ENSEMBLE LEARNING METHOD FOR FILTERING NOISE DATA USING QUARTET CLASSIFIERS

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ABSTRACT

Entire globe functions upon a future agenda based on knowledge discovery using the available data source carrying various Big Data challenges in terms of data quality, management and classification. The data grows huge in size but quality keeps challenging the propensity or decision making. The meaningless information in a system for processing affects the data quality termed as noise data. Noise data can be filtered through the quartet classifier ensemble filter using its scalability and performance characteristics. We compare our findings using Quartet Classifier Ensemble for Big Data (QCE-BD) with the two pre-processing approach: a homogeneous and heterogeneous ensemble filter. The proposed method using broad dataset from our empirical research produces a comparable result.

Keywords: *Attribute noise, big data, class noise, ensemble, noise data filter*

Introduction

The ensemble is one of the most encouraging regions of exploration in AI and information mining. Different classifiers in an ensemble could be consolidated to accomplish preferable execution over any individual classifier [1]. The learning capacity of reliable students and frail students are the same, and feeble students can be supported to be reliable students [2]. If all the classifiers make similar forecasts in an ensemble, they also make similar mistakes [3]. In this way, an ensemble requires its individual classifiers [4, 7].

The development in innovation, the high-serious market, and the widespread utilization of algorithms have prompted widespread expansion for better programming quality and dependability expectations.

The noise contained in the planning dataset can be isolated into two central orders: quality noise and imprint noise. Attribute noise is portrayed as imprecision or a goof introduced in the property assessments. Conversely, name noise is achieved by mislabeling. The two kinds of noise have been totally packed in various works [2], which have prescribed dispensing with property noise to reduce the insightful exactness if a comparative attribute noise is accessible when the classifier resembles this used. Nevertheless, shedding mark noise dependably improves the insightful accuracy. This work fixates on name noise, and "noise" in this work astoundingly insinuates name noise [10].

Ensemble learning channels fluctuate the extent that classifier improvement just as a decision blend. Regardless, most works community on the mislabeled planning dataset and ignore the effect of unlabeled data. As semi-coordinated learning shows, appeared differently in relation to checked data, unlabeled data is typically less difficult to obtain and basic in various applications. The accomplishment of the current semi-managed learning strategies rouses us to develop another noise channel to use unlabeled data to improve the noise channel execution on a mislabeled getting ready dataset and proposed Sequential Least Squares Programming Method [9].

a) **Noise in the features**:

It is given by the botches that occurred during the section of the characteristics assessments. Among the wellsprings of such a noise are: factors with missing characteristics and dreary data.

b) **Noise in the classes**:

It is given by the mix-ups introduced during the models' undertaking to the classes. The presence of such a noise may be a direct result of subjectivity, bungles in the data area measure, and off base data for consigning a guide to a class. There are two possible wellsprings of class noise: I) Inconsistent

models. These are events with comparative property assessments yet having a spot with at any rate two interesting classes of the dataset, and ii) Error in the characterization. Models are consigned mistakenly to a class. Such a misstep, generally speaking, happens when there are classes with tantamount characteristics for the qualities [4].

As far as we could know, existing noise filters are frequently joined with over-testing strategies or just arrangement with the uproarious models in the more significant part class. No noise separating endeavor centers around minority models during the time spent under-examining for imbalanced classification.

The remainder of the paper is composed as follows: section 2 presents the foundation investigation of noise separating. Section 3 presents our proposed algorithm. Section 4 presents the outcomes, and concludes up this paper in section 5.

Background study

The creators produce such manufactured inconsistency information progressively, giving it to the increased Kalman channel based classifier algorithm, hence empowering human apnea identification because of this exertion. The comparability classifier ends up being ready to recognize focuses misidentified by the greater part of the other prepared classifiers that didn't use past choices. In future investigations, various reference labels might be utilized to merge the comparability classifier choices ideally [1]. The creators propose a novel methodology, improved delicate, more significant part casting a ballot by misusing unlabeled information (ESMVU) for mislabeled information separating [2].

Ensemble-partitioning filter, a conventional execution that brings together the ideas of certain filters portrayed already in writing. The Ensemble-Partitioning Filter can be tuned by a few limits, for instance, number of distributions, number of base classifiers, or accentuation ending measure. In this way, by defining these limits appropriately, it is possible to dispatch the filters such as classification, ensemble, Multiple-Partitioning, or the Iterative-Partitioning. They are formalizing quite a nonexclusive method to manage noise isolating licenses the master to adjust a separating plan which fits best to the given territory issue [3]. The essayists store the express particles' ensembles during the isolating cycle and use the data about those ensembles later. By determining a cross-covariance between ensembles from different purposes, the makers can clearly revive the current evaluated state with conceded assessments [5]. Any arbitrary testing may leave behind a brilliant open door for singular pockets, and in this way, learning may not happen viably. Here that can be evaded by outlining holders and pick tests proportionate to the models open in every repository. Moreover speaks to how, when plentiful data isn't available, the makers can, regardless, do learning by taking an insignificant illustration of the data. Ensemble-based thoughts and channels applied in preprocessing expected a major capacity in growing the learning precision. The use of the filters altogether improves preparing an execution. In any case, the test outcomes have not expanded correspondingly. Speculation ability is undermined to the detriment of expanding the preparation precision [6].

The creators brought separating instrument into the KNNs individually, as indicated by the individual filtering qualities of the human intellectual conduct, and its explanatory model is introduced. It is additionally a calculation system. The test results show that the proposed calculation's vigor is upgraded to various degrees on different informational collections when contrasted with the specific KNNs and the estimated KNN [8].

System model

Notably, all highlights of the informational collection don't contribute similarly to classification. Just a subset of highlights might be adequate to become familiar with the informational index's properties with great precision. Also, not all the instances of the data are expected to set up a classifier. There may be noise in those courses of action of cases. Here, noise suggests that the events which veer off from the overall lead of the instructive record.

Dataset description

The dataset subtleties are gathered from EPSILON exchange information. The dataset comprises of 500,000 instances and 2000 attributes as a total of 1,000,000,000 instances is utilized in our QCE-DB algorithm.

PSO setup

The PSO calculation is a hand of advancement calculation for mimicking swarm insight conduct proposed by Kennedy and Eberhart in 1995. It is a booming worldwide streamlining calculation by advancing the hunt through the gathering insight direction created by the collaboration and rivalry of particles in the gathering. In particular, it tends to be communicated as: haphazardly introduce a molecule gathering (the amount is m) in an N-dimensional inquiry space.

The particle i position is $X_i=(x_{i1},x_{i2},\ldots x_{in})$ its velocity is $V_i=(v_{i1},v_{i2},\ldots v_{in})$ its individual extreme value $p_i=(p_{i1},p_{i2},\ldots p_{in})$, and the population's global extreme value is $Gi=(g_{i1},g_{i2},\ldots g_{in})$. After determining the above two extremes, you can update the speed and position of the particle according to the following equation:

$$\begin{cases} V_i^{k+1}=\omega*V_i^k + c_1*rand()*\left(P_i^k-X_i^k\right)+c_2*rand()*(G_i^k-X_i^k) \\ X_i^{k+1}=X_i^k+V_i^{k+1} \end{cases}$$

------Eq. 1

Where in Eq1: rand() is a random number between interval (0,1), and c_1, c_2 are collectively referred to as a learning factor or an acceleration factor, generally $c_1=c_2=1.4692.\omega$, an inertia coefficient.

Class noise

We acquaint a measure with assess the quality of an occurrence. In this way, for the I-th example, we register Qi=(ri-di)/max(di,ri) , where di is the separation of the I-th separation to the centroid of its class and ri is the base separation of the I-th case to the centoid of the classes where doesn't have a place with. Uproarious occasions will have negative qualities for the quality measure Q. Nonetheless, a few cases situated close to the limit of at least two classes may likewise have little negative qualities for the quality measure.

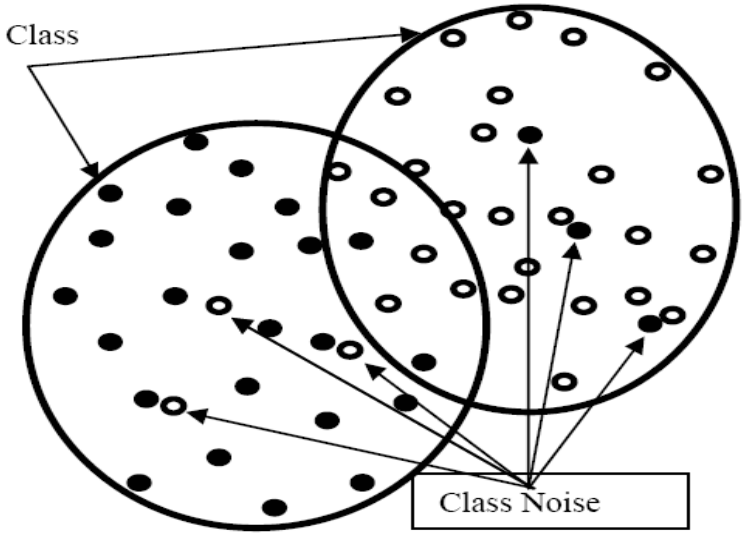

Figure 1. Graphical representation of class noise

Attribute noise

The mistakes are happened during the passage of the estimations of the attributes. Among the wellsprings of this sort of noise are: factors with missing qualities, and repetitive data.

The misclassified attribute esteem sets are given to the second stage where a portion of the attribute esteems in misclassified occasions are specifically supplanted, with the goal that the refined cases could be classified effectively.

The proposed calculation perceives the boisterous events and remembers them from the events that are in as far as possible. The calculation's goal is to perceive and delete the uproarious cases, securing the class assignment and as far as possible with the ultimate objective that neither particular of the classes

nor the classification calculation's discriminant force is changed.

Learning algorithms

Extremely Randomized Trees(ERT)

ERT is a very familiar technique in the AI strategies for relapse and classification errands. Haphazardly test both attribute and cut-point decision while parting a tree hub. ERT works by making a more number of choice trees from the preparation dataset. The quantity of choice trees is considered as the significant hyper-boundary in ERT. The quantity of trees can be set through the n_estimators.

K-Nearest Neighbor (KNN)

KNN can be utilized for relapse just as classification issues. KNN takes a shot at a rule that comparable things are near one another.

Logistic Regression (LR)

The underlying technique of Logistic regression is same as the linear regression. It is used to model a binary dependent variable.

Random Forest (RF)

Ensembles are a bunch of models expand upon the AI calculations. The irregular backwoods is a model comprised of numerous choice trees with the arbitrary testing of preparing data focuses when building choice trees and arbitrary subsets of highlights accounted during the hub parting. This model incorporates the averaging the expectation of trees.

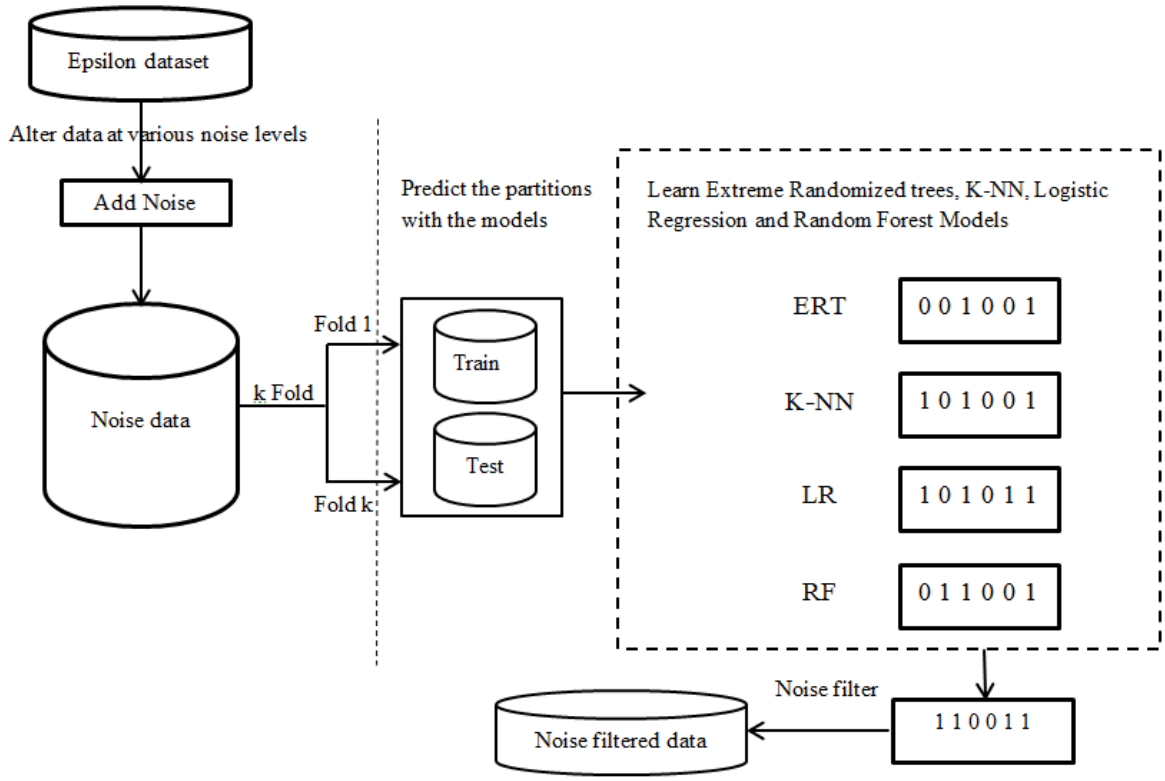

Figure 2. Noise filtering with ensemble

In this segment, prepared models are applied with ensemble techniques, as demonstrated as follows. Ensemble learning method is developed from the models, as appeared in Figure 2.

The weighted normal of the two probabilities is determined from the yield likelihood of every ensemble model.

$$P=\alpha * p1 + (1-\alpha) * p2 \text{----------} \textbf{Eq. 2}.$$

In **Eq. 1**, P denotes the output probability of the ensemble model. Meanwhile, p1 and p2 are the prediction probabilities given from different combinations of tokenizers and models. The determined for weighting between two probabilities where $0 \leq \alpha \leq 1$.

Quartet Classifier Ensemble identifies the mislabeled instances in the dataset using a set of four learning algorithms: ERT, KNN, LR, and RF. A well-known k-fold cross validation applied across the train data. The KNN implementation with Minkowski distance

calculates the distance between two data points in different ways. Four algorithms are trained on k-1 parts. Every classifier in the ensemble model tags the test samples from the test set in the fold. Input data of the sample gets tagged at each closure of k-fold. The target labels obtained by applying the weight of prediction labels over the Sequential Least Squares Programming function to identify the inequality data which is active and inactive are solved by iterative process. The came about misfortune from every classifier applied over the Particle Swam Optimization calculation to get the best or wellness esteem further to result out an averaging strategy to work out a few assessors autonomously and afterward to average their forecasts. Since the change is diminished, the consolidated assessor as ensemble is superior to any of the single base assessor.

QCE-BD is with the unique ensemble of four learning algorithms. QCE-BD algorithm filters the noise data by applying k-fold over the training data. The dataset instances are altered at various noise levels 0%, 5%, 10%, 15% and 20% where the dataset remains unaltered at 0% noise level. The hold-out validation process is performed as usual. Class noise and attribute noise creation process are performed on the independent and dependent features respectively.

Spark is a distributed general purpose clustering framework and built on top the distributed data structure known as Resilient Distributed Databases (RDDs). The dataset stored in Hadoop Distributed File System returns as an RDD of strings. RDD provides core functionality for reading data stored in Hadoop.

S**ub algorithm 1** describes the attribute noise creation process as part of the QCE-BD noise data filtering process algorithm.

The number of instances to be affected in attribute noise creation process calculated with the independent features according to the noise level applied. The independent features are huge in number for which the standard deviation applied as a measure of the spread of a distribution of the instances. As an iterative process, noise data created for the selected instance based upon the index across the dataset.

