



Studies on TiO₂ thin film deposited by spray pyrolysis technique for sensing Glucose

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Abstract - In this study, we report an effective glucose electrochemical biosensor using TiO₂ electrode. Glucose is an essential biomolecule for human beings. It serves as a source of energy for a living cell and a metabolic intermediate. TiO₂ thin film electrode was prepared by Spray pyrolysis technique. Cyclic voltammetry (CV) was used to analyse the performance of the TiO₂ as the electrochemical biosensor. TiO₂ electrochemical biosensor exhibits good sensitivity and high linearity for the detection of glucose.

Keywords: TiO₂ thin film, Spray pyrolysis technique, Cyclic voltammetry, Glucose sensor.

1. INTRODUCTION

Glucose, is a monosaccharide with a molecular formula C₆H₁₂O₆, is an essential biomolecule for human beings. It is also known as simple sugar or dextrose. Glucose in the blood and tissue fluids is drawn upon by all the cells of the body and used for the production of energy. The glucose found in bloodstream is referred to as blood sugar and its normal concentration is 80 to 120 mg/dL or 4.4 to 6.6 mM. Blood sugar level becomes much higher in persons suffering from diabetes mellitus. Thus detection of glucose is important in the areas of clinical diagnosis and treatment of diabetes [1].

There are several methods used for the analysis of blood glucose. They are optical, conductometric, refractometric, chromatography, amperometric, fluorometric, enzymatic method and electrochemical analysis [2-5]. In recent years the electrochemical analysis have gained attention in the investigation of important biological molecules and drugs because of their simplicity, cost effectiveness, easy handling and highly sensitive compared to other methods [6]. The objective of the work is to fabricate a metal

oxide semiconductor electrode material for electrochemical biosensor to sense glucose.

Metal oxide semiconductor films have been widely studied and have received considerable attention in recent years, due to their optical and electrical properties. The metal oxide semiconductors such as TiO₂, ZnO, and SnO₂ are researched widely for various application such as optoelectronic devices, sensors, solar cells and soon. Among these semiconductors, TiO₂ thin films have many applications to engage in the field of sensors, antireflection coatings, solar cells, photo catalysts depend not only on its energy band structure but to a great extent on its crystal structure, crystallite size and morphology. Titaniumdioxide (TiO₂) is an n-type semiconductor, which can be found in any of its three polymorphs: anatase, brookite, and rutile [7].

Environmental friendly TiO₂ thin films got interest in the field of biosensor due to its good biocompatibility, large surface area, immobilizing ability and good surface, structural, physical, chemical and optical properties. The immobilizing amount of enzymes, activity of immobilized enzymes and conductivity are the key factors for the sensitivity of biosensors [8,9].

Semiconductors in the form of thin films got greater technological importance because of their variety of advantages over bulk crystals [10]. TiO₂ thin films were fabricated by many methods including molecular beam epitaxy, spin coating, electro deposition, RF-magnetron sputtering, pulsed laser deposition (PLD), metal- organic chemical vapour deposition (MOCVD) and spray pyrolysis.

Among these spray pyrolysis is a cost effective, simple and efficient technique.

Spray pyrolysis technique is a very valuable technique to produce TiO_2 thin films for tremendous applications. Interest in spray pyrolysis technique is due to its large number of advantages such as cost-effectiveness (equipment costs and energy needs), good film homogeneity, easiness of doping effectively, moderate processing temperatures (100-500 °C), control of thickness, easy to vary film composition and possibility of multilayer deposition with uniformity [11].

2. CHEMICALS AND METHODS

The chemicals used for the preparation of TiO_2 thin film electrode was titanium tetraisopropoxide (TTIP, $\text{Ti}\{\text{OCH}(\text{CH}_3)_2\}_4$, 97%), ethanol ($\text{C}_2\text{H}_5\text{OH}$, 99.9%) and acetyl acetone (AcAc, $\text{CH}_3\text{COCH}_2\text{COCH}_3$, 98%). Potassium hydroxide (KOH) pellets was used for preparation of KOH electrolyte buffer solution. All the chemicals were bought in analytical grade and used without further purification.

2.1. Preparation of TiO_2 precursor solution

For preparing TiO_2 precursor solution the molar ratio of TTIP, ethanol and AcAc was maintained as 1:10:1. 4 ml of TTIP was dissolved in 20 ml of ethanol in a beaker and stirred for 10 minute using magnetic stirrer. A transparent solution was obtained. To this mixture 4ml of acetylacetone was added and stirred for 10 minutes. Now an orangish yellow solution was obtained. Again 20 ml of ethanol was added to the solution and stirred vigorously for 1 hour in a closed manner [12]. The obtained TiO_2 precursor solution is atomized into spray pyrolysis for film growth.

2.2. Preparation of TiO_2 thin films

The atomized TiO_2 solution was sprayed on finely cleaned glass slides by Spray pyrolysis technique with spray rate of 4ml/min, air as carrier gas, pressure of 1 bar, at a substrate temperature of 350 °C, nozzle to substrate distance as 15cm. TiO_2 solution was sprayed for 1 minute and then the film was

pre-annealed for 10 minutes at 350 °C in muffle furnace. This was considered as 1 coating. The similar process was followed upto 10 coatings. After that the TiO_2 thin film was post annealed at 500 °C for 1 hour [12]. Deposited TiO_2 thin film was used as electrode material to sense glucose.

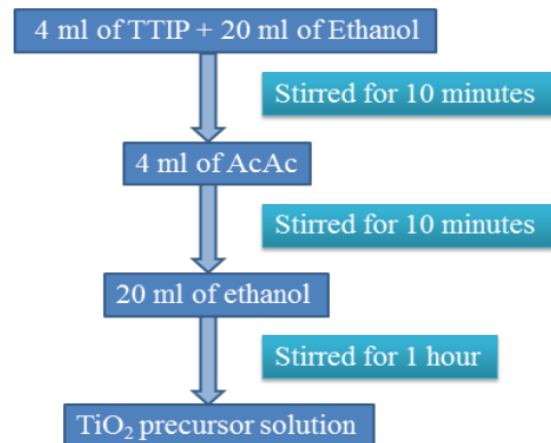


Figure 1: Flow chart of preparation of TiO_2 precursor solution

3. ELECTROCHEMICAL RESPONSE OF TiO_2 THIN FILM ELECTRODE FOR GLUCOSE SENSING

The electrochemical analysis with three electrode cell was carried out by using Ag/AgCl (KCl) as reference electrode, glassy carbon electrode (GCE) as counter electrode and TiO_2 thin film as working electrode. 1M KOH with pH 7 was the electrolyte.

In the sensing process, glucose was added in different concentrations ie; 1mM, 3mM and 5mM into 1M KOH electrolyte with TiO_2 film as working electrode. Figure 2 shows the comparison CV plots for different concentrations of glucose with TiO_2 electrode.

The schematic representation of the glucose sensing mechanism of glass/TiO₂ electrode is shown in Figure 3.

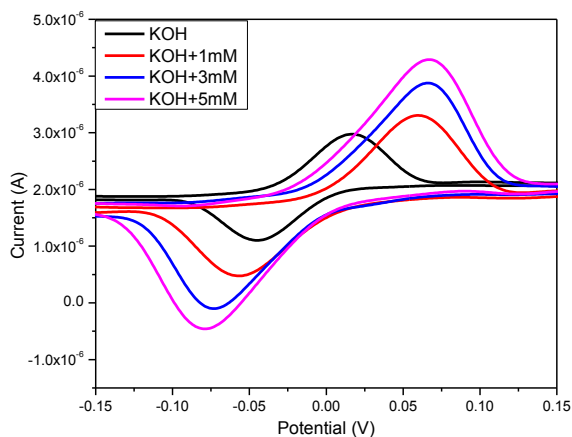


Figure 2: Comparison CV sweep curve of TiO₂ electrode with different glucose concentrations in 1M KOH.

It is observed from the plot that the TiO₂ electrode shows a rapid and sensitive response for glucose. The current voltage response of TiO₂ electrode in the presence of glucose in KOH solution shows higher response in comparison with KOH solution. Also the anodic peak current *I*_{pa} increases and the cathodic peak current *I*_{pc} decreases upon the successive addition of glucose. The anodic and cathodic peak potential (*E*_{pa} & *E*_{pc}) and current (*I*_{pa} & *I*_{pc}) are tabulated in Table 1.

Table 1: Anodic and cathodic peak potential (*E*_{pa}, *E*_{pc}) & anodic and cathodic peak current (*I*_{pa}, *I*_{pc}) of various concentration of Glucose for TiO₂ electrode.

Electrode	Concentration	<i>E</i> _{pa} (V)	<i>E</i> _{pc} (V)	<i>I</i> _{pa} (μA)	<i>I</i> _{pc} (μA)
TiO ₂	KOH	0.0166	-0.0452	0.975	-0.842
	KOH + 1mM glucose	0.0601	-0.0564	1.421	-1.196
	KOH + 3mM glucose	0.0661	-0.0727	1.921	-1.820
	KOH + 5mM glucose	0.0667	0.0794	2.480	-2.249

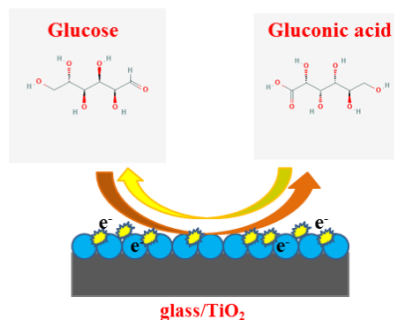


Figure 3: Schematic representation of glucose with glass/TiO₂ electrode.

Figure 2 clearly shows that the sensing process of glucose on the glass/TiO₂ electrode is redox due to the presence of both anodic and cathodic peak. Hence glucose on oxidation gives gluconic acid and on reduction process gluconic acid converts into glucose. The electrons generated from these biochemical reactions are transferred to the electrode, which amplifies the electrochemical signal resulting in improved sensing.

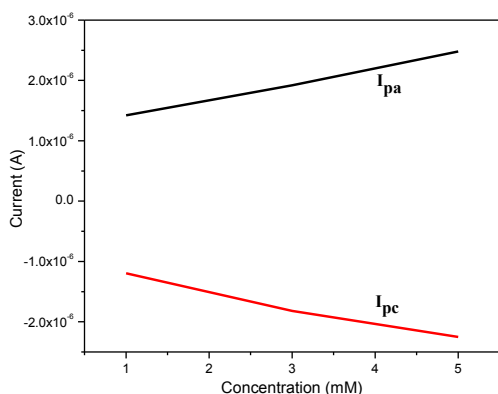


Figure 4: Linear plot of anodic & cathodic peak current Vs concentration of glucose for TiO₂ electrode.

The linear curve for anodic and cathodic peak current Vs concentration of glucose for TiO₂ electrode was shown in Figure 4. It reveals that the anodic current increases and cathodic current decreases linearly as the concentration of glucose were increased. The good linear relationship between the peak currents and the concentration of glucose signifies that the TiO₂ electrode has got the ability to sense glucose.

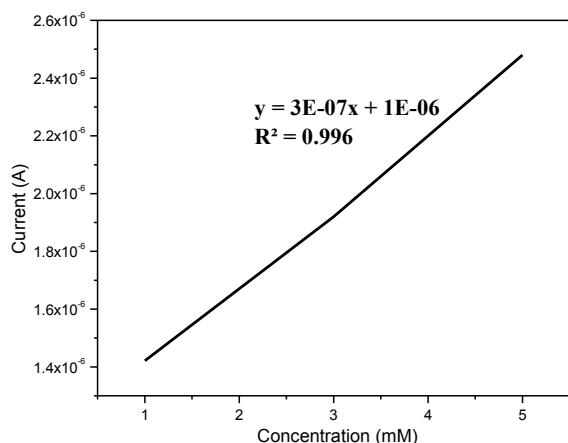


Figure 5: Linearity calibration plot for anodic current Vs concentration of glucose for TiO₂ electrode.

The linearity calibration plot for anodic current Vs concentration of glucose for TiO₂ electrode, which was evaluated by least square regression method, is shown in Figure 5. The calibration plot show that the anodic current (oxidation peak current) increases linearly with respect to increase in glucose concentration ($R^2=0.996$), which can be attributed to the increased number of released electrons during oxidation. Thus electron transfer rate is higher for presence of glucose than absence of glucose. The regression equation for TiO₂ electrode with various concentration of glucose is $I_{pa} (\mu A) = 3E-07x + 1E-06$ and its correlation coefficient is 0.996. The sensitivity of glucose of TiO₂ electrode as obtained from the above plot is $1.421 \mu A \text{ mM}^{-1}\text{cm}^{-2}$. The linear range of glucose detection is 1mM-5mM.

4. CONCLUSION

Glucose biosensor was successfully constructed using TiO₂ electrode in an electrochemical cell. The electrochemical response studies of TiO₂ electrode for detection of glucose show good linearity and high sensitivity of $1.421 \mu A \text{ mM}^{-1}\text{cm}^{-2}$.

The current study implies that the constructed TiO₂ thin film based electrochemical biosensor act as a potential candidate for application in the detection of glucose.

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Fingerprint Recognition using fewer GLCM Features and Artificial Neural Network

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Abstract - This proposed work is recognizing fingerprint with minimum features by artificial neural network. Instead of considering all features generated from GLCM, only four features are used in the recognition process. The statistical co-occurrence features energy, entropy, correlation and cluster prominence are extracted from the GLCM matrix of single direction used for recognition. The Back propagation and Levenberg Marquardt algorithm are used for training the neural network. The experimental results show that the good recognition rate is obtained in this proposed work.

Keywords: Fingerprint Recognition, GLCM, Haralick Features, Artificial Neural Network.

1. INTRODUCTION

Fingerprint recognition is the oldest and most acceptable method of Biometric Systems. The useful properties lead to use fingerprint for authentication are its uniqueness and stability over a lifetime of a human being [1]. The uniqueness of fingerprints is determined by local and global features. The local features are represented as ridge bifurcations and ridge endings. The global features are represented as ridges and valleys. These features are known as minutiae [2, 3]. Fingerprint features are classified into three levels. Level_1 is Patterns, Level_2 is Minutiae and Level_3 is Pores and Ridges. These features are used for recognizing fingerprints [3]. The fingerprints patterns are divided into three parts. Loop such as right loop and left loop covers 65% of fingerprints, Arch such as plain and tented arch covers 1% of fingerprints and whorl covers 30% of fingerprints and accidental whorl covers 1% of fingerprints [3, 4]. The local ridge characteristics of a fingerprint image are known as minutiae. More types of minutiae features are characterized by the spatial location. The two main minutiae types are bifurcations and ridge endings (also known as termination) [5]. The other minutiae types are shown in figure 1.

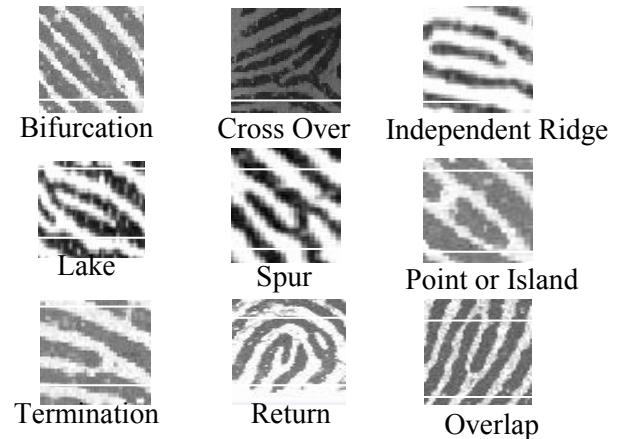


Figure 1: Types of Minutiae

The Level-3 features consist of geometrical details of ridges and pore location and details of small characteristics from a fingerprint image. The fingerprint recognition is the process of identifying an individual person based on minutiae points [6] or features. The texture analysis methods are divided into four categories namely Model based, Statistical based, Structural based and Transform based [7, 8]. The method covered in this paper is statistical based method. The statistical feature extraction is classified into three categories such as: First-order, Second-order and Higher-order statistics [7]. In the first-order statistics features are extracted from a single pixel. The higher-order statistics features are extracted from two or more pixels. The second-order based statistical method extract the features by pair of pixels [8]. The most popular second-order statistics feature extraction method is Gray Level Co-Occurrence Matrix (GLCM). The GLCM is also known as Gray Level Spatial Dependence Matrix. It displays the brightness occurs in an image. It defines the relationships between the neighboring pixels [9].

Tripti et al. [10] have proposed a fingerprint recognition by artificial neural network based on image preprocessing and segmentation. Krisakorn and Vutipong [11] have proposed a new reference point (focal point) for recognizing fingerprint. The focal point calculated by the average cross points five times repeatedly from the full thinned ridge image. Virginia Espinosa-Duro [12] have proposed a minutiae detection algorithm for fingerprint recognition based on the minutiae mapping. Satya et al. [13] have designed an efficient approach for fingerprint recognition which is implemented in many steps. The steps of this proposed system are image acquisition, fingerprint image isolation, enhancement and feature extraction. The implemented approach shows the combination of adaptive enhancement and canny edge detector gives the efficient fingerprint recognition approach. Vijayaprasad et al [14] have proposed a fingerprint matching approach using the global minutiae matching which is used for classification and support vector machine. Baldi and Chauvin [15] have proposed a fingerprint recognition using matching algorithm and neural network. The matching algorithm decides whether or not the two fingerprint images originate from the same finger. This algorithm has two stages. First is a preprocessing stage which calculates a central region from the fingerprint image. The second stage is implemented by a probabilistic Bayesian approach which is used to estimate the probability of two central regions and neural network is trained by gradient descent method for recognition. Wai-Fung et. al [16] have proposed a fingerprint recognition using neural network. In this work, minutiae are extracted from the fingerprint image. Multilayer perceptron with a single hidden layer is trained by backpropagation algorithm. Hamid et. al [17] have proposed automatic fingerprint identification based on statistical descriptors using machine learning techniques.

