should be imparted to the employees of BPO industries in a well organised manner.

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## **A STUDY ON CUSTOMER SATISFACTION TOWARDS LIC POLICIES IN VANIYAMBADI TOWN**

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### **ABSTRACT**

*In the modern industrialized era human life and property are inevitably exposed to different kinds of risks. Life insurance is the universally pervasive system to eliminate “risk” which facilitates the policy holder to get some security for him/her and his/her family members from the unforeseen risk of death of policyholder who in most of the cases the bread winner of the family. Every human being has the tendency to save and protect him/her and their dependents from risk events of future. And insurance is being such a form of saving where in people tries to assure themselves against risks or uncertainties in future.*

**Key Words:** Customer Satisfaction, LIC Policies

### **INTRODUCTION**

The concept of insurance was introduced by British in the 17<sup>th</sup> Century itself. In the year 1787 the first insurance corporation was formed in New York. The formation of LIC of India by the Government of India which has taken the first step towards nationalization of life assurance business in India on 19<sup>th</sup> January 1956. A thriving insurance sector is very important to every modern economy.

The insurance is a contract between two parties the “insurer” and the “insured” where the insurer agree to pay the insured for any financial loss arising out of any uncertain events in return for a regular payment of a pre-determined sum of money termed called “premium”. In life insurance, it provides both safety and protection to individual and encourages savings. The insurance may be described as a social device to eliminate risk to life and property. There two branches of insurance, namely, general insurance and life insurance of which former deals with the exposure

of risks of a goods and property whereas life insurance is a way to meet the contingencies of physical death and economic loss. The life insurance is a contract for payment of a sum of money to the person assured on any uncertain event.

In the new economic reality of globalization, insurance companies face a dynamic global business environment. Radical changes are taking place owing to the internationalization of the activities, the appearance of the new risk, new type of covers to match with new risk situation, and unconventional and innovative ideas on customer service. Lower growth rates in developing markets, changing customer needs and the uncertain economic conditions in the developing world are exerting pressure on insurance sector. The existing insurance are facing difficulties from non-traditional competitors who are entering the retail market with new approaches and through new channels.

Today LIC functions with 2048 fully computerized branch offices, 113 divisional offices, 8 zonal offices, 992 satellite offices and the corporate office. LIC also has a network of around 13,37,064 individual agents, 242 Corporate agents, 79 referral agents, 98 brokers and 42 banks as on 31.3.2011 for soliciting life insurance business from the public.

## **SIGNIFICANCE OF THE STUDY**

Generally, consumers do not have much awareness on insurance policies and the type of service rendered by LIC. Consumer's satisfaction is the major factor in any type of industry and insurance industry is not an exception to it. Whether marketing tangible product or intangible service. The service quality and satisfaction level of policyholders play a major role. The success of the insurance companies depends on the awareness among the policyholders about the insurance companies.

## **STATEMENT OF THE PROBLEM**

Insurance sector as a whole has contributed to the development of economy through generation of employment opportunities, acceleration of industrial growth etc. Although Insurance Corporation of India has its own significance and place in the economy, it is not free from problems.

Customer satisfaction is the true differentiator for the success of any business and is more so in insurance, where the product is perceived to be the intangible. The three main aspects i.e. awareness level, service quality and satisfaction level of the policyholders have to be considered. Studying the behavior of policyholders and analyzing the existing marketing strategies of Life Insurance Corporation of India

with regard to various products offered by the company. It is perceived through various research studies that the policy holders have lost interest in personal policies due to fewer returns they fetch. Hence, the researcher has taken this area to know other reasons for this behaviour of the policyholders.

## **REVIEW OF THE LITERATURE**

Jalander Reddy M.T (2017) in their research article “Customer satisfaction on LIC at Nanyal Town” have said the customer expectation and satisfaction level of life insurance policyholder towards products offered by Life Insurance Company of India. Information collected through the questionnaire from 210 respondents which showed in the age group 40 to 60 i.e., middle aged people are more interested in life insurance investment than youngsters.

SathyamK (2018) in his research article entitled “Customer Satisfaction on LIC in Thiruvalluar District” has said insurance is the one of the major segments of financial market. The insurance business is unique in the sense that it is rewarded for managing the financial system.

## **OBJECTIVES OF THE STUDY**

1. To understand the expectations of the Policy takers and benefits offered by the LIC.
2. To analyze the factors considered while thinking of an investment in life insurance by policyholders.
3. To give necessary recommendations for improving the service of LIC.

## **HYPOTHESES**

1. There is no significant difference between age of respondents and their level of satisfaction.
2. There is no significant difference between income of the respondents and their level of satisfaction

## **METHODOLOGY OF THE STUDY**

### **Sources of data**

The sources of data have been collected through both primary and secondary sources. Primary data has been collected by Interviewing LIC policy holders.

Secondary data were gathered through various journals and website including [www.licindia.in](http://www.licindia.in).

### **Area of the study**

The area of study is restricted to Vaniyambadi Town of Vellore District due to time and finance constraints.

### **Sample size**

150 customers have been randomly selected from the list of policy holders available with LIC Office of Vaniyambadi.

### **Statistical tools**

For analysis of the data simple percentile and ANOVA has been used by the researcher.

### **LIMITATION OF THE STUDY**

1. The study is limited to Vaniyambadi Town only due to financial and time constraints.
2. This study is limited to life insurance policy holders in Vaniyambadi town and non-life insurance policies have not been taken for the study.
3. Private players in the Insurance industry have not been considered.

### **ANALYSIS AND INTERPRETATION OF THE DATA**

#### **RESPONDENTS' PROFILE**

**Table No.1**

#### **AGE WISE CLASSIFICATION OF THE RESPONDENTS**

<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
Below-20	14	09
20-30	42	28
30-40	30	20
40-50	49	33
Above-50	15	10
<b>Total</b>	<b>150</b>	<b>100</b>

Source: Primary Data

From the above table it clear that 9% of the respondents are under 20 or below years of age group and 28% of the respondents are between 20-30 years of age group; 20% of the respondents are in between 30-40 years of age. 33% of the respondents are having age between 30-40 years and only 10% of the respondents are above 35 years of age group.Hence the majority (33%) of the respondents come under the age group of 40-50 years.

**Table No.2**

**GENDER WISE CLASSIFICATION OF THE RESPONDENTS**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
MALE	96	64
FEMALE	44	36
TRANSGENDER	00	00
<b>Total</b>	<b>150</b>	<b>100</b>

Source: Primary Data

The above tables clearly indicate that out of 150 samples 64% of the respondents are male members& remaining 36% of the respondents are Females. There is not even a single transgender forms part of our sample.Hence, majority (64%) of the respondents are Male and the LIC should think of expanding its customer base gender wise and try to bring in more and more female and trans-genders.

**Table No.3**

**EDUCATIONS WISE CLASSIFICATION OF THE RESPONDENTS**

<b>Educational Qualification</b>	<b>Frequency</b>	<b>Percentage</b>
SSLC or Below	28	19
HSC	21	14
UG	34	23
PG	53	35
Others	14	9
<b>Total</b>	<b>150</b>	<b>100</b>

Source: Primary Data

From the above table it is understood that 19% of the respondents are in below SSLC category. 14% of the respondents are in HSC level; 23% of the respondents are undergraduates and 35% of the respondents are post graduates. Remaining 9% of the respondents are in 'others' category. Hence the majority (35%) of the respondents are post graduates. Awareness need to be created by LIC amongst the graduates and people with school education to go for life policies.

### **Analysis of Variance (ANOVA)**

$H_0$ : "There is no significant difference between age of respondents and their level of satisfaction."

**Table No.4**

### **ANOVA**

<b>Level of Satisfaction</b>	<b>Sum of Squares</b>	<b>Df</b>	<b>Mean Square</b>	<b>F</b>	<b>sig</b>
Between the groups	5.793	4	1.448	0.987	0.417
Within the groups	214.247	146	1.467		
<b>Total</b>	<b>220.040</b>	<b>150</b>			

The significance level is more than 0.05, hence null hypothesis is rejected. Hence, it can be concluded that there is a significant difference between age of respondents and their level of satisfaction.

$H_0$ : "There is no significant difference between income of the respondents and their level of satisfaction."