Sub algorithm 2 describes the class noise creation process.

The same experimental setup followed for creating class noise at various noise levels. For each noise level, the occurrences of ward highlights chose for the preparing are changed by supplanting the current mark with another accessible name in the dataset. Class noise is otherwise called label noise.

Sub algorithm 3 and sub algorithm 4 describes the noise data filtration with QCE-BD learning process.

Algorithm QCE-BD noise data filtering process.

Sub algorithm 1: Attribute noise creation process

```
1:   Input: data, noise ratio level
2:   Output: noise data, index of the noise data
3:   Begin
4:       Row_affect= size(x)/100 * noise_ratio
5:       noise_index =array of index value
6:        K= standard deviation of x columns
7:       for each noise_index in  x do
8:          Temp= random number between 0-k
9:          noise_x.add ( x * temp)
10:       end for
11:       Return   noise_x, noise_index
12:  End
```

Sub algorithm 2: Class noise creation process.

```
1:   Input: data, noise ratio level
2:   Output: noise data, index of the noise data
3:   Begin
4:                Row_affect= size(y)/100 * noise_ratio
5:                noise_index =array of index value
6:                for each noise_index in  y do
7:                      If( y == 1) then
8:                            noise_y.add(0)
9:                      Else
10:                          noise_y.add(1)
11:                     end if
12:               end for
13:               Return   noise_y, noise_index
14:  End
```

Sub algorithm 3 QCE-BD learning process

```
1:    Input: partitioned noise data using k-Fold
2:    Output: filtered data without noise
3:    Begin
4:    for each iteration until max_iteration do
5:       split data into k_Folds  which consist train and test set
6:     for each k_Folds  do
7:         for each blearners do
8:           Train the blearner with folded train set
9:           Obtain target label probabilities from the blearner on test set in fold
10:          Construct prediction matrix of class probabilities from blearners
11:      end for
12:    end for
13:      Obtain weights to reduce loss on target labels
14:      Obtain mean value of the predicted target labels over the blearners
                                                  with (predicted target labels * weights)
15:      Obtain loss from the prediction of target labels
16:      if loss < preceding iteration then
17:         Add mean value of the predictions of target labels
18:      Else
19:       Return predictions
20:       Break for
21:      end if
```

Sub algorithm 4 Optimization process using PSO

```
1:  Input: predicted target labels on k_folds
2:  Output: weights
3:  Begin
4:    Objective= calculate loss for each blearners prediction
5:    Find SLSQP with this objective
6:    Find best fitness value for this objective using PSO algorithm
7:     Return mean values of both optimizer weights
8:  End
```

RESULTS AND DISCUSSION

In this part, we examine the exactness, execution and the noise data separating results acquired by the Quartet classifiers in the wake of applying the proposed structure QCE-BD without actualizing any noise treatment procedures and contrasted and the current ensemble frameworks Homogeneous Ensemble for Big Data (HME-BD), and Heterogeneous Ensemble for Big Data (HTE-BD).

The parameters used for noise filtering process are shown in **Table 1**.

Table 1. Classifier parameter setting

Classifiers	Parameters
Extreme randomized trees	n_estimators=200, max_depth=100, max_features=10,criterion='gini',
Random forest	n_estimators=200, max_depth=100,criterion='gini',
K-NN	n_neighbors=11,leaf_size=30, distancec='minkowski'
Logistic Regression	C=1.0,intercept_scaling=1, max_iter=100

Table 2 shows the test precision esteems for the dataset Epsilon and the five degrees of noise utilizing the Quartet Classifier Ensemble for Big Data (QCE-BD) algorithm for classification. From these outcome we can point out that the proposed framework QCE-BD is able to improve the behavior and performance in every level of noise.

QCE-BD enables the highest accuracy values as the classifiers vary with those ensembles in HTE-BD and HME-BD in class noise filtering. The weighted average ensemble contributes equally to predictions representing the accuracy value of QCE-BD. From the beginning of 0% noise level, QCE-BD outperforms both HME-BD and HTE-BD represented in **Figure 3**. At every noise level, QCE-BD performance is incrementing more than 8% comparing with the HME-BD and between 1 to 2% with HTE-BD.

Table 2. Class noise: accuracy comparison between QCE-BD, HME-BD, and HTE-BD

Dataset	Noise ratio (%)	HME-BD (%)	HTE-BD (%)	QCE-BD (%)
Epsilon	0	58.06	66.02	73
	5	58.60	66.09	67
	10	58.61	66.10	68
	15	58.41	66.00	66
	20	58.09	65.65	66

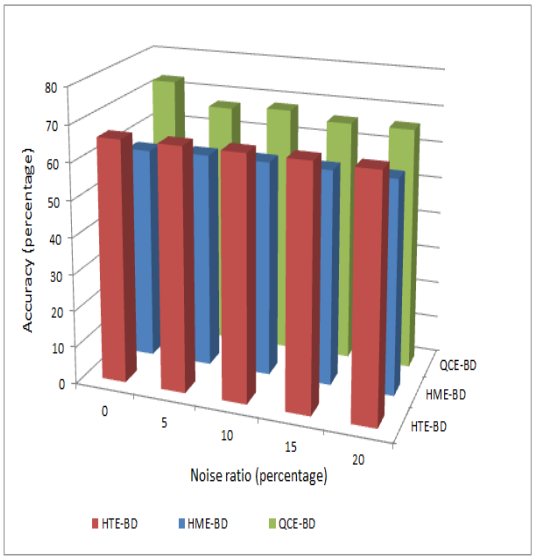

Figure 3. Class noise accuracy comparison

In **Table 3,** we set a benchmark for attribute noise filtering using the classifiers ensembles in the proposed framework QCE-BD applying the dataset EPSILON represented in the **Figure 4**.

Table 3. Attribute noise: Test accuracy using QCE-BD

Dataset	Noise ratio (%)	QCE-BD (%)
Epsilon	5	68
	10	66
	15	69
	20	67

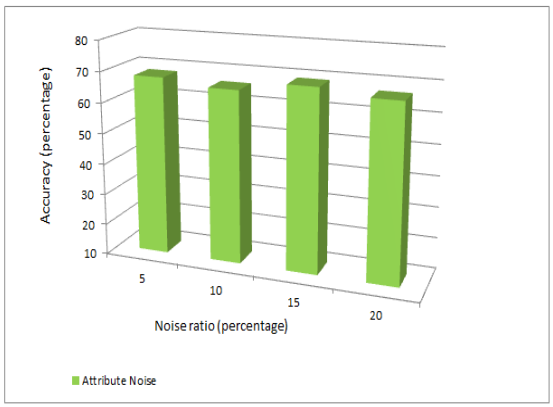

Figure 4. Noise ratio percentage

In **Table 4**, the average percentage of correctly removed class noise instances obtained by applying the proposed framework QCE-BD for the dataset Epsilon. Even though HME-BD outperforms HTE-BD in removing the class noise instances around 77% and 81% at various noise levels, the proposed framework QCE-BD outperforms both the ensemble methods from. The graphic depiction of these percentages of correctly removed class noise instances represented in **Figure 5**.

Table 4. Class noise: Percentage of correctly removed instances after the filtering process

Dataset	Noise ratio (%)	HME-BD (%)	HTE-BD (%)	QCE-BD (%)
Epsilon	5	65.05	30.64	77.80
	10	65.98	30.27	78.87
	15	67.15	30.70	76.02
	20	66.51	30.86	81.09

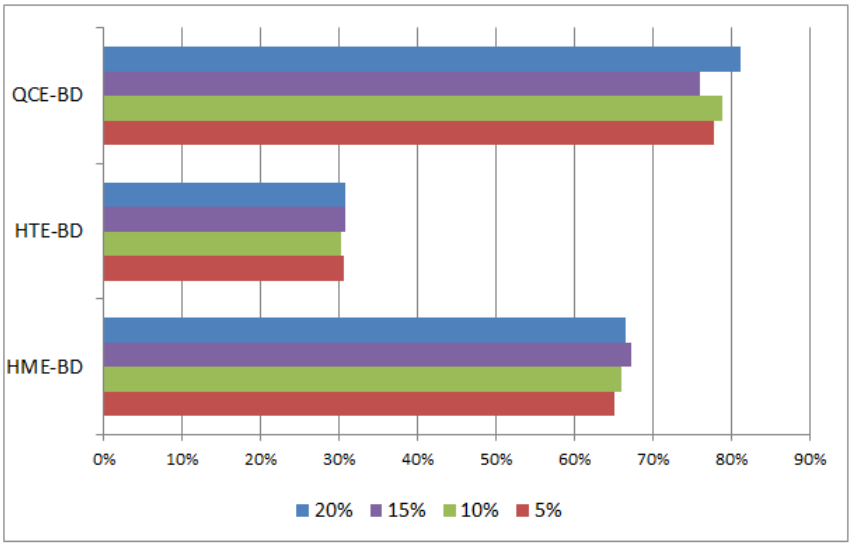

Figure 5. Average percentage of correctly removed instances

In **Table 5**, the average percentage of correctly removed attribute noise instances obtained by applying the proposed framework QCE-BD for the dataset Epsilon is a benchmark at various levels of noise. The graphic representation of these percentages of correctly removed attribute noise instances represented in **Figure 6**.

Table 5. Attribute noise: Percentage of correctly detached instances after the filtering process

Dataset	Noise ratio (%)	QCE-BD (%)
Epsilon	5	72.87
	10	76.02
	15	84.92
	20	77.66

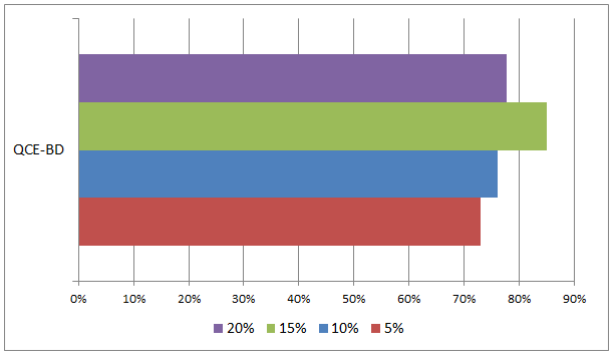

Figure 6. Attribute noise: Percentage of correctly removed instances after the filtering process

In **Table 6**, the comparison of average run times of three Ensemble methods for the dataset Epsilon is tabulated. The average execution time represented graphically in **Figure 7** for both class and attribute noise without considering the five levels of noises as a factor using the QCE-BD as a comparison chart with the HME-BD and HTE-BD. The average execution time of proposed framework QCE-BD for removing class noise instances is higher than the HME-BD and HTE-BD. The attribute noise removing instance executed only using the proposed framework QCE-BD as there are no factors available for comparison.

Table 6. Class Noise: Average run times for HME-BD, HTE-BD and QCE-BD in seconds

Dataset	Noise Type	HME-BD	HTE-BD	QCE-BD
Epsilon	Class	2,021.14	5,664.06	11,449.61
	Attribute			14,173.91

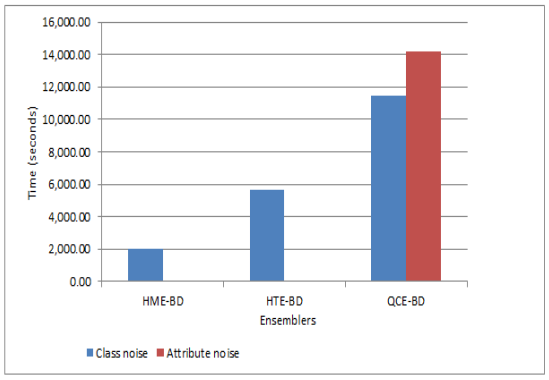

Figure 7. Execution time between ensembles for class noise and attribute noise

In **Table 7**, the memory utilization plays a role in the system performance. Even though the average execution time of proposed framework is higher, we denote here that memory utilization is nominal which can be used as a benchmark for the future proposal.

Table 7. Average memory utilization for noise types in percentage

Dataset	Noise Type	Utilization (%)
Epsilon	Attribute	5.271902749
	Class	4.131828775

We completed trials on true EPSILON datasets with various examples, attributes, and classes. We have utilized a group made out of 10 processing hubs and one expert hub. The figuring hubs hold the accompanying qualities: 1 processors x Intel(R) Xeon(R) CPU EPYC-7282, 16 centers processor, 2.80 GHz, 60 GB RAM. As to, we have utilized the accompanying design: Hadoop 2.7.0-Apache Hadoop dissemination, Apache Spark and 160 centers (16 centers/hub), 320 RAM GB (32GB/hub).

Conclusion

This noise data filtering proposal QCE-BD obtained a clean dataset from thousands of features and instances in million with a nominal time. Ensemble technique with the choice of four learning algorithms is a different proposal dealing with the both class noise and attribute noise. QCE-BD outperforms the HTE-BD in terms of class noise filtering accuracy up to 2% and attribute noise filtering sets a benchmark with 67% to 69% at various noise levels particular to the epsilon dataset. With the highest level of 20% class noise ratio, noise filtering instances averages up to 81% whereas the correctly removed instances after the attribute noise filtering process averages up to 84% with 15% noise level ratio. Furthermore, experimental setups continue improving the process of noise filtering precision with various datasets, and accuracy improvements.

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ROLE OF INFORMATION AND ITS IMPACT ON BUSINESS PERFORMANCE: STRUCTURAL EQUATION MODELLING (SEM) PERSPECTIVE IN SAUDI ARABIA

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ABSTRACT

Structural Equation Modelling (SEM) encompasses a varied forms of computational algorithms, statistical techniques, and mathematical models, which is utilized to fit the constructs of information. SEM test the hypothesis by utilizing data generated from respondents who are all participated in the intelligence test. This article focusses on the investigation of relationship among the successive elements of successive critical factors for management of quality (SCEMQ) and business progression (BP). The instrument is adopted to gather primary data from the business organization. In this article, two-step SEM model is incorporated in the investigation of SCEMQ and BP. The article identified 7 critical successive elements namely Commitment with top management (CTM), Focus on customer (FC), Planning of strategic (PS), Management of process (MPR), Management of people (MP), Quality of leadership (QL), and Management of supplier (MS), which has a significant role in defining the performance of the business. From this study, it is identified that the quality and information has huge contribution towards the success of business.

Keywords: *Business progression, successive elements, information, SME, SCEMQ and management.*

Introduction

The context of business and industrial has witnessed a radical alteration over the past two decades with varying requirements of customer, emerging technology and marketing scenario. In order to endure in this competitive situation, business firms have initiated the reorientation of their proficiencies by means of execution of diverse practices [1, 2]. Lean manufacturing is a kind of production enhancement system that is concentrated on the manufacturing system reconfigurationin terms of restructuring the processes, which enable minimized wastage, minimising differences and thereby enabling the reduction of cost [5-7].

Numerous techniques and tools have been developed in the context of manufacturing and business improvement. It is extensively observed as a business tactic, few researchers have focussed on the endorsement of business performance enhancement. One of the indefinite questions is that how a producer can recognize techniques and tools, and the appropriate abilities to make the business progress effective. There are numerous significant issues that is necessarily addressed to recognize how constructive models can be accomplished with clarity of persistence, goals and focus [8, 9].

Data is an inventive method to advance and set up the gained data from the differentiated business asset [16-21]. Through this data, a successful relationship is started and it will help the specialists to join the various assets of information. The business execution can be improved adequately and the seriousness likewise improved [10, 11]. Data the board rehearses implies the way toward securing, putting away, tolerating, sharing, instigating information, and these moves are made in the organizational learning cycle as to the way of life and methodologies of the associations [12, 13].