The seven statistical features namely variance, homogeneity, maximum probability, entropy, energy, dissimilarity and contrast with four different distances are calculated using the GLCM. These features are trained by five different types of machine learning algorithms namely error pruning tree, random tree, J48 tree, random forest and decision stump. Sireesha and Sandhyarani [18] have proposed a fingerprint recognition using the combination of various texture features trained by neural network. In this work, texture features are extracted using local binary pattern (LBP), local gabor xor pattern (LGXP), Gabor filter and GLCM. The statistical features of sum of squares and contrast are calculated from the GLCM matrix. These features are combined in a vector and trained by neural network using bat algorithm.

In this proposed work, the GLCM matrix is calculated for a single spatial relationship of the fingerprint image. The statistical features namely energy, entropy, correlation and cluster prominence are extracted from the GLCM matrix. They are used to incorporate knowledge in the neural network for recognizing fingerprint. GLCM is elaborated in section II, Artificial neural network is briefly explained in section III. Section IV contains the training algorithm of this proposed work and experimental results and discussion are explained in section V.

2. GRAY LEVEL CO-OCCURRENCE MATRIX

The GLCM is an old method used for texture feature extraction. It is proposed by Haralick et.al. [19] in 1973. The fourteen features are extracted from the GLCM by Haralick [20]. One-dimensional histogram is not a good texture measure for finding exact relationships between two pixels. Two-dimensional histogram is used to overcome this drawback. The GLCM are computed for the few predefined directions θ and distances d . The GLCM reveals the pixel brightness in an

image. The GLCM matrix is generated by the distance and angles. The default distance value (d) is 1. The angles in degrees (θ) are 0° , 45° , 90° and 135° .

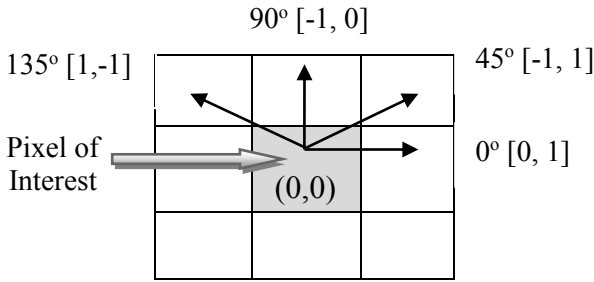


Figure 2 Spatial relationship between reference and neighbouring pixel

It considers two pixels for GLCM texture calculation. These two pixels referred as reference pixel and neighbouring pixel. Number of rows and number of columns of the GLCM are equal to the number of gray levels G in the image. The Haralick features are extracted from the GLCM. The predefined directions and distances of the relationships between the pixels are used to reduce the time consumption for generating GLCM matrix. The GLCM matrix contains number of co-occurrence of the pixels with the gray level j at the distance d and at the direction θ of gray levels of pixels i .

The fast GLCM method [21] to generate GLCM is

$$GLCM_{d,\theta}^{(x_c,y_c)}(i,j) = \sum_{\substack{(x_1,y_1) \\ (x_2,y_2)}} \delta[I(x_1,y_1),i] \cdot \delta[I(x_2,y_2),j]$$

$$s.t \begin{cases} (x_2,y_2) = (x_1,y_1) + (d \cos \theta, d \sin \theta) \\ (x_1,y_1) \text{ and } (x_2,y_2) \in \mathbf{W}_{(x_c,y_c)} \end{cases} \quad (1)$$

$$\text{Where } \delta[m,n] = \begin{cases} 1 & \text{if } m = n \\ 0 & \text{Otherwise} \end{cases}$$

The $\delta[.,.]$ is the kronecker delta function. G is the number of gray levels in the fingerprint image. I is a gray level image have two gray levels i and j in the range from $\{1,2,\dots,G\}$. $I(x_1,y_1)$ is the reference pixel and $I(x_2,y_2)$ is the neighbouring pixels in the neighbourhood window $\mathbf{W}_{(x_c,y_c)}$. The (x_c,y_c) is the center pixel of neighbourhood window.

Different types of statistical measures are calculated from the GLCM matrix. The mean and standard deviation are the first order

statistics features concerned with the individual pixel properties in an image. The homogeneity, inertia, local homogeneity, entropy, energy, contrast, correlation, variance, sum of average, sum of entropy, difference of entropy, shade and prominence are second order statistics features concerned with co-occurrence of pairs of pixels. The second order statistical features energy, entropy, correlation and cluster prominence are used in the proposed work.

Energy

The energy feature is calculated by the sum of the square of each element in the GLCM matrix. It is also means Angular Second Moment (ASM) and is calculated as

$$\text{Energy} = \sum_{i,j}^{N-1} (P_{i,j})^2 \quad (2)$$

Entropy

The entropy measures the randomness of intensity distribution in an image and is calculated by the sum of multiplication of each pixel from GLCM matrix and its inverse.

$$\text{Entropy} = \sum_{i,j}^{N-1} -\ln(P_{i,j})P_{i,j} \quad (3)$$

Correlation

It defines that how a reference pixel is correlated to its neighbour over the whole image and is calculated by

$$\text{Correlation} = \sum_{i,j}^{N-1} P_{i,j} \frac{(i-\mu)(j-\mu)}{\sigma^2} \quad (4)$$

Cluster prominence

The cluster prominence measures the asymmetry and is obtained by

$$\text{Cluster Prominence} = \text{sgn}(B)|B|^{1/4} \quad (5)$$

Where

$$B = \sum_{i,j}^{N-1} \frac{(i+j-2\mu)^4 P_{i,j}}{4\sigma^4(1+\text{Correlation})^2}$$

μ - mean of the GLCM and it is calculated by

$$\mu = \sum_{i,j}^{N-1} iP_{i,j}$$

σ^2 - standard variance of the reference pixels intensities relationships that is calculated by

$$\sigma^2 = \sum_{i,j}^{N-1} P_{i,j} (i - \mu)^2$$

$\text{sgn}(x)$ – It is a sign of a real number

$$x = -1 \text{ if } x < 0$$

$$x = 0 \text{ if } x = 0$$

$$x = 1 \text{ if } x > 0$$

3. ARTIFICIAL NEURAL NETWORK

Artificial neural networks have the ability to learn non-linear or complex relationships between inputs and outputs. ANN is mostly used for machine learning problems. The feedforward neural network is a supervised neural network. FNN is fully interconnected by layers. Each layer connected by means of synaptic weights. The data passes through the input neurons and exit on the output neurons. The hidden layer neurons are discovering relationships between the input patterns. Having enough hidden layers the neural network is able to approximate mapping from the input to the expected output. Each hidden layer neuron applies the non-linearity to its input pattern.

The backpropagation is a training algorithm used to train the neural network. It is also called as generalized delta rule. This algorithm is a supervised learning technique based on gradient descent method which reduces the training error of the output computed by the network. The learning algorithm is a mathematical logic and adapts the change by itself when the change of environment occurs. It is used to change or update the synaptic weights of each neuron during training.

Net: It tells the total value enter as input to the hidden layer neuron.

$$Net_i = \sum_{j=1}^n (Iw_{i,j}x_{jn} + HB) \quad \forall i = 1, 2, \dots, h \quad (6)$$

where $Iw_{i,j}$ is the weight value of the i^{th} input neuron to j^{th} hidden neuron, x_{jn} is the input value and HB is the bias value for hidden neurons.

Hidden Layer Activation Function

$$Ho_i = f(Net_i) \quad \forall i = 1, 2, \dots, h \quad (7)$$

Where $f(Net_i) = \frac{1}{1+e^{-(Net_i)}}$ and h is the number of hidden neurons.

Output Layer Activation Function

$$Yo_i = f(\sum_{i=1}^h Hw_i Ho_i) \quad \forall i = 1, 2, \dots, m \quad (8)$$

Where Hw_i is the i^{th} hidden neuron weight value and Ho_i is i^{th} hidden layer activation

function and m is the number of output layer neurons.

Network error

$$E = \frac{1}{2} \sum_{i=1}^m (y_i - o_i)^2 \quad (9)$$

Where E is the error of the network

y_i is the obtained output

o_i is the desired output

The rate of change of error E with respect to weights of output to hidden neurons

$$\frac{\partial E}{\partial v_{j,k}} = 2e_i * f(Net_k) * h_j \quad \text{Where } e_i = y_i - o_i \quad (10)$$

The rate of change of error E with respect to weights of input to hidden neurons

$$\frac{\partial E}{\partial w_{i,j}} = x_i * h_j * (1 - h_j) * (\sum_{k=1}^m (y - o) * o * (1 - o)) \quad (11)$$

Where x is the input pattern and h is the output of hidden neuron.

Update the Weight of Hidden Layer to Output Layer

$$Hw_{k,j} = Hw_{k,j} + \left(lamda * \frac{\partial E}{\partial Hw_{k,j}} \right) + (momentum * previous \frac{\partial E}{\partial Hw_{k,j}}) \quad (12)$$

Update the Weight of Input Layer to Hidden Layer

$$w_{j,i} = w_{j,i} + \left(lamda * \frac{\partial E}{\partial w_{j,i}} \right) + (momentum * previous \frac{\partial E}{\partial w_{j,i}}) \quad (13)$$

The Levenberg Marquardt algorithm is the numerical optimization technique used to solve the problems of nonlinear least squares minimization. It is also known as the damped least squares method. It works with the jacobian matrix and gradient vector. The Levenberg algorithm is a curve fitting method as a combination of two minimization methods. The first method is gradient descent method used to reduce the sum of the squared errors by updating the parameters in the steepest descent direction. The second method is the Gauss newton method used to reduce the sum of the squared errors by least squares functions to find the minimum of the quadratic.

$f(Net_i)$

4. TRAINING ALGORITHM

Algorithm 1: Generate GLCM and feature extraction

Step I: Read the fingerprint image

1. Image re-quantization: reduce the 256 gray levels of input images into 32 levels
2. Calculate GLCMs by spatial relationship parameter, 0° direction and 16 pixel distance using eq (1)
3. From the GLCMs extract four statistical features energy, entropy, correlation and cluster prominence using eq (2), (3), (4), (5)
4. Generate feature vector of size 1x5 by arranging four features with the bias value 1. This is a pattern.
5. Do the above steps for all images

Algorithm 2: Neural network training

Step I: Initialization

- i. Initialize the neural network with the random weight values from the range [-1 1]
- ii. Initialize the learning rate with the value from the range [0 1]
- iii. Initialize the momentum with the value from the range [0 1]

Step II: ANN Training Algorithm

1. Enter the input patterns and corresponding desired output patterns
2. Initialize hidden and output layer weights
3. For loop for training patterns

- a. Select a pattern from the training dataset to the network
- b. Calculate net, output values for hidden and output neurons using eq (6),(7), (8)
- c. Calculate network error using eq (9) and accumulate it
4. End for loop
5. Calculate rate of change of error with respect to weights W and V using (10), (11)
6. Update the weights of input to hidden layer and hidden to output layer using (12) and (13)
7. Repeat the steps 3 to 6 until desired accuracy is reached in the network

5. EXPERIMENTAL RESULTS AND DISCUSSION

The proposed work is applied on the public fingerprint databases namely set B of FVC 2000 and FVC 2002 which are collected from UCI repository. Every sub database contains 8 different impressions of 10 person's fingerprints and it leads to total of 640 different fingerprints. Two datasets FVC 2000 (DB1, DB3) are considered for recognition using backpropagation algorithm. The datasets FVC 2000 (DB2, DB4) and FVC 2002 (DB1, DB2, DB3, DB4) are recognized using Levenberg Marquardt algorithm tool in the environment MAT Lab R2009. Table 1 describes the image size, sensor type and resolution of each dataset.

Table 1: Description of FVC Databases

Database	Sub Database	Size	Resolution	Sensor Type	Set
FVC 2000	DB1	300x300	500dpi	Low-Cost Optical	10x8
	DB2	256x364	500dpi	Low-Cost Capacitive	10x8
	DB3	448x478	500dpi	Optical	10x8
	DB4	240x320	About 500dpi	Synthetic Generator	10x8
FVC 2002	DB1	388x374	500dpi	Optical	10x8
	DB2	296x560	569dpi	Optical	10x8
	DB3	300x300	500dpi	Capacitive	10x8
	DB4	288x384	About 500dpi	Synthetic Generator	10x8

The GLCM are obtained for 0° direction with their spatial relationship [0 16] for the re-quantized fingerprint image. The required statistical features energy, entropy, correlation and cluster prominence are extracted from the GLCM matrix. Table 2 shows the sample extracted features values for the dataset with bias value 1.

Table 2: Sample extracted features with bias value

Database/Features	Energy	Entropy	Correlation	Cluster Prominence	Bias
FVC 2000_DB1	0.0090	0.6122	0.6108	0.2627	1
FVC 2002_DB1	0.3813	0.4812	0.6010	0.2408	1

The features extracted from the generated GLCM for the dataset FVC2000

Table 3: Performance of FVC 2000 DB1 and FVC 2000 DB3 Fingerprint Images Dataset

Database	Hidden Neuron	Momentum (μ)	Learning Rate (λ)	Termination Condition (MSE)	Training Time in seconds	Accuracy
FVC 2000 DB1	19	0.1	0.01	0.01	720	92.50 %
FVC 2000 DB3	12	0.1	0.0	0.01	660	92.51 %

The features extracted from the generated GLCM for the dataset FVC2000 DB2 and FVC2000 DB4 and FVC 2002 (DB1, DB2, DB3, DB4) datasets are used as input patterns for the neural network. The network is trained using levenberg-marquardt algorithm tool. Total input pattern considered from each dataset is 66 for training and 14 for testing and are chosen randomly. The architecture of this

Table 4: Performance of FVC 2000 (DB2, DB4) and FVC 2002 (DB1, DB2, DB3, DB4) in LM Algorithm

Database	Momentum (μ)	Termination Condition (MSE)	Training Time in seconds	Epoch	Accuracy
FVC 2000 DB2	0.001	0.00001	1.0140	39	91.25 %
FVC 2000 DB4	0.001	0.00001	1.0360	37	92.50 %
FVC 2002 DB1	0.001	0.00001	1.1490	44	91.25 %
FVC 2002 DB2	0.001	0.00001	3.156	49	93.75%
FVC 2002 DB3	0.001	0.0045	0.1047	50	88.75%
FVC 2002 DB4	0.001	0.0001	2.626	40	95%

DB1 and FVC2000 DB3 are used as input patterns for the neural network. The network is trained using backpropagation algorithm. A total input pattern of each dataset is 80 for training and testing. The architecture of this network is 5 neurons in the input layer and 4 neurons in the output layer, the neurons in the hidden layer is not a constant one and is varied from dataset to dataset. Weights are initialized from the interval [-1, 1].The termination condition of the network is MSE 0.01. During testing, output is 1 if the value of the output neuron is greater than 0.5, otherwise 0. Table 3 shows number of hidden neurons, momentum, learning rate, termination condition, training time in seconds and accuracy results of each datasets.

network is 5 input neurons, 20 hidden neurons and 10 output neurons. Weights are initialized from the interval [-1, 1].The learning rate parameter is randomly chosen from the interval [0, 1]. The momentum value is set to 0.001. Table 4 shows momentum, learning rate, termination condition, training time in seconds, epoch and accuracy of each datasets during training.

It has been observed from the table 3 and table 4 that the training time of Levenberg-Marquardt algorithm is lesser than the backpropagation algorithm. Figure 3 shows the learning curve representation of epoch vs mean

square error for FCV 2000_db2 database. The x-axis represents the epoch value and Y axis represents the mean square error. In 39th epoch the targeted mean square error is reached.

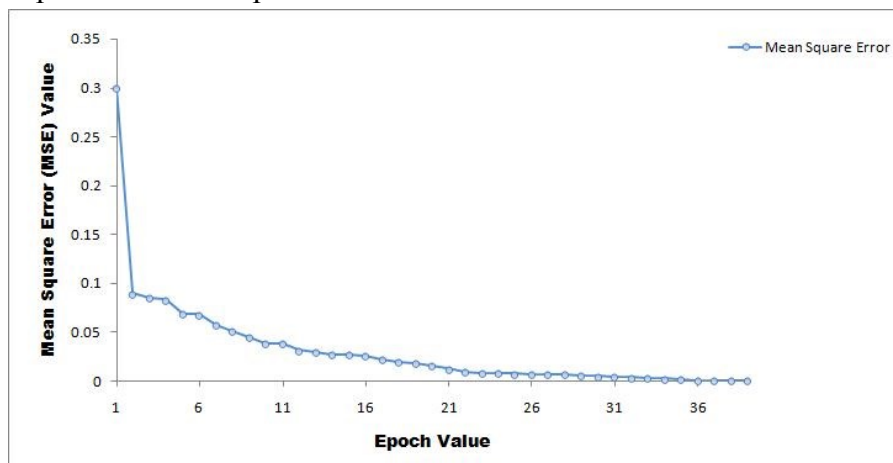


Figure 3: Epoch Vs MSE for FCV 2000_DB2 Database

The overall results of recognition rate for various fingerprint datasets are shown in table 5.

Table 5: Fingerprint Recognition Accuracy

Database	Sub Database	Accuracy %
FVC 2000	DB1	92.50%
	DB2	91.25%
	DB3	92.50%
	DB4	92.50%
FVC 2002	DB1	91.25%
	DB2	93.75%
	DB3	88.75%
	DB4	95.00%
Total Accuracy		92.18%

6. CONCLUSION

The fast GLCM method is used to generate GLCM and only four co-occurrence statistics features energy, entropy, correlation and cluster prominence are extracted from the GLCM for recognizing the fingerprint instead of 17. A single hidden layer neural network is considered to recognize fingerprint image. The

backpropagation algorithm and Levenberg-marquardt algorithm are used to train the neural network. The neural network is efficiently trained to recognize the fingerprint with these features. The experimental results show that the neural network which uses Levenberg Marquardt algorithm for training gives good accuracy in fingerprint recognition than backpropagation training algorithm. It has also been observed that training time of the neural network is lesser when Levenberg Marquardt algorithm is used.

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Information Access Behavior of Social Science Researchers in Affiliated colleges in Virudhunagar district

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Abstract - This paper attempts to study the information use pattern of social science researchers in affiliated colleges in Virudhunagar District. Information has the power only when it is transferred and communicated. The Research emphasizes on how this power is utilized by the user like research scholars, research guide, Librarian and to show on thru sample data collection, how the Library system should be modified, How the Digital system should be adopted in Library system for keeping power of Information.