**Table No. 5****ANOVA**

<b>Level of Satisfaction</b>	<b>sum of Squares</b>	<b>Df</b>	<b>mean Square</b>	<b>F</b>	<b>sig</b>
Between the group	14.782	4	3.695	2.629	0.037
Within the groups	205.258	146	1.406		
<b>Total</b>	<b>220.040</b>	<b>150</b>			

The significance level is less than 0.05, hence null hypothesis is accepted. Hence, it can be concluded that there is a no significant difference between income of the respondents and their level of satisfaction.

**FINDING OF THE STUDY**

1. Aged people and youngsters do not prefer to invest in life insurance.
2. Males are more interested than females and transgender in life insurance.
3. Only highly educated i.e., post graduates and above qualification have well realized about the significance of the life insurance. Graduates and people with school education have less interested and/or less informed.
4. There is a significant difference between age of respondents and their level of satisfaction.
5. There is no significant difference between income of the respondents and their level of satisfaction.

**SUGGESTIONS**

By considering the competition from private players, LIC is expected to consider the following suggestions.

1. Organise more and more awareness programmes amongst the general public.
2. Special and new policies have to be devised and offered for the youngsters.

3. Retirement schemes to be more transparent.
4. Special and new policies have to be devised exclusively for transgenders.
5. Measures to be made to include a chapter in schools about the significance of insurance.
6. Different policies for different income groups to be introduced.
7. Cash back offers may be given in all possible policies.
8. Customer feedback mechanism needs to be reviewed.

## **CONCLUSION**

In the modern world due to heavy competition globally on insurance policies and its products, LIC is expected to not only concentrate on inland customers but also think of having overseas business. Many Indians serving abroad may take the opportunity of investing in LIC if offered in their countries. Policies should be of a kind which should not seem to be blood sucker till a very long period and at the end fetches very little monetary benefits to the policy holder or to the beneficiary but to offer in between good cash backs and a considerable return on maturity or on claim apart from ease in loan offers.

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## **A STUDY ON ERGONOMICS IN QUALITY OF WORK LIFE IN SOFTWARE INDUSTRY**

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### **ABSTRACT**

*Studies have indicated the application of ergonomics in improving the quality of work life, through increasing productivity. Work urgency, accuracy and demands compel the computer Professionals to spend longer hours before computers without giving importance to their health, especially body weight. Increase of body weight leads to improper Body Mass Index (BMI), which may result in altered posture (standing & work sitting), reduce flexibility, aggravate work related musculoskeletal discomfort and occupational-psychosocial stress. The objective of the study is to find out the effect of BMI on psycho-physical health (posture, flexibility, work related musculoskeletal discomforts and occupational stress of computer workers in a developed ergonomic setup. On the other hand, there are large differences between developing and developed countries in applying ergonomics knowledge, a descriptive inferential study has been taken to analyze the effect of BMI on posture, flexibility, and work related musculoskeletal discomfort and occupational-psychosocial stress. A total of 500 computer workers, aged 25-35 years were randomly selected from Software and a BPO company in Chennai city, India for the participation in this study. Therefore, this study has tried using the studies of society and culture dominated by manufacturing service, Study results showed increased productivity, improved work life quality and reduced stress.*

**Keywords:** Ergonomics, Work life, Stress, Psychological, Physical.

### **INTRODUCTION**

The amazing growth of Information and Communication Technology (ICT) has an implication for every aspect of civil society. It has got enormous advantages in easing the delivery of information around the world as well as the central role of information in the global economy which will shape the dynamics of the new millennium the Indian scenario, all these ICTs are being used for various purposes not only for gathering information but also for giving opportunities to utilize them for imparting skills as well as enhancing the knowledge by way of showing various

data to any remote locations with the help of connectivity. Computer use has increased dramatically over in the past decade. Most office workers use computers for at least some of the tasks that they perform and many use computers for the majority of time that they spend at work. Increased psycho-physical stress has been associated with the use of computers due to lesser opportunity to shift one's body position or perform a task away from the computer station as well as reduced interpersonal interaction. Workers of the industries and offices usually suffer from musculoskeletal discomforts due to their workload, which causes injuries to the tissues. Many studies of this condition have investigated symptoms in the neck and upper extremities. Musculoskeletal problems are the foremost health concern associated with the Video Display Terminal (VDT) use. Early studies of VDT operators showed large percentages reporting musculoskeletal disturbances although fewer VDT operators reported muscular problems in contrast to visual problems, the extent of the effect was less transient and more pronounced. Studies confirmed that VDT users have musculoskeletal complaints than do nonusers. The influence of a VDT does not seem to be directly affecting musculoskeletal system but rather affect the physical behavior of the user. It induces poor posture if placed at a non ergonomically designed workstation, forces a sedentary lifestyle and frequently demands ongoing repetitive motions. Computer professionals suffer from a lot of musculoskeletal discomforts, occupational stress, loss of flexibility and postural disorders due to their improper BMI i.e. overweight and obesity. Organizational productivity reduces due to the above mentioned factor which is not checked. Therefore, an attention is necessary to ensure the correct BMI towards the achievement of the goal in the workplace by physical assessment, laboratory investigation, proper dietary regimen and exercise protocol. So a comparison of performance than the base year indicated lower costs and increased revenue and expanded with less manpower in data analysis questionnaire "quality of work life" and "body mapping" which showed that significant difference in confidence interval between the sample and control population is ninety-nine percent and there is reduction of stress and increase in quality of work life. Those indices indicated the positive effect of interventions ergonomics.

## **REVIEW OF LITERATURE**

**Huang and Malina (2005)** conducted a cross-sectional study to evaluate the relationship between BMI and a physical fitness index (PFI) based on four indicators of fitness

**Araet al.(2007)** conducted a cross sectional study in a regional representative sample of 1068 children 7 to 12 years of age to determine the relationship between physical activity levels and adiposity and found out the level of physical activity had a significant effect on BMI.

**Ayaet al.(2008)** did a study to examine the gender difference that exists in the relationship between percentage body fat and body mass index in Japanese children (187 boys and 163 girls aged 9-10 years, 137 boys and 155 girls aged 12-13 years) using a population based cohort and reported that correlation in boys were not as strong as those observed in girls.

**deGreefet al.(2009)** conducted a study to assess health related physical fitness of 5584 sedentary elderly in the Nederland with the help of Groninger Fitness Test (GFT) and reported that, lower physical fitness status has been seen among the age group of 55-65.

## **NEED FOR THE STUDY**

Computer professionals' physical health is important for the nation building. They are the back bone of modern economic development, provided, they safeguard their own backbone. However, in modern days, work urgency, work accuracy and work demands force the computer professionals to spend longer hours with computers neglecting their health, especially body weight. Increase of body weight leads to improper BMI, which may affect their work posture, flexibility, work related musculoskeletal discomfort and Occupational stress.

## **SIGNIFICANCE OF STUDY**

This study will provide an insight to the Clinicians and Ergonomists about the relationship of BMI with posture, flexibility, work related musculoskeletal discomfort and occupational stress in order to formulate well designed training program to avoid overweight for making the computer professionals fit at their sedentary work and free from musculoskeletal injury and stress. For the IT

companies, this will help in saving money from the insurance, minimize worker absence and better productivity.

## **STATEMENT OF THE PROBLEM**

Effect of different BMI on posture (static/standing & dynamic/work sitting), flexibility, work related musculoskeletal discomfort and occupational stress of computer workers working in an ergonomic setup at Chennai city.

## **OBJECTIVES**

- ❖ To find out the effect of Body Mass Index on posture (static/standing and dynamic/work sitting) of computer workers in a developed ergonomic setup.
- ❖ To find out the effect of Body Mass Index on flexibility of computer workers in a developed ergonomic setup.
- ❖ To find out the effect of Body Mass Index on work related musculoskeletal discomfort of computer workers in a developed ergonomic setup.
- ❖ To find out the effect of Body Mass Index on occupational stress of computer workers in a developed ergonomic setup.

## **HYPOTHESIS**

Based on the objectives, the following hypothesis has been formulated.

- ❖ Respondents do not differ significantly the effect of Body Mass Index on flexibility of computer workers towards educational qualification in a developed ergonomic setup.

## **METHODOLOGY**

## **DATA ANALYSIS**

This study is based on primary and secondary data. Primary data collected from a random sample of 100 respondents in Chennai city with the help of well drafted, pretested and structure questionnaire. Besides, necessary secondary sources were also referred. The collected data were discussed through various statistical measures such as mean, SD, f-ratio and other analysis of I.T Sectors towards quality of work life through ergonomics.