The Structural Equation Modelling (SEM) encompasses varied forms of computational algorithms, statistical techniques, and mathematical models, which is utilised to fit the constructs of information [14, 15]. SEM test the hypothesis by utilizing data generated from respondents who are all participated in the intelligence test. The study generated from diverse respondents of Saudi Arabia has constructed with the SEM model which in turn enhances the business performance by developing the relationship among the critical factors. The business and the performance of the employers is improved by the estimation and assessment of the SEM model.The surviving from the article is coordinated as follows: related works and the issues in the framework are depicted in Section 2, the outcomes are talked about in Section 3 and the paper is finished up in Section 4.

Related Works

In the contractor satisfaction issue, participant's performance and critical successive factors are examined. The satisfaction is investigated in the terms of economic and production where the SEM model is adopted by this study [22].The knowledge acquired from the business and transaction is utilised for the behaviour analysis [23]. The relationship among the quality management and the business is evaluated with the assistance of SEM model [24] whereas the performance of the organization is investigated [25].The SEM model is utilised in the construction of relationship among the performance and enhancement of quality. The constructive framework has made the improvement of quality in business [26] and the management of quality rely on the performance of the business [27].The SEM based relationship establishment among the quality management and performance has numerous applications [28]. The significance of SEM and their reviewed whereas the performance enhancing factors are investigated [29, 30].The SEM model adopted by the business performance improvement study has utilised numerous constructs for measurement and also has diverse strategies. The small portion of data in the SEM model has no efficiency where high proportions are not able retain the reliable parameters. This inadequacy is rectified by the chi-square test and the fit indices has significant role in the estimation of developed model. The factors like two-stage SEM and statistical analysis has huge impact in the business progression as well as generating the relationship among the factors [31-33].

Result and Discussion

A conceptual framework is framed with the observations from the literature review. SEM model used in this study is composed of two significant aspects namely SCEMQ and BP. The influential elements in SCEMQ and BP is examined. The article adopted in this instrument is framed from the studies [27-32] that includes 35 objects for successive critical elements for management of quality (SCEMQ) and 10 objects for business progression (BP). A questionnaire that is self-administered technique is utilised for the data collection. It acquire responses from the respondents of 5 point likert scale from strongly disagree to strongly agree. In light of the inquiries and targets from the examination, the accompanying theory is outlined and expressed her,

H1: The positive and important relationship among the critical element of SCEMQ deployment and BP.

The study is conducted among 232 organization that encompasses small and medium business sectors and 810 significant responses are acquired from the respondents of Saudi Arabia. The survey is carried among the respondents with the knowledge of SCEMQ and BP. The two-phase structural equation modelling (SEM) is incorporated to investigate therelationship among SCEMQ and BP. The entire sequence is validated and tested with the assistance of confirmatory and path analysis whereas the relationship is generated. The conceptual architecture of this study is illustrated in Figure 1.

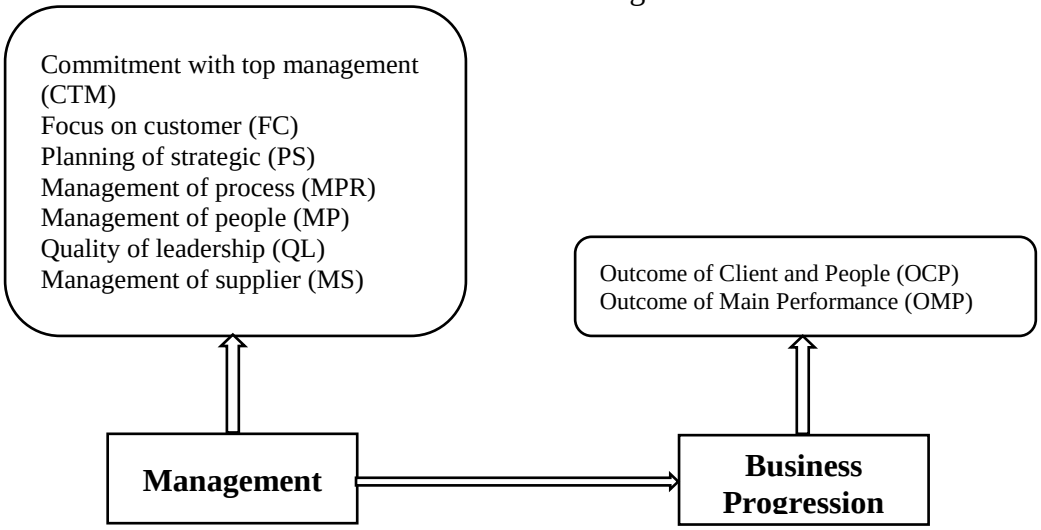

Figure 1. Conceptual Architecture

Confirmatory Analysis

In the initial phase of SEM, reliability measure, analysis of confirmatory and exploratory element analysis. The underlying facts in the SCEMQ and BP is analysed by the measure of exploratory element examination (EEE). To frame the SCEMQ, seven significant elements are retrieved with the assistance of eigenvalue, principal component analysis (PCA), and varimax with the scale value greater than 1. The items encompassed in every element are listed and their sub-category of element is elucidated in Table 1.

Element 1: Commitment with top management (CTM)
Element 2: Focus on customer (FC)
Element 3: Planning of strategic (PS)
Element 4: Management of process (MPR)
Element 5: Management of people (MP)
Element 6: Quality of leadership (QL)
Element 7:Management of supplier (MS)

Table 1. EEE for SCEMQ

Symbols	Objects	Elements						
		1	2	3	4	5	6	7
CTM1	Top executives accepts the responsibility for the performance quality and its magnitude	0.813						
CTM2	The process of long term quality enhancement that aids management	0.813						
CTM3	Significance is devoted to the quality by the relation management by considering the objectives of revenue or cost	0.828						
CTM4	The management has communicated and developed a visualized quality as a portion of strategies in the organization	0.868						
CTM5	The management has includes the enrichment of quality as a way to improve the profit	0.821						
FS1	The necessities of customers are reviewed prior to the assurance and the delivering the product		0.734					
FS2	The satisfaction of the customer is observed by customer claims, reports acquired from dealers and warranty where certain measures are carried to identify the satisfaction of customers via survey		0.833					
FS3	The customer requirement and the needs are gathered via consistent meeting whereas the customer voice is considered in developing the further product		0.797					
FS4	To provide assistance and offer required information to the customer, free tele-phone and support cell aided customer care is provided where the complaints and enquires are place		0.846					
FS5	The management is dedicated to have elated customers and not customers with satisfaction		0.887					
PS1	In the strategic planning, assurance of quality is a main component			0.806				
PS2	The planning of strategic encompasses manufacturing, management of information and process necessary for the realization of product			0.713				
PS3	The subsequent plan for strategy is elected based of the comparative analysis of information			0.761				

	managed							
PS4	A self-assessment is attained by the information accumulated from the customer for certain episodic interval with relevant to the satisfaction of customer and quality of the product			0.721				
PS5	The plan with strategy addresses the rearrangement of process of work and emphasis on the constant innovation and enhancement			0.795				
MPR1	The product quality and material processing is enriched by the technique PDCA (Plan, Do, Check and Act)				0.779			
MPR2	The input information is processed and all the necessities are defined where the output product is accepted before the product release				0.738			
MPR3	The product testing techniques are developed to discover the artefact by appropriate means through the realisation of product				0.751			
MPR4	The process control is initiated by statistical analysis and the process is enriched by the quality control elements				0.820			
MPR5	The proficiency of the process is determined and utilized for further enrichment of performance				0.646			
MP1	The work force strategies are well associated with the strategies of organization					0.825		
MP2	The work force is committed and able to meet the intended quality					0.770		
MP3	The education is imparted and necessary training is offered to all the employers and preserve the process of training records					0.731		
MP4	The well designed infrastructure is necessary to accomplish the conformism to the product					0.825		
MP5	The organization has certain forces for accomplishing task, quality circle, and teams of cross-function to resolve issues related with quality					0.819		
QL1	The team heads are devoted to meet the standard and offer a supportive atmosphere for attaining aimed quality						0.701	
QL2	Senior heads participate actively and the workforce is inspired in the innovation and the enrichment of quality						0.691	
QL3	The heads in the organization will support and listens to the workers and also inspire them to manage as well as decide the plans and policies drafted for quality						0.592	
QL4	The heads will reward and acknowledge the contribution of employees towards the enrichment of the quality						0.786	
QL5	The progress and the applications are assessed directly by the heads to check the quality standards						0.785	

MS1	The business firm estimate and elect suppliers based on their capability to supply that relate to the necessities							0.697
MS2	The business firm utilises the vendor authorization process to standardize the key suppliers							0.677
MS3	The business firm have minimum count of suppliers and preserve long-term connection with the supplier							0.874
MS4	The business firm comprises suppliers and customers in planning the quality							0.854
MS5	The supplier's assistance to enhance the services or products and deliver essential help							0.848

From the Table 1, it understands that the total variance is about 76.89% and the sample capability measure of Kaiser-Meyer-Olkin is 0.887 whereas this sample acquired best outcomes. The objects are loaded where their value is greater than 0.50 and every element issiti higher than 0.801 (lies among 0.801and 0.947). From the Table 2 it is identified that the samples are good and measures are reliable.

For the construct of BP, two significant elements are retrieved with the assistance of eigenvalue, principal component analysis (PCA), and varimax with the scale value greater than 1. The elements involved in the investigation of reliability is outcome of client and people (OCP) and outcome of main performance (OMP). The subject under every element is elucidated in Table 2 and the outcome of reliability for the investigation of every element is elucidated in Table 3.

Table 2. EEE for the performance of the business

Symbol	Object	Element	
		1	2
OCP1	Enhanced capability of workforce to respond to fluctuating the necessities customer	0.784	
OCP2	Enhanced fulfilment of the workers and decreases non-attendance	0.745	
OCP3	Enhanced capability of workforce to update and counsel customers about services and products	0.783	
OCP4	Enhanced communication system established with customers that gives an enhanced customer fulfilment	0.801	
OCP5	Enhanced customers' awareness of the organisation results in customers' loyal customers and consolidation	0.717	
OMP 1	Increased share of market and sales gives improvement in profit		0.726
OMP 2	Enhanced process competence improves the information processing system and also it is handled effectively		0.686
OMP 3	Upgraded greatness of properties got from the sellers bring about improved associations with vendors		0.829
OMP 4	Improved greatness picture of the association brings about building a brand		0.841
OMP 5	Improved cultural view of the association brings about making of work, strategies with equivalent rights, less mishaps, and less harm to environment		0.797

Table 3.Analysis of Reliability

Element	Cronbach's alpha

Commitment with top management (CTM)	0.944
Focus on customer (FC)	0.891
Planning of strategic (PS)	0.933
Management of process (MPR)	0.898
Management of people (MP)	0.901
Quality of leadership (QL)	0.881
Management of supplier (MS)	0.913
Outcome of Client and People (OCP)	0.862
Outcome of Main Performance (OMP)	0.861

From the Table 2 and 3, it understands that the total variance is about 66.94% and the sample capability measure of Kaiser-Meyer-Olkin is 0.841 whereas this sample acquired best outcomes. The objects are loaded where their value is greater than 0.50 and the outcome of Cronbach's alpha for every element is 0.801 that is highly reliable.

The investigation of confirmatory elements are attained by considering the SCEMQ and BP. The measure of validity is examined in the initial model and outcome supports the SCEMQ and BP. The standardised regression weight of every item in the confirmatory element model is elucidated in Table 4.

Table 4. Regression weight and t-value

Symbols	Objects	Regression weights	t-values
Commitment with top management (CTM)			
CTM1	Top executives accepts the responsibility for the performance quality and its magnitude	0.867	34.081
CTM2	The process of long term quality enhancement that aids management	0.890	35.861
CTM3	Significance is devoted to the quality by the relation management by considering the objectives of revenue or cost	0.871	33.439
CTM4	The management has communicated and developed a visualized quality as a portion of strategies in the organization	0.921	37.572
CTM5	The management has includes the enrichment of quality as a way to improve the profit	0.866	-
Focus on customer (FC)			
FS1	The necessities of customers are reviewed prior to the assurance and the delivering the product	0.774	27.512
FS2	The satisfaction of the customer is observed by customer claims, reports acquired from dealers and warranty where certain measures are carried to identify the satisfaction of customers via survey	0.763	26.891
FS3	The customer requirement and the needs are gathered via consistent meeting whereas the customer voice is considered in developing the further product	0.727	24.969
FS4	To provide assistance and offer required information to the customer, free tele-phone and support cell aided customer care is provided where the complaints and enquires are place	0.837	31.439
FS5	The management is dedicated to have elated customers and not customers with satisfaction	0.891	-
Planning of strategic (PS)			
PS1	In the strategic planning, assurance of quality is a main component	0.956	42.444
PS2	The planning of strategic encompasses manufacturing, management of information and process necessary for the realization of product	0.854	33.706
PS3	The subsequent plan for strategy is elected based of the comparative analysis of information managed	0.851	33.520
PS4	A self-assessment is attained by the information accumulated from the	0.749	26.598

	customer for certain episodic interval with relevant to the satisfaction of customer and quality of the product		
PS5	The plan with strategy addresses the rearrangement of process of work and emphasis on the constant innovation and enhancement	0.871	-
Management Process (MPR)			
MPR1	The product quality and material processing is enriched by the technique PDCA (Plan, Do, Check and Act)	0.896	23.678
MPR2	The input information is processed and all the necessities are defined where the output product is accepted before the product release	0.863	22.937
MPR3	The product testing techniques are developed to discover the artefact by appropriate means through the realisation of product	0.775	20.762
MPR4	The process control is initiated by statistical analysis and the process is enriched by the quality control elements	0.775	20.760
MPR5	The proficiency of the process is determined and utilized for further enrichment of performance	0.695	-
Management People (MP)			
MP1	The work force strategies are well associated with the strategies of organization	0.782	27.082
MP2	The work force is committed and able to meet the intended quality	0.823	29.427
MP3	The education is imparted and necessary training is offered to all the employers and preserve the process of training records	0.729	24.387
MP4	The well designed infrastructure is necessary to accomplish the conformism to the product	0.862	31.644
MP5	The organization has certain forces for accomplishing task, quality circle, and teams of cross-function to resolve issues related with quality	0.863	-
Quality of leadership (QL)			
QL1	The team heads are devoted to meet the standard and offer a supportive atmosphere for attaining aimed quality	0.785	24.062
QL2	Senior heads participate actively and the workforce is inspired in the innovation and the enrichment of quality	0.756	23.019
QL3	The heads in the organization will support and listens to the workers and also inspire them to manage as well as decide the plans and policies drafted for quality	0.742	22.397
QL4	The heads will reward and acknowledge the contribution of employees towards the enrichment of the quality	0.796	24.481
QL5	The progress and the applications are assessed directly by the heads to check the quality standards	0.788	-
Management of supplier (MS)			
MS1	The business firm estimate and elect suppliers based on their capability to supply that relate to the necessities	0.762	24.821
MS2	The business firm utilises the vendor authorization process to standardize the key suppliers	0.754	24.472
MS3	The business firm have minimum count of suppliers and preserve long-term connection with the supplier	0.895	31.261
MS4	The business firm comprises suppliers and customers in planning the quality	0.931	33.249
MS5	The supplier's assistance to enhance the services or products and deliver essential help	0.811	-
Outcome of Client and People (OCP)			
OCP1	Enhanced capability of workforce to respond to fluctuating the necessities customer	0.656	21.464

OCP2	Enhanced fulfilment of the workers and decreases non-attendance	0.531	16.315
OCP3	Enhanced capability of workforce to update and counsel customers about services and products	0.705	23.880
OCP4	Enhanced communication system established with customers that gives an enhanced customer fulfilment	0.876	34.410
OCP5	Enhanced customers' awareness of the organisation results in customers' loyal customers and consolidation	0.883	-
Outcome of Main Performance (OMP)			
OMP1	Increased share of market and sales gives improvement in profit	0.678	19.256
OMP2	Enhanced process competence improves the information processing system and also it is handled effectively	0.647	18.340
OMP3	Upgraded greatness of properties got from the sellers bring about improved associations with vendors	0.812	23.364
OMP4	Improved greatness picture of the association brings about building a brand	0.894	25.721
OMP5	Enhanced societal perception of the organisation results in creation of employment, policies with equal rights, fewer accidents, and fewer damage to atmosphere	0.748	-

The weights or coefficients are significant at the level of 5% which is identified from the Table 4.