Keywords: Information sources, User behaviour, Information structure

1. INTRODUCTION

Information is described as the fifth need of man ranking after air, water, food and shelter. In one form or another, it remains a significant element in the development of human society and it has shaped over a long period of time into the way in which we think and act. The information 'explodes' into power only when it is transferred and communicated, in other words, information is activated by communication. More research into behavior and information gathering patterns of the user groups, will assist the library more effectively in developing programmes and using the resources and limited funds to achieve desired goals. Accurate and up-to-date knowledge about users and their information behavior emerges now as one of the essential ingredients for any library system design. The effectiveness of library and information system depends on the extent to which the system characteristics correspond with the user and on how much the potential user is willing and able to make use of it. The Librarian has to intimately and individually understand the requirements of his users and continuously update his knowledge about users through systematic studies and observations.

Information use pattern studies are one

of the important areas in user studies. The motives and purposes of users give a new insight into information needs and requirements. To satisfy such needs and requirements, users adopt various means for accession to sources of information, and in the act of accession to information, the user relies or calls upon the sources predetermined which lead to satisfaction or dissatisfaction.

Statement of the Problem

This study examines information seeking behaviour of social science researchers in affiliated Colleges in Virudhunagar District. The information needs can be assessed on the basis of duration and quantum of time utilization in search of information in libraries of their own institutions and also in other institutions; and so the time aspect had been brought within the purview of the present study.

2. REVIEW OF LITERATURE

Chern Li Liew and Siong Ngor Ng (2006)¹ this study investigates the information seeking behavior of fourteen ethnomusicologists in New Zealand via interviews. The findings shed light on what information ethnomusicologists seek, the sources and services they use, and the barriers they face in information seeking and use. A number of ways in which libraries can create collections and design services that will meet the information needs of ethnomusicologists are proposed.

Angela Weiler (2005)² Research in information-seeking behavior, motivation, critical thinking, and learning theory was explored and compared in a search for possible motivating factors behind students' dependence on television and the Internet for their

information needs. The research indicates that only a very small percentage of the general population prefers to learn by reading.

Andy Barrett (2005)³ this paper summarizes an exploratory research study on the information-seeking habits of graduate student researchers in the humanities. In-depth interviews with a small sample of humanities graduate students were used to explore to what extent humanities graduate students might constitute a user group distinct from faculty and undergraduate models. Sharma and Pant (2004)⁴ in their study on information seeking patterns of Defense Research and Development Establishment (DRDE) Scientists revealed a few trends, which provide very valuable data for analysis. Field of research work in such establishment has been growing up very rapidly therefore, providing the correct and pin pointed information to the scientists is an incredible task for library personnel. They study found that most of the scientists belong to 40-49 age group; 100% of scientists of this establishment are using library for referring the journals articles. One of significance change of communication media, internet is most popular among the scientists.

Shokeen and Kushik (2002)⁵ studied about information seeking behavior of social scientists working in the universities located in Haryana. They reported that most of the social scientists visit the library daily. The first preferred method of searching the required information by the social scientists followed by searching through indexing and abstracting periodicals, and citations in articles respectively.

3. OBJECTIVES

The researcher has framed the following objectives.

- ❖ To analyse the time spent by the users on accessing the resources.
- ❖ To identify the types of information used by the users.

- ❖ To identify the users' opinion on collection of library resources in the institutions under study.
- ❖ To find out the respondents' views on advantages of using the library of their own institutions.

4. HYPOTHESES

The following hypotheses are formulated on the basis of content and coverage of framed objectives and they are tested by employing appropriate statistical tools:

- ❖ There is a significant difference between the different disciplines of users and types of materials used in the library
- ❖ There is a significant difference among the users and the services provided by the library.
- ❖ There is a significant difference among the users in time spent for accessing the Internet facilities
- ❖ There is a significant variation between the purposes of library visit among the respondents.

5. METHODOLOGY

This study attempts to questionnaire method and the study is Information seeking behaviour of social science researchers in affiliated colleges in Virudhunagar District,

6. SAMPLING

In order to study the information seeking behaviour of social science researchers in the departments of affiliated colleges, researcher has chosen ten college libraries in Virudhunagar District.

7. DATA COLLECTION

The researcher has used the questionnaire method for collecting the data from the respondents. The questionnaires were designed to get the background information of the user, duration and quantum of library use, nature and type of information required, motivation to seek and collect information, extent of utility of library services and facilities, and their opinion about the library

services and facilities provided. The researcher carried out the data collection work during the period of January 2014 to June 2015.

8. DATA ANALYSIS

The collected data are classified and tabulated according to the objectives and hypotheses stated. First, the data are recorded on data sheets and then fed to the computer personally. In order to test the hypotheses, the chi-square statistical and ANOVA two way

model were applied. The general data interpretation was made with the help of percentages and averages

The study covered the social science research programmers such as Commerce, Economics, Management and History offered in the departments of ten affiliated colleges in Virudhunagar District. The respondents are research scholars from M Phil or Ph D in the above disciplines.

Table 8.1 Subject-Wise Distribution of the Respondents

Institutions	Commerce	Economics	Management	History	Total
Affiliated Colleges	38	25	20	17	100

In the above table, the subject – wise distribution of the respondents shows that eighty four percent of the respondents belong to the affiliated colleges and remaining sixteen percent of them are from university departments.

8.2 Course of Study

Researches are undertaken for several reasons. They could be taken up, for instance, just to satisfy one’s curiosity, plan for an experiment, prepare a scheme or policy, test a hunch, or just for the heck of it. Researches are also carried out at individual level to make one acquire a qualification. Respondents in this study were carried out a research for the purpose of qualifying M Phil or Ph D in their respective fields. A course of study of the respondents in the above table indicates that the

majority of the respondents were doing full-time M Phil (45.5%) and full-time Ph D (35.2%) and a minor portion of the respondents were part-time Ph D (13.6%) and part-time M. Phil (5.7%) scholars during the surveyed period. It is also found that at the maximum of 57.3 per cent of the commerce scholars are doing M.Phil full time and 40 per cent of the scholars are doing Ph.D. full time, belongs to the Department of Economics.

8.3 Frequency of visits to the library

It is an accepted fact that the frequency of visit to the library by users depends upon the nature of library collection, organization, maintenance, and above all the services and helpfulness of the library staff in making use of library resources.

Table 8.3 Frequency of visits to the library

Frequency of visits	Commerce (N=38)	Economics (N=25)	Management (N=20)	History (N=17)	Total (N=100)
Every day	22 (57.89)	16 (64.0)	14 (70.0)	6 (35.29)	58 (58.0)
Once in two days	8 (21.05)	6 (24.0)	5 (25.0)	7 (41.18)	26 (26.0)
Weekly once	4 (10.53)	2 (8.0)	1 (5.0)	4 (23.53)	11 (11.0)
Once in two Weeks	3 (7.89)	1 (4.0)	0	0	4 (4.0)
Monthly	0	0	0	0	0
Occasionally	1 (2.63)	0	0	0	1 (1.0)
Total	38 (100.0)	25 (100.0)	20 (100.0)	17 (100.0)	100 (100.0)

The above table Indicates that the maximum of 58 (58.00%) respondents visit the library ‘everyday’ and 26.0% of respondents visit the library ‘once in two days’. This shows the significance of the library in knowledge-centre as a source of information. Overall, a negligible portion of the researchers accounts for less than 1.50% who do visit the library occasionally.. Majority of (57.89%) the scholars from Commerce department are using the libraries everyday. While 64% of the

scholars belong to the department of Economics have the visit to the library ‘everyday’ and only one or two percent of the Research students from commerce department are ‘occasionally’ visiting the library.

8.4 Type of library materials used most frequently

Hypothesis 1: There is a significant difference between the users and types of materials used in the library

Library materials	Commerce (N=38)	Economics (N=25)	Managem ent (N=20)	History (N=17)	Total (N=100)
Text Books	34 (89.47)	23 (92.0)	17 (85.0)	17 (100.0)	90
Reference Books	31 (81.58)	19 (76.0)	15 (75.0)	16 (94.12)	80
Subject Periodicals	10 (26.32)	10 (40.0)	6 (30.0)	6 (35.29)	30
Newspapers and magazines	19 (50.0)	11 (44.0)	7 (35.0)	9 (52.94)	45
Government documents	6 (15.79)	5 (20.0)	3 (15.0)	2 (11.76)	16
Computerized information service	7 (18.42)	5 (20.0)	3 (15.0)	4 (23.53)	19

The above table shows that, among the total respondents, 90 % used ‘textbooks’ more often than any other library material, whereas 80% of the respondents use ‘reference books’ among the library material. However, 30% of the respondents use ‘subject periodicals’. Documents such as ‘government documents, computerized information service’ were found to be of very little use. It is inferred from the

above table and analysis, the results shows that there is no significant difference is observed between users from various disciplines and types of library materials. Hence the hypothesis is rejected.

8.5 LIBRARY SERVICES

Hypothesis 2: There is a positive opinion about the library services among the users

Opinion	Commerce (N=38)	Economics (N=25)	Management (N=20)	History (N=17)	Total (N=100)
Excellent	7 (18.42)	3 (12.0)	1 (5.0)	3 (17.65)	14 (14.0)
Good	16 (42.11)	14 (56.0)	9 (45.0)	8 (47.06)	47 (47.0)
Satisfactory	14 (36.84)	6 (24.0)	6 (30.0)	5 (29.41)	31 (31.0)
Unsatisfactory	1 (2.63)	1 (4.0)	3 (15.0)	1 (5.88)	6 (6.0)
Can't say	0	1 (4.0)	1 (5.0)	0	2 (2.0)

The majority of the respondents (47.00%) indicate that the library services are 'Good'. This opinion is uniform in all college libraries in the district. 31.00% of respondents grade the services as 'satisfactory'. Fewer (6.00%) percentage of respondents expressed that the services are 'Unsatisfactory', and 2% of respondents said, 'Can't say' any thing about the services.

It is also found that 42.11% of the Researchers from the Department of Commerce said that the services in their opinion were 'Good'. 17.65% of the History Scholars

indicated that the serving was 'Excellent'. According to the analysis of the study, the opinion about library service is good in all the colleges. Very fewer percentages are of the researcher's shows their dissatisfaction. This may be due to lack of sub staff for assisting to the librarian. It is inferred from the table that the opinion about library services are good. Hence, the hypothesis is accepted.

8.6 Time spent for using internet by the users

Hypothesis 4: There is a significant difference among the users in time spent for using Internet facilities

Duration of using Internet	Commerce (N=38)	Economics (N=25)	Management (N=20)	History (N=17)	Total (N=100)
Less than one hour	12 (31.58)	8 (32.0)	6 (30.0)	5 (29.41)	31 (31.0)
One to two hour	10 (26.32)	12 (48.0)	12 (60.0)	6 (35.29)	40 (40.0)
Two to three hour	7 (18.42)	4 (16.0)	1 (5.0)	3 (17.65)	15 (15.0)
Three to four hours	7 (18.42)	0	1 (5.0)	2 (11.76)	10 (10.0)
Four hours & above	2 (5.26)	1 (4.0)	0	1 (5.88)	4 (4.0)

The above table shows the duration of using Internet by the respondents in the college libraries. Of the total, 40.0% of respondents are using Internet 'One to two hours per day, 31.0% are using 'less than one hour', and less percentage (4.0%) of the users are using 'four hours and above' per day.

Majority 12(60.0%) of the researchers from the department of Management and 12(48%) of the researchers from the department of Economics are using Internet in their library 'one to two hours' per day.

The above table shows that the average opinion by the respondents about the use of Internet facility indicates that the mean for all users is 2, that is, duration for using Internet is one to two hours per day on an average.

9. FINDINGS:

- It is found from the study that eighty four percent of the respondents belong to the affiliated colleges.

- Majority of the respondents were doing full-time M Phil (45.5%) and full-time Ph D (35.2%) and a minor portion of the respondents were part-time Ph D (13.6%) and part-time M. Phil (5.7%) scholars during the surveyed period
- It is found from the study that the maximum of 58 (58.00%) respondents visit the library 'everyday' Majority of (70.0%) the scholars from Commerce department are using he libraries everyday. While 64% of the scholars belong to the department of Economics have the visit to the library 'everyday' and only one or two percent of the Research students from commerce department are 'occasionally' visiting the library.
- There is no significant difference is observed between users from various disciplines and types of library

materials. Maximum of 90 % of the users used 'textbooks' more often than any other library material, whereas 80% of the respondents use 'reference books' among the library material. However, 30.00% of the respondents use 'subject periodicals'. Documents such as 'government documents, computerized information service' were found to be of very little use.

- It is inferred from the analysis that the scholars are using the internet consistently
- It is also found that majority of the respondents have reported that saving time is the main benefit of using e-Resources

10. CONCLUSION:

The users' opinion about the purpose, usage of information channels, information sources, library services etc. were the yardstick to measure the quality of libraries. In this study, it is evident from the fact that the opinion about the library services are good and they are expecting that the introduction of ICT and maintenance of changes in the application of ICT in library management is quite required to get the information with high bandwidth.

Working hours, infrastructure and attitude of library staff towards the user community are analysed with the users' perception and it has to be improved. The present digital era is giving various information seeking avenues to the users and even though it is very much important to upkeep these and it should be incorporated in the library routines.

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A Critical Study of Maya Angelou's *Gather Together in My Name*

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Abstract - Black Women Autobiography started as a subgenre of Black Autobiography in the early 1960's. It was an opportunity to black women to raise their painful voices against their racial and sexual harassments. Maya Angelou, the American poet, memoirist, actor and singer whose several volumes of autobiography explore the themes of economic, racial, and sexual oppression. She is a notable figure in the history of Black American Women Autobiography. She clearly portrays her struggle as a black child and mother in her autobiographies particularly in her *Gather Together in My Name*. It talks about her struggles as a prostitute in an African society. Maya presents herself as a dominant figure and shares her personal experiences, her affection, frustration and pain. It is about the theme, style, language of Maya Angelou in this autobiographical piece. It also deals with the pain and struggle of Maya a strong and courageous woman who is surviving in an Afro-American country.

Keywords: Lesbian, affection, frustration, struggle, self-reflection, prostitution, illegitimate

1. INTRODUCTION

An acclaimed American poet, storyteller, activist, and autobiographer, Maya Angelou was born Marguerite Johnson in St. Louis, Missouri. Angelou has had a broad career as a singer, dancer, actress, composer, and Hollywood's first female black director, but is most famous as a writer, editor, essayist, playwright, and poet.

She published seven autobiographies, three books of essays, several books of poetry, and is credited with a list of plays, movies, and television shows spanning over 50 years. She received dozens of awards and more than 50 honorary degrees. Angelou is best known for her series of seven autobiographies, which focus her entire painful and struggling life.

Gather Together in My Name is of Maya Angelou's second novel. In the novel, Maya Angelou describes her life with her newly born baby, who came out of an impulsive testing of her sexual identity. She chronicles the struggles to reach a promising life and carry both the beauty and the burden of motherhood and womanhood.

2. ANALYSIS

The story begins in the years following World War II. Sixteen year-old Angelou has just given birth to an illegitimate son in San Francisco. She goes through a number of jobs and relationships in search of stability in her life. Each relationship is as disappointing as the last as men take advantages of her. In this journey she went into unsuccessful relationships and came out dissatisfied. The men with whom she developed relationships barring her brother, Bailey and her neighborhood, L. C. Smith and Troubadour Martin whom she saw at her boss's restaurant in Oakland, exploited her physically, financially and psychologically.

In this volume Maya worked as a dancer, a cook, a Madam, a waitress, and briefly as a prostitute. For one of her jobs, Maya becomes a manager for two lesbian prostitutes. Though she was iron-willed and sharp minded, she was unable to keep her life away from her vulnerabilities. Readers sense a tragic decline in her vital strength now and then. The novel depicts how most of the African American women in the urban backdrop are trapped into the world of drugs and prostitution. Maya does not shame about her job and hobbies. Simply she says, "Love is blind and hides a multitude of faults. I know what you're talking about, and prostitution is like beauty. It is in the eye of the beholder" (136).

Throughout her two year life's journey, she encountered many hurdles and failures. She deeply longed for a secure life, but the dream never came true. Her persistence, confidence and human concerns created hope to expand her vision for life. Though she was cheated by Curly, R. L. Poole and L.D. Tolbrook, she

never blamed them; instead she tried to discover her own flaws and comprehend the situation better. She never drifted away from her world of fantasy as winning an ideal man's hand that must yield deep quench for both physical and spiritual love, and accomplishing a secured life. At one stage, she learnt that money alone could not bring happiness, but it could create threat to life. Many times her tenderness, sensuality and innocence led her to the questionable. Every time, she dreamt of living with her man together: first with Curly, next with R. L. Poole and then with L.D. Tolbrook and Troubadour Martin respectively. Gathering all these events together were her life's unforgotten experiences. Her multiple vocations mirrored the pathetic situations and constrained life styles of African American women in the so called promised land, United States of America. Her story represented the tragic lives of young black girls. At the end of the story, though she found no mission or destination for her life, she realized her innocence and swore not to give up her struggle. As a result she could come out from the crisis of identity.

The autobiographies reveal the author's strong appetite for the ultimate existence, and accepting the bitter realities in life with iron-heartedness. The psychological phenomenon of Maya Angelou made her a distinguished personality in the course of her divergent experiences. She blamed neither the society nor the family institution for her suffering and critical situations, whereas many great black authors neglected this aspect and projected it negatively. Through the device of writing autobiography, Maya Angelou shared her quest for human individuality, identifying her personal struggle with the general conditions of her personal life.

Her *Gather Together in My Name* celebrates the richness and vitality of Southern Black life and the sense of community that persists in the face of poverty and racial

prejudice. Initially, her celebration of Southern Black life is revealed through the portrait of the author's life as a black child in Arkansas of the 1930s in *I Know Why the Caged Bird Sings*. The second delineated a young woman's struggle to create an existence striving to achieve a promising life and love in America during post-World War II in *Gather Together in My Name*.