## RESULTS AND DISCUSSION

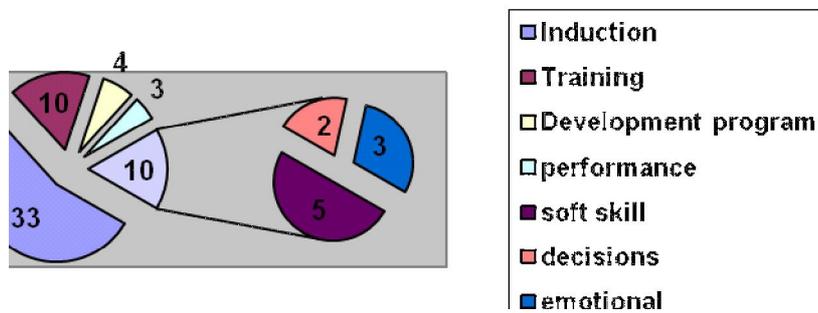
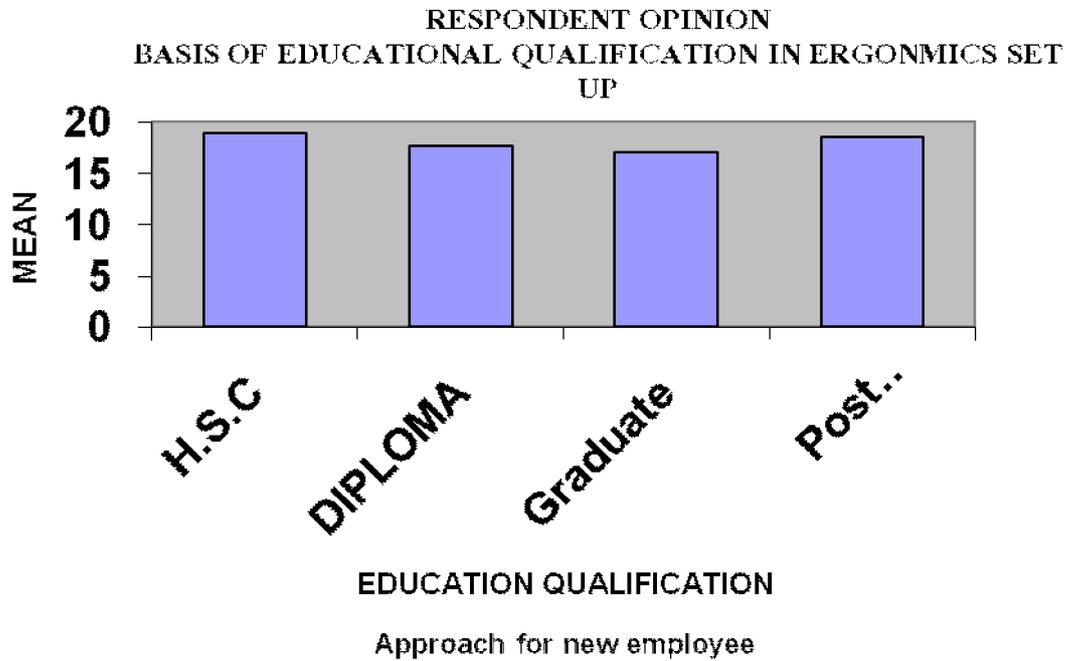
**Table 1**

### **Respondents' opinion on Body Mass Index on flexibility of computer workers towards educational qualification in a developed ergonomic setup**

**Source: Primary Data.**

Ho: Respondents do not differ significantly on Body Mass Index on flexibility of computer workers towards educational qualification in a developed ergonomic setup. The result revealed that the obtained F-ratio (2.34) is not significantly at 0.01 level. Hence, the stated hypothesis is accepted. So, respondents do not differ significantly on the computer workers towards educational qualification in a developed ergonomic setup.

<b>Education Qualification</b>	<b>N</b>	<b>Mean</b>	<b>Std.Deviation</b>	<b>F-ratio</b>	<b>LS</b>
H.S.C	25	18.88	4.26	2.34	N.S
Diploma	16	17.69	2.24		
Graduate	20	17.05	1.85		
PostGraduate	39	18.56	2.26		
Total	100	18.52	2.91		



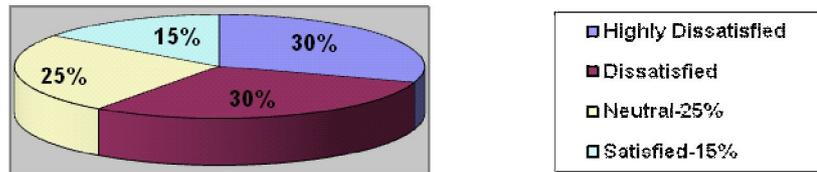
Source: Primary Data

**B)Body Mass Index on work related musculoskeletal discomfort of computer workers in a developed ergonomic setup.**

**Total respondent = 100**

**1) Highly Dissatisfied = 30%**

<b>2) Dissatisfied</b>	<b>= 30%</b>
<b>3) Neutral</b>	<b>= 25%</b>
<b>4) Satisfied</b>	<b>= 15%</b>



### Inference

From the above chart, it is inferred that 30% of the respondents have expressed their views to be dissatisfied while another 30% of the respondents have brought their response to be highly dissatisfied.

### FINDINGS

- v 40% of respondents indicated that the Computer workers' health is foremost important for better productivity of any IT or BPO Company. Correct ergonomic setup, frequent rest, stretching and strengthening exercises may reduce few degrees of physiological and psychological load in the body, otherwise, it might lead to serious work related musculoskeletal disorders and occupational- psychosocial stress in due course of time.
- v 20% of the respondents indicate that an effort has been made here to find out the influence of BMI over Psychophysical health parameters in a developed ergonomic setup.
- v 40% of the respondents say that checklist helped in confirmation of the working posture of computer workers at the workstation as well as the workstation was

found ergonomically suitable according to technical user comfort for every subject. Male dominated subjects were considered here because of their voluntary willingness towards the participation. Out of, mostly female subjects were found more reluctant to participation for nonrestricted body flexibility of lower back and hamstring muscles been noticed during data collection.

- v 50% of the respondents indicate that the Work experience of more than one year has been taken here because the subjects do get maximum musculoskeletal complains at that time, which has been confirmed during the interaction.
- v 60% of the respondents were indicate that the respondent had a Daily minimum eighthour of working period (including one hour lunch break and other microbreaks) was taken for the study, but it has been seen that they work more than ten hours on some days due to their workload.

## **SUGGESTIONS**

- v Ergonomic studies have shown systems with weak de-signing, neglected ergonomic principles and have brought staff and workers disorders. Not considering to the ergonomic principles at work can provide spiritual and physical tensions, low productivity and unsuitable work life quality and effective execution of ergonomic programs and increasing ergonomic awareness.
- v Nowadays improving productivity has been recognized as one of the most important cultural and socio-economic development alternatives as access to success in speeding productivity improvement is one of main conditions of access to suitable place in world competition and improving people's life.
- v This has been forecast to one third at the end of the fifth program and improving judiciary and administrative system for increasing movement and efficiency, improving service delivery to people, assuring staff livelihood, increasing indices of work and life environment and spiritual and physical hygiene.
- v Since results of different researches have shown logical and positive impact

on applying productivity and total ergonomic knowledge, efficient development, maintaining human rights, welfare, social security, relative increase of per capita income, thought innovation and so on

- v Ergonomic changes have not achieved the useful effectiveness in producing environment, thus, all attempts of ergonomic researchers should be coordinated in decreasing ergonomic risk factors and as a result improving quality of work life practically and usefully. The conducted researches show that distributing ergonomics knowledge among staff is for helping and better execution of service and production programs.
- v The results of conducted study show that ergonomic uses in designing tools will provide much effect on psychic health, work satisfaction, increasing efficiency, security and health and as a result it will improve work life.

## **CONCLUSION**

Ergonomic studies have shown systems with weak de-signing, neglected ergonomic principles and have brought staff and workers disorders. Not considering to the ergonomic principles at work can provide spiritual and physical tensions, low productivity and unsuitable work life quality and effective execution of ergonomic programs and increasing ergonomic awareness. Nowadays improving productivity has been recognized as one of the most important cultural and socio-economic development alternatives as access to success in speeding productivity improvement is one of main conditions of access to suitable place in world competition and improving people's life. Studies have indicated the application of ergonomics in improving the quality of work life, reducing musculoskeletal disorders and increasing productivity. On the other hand, there are large differences between developing and developed countries in applying ergonomics knowledge, the need of applying the science of culture, especially in developing countries and the third world is vital, but the culture implementation and pay evaluation of total ergonomics (micro and macro) is low. Therefore, this study has tried using the studies of society and culture dominated by I.T Industry, results showed increased productivity, improved work life quality and reduced musculoskeletal disorders.