Path Analysis

In the subsequent stage, theory test, examination of way and undimensionality test where the develop way is researched by the PCA, Dillon-Goldstein's rho and Cronbach's alpha. The PCA with varimax turn for each build is refined autonomously. For the build of SCEMQ has 7 indicators, the underlying eigen value is higher than one (3.353) and the resulting one is short of what one (0.971). This qualities guarantees the undimensionality of the develop. Indistinguishably, for the develop of BP has 2indicators, the underlying eigen value is higher than one (1.556) and the resulting one is short of what one (0.448). This quality guarantees the undimensionality of the build. The Cronbach's alpha for each develop is higher than 0.071 and Dillon-Goldstein's rho for each build is higher than 0.81. This worth powerfully upholds the undimensionality of the build. The results of the undimensionality are clarified in Table 5.

Table 5. Outcome of the un dimensionality

Block	Count of indicator	Cronbach's alpha	Dillon-Goldstein's rho	First eigen value	Second Eigen value
Successive Critical Elements for Management of Quality (SCEMQ)	7	0.815	0.864	3.353	1.556
Business Progression (BP)	2	0.716	0.876	0.971	0.448

The most extreme probability assessment (MLE) is used in examining the boundaries in the primary model by using the AMOS esteem twenty. This schematic model offers a solid match to the given information. The indices utilised in this model is elaborated and the acquired values are higher than 0.8 (Chi-square test=1.972, p-value>0.05, degree of freedom=26, root mean square error approximation=0.052, Tucker-Lewis index=0.908, comparative fit index=0.935, goodness fit index=0.927 and adjusted GFI=0.863). The regression of standardized weight is 0.94 that is significant of five percent (p-value<0.05). Hence the hypothesis H1 is

strongly accepted. The schematic relationship among the success elements of SCEMQ and BP is given in Figure 2.

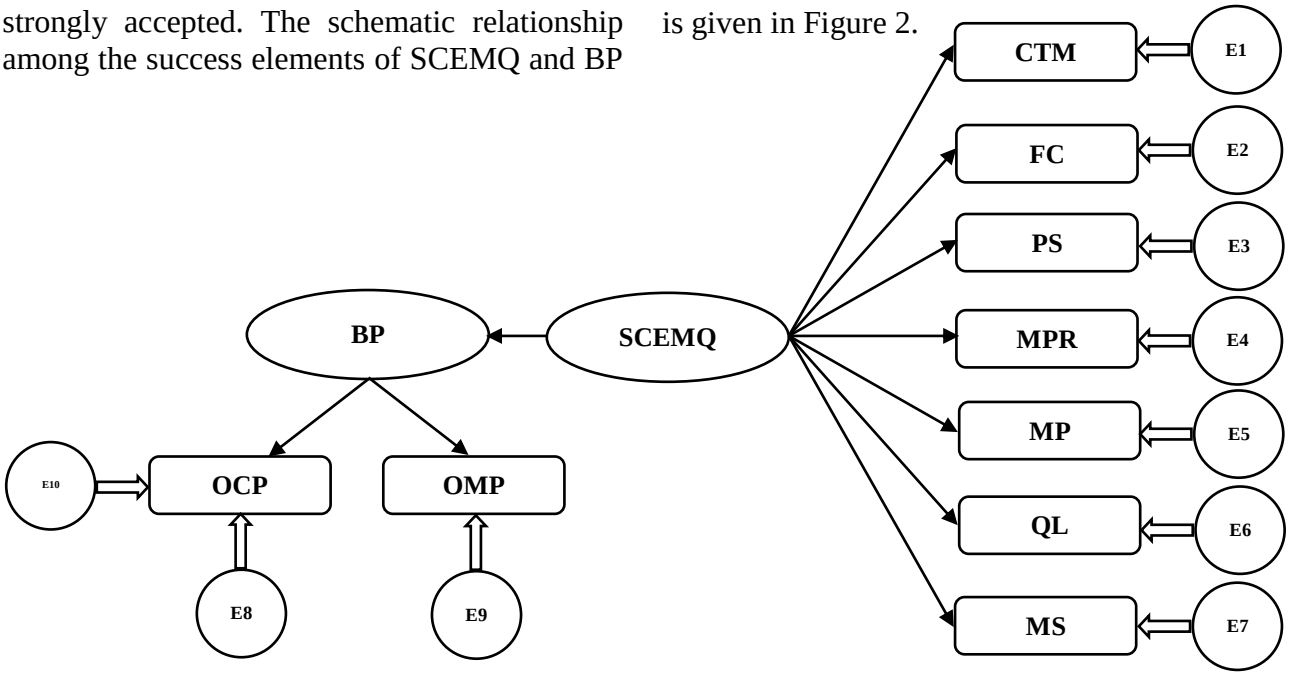

Figure 2. Schematic relationship among success element of SCEMQ and BP

Conclusion

The improvement of business performance has witnessed competition among other companies in terms of variety of product, quality, cost and satisfaction of customer. The successful deployment of SCEMQ will enriches the progression of business and customer service will be exceled. The article is established with a theoretical aspects with successive elements in the deployment of SCEMQ, which in turn enriches the BP. The instrument is adopted to gather primary data from the business organization. In this article, two-step SEM model is incorporated in the investigation of SCEMQ and BP. The article identified 7 critical successive elements, which has a significant role in defining the performance of the business. Initially, confirmatory investigation and path analysis is attained to measure, validate and test the quality and information with business growth. From this study, it is identified that the quality and information has huge contribution towards the success of business.

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THE ROLE OF ARTIFICIAL INTELLIGENCE BASED APPROACHES FOR THE MANAGEMENT OF INFORMATION AND EFFICIENT DECISION MAKING

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ABSTRACT

Information management system is an emerging field that gains considerable attention by both government and industry. The generation of vast amount of data has necessitated an efficient approach that is attained by Artificial Intelligence (AI). The information management is step towards the construction of management and organization of knowledge. The information management system plays significant role in information era where AI transforms the information into organization information. The building block advancing and the succeeding of this information management is attained by the artificial intelligence. The data generation and accumulation is accomplished by the varied sources. The information gathered from varied sources are managed by AI and further the information provide adequate decision making system. The management of huge information faces the issues in maintenance, organization and decision making. The issues in the management of information are rectified by AI based technique. In this paper, role of AI in information management is illustrated with E-Delphi method analysis. The AI based technique usage in diverse domain is investigated by the E-Delphi method.

Keyword: Knowledge management system, artificial intelligence, e-Delphi method, decision making, and knowledge building.

Introduction

The information management shows significance in the information era and in the 21st century, knowledge centric business is concentrating towards the information processing. The management system permits the sharing of information where the organization has huge information generation [1]. This stimulates the organization to perform as a team, collaborate and the information shared has significance in the progress of the company.

However, the management process of information is a complicated process, which is due to the vast amount and diverse varieties of data. Primarily, the challenges faced in traditional information management are difficulty in accumulation, making them to available and efficient utilization [2]. The information is powerful tool to handle diverse resources in the organization effectively. The information and management need effective approach with high concern.

The information management provide huge opportunities for the organization to produce needed materials, automate and the information shared among the organization satisfy the needs [3]. The effective fuse of unmistakable data the executive's framework is accomplished when the assets and the information are overseen capably.

The statistics framework assumes a conspicuous part in the movement of information the board [4]. It is gained that the information the board are the starter cycle for improving the capacities of distinct innovation and productive appropriation just as the consolidation of innovation depend on the successful usage of interaction [5, 6]. The development of data the board framework pulled in the specialists to start assorted strategies and contributes the powerful joining of data the executives [7-10].

Data sharing is particular as the cycles of scatter information among all people convincing a section in the activities of a particular interaction [11, 12]. In the new past, there is huge attention in Information the executives as a developing practice [13]. The data the executives as an interdisciplinary field those accentuations on data as a source, with superior prominence on the achievement and oversight of fringe data the board.

Data the executives degrees the management of other critical reports and inward records. Data the executives fundamentally manages running archived and express information (that is, data), which can be unquestionably shared/moved inside or

outside the functioning association [14, 15]. The conventional data the board framework faces inconveniences because of the tremendous measure of information age and construction of data. The compelling preparing and disposing of inadequacies of the conventional framework is accomplished by the inception of Artificial Intelligence into the data the executive's framework.

The surviving from the paper is requested as follows: the accessible data the board approaches are examined in segment 2, the Artificial knowledge upheld data the executives and dynamic is clarified in Section 3, the E-Delphi technique based information assortment and mathematical results are talked about in Section 4 and 5 separately, and the data the board framework with AI is closed with future idea.

Related Works

In this part, data the board methods that are created for viable treatment of procured data from assorted asset is talked about. This segment includes the data identified with data the executives and the assessments of investigate. In Table 1, the exhaustive investigation of data the executive's framework is given.

Table 1. Information Management System: A Critique

Inference and Information Process	**Database**	**Variant of Information Management**	**Participants**	**Country**	**Source**
The significance of information sharing, and application on the competent as well as innovative world is elaborated	Google Scholar	Enterprise crowd sourcing systems (ECS)	IT employees	USA	Vel et al, 2018 [16]
The effect of securing of data and its value is seen.	Science Direct	Educators Network Community	Essential and Middle teachers	China	Qin et al 2017 [17]
The effect of synergistic information, data framework information on the appropriation of Information System	Taylor and Francis	Knowledge management system	Information System department chief officer	-	Tsai and Hung 2016 [18]
The consequence of the "attitude to co-operative sharing of knowledge" on the purpose to utilise commercial wikis.	ScienceDirect	Wiki	Information System Employees	Spain	Iglesias 2015 [19]
The significance of acquisition, application and dissemination of information on the supply chain of e-business adoption.	Emerald	E-Business System	Top management people of any firms	Malaysia	Yee long chong 2014 [20]
The significance of acquisition, application, storage, protection and dissemination of information on e-business adoption.	Emerald	-	Information System Managers	Taiwan	Lin 2013 [21]

The effect of big business asset arranging (ERP) on the accomplishment of ERP	Science Direct	-	End users of ERP and Information System Executives	China	Shao et al 2012 [22]
The significance of acquisition, application, and sharing of information on e-business	Emerald	E-Business System	Information System Executives	Taiwan	Lin and Lee 2005 [23]
The meaning of securing, application, level and sharing of data on the effective joining of e-business	Emerald	-	-	-	Lee 2001 [24]

Artificial intelligence supported information management and decision making

Data the board is an innovative way to deal with advance and set up the absorbed data from changed sources. Through fantastic data the board, it helps the people groups to relate a scope of certainly accessible sources and with the help of data instruments, it sorts data the executives as easy to start a superior data or information the executive's framework. While the portrayal of data the board is extraordinary at home, working environment and abroad. Nonetheless, in the situation of the real world, it is used to assist individuals with improving the advancement of work effectively and acclimatize their broadened wellsprings of data and enhance their intensity [25-27].

Latest things or issues are thorough across assorted occupations on the planet includes the calling of data. Nonetheless, the issues are in the degree of data the board framework. One of the arising issues in the new occasions fluctuating from the general public of information and information, information and information the board to specialised skills, abilities, and approaches in the globalization of data administrations. These issues are currently lashing the need for adjustment in the data management system. Considering this, the callings of data is experiencing marvellous alterations [28, 29]. The appearance of innovation has enhanced the data business.

Man-made consciousness is unyielding as machine insight and it pays counterfeit techniques to procure the improved knowledge on a PC framework. Computer based intelligence marks the machines toper form like people and propels the machines to savvy thinking [28]. Computer based intelligence is the wide keep that is a movement and combination of neurophysiology, linguistics, computer science, brain research, control hypothesis and data. It is a far reaching specialized and between disciplines, which is related to brain research, data, natural, intellectual, and framework science [29]. Simulated intelligence has advanced extreme events on the master framework, design acknowledgment, game, regular language preparing, data handling, and data set with savvy robot, programmed programming, and hypothesis demonstrating [30, 31].

Artificial intelligence (AI) exists in the universe for around sixty years and has drilled AI in various fields. The escalation of force in the super registering and advances of Big Data appear to have approved AI in the preparing and learning measure. The inventive gathering of AI is immediately escalating and turns into an alluring theme for research. This paper means to perceive the challenges related with the effect and use of reinforced AI based frameworks for dynamic and recommend a bunch of exploration proposition for data frameworks (IS) scientists [31].

Table 2. Analysis of Traditional and AI supported Information Management System

Characters	**Traditional Technique**	**AI Technique**
The capability of sensors	High	Low

The capability of imagination and creativity	High	Low
The capability of learning via past experience	High	Low
The capability to adoption	High	Low
The capability to afford the intelligence accumulation cost	High	Low
The capability to utilise the source of information	High	High
The capability to accumulate the vast amount of information from external	High	High
The capability to attain the complicated computation	Low	High
The capability of transmission of information	Low	High
The capability to attain a series of rapid estimation accurately	Low	High

Materials and Methods

The e-E-Delphi method is elected in this paper to establish and validate the questionnaire that estimates the perception of information management with AI. The E-Delphi method is originally formulated by the Rand Corporation on 1950's [32]. The main intent of E-Delphi approach is to attain consent on group of person's opinion [33]. Primarily, panel of members elected for the participation to exhibit an involvement or interest in the area correlated with the research [34, 35], they are asked to contribute in numerous rounds of discussion or feedback to offer an independent perception or knowledge [36, 37].

The chief advantage of E-Delphi approach is group of people opinion is replaced by the individual people [30]. This technique is widely utilized in many fields and in these article emphases on the fields namely business, medical and in education. Generally, E-Delphi technique uses the paper-based questionnaire, which collects data from the participants and the difficulties in the data collection necessitated the online data collection scheme E-Delphi. The internet and electronic based questionnaire permits fast response, minimized cost of resource and anonymity [30–34]. This investigation article used E-Delphi method to approve and build up a survey that investigates the view of AI in data the board [34-42].

Design

The questionnaire exposes the general information's about the demographic data that encompasses the gender, age, designation, experience, and department. The participants accomplished the surveys regarding the context of information management and artificial intelligence whereas the contents and the practices incorporated AI aided Information management as well as traditional management system. This article follows the traditional schema of Delphi method and the hindrance in the system is rectified by the online system that E- Delphi scheme. The information's are collected by the online survey platform. In this research, 370 participants from the medical, business and IT organization is included. At the start this article it has unequivocal that bunch arrangement is more noteworthy that of 75% on each question would be a satisfactory degree of agreement for the examination.

Table 3. Respondents Characteristics

Category of Variable	**Count of the Respondents**	**Percentage of the Respondents**

IT	120	100
Male	47	49
Female	73	61
Business Organization	140	100
Male	83	59
Female	57	41
Medical Experts	110	100
Male	56	52
Female	54	49

Result and Discussion

In this part, the outcomes got from the E-Delphi investigation are taken for the assessment. Members gave fundamentally incredible scores to the AI upheld data the board is portrayed in the Table 4. The rating extent designated to the customary and AI upheld data framework is outlined in Figure 1.