Maya Angelou's serial autobiography recaptured her own subjective experiences. Throughout her work, she described the personal, social, cultural, and historical influences which shaped her life and personality. She explored herself and individual identity and her relationship with the family, the community and the world. Of course, the divergent experiences which she confronted in her life represented the stages of her spiritual growth and awareness. Her study of autobiography was significant as it offered her deep insights into personal and group experience in America in this novel. Her work echoed her conception of herself as a human being and the survival strategies available to a black woman in America.

The major sources of the themes in her poetry, plays, and screen plays were her autobiographical novels. In *Gather Together in My Name*, her chief mission was to evoke critical self-reflection and self-realization. She was aware that her bitter and vexed past led her to taste the sugar of her present triumphant position as the renowned Renaissance woman called Maya Angelou. In fact, her artistry made her enjoy the heights of her life and success acted as a driving force to the readers to comprehend themselves better.

Angelou perceived her novel as an opportunity for her readers to peer into her world and reflected on their own worlds, a point of self-reflection that would engage one to observe oneself and concurrently to observe humanity. She waged her own revolution and became a paradigm to her readers to survive

and transcend a socially constructed ideology designed to control self-understanding and socio-economic mobility.

It is no doubt that because of Angelou's efforts, the African American woman has gained wider respectability and greater reception. Her vividness and veracity have moved the impetus to the blacks to struggle for equality. She has richly recorded the African American feminine experience from the early days of the Civil Rights Movement to the present day. In her lectures, Angelou brought to public attention the countless and important contributions that African Americans have made to American culture and literature.

According to Angelou, the African American Woman epitomizes the strong-will to survive without losing empathy and compassion. She herself, promoted the archetypal black female representative for black female inclusiveness. Her greatest legacy lies in her ability to infuse universality into her experience through her literary works, especially her elevation of racial and gender concerns. Her books continue to be studied in American Studies and Women's Studies classes.

Even though she struggled more to drive her ordinary life, she never lost her courage and confident. She says

My courage was dwindling. Unfortunately, fortitude was not like the color of my skin, given to me once and mine forever. It needed to be resurrected each morning and exercised painstakingly. (169)

3. SUMMATION

A study of Maya Angelou's *Gather Together in My Name* reveals that Maya Angelou's main objective is not only to narrate her story of triumph at the personal level but also to voice the trail and tribulations of African American women in the backdrop of racial and gender discrimination even in the advanced west. However, at last she succeeded to document the social history of her fellow women and social economic conditions of the west.

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Customers' Satisfaction with Banking Codes and Standards Board of India's Information: A Study with Reference to Virudhunagar District

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Abstract - "Quality in service product is not what you put into it. It is what the client or customer gets out of it – Peter Drucker"

The present study tested a theoretical model considering banking customer' personality traits as predictors of bankers – customer' relationship with Banking Codes and Standards Board of India's (BCSBI's) information, the perception of customers among their awareness and satisfaction about BCSBI's information. Bank customers were surveyed in Virudhunagar district with sample respondents 1552 in number from eight taluks. BCSBI's information is the process of adapting to the role of being a customer and to various aspects of the banking transactions environment. Failure to banking service can lead to mental health issues, customer's complainants and follow up to grievances, they have to bring to banking ombudsman. There may arise unnecessary problems for the bankers and their customers. In order to avoid the problems, the bankers and the customers have to adhere to the code of bank's commitment to customers of BCSBI. The present study focuses on customers' satisfaction with the aspects of BCSBI's information.

Keywords: BCSBI, RBI, Code of bank's commitment to customers.

1. INTRODUCTION

An independent and autonomous watchdog to monitor and ensure that the Banking Codes and Standards adopted by the banks are adhered to in true spirit while delivering their services. The idea came out of S.S.Tarapore committee recommendations to improve the quality of banking services to individual customers. The code is not only meant to provide protection to the individual customers, but is also expected to generate awareness for the common man about his rights as a consumer of banking services.

2. RESEARCH QUESTIONS

- a) What is customers' level of knowledge of and satisfaction with the commercial banks on the code of banks' commitment to customers of BCSBI's information?

- b) What are the factors that affect the aspects of BCSBI's information related to the personal profile of the customers?

3. OBJECTIVES OF THE STUDY

- a) To find out average score of overall knowledge is and satisfaction with the aspects of BCSBI's information with respect to the personal profile of the respondents.
- b) To find the significance of association between the personal profile of the respondents and level of overall knowledge and satisfaction of BCSBI's information.

4. HYPOTHESIS

- a) **H₀:** There is no significant difference in the average score of overall knowledge in the aspects of BCSBI measures with respect to the personal profile of the respondents.
- b) **H₀:** There is no association between the personal profile of the respondents and the level of overall knowledge of BCSBI's information in the banking sector.
- c) **H₀:** There is no significant difference between the average scores of satisfaction about BCSBI measures and the personal profile of the respondents.
- d) **H₀:** There is no association between respondents' opinion about the level of satisfaction with the aspects of BCSBI's information and their personal profile.

5. METHODOLOGY

The investigators have adopted the survey method of research to study overall knowledge is and satisfaction with BCSBI's information among banking customers in Virudhunagar district. They used stratified random sampling technique for selecting the

sample from the population. The stratification was done on the basis of gender and locality of customers. The sample consists of 1552 customers from eight taluk in Virudhunagar district. The statistical techniques used for analyzing the data for the present study were average score analysis, t-test, ANOVA and Chi-square test.

6. AVERAGE SCORE ANALYSIS OF OVERALL KNOWLEDGE OF BCSBI'S INFORMATION

The average score analysis of overall knowledge of BCSBI measures with respect to the personal profile, namely, "gender, age in years, accounts with bank, location of the bank, taluk, designation, educational qualification, customer's residence" was made.

6.1 The effect of the personal profile of the respondents, on the overall knowledge in the aspects of BCSBI's information among the

respondents is shown in the following table 1.1. (with t test and ANOVA).

It is inferred from the above analysis that the maximum overall knowledge in the aspects of BCSBI's information was among male respondents in the age group of 36-45, account with regional rural bank, location at urban, tiruchuli taluk, retired persons, research graduate and customer residence at urban area.

The difference in the average score of overall knowledge in the aspects of BCSBI's information with respect to the personal profile of the respondents using the inferential statistic of t-test and ANOVA test are made after verifying the normality assumption by Q-Q Plot technique.

H₀: There is no significant difference in the average score of overall knowledge in the aspects of BCSBI measures with respect to the personal profiles of the respondents.

Table 1.1 Overall Knowledge in the Aspects of Bcsbi Measures with respect to Customer's Personal Profile

Personal Profile of the Respondents		N	Range		Mean	SD	Mean %	ANOVA /t test	p
			Min	Max					
Gender	Male	801	35	121	89.52	13.00	66.31	63.413	<0.001**
	Female	751	32	110	68.53	15.53	50.76		
Age in years	18 - 25	375	32	121	79.21 ^{a,b}	18.05	58.67	12.154	<0.001**
	26 - 35	572	32	118	76.22 ^a	17.39	56.46		
	36 - 45	359	40	120	84.30 ^b	17.53	62.45		
	46 - 60	199	36	114	80.31 ^{a,b}	16.50	59.49		
	Above 60	47	36	102	77.19 ^a	17.07	57.18		
Account with bank	Public sector bank	709	32	120	77.44 ^b	20.35	57.36	26.870	<0.001**
	Private sector bank	450	51	115	82.98 ^c	12.03	61.47		
	Regional Rural bank	202	63	121	84.80 ^c	11.44	62.81		
	Co-operative bank	191	32	118	72.27 ^a	20.30	53.53		
Location of the bank	Rural	698	32	115	73.54 ^a	18.89	54.48	76.539	<0.001**
	Semi-urban	639	35	120	83.56 ^b	15.40	61.90		
	Urban	215	44	121	85.78 ^b	14.19	63.54		
Taluk	Sivakasi	280	32	113	77.61 ^{a,b,c}	18.20	57.49	6.975	<0.001**
	Virudhunagar	277	36	121	75.62 ^{a,b}	17.67	56.01		
	Rajapalayam	297	37	119	79.35 ^{b,c,d}	16.09	58.78		
	Aruppukkottai	210	40	117	81.77 ^{c,d}	17.17	60.57		
	Tiruchuli	86	52	118	84.98 ^d	16.13	62.95		
	Sattur	136	42	120	82.68 ^{c,d}	18.60	61.24		

	Srivilliputhur	188	32	119	82.44 ^{c,d}	18.24	61.06		
	Kariapatti	78	38	102	73.18 ^a	17.61	54.21		
Designation	Students	64	36	113	76.91 ^a	17.91	56.97	6.402	<0.001**
	House wife	72	36	121	78.01 ^a	18.77	57.79		
	Salary person	384	34	115	77.08 ^a	17.40	57.09		
	Daily wages	102	36	115	83.09 ^{a,b}	17.34	61.55		
	Self employer	739	32	119	78.75 ^a	17.74	58.34		
	Professional	132	52	119	85.67 ^b	15.74	63.46		
	Retired person	59	54	120	85.68 ^b	18.07	63.47		
Educational Qualification	Illiterate	62	35	112	81.63	14.97	60.47	3.353	0.010*
	10th Std./12th Std./Diploma	399	32	111	76.73	17.18	56.84		
	Under Graduate	720	34	121	79.84	18.08	59.14		
	Post Graduate	326	38	118	80.74	17.38	59.81		
	Research Graduate	45	48	118	82.00	20.40	60.74		
Customer's residence	Rural	600	32	121	79.16	17.95	58.63	0.769	0.464
	Semi-urban	689	32	120	79.08	17.59	58.58		
	Urban	263	34	118	80.60	17.53	59.70		

Source: Primary data

* Significant at 5 %, ** Significant at 1 %

6.2 HYPOTHESIS TESTING BY CHI-SQUARE ANALYSIS

The following null hypothesis was verified by chi-square test.

H₀: There is no association between the personal profile of the respondents and the level

of overall knowledge of BCSBI's information in the banking sector.

The results of the test are shown in the summarized table 1.2.

Table 1.2 Results of Chi Square Test

Profile of the Respondents	Calculated Chi-square value	DF	'p' Value	Remarks
Gender	359.25	2	0.000	Highly Significant
Age in years	48.91	8	0.000	Highly Significant
Account with bank	182.16	6	0.000	Highly Significant
Location of the bank	151.25	4	0.000	Highly Significant
Taluk	72.99	14	0.000	Highly Significant
Designation	72.34	12	0.000	Highly Significant
Educational Qualification	38.49	8	0.000	Highly Significant
Customer's residence	0.18	4	0.996	Not Significant

Source: Primary data

It is noted from the above table that the 'p' value is less than 0.05 and hence it is concluded that there is highly significant association between the gender, age, account with bank, location of the bank, taluk, designation and educational qualification of the respondents and the level of overall knowledge

of BCSBI's information. Hence the hypothesis of association between 'gender, age, account with bank, location of the bank, taluk, designation and educational qualification of the respondents and the level of overall knowledge of BCSBI information are not associated' does not hold good.

However, the hypothesis of 'customer's residence and the level of overall knowledge of BCSBI information are not associated' holds good.

6.3 LEVEL OF OVERALL KNOWLEDGE OF BCSBI'S INFORMATION FOR PERSONAL PROFILE OF THE RESPONDENTS

To find the significance of association between the personal profile of the respondents and level of overall knowledge of BCSBI's information, a two-way table was prepared and the results are shown in the following table 1.3.

It is found that the percentage of adequate level of overall knowledge of BCSBI information of respondent's was the highest (11.40 per cent) among male customers and the same was the lowest (1.16 per cent) among female customers; the highest (4.45 per cent)

among 36-45 years respondents and the same was the lowest (0.26 per cent) among above 60 years in the age group; the highest (7.80 per cent) among public sector banks and the same was the lowest (1.22 per cent) among co-operative banks in the account with bank; the highest (7.02 per cent) among semi-urban area and the same was the lowest (2.45 per cent) among urban area in the location of bank; the highest (2.45 per cent) among Aruppukkottai and the same was the lowest (0.32 per cent) among Kariapatti in the taluk; the highest (5.22 per cent) among self employment and the same was the lowest (0.39 per cent) among house wife in the designation; the highest (7.22 per cent) among under graduates and the same was lowest (0.32 per cent) among illiterates in the educational qualification;

Table 1.3 overall Knowledge In The Aspects Of BCSBI Measures With Respect of Customer's Personal Profile

Personal Profile of the Respondents		Level of knowledge						Total
		Inadequate		Moderately adequate		Adequate		
		N	%	N	%	N	%	
Gender	Male	26	1.68	598	38.53	177	11.40	801
	Female	280	18.04	453	29.19	18	1.16	751
Age in years	18 - 25	72	4.64	247	15.91	56	3.61	375
	26 - 35	138	8.89	400	25.77	34	2.19	572
	36 - 45	52	3.35	238	15.34	69	4.45	359
	46 - 60	35	2.26	132	8.51	32	2.06	199
	Above 60	9	0.58	34	2.19	4	0.26	47
Accounts with bank	Public sector bank	201	12.95	387	24.94	121	7.80	709
	Private sector bank	41	2.64	378	24.36	31	2.00	450
	Regional Rural bank	1	0.06	177	11.40	24	1.55	202
	Co-operative bank	63	4.06	109	7.02	19	1.22	191
Location of the bank	Rural	228	14.69	422	27.19	48	3.09	698
	Semi-urban	63	4.06	467	30.09	109	7.02	639
	Urban	15	0.97	162	10.44	38	2.45	215
Taluk	Sivakasi	61	3.93	194	12.50	25	1.61	280
	Virudhunagar	68	4.38	195	12.56	14	0.90	277
	Rajapalayam	56	3.61	216	13.92	25	1.61	297
	Aruppukkottai	35	2.26	137	8.83	38	2.45	210
	Tiruchuli	8	0.52	59	3.80	19	1.22	86
	Sattur	21	1.35	84	5.41	31	2.00	136
	Srivilliputhur	33	2.13	117	7.54	38	2.45	188

	Kariapatti	24	1.55	49	3.16	5	0.32	78
Designation	Students	13	0.84	43	2.77	8	0.52	64
	House wife	14	0.90	52	3.35	6	0.39	72
	Salary person	82	5.28	275	17.72	27	1.74	384
	Daily wages	19	1.22	63	4.06	20	1.29	102
	Self employer	161	10.37	497	32.02	81	5.22	739
	Professional	6	0.39	90	5.80	36	2.32	132
	Retired person	11	0.71	31	2.00	17	1.10	59
Educational Qualification	Illiterate	9	0.58	47	3.03	6	0.39	62
	10th Std./12th Std./Diploma	91	5.86	285	18.36	23	1.48	399
	Under Graduate	131	8.44	477	30.73	112	7.22	720
	Post Graduate	64	4.12	221	14.24	41	2.64	326
	Research Graduate	11	0.71	21	1.35	13	0.84	45
Customer's residence	Rural	119	7.67	405	26.10	76	4.90	600
	Semi-urban	137	8.83	465	29.96	87	5.61	689
	Urban	50	3.22	181	11.66	32	2.06	263

Source: Primary data

7. AVERAGE SCORE ANALYSIS REGARDING SATISFACTION WITH THE ASPECTS OF BCSBI'S INFORMATION

The average score analysis of satisfaction with the aspects of BCSBI's information with respect to the personal profile, namely, "gender, age in years, account with bank, location of the bank, taluk, designation, educational qualification, customer's residence" was made-table 1.4.

It is inferred from the above analysis that the maximum satisfaction with the aspects of BCSBI' information was among female customers, 36 – 45 years in age group, private sector bank in account with bank, Semi-urban in location of the bank, Srivilliputhur in taluk, Students in designation, illiterate in educational qualification and rural in customers' residence.

Table 1.4 Satisfaction With The Aspects Of BCSBI Measures In Respect of Customer's Personal Profile

Personal Profile of the Respondents		N	Range		Mean	SD	Mean %	ANOVA /t test	p
			Min	Max					
Gender	Male	801	9	44	22.32	8.72	49.61	0.191	0.848
	Female	751	9	45	28.60	7.44	63.55		
Age in years	18 - 25	375	9	44	24.58	8.61	54.63	1.920	0.105
	26 - 35	572	9	43	22.66	8.85	50.36		
	36 - 45	359	14	45	31.16	5.74	69.25		
	46 - 60	199	9	43	24.80	8.21	55.12		
	Above 60	47	9	40	22.40	8.20	49.79		
Account with bank	Public sector bank	709	9	44	24.10	9.11	53.55	28.569	<0.001**
	Private sector bank	450	9	45	26.93	8.31	59.84		
	Regional Rural bank	202	9	44	25.81	8.79	57.35		
	Co-operative bank	191	9	42	25.87	7.29	57.50		
Location of	Rural	698	9	44	24.10	9.19	53.56	19.634	<0.001**

the bank	Semi-urban	639	9	45	26.58	8.34	59.06		
	Urban	215	9	44	25.82	7.60	57.39		
Taluk	Sivakasi	280	9	44	26.37	8.47	58.60	7.890	<0.001**
	Virudhunagar	277	9	43	24.37	8.91	54.16		
	Rajapalayam	297	9	43	24.66	9.55	54.81		
	Aruppukkottai	210	9	43	24.54	8.52	54.54		
	Tiruchuli	86	12	42	25.80	6.50	57.34		
	Sattur	136	9	44	25.90	8.12	57.57		
	Srivilliputhur	188	9	43	26.96	8.20	59.91		
	Kariapatti	78	9	45	24.79	9.64	55.10		
Designation	Students	64	11	42	27.31	8.49	60.69	3.723	0.001**
	House wife	72	11	41	25.58	8.73	56.85		
	Salary person	384	9	44	24.42	9.19	54.27		
	Daily wages	102	10	44	25.61	8.11	56.91		
	Self employer	739	9	45	25.41	8.86	56.46		
	Professional	132	12	41	25.86	6.90	57.47		
	Retired person	59	11	42	26.90	8.18	59.77		
Educational Qualification	Illiterate	62	14	45	29.19	8.06	64.87	13.522	<0.001**
	10th Std./12th Std./Diploma	399	9	44	27.61	8.07	61.36		
	Under Graduate	720	9	43	24.37	8.93	54.15		
	Post Graduate	326	9	43	23.83	8.38	52.96		
	Research Graduate	45	10	43	27.00	8.42	60.00		
Customer's residence	Rural	600	9	45	25.64	8.53	56.98	7.032	0.001**
	Semi-urban	689	9	44	25.38	8.82	56.40		
	Urban	263	9	43	24.66	8.84	54.80		

Source: Primary data

** Significant at 1 %

7.1 HYPOTHESIS TESTING BY CHI-SQUARE ANALYSIS

The following null hypothesis was verified by chi-square test.