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## RENAISSANCE OF INDIAN WRITING IN ENGLISH

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### ***Abstract***

*The renaissance of modern Indian writing in English begins with the works of Ram Mohan Roy who is the pioneer of Indian writing in English. He is believed to be the prominent figure in the Bengali literature. He was a social reformist from Bengal, who voiced against the injustices to women. He insisted and supported the remarriage of widow and voting rights for women. He emphasized on English education as well. He believed that it is only through English education that India could be one among the developed nations in the world. Thus education of English language created awareness among Indians, particularly the Indian writers in English. A majority of whom focused writing in their mother tongue previously which paved way for native language with the relevance of western aesthetic norms. A few of such Indian writers though penned in their own mother tongue, yet a few of them realized the significance of exhibition of their ideas in the English language.*

### **Key Words: Renaissance- English education-Indian writers in English-**

The Indian writing in English refers to the body of authors and poets who made their literary contribution in the English language. They write in English though their native or co-native languages either any one or many languages in India. Indian writing in English consists of the literary pieces of the Diaspora or expatriates in India. The Indian expatriate is the body of writers and poets, majority of who neither live in India nor are they Indian citizens. The Indian literature in English is not new to the Indian land. It has been deep rooted in the Indian soil since centuries.

Renaissance is the basic inspiration for the reconstruction of future. In another sense, it is considered another world or rebirth of literature. 'Renaissance is basically considered as an inspiration from the past and planning to rebuild the future. Thus, in this respect the renaissance in the life of a nation is like the coming of a new age'. (P-7) It is the Indian authors and poets who by their artistry and poetic wand stirred the English literary world in and around India. Notably, Salman

Rushdie's 'Mid Night Children', Rabindranath Tagore's 'Gitanjali', a collection of the songs of offerings, Bankim Chandra Chatterjee's Ram Mohan's Wife and poets like Sarojini Naidu are the pillars of Indian writing in English. The credit of being the first Indian novelist goes to Bankim Chandra for his work 'Rajmohan's Wife' (1864).

The renaissance in India in the field of literature is a source of attraction towards the west and a literary outcome of post colonialism. India has had witnessed so many social ebbs and flows .i.e social evils like hazards of orthodoxy, caste and dowry systems. There was a great uprising of superstitions that posed a threat to the social order. It is the renaissance in India that came as a weapon to fight these social evils and eradicate them from Indian soil. Renaissance in India brought the idea of the West come true that was the imitation of it that disrupted a rearrangement in the society taking it to the path of peace and harmony. Hence, it could be taken that the literary renaissance in India flourished like a flash light over the darkened paths of false believes and baseless ordinances. It appeared as a remedy from the threats of orthodoxy, dowry and narrow caste systems.

It is the entry of the British during the regime of the Mughal Emperor Jahangir in 1608, that the English was first introduced to the Indian soil. The visit of Captain William Hawkins to India in connection for a trade in 1608 opened a new gate to Indian writing in English. 'It all started in the summers of 1608 when Emperor Jahangir, in the courts of Moguls, welcomed Captain William Hawkins, commander of British Naval Expedition Hector. It was India's first tryst with an English man and English. Jahangir later allowed Britain to open a permanent port and factory on the special request of King James IV that was conveyed by his ambassador Sir Thomas Roe. English were here to stay.' (p29)

The Indian literature in English has flourished across the Indian continent by the illustrious and eminent writers in the English language. In fact, it is their remarkable and extra ordinary literary versatility that has left their indelible impression in the field of Indian writing in English. Even their writings astonished the writers of the West and made their heads turned towards Indian literature in English. It should not be forgotten that the literary art of the Indian writers in the English language was not an easy task. Even some of the famous novelists and social reformers had to draw a blank before their writing saw the publishing houses Mulk Raj Anand's first novel, 'Untouchability' was not accepted by any publisher in India. Later by the guidance and support of E.M Foster, it was published in England having been rejected by seventeen times by various publishers. Similarly Gitanjali bagged fame to

Rabindranath Tagore, who was supported by W.B. Yeats for its publication. This piece of literature received applause from various parts of India as well as abroad and Tagore was honored with the title Poet Laureate. It won the noble prize in 1913. The literary versatility of R.K.Narayan was brought under lime light by Graham Greene who had been his companion till death.

The Indian literature touched its fame by the artistic and realistic writers like Mulk Raj Anand and R.K Narayan and in fact, Raja Ram Mohan Roy. Their contributions to the field of Indian writing in English cannot be forgotten. The first writing in English by an Indian is a book entitled, 'The Travels of Dean Mahomet' published in 1793. It was written by a person named Sake Dean Mahomet. The book is believed to be the first piece of Indian writing in English.

William Walsh, the English critic picked out three of the most famous writers of the literary circuit at that time. (p6). He states three eminent Indian writers in English, whom he denotes the 'Three Big'. The Three Big he refers to Raja Ram Mohan Roy, Mulk Raj Anand and R.K.Narayan. It is they who opened space for the future Indian writers in English. These eminent writers penned their realistic view of India through their novels and short stories in English language that prospered their fame. Walsh calls these three writers as 'trinity of Indian writing in English'.

The renaissance of modern literature in Indian begins with the works of Ram Mohan Roy who is the pioneer of Indian writing in English. He is believed to be the prominent figure in the Bengali literature. He was a social reformist from Bengal, who voiced against the injustices to women. He insisted and supported the remarriage of widow and voting rights for women. He emphasized on English education as well. He believed that it is only through English education that India could be one among the developed nations in the world. Thus education of English language created awareness among Indians, particularly the Indian writers in English. A majority of whom focused writing in their mother tongue previously which paved way for native language with the relevance of western aesthetic norms. A few of such Indian writers though penned in their own mother tongue, yet a few of them realized the significance of exhibition of their ideas in the English language.

Thus the Indo-Anglian literature came into existence. Indian literature in English was given a push by a specific class which was either Indian born British or British educated Indians. Later, the poet laureate Rabindranath Tagore and the Nightingale of India, Sarojini Naidu, represented these Indian writers in English. 'Rabindranath Tagore and Sarojini Naidu who contributed a lot to the English literature initially represented the natives but it was only in mid seventies that a new

breed of boarding-school educated, elite brand of English authors started to appear on the radar. These writers gave a much-needed oxygen to English literature with their crisp, tongue-in-cheek and realistic fiction that were read all over the world.' (p31). Tagore translated the collection of his Bengali songs of offerings into English. The western writers were so impressed by it. One of such writers is W.B Yeats who came forward to have this collection published.

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**A STUDY ON TRAINING AND DEVELOPMENT OF EMPLOYEES IN  
LUK INDIA PVT LTD, HOSUR**

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**ABSTRACT**

*As the generator of new knowledge, employee training and development is placed within a broader strategic context of human resource management, i.e. global organizational management, as a planned staff education and development, both individual and group, with the goal to benefit both the organization and employees. To preserve its obtained positions and increase competitive advantage, the organization needs to be able to create new knowledge, and not only to rely solely on utilization of the existing knowledge (Vemic, 2007). Thus, the continuous employee training and development has a significant role in the development of individual and organizational performance. The strategic procedure of employee training and development needs to encourage creativity, ensure inventiveness and shape the entire organizational knowledge that provides the organization with uniqueness and differentiates it from the others.*

**Keywords: Training, Development**

**Training**

Training is the organized procedure in which the people learn knowledge and skill for definite purpose.- Dale .S

**Development**

Development refers to the learning opportunity designed to help Employee grow. Training is the systematic development of the knowledge, skills and attitudes required by an individual to perform adequately a given task or jobs. Training can involve learning of various kinds and in various situations i.e. on the job, off the job, in the company or outside the company. It can involve the use of many techniques

like demonstration, practice, coaching guided reading, lectures, discussions, case studies, role playing, assignments, projects, group exercises, programmers learning, seminars, workshops, quizzes etc., These techniques can be deployed by many people, especially by company Trainers, Managers, Supervisors, colleagues or External Trainers and Educationists.