Table 4. Comparison of ratings from 370 participants relevant to confidence in information management supported by AI

Capability	**Traditional Information Management**	**AI Supported Information Management**	**Difference in Mean**	**P value**	**t(df)**	**Cohen d**
Acquiring relevant information from the database	3.39 (1.03)	3.82 (0.84)	0.434 (0.258 to 0.609)	<.001	4.89 (177)	0.408
Attaining accurate retrieval	3.28 (0.95)	3.90 (0.77)	0.634 (0.454 to 0.811)	<.001	6.97 (168)	0.619
Suggesting appropriate decision	3.31 (0.99)	4.09 (0.64)	0.79 (0.621 to 0.93)	<.001	9.66 (172)	0.969
Planning based on the suggestion provided by decision	3.97 (0.94)	3.71 (0.83)	–0.256 (–0.416 to –0.095)	.002	–3.13 (195)	0.242
Allocation of adequate quantity of time	3.26 (1.31)	3.55 (0.98)	0.296 (0.043 to 0.547)	.02	2.32 (172)	0.211
Taking away the anxiety and worries with the AI supported system	2.16 (1.09)	4.16 (0.85)	1.974 (1.79 to 2.179)	<.001	20.17 (192)	1.652
Providing the relevant data based on necessity	3.38 (1.21)	4.07 (0.81)	0.696 (0.488 to 0.912)	<.001	6.51 (192)	0.591

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Left Blank
Efficient information retrieval with AI	5.7	25.8	19	14.3	31.7	3.5
Efficient information retrieval with traditional technique	23	21	15	21	17	3
Relevant information retrieval with AI	9	11	10	36	32	2
Relevant information retrieval with traditional technique	21.4	19.6	10.8	26.9	20.5	0.8
Effective information management with AI	8.8	9.2	9.3	31	39.6	2.1
Effective information management with traditional Technique	12	31	11	8.7	31.2	6.1
Effective decision making with AI	7.2	6.1	9	31.4	37	9.3
Effective decision making with traditional Technique	31.2	21.1	11	26.7	5.9	4.1
Effective Information Accesing with AI	9.3	11.4	15.8	33.3	27.1	3.1
Effective Information Accesing with traditional Technique	23.1	21.1	9.8	31	10.4	4.6

Figure 1. Outcome of the questionnaire concerning the information abilities of traditional technique versus artificial intelligence (AI).

From the Figure1, the information acquired that the questionnaire is circulated among the respondents and their opinion on the information management with AI is illustrated. Every participant has diverse opinion and some of them has left bank. The opinions of every participants are illustrated.

The participants included in this technique responded to various rounds and they shared their experience via questions in the questionnaire. The difficulties and the advantages of AI aided information management system is acquired through the instrument. The correlation of expertise is estimated for both the traditional and AI technique where the correlation is proficiently estimated with the ratings, which is given in Table 5.

Table 5. Correlation among the prior expertise of AI and assigned ratings for the abilities of Information Management by Traditional Technique and AI

Capability	**Correlation among the prior expertise of AI and assigned ratings for Traditional Technique**		**Correlation among the prior expertise of AI and assigned ratings for AI**	
	r	**P value**	**R**	**P value**
Acquiring relevant information from the database	–0.016	.84	.192	.011
Attaining accurate retrieval	0.113	.121	0.171	.031
Suggesting appropriate decision	0.104	.161	0.214	.0067
Planning based on the suggestion provided by decision	0.063	.391	0.294	<.001
Allocation of adequate quantity of time	0.011	.871	0.268	<.001

Taking away the anxiety and worries with the AI supported system	–0.0011	.98	0.311	<.001
Providing the relevant data based on necessity	0.0162	.831	0.2062	.0071

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Left Blank
It is convenient with AI based Information Management	5.2	25	11	24.2	29.6	5
It is convenient with AI based Decision Making	11	12.2	14	41	18.3	3.5
It is convenient with AI based Information Accessing	8	12	9	37.4	31.6	2
It is convenient with AI based Information retrieval and storage	6.9	18.2	9.7	43.1	21.3	0.8

Figure 2. Consequences of the survey with respect to control of artificial intelligence (AI)

From the Figure 2, it is identified that the AI aided information system is effective in diverse aspects and most of the respondents agree with the AI based information management system.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Left Blank
Disagreement with AI technique	6	17	14	41.4	20.1	1.5
Disagreement with Traditional technique	21	13	11	31.2	20.8	3

Figure 3. Results of the questionnaire regarding disagreement between AI and physicians

From the Figure 3, it is identified that the AI aided information system is slightly agreed by the respondents that is due to the lack of knowledge of AI.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Left Blank
AI for information management with confidential information	4.1	32.1	14	14.3	32.3	3.2
AI for information management with sensitive confidential information	21	18.6	12	19.8	25.7	2.9
AI for decision making with sensitive confidential information	19	17.8	11	32	18.4	1.8

Figure 4. Consequences of the survey with respect to the utilization of AI for diagnosing ailments of low, medium, and high seriousness

From the Figure 4, it is identified that the AI aided information system gained attention and trust from the major part of respondents due to their efficiency, accuracy, privacy and security policies.

Conclusion

Relies upon the nature of created data, the absorbed data is handled and angles required are incorporated from the prepared information. The data handled with the guide of AI offers conspicuous data and powerful choice emotionally supportive network. The competent choices are refined by computerized reasoning (AI) and the fundamental discernments are taken. This, paper tended to the part of AI in data the executives and furthermore gave a thorough investigate of data the board framework. The E-Delphi procedure is used to assess the instrument. From the examination of the reaction from the respondent, the result shows a large portion of the respondents are concur with the AI upheld data framework. Additionally, AI based framework is exceptionally successful regarding recovery, stockpiling and handling. In future, the work can be stretched out to investigate with some other field of respondent and other factual examination method.

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KNOWLEDGE, PERCEPTION AND ATTITUDE TOWARDS INFECTION CONTROL AMONG DENTAL PROFESSIONALS DURING THE PERIOD OF PANDEMIC IN A SOUTHERN STATE OF INDIA - A CROSS SECTIONAL ANALYSIS.

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ABSTRACT

The scenario of the COVID-19 pandemic has put dental professionals under high risk of nosocomial infection. To prevent this risk, they have to update themselves based on the government guidelines for infection control during the pandemic and follow them strictly in their day to day dental practice.The present study was carried out to evaluate the knowledge, perception and attitude among dental professionals about infection controlduring the covid-19 pandemic. A self-administered, anonymous, questionnaire comprising of 33 close-ended questions were used to gather relevant information. A total of 389 dentists submitted the response, out of which 321 complete responses were included in the statistical analysis. Pearson's Chi-square test was used with p value>0.05. 91% of the participants had accepted that currently they were giving due weightage to medicaland travel historyand 100% of the participants agreed that they reported the concerned authority about covid positive and covid suspected patients. There was a significant difference (p=0.004) of opinionbetween the genders about the usage of alcohol for disinfection purpose.All the participants agreed that they were changing gloves for every patient and 74.1%of them laminate headrest, light holder and tray holder before starting any procedure for the patients. The present study results show that Indian dental professionals' havegoodknowledge and attitude towards controlling the spread of covid-19 as a nosocomial infection.For the safety of the dentists and patients, dental surgeons should follow strict infection control in their practice.

Keywords: *Awareness, COVID-19, Dentistry, Infection control, Psychology, Nosocomial infection*

Introduction

Infection is a process of invasion and multiplication of microorganisms that are not normally present within the body. Movement of infectious microbes from one person to another person is called as cross infection.[1,2] The infection is termed as nosocomial infection if it occurs in a health care and termed as community infection if it occurs in other places other than health care facilities.Some of these diseases remain locally contained(endemic) but others spread over large areas worldwide resulting in pandemics.[3,4]

One such pandemic is the recent COVID-19 virus. Previously outbreak of corona virus occurred as Severe Acute Respiratory Syndrome Corona virus (SARS-CoV) and Middle East Respiratory Syndrome Corona virus (MERS-CoV) in 2003 and 2015.But their incidence of occurrence was limited. Current outbreak of SARS-CoV2 (COVID-19) was first reported by the Chinese authorities in Wuhan city in November 2019.[5-7] The infection began to spread rapidly throughout the world and has become pandemic.According to CDC, at present CoVID-19 spreads from person to person through respiratory droplets produced by the infected person. The origin of droplets may be nasopharyngeal or oropharyngeal secretions. Recently researchers' have found thepresence of CoVID-19 virus in saliva of infected patients and thus saliva can play an important role in the spread of infection from person to person.[8,9] The dental surgeons work in close proximity with the patients and are constantly exposed to their body fluids. Hence the dental care settings

are invariably having high risk of COVID-19 exposure.

Infection control can be explained as each and every practicable precaution or step which can be taken to restrain the spread of infection. One of the main aim of infection control in dental care unit is preventing the spread of disease-causing agents either from one patient to another patient orfrompatients to a dental practitioner or vice versa.[10-12] Therefore, for the safety of all patientsthe dental practitioner must follow high standards of dental infection control and occupational safety.It has become an important protocol for dental care professionals in their infection control preventive strategies to avoid the COVID-19 spread by focusing on patient placement, hand hygiene, personal protective equipment (PPE), and caution in using aerosol-generating equipments.[13]

Aim & objectives of this study

To evaluate

---awareness about the infection control

---perception towards the controlling spread of infection

---practice and psychological changes towards infection control among dentists

Materials & methods

After obtaining institutional ethical committee approval this cross-sectional study was carried out in August-September 2020, among the dental practitioners, consultants and faculties through Google forms by using WhatsApp social media and email across Tamilnadu, India. This study was conducted in full compliance with the Declaration of Helsinki. Before starting the questionnaire informed consent was obtained and participants were assured with the maintenance of anonymity. The cross sectional survey was a close-ended questionnaire having 33 questions and the questionnaire was designed to fulfill three objectives: the awareness, perception and attitude towards infection control among the dentists during the COVID-19 pandemic.The questionnaire-required consent to participate in this study. Confidentiality and anonymity was maintained so that the responses were not linked to the individual participants. Study was conducted only after getting consent from the participants. The questionnaire was developed after reviewing several relevant literatures.[2,8,11] Before the main survey, a small primary pilot study was conducted with a group of 15 participants. On the basis of that pilot study, the questionnaire was redesigned and validated with the help of relevant experts from the field of statistics and epidemiology.The questionnaire had three parts: the first part was related to demographic data (nature of practice and age group). The second part consisted of questions to assess the participants' knowledge and perceptions about infection control. The third part had questions related to evaluate their attitude towards infection control.

A descriptive analysis was done to analyze the demographic data, mean knowledge andattitude of the participants. Chi square test was usedto evaluate the significant relationship between the study variables and the p value was fixed at >0.05 for significance.

Results

Table: 1 Demographic Detail

Of the 321 participants, 105(32.5%) were males and 216(67.5%) females. The mean age of the participants was 38.6 years and the average years of experience was 16.2. Among the participants majority of them were practioners (50.5%) followed by faculties (16.5%).Nearly, 70% of the study participants in the present study had <10 years of experience as dental practitioners [Table 1].

Table: 2 Awareness and perception about infection control

91% of the participants hadaccepted that currently they were giving more attention to the medical history. 78.5% of them mentioned that they postponed the treatment procedure for those patients having suspicious symptoms and reported (100%) the concernedhealth authority about suspected patients.[Table:1] For the question, "Can we use a disinfectant as holding solution?", majority (81.9%) of the participants responded as no. There is a significant difference (p=0.004) present between the genders regarding usage of alcohol for disinfection purpose for all surface. All of them agreed that by following strict infection control, the chain of spread can be stopped and 83.1% had fear of being infected by covid-19 from patients. 92.8% of them were aware about guidelines issued by the government incontrolling thespread of the infection

Table:3Attitude towards infection control

100% of the participants agreed that they are changing gloves for every patients and 74.1% laminate headrest, light holder and tray holder before starting any procedure for the patients.85.1% agreed that they wereasking every patient to rinse his/her mouth with antibacterial mouthwash before treatment and 75.7% disinfect the operating surface between patients. Except 4% of participants, all of them accepted that they wash their hands before and after each and every patient examination.

Discussion

As thousands of people have lost their life and many are still losing their lives due to the pandemic spread of COVID-19 the world is in a state of emergency. Since dentists are considered to be at high risk for nosocomial infections,in March 2020 the CDC and ADA recommended that dentists can postpone elective procedures.[14,15] In dental clinics this viral disease can be transmitted to other persons through direct or indirect contact such as personal contact, saliva, blood or contaminated instruments. Based on the online search this study is first of its kind about the knowledge, perception and attitude of dental surgeons regarding COVID-19 and infection control procedures in a South Indian state.The response rate indicates that mostof dental offices were using enhanced infection control protocol and majority of them started usingadvanced PPE. It was also observed in this study that most of the participants had good knowledge about COVID-19 and werefollowing WHO, CDC& government recommendations of infection control during the pandemic.

In normal situation, identifying systemic illness through medical history is very important for the safety of the patients as the medications they use can have a broader range of action as well as serious interactions. During this pandemic situation screening of the patients and employees before entering the dental clinic has become a routine protocol to avoid unnecessary spread of infection.[16,17] It has been done through monitoring of the body temperature, identifying symptoms and taking basic medical history at the entry point through the triage service.In the current study, 100% of the respondents reported that they record basic medical history of all the patients attending their clinic.It's comparatively higher than previous studies conducted by Bommireddyet al., (57.7%), Al-Rabeah et al.,(93%) and Sofola et al., (92.5%).[9,11,18] According to the previous research reports, depending on the nature of surface, the temperature and the humidity of the environment coronavirus can persist on surfaces from a few hours to upto several days.[6,9,13] Most of the dentists(75.7%) confirmed that they routinelydisinfect the operating surface between patients and Al Rabeah and Moamed reported in their study that 37.9% of dentists sterilized their hand pieces by autoclaving.[19] To prevent the cross contamination in dental clinics, maintaining proper hand hygiene is one of the strict measure to be followed and it can be achieved through wearing gloves, cleaning and washing hands thoroughly for each patients.[2,5,20] All the respondents in our study reported routine change of their gloves, mask, face shield and disposable gown for every patient.According to one previous study conducted in Karnataka, more than 90% of dental practioners were using gloves routinely.[6] However; another study conducted in Hyderabad reported that only 57% of their respondents use gloves routinely.[11]96% of our participants reported that they wash their hands before and after every patient examination.This percentage is much more than the previous studies (59% & 92.9%).[14,15]

Since many microbial organisms spread through aerosol, the usage of mask is mandatory in preventing infection spread in dental clinics. There are several types of masks available in the market and they have been used by the dentists according to their convenience. But CDC recommends N-95 masks to prevent the spread of COVID-19.In comparison with other types of masks according to researchers N-95 gives better protection from corona virus. Most of the respondents of this present study mentioned that they were using facemasks and face shield. Comparatively this is more than the findings of previous studies which reported (50%, 59%, 60%& 85%) of wearing a face mask.[14-16]

Previous studies have proved that preprocedural rinsing with mouthwash containing anti-microbial agents limits the spread of infection through aerosols.[6,7] In our study 85.1% of the participants accepted that they were asking every patient to rinse his/her mouth with

antibacterial mouthwash before treatment and 11.2% of them accepted that not always but it depends on the treatment. The percentage of dentists following the protocol of preprocedural rinsing with mouthwash is comparatively higher than the previous studies (55.4% & 90.3%).[14,15] Although the vaccine for COVID – 19 is now available, its efficacy still remains questionable. In such scenario prevention of infection is a better option and for this, following strict infection control measures is important.[20] Majority of the participants in our study also agreed to this fact (94.1%). Overall this study shows that there is no significant difference in the knowledge and practice of infection control between genders except for question about usage of alcohol as disinfectant(p=0.004). This study has noted that the level of knowledge about COVID-19 and importance of infection control measures in dental clinics was high among the participant dentists. This knowledge and awareness could be due to theindividually acquired knowledge along with the efforts taken by the government and dental associations to spread the information to the dental professionals.The present study is having its own limitation as well. Because of the lockdown situation during the study period, the study was totally dependent on the electronic survey methods to collect the data and relied entirely upon the responses given by the practitioners. No other method could be used to cross verify the information given by the participants if they are strictly adhering to the infection control protocols in their practice. The study was entirely dependent on the subjects' response alone.