H₀: There is no association between respondents' opinion about the level of

satisfaction with the aspects of BCSBI's information and the personal profile of respondents in the banking sector. The results of the test are shown in the summarized table 1.5.

Table 1.5 Results of Chi Square Test

Profile of the Respondents	Calculated Chi-square value	DF	'p' Value	Remarks
Gender	207.52	2	0.000	Highly Significant
Age in years	231.16	8	0.000	Highly Significant
Account with bank	43.67	6	0.000	Highly Significant
Location of the bank	15.04	4	0.005	Highly Significant

Taluk	30.03	14	0.008	Highly Significant
Designation	17.36	12	0.137	Not Significant
Educational Qualification	60.18	8	0.000	Highly Significant
Customer's residence	2.54	4	0.637	Not Significant

Source: Primary data

From the analysis, it is concluded that there is highly significant association between the gender, age, account with bank, location of the bank, taluk and educational qualification of the respondents and the level of satisfaction with the aspects of BCSBI's information.

However, there is no significant association was found between the designation and customer's residence of the respondents and the level of satisfaction with the aspects of BCSBI's information.

8. SUGGESTIONS & CONCLUSION

From the present study, it is confirmed that, there is a high positive relationship between bankers – customers about BCSBI's information in Virudhunagar district. The customers of commercial banks are in need of some psychological support for doing of their banking transactions. So, the bankers may give guidance and supportive care to their customers.

All commercial banks may assign importance for providing service to their customers who may have physical and mental problems. The banks may be teaching to adjust with oneself and with their banking transactions environment. The commercial banks must often conduct meetings with their customers and make them to know about their status which is convenient to improve knowledge about services of the banks. It is also helpful to give better satisfaction among their customers. Bankers are the role model of their customers. This would result in customer satisfaction while transacting with the commercial banks. So, high level adjustment, physical and mental stability and how to adjust with others would give better service.

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Caste Clashes, Conflicts and Struggles in Bama's *Vanmam* (Vendetta)

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Abstract - Dalit Literature is a literature about Dalit's protest, pain and agony. Most of the Dalit Literature is the voice of the voiceless in the caste-rooted Indian society. Bama is a celebrated dalit woman writer. *Vanmam* (2002) is the third novel of Bama which brings out the issue of caste incited by the upper-caste Naickers between the two sub-castes in Dalit community- Pallars and Parayars at Kandampatti village. The loss on both sides makes them understand the role of the upper castes and state machinery, especially the police who immortalize their animosity. Towards the end of the novel the sub-castes of Dalits put an end to their vendetta and they are united. Since then they lived together in mutual tolerance and friendship. The novel mirrors inter caste rivalry in Dalit communities in India in general and in Kandampatti village in particular. This paper explores the caste clashes, conflicts and struggles among the Dalits and how they are used by the uppercaste people in promoting the animosity among themselves.

Keywords: Voice of Voiceless, Dalit, casteism, annihilate, downtrodden, underdogs, discrimination, enlightened

1. INTRODUCTION

Bama is one of the Dalit women writers, who have been actively involving in social issues, particularly Dalit issues in India. This novel is differentiated from her earlier novels as it focuses the involvement of the church and Christianity which empowered the Parayars community towards the rational thinking. Bama retains her critique of casteism in the church and also portrays the Dalits as more assertive in this novel than the earlier ones. Among the contemporary Dalit writers, Bama, the nun-turned social activist has carved a niche for herself as a powerful voice of the voiceless underdogs. Bama in her popular autobiographical novel *Karukku* (1992), records the harrowing experiences she has undergone as a woman as well as a Dalit nun. What is the most appalling in the work is her startling revelation of discrimination in the Church and the institutions, a subject hitherto unexplored. Her other major works are *Sangati* (1994) and

Kusumbukkaran (1996). Bama's *Vanmam* (meaning vendetta) translated into English by Malini Seshadri, strikes a chord in Dalit writing. Unlike her earlier works, many of the Dalit writings, in *Vanmam*, Bama instead of blowing up the agonies and sufferings of the downtrodden, she loudly raises her voice and vehemently asserts the need for the unity and solidarity of the suppressed for a better future.

2. VANMAM

Bama's *Vanmam* (Vendetta), which first appeared in Tamil in 2002, is not the usual novel of atrocities against Dalits, though atrocities are depicted, particularly the brutality of the police against women when they cannot vent their rage on the absconding men. But rather than focus on violence, it strikes at the heart of one of the most problematic aspects of Dalit identity: the enmity that frequently exists among different Dalit castes themselves. The protagonists here are two Dalit castes, Parayars and Pallars, in Kandampatti village of Tamilnadu. The Parayars are Roman Catholics and the Pallars are Hindu, identifying themselves as DKVs or Devendra Kula Vellalar. The Parayars' Christianity influences them to the extent that they are on the one hand more assertive, and on the other hand appear more ready than the Pallars to talk of humanity, forgiveness and compromise. The Pallars are portrayed as the victims of Hindu discrimination and caste feeling which make them susceptible to be used by Naickers.

3. COMMUNITY FIGHT: NAICKERS MAKE CONFLICT AMONG DALITS

The other large Dalit community, the Chakkuliyars, appear only by name; they are not portrayed in all the events that are depicted. The Naickers appear occasionally, but they

almost never directly confront the often assertive Parayars. The Naickers stoke the fires of conflict and try to provoke the Pallars into action. In a way, they are the promoter of quarrels. Bama makes it clear that it is the very structure of caste, which inherently involves hierarchy and enmity that lays the ground for the vendetta depicted in the novel. In the novel, Parayars and Pallars viciously attack each other. The heroes of the story appear to be the young, educated Parayar youth. They are depicted in all their mischievousness and haughtiness. Jayaraju, who begins as arrogant with his airs of cleanliness and scorn for the dirt and smell of the Dalit street, but is drawn in as a leader of an active youth association; Anthony, full of tricks but concerned for justice; and many others. Neither Jayaraju nor Anthony is mentioned much in the latter half of the book, and references are mainly to the youth as a group, both among Parayars and Pallars.

4. CASTE CLASHES IN *VANMAM*

In *Vanmam*, the plot moves around two Dalit castes in a village called Kandampatti in Tamil Nadu which may be considered a microcosm of the Indian subcontinent. It is a village surrounded by beautiful mountains where people of different communities live for generations. The Parayars of the village are Christians and their Church is in the western part of the village. Next to the Parayar streets are the streets of Pallars who are also Dalits, but Hindus. Away from the Dalit streets are the streets of Naickers, Nadars, Thevars and Chettiers. Agricultural land owned by the landlords is in the western part of the village and therefore both Parayars and Pallars have to walk through the streets of the upper class to reach the fields. In Kandampatti village, both the Parayars and the Pallars are the labourers, working hard from morning to evening in the fields of the landlords and they are destined to lead a pitiable existence with the husk thrown by them. In spite of their hard labour, they have

to remain half-fed with porridge. While commenting on the diligence of Parayars, Bama writes, "The Parayars toiled hard day and night to turn even barren land into fertile fields"(6). Unfortunately, their hard labour does not assure them of ample food. The poor students of the village, during vacation, would play in the ponds and come back in the afternoon.

Sometimes they would come home hungry after their bath and look eagerly into the kanji pot. But it would be empty because their younger brothers and sisters would have finished off the food. (45)

Worse than this that they would go for menial jobs with the empty stomach. Besides starvation they have to live in constant fear of the atrocities of the landlords and the communal clashes which may erupt any time. While delineating the precarious existence of the Dalit, Bama writes, "What a life . . . even a dog's life would be better . . . can't live and can't die either . . ." (113).

The vendetta between the Parayars and Pallars does not have a legitimate reason and its source is not clearly known. The earliest instance of violence in the village is the killing of a Pallar by a Parayan named Mannangati. Mannangati enjoyed certain privileges in the village which irked the Pallars who out of envy dragged him to a brawl and tried to stab him. But Mannagatti got hold of the knife and ripped out the guts of a Pallar. Yet the Parayas and the Pallars got along well. In another occasion, Marraasu, a Parayar and Karuppuswamy, a Pallar, got into a quarrel when both were involved in watering the farms of Naicker. Following the instigation of the landlord who encouraged him "to be aggressive and promised to take care of everything" (8). Karuppuswamy killed Marraasu. These are isolated incidents which do not affect the cordial relationship between the Parayas and the Pallars for some period and they celebrated festivals together

and took part in common festivities, functions and programmes.

Vanmam shows how Dalits have internalised the given social system of segregation based on caste. If Parayars and Pallars are outcastes in the eyes of Naickers, Odaiyars, Chettiars, Naidus and Nadars; Pallars and Paraiyars treat each other as outcastes within their own social habitat. While Parayars have embraced Christianity, Pallars remain within the Hindufold. This fact is played up by Naickers and other upper castes to keep the two Dalit communities divided. This results in Paraiyars and Pallars getting into arguments and strifes over whose lands should be watered first. While Paraiyars and Pallars remain landless, they go to the extent of killing each other over an argument over whose landlord's lands are irrigated better. The novel, in fact, opens with an account of murder of a Paraiyar farmhand, Marraasu at the hands of Karuppusami, a Pallar farmhand, over distribution of water to their respective master's lands. As Karuppusami's master protects him, he gets away with Marraasu's murder and surreptitious disposal of his body. In this way, the enmity between the two communities is nurtured and kept alive by Naickers.

The upper caste landlords stoke the fire of hatred and prejudice, call in the police and settle scores with the Paraiyars. The novel is written from the Paraiyar's point of view in the mean time; some of the educated youths of Parayar streets formed the "Khazani Arts Troup" and conducted various cultural events. These developments on the Parayar street make the Naickers grow jealous and they accused the church for encouraging the Parayars. "... They belong to the Church, they get lots of support. Also, many of them are now educated" (2).

Strengthened by the successful conduct of cultural programmes, the Dalit youngsters wanted to install a statue of Ambedkar, the Messiah of the Dalits. Further, they desired the involvement of all Dalit groups in the venture.

The Pallars donated Rs. 1,000/- for the statue, which was unveiled in a colourful function. The solidarity in organizing the programme and the speeches made on the occasion infuriated the landlords who conspired to annihilate the unity of the downtrodden. Incited and instigated by the Naickers, some of the Pallars, who have not realized the evil intentions of Naickers, demanded to return the money donated for the Ambedkar's statue. The comfortable life of the Parayars and Pallars faced a serious of setbacks over the issue of putting up a flag pole near the statue of Ambedkar. Violence erupted when a wire tied to the pole was cut by a Parayar young man. Instead of pacifying the landlords, they instigated the Pallars by saying, "How arrogant they are to lay a hand on the wire you people have put there. Don't let them get away with this. It's either you or them now" (80).

In the violence that followed, innocent people from both sides were mercilessly butchered and houses and belongings were destroyed. The worst affected by the violence were Parayars who could not get support either from the Government or from the Church, whereas the Pallars enjoyed the favours of the landlords and the police. The Paraya men dispersed to different places out of fear. Under the guise of searching for men, police "enter the house of Parayas and talk vulgarly to the women and even misbehaved with them" (88). The women were dragged to street and they were beaten up brutally, "with no regard even for the infant and the aged, they kept on swirling their lathis down hard again and again" (89). They got blown everywhere in their bodies. "All the women had swellings and black bruises all over their bodies as the blood clotted and congealed under the blows" (89). The Parayar women were more scared of the police than of the riots. The women who were taken to the police station were subjected to severe torture and abuses. Chellakili, a pregnant Parayar woman was kicked in the lower belly by a policeman with his boot:

Chellakili curled up and collapsed on the floor of the cell. As she lay there on the floor of that police lock-up, she felt a sharp pain in her belly . . . and had an abortion right there. (86)

Kandampatti was caught in the grip of fear. The following year the Parayars had to skip Christmas celebration. However, during the Easter festivities violence broke out in the village. The loss of lives, oblique poverty and tormenting experiences of violence make the villagers brood over the destruction nature of vendetta which makes them realize that nothing can be achieved through violence. They could not harvest anything but the loss of a few innocent lives, untold miseries and misfortunes. For the upper class Naickers, “the news that the Parayar street had become a wasteland was as sweet as the sweet of nectar” (122).

When the murder of a Paraya came to trial in the Court of Law there evolved a common notion of peace between the two communities. Jayaraju, an educated Parayar young man, declared in public:

we were just beginning to progress slowly and now these murders and court cases and police raids . . . all over people scattered about, studies ruined, not even able to attend Church . . . how long can we go on like this? (126)

The two groups resumed discussion which led them to compromise. They unanimously declare, “After all, life is short. We work, we eat . . . we die. Why take on unnecessary problems?” (129). When the upper class people heard of a peace agreement, they mocked and ridiculed both Pallars and Parayars:

What sort of fellows are these? After so much killing . . . so much wandering around like refugees . . . they are supposed to be uniting again. Shameless fellows!” (132)

In fact, the upper class people are upset over the unity of the subaltern as they are quite sure that their domination will be questioned.

5. SUMMATION

To strengthen her voice for the unity of the Dalits, Bama portrays the election held in Kandampatti after the union of Parayars and Pallars. In the history of Kandampatti, only Naickers contested for the post of President and won. The enlightened Parayars and Pallars fielded Kaallaiyan of the Pallar caste as the joint candidate. The Parayars and Pallars campaigned together for Kaallaiyan which enabled him to win the election. Bama asserts that the victory in Kandampatti is symbolic of the victories of the Dalits at the national level if they stand united. Kaalimuthu one of the minor characters of the novel affirms:

It’s not enough that we have won in the Panchayat election. The Dalit voice must resonate in the state legislature and in the national parliament . . . we must capture the levers of government power. Let this be the first step towards that goal. (134)

Finally the Dalits realizes that only through the education, they can overcome their struggle for poverty and prove their social status in their society.

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Performance of Cluster Analysis for Consumer Segmentation: A Study with reference to Virudhunagar Junction of Southern Railway

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Abstract - Indian Railways (IR) is a mammoth Public enterprise. It is ideal for long distance travel and movement of bulk commodities. It brings together the diverse geographies and stands as a vivid model of national integration of the country. As the rail passengers are diverse in nature, they are expecting a host of service quality attributes of IR or Southern railway (SR). So, the IR/SR bears an onerous task of providing different categories of service quality attributes to the passengers and for which, the IR should be a profitable enterprise. The present study by applying cluster analysis strives to explore how many groups are there in the rail passengers in Virudhunagar Junction of Madurai division in Southern railway of IR.

Keywords: Madurai division Southern Railway, Indian Railway, Cluster analysis, Service quality.

1. INTRODUCTION

As compared to road transport, the IR has a number of intrinsic advantages. Therefore, the IR has a pride of place in the economic development of India. After globalization, rail transport faced intense competition from other modes of surface transport like passenger vans. So, in surface transport, the IR has to ponder over upgrading service, quality. Now, to remain competitive in the field, IR/SR has to concern about improving the service quality.

Service quality is a comparison of expectations with performance. From the viewpoint of business, service quality is an achievement in customer service. Customers form service expectations from past, recent experiences and advertisement. For instance in the case of rail journey, passengers compare perceived service with expected service in which if the former falls short of the latter, the passengers are disappointed; of course, the modern consumers expect a band of service quality attributes from the railways such as basic amenities, modern amenities (tech drivers) ticket looking facilities and service

operational activities like safe travel, speed of trains, punctuality of trains, and frequency of service. The measurement of these attributes of service quality depends on passengers' expectation in terms of the attributes of the rail service, they may receive and the Southern Railways' ability to offer this expected service. The present paper attempts to segments the passengers of Madurai division in Southern Railway with reference to Virudhunagar junction by performing cluster analysis.

2. LITERATURE REVIEW

Sheeba and Kumuthadevi (2013) [1] in their study applied factor analysis for exploring the factors that result in passenger satisfaction in train journey. They found the important factors that determined the passengers' satisfaction in the order of basic amenities, Cleanliness, safety, punctuality, health care service and railway staff behaviors.

Neelamegam and Murugan (2015) [2] in their study found that passengers in their ranking of service quality attributes of Southern railway accorded first rank to affordable train fare and last rank to catering service of the SR.

Neelamegam and Murugan (2016) [3] in their study examined passengers' kind of problem in online ticket booking. Found that the need for debit card and internet banking was most important problem in online booking.

Neelamegam (2018) [4] in his study evolved a 29 item multiple attribute scale compressed into four dimensions as the base to measure service quality in Madurai division of Southern Railway. His significance testing revealed there were difference between expectation and perception of passengers in terms of all the four dimensions(basic

amenities, modern amenities, ticket booking facilities and service performance activities) in Madurai division of SR. He strongly suggested for a pragmatic solution for augmenting the revenue of SR/IR from passenger traffic without administering premium Tatkal scheme and operating premium trains. Paper examined the passengers’ preference rating for the service quality attributes of SR, and found low fare and reservation system in booking were the most preferred attributes among the 12 attributes.

Neelamegam (2017) [5] examined the passengers’ preference rating for the service quality attributes of SR, and found low and reservation system in booking are the most preferred ones among 12 attributes. The present paper sheds, light on sample passengers’ reasons for holding season ticket and how many clusters or groups are in the rail passengers in the study division of SR.

3. NEED FOR THE STUDY

Of late, measurement of service quality including railways has assumed significance. Maintenance of Service quality depends on competitive as well as financial strength of a concern. This necessitates a mammoth public enterprise like the Indian railways to find its consumer segmentation, and for which the present researcher applied a multivariate interdependence type of statistical technique, namely, cluster analysis.