### **Need and benefits of training**

1. Training programmers helps in increasing the quantity and quality of output.
2. It helps each individual member to utilize and develop his/ her full potential.
3. Employees feel that they are being taken care of by the management and this leads to an increase in their morale.
4. As training helps in building the second line of competent officers, there will be competent replacement for more responsible positions.
5. The availability of trained personnel ensures long term stability and flexibility in the organization.

### **Training and development methods**

There are a large number of Training and Development programmes meant for different types of employees at different levels. Broadly speaking the various training and development methods can be classified in the following two categories.

#### **A) On - the Job Methods**

1. Coaching
2. Job Rotation
3. Committee
4. Assignment

5. Special Project

### **B) Off-the Job Methods**

1. Class room Lectures
2. Conference and Seminar
3. Workshop
4. Audio visual film
5. Brain Storming

### **Learning Process**

Learning happens all the time whether or not you are fully aware of it. Are you a person who forgets to save your work on your computer on a regular basis? If a power failure occurs and you lose some data, do you learn anything? If you say to yourself, "I must remember to save more often", you have done some learning. This type of learning is called incidental learning; you have learned without really thinking about it or meaning to. On the other hand, intentional learning happens when you engage in activities with an attitude of "what can I learn from this?" Employee development requires you to approach everyday activity with the intention of learning from what is going on around you.

### **Benefits of employee learning experience**

Based on adult learning principles, here is a checklist for a successful employee learning experience:

1. The goals of the employee training or development program are clear
2. The employees are involved in determining the knowledge, skills and abilities to be learned
3. The employees are participating in activities during the learning process
4. The work experiences and knowledge that employees bring to each learning

situation are used as a resource

### **Responsible for Employee Training and Development**

Employee training is the responsibility of the organization. Employee development is a shared responsibility of management and the individual employee. For employee training and development to be successful, management should:

1. Provide a well-crafted job description - it is the foundation upon which employee training and development activities are built
2. Provide training required by employees to meet the basic competencies for the job. This is usually the supervisor's responsibility
3. Develop a good understanding of the knowledge, skills and abilities that the organization will need in the future. What are the long-term goals of the organization and what are the implications of these goals for employee development? Share this knowledge with staff

### **Review of literature**

1. **Bates and Davis (2010)**, have said Usefulness of training programme is possible only when the trainee is able to practise the theoretical aspects learned in training programme in actual work environment. They highlighted the use of role playing, cases, simulation, mediated exercises, and computer based learning to provide exposure to a current and relevant body of knowledge and real world situations.
2. **Kalaiselvan and Naachimuthu (2011)**, have classified training cost and business benefits in to four by drawing a chart are drawn on X and Y axis respectively. Four quadrants were identified to highlight (i) strategic (Lower training cost and higher business benefits), (ii) Payback (Higher training cost and higher business benefits) (iii) Think (Lower training cost and lower business benefits) (iv) Drop (Higher training cost and higher business benefits)
3. **Karthik R (2012)** has said that training objectives tell the trainee that what is expected out of him at the end of the training program. Training objectives are of great significance from a number of stakeholders; Trainer, trainee, designer and evaluator.

### **Organisation profile**

The **Schaeffler Group** is a leading manufacturer of rolling bearings and linear products worldwide as well as renowned supplier to the automotive industry. In India, with its three strong brands – **INA, FAG and Luk** – the **Schaeffler Group** has emerged as a leading development and engineering partner for its customers ensuring cost effective local production, rapid delivery service, seamless application engineering and sales support.

**LuK India** is ISO TS 16949 Certified Company, Strategically located in South India at Hosur in the state of Tamilnadu. LuK India is a fully integrated Clutch Assembly manufacturing unit within house research and development capabilities. LuK India has access to technology, expertise, and management system of the Schaeffler Group. With a philosophy of customer focus, constructive cooperation LuK India today is one of the preferred business associate by most of the OEM's in India. LuK India, Offers innovative, technologically superior products with highest standards of quality to the automotive world in Passenger Vehicle, Tractor, Commercial vehicle segments, and always offering new products like Clutch Release system, the dual mass flywheel for better driving and comfort in India, thus, making one of the India's largest OEM suppliers, in service of leading automotive brands in the country.

“Best in Class” is the ambitious goal driving LuK, our products today meet most stringent quality requirements thanks to the advanced quality management system, our employees knowingly assume responsibility with specialist skills.

LuK does not stop at best in quality but thrives to excel in quality. This is achieved through the wholehearted support of management and people committed to quality policy of Schaeffler Group. While meeting the increased levels of globalisation and technology we take care of the environment right from start until finish of the product. We have the ISO 14001 EMAS certification as a part of comprehensive environment protection. Our objective is to achieve increased level individual mobility, travel comfort together with environment protection by adopting technologies that drive the future.

### **Objectives of the study**

1. To study the importance of Training and Development.
2. To study has employer is benefited from the training programmes given by LUK INDIA PVT LTD.
3. To explore the methodology and types of training provided to the employees in LUK INDIA PVT LTD.
4. To know the challenges in training and Development faced by LUK INDIA PVT LTD.

### **Scope of the study**

The study covers whether the training programmes conducted by the organization is useful for its overall development i.e. Individual development and organizational development. The study benefits facilitate employees and management in identifying required changes in the programmes for their improvement.

### **Research design**

The research design is a descriptive research. Descriptive research means fact finding research.

### **Sources of data**

1. Primary Data
2. Secondary Data

### **Sample design**

A sample design is a definite plan for obtaining a sample from a given population. It is the procedure used by the researcher in selecting item for the sample.

**Sampling size and technique**

50 employees were taken as the sample respondents from LUK India private Limited, Hosur. The technique used in the study was simple random sampling. A randomly selected sample from the total employee population, giving all the individuals in the sample an equal chance to be chosen.

**Tools used for analysis**

Researcher has used simple percentage and weighted average method of descriptive statistics.

**Data analysis and interpretation**

The successful functioning of any Company is determined by the factors like men, material, money and market. Among all these factors, man power assumes greater significance. Manpower is the life blood of any company. Hence, it is essential for every organisation to adopt the training and development practices in the administration.

**TABLE 1**  
**WORK EXPERIENCE**

<b>Sl. No</b>	<b>Particulars</b>	<b>No. of Respondents</b>	<b>Percentage</b>
1	1 to 5 years	27	33.5
2	5 to 10 years	29	36.25
3	Above 10 years	24	30
<b>Total</b>		<b>80</b>	<b>100</b>

**Data Source: Primary Data**

### Interpretation

The above table infers that 33.5% of respondents working in the LUK INDIA PVT LTD have experience between 1 to 5 years. 36.25% of respondents working with LUK INDIA PVT LTD have 5 to 10 years of experience, 30% of respondents are working in LUK INDIA PVT LTD for more than 10 years.

**TABLE 2**

### EMPLOYEES PARTICIPATION IN TRAINING PROGRAMMES

SI. No	Particulars	No. of Respondents	Percentage
1	One	32	40
2	Two	16	20
3	Three	19	23.75
4	None	13	16.25
<b>Total</b>		<b>80</b>	<b>100</b>

### Data Source: Primary Data

### Interpretation

The above table shows that 40% of respondents have attended one training programmes, 20% of the respondents have attended two training programmes, 23.75% of respondents have attended the training programmes 3 times, and 16.25% of respondents didn't attend the training program at all.

**TABLE 3**  
**RELEVANCE FOR WORK**  
**(WEIGHTED AVERAGE METHOD)**

Sl. No	Particulars	Strongly Agree	Agree	Neutral	Disagree	Strongly Agree	Total	Total/No. of Respondents	Percentage	Rank
1	Disciplinary Matters	28×5 140	17×4 68	19×3 57	12×2 24	4×1	293	293/80	3.66	VII
2	Women at Work Place	28×5 140	25×4 100	18×3 54	4×2 8	5×1 5	316	316/80	3.95	II
3	Work & Life Balance	22×5 110	26×4 104	25×3 75	5×2 10	2×1 2	307	307/80	3.83	V
4	Computer Training	32×5 160	26×4 104	9×3 27	8×2 16	5×1 5	312	312/80	3.9	III
5	Training for Finance Management	25×5 125	30×4 120	16×3 48	6×2 12	3×1 3	308	308/80	3.85	IV
6	Communication & Soft Skill	32×5 160	25×4 100	18×3 54	3×2 6	2×1 2	322	322/80	4.03	I
7	Boosting Employee Motivation	29×5 130	30×4 220	12×3 36	6×2 12	3×1 3	301	301/80	3.76	VI
8	Right to Information Act	17×5 85	26×4 104	28×3 84	5×2 10	4×1 4	287	287/80	3.58	VIII
9	Training for Employee Union	24×5 120	13×4 52	20×3 60	15×2 30	8×1 8	270	270/80	3.37	IX

**Inference:** Communication & Soft Skill is the foremost requirement for work..

### Findings

1. Above 16% of the Employees have not participated even a single Training Programme.
2. 42.5% of the Respondents are Agree Job Skill Improvement Training.