Conclusion

Although some amount of lack of awareness about infection control still exists among the dentists, the present study concludes that most of the participants had good knowledge and awareness about COVID-19 and the infection control procedures to be taken during this pandemic period. Keeping in mind the severity of the Covid 19 disease, the dentists and the supporting staffs should cautiously handle the dental clinics by strictly adhering to the guidelines issued by the government.

Based on this study it can be recommended as:

1. The infection control protocol should be included as a part of curriculum in the preclinical course specifications.
2. Periodical updating about nosocomial infection and its prevention methodology should be made mandatory among dental professionals.
3. Health officials should make surprise inspections to evaluate the implementation of infection control protocol in the clinics.

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Conflict of Interest

Authors doesn't have any conflict of interest

Authors' contributions

MNM conceptualized, designed the Study and prepared final draft of manuscript. NM and SB framed the questionnaire and prepared initial draft of manuscript.DR, SK and SR collected data, provided logistic support, reviewed, and edited the manuscript. AMForganized, analyzed and interpreted data. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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DETECTION OF PLANT LEAF NUTRIENT USING DENSE NEURAL NETWORK BASED IoT BASED DATA ACQUISITION

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ABSTRACT

In recent times, Internet of Things (IoTs) play a major role in acquisition of data in an environment and serves as an input tool for wide applications. Most of the inputs captured from IoT cameras are noisy and raw, and hence it is necessary to validate the environment with proper processing. In this paper, we hence develop a deep learning model that aims to validate the environment based on the inputs obtained from the IoT. The study uses DenseNet to get trained with the training data for validating the presence of nutrient deficiencies in plant leaves. The DenseNet are validated in such a way that it uses 30% of the input data for testing. The simulation is conducted to test the efficacy of the model and the results of simulation shows that the proposed method obtains improved rate of detection accuracy than other methods.

Keywords: Detection, Plant Leaf Nutrients, Dense Neural Network, Internet of Things

Introduction

Agricultural land is likely to be permanently lost because of the ever-growing population and shortage of water resources. One of the threats to plants that must be considered at this time is disease. It is happening, and they are grown in strange conditions. The harvest of many useful crops and plants is at risk due to illness. Surviving in the natural world without human assistance would be a difficult feat. A rise in crop yield loss is usually associated with the existence of illness or environmental conditions, such as temperature, water availability, and accessibility to nutrients [1]-[5].

Environmental elements, such as temperature and humidity, are critical for productivity. The root exudates of the plant play a vital function in increasing the nutrients of the soil. Cultivated plants are always more tolerant of illnesses compared to wild plants. This is an example of large numbers of the same species or other sorts of things that have the same genes grown together [21]. This example could span long distances, and it is commonly known as "the neighbour from hell."

Disease-causing microbes could proliferate in these conditions. Plant illnesses influence plant development and yield, and thus influence agriculture in terms of both socioeconomic and biocultural impacts. Many countries' economies have been dramatically affected by various forms of leaf diseases, such as spots, mildews, rusts, and blight. Plant diseases have a role in maintaining equilibrium in the relationship between live plants and animals. Plant cells mostly strengthen their defences against animals, insects, and pathogens by activating the plant's communication routes, which are found within the plant [22] [14]. This care has been used by humans to select and grow food, provide medicines, clothe ourselves, create shelter, provide fibre, and to embellish the environment for thousands of years. So, as a result, it is critical to keep an eye on regional agricultural diseases in order to improve food security.

Many emerging countries are dependent on agricultural expansion. In India, agriculture is vital to the country economic growth. Ninety-five percent of the agricultural area in the northern Indian states is used to cultivate cotton crops [15]-[19]. Diseases affect the production of cotton crops, affecting its productivity. The greater yield of cotton crops requires early detection and classification of these diseases. This review paper included information on the numerous cotton illnesses and their symptoms. This research studies various machine learning strategies for classifying cotton illnesses, as well as detection and segmentation algorithms. This study would serve as a good reference for future researchers on this subject.

In this paper, we hence develop a deep learning model that aims to validate the environment based on the inputs obtained from the IoT. The study uses DenseNet to get trained with the training data for validating the presence of nutrient deficiencies in plant leaves.

Background

Cotton is a staple crop that accounts for around 35% of the total fiber and raw material, used in textile manufacture [6–8]. India's economy is affected in numerous ways by India's most important and major cash crop, which is rice [9, 10]. On the global market, soybeans are viewed as the most commercially significant commodity, although several disease pathogens negatively affect their yields [11–13]. Taken together, these factors represent most of the yield on the planet. At a geographic level, India is the first to rise to the challenge. It places third in terms of overall production.

Cotton is an important player in the Indian agricultural and industrial economies. Cotton is grown in states throughout India and is divided into three zones: north, central, and south. Cotton is grown on 90% of the land in each of the states in each of the zones, which results in 95% of the total cotton production in India. Although nearly all of the world cotton production takes place in large countries such as India, just 5% of global cotton is produced by countries with populations less than 2 million people, such as Bihar, Meghalaya, Tripura, Orissa, and Assam. The crop-protection methods that are used are different based on the soil type, the availability of crop-protection sources, and the overall degree of production.

In various global segments, plant infections have proven to be a major obstacle for plant development and harvest creation. A number of cycles are brought to bear when plant infection occurs, such as water and supplement absorption, chemical change, flowering, formation of the fruit, plant growth, cell division, and extension. Manual processing of cotton illnesses results in inefficiency, making detection difficult. One or more species of microbes, nematodes, and other agents may be responsible for damaging cotton crops. To do this, focus should be placed on stopping epidemics of infectious diseases, such as those caused by pestilence and disease control strategies that work.

Disease Type:

Cotton problems most frequently encountered in nature are a result of nutritional deficits, environmental stress, and the presence of contaminants that create imbalances. These factors affect the growth of the crop, which in turn influences cotton production. There is a difference between the environmental issues (harming environments and disorder) and the change of the plant. Cotton is susceptible to two primary limiting plant diseases: Verticillium wilt and cotton leaf curl disease. The exceedingly virulent verticillium wilt is widespread and epidemic. Another of the many elements that cause disease is the number of wilt pathogens.

Another vital component of fiber production is the cotton boll [20]. Leaf-footed bugs were shown to have a similar set of symptoms to cotton boll injury, and these symptoms are closely related to the appearance of cotton boll leaf spots. Field developed resistance and early detection of bollworm and pink bollworm were also described in [23]. Plants in the early stages of development were often doused with fungicides to suppress cotton seedling disease. This virus, a member of the Bromoviridae family, belongs to the genus Ilavirus. Visual observation of the plants sometimes misdiagnoses TSV infection since this virus appears to be similar to other nutrient problems which affect cotton.

- Angular Leaf Spot or Black Arm Disease.
- Vascular Wilt Disease.
- Grey Mildew or Dahiya Disease.
- Anthracnose Disease.
- Root Rot Disease.
- Boll Rot Disease.
- Leaf Spot or Blight Disease.

Proposed Method

The structure has been carefully built to handle the capture challenges in real field situations, where sensory constraints on inexpensive

mobile phone cameras and an unpleasant image capture environment are quite tough to deal with. The first thing we did was to evaluate all of the difficulties, which started during the initial section of the procedure. In other words, a farmer can see the wounded leaves or fruits while standing on the top of the tree. The resulting footage will have a lot of background noise because of the tiny size of the items in focus and motion blur, and features will be lost because of this. In order to overcome these obstacles, the solution provided was custom-tailored to function in real-world settings. The architevcutre of which is given in Figure 1.

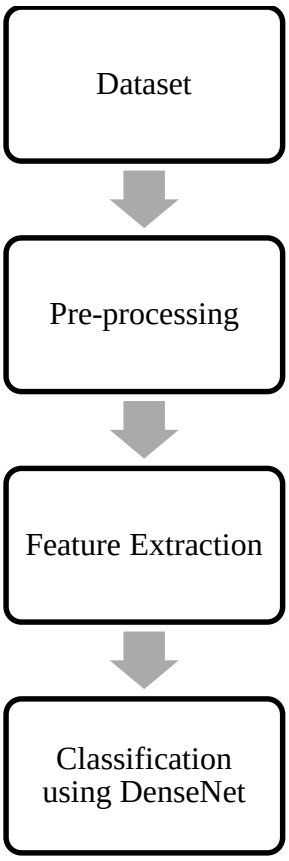

Figure 1: DenseNet Classification Model for Plant Nutrient Recognition Model

Preprocessing

In a normal end-to-end learning environment, there is little or no pre-processing necessary. More often than not, when end-to-end input training is available, it's unnecessary to prepare. To prepare the input for processing quickly, it had to be prepared in this situation. Features could then be learned successfully. You can see the flow of the model in Figure 1.

Feature Extraction

The image feature is discovered in the convolutional layer. At the outset, quicker images are defined as millions of coloured squares. In this study, the image is scaled and processed to 56x56 pixels, and 56x56 pixels wide by 56x56 pixels tall rectangular blocks are set up to account for. Every pixel between 0 and 255 is treated as though it were grayscale, and transformed into grayscale. Pixels are estimated to be 56 inches wide and 56 inches tall.

Once pooling is complete, each pooling layer is blurred before work begins on the next pooling layer. Where numerical data for image entries is compressed to 1x1 pixels, every 2x2 pixel on the edge of each pooling layer is used. If processing 4x4 images, the data in the output is 2x2 pixels. There are twice as many pixels in an image with two pooling layers.

When the feature detection processes have finished, Softmax eventually translates the output of the neural network to the probability of which error to expect. Cotton leaf is an accurate label if and only if the findings of DenseNet-169+ are also accurate. Following these steps, the connection weight is determined and then updated.

Classification

This is a sort of neural network known as DenseNet-169+, which makes use of dense linkages between layers via dense blocks (with their respective feature-maps). All prior layers and their feature maps each receive additional inputs from all later layers, and the topmost layer passes on its feature maps to the subsequent layers to preserve the original nature of classifiers.

In order to construct the DenseNet, the developer used four dense blocks with equivalent layers on all datasets, except for ImageNet. Prior to it entering the first block, a convolution of 16 output channels will occur on the image input. To preserve the size of the functional map with a kernel size of 3x3, each input side is zero-padded using a single pixel. In between two blocks, the transitional layers are made up of 1x1 convolutions and an average of 2x2 poolings. The final dense block is where the global average is applied, and a softmax classifier is appended. In the three thick blocks,

the feature map is 32x32, 16x16, and 8x8 accordingly.

Results and Discussions

The MATLAB simulation software has been used for the detection of leaf diseases. In the training and testing dataset, a total of 500 infected and healthy leaves are employed. Diverse modules include a temperature and humidity sensor, moisture sensor, hall flow sensor, and a VGA camera camera module, the Internet of Services System Implementation. The assessment determines the efficient functioning of all modules and their data collection for analytical purposes in real time.

Images	ANN	CNN	ResNet	DenseNet
500	38.95	41.33	45.96	60.88
400	42.2	45.36	51.32	63.26
300	48.6	54.5	60.89	65.87
200	67.54	69.77	73.57	73.81
100	69.78	72.03	75.71	75.99

Table 1: Accuracy

The Table 1 shows the results of accuracy between the proposed DenseNet model and other existing deep and machine learning models including ANN, CNN and ResNet. The results of simulation show that the proposed DenseNet has higher classification accuracy over various test images than other existing models.

Images	ANN	CNN	ResNet	DenseNet
500	34.46	36.78	42.12	48.12
400	41.59	44.12	48.86	61.09
300	47.76	50.75	57.98	62.12
200	50.44	52.81	59.7	63.6
100	51.48	55.68	61.63	64.83

Table 2: F-measure

The Table 2 shows the results of F-measure between the proposed DenseNet model and other existing deep and machine learning models including ANN, CNN and ResNet. The results of simulation show that the proposed DenseNet has higher F-measure over various test images than other existing models.

Images	ANN	CNN	ResNet	DenseNet
500	44.1	47.44	51.46	51.85
400	46.5	48.95	53.91	54.67
300	50.73	54.18	57.98	63.04
200	52.43	56.53	66.89	68.05
100	53.65	63.41	68.02	70.66

Table 3: Sensitivity

The Table 3 shows the results of Sensitivity between the proposed DenseNet model and other existing deep and machine learning models including ANN, CNN and ResNet. The results of simulation show that the proposed DenseNet has higher Sensitivity over various test images than other existing models.

Images	ANN	CNN	ResNet	DenseNet
500	51.19	55.2	59.83	60.62
400	53.51	57.95	62.69	63.18
300	54.99	59.1	64.03	65.72
200	67.98	70.64	74.33	74.6
100	69.4	72.05	76.01	76.5

Table 4: Specificity

The Table 4 shows the results of Specificity between the proposed DenseNet model and other existing deep and machine learning models including ANN, CNN and ResNet. The results of simulation show that the proposed DenseNet has higher Specificity over various test images than other existing models.

Images	ANN	CNN	ResNet	DenseNet
500	73.37	67.83	60.4	57.16
400	68.86	68.78	60.8	53.43
300	64.45	61.76	47.57	46.03
200	40.65	36.01	35.44	35.05
100	35.27	35.25	34.29	33.9

Table 5: MAPE

The Table 5 shows the results of MAPE between the proposed DenseNet model and other existing deep and machine learning models including ANN, CNN and ResNet. The results of simulation show that the proposed DenseNet has reduced MAPE over various test images than other existing models.

Conclusions

In this paper, DenseNets are developed and trained to validate the environment based on the inputs obtained from the IoT. The study uses DenseNet to get trained with the training data for validating the presence of nutrient deficiencies in plant leaves. The DenseNet are

validated in such a way that it uses 30% of the input data for testing. The simulation is conducted to test the efficacy of the model and the results of simulation shows that the proposed method obtains improved rate of detection accuracy than other methods.

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WOMEN EMPOWERMENT THROUGH SELF HELP GROUP

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ABSTRACT

As of late, issues of women are strengthening and support in self-improvement gatherings have acquired grounds and are at the middle stage in worldwide advancement talk. Despite the proof of women's achievements in a given domain of public and neighborhood-level turn of events, women's strengthening today passes on particularly to be wanted. In endeavors to improve and upgrade the support and strengthening of ladies, the third Millennium Development Goal (advancing sexual orientation correspondence and ladies strengthening) is centered on women's upliftment in the financial advancement of Madurai. This examination is expected to accomplish various goals. Among these are: to analyze the idea of Self-assistance gatherings (SHGs) in the Madurai; to evaluate techniques of engaging ladies through SHGs; to inspect the degree to which ladies are enabled by partaking in SHGs; to look at the difficulties blocking the gatherings in engaging ladies. The investigation took on the contextual analysis approach which permits factual derivations to be made to a more extensive populace so that outcomes can be extrapolated. Multistage examining procedure and the subjective and quantitative investigation were utilized to come out with the experimental discoveries. The investigation uncovered various fascinating discoveries which include: different nature of SHGs with around 67% being shaped along strict and financial lines; ability preparing, grown-up instruction, and endeavor improvement as the procedures of enabling ladies through SHGs. The degree of women's strengthening through taking part in bunches areas expanded self emphatics and certainty and protection from negative social practices; and difficulties, similar to helpless participation of individuals, hindering the activities of the gatherings in engaging ladies. Because of the discoveries uncovered, various recommendations were made to upgrade the strengthening of ladies. These incorporate the accompanying: working on the idea of SHGs; upgrading methodologies of engaging ladies through the gatherings; working on the inclusion of SHGs in women's strengthening and defeating the difficulties of SHGs.