1. To find the passengers’ purposes of holding season ticket
2. To find the consumer segmentation in Madurai division of SR.

4. HYPOTHESIS TESTED

H₀: There is no difference in passengers’ holding season ticket for the factor different levels of occupation.

5. DATA & METHODOLOGY

The study has mainly depended on primary data which were collected by conducting a sample survey of rail passengers (numbering 260) in Virudhunagar Junction of Madurai division.

In the absence of a concrete sampling frame, quota sampling based on the control variable of occupation was applied. Accordingly, quotas were fixed and samples were selected in the order of 99 passengers in occupation category of student/Scholar, and house wife, 97 passengers in the category of private & public sector employee and 64 samples in the category of business and professionals. Relevant statistical tools i.e., percentage calculation, weighted average, one way ANOVA and cluster analysis were used to analyse survey data.

6. FINDINGS OF THE STUDY

The analysis of survey data pertaining to passengers’ occupation is presented in Table 1

Table 1 Passengers’ occupation

S. No	Occupation	No.	% to Total
1	Student / Scholar	67	25.8
2.	Professional	19	7.3
3.	Business	45	17.3
4.	Private / Public Sector employee	97	37.3
5.	House wife	32	12.3
Total		260	100.0

Source : Primary data

It is clear from Table 1 that, a sizeable 37.3% are employees, followed by 25.8% are students.

Season Ticket

The survey noted the passengers’ holding season ticket. Southern Railways(SR) issues two types of season ticket based on periodicity of time. One is monthly season ticket, and the other is quarterly ticket. Table 2 shows passengers’ possession of season ticket, if they have it.

Table 2 Holding season ticket duration wise

S. No	Duration	Count	% to total
1	Monthly	25	9.6
2	Quarterly	29	11.2
3.	Not yet	206	79.2

Source: Primary data

The analysis reveals that most of the respondents (79.2% did not hold the **Season Ticket**.

Further probe into the matter unfolds respondents' views on benefits in holding the season ticket. IR/SR grants concession to passengers in varied forms in order to persuade them to choose rail journey. One among them

is issuance of season ticket. At this juncture, respondents were requested to record their level of agreement to the different kinds of benefit of holding the season ticket (table 3)

Table 3 Benefits in holding season ticket

Variable	Count for level of agreement					Wt. mean
	SA	A	NAND	DA	SDA	
There is time saving	132	91	26	8	3	4.31
There is money saving	155	66	31	6	2	4.41
Avoiding tension from joining the queue in the station	119	74	40	19	8	4.06
Avoiding daily travel cost	56	116	55	30	3	3.74
Benefit of travel for more than one time in a day	41	75	64	49	31	2.8
Refund facility for return of ticket before expiry date	32	51	84	46	47	2.9
Advantage of getting down at convenient stations	53	111	70	21	5	3.71

Source: Primary data; result calculated

The above analysis brings to the fore that passengers mainly want to hold a season ticket for reaping the gain of cost and time.

Hypothesis testing

One way ANOVA was performed to test the following null hypothesis.

H₀: There is no difference in holding season ticket to save money for the factor different level of occupation.

Output

Table 4 ANOVA (One way)

	Sum of squares	Df	Mean square	F	Sig.
Between groups	10.905	4	2.726	3.998	0.004
With in groups	173.88	255	0.682		
Total	18.785	259			

Source: Primary data, result calculated

Significance test reveals the null hypothesis is not accepted.

Performing cluster analysis:

As the rail journey is a paid service, passengers expect from the IR/SR, a host of service quality features-here expectations of one group of passengers for the service quality feature may differ from the expectations for a set of service quality attributes of some other

group of passengers. If so, it is a paramount duty of IR/SR to provide such set of service quality attributes to these varied groups. Here, cluster analysis, a multivariate statistical method will be used to understand the consumer/ passenger groups in the study division. In the present study Cluster analysis was made with the objective of clustering the passengers 260 in number based on their intensity of expectations of service quality features of IR/SR.

Output - interpretation

First, data were put in the SPSS package and hierarchical clustering was carried out. This was made in order to find out the number of clusters that exists in the data. The basic output of this stage is the agglomeration schedule using average linkage. The last 19 stages of the agglomeration schedule are shown in Table 5.

Table 5 Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage cluster first appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
241	67	169	57.000	87	0	256
242	172	180	59.000	0	0	252
243	1	124	59.376	237	221	244
244	1	7	59.601	243	238	250
245	53	119	62.500	231	230	258
246	9	207	62.750	236	8	251
247	32	125	63.000	0	29	254
248	168	212	66.000	0	0	259
249	183	206	67.000	0	0	255
250	1	130	68.493	244	24	251
251	1	9	68.776	250	246	252
252	1	172	70.784	251	242	253
253	1	30	73.141	252	240	255
254	32	184	74.333	247	0	256
255	1	183	79.070	253	249	257
256	32	67	79.179	254	241	257
257	1	32	85.137	255	256	258
258	1	53	91.657	257	245	259
259	1	168	92.422	258	248	0

$$(79.179 - 79.070) = 0.109$$



4 Cluster solution

$$(79.070 - 74.333) = 4.737$$



5 Cluster solution

The squared Eulidean distance between the two respondents is given under the fourth column captioned “Coefficients”. The agglomeration schedule from stage 1 to stage 249 denotes the sequence in which the respondents get combined with others. At stage 259, all respondents are combined together and thus, one obtains a 1 – cluster solution. Similarly, stage 258 represents a 2 – cluster solution, stage 257 a 3 – cluster solution, and so on.

The largest difference is 6.520, which indicates a 2 Cluster solution, and this is chosen.

Final stage:

After having classified the passengers into two clusters, the next step is to find the typical characteristics of the passengers belonging to each of the two clusters by performing K Means Cluster, so that they can be understood and addressed as distinct consumer/ passenger segments.

Based on the agglomeration schedule, one may consider the following possible solutions, based on the coefficient values.

$$(92.422 - 91.657) = 0.765$$



1 Cluster Solution

$$(91.657 - 85.137) = 6.520$$



2 Cluster Solution (Optimal solution)

$$(85.137 - 79.179) = 5.958$$



3 Cluster Solution

Table 6 Initial Cluster Centers

Variables	Cluster	
	1	2
Speed of the train	5	3
Safety in the compartment of train	4	5
Passenger railway fare	4	3
Safety in the railway station	5	2
Arrival and Departure of train is in time	5	1
Display of name chart in reserved compartment	4	4
Existence of touch screen facility at the station	4	3
Announcement about the train timings and such other basic information in the railway station	3	5
Decent behavior of staff at the railway station and compartment	5	2
Parking facility at the station	4	5
Seating facility at the station	5	4
Rest room facility at the station	1	5
Rest room facility in the compartment of train	4	5
Drinking water facility at the station	3	5
Drinking water facility in the compartment	5	2
Online booking facility	5	2
Ticket cancellation facility	5	2
Network speed at the time of ticket booking	5	2
Season ticket facility	5	4
Existence of booking ticket in advance	4	2
Tatkal scheme of booking facility	3	1
Frequency of train service	5	3
Comfort in train journey	1	5
Cleanliness of compartment	5	3
Cleanliness of station	1	3
Catering service in the compartment	4	2
Catering service in the station	3	1

Note: the above points correspond to the values obtained in five point numerical scale.

Source: Primary Data, Result Computed.

The Cluster centre values in table represent the mean values of each of the 27 variables based on feedback from passengers belonging to the respective clusters. The rating scale used during data collection ranged from 1 to 5. Higher rating on a particular variable indicates higher importance / expectation given to that variable by the rail passengers. It is clear that passengers in cluster 1 rate some of the variables higher than passengers in cluster 2; similarly, passengers in cluster 2 rate certain other variables higher than passengers in cluster 1.

The passengers belonging to the two clusters (or consumer /rail passenger segments) may be broadly described as follows.

Cluster 1: This comprises rail passengers who demand several service quality features of Indian Railways like speed of the train, safety in the railway station, decent behavior of railway staff, cleanliness in the compartment, frequency of train service, as well as better computerized service of online ticket booking facility and network speed while booking ticket. This cluster appears to be business executives and higher income passengers who need modern and neat services from the railways.

Cluster 2: It clear from table, that the rail passengers in this cluster are very much interested in the provision of basic facilities of Indian Railways like parking facility, drinking water facility, rest room facility, announcement

of train timings and such other basic things. The characteristic of the group is to have basic amenities at an affordable cost.

Implication

Two groups have emerged from the cluster analysis. Group 1 is business oriented passengers seeking a variety of service, and group 2 represented by passengers seeking basic facilities at an affordable cost.

7. SUGGESTION

The above analysis reveals there are two segments of rail passengers; while business men and higher income group aspire for a host of service quality attributes, the low income group is mainly concerned about affordable train fare. The main question is “will the IR/SR be able to meet the wish of the higher income group”? one is rather precarious in finding an answer to this question; because IR is facing shortage of funds. ⁶It is operating at a loss, i.e., spends Rs.111.51 to earn only RS.100-facing the problem of a high operating ratio of 111.51%. As a result, nothing is left for investment in improvement in service quality. To refurbish its performance, it has to prune its expenditure and augment its revenue both in freight traffic and passenger traffic.

The present author, earlier in his ICSSR sponsored Senior fellowship (2016 to 2018) offered practical suggestions for reducing the expenditure and augmenting the revenue of IR/SR. Some of these suggestions were.

1. It is recommended for doubling and electrifying the high revenue yielding route, namely, Madurai – Kanniyakumari stretch in Madurai division of SR. This would substantially raise service quality, i.e., safety and punctuality in travel and thereby giving a boost to revenue.
2. Another recommendation is to increase the hauling capacity of engines and some of the crowded express / passenger trains be permanently augmented with three coaches.
3. IR/SR is a state transporter, and for upgradation of service, i.e., introduction of

high speed & semi high speed trains as well as for conversion of single tract into double lane, huge investment is required and for this PPP scheme may be a practical solution. It is heartening to note that the Finance Minister Mrs.Nirmala Seetharaman in her Railway Budget, 2019 stated that the Union Government would encourage PPP Scheme in railway transport.

4. Experts in the field say that the II class ordinary fare remains unrevised for a long time. It is recommended that the fare may be raised and the raise maybe 20 to 25 percent less than road transport fare.

8. CONCLUSION

Premium tatkal scheme should be withdrawn as it is fleecing the rail passengers. ⁷It is reported that during the last nine years (2010 -11 to 2018-19), the IR has earned a whopping revenue of Rs.20,720 crore through Tatkal and premium Tatkal schemes both the schemes are used at times of emergency. In premium tatkal, fare is not fixed; and it will be going upward / changing as per the demand of the passengers. This flexi premium tatkal highly affects the common man, so, it must be scrapped immediately. ⁸In the past five years (2014-19) there is 26% jump in number of 3 A/C berths and only 3% paltry increase in sleeper berths in IR. Also, many of the new trains introduced were premium trains like UDAY, Humsafar, Duronto, AC Express, Tejas and Vande Bharat (Train 18) expresses whose ticket fares are as high as air fare. While this may benefit a section of passengers, a bulk of passengers travelling in non A/C coaches are left out. To conclude, the fleecing and discriminating schemes like premium tatkal and hefty hike in the number of seats in A/c coaches must be stopped and passengers friendly above mentioned measures for augmenting revenue or reducing working expenses must be practised.

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Integrating a Cultural Intelligence in Multicultural Workforce in Chennai City

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Abstract - Today's environment that is more complex, dynamic and competitive than ever before has thrown up a new term called CQ (Cultural Intelligence). The importance of CQ asking businesses to function efficiently in different cultural contexts has never been more important. The purpose of this research study is to examine the integrating a cultural intelligence in multicultural workforce in Chennai city. The Rotated Factor Matrix for the variables relating to the Integrating a Cultural Intelligence in Multicultural workforce among the overall sample member is given in Table. The study concludes that majority of the factors having positive loadings, which implies that majority of the respondents agree there is an importance of integrating a Cultural Intelligence multicultural workforce.

Keywords: Cultural Intelligence, Workforce, Multiculture.

1. INTRODUCTION

We are all familiar with IQ and EQ. Today's environment that is more complex, dynamic and competitive than ever before has thrown up a new term called CQ (Cultural Intelligence). The importance of CQ asking businesses to function efficiently in different cultural contexts has never been more important.

Employees who have a very high level of CQ are able to bridge the divides and knowledge gaps in an organization, educate their colleagues about different cultures, help to build interpersonal connections in a multicultural office environment, enhance innovation and creativity and assist the organization makes the best use of multiple perspectives in a multicultural workforce.

It is not just enough to be intelligent, emotionally mature or have good social skills. CQ is a combination of cultural knowledge, cross-cultural skills, and cultural metacognition and these skills do not operate in isolation from each other.

The internet has made it possible to communicate at one click of a button. Emails

and video conferencing have allowed information to be transferred regardless of the time and location. It is now possible talk to someone living in another country from the comfort of one's home or office. Many companies are also accepting foreign talents to grow their business.

Working in a culturally diverse environment, however, makes it easy to forget that the people one is dealing with have perceptions and perspectives different from one. Developing a sense of cultural intelligence is important to learn how to deal positively with people from different cultures. Enhancing cultural intelligence is possible and doing so will allow one to become more compassionate and sensitive to other people.

Cultural intelligence also plays a huge role in determining cooperation among people from various corporate cultures, traditions, nationalities, disciplines, functions and cultures. Bridging cultural differences can make or break one's business. Developing and enhancing cultural intelligence may not be an easy feat. It is a process where people slowly gain a new perspective and insight to new professional methods and language that will let them develop better solutions when it comes to cross cultural situations.

How to Enhance the Level of Cultural Intelligence in One's Workplace

Cultural intelligence is an important aspect in one's professional and everyday life. Building compassion between colleagues and clients of different cultural backgrounds and nationalities can be done by developing personal attributes that boost one's quality of life, personal and corporate reputation and customers' experience. There are various ways

to improve the level of cultural intelligence in one's workplace. Some of them are:

- **Create a common ground** – There are cultures that different from one, but it is important to keep in mind that humans still share some basic traits. A different culture may have the same cultural practices as one. Finding a common ground allows one to better understand another person and eliminate barriers in communication. One can talk to people from another culture and get to know them better.
- **Avoid stereotyping** – Stereotyping is a common practice. It gives one a profile of another person, but it can be dangerous as it can lead to making negative and unfounded assumptions. What one need to remember is that people from different cultures have their own practices and beliefs that may different from one's own. Try to understand and judge a person on his own worth instead of assessing him from a cultural point of view.
- **Keep learning** – One learn new skills such as managing one's stress, motivating oneself and enhancing one's emotional intelligence. Learning about other cultures should be included in one's list as well. One can always do this by searching the web or talking to other people in one's workplace. The internet is a great source of information and one can use it to learn something new about a different culture like their cultural behaviors and practices. One might even get some interesting facts that can be useful in dealing with people from different cultures.
- **Be aware and accepting** – Awareness and acceptance are important factors in developing cultural intelligence. Being aware allows one to become more mindful of the practices and habits of people from another culture. Acceptance of their cultural practices shows one's sense of empathy as to who they really are and how one sees them. The way one treat another person will

also reflect on how that person sees one. Accepting other cultures will enhance one's level of empathy, which will help one become a true culturally intelligent individual.

Trying different foods unique to another culture is also a great way to understand other people. Aside from satisfying one's taste buds, the way they prepare their special delicacies may give one an idea about their traditions. This is also a great way to meet new people and establish great relationships.

Sampling Design

A random sampling of Employees in multicultural workforce in Chennai unit was chosen from the 'universe'.

Objective of the Study

The purpose of this research study is to examine the integrating a cultural intelligence in multicultural workforce in Chennai city

2. REVIEW OF LITERATURE

Earley PC and Mosakowski E (2019) in their article captioned "Cultural intelligence" hasIn an increasingly diverse business environment, managers must be able to navigate through the thicket of habits, gestures, and assumptions that define their coworkers' differences. Foreign cultures are everywhere--in other countries, certainly, but also in corporations, vocations, and regions. Interacting with individuals within them demands perceptiveness and adaptability. And the people who have those traits in abundance aren't necessarily the ones who enjoy the greatest social success in familiar settings. Cultural intelligence, or CQ, is the ability to make sense of unfamiliar contexts and then blend in. It has three components--the cognitive, the physical, and the emotional/motivational. While it shares many of the properties of emotional intelligence, CQ goes one step further by equipping a person to distinguish behaviors produced by the culture in question from behaviors that are peculiar to particular individuals and those found in all

human beings. In their surveys of 2,000 managers in 60 countries, the authors found that most managers are not equally strong in all three of these areas of cultural intelligence. The authors have devised tools that show how to identify one's strengths, and they have developed training techniques to help people overcome weaknesses. They conclude that anyone reasonably alert, motivated, and poised can attain an acceptable CQ.

Dana L. Ott and Snezhina Michailova (2015) in their research paper titled “Cultural Intelligence: A Review and New Research Avenues: Cultural Intelligence” has Cultural intelligence (CQ), an individual's capability to function and manage effectively in culturally diverse situations and settings, has become the focus of a vibrant scholarly conversation and a flourishing area of multidisciplinary research. Since the introduction of the concept in 2002, substantial research has been conducted concerning its definition, the validation of its measurement, and the examination of its development and predictive capabilities. The present paper systematically reviews 73 conceptual and empirical articles published on CQ from 2002 to 2015 in management and international business journals as well as in education and psychology. The authors discuss two distinct conceptualizations of CQ, developments within the conceptual research, and opportunities for further theorizing. They also cluster the empirical studies based on how CQ was used and identify patterns, achievements and challenges within the literature. Finally, based on their analysis, they identify promising avenues for future research and propose specific questions that can further advance the scholarly conversation on CQ.