3. 47.5% of the Respondents are Agree the Training Developing Policy is Importance in LUK INDIA PVT LTD.
4. 45% of the Respondents are Strongly Agree the Training and Development help the Organization to maintain employee retention.
5. 37.5% of the Respondents are Agree Training Programmes help to Achieve work Target in LUK INDIA PVT LTD.

### **Suggestions**

1. The LUK INDIA PVT LTD management is not providing training programmes to all the employees. Only few of employees were given chances to attend many programmes. So the management has to concentrate on each of the employees and suitable training programmes may be offered. It will improve productivity as a whole.
2. Better the LUK INDIA PVT LTD HR Department should learn new innovative concepts and training modes to design programmes for employees of different cadres.
3. Management is expected to bring effectiveness in the training programmes by carefully designing the training and objectives and rightly opting the trainers.

### **Conclusion**

This research based on training and development. The training should be developed the growth of organization. The training should be given to existing employee and new employee in LUK INDIA PVT LTD. The organization should achieve the fullest employee's satisfaction through training programs. Training is useful for developing the Employees knowledge as well as to achieve the goal of the organization. The organization has to concentrate more on training and development, then it will make the employees work effectively work in the organization.

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## **A STUDY ON QUALITY OF WORK LIFE IN INFORMATION TECHNOLOGY SECTOR**

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### **ABSTRACT**

*Quality of work life (QWL) has become one of the most important issues these days in every organization. Employees are the force that is behind every successful organization. The research design chosen for the study is descriptive in nature. This study is on quality of work life in IT Sector at Chennai City. There is a vital need to know the balance level of employees with regard to both their work and family or personal life. Primary data were collected with the help of the structured questionnaire from the existing employees of this sector from lower level employees of non-voice and voice department. Secondary data was collected from earlier research work, various published journals, magazines, websites and online articles. QWL provides for the balanced relationship among work, non-work and family aspects of life. The sampling method adapted in this study is stratified sampling and the sample size considered for the study is 200, where in all the samples where employees in IT. From the study it is inferred that most of the employees were satisfied with the quality of work life provided by the company.*

**Keywords:** Employee involvement, Job satisfaction, Motivation, QWL, IT.

### **INTRODUCTION**

Quality of work life refers to the effective management of multiple responsibilities at work, at home, and in the other aspects of life. It is an issue that is important both to the organizations and to employees. In the current economic scenario, organizations are hard pressed for higher productivity and need employees with improved quality of work life as an employee with better quality of work life will contribute more meaningfully towards the organisational growth and success.

Family and personal life related factors include increasing participation of women in workforce, increasing participation of child bearing women in workforce, increasing participation of dual career couples in workforce, increase in single-parent/ single person households, increase in child-care/ elder care burden on employees and health and well being considerations.

Information Technology (IT) is a developing industry that is receiving significant attention from all other sectors such as government, business, as well as from the academia. IT is basically formulated to outsource processes to a third party that are not core to a company but are necessary in its everyday operations. India has the most number of IT companies in the world and consequently the most studies and researches made on this subject. Philippines also has its share in the IT industry, being the third IT center in the world. With the sustained growth of this industry, IT's are now receiving considerable academic attention dealing with multiple aspects like work conditions, organizational environment and specific organization and work-related issues.

## **REVIEW OF LITERATURE**

**Vicky Nanjappa (2007)** identified that in the last two months, over 100 IT professionals have made a beeline to Ayurvedic centres for de-stressing programmes, where they are taught how to strike a balance between their personal and professional lives.

**Kelley and Moen (2008)** brings out the opinion of the experts that most suicide cases in the city are related to stress; its citizens are unable to cope with Bangalore's quick growth. If you walk into Bangalore's leading hospitals, you will find a large number of patients suffering from stress-related ailments. Doctors specialising in this disorder told rediff.com that, on an average, they treat at least 10 patients a day for stress-related ailments.

**Frone et al. (2011)** points out the regular practices of many Health care institutes and the National Institute of Mental Health and Neurosciences in Bangalore also treats patients for stress-related ailments. It examines the close study conducted in Bangalore which indicates that work-related insecurity, extended working hours and stringent deadlines also contribute to Bangalore's rising stress levels. Psychiatrists say that those afflicted by stress should spend more time with the family and talk about their problem.

## **NEED AND RELEVANCE OF THE STUDY**

Information Technology or IT is a general term describing the outsourcing of business processes, or functions of an organization to an external vendor or service provider on a set of predetermined performance metrics. Today businesses span across the entire globe by their overseas operations and thus they leave visible changes in the societies of various geographies.

### **OBJECTIVES OF THE STUDY**

1. To determine the demographic variables with the level of Quality of Work Life.
2. To find the association between of socio-economic variables of workers and their level of QWL.
3. To examine the relationship between Job Satisfaction and level of Quality of Work Life among the employees of IT 's.
4. To examine the dimensions required for Quality of work life.

### **HYPOTHESES OF THE STUDY**

1. There is a significant relationship between educational qualification and salary.
2. There is a significant relationship between the experience and income of IT employees.

### **RESEARCH METHODOLOGY**

#### **SAMPLE DESIGN**

The respondents were selected by using convenience sampling technique. A thorough review of literature was conducted before selecting the topic of the study. The research design chosen is descriptive in nature.

Wipro IT , TCS IT , Rapid Care , Acusis ,Sutherland , Integra , RBS , Sparsh , Mphasis , Spi, IBM IT , Aditya Birla Minacs Worldwide, First Source, Infosys IT , HCL IT and EXL Service which are situated in Chennai City.

**Sample Size** 200 employees of IT companies were selected as sample units

- v In order to retain objectivity, every attempt was made to take an unbiased sample.
- v A well structured questionnaire was prepared and used to collect primary data considering 10 parameters other than personal information for calculating the employees' Vulnerability to stressors.
- v Personal Information relates to Personal profile, Company culture, Job con-

tent/growth, Career advancement, Training, Salary and compensation and Performance appraisal system.

The pilot study facilitated the researcher to restructure the questionnaire. It identified the defects in the questionnaire and helped the researcher to add as well as to remove the questions in the questionnaire. The researcher collected reviews and secondary data from various sources such as research study, survey report, magazines, newspapers, bulletin, annual reports, internet and books.

### **STATISTICAL TOOLS**

The researcher had applied the relevant standard statistical tools to analyze the sampling method adapted to this study is stratified sampling and the sample size considered for the study was 200 where in all the samples were employees in IT's. The researcher selects the respondent from employees of Chennai at middle and lower level from the age group 19 to 55 years. Information was collected from employees at voice and non voice department. Clerical staff and executives from voice and non voice department. This describes the level of quality of work life posses by an employee. Therefore, this research is descriptive in nature. The tools for the analysis include Descriptive analysis, Cross tabulation, Chi-square test, weighted average analysis, one way ANOVA, correlation, factor analysis. A well structured Questionnaire was used to collect the information from the respondents. Likert 5 point scale was used to measure the level of job satisfaction of employees besides percentage analysis is made to exhibit the results with the help of pictographic presentations wherever required.

### **LIMITATIONS OF THE STUDY**

1. This study ignored unregistered, medium and small scale IT service providers as they involve in secondary level contracts.
2. The study ignored the IT companies rendering services only at the City level.
3. The IT Companies established at the rural areas were not covered.
4. The application of present study cannot be substantiated with other IT companies operating in different city and other places.

### **ANALYSIS AND DISCUSSION**

- 1) **Chi – Square test has been applied to find the goodness of fit using the following hypothesis.**

Null Hypothesis ( $H_0$ )	The collected data represent the true nature of the sample universe.
Alternative Hypothesis ( $H_1$ )	The collected data doesn't represent the true nature of the sample universe.