Keywords: *Empowerment, self-improvement, Self Help Group (SHG)*

Introduction

The previous thirty years have seen a consistent expansion in the consciousness of the need to enable ladies through measures to build social, monetary, and political value, and more extensive admittance to crucial common liberties, enhancements in sustenance, fundamental wellbeing, instruction, and self-improvement gatherings (SHGs). Indeed, even in the light of uplifted global mindfulness on sex issues, it is an upsetting reality that no nation has yet figured out how to kill the expanding sexual orientation hole. A few nations that don't benefit from the maximum capacity of one portion of their social orders are misallocating their HR and sabotaging their serious potential in their formative journey (Zahidi, 2005). Ladies are considered as an amazingly significant point during the time spent change in the country regions. Women's support in self-improvement gatherings gives them the chance to be effectively engaged with the dynamic cycle. Women's interest through women's bunches has demonstrated to be a powerful way to achieve an adjustment of their lifestyle as far as financial prosperity and reception of innovation (Singh, 2009). Ladies in Madurai contribute massively to public turn of events and there is in this manner the need to urge and support ladies to effectively include themselves in open life and administration

(GSGDA, 2010). The enlivening of ladies in Madurai towards a general public where equity and fellowship win can best be accomplished by lady-to-lady contact. The social examples of Madurai's society are to such an extent that social advancement among ladies can be advanced viably with the help of individual relationships among them. Ladies can move certainty and offer improvement for social change particularly among their sisters in the country regions. Subsequently, compelling authority among ladies should come from the positions of ladies themselves. Their subjective support can be accomplished through the arrangement of women's gatherings and instructive projects (Deshmukh, 2005: p 195).

Concept of Empowerment

Strengthening is a multi-dimensional cycle, which should empower ladies or gathering of ladies to understand their full character and force in all circles of life (Surekharao and Rajamanamma, 1999). It comprises of more noteworthy admittance to information and assets, more prominent self-rule in dynamic to empower them to have more noteworthy capacity to design their lives or to have more prominent command over the conditions that impact their lives and liberated from shocks forced on them by custom, conviction, and practice. By and large improvement with equity is relied upon to produce the powers that lead to a strengthening of different segments of the populace in a nation and to bring their status uniquely up in the event of ladies. "Strengthening comes from Women's gatherings who try to enable themselves through more noteworthy confidence. They have the right to decide their options throughout everyday life. They additionally try to acquire control and admittance to assets". Strengthening is a measure, which assists individuals with overseeing their lives through bringing issues to light, making a move, and working to practice more prominent control. Strengthening is the inclination that actuates the mental energy to achieve one's objectives (Indiresan, 1999).

Problem Statement

Women, who address half of the human assets of most social orders are regularly not perceived and respected because of their minimized situation in the public eye. Ladies act notwithstanding regenerative jobs, a few useful errands, yet regularly, these jobs are not perceived and not apparent. It is their regenerative job that overpowers their useful job of acquiring and addressing job needs. Understanding this, the third Millennium Development Goal (MDG) has included women's strengthening and advancing sexual orientation balance among the eight MDGs (Manimekalai, 2007). Notwithstanding numerous peaceful accords confirming their basic freedoms, ladies are still significantly more reasonable than men to be poor, unskilled, and jobless. They are more outlandish than men to be politically dynamic and undeniably almost certain not to be in bunches which will offer them the chance to be monetarily strong and politically dynamic (State of World Population, 2005). Ladies in Madurai experience more noteworthy destitution, have heavier time loads, lower paces of use of useful assets, and lower proficiency rates (Madurai Living Standards Survey 4, 2000). Likewise, there is as yet lacking portrayal and cooperation of ladies insignificant spaces of the Maduraiian culture particularly in political and public assistance arrangements (GSGDA, 2010). Strengthening has a multi-dimensional spotlight and its prosperity relies upon ecological powers in a given society. For that, a solid climate is an unquestionable requirement for women‟s strengthening at the grassroots level. Drawing exercises from encounters and contextual analyses at the neighborhood, public and worldwide levels is significant in guaranteeing women’s contribution in gatherings (Singh, 2009). As indicated by the UNIFEM (2000), five significant components of women’s strengthening and opportunity have been recognized concerning worldwide examples of imbalance among people. These incorporate; monetary cooperation; financial freedom; political strengthening; instructive accomplishment and wellbeing and prosperity. Albeit critical advancement has been accomplished in various manners that add to women’s strengthening, for example, instruction and offer in the work market; the speed of this strengthening has been slow and lopsided across districts (United Nations, 2009).

Study Objectives

The investigation has general destinations to:

1. Examine the degree to which women‟s cooperation in self-improvement gatherings engages them; and
2. Find out the different methodologies embraced by the self-improvement gathering in engaging ladies.

In this way the investigation tries to accomplish the accompanying explicit destinations:

- To look at the idea of women's self-improvement gatherings in Madurai City.
- To recognize procedures of enabling ladies through self-improvement gatherings;
- To survey the level to which ladies are engaged by partaking in self-improvement gatherings;
- To inspect the difficulties blocking self-improvement gatherings in enabling ladies;
- To make strategy suggestions to improve the current circumstance of self-improvement gatherings in the city

Research Design

The examination configuration utilized for the investigation is the contextual analysis approach. As per Nachmias, (1992) a contextual analysis involves a perception of a solitary gathering or wonder at a solitary point on schedule, generally resulting in some marvel that supposedly delivered change. A contextual analysis research configuration as indicated by Bromley (1990) is a deliberate investigation into an occasion or a bunch of related occasions which mean to portray and clarify the marvel of revenue. Following the abovementioned, the Madurai was exposed to basic assessment in the space of women's strengthening through investment in self-improvement gatherings. Haggett (1977) expressed that contextual analysis is an experimental inquiry that considers an examination of the elements of a specific framework.

Study Variables

Kreuger and Neuman (2006) clarified that a variable is an idea that differs. They expressed that a variable might take on at least two qualities which are it is ascribed. As indicated by Babbie (2007) factors are the intelligent groupings of properties. This was re-repeated by Miller and Brewer (2003) as they considered the possibility that factors help in moving an examination from a reasonable to an observational level, utilizing the factors as key components of the exploration issue. The factors utilized for the examination include a) Nature of SHGs in Madurai b) Strategies of enabling ladies through SHGs. C) Level of women's strengthening and the support in SHGs d) Challenges blocking SHGs in engaging ladies. Information Sources Both auxiliary and essential information sources were utilized for the exploration. Auxiliary information on the rundown of self-improvement gatherings in the Madurai was gathered from the Department of Women and Children's Affairs. Essential information was likewise gathered on the techniques for engaging ladies, the degree to which SHGs enable ladies, and the difficulties facing these gatherings from the field.

Data Collection Instruments

The data collection procedures used for the investigation join the use of coordinated surveys and meeting guides. The studies were used for the grouping of data from people in the picked SHGs. The study typifies both open and shut completed requests for subjectively picked people from the various get-togethers. Gatherings were driven for foundations drew in with the investigation using a meeting guide.

Sampling Techniques

The multi-stage inspecting strategy was taken on. The inspecting procedures remember the purposive examining technique for the assurance of SHGs and establishments to be met. Purposive inspecting is utilized when the different examining units fulfill certain measures of interest. In this examination, the picked bunch should be exclusively women‟s bunch, situated in the City and are working.

Selection of Study Population and Area

According to Frankel and Wallen (2000), a population refers to the group to which the results of the research are intended to apply. They stated that a population is usually the individuals who possess certain characteristics or a set of features a study seeks to examine and analyze. Kumekpor (2002) emphasized this by defining a population as the total number of all units of the issue or phenomenon to be investigated into which is "all possible observations of the same kind". The research

population consists of registered self-help groups. The study was carried out in specific communities in Madurai.

Analysis and Interpretation

Age Structure of Respondents

The investigation populace is overwhelmed by ladies between the ages of 30-39 and 40-49 associates comprising around 32% each. It was anyway noticed that solitary 16% of the ladies between the ages of 20-29 are into self-improvement gatherings. This was ascribed to the way that most young ladies inside this age partner are ordinarily in school. The organization of the times of the respondents is displayed in Table 4.1 with more ladies being in the monetarily dynamic populace.

Marital Status of Respondents

Issues identifying with marriage are basic to the achievement and the degree of strengthening of SHGs. Information assembled through the field overview shows that about a portion of the ladies (53%) are hitched with around 5% are cohabiting.

Educational Characteristics of Respondents

The instructive foundation of the respondents has a solid relationship with the achievement or in any case of the exercises of SHGs. The examination showed that around 75% of ladies in SHGs have had some degree of instruction, which gives the premise and more profound comprehension of the goals of these gatherings. Once more, the degree of schooling of the respondents has worked with the strengthening interaction by causing individuals from the gatherings to comprehend issues like investment funds, credit reimbursement, and home keeping.

Religious Characteristics of Respondents

Around 35% of the gatherings are framed along strict lines. Around 70% of the respondents are Christians whiles the leftover are Muslims. It was additionally noted through the study that issues verging on strengthening like home keeping and grown-up schooling are diverted along strict lines through the direction of their strict convictions.

Ethnic Background of Respondents

In attempting to inspect the elements of SHGs, nationality was recognized to be a vital variable. The investigation uncovered that most individuals from the SHGs in the Madurai are transcendently Ashantis establishing around 55% of the respondents met. The predominance of the Ashantis in the SHGs presents a more noteworthy road for simple comprehension of issues and inclusion in the exercises of the gatherings which are coordinated towards the strengthening of their individuals

Employment Status of Respondents

The type and nature of occupation in which members of SHGs are engaged greatly influence their empowerment and participation levels especially in household decision making as well as the activities of the SHGs. The type and nature of occupation in which members of SHGs are engaged greatly influence their empowerment and participation levels especially in household decision making as well as the activities of the SHGs.

Findings, Recommendations, and Conclusion

The examination uncovered the presence of a few ladies Self Help Groups in Madurai. It was discovered from the examination that 36% of the SHGs are shaped along strict grounds and 31 percent on monetary lines with around 33% being socially disposed of. The strict and monetary situated SHGs in the City incorporate the FOMWAG, Christian Mothers, PHBA, among others, while the socially disposed of SHGs were FLFC, DWF, and others. The examination again uncovered that the vast majority of the SHGs are confronted with the issue of latent individuals. The dynamic participation strength of the gatherings goes from 50 to 100 with the torpid gatherings having under 25 individuals. It was seen through the examination that SHGs in the City present an assortment of methodologies that are equipped towards the improvement of the everyday environments and norms of their individuals. These methodologies included admittance to credit, expertise preparing, venture improvement, grown-up schooling, and backing and local area commitment. Around 85% of the SHGs individuals met showed that their support in the exercises of the gatherings has outfitted them with abilities, for example, dabs making, tye and color batik, body and hair cream making, home administration, providing food benefits just as stitching. Around 75% of the ones who have procured the abilities use it locally or to create a pay to earn a living wage. It was additionally understood that solitary the

three fundamental monetary slanted gatherings (PHBA, Help to Help, and GAWE) took on big business improvement as a significant methodology with the remainder of the gatherings drawing in individuals on accounting to upgrade their organizations.

Recommendations

Issues of women's investment and strengthening are basic in the improvement of Madurai. Coming from the above discoveries, the investigation proposes various proposals which are coordinated towards endeavors in improving women's strengthening techniques in the accompanying sub-areas. It was uncovered through the investigation that there are a few SHGs in Madurai which have various targets. The investigation suggests the detailing and foundation of a typical arrangement for SHGs in the City which will assist with bettering the direction of their exercises and advance powerful joint effort among the gatherings. The Department of Women and Children Affairs should play the lead job in a joint effort with the gatherings in the medium term to define a woman ‟s bunch strategy to direct and advance the government assistance of ladies. This will give them a typical stage for them to air their voice, increment their enrollment strength and contribute their share to the improvement of the Madurai. A few techniques were distinguished through the examination in regards to the advancement of self-improvement gatherings in Madurai. These techniques incorporate schooling and expertise preparing, among others. It is suggested that there ought to be normal management by the DWCA to guide the group's exercises to assist with understanding the targets of SHGs.

Conclusion

Women are a basic piece of each economy. All-round improvement and amicable development of a country would be conceivable just when ladies are considered as co-accomplices in progress with men. Strengthening of ladies is vital for saddle the ladies work in the standard of financial turn of events. Women's SHGs have been demonstrated to be a vital road from which ladies can be enabled. The goals set for the examination which incorporated the degree to which SHGs engage ladies; the procedures for enabling ladies; the idea of SHGs; and the difficulties obstructing the gatherings have been accomplished through the investigation. The investigation uncovered that SHGs enable individuals by arousing self-emphatics and certainty among them, increment their pay level, assist them with obtaining abilities, take an interest in dynamics at home and in their networks, enable them to oppose negative social practices, and refine their day to day environments. It was noticed that the gatherings took on a couple of the accompanying systems, that is; expertise preparing, non-conventional schooling, support, endeavor improvement, and local area initiative and commitment as the fundamental methods of enabling ladies who are individuals. In light of the experimental discoveries, the examination suggested that there ought to endeavor in upgrading procedures of enabling ladies through ordinary management of the group's exercises by the Department of Women and Children's Affairs. To engage more ladies in the City, there ought to be the refinement of ladies in the City on the meaning of taking an interest in SHGs with the end goal for them to be individuals. Defeating the difficulties looked by gatherings, the enrollment status of SHGs in the City should be improved. Government should mediate in the conceding of credit at a moderately lower financing cost to ladies' gatherings. It was likewise recommended that there ought to be the institution of bye-laws for women's SHGs. The job of ladies in the improvement of any nation can't be over accentuated. The execution and adherence of the above-expressed suggestions will along these lines lead to progress in women‟s interest in the family, local area, and the public level.

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HYBRID METHOD IN IDENTIFICATION OF KEYPOINTS USING QUADRATIC SVM WITH SIFT ALGORITHM

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ABSTRACT

Key point in image processing plays a vital role in Scale-Invariant feature transform algorithm. Hybrid SIFT algorithm helps to increase the number of key points used in the diseased plant leaf image for disease identification and classification. In this study, A hybrid algorithm Hybrid SIFT is implemented for the detection of diseases in plant Leaf images in the Plant Village dataset. Scale-Invariant feature transform algorithm has been incorporated with Quadratic Support Vector Machine to enhance its overall efficiency. This algorithm finds the maximum number of key points from testing and training images. Therefore it helps in improving the accuracy of identification and classification of plant leaf diseases. Quadratic SVM has a speed of 2200 obs/sec, When combining with SIFT will boost the speed. This study proves that the proposed hybrid algorithm performs well rather than the Scale-Invariant feature transform algorithm. Hybrid SIFT identifies 423 matching key points whereas SIFT algorithm identifies 386 key points. From this, the maximum numbers of key points were identified with a minimum computation time of 9.1 sec. Hybrid SIFT algorithm provides the solution with maximum key points from the regular Scale-Invariant feature transform algorithm.

Keywords: *Plant disease, Scale Invariant Feature Transform algorithm, Support vector machine, Quadratic Support Vector Machine algorithm, Key points detection.*

INTRODUCTION

Feature extraction and matching consider being a former step in detecting plant leaf disease detection. Identifying matching key points and features is a crucial task to accomplish image mosaic, camera calibration, object recognition. etc. Therefore, Requirements are in need to fulfill by these features. One of the most extensively used methods for feature detection is Scale-Invariant Feature Transform (SIFT). This algorithm finds the local features in an input image. SIFT was published by David Lowe in 1999. It is called invariant because it is invariance to illumination, scale, and rotation [1].

In image processing one of the trending topic is key point detection which is used to identify the point of interest in an image. Key point is an interest point which is defined in some particular image. These key points are scale and rotational invariant which is used in many applications. Key points are derived from SIFT detectors and their descriptor is computed by SIFT descriptors.