Caputo, Andrea, Ayoko, Oluremi B. Amoo, and Nii in their research captioned **“The moderating role of cultural intelligence in the relationship between cultural orientations and conflict management styles”**

has Today's international corporate environments demand that employees are culturally intelligent for effective engagement in cross-cultural interactions. This study examines the moderating effect of cultural intelligence (CQ) in the relationship between individual cultural orientations and the choice of a conflict management style. A sample of 403 employees completed self-report measures of all study variables. Findings confirmed the impact of cultural orientations on conflict management styles, namely avoiding, forcing and problem-solving. Moreover, findings confirm the existence of a moderated effect of some facets of cultural intelligence on the relationship between individual's cultural orientations and conflict management styles. The study offers novel empirical evidence for the important role that cultural intelligence has in managing conflict for increased productivity and performance in diverse international environments.

3. FACTOR ANALYSIS

Mathematically, factor analysis is somewhat similar to the multiple regression analysis. Each variable is expressed as a linear combination of the underlying factors. The amount of variance a variable shares with all the other variables included in the analysis is referred to as communality. The co-variance among variables is described in terms of a small number of common factors together with a unique factor for each variable. These factors are not over observed. If the variables are standardized, the factor model may be represented as:

$$X_i = A_{i1}F_1 + A_{i2}F_2 + A_{i3}F_3 + \dots + A_{im}f_m + V_iU_i$$

Where,

X_i = i^{th} standardized variable

A_{ij} = Standardized multiple regression variable 'i' on common factor 'j'

F = common factor

V_i = Standardized regression co-efficient of variable on unique factor 'i'

U_i = the unique factor for variable 'i'

M = Number of common factors

The unique factors are uncorrelated with each other and with the common factors. The common factors themselves could be expressed as linear combination of the observed variables.

$$F_i = W_{i1}X_1 + W_{i2}X_2 + W_{i3}X_3 + \dots + W_{ik}X_k$$

Where,

F_i = Estimate of i^{th} factor

W_i = Weight on factor score co-efficient

K = Number of variables

It is possible to select weights or factor score co-efficient so that the first factor explains the largest portion of the total variance. Then a second set of weights could be selected, so that the second factors accounts for most of the residual variance, subject to being uncorrelated with the first factor. This

same principle could be applied to selecting additional weights for the additional factors. Thus, the factors could be estimated so that their factor scores, unlike the value of the original variables, are not correlated. Further more, the factor accounts for the highest variance in the data, the second factor for the second highest variance in the data and so on. Rotated Factor Matrix for Integrating a Cultural Intelligence in Multicultural workforce (Factor Analysis). The Rotated Factor Matrix for the variables relating to the Integrating a Cultural Intelligence in Multicultural workforce among the overall sample member is given in Table 1.

Table 1 Rotated Component Matrix

Variables	1	2	3	4	5
Creating productive relationships based on giving importance to people's differences	-.205	.256	.177	.226	.719
Communicating effectively in different cultural settings	.031	.081	-.107	.791	-.168
Maximizing teamwork in groups where people act and think differently	-.611	-.219	-.349	-.202	.413
Differences can be used to improve innovation processes and assess intercultural communication	.020	.885	.113	-.137	-.046
Maximizing corporate brand investment	-.160	.087	-.351	-.230	.043
Providing tools for improving sales success, people performance and brand image	.797	-.005	.117	.062	-.006
Encouraging people to be the best they can be Offering insights to better understand international colleagues and clients	.053	.093	.277	.271	.155
Establishing a common ground	.255	.298	.387	.573	.337
Attitude	.354	.402	.481	.560	.205
Attempts to work together	.538	-.205	.030	.653	.148
Maximizing the benefits	.662	.195	-.367	.123	-.231
competitive advantage	-.072	-.104	-.827	.152	.015
Determining major cross-cultural communication skills to improve employee engagement	.339	.534	.378	.038	-.009
Developing genuine intercultural skills to enhance customer relationships	.183	-.072	.033	-.013	-.222
Presenting and marketing one's business as a unique international brand	-.027	.071	.165	-.024	-.690
Develop a relationship with other cultures through talking and interacting	.141	.823	-.092	.356	.065
Manage uncertainties, ambiguity, and change in a multicultural exchange	-.004	.079	.043	.446	-.668
The ability to adapt one's behaviour to the cultural demands of unfamiliar environments	.593	.559	.410	.057	-.020
Empathize with a person from a different culture; putting oneself in their shoes and looking at a situation from their perspective	.735	.328	.392	.120	.110
Being sensitive to feelings and subtle meanings in various cultural contexts	.114	.066	.639	.106	-.124

Table 1 exhibits the rotated factor loading for the 20 statements (factor) of the Integrating a Cultural Intelligence in Multicultural workforce. It is clear from the Table 1 that all the 20 statements had been extracted into five factors, namely, F₁, F₂, F₃, F₄, and F₅. The factors with identified new names which influence the Integrating a Cultural Intelligence in Multicultural workforce had been presented in the following tables.

Need Cultural Intelligence

Cultural intelligence is related to the ability to adapt and interact within a multicultural work environment. It includes the components of intercultural engagement and communication as well as understanding. Although we might be open-minded and show interest in understanding someone else, we will be challenged — or worse, confronted — to leave our comfort zone. Interactions are not

limited to our linguistic and ethnic differences; our interactions move us beyond our values, social norms, belief systems and so on.

Leaders are challenged in managing human complexity by building bridges and transforming differences into strengths. They must bring people together to achieve the same goal, following the same objectives and strategies. How? By maintaining a collaborative mindset between employees and business partners, developing relational qualities such as trust, respect and tolerance, and encouraging the development of interpersonal skills. Cultural ignorance, on the other hand, lends itself to pitfalls such as the lack of understanding and the rapid spread of miscommunication (assumption, judgment, perception, etc.) which lead to clashes, limited growth and missing development opportunities.

Table 2 FACTOR 2: NEED CI

S.No	Variables	Factor Loading	Eigen Value	Percentage of Variance
1	Creating productive relationships based on giving importance to people’s differences	-.205	3.078	15.389
2	Communicating effectively in different cultural settings	.031		
3	Maximizing teamwork in groups where people act and think differently	-.611		
4	Differences can be used to improve innovation processes and assess intercultural communication	.020		

Among the Integrating Cultural Intelligence, the factors regarding ‘Creating productive relationships based on giving importance to people’s differences’, ‘Communicating effectively in different cultural settings’, ‘Maximizing teamwork in groups where people act and think differently’ and ‘Differences can be used to improve innovation processes and assess intercultural communication’, were the factors with higher positive loadings on factor 1 are characterized as “Need EI”. Hence, F₁ is termed as *Need EI*. The eigen value for the above Factor I was 3.078 and the percentage of variance was 15.389. It could be concluded that Integrating

Cultural Intelligence has resulted in, ‘Maximizing teamwork in groups where people act and think differently’ it was strongly accepted by the respondent followed by the ‘Communicating effectively in different cultural settings’, ‘Creating productive relationships based on giving importance to people’s differences’ and ‘Differences can be used to improve innovation processes and assess intercultural communication’ which was negatively loading.

Benefits of Cultural Intelligence

One of the benefits of cultural intelligence is the cultivation of the workspace as a creativity and innovation hub for problem-

solving and design-based thinking by fostering effective teamwork and productivity or creating an entrepreneurial culture, for example. Nowadays, cultural intelligence is integrated into the strategic approach of Human Capital Asset Management and Development departments. Businesses are able to measure

intercultural performances and capabilities against factors such as behavior, knowledge, motivation and strategy. Creating a supportive workforce will encourage emotional intelligence skills such as empathy, confidence and the development of diversity in success.

Table 3 FACTOR 2: BENEFITS OF CI

S.No	Variables	Factor Loading	Eigen Value	Percentage of Variance
1	Maximizing corporate brand investment	.087	2.664	13.319
2	Providing tools for improving sales success, people performance and brand image	-.005		
3	Encouraging people to be the best they can be Offering insights to better understand international colleagues and clients	.093		
4	Establishing a common ground	.298		

From the table 3, the factors regarding ‘Maximizing corporate brand investment’, ‘Providing tools for improving sales success, people performance and brand image’, ‘Encouraging people to be the best they can be Offering insights to better understand international colleagues and clients’ and ‘Establishing a common ground’ were the factors with higher positive loadings on factor 2. The above said four factors with high loading on Factor 2 could be characterized as ‘Benefits of CI’. Hence F₂ is termed as **Benefits of CI**. The eigen value for the above Factor II was 2.664 and the percentage variance was 13.319. It could be concluded that the Cultural Intelligence has resulted, ‘Establishing a common ground’; openly recognize and reinforce positive characteristics in others’ in the study area and it was accepted by the respondents followed by the, ‘Maximizing corporate brand investment, ‘Providing tools

for improving sales success, people performance and brand image’, ‘Encouraging people to be the best they can be Offering insights to better understand international colleagues and clients’.

Developing Cultural Intelligence

Developing cultural intelligence facilitates happiness at work, encourages diversity awareness and reinforces inclusion and talent retention. The three elements necessary for developing cultural intelligence are education (curiosity enhances learning), information (cross-cultural knowledges) and prevention (internal and external communication). Social networks have supported global economy growth and the development of new business trends as well as the upbringing of a new culture of connectivity and of sharing. Cultural intelligence is all about TRUST: Tolerance, Respect, Unity, Solidarity and Teamwork.

Table 4 FACTOR 3: DEVELOPING EI

S.No	Variables	Factor Loading	Eigen Value	Percentage of Variance
1	Attitude	.481	2.503	12.515
2	Attempts to work together	.030		
3	Maximizing the benefits	-.367		
4	competitive advantage	-.827		

From the table 4, the factors regarding ‘Attitude’, ‘Attempts to work together’, ‘Maximizing the benefits’ and ‘competitive advantage’ were the factors with higher positive loadings on Factor 3 could be characterized as “Developing EI”. Hence F₃ is termed as **Developing EI**. The eigen value for the above factor III was 2.503 and the percentage of variance was 12.515. It could be concluded that the Developing Cultural Intelligence has resulted in ‘Attitude’ in the study area and it was agreed by the respondent followed by the ‘Attempts to work together’, ‘Maximizing the benefits’ and ‘competitive advantage’.

Cultural Knowledge

Cultural Knowledge is the understanding of the sensitivity of other cultures in different contexts; for example, how people behave when they disagree with each other and how they give feedback to those that report to them.

Knowledge can be gained through newspapers, books, movies, travelling to a country and having friends from different cultures. Being mindful of the uniqueness and the nuances of each culture and the wisdom of when this information could be used in the future will go a long way in boosting one’s cultural knowledge.

Table 5 FACTOR 4: CULTURAL KNOWLEDGE

S.No	Variables	Factor Loading	Eigen Value	Percentage of Variance
1	Determining major cross-cultural communication skills to improve employee engagement	.038	2.330	11.652
2	Developing genuine intercultural skills to enhance customer relationships	-.013		
3	Presenting and marketing one’s business as a unique international brand	-.024		
4	Develop a relationship with other cultures through talking and interacting	.356		

From the Table 5, the factors regarding ‘Determining major cross-cultural communication skills to improve employee engagement’, ‘Developing genuine intercultural skills to enhance customer relationships’, ‘Presenting and marketing one’s business as a unique international brand’ and ‘Develop a relationship with other cultures through talking and interacting’ were the factors with higher positive loadings on factor 4 could be characterized as “Cultural Knowledge”. Hence F₄ is termed as **Cultural knowledge**. The eigen value for the above factor IV was 2.330 and the percentage of variance was 11.652. It could be concluded that the Leadership has resulted in ‘Determining major cross-cultural communication skills to improve employee engagement’, in the study area and it was

agreed by the respondent followed by the ‘Developing genuine intercultural skills to enhance customer relationships’, ‘Presenting and marketing one’s business as a unique international brand’ and ‘Develop a relationship with other cultures through talking and interacting’ which was negatively loading.

Cross-cultural Skills

Culture refers to the shared traditions, beliefs, customs, institutions, folklore, and history of a particular group of people. A culture is shared by people of the same ethnicity, language, customs or religion. Competence, meanwhile, means to have sufficient knowledge and skills to enable someone to work in a wide variety of situations.

Cross-cultural competence, therefore, refers to possessing the knowledge and skills necessary to work with people of different nationalities, ethnic communities, languages, and religions. If a person, school or organization is culturally competent, it means that they understand, appreciate, and can effectively work with people with different traditions, beliefs, and customs.

Millennial idealism offers a great opportunity to overcome many social injustices, including racism. This generation is “color blind” and multicultural, so by embracing this aspect of millennial mindset,

we can organically grow out of some implicit biases that currently hinder cultural competence in the workplace.

The good news is that you can now arrange for cross-cultural competence training for one’s school or organization where every generation of employee, from top to bottom, is taught skills to help them interact with people from cultures other than their own more effectively. These skills often include

- Active listening capabilities
- People interaction skills
- Flexibility, and
- Emotional intelligence

Table 6 FACTOR 5: CROSS CULTURAL SKILLS

S.No	Variables	Factor Loading	Eigen Value	Percentage of Variance
1	Manage uncertainties, ambiguity, and change in a multicultural exchange	-.668		
2	The ability to adapt one’s behaviour to the cultural demands of unfamiliar environments	-.020		
3	Empathize with a person from a different culture; putting oneself in their shoes and looking at a situation from their perspective	.110	1.977	9.884
4	Being sensitive to feelings and subtle meanings in various cultural contexts	-.124		

From the table6, the factors regarding ‘Manage uncertainties, ambiguity, and change in a multicultural exchange’, ‘The ability to adapt one’s behaviour to the cultural demands of unfamiliar environments’, ‘Empathize with a person from a different culture; putting oneself in their shoes and looking at a situation from their perspective’ and ‘Being sensitive to feelings and subtle meanings in various cultural contexts’ were the factors with higher positive loadings on factor 5 could be characterized as “Cross Cultural Skills”. Hence F₅ is termed as **Cross Cultural Skills**. The eigen value for the above factor V was 1.977 and the percentage variance was 9.884. It could be concluded that the Cross Cultural Skills has resulted in ‘Empathize with a person from a different culture; putting oneself in their shoes and looking at a situation from their perspective’ in

the study area and it was agreed by the respondent followed by the ‘Manage uncertainties, ambiguity, and change in a multicultural exchange’, ‘The ability to adapt one’s behaviour to the cultural demands of unfamiliar environments’, and ‘Being sensitive to feelings and subtle meanings in various cultural contexts’ which was negatively loaded.

4. CONCLUSION

Cultural intelligence is a crucial skill in today’s world. As we are working and living in a multicultural community, acquiring a different set of perspectives, knowledge and skills is important in order to succeed. You need to be prepared to communicate and work with people from different backgrounds, races and cultures. Gaining knowledge about other cultures is no longer optional. It is necessary in

order to learn, understand and deal with different situations competently.

The study concludes that majority of the factors having positive loadings, which implies that majority of the respondents agree there is an importance of integrating a Cultural Intelligence multicultural workforce. So we conclude that integrating a Cultural Intelligence are need for the successful performance of multicultural workforce.

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Racism in Nadine Gordimer's *Burger's Daughter*

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Abstract - Racism is a word of many definitions. From the beginning of South Africa, there were conflicts with the country, slavery of blacks, and going against the people. Racism was a fluctuated conflict in the nineteenth century and still exists today even though there are laws against it. The intellectuals and writers in this country could not keep silent against these racist practice and they discussed them in their works. One of these is Nadine Gordimer, the noble-winning writer in literature. She was a white activist who has been an eye witness of racist era. In this paper about racism in her novel *Burger's Daughter*.

Keywords: Racism, Apartheid, Racial Discrimination, Nadine Gordimer

1. INTRODUCTION

Burger's Daughter is about anti-apartheid in South Africa. They search to overthrow the South African government. Gordimer novels about South Africa struggle politics, and she knew many of the activist. *Burger's Daughter* was judged to be indecent and capable of endangering the state of the Republic of South Africa, on the grounds that its story depicted white characters considered as bad and black characters considered as good. In addition, Gordimer was accused of having written a clearly political novel whose theme of fostering black militancy posed a threat to the peaceful co-existence between the separated races of the country.

2. RACIAL DISCRIMINATION

Racial discrimination is the act of treating someone differently than others because of the color of his or her skin. This generally happens because of a social construct, or the attachment to certain meanings to a person's race, used to justify the discrimination. Race is the primary determinant of human traits and capacities and that racial differences produce an inherent superiority of a particular race. Racial discrimination occurs when an individual is subjected to unequal treatment because of their actual or perceived race.

- People call them by various names instead of their actual name in order to insult them.
- Black people are made to sit differently away from others
- They are terminated or demoted from their job and not given any good reason to justify the decision.
- People around them humiliate their family and their nature of origin.

3. APARTHEID IN BURGER'S DAUGHTER

The system of Apartheid was dismantled and Nelson Mandela ascended from his tiny jail cell to become the leader of an integrated South Africa. Nadine Gordimer was got the Nobel Prize for Literature with *Burger's Daughter* specifically for her ability to fuse art and morality. The Guardian included the novel among the top 10 books ever produced in South Africa. Once against book banning was proven to be the most effective way to accomplish exactly the opposite of the intent of the ban and once again the lesson failed to be learned by those who would follow suit in the future.

Burger's Daughter is about a group of white anti-apartheid activists in South Africa seeking to overthrow the South African government. It is set in the mid-1917's, and follows the life of Rosa, the title character, as she comes to terms with her father Lionel Burger's legacy as an activist in the South Africa Communist party.

Burger's Daughter offers a fascinating take on the apartheid era, but the novel's interest goes far beyond its foregrounding historical merit. It also raises issues of universal concerns, issues of mind over matter, action over inertia, life over death. Rosa's personal struggle to come to terms with her father's legacy is one of them.

Following in the footsteps of a god-like father is a universal challenge for any dutiful child to perceiving the ultimate meaning of the actions of one's parents, the pertinence of their ideology and their real power to change fate and destiny. In our house, Rosa says, it was believed that changing the world, eliminating private conflicts set up by the competitive nature of capitalist society would give meanings to people's lives. But these political and humanitarian preoccupations neither acknowledged nor explained the mystery of life and death beyond the revolution

Many of Gordimer's works have explored the impact of apartheid on individuals in South Africa. Journalist and novelist George Packer writes that, as in several of her novels, a theme in *Burger's Daughter* is of racially divided societies in which well-meaning whites unexpectedly encounter a side of black life they did not know about. Literary critic Carolyn Turgeon says that while Lionel was able to work with black activists in the ANC, Rosa discovers that with the rise of the Black Consciousness Movement, many young blacks tend to view white liberals as irrelevant in their struggle for liberation. Rosa witnesses this first hand listening to the black university student in Soweto and, later, in London, her childhood friend "Baasie", who both dismiss her father as unimportant.