**Table1 Chi – Square Test on Age group**

AGE GROUP	Observed Frequency	Expected Frequency	$(O_i - E_i)^2 / E_i$
Below 19	46	50	0.32
20 - 25	64	50	3.92
26 - 30	50	50	0
31 and Above	40	50	2
<b>TOTAL</b>	<b>200</b>	<b>200</b>	<b>6.24</b>

Source: Primary data

Chi – square	=	6.24
d.f.	=	3
Critical value	=	7.82

Computed chi – square value is lesser than critical value, therefore,  $H_0$  is accepted. i.e. the collected data represent the true nature of the sample universe.

**2) Again Chi – Square test has been applied to find the goodness of fit using the following hypothesis.**

Null Hypothesis ( $H_0$ )	The collected data represent the true nature of the sample universe.
Alternative Hypothesis ( $H_1$ )	The collected data doesn't represent the true nature of the sample universe.

**Table 2 Chi – Square Test on Gender**

<b>Gender</b>	<b>Observed Frequency</b>	<b>Expected Frequency</b>	<b><math>(O_i - E_i)^2 / E_i</math></b>
Male	110	100	1.0
Female	90	100	1.0
<b>Total</b>	<b>200</b>	<b>200</b>	<b>2.0</b>

Source: Primary data

Chi – square = 2.0

d.f. = 1

Critical value = 3.84

Computed chi – square value is lesser than critical value, therefore,  $H_0$  is accepted. i.e. the collected data represent the true nature of the sample universe.

## **FINDINGS**

- v It is inferred that 55% of the respondents who is working with Chennai City IT Company are male and remaining 45% of the respondents are female.
- v Generally IT sector prefers both the gender but the female employees are not that much satisfied with the shifts of the working hours because IT sector mainly works in the timing of US and UK. Most of the people who work in HCL fall under the age category of 19 to 29 years old and few people fall under the category of less than 18 years old.
- v Young generation are interested in IT because getting into this sector is very easy than into any other sector. Because IT sector only prefers the communication skills.
- v It can be interpreted that most of the respondents working in IT Companies have the working experience of 2 to 5 years and very few respondents have the experience of more than 10 years in this organization. Because mainly

within 5 year experience people require a job change usually due to work stress and recognition problem.

- v There is no significant different between department and opportunity for career advancement of the respondents.
- v It can infer that the companies provide equal opportunity for career development to their employees of all the departments.

### **SUGGESSTIONS AND RECOMMENDATIONS**

- v The organization must provide the compensation according to the work done by the employee. It should not vary with the qualification but should vary with the experience of the employee. By doing so the company can reduce the attribution rate and employees are more motivated and committed toward work that is been done.
- v It is recommended that the company must follow an accurate and stable time for the work. If the working hour of an employee's varies, it may increase the stress level of the employee and reduce the satisfaction level as a whole.
- v As a result, the company losses the targeted position in the market. It is recommended that the employees should be integrated with their superiors and subordinates in a timely basis and equal intervals.
- v Proper Communication System should be made mandatory, so that the company have an effective communication all over the hierarchy. This creates the clear job objectivity and a higher turnover.

### **CONCLUSION**

The study found that there is dissatisfaction among the employees regarding the Quality of Work life in IT sector. The factors determining the dissatisfaction with the quality of work life in the organization were lack of income & fair compensation, safe & healthy working conditions, opportunities & develop human capacity, opportunity for career growth. All these factors are responsible for the dissatisfaction among the employees of IT. A satisfied employee is more likely to remain with the organization, come to work regularly contribute to high performance, contributes to organizational goals and effectives, works with positive force within the organization, help to build a strong culture, have more commitment to organiza-

tion, keep his personal interest to employee ethics and so on. The study revealed that employees perceive the quality of work life as conducive environment; organization should provide them the required training and resources whenever necessary it will helpful for their career growth.

### **Implications for further Research**

The results from vulnerability to stressors of IT s employees' data indicate that they are vulnerable to various stressors, especially work related stress as it is the result of other stressors. The future researcher can focus on evaluating the performance of IT companies in terms of training, behavioral pattern of the employees, the attitude and motivational aspects towards IT jobs and their social and family roles.

The future research can also address the issue of the job satisfaction aspects of IT employees and their productivity can be compared with their work target. Future research could explore the impact and importance of culture and behavior norms in supporting IT employees to show corporate culture existing in the IT.

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## **BAZAARS AND MARKETS IN MEDIEVAL INDIA**

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Bazaars and markets are the factors which help us differentiate between an urban and a rural settlement. Throughout the ages they have played a distinctive role in the development of a town or a city. Literally bazaars signify spaces where brisk commercial activity in the form of buying and selling surplus produce or products, which have a demand in the area, takes place.

This paper attempts to make a study of the physical space which constituted a bazaar or a market in Medieval North India. The area undertaken for this study is confined to the Delhi-Agra region. This is so for two reasons: one, that the Mughal Empire, and second, the archaeological and textual data also is the most important for this region. Thus this paper generally confines itself to the study of the Bazaars in Delhi, Agra and Fatehpur Sikri.

Delhi emerged as a prominent city under the Chauhans and then as Dar- Us-Sultanate of the Delhi Sultans from 1206 before ultimately gaining prominence under the Mughals when Shahjahan built his capital, Shahjahanabad . Agra first gained prominence under the Lodi's, before Akbar developed it as his capital. Though it ceased to be the Dar- us- Sultanate after Jahangir, it continued to flourish as a major urban settlement down to the modern times. Fatehpur Sikri , on the other hand , is supposed to be a “one reign wonder”.

Fatehpur Sikri came into existence as a result of a royal decree in 1571, remained a capital city till 1585 before sinking to a political oblivion. It however continued as a commercial entrecote even after the reign of Akbar, when it catered to the needs of indigo merchants and rug-sellers. Excavations and explorations have revealed much information regarding the shops and markets in these towns, especially Tughluqabad in Delhi, and Fatehpur Sikri in Agra. Textual evidence as well as old maps also provides us much information on the markets and bazaars in the towns of Agra (later known as Akbarabad) and shahjahanabad.

Though the history of Delhi is traced back to Indraprasath, the legendary city of the Pandavas, it is from the period of Rai Pithora III, popularly known as Prithviraj Chauhan the antecedents of this town can historically be traced. Rai Pithora III, popularly known as Prithviraj founded the Qila -I Rai Pithora popularly known as Lal Kot in 1052 AD. It was this Qila-I Rai Pithora and the city around it which was conquered and subsequently added upon by Qutbuddin Aibak and Iltutmish, who constructed their palaces, mansions and the Quwwat -ul- Islam Mosque along with bazaars and markets.

The city which started developing at this site and replaced the Lalkot, was identified by subsequent fourteenth century Sultanate chronicles as Delhi-I Kuhna (The old City). The city gradually started shifting from the Aravali ridge towards Yamuna. First during the period of Ghiyasuddin Balban, the suburb of Ghiyaspur was developed which was situated near the khanqah (Hospice) of Shaikh Nizamuddin Auliya, and then when Muizzuddin Kaiqubad came to the throne, according to Ziya Uddin Barani the qasr of Kilokhari was established.

It was in this vicinity that, under Jalaluddin Khalji , the Shahr-i Nau (The New City) developed . Not only the nobles and other great men were encouraged to build their mansions in this area, but large bazaars were also established in its environs. The large and specialized markets like the bazaar -I Buzzazan (market of cloth -merchants) and all the major commercial centers, at least till the time of Alauddin Khalji, remained in the old city, which under the Khaljis emerged as the shahr par excellence.

During this period the city developed not only as the capital city, but also as a viable commercial centre. Comprising of a number of sarais and inns, it attracted a large number of merchants and traders towards it. Thus there were general markets for things of common use and specialized markets for grains, cloth, horses, as well as slaves of all nationalities. These congested markets, we are told, were also over-run by brokers. Unfortunately not much information is available on the lay-out and plan of these bazaars and markets of the early medieval period.

Some information of the bazaars during sultanate period, especially in the region of Delhi, however, becomes available from the Tughluq period onwards. Between 1320 and 1325 Ghiyasuddin Tughluq built the city of Tughluqabad, which, however, on the death of the sultan in 1352, ceased to be the capital city. Spread over some 300 acres and located on a hill surrounded by a low-lying area, Tughluqabad

appears to have been inspired by the Khurasanian model of towns, such as Bust, Nishapur and Tus. Like them the whole city was divided into three distinct areas, viz., the main or the lower town (the shahristan or the pa in shahr), the upper town.

Explorations and excavations by the Mehrdad and Natalie H. Shokoohy have revealed that the markets at Tughluqabad were located in the main town, the general lay-out of which is in the form of a trapezium or a quadrilateral with two main roads emanating from the citadel and culminating at the city ramparts. Shops and markets were generally aligned along these arterial roads.

The long and straight 20m wide market street aligned along a north-south axis, starting from the northern gate of the citadel and culminating at city gate in the north (popularly known as “Dhoban Dhobani Gate”), was marked by a row of shops on each of its side. This bazaar, in local parlance of the 19<sup>th</sup> century, was known as the Khas Bazaar. Ending towards the city gate; this road is preceded by a triangular area, which according to the Shokoohy may have been an open market-place where local farmers may have brought their daily produce for sale.

A number of shops have been revealed through the excavations. Just as we would see in the case of Fatehpur Sikri, the shops were built on top of a platform (0.65 m high) and are fronted with a one meter wide verandah. Being equal in size, each of the shop was about 3 m wide and 5m deep. Probably the platform running in front of the shop was used to display the goods, while the shop itself was used to store the products. The buyer would generally stand on the street below to buy what was being sold.

Although at the Khas Bazaar only the shops survive only up till the plinth level they provide the earliest examples of a typical bazaar in the Indian milieu. The traces of arches which survive in the back front walls also help us identify that the tradition of building shops remained almost the same from at least 14<sup>th</sup> century down to the eighteenth and nineteenth century in north India.

Just outside the East Gate of the citadel, along a shorter road aligned in an east-west direction, was a chowk which was once surrounded by shops and other public structures. This open square was inspired by the Iranian traditions and was followed in many sultanate towns like Nagur, Bidar and Ahmedabad. Another road from the north of this chowk led to the end of the walled city. Running parallel to the Khas Bazaar, it was provided with two market squares located in the middle of the town. These chowks were probably grain markets. Similar shopping complex were revealed during the excavations of the 15<sup>th</sup> Century Champaner in Gujarat.

Excavations revealed a row of at least 11 shops built atop a raised platform and comprised of a 'sufficient space provided in front of each shop for the convenience of buyers.

An additional feature encountered in this complex was that each of this shop was provided with a storehouse and a residence at the back. Much more detailed information is available on the shops and bazaars of the Agra-Delhi region from the period of Akbars reign onwards. We also have the testimony of a contemporary that the residence of the traders and shopkeepers were generally either located on top of their shops or behind them.

During this period, the Timurid tradition of locating the markets between the shahristan (the town area with the palace and bureaucratic establishments) and the rabaz (suburbs comprising the houses of the general masses reflecting a close followed. Thus at Agra, Fatehpur Sikri and Shahjahanabad, the markets were located in the areas which not only surrounded the imperial areas but which were connected to, and accessible from, the fort and palaces, as well as the areas where the civic population resided.

This feature appears to have also been closely followed while setting up temporary camps, which had, in the first place, inspired the Mughal town plans. Explaining the Mughal encampment, and after discussing the royal tents and enclosures in it, Abu' l Fazal writes: "Behind the tents at some distance, the buyutat are placed; and at a further distance of 30 yards behind them, at the four corners of the camp, the bazaars. The nobles encamped on all the sides, according to their rank outside the complex for the imperial use".

From an old map of Agra, dating back to 1720 it appears that the city of Agra had around eight radial roads emanating from different directions and culminating at the fort. The main imperial road coming out of the northern gate of the fort is depicted in this map as opening into an octagonal bazaar labeled as Chaharsu which is situated in front of the Jami' Masjid and the gate of the city where it ends, the whole wide road is flanked with shops on both its sides. Another market is located on a road towards the south-western corner of the town.

Similarly at Fatehpur Sikri explorations revealed at least five markets in an area connecting the Imperial and bureaucratic area with the civic population. The prominent and largest of these Akbari bazaar appears to be mentioned by Abu' l Fazal and other contemporaries, and is said to be between the Diwan-I Am and the Agra gate of the town comprised of approximately 470 shops, 235 on either side of the road.

In their layout, these shops, just in case of the Tughluqabad, tend to follow a similar plan: A 1.6 m wide platform fronting an open vestibule 1.8 m wide rose to a height of 80 cm. This verandah or ante-chamber entered into a flat-roofed rectangular shop chamber which is 7.90 x 3.5m in its dimensions. As in the case of the Tughluqabad market, the platform was probably meant for the shoppers. The width of the road between the two rows of shops varied between 18.6m and 15.4m and the Agra Darwaza. A series of 3.64 m wide cross-lanes placed at regular intervals emanated from this market and headed towards the residential areas.

At Shahjahanabad, the two main boulevards connecting the fort with the city gates were provided with shops and bazaars. On the road running east-west and connecting the fort with the Lahore Darwaza of the town, was situated the Shops also lined the second main avenue which ran in a north-south direction and connected the citadel through its Akbarabadi Gate with the Delhi Darwaza of the city in the south.

At least by mid-18<sup>th</sup> Century when Dargah Quli Khan visited Delhi, the Chandni Chowk bazaar was divided to three sections. The first section of the market from the Lahori Gate of the fort to the Kotwali Darwaza was called Urdu Bazar which served the imperial household and the elites as well as the soldiers, clerks, artisans and others who lived around the palace-fortress. The second section was between Kotwali Chabutara and the Chandni Chowk square, known as Jauhari Bazaar. Each of these sections was 480 yards long due to being situated near Fatehpur Masjid was known as the Fatehpuri Bazaar.

The second market street mentioned above, connecting the Akbarabadi Gate of the fort with the Delhi gate of the city too was quite impressive and comprised 888 shops lining both sides of the road. Though not as impressive as the Chandni Chowk bazaar, it was still quite a thriving market. One hears of different types of bazars during the Mughal period.

Amongst them the main bazaar often known as well chowk, as we have already seen, occupied an extensive, central and prominent area of the city. Manrique thus defines these chowk as a space and open place in the centre of a town. Thus we have the Chandni Chowk and the Chowk Sha adullah Khan in Shahjanhanabad and the chowks of Agra and Lahore.

On the other hand, was a daily marketplace where horses, cattle and sometimes slaves were sold. Peleaert noted the nakhkhas of Agra used to be held every morning. Camels, horses, oxen along with tents and cotton goods were sold there.

At least at Agra, this cattle market was a covered building. Ganj and mandi of mandvi were the grain markets, while a closed market, sometimes attached to a noble's establishment, was known as katra. Generally such structures would be walled enclosures used for storing grain. Pent or hat was a market held at a fixed place around the city or a village of note on fixed days – once a week or more in which petty banias and local manufacturers and artisans gathered to sell their products. In these types of weekly hats all those who brought their commodities to be sold had stalls on the ground and in the open. Apart from these, there were also Mohalla markets which catered to the needs of the neighborhood.

On the basis of their physical form, the markets, as have been seen above could be simply a bazaar if it was in the form of rows of shops on both sides of a road of street. They would be known as a chowk if in the form of a square of katra, if enclosed on all sides. These types of markets were quite common of almost all the towns and cities of Sultanate and Mughal India. A new type of market-plan made its appearance from the period of Akbar: The It was shaped like a cruciform. There were at least two such markets, one of the other Agra.

The cross-shaped market, which appears to be the earliest such example in India is situated in Fathpur Sikri a little north of the main road of the town adjoining the Moti Baugh area and Muhalla Kotla. This structure is organized around two straight intersecting 14m wide roads forming a regular square. In the centre, where the intersecting roads cross, a square is formed. Each arm of the cruciform having a length of 100 m contains 66 cells, 33 on each side of the road and is fronted with verandahs.

The total number of cells in this structure is 276, each of which internally measures 2x2.5 m, while the pillared verandah is 4m wide. Each wing of the cruciform terminates at a tribute entrance gate. The plan of the structure closely resembles a typical built by Shahjahan at the Tajganj near Taj Mahal in Agra was also of the same type and shape. The only difference between it and the one at fathpur sikri is that here the four wings of the bazaar adjoined four square enclosures which forms katras enclosed markets on the outer side of his chaharsuq.

The Covered Bazaar near the Lahore Gate of the Delhi fort is an extension of the variety of the market. The only difference here was the fact that just like typical central Asian markets of Heart, Samarqand or Bukhara, the whole structure along with its central avenue along which the shops are places was covered with vaults.

In the centre where the four wings cross was an octagonal open space to let in air and sunlight. It is a plan which though reminding of Central Asian antecedents, is a unique example not encountered elsewhere in Indian architecture.

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