Author and academic Louise Yelin says that Gordimer's novels often feature white South Africans opposed to apartheid and racism who try to find their place in a multiracial society.

4. CONCLUSION

Nadine Gordimer's *Burger's Daughter* is about apartheid in South Africa. She became anti-apartheid novelist, her close observation made her to do this. Her novels are the representation of people who either are in distress for being separated from the racism of the society like whites or suffer from imposed deprivation like the blacks. She is the writer of commitment and in her novels, she testifies to the predicaments of her society marked by political issues during apartheid. Gordimer's literary output serves through which she expresses her protest against oppression and rights for people equality and liberation. She is also an observant witness. Her writings reflect the depths of her people's consciousness and lay bare their psycho-political development. In her authentic portraits of South Africa, Gordimer calls for a radical change, a transformation inevitable for the betterment of her fragmented society.

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The Voice of Ambiguity in Thomas Pynchon's *V*

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Abstract - Thomas Pynchon's perception of culture and society along with their inherent problems, and the possibility of the eradication of those problems, in general, has aided in the development of his view of the world which seems very much guided by the contemporary science, in special. The application of the scientific concept on human reality and their finding their relevance is Pynchon's greatest endeavour. Other than entropy and thermodynamics, Pynchon also uses the concept of 'force' in the delineation of human behaviour in mass but not in an individual, which Pynchon believes is unpredictable. Pynchon had indeed succeeded in interpreting a reality of nature or world in *V*. The contemporary science and technology has led him to form a view and understanding of the working – patterns of the realities. These working patterns, he found, fit in every system of knowledge. Thus it helped him in looking at the problems of the world and at its redeeming possibilities while at the same time forming a world-view, at large, through these scientific concepts. Both Scientist and author have their own view point regarding the forces of law. This radical transformation in the understanding of the laws laid a greater impact in the understanding of human reality and existential reality on Pynchon's mind.

Keywords: Existentialism, Postmodern Condition, Cultural Labyrinths, Uncertainty

Pynchon is perhaps the most enigmatic of the American writers who has achieved considerable amount of fame and name. He belongs to the class of writers in whom there is persistent strain of suspicion towards biography and hostility towards publicity. He was associated with no rumours, no interviews, no public appearances and no pictures, even when he was chosen for the Pulitzer and the Faulkner Award he declined it. There is a constant mixing of disciplines like arts, science and music in his works. This tendency helped Pynchon to be one with peers like Bellow, Barth, Bartheleme to name a few, in reformulating a new directionality and breaking away from the traditional writers. In keeping with the ethos of the modern times, Pynchon advocates for a fractured, fragmented and discontinuous order as being contrary to the consistent and coherent old.

The fiction of sixties makes an attack on the historical and the real. But gradually experimentation became the cult thus lashing at direct historical reference. So, rejecting the pre-formed ideas of reality it tried to create its own provisional and free world of creative consciousness. A loss of signification and coherent meaning reigned high. A wave towards experimentalism was soaring. The art and literature of the decade of sixties was mainly influenced by an unmanageable stylistic glut, formal multiplicity and interfusion. The correlation between sign and signification became arbitrary on the one hand and on the other the style almost became styleless by acquiring multiple but fascinating forms like an imaginary museum or a kaleidoscope, thus, resulted in a parody. T.Rajeshwar in *Modernism and Post Modernism in English Literature* says that: "There are poems, novels, and plays in modern world literature, describing human life as an absurd, ridiculous, and superfluous phenomenon. In our day a number of people consider these works demoralizing, destructive, and refuse to accept this kind of approach" (224) All these characteristics hinted towards a new tendency, postmodernism, which is called the storehouse of styles. A further move towards experimental and avant-gardism of modernism was suggested as the basic trend in postmodernism but at the same time it disregarded its high seriousness and hope for any formal totality and transcendence.

Thomas Pynchon is one writer who remarkably represents this 'break away' trend of the modern discontinuity in his works. His area of grotesque begins in the historical world, well depicting the psychic imbalances and cultural disruption of Nazi and wartime America and Europe. The characters of Pynchon are made such, who can't skillfully

handle the inchoate and variegated world in which they find themselves agaped and driven along. So, the determining factor in Pynchon's writings is the text which runs by an extensive and often expository discursiveness. It functions on the interface between two levels of experience one, the experience of hyperactivity and excess and the other one of hermetic containment. These essential postmodernist experiences and mannerisms have provided a direction to Pynchon's work.

The graphic plot in his first novel *V.* is on discontinuity. There are two complete stories which run parallel and overlap through the enigmatic initial which is the title of the book *V.* Thus *V.* is a mysterious and dangerous woman whose numerous identities and loyalties are of shifting type. The two plots of the novel are brought close to each other in search of *V.* via the investigation of her plot. Pynchon also successfully attempts to concede with this plot, the unraveling of the bogus plot of which the characters are the victims. The second novel, *The crying of Lot 49*, seems astonishing as being very short and classical in its pace and economy. It is a very elegantly crafted novel and doesn't show an exercise in the narrative form. Pynchon's interest in absurd and black humour comes in the foreground in this novel also. The two aspects of personality, head and heart get amalgamated in the central figure, the chief investigatrix, Oedipa Mass. She is given a work to solve the puzzle of Pierce Inverarity's enmeshment which challenges her own sanity. The novel has tried to rediscover the Oedipus myth as the tragi-comedy of rationalism, which tries to categorize and understand the deep-rooted complexities of its own life. The figure of Oedipus includes binaries in itself: masculine and feminine, passionate and intellectual, quester and the object, victim of the quest and its victimizer. The choice of language had always been a problem for an artist and Pynchon derives his language from the theory of information technology in this

novel. In the science of information theory, the information transmitted by a signal depends upon the inverse ratio of noise, redundancy and non-information. The type and quality of any information transmitted by the element is in accordance to the negative logarithm of its predictability in transmission. In other words, a medium can become full of information with separate facts derived from them. Though there is disparity at the surface but it doesn't hide the coherence which is at the deeper level. The next novel *Gravity's Rainbow* is about the nightmare dreamt by a British Intelligence Officer during the World War II of V-2 bombardments which would affect his mental powers. Whole of the novel is either dream-like or nightmarish. This logic of dream has an impact of existentialism. Pynchon feels the need of using language as significant signs and must enter a post-humanist space. He also tries to grapple with the problem of communication and the structurelessness created by its own self. But the method that he has adopted is one to evolve a continuous hypothesis through the layers of discontinuities.

The whole environment and situation is replete with death, decay and decline whether be it the real desert or modern society both are shown as garbage heap. Every situation disintegrates into chaos or decay. A drift towards the mechanical and inanimate is over-emphasized. The old Renaissance system, civilization and buildings are disintegrating with the hints of extinction and dehumanization thus quickening the entropic processes of human kind. Benny Profane in his imagination converses with a machine called SHROUD (Synthetic Human Radiation Output Determined) which echoes a worrying parody of human existence where the man is heading towards in this age. Benny, a layman is unable to conceive or understand the direction of his walk. That Man is moving towards future with too much dependence on the inanimate machines. Pynchon has tried to bring out a

starting point of human extinction from the old imperialist events linked in extenuation to the process with Hitler, contemporary automotation, tourism and the Whole Sick Crew – this might be the crux of the novel.

It is a general agreement that historical chapters are weightier than contemporary one, but it does give a valuable contribution in shaping up the theme of the novel. Benny Profane appears suddenly in the first chapter of the book without any introduction or history suggesting that his existence matter only for the present. He keeps shifting from one job to another and his life is full of violent parties, this clearly indicates that he is not a conventional character but a 'free wheeling character' where the character experiments and produces a contrast of unsettled provisional life to the domestic sobriety of Victorian or Renaissance age. In the first chapter, during the drinking session he says in second person: "Try to squeeze a water melon into a small tumbler sometime when your reflexes are not so good. It is next to impossible" (18). The emotional life given to Profane is uncontrolled and aimless, suggested by his sympathy for derelicts and bums, nostalgia for Depression and his involvement in other's tensions. In this way Profane is attributed no specific clear role, but of a derelict where chance fights and escapades are constant throughout the book.

Thus, an uncertainty surrounds Profane. A truncated character is suggested by the label of 'schemihl' and 'yo-yo' given to him in the title of the first chapter by Pynchon. In this way by accepting this label he himself reduces his existence at the same time to an amoeba – like passivity.

The second label 'yo – yo' suggests the endless aimlessness of everything in life and calls for a look into the movement of his life which is one of Profane's determinants, wherever he goes he just 'happens' to pass whether through Norfolk or Virginia, New York, shuttle or later in Staten Island Ferry.

Profane is one of those absurd figures who happen to be same throughout and at the mercy of chance without any persistent change, that his clothes are also same in the end as at his first entry in the narrative. So the movement of his 'yo-yo' like life is to kill the monotony of life. In this way Profane is just an attenuated and lethargic version of 'Beat mobility' who disappears into the deluge of darkness at the novel's end.

It is through Profane that we come across a group of New Yorkers collectively called Whole Sick Crew. The members of this Whole Sick Crew participate in a common lethargy. They are a product of their machine – driven environment. Through them Pynchon elucidates that the Edenic Garden has transformed into Machine. The two computers SHROUD and SHOCK (Synthetic Human Object Causality Kinematics) reflects the barren future for man and an extension of mankind. This degeneracy of mankind into machine is most visible in Whole Sick Crew. They are the impersonations of poverty and rebellion of artistic souls, "most of them worked for a living and obtained the substance of their conversation from the pages of Time Magazine" (56-57), and their avant-gardism is dismissed. Their motionlessness is projected by a range of static images and when they move their movement is restricted to monotonous and repetitive ones, from one party to another. The emotion of love for whole Sick Crew is restricted only to mechanical activity. The whole of the group comes out as a self – deceived lot excessively involved in the consumer network.

In the second main plot which sets up the historical chapters of the novel is the research work of Herbert Stencil to trace out a mysterious and dangerous woman V. Though the historical chapters are quite self – contained but still some seems overlapping into the modern chapters. Pynchon has designed Stencil's search for information with Whole

Sick Crew at its periphery and his route is intersected by Profane that urgently reminds the intersecting paths of Stephen and Bloom in Ulysses. Stencil can be viewed as a “century’s child and he is fulfilling that role by representing modern man in quest for reality. Prior to War he was a derelict like Profane and got into some unmeaningful action by the journals of his father so, he becomes a representative of those American heroes who are adrift in lethargic aimlessness. Through the references of V. in his father’s journals he finds a reason for motion. Otherwise he was a victim of sleep and inertia. So, he shapes out his quest for V. through some deft clues but its success is terrifying also as it will again push him back to inertia and sleep. Again everything and every situation would disintegrate into entropic processes. So, to keep ‘active a borderline metabolism’ Stencil adopts a strategy of ‘Approach and Avoid’. This strategy can give some aid in maintaining consciousness and meaningful action but it does project the inherent solipsism implicit in them. All his techniques of self – extension and self – duplication are a means of furthering his quest and distancing any direct contact with reality. The faint clues of V. which he has transformed into fantasy becomes his obsession.

Stencil is locked in the hothouse of history and Profane wandering in the streets of modern world, which is his natural domain. Profane has come from nowhere and in the end disappears into the darkness of nowhere. The street is an area of waking with absolute present and meaninglessness, unaware and indifferent to patterns and clues which Stencil is observed with. He confesses that he has learnt nothing from his roaming up and down the streets of world other than to be frightened of them. Stencil fits into this zone of hothouse which is a region of memory, when mind is sealed up with past memories. And under the street is an area of dream to seek some temporary peace and oblivion. This is the domain where artists

descend to flourish their imagination. The three domains are the three levels of consciousness which hints at human need to make fantasies.

The main action of the novel is to unravel the mysteries surrounded around V. She is shown as a woman wrapped in a number of disguises as for example Victoria Wren, Hedwig Vogelsang, Veronica Manganese, a mysterious lady in Paris, a Bad Priest in Malta, a number of other references suggested by letter V. A number of such references puzzles Stencil as well as the reader to reach the correct V. The true identity of V. remains indispensable even at the end. V. is considered as a warehouse of knowledge. When the readers expectations get undermined and a number of possibilities are placed before him then he attempts to search a meaning himself and cannot get outside the novel. It is for reader’s involvement technique that Pynchon uses ellipses, jumps over space and time, shifting from lyrical reverie to a nightmare, multiple interpretations, disorientation of systems and patterns or denying any kind of finality.

The denial of any finality is evident in Calvinism also which believes in sticking to binaries and negates any possibility for middle ground. So, whichever Pynchon’s character tries to leave the fixed polarity of his identity and encompasses this middle ground he gets victimized by a controlling system which again aims to give him a fixed identity. Bowing down to this control means accepting a mechanical life which is most akin to an inanimate and escape seems an impossibility. The only way to escape is through humanistic responses to life confinements. In *V.*, *The Crying of Lot 49* and *Gravity’s Rainbow*, the characters could renew their vitality only by descending into the underworld of their vitality only by descending into the underworld of their gutters and by drawing those energizing faculties of culture which had been dumped as waste by the power mongers, which hindered their effort of control. In this way, Pynchon undermines the empirical

determinacy of Western worldview by satirizing such characters, disrupting the traditional narrative pattern and favouring the anarchic humanism by highlighting the threats of overdependence on rationalism. Thus, Pynchon demands from the new age to shed the reliance on old established names and invent their own act of naming and terminology. Like the way he himself used word Luddite for counter – revolutionaries who denies rational arrangement of mechanics in the world. The Luddites according to Pynchon was a group in Britain between 1811 – 1816 who objected the use of machinery that replaced them in the textile industry. They broke their loyalties with British king and joined the mythical king Ludd who in 1779 in a fit of insanity destroyed two knitting hosiery machines in a house. Thus, the anti – mechanizationists started calling themselves Luddites.

Moreover, to bring a change in the new point of view in the society, Pynchon tries to convert his readers through his Luddite – plots, such plots deny any reliability on rationality. He tries to free the Western Psyche from any sort of colonialism. So, Pynchon becomes a moralist as well, along with being a fabulist, detective, black humourist and so on. He appears a self – effacing saviour of the doom by recording the conscience-death of our culture and makes vocal the salvational alternatives and possibilities. Indeed, Pynchon's work has registered and catalogued every aspect of modern man's history in a fragmented and chaotic manner. The obscurant aspect is learnt to his work by the full range of allusions used. But his allusions whether scientific or artistic have a pattern which provides his work a unity. These patterns exhibit an antinomy between entropic, void ward drift visible in the materialistic view of things and the possibilities for transcendence suggested in the spiritual view.

In *V.*, Pynchon has made use of Botticelli's painting *The Birth of Venus* as an allusion. The painting is of lovely goddess

Venus who is portrayed in all her perfection, beauty and innocence. There are two plots in the novel that run parallel to each other, one is set in the present, i.e., fifties of the nineteenth century and the other at the turn of the century leading up to the present. The protagonist of the first plot is Benny Profane and of the other one is Stencil. Stencil takes up a great task of resolving the mystery of a woman, V., who happens to be his mother but she is also projected as the archetypal Terrible Mother by the mytho-graphers. At the outset she is shown as an ingenuous young English lady, Victoria Wren and is thus alluded to Botticelli's painting *Birth of Venus* but gradually, there is transformation of Victoria Wren into V, in Florence which gives occasion to make the painting an ironic emblem of V's decadent character graph. In Pynchon's imaginary Florence of 1899, a freelance political operative, Raphael Mantissa, appreciates and tries to seek in the painting something that's lacking in his life, i.e., transcendence and perfection. According to the author he belongs to 'a circle...whose outer rim was tangent to rims enclosing the – Decadents of England and France, the Generation of '98 in Spain, for whom the continent of Europe was like a gallery one is familiar with but long weary of' (160) Pynchon tries to build a connection between the rise of fascism and the downfall of aestheticism.

In the beginning, Pynchon presents Victoria Wren as an idealized incarnation of Goddess Venus, but gradually her image gets distorted which complacents to the 20th century environment and thus out of the beautiful and strangely religious Victoria Wren emerges a creature of horror and darkness. Through her, Pynchon gives a peep inside the decadent Western culture and provides a contrast for pupal stage of being which will eventually embody that culture's decadence. Botticelli's *Birth of Venus* stands in sharp contrast to the birth of V-ness. Where the pure and perfect

beauty of Venus is born in daylight out of the breezy Aegean Sea, the creature of horror and darkness is born at night in the midst of chaos and confusion. So, the birth of V. celebrates the decline of all the cultural sanctities of the civilization. In this way, the painting takes a new connotation and stands for all that is inclusive in V by the new dispensation. Its subject, Venus, is no more a pious beauty but gets transformed into a beauty of terror and darkness, so the subject is displaced. The action of the birth of goddess is travestied. It has lost its position as an aesthetic epitome and fails to soothe the melancholic anarchist's soul. V is seen as Vheissu, a viod, a falasity; so, the painting suffers multiple degradation.

Pynchon's text are regarded as allegories, for his narratives try to seek values and interest affected by the discourses of truth. Pynchon directs his narration in the pursuit of truth and narrative tries to seek enlightenment and brings consciousness of the manners in which views of culture are used to sustain cultural power at the expense of individual freedom. And, generally, allegory interprets that human activity which works between the culture and the individual consciousness. And through this individual allegorical text it is possible to show a self – conscious document of the manner in which cultural discourses find social validation and also how they authorize certain configurations of cultural power.

Both narrative and absolute truth are conflated in the similar quasi transcendental source of legitimation which is invoked for both culture and society. So, allegory engages itself in not just the political, social and economic realities of culture but also in the justification of explanations of those realities provided by culture.

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