The Comparison between the calibration for SIFT and extended SIFT in image recognition, Tao et al[2]. Grabner et al. [3] proposed an approximation of SIFT. They worked on increasing the speed of SIFT by using integral images to decrease the cost of scale space finding. Aeyman Hassan et al [4] a study of SIFT evaluation was carried out in a small dataset by using simple threshold. Abdul Hafiz et al[5] proves that the Quadratic support vector machine algorithm performed well in accuracy and speed. Namita M. Butale et al [6] implements K-means clustering for segmentation and SVM for classification. Shraddha et al [7] proves reliable key point matching if a certain region has been change intensity, scale and rotation. Jun Liu et al[8]describes 93.33% is the result of disease recognition with the use of SIFT algorithm.

This paper contains the literature review in section II , In methodology section III describes the image acquisition, image pre-processing and the combination of algorithm Quadratic SVM and Scale-Invariant Feature Transform algorithm. Results and conclusions are the section IV and V respectively.

RELATED WORK

Abdul Hafiz Bin Abdul Wahab, Rahimi Zahari, Tiong Hoo Lim et.al [5] explains the algorithm used is able to correctly distinguish between healthy part of a Chilli plant, the area affected by cucumber mosaic and as well as the background. A high percentage of accuracy is obtained for both

classification of background images and the healthy part of the plant. However only, 57.1% accuracy was obtained for classification of cucumber mosaic. This can be improved by training more data set of the plant affected by cucumber mosaic virus. The Advantage is Quadratic SVM shows the best possible SVM method as it has high accuracy of 90% with fast prediction speed of roughly 2200 obs/sec compared to Medium Gaussian SVM which only show a rough prediction speed of 920 obs/sec.

Namita M. Butale, Dattatraya V. Kodavade et .al [6],discusses identifying disease at its early stage is a major requirement in disease detection. Major resources are used in monitoring the plants and detecting the diseases that can be reduced by automating the system. Infected leaf image dataset are identified with various crops for tomato, corn, grape, peach, pepper bell. The author implements K-means clustering for segmentation and Support Vector Machine for classification. The proposed algorithm is implemented on five categories of plant leaf images. Optimum results are produced with very less computation time.

Shraddha et al [7], provides various categories of the tests: Intensity change, scale change, rotation. The Key point descriptor creates a matrix of values called a descriptor where it can be explained by means of features possibly used for image matching. A higher percentile and duration for testing the entire test image is performed well with these values obtained by the proposed method. Advantage is it can handle reliable key point matching if a particular region has been change and, furthermore, determine the geometric transformation like scale and rotation applied to perform such tampering.

Jun Liu, Fang Lv, and Bobo Liu et.al [8] mainly details the use of SIFT algorithm to find different diseases of sunflower leaves. At first the collection of image of sunflower disease is described. In Second step, the image is preprocessed before image recognition. In this paper author used histogram equalization to defog the image and the image is denoised by homomorphic filtering. In third step the feature vector of image is extracted by SIFT algorithm. At last, the characteristic vector was coordinated and the identification of the disease image was completed. Advantage is the recognition rate can reach 93.33% when using SIFT matching algorithm to identify four diseases of sunflower leaf. Limitation would be it takes only very less key points into consideration.

Mrs. Gaganpreet Kaur, Sarvjeet Kaur, Amandeep Kaur et.al [9] explains various image processing methods applied by various researchers in the field of agriculture for feature extraction, segmentation and classification. Various image processing methods applied on different plants are described. Several filtering techniques can be used to de-noise the image so that the diseases can be detected efficiently and clearly because noise creates problems in identification of diseases.

Vijai Singh, A.K.Mishra et.al [10], proposed plant plant disease detection using genetic algorithm. Genetic Algorithm (GA) is optimization algorithm. The algorithm proceeds with population that's set of solutions. From one population solutions are selected and new population is made . Required results were obtained with little computations, the performance of the proposed algorithm to identify and classify the plant leaf diseases. Limitation of this method is accuracy is low in some diseases, to increase that other advanced or hybrid algorithms must be used.

METHODOLOGY

In this research a New algorithm named Hybrid SIFT is used to identify the keypoints in the diseased leaf image.The Hybrid SIFT algorithm is the combination of SIFT algorithm with the Quadratic SVM algorithm. Quadratic SVM acts as a booster to the Scale –Invariant SIFT algorithm. Images from Plant Village dataset is used. Image Acquisition during this phase, images of plant leaves are gathered using digital media like camera, mobile phones etc. with desired resolution and size.

Fig: 1 (a) Healthy Soybean Leaf (b) Infected Soybean Leaf

Image pre-processing methods use the considerable redundancy in images. Neighbouring pixels like one object in real images have essentially an equivalent or similar brightness value, so if a distorted pixel are often picked out from the image, it can usually be restored as an average value of neighbouring pixels. Gaussian filter Gaussian filter is to remove noise from de-noised input. This filter contains a input function in stepwise without overshoot, thanks to this the autumn time and rise time is reducing. So this action of behaviour says the filter will delay with minimum possible. Mathematically, a Gaussian filtering method response the signal of input in the way of twist to drawn from a Gaussian functions. This change is called weierstrass transform. In this image processing the Gaussian function run down to blurring a picture it's the results of Gaussian blur. The effect of graphics software is typically wont to reduce a noise in image. The Gaussian distribution (Gx) with standard deviation (σ) for one dimension and two dimension it is represented like (x) is an image point for one dimension and (x,y) is the pixel for two dimension it is described below in two equation. This two equation will applied to the original image

$$G(x) = \frac{1}{\sqrt{2\pi\sigma^2}}\, e^{-\frac{x^2}{2\sigma^2}} \qquad (1)$$

QUADRATIC SVM

For quadratic SVM, a polynomial kernel function with polynomial order, q of 2 is used with automated kernel scale as well.[2].

$$G(x_j + x_k) = (1 + x_j{}' x_k)^q \qquad (2)$$

SIFT ALGORITHM

SIFT algorithm contains the following stages:-

SCALE-SPACE EXTREMA DETECTION

In order to implement the first stage, it was important to detect features at different scales. Therefore, one good choice was Gaussian kernel(*G*). An image (*I*) will be convolved with that kernel as shown in Equation 3:-

$$L\,(x, y, \sigma) = G(x, y, \sigma) * I(x, y) \qquad (3)$$

$$D\,(x, y, \sigma) = (G\,(x, y, k\,\sigma) - G\,(x, y, \sigma)) * I(x,) = L(x, y, k^{\sigma}) - L(x, y, \sigma). \qquad (4)$$

The concept of the Equation 4 shows the difference of Gaussian (GUN), which is considered as a good approximation to the scale-dependent Palladian of Gaussian 2.2G.

LOCALIZATION:

During this stage, there are fewer points to deal with instead of use all image pixels. However, it is still a large number of key points. They can be reduced by eliminating key points with low contrast since they are sensitive to the noise. This was done by taking Taylor expansion of scale space function as following:-

$$D(x) = D + \frac{\partial \mathrm{D}^{\mathrm{T}}}{\partial \mathrm{x}} * \mathrm{x} + \frac{1}{2}\mathrm{x}^{\mathrm{T}} * \frac{\partial^2 \mathrm{D}}{\partial \mathrm{x}^2} \qquad (5)$$

$$\hat{}\mathrm{x} = -\frac{\partial^2 \mathrm{D}}{\partial \mathrm{x}^2}\,\frac{\partial \mathrm{D}}{\partial \mathrm{x}} \qquad (6)$$

From Equation 5 and 6, we will obtain equation 7

$$D(\hat{}(x)) = \mathrm{D} + \frac{1}{2} * \frac{\partial \mathrm{D}^{\mathrm{T}}}{\partial \mathrm{x}} * \hat{}\mathrm{x} \qquad (7)$$

If *D*(ˆ*x*) less than 0.3, maxima or minima extrema will be rejected. The second enhancement is to remove some unstable points which can give a high response because they are located at the edges. This problem is solved using Hessian matrix (*H*),

by checking the ratio if it is less than specific threshold:

$$\frac{T_r(H)}{Det(H)} < \frac{(r+1)^2}{r} \quad (8)$$

Where r=10, we need 20 floating point operations to test each keypoint.

ORIENTATION ASSIGNMENT

The gradient magnitude $m(x, y)$ and orientation $\theta(x, y)$ for each sample point was determined in this step. The gradient histogram (36 bins) was constructed from gradient orientation, weighted by Gaussian window (σ = 1.5).

$$m(x,y) = \sqrt{(L(x+1,y) - L(x-1,y))^2} + \sqrt{(L(x,y+1) - L(x,y-1))^2} \quad (9)$$

$$\theta(x,y) = \tan -1 \frac{(L(x,y+1) - L(x,y-1))}{(L(x+1,y) - L(x-1,y))} \quad (10)$$

DESCRIPTOR

The gradient magnitude and orientation were computed around each sample point in the region of key point. Figure2 illustrates 2x2 descriptor

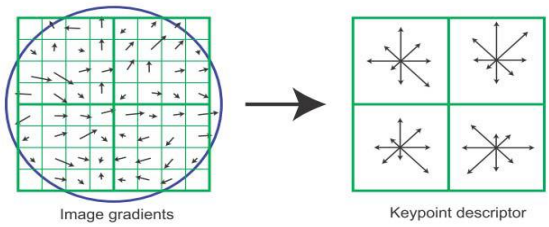

Fig 2: Descriptor

Array with 8 orientation bins but the experiments were done using a 4x4 descriptor. This means that we have 4x4x8=128 feature vector in total [6]. This vector was normalized to unit length to avoid the impact of illumination changes. By specifying the value of unit feature vector to be not larger than 0.2, we will get rid of the effect of large gradient magnitude.

3.2.5. KEY POINT MATCHING

Matching key points of query image with others in the database was performed through using nearest neighbour threshold with minimum Euclidean distance. However, due to the background clutter, many features could not find any match, so another technique was used called nearest neighbour distance ratio (NNDR). It is supervised learning method, where training data are used for classification.

$$\text{NNDR} = \frac{f1}{f2} = \frac{|F_A - F_B|}{|F_A - F_C|} \quad (11)$$

Where $f1$ and $f2$ are the nearest and second nearest neighbour distances. *FA* is the target descriptor. *FB* and *FC* are its closest two neighbours.

RESULTS AND DISCUSSIONS

Hybrid SIFT algorithm is implemented in a infected leaf .Gaussian filter for the pre-processing and the hybrid algorithm gives resultant key points in a image as red colour markings. The number of key points in a testing image is 478. Number of key point matches is 423.

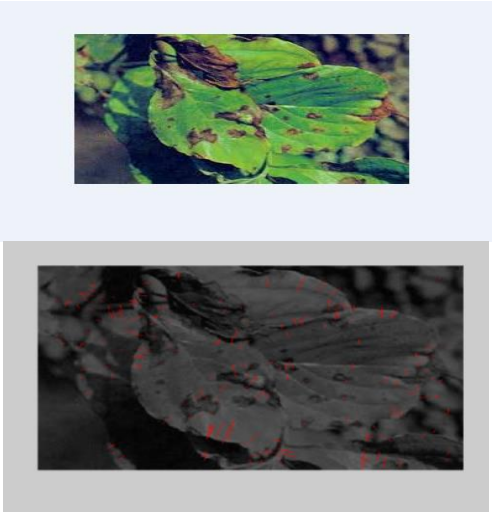

Fig 3: Result for Hybrid SIFT algorithm

The total time taken to determine the key points is 9.1 seconds. Figure 3 explains the results of Hybrid SIFT algorithm . SIFT algorithm gives the result as number of key

points in a testing image is 436.Number of key points matching is 386.

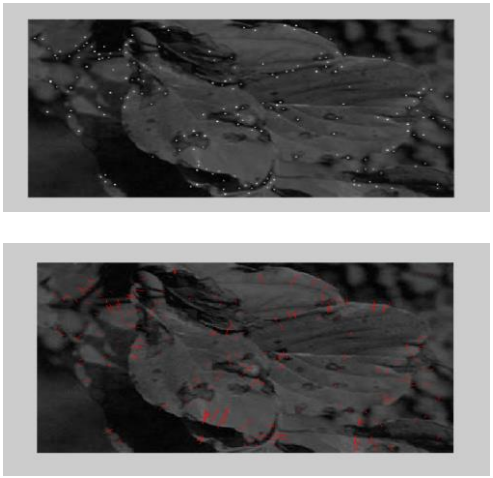

Fig 4: Result of SIFT algorithm

The total time taken for SIFT algorithm to determine the key points is 15.5 seconds. Figure 4: Shows the resultant image of SIFT algorithm. According to the results the proposed Hybrid SIFT algorithm provides better results in accuracy and also performs well with the computation time.

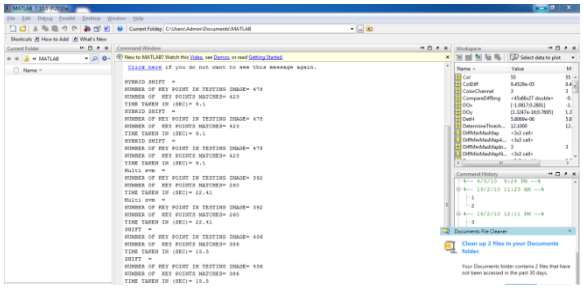

Fig 5: Results in Mat lab window

CONCLUSION

Detection of plant diseases at early stage is necessary because diseases reduce the production of crops. If adequate plant care is not taken, it creates severe plant impacts and affects the quality, amount or productivity of the corresponding item. To reduce the cost of disease detection

Automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier as well as cheaper. In this research the key points of an diseased leaf is identified with Hybrid SIFT algorithm and also compared with the results of regular SIFT algorithm. Hybrid SIFT is a combination of SIFT and Quadratic SVM. The Number of matching key points are determined as it is the process of disease detection .Time taken for the analysis is calculated for both the algorithms. Hybrid SIFT shows better matching key points (423) and also It determines the key points in a very less time(9.1seconds). With these algorithms sift provides better results and it also supports the image with the invariance. This research can be further implemented to various leaf diseases and large database.

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ADDITIVE PROPERTIES OF NORMAL CIRCULANT POLYNOMIAL MATRICES

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ABSTRACT

We have introduced normal circulant polynomial matrices as a generalization of normal polynomial matrices. Sums, products and direct product of normal circulant polynomial matrices are investigated.

***Keywords**: Circulant polynomial matrices, normal circulant polynomial matrices.*
***AMS Classification:** 15A09, 15A15, 15A57.*

Introduction

Let $(a_1(\lambda), a_2(\lambda), ..., a_n(\lambda))$ be an ordered n-tuple of polynomials with coefficients in the field of complex numbers, and let them generate the circulant polynomial matrix [1,3,4,8] of order n:

$$A(\lambda) = \begin{pmatrix} a_1(\lambda) & a_2(\lambda) & \dots & a_n(\lambda) \\ a_n(\lambda) & a_1(\lambda) & \dots & a_2(\lambda) \\ & & \vdots & \\ a_2(\lambda) & a_3(\lambda) & \dots & a_1(\lambda) \end{pmatrix} \quad (1)$$

We shall often denote this circulant polynomial matrix as

$$A(\lambda) = circ(a_1(\lambda), a_2(\lambda), ..., a_n(\lambda)) \quad (2)$$

Let $A(\lambda)$ be an $n \times n$ polynomial matrix and $\pi(\lambda) = circ(0,1,0,...,0)$. $A(\lambda)$ is a circulant polynomial matrix if and only if

$$A(\lambda)\pi(\lambda) = \pi(\lambda)A(\lambda) \quad (3)$$

In this paper, we defined a new type of polynomial matrix called normal circulant polynomial matrix, which is a generalization of the normalpolynomial matrix. For this class of matrices, we investigate thesums, products and direct products.

Before proceeding, we introduce some notation needed throughout this paper. Let $C_{n\times n}(\lambda)$ denote the set of all $n \times n$ polynomial matrices over the complex field C and $I_n(\lambda)$ denote the identity polynomial matrix of order n. For a matrix $A(\lambda) \in C_{n\times n}(\lambda)$, we denote the transpose, the adjoint and the determinant of $A(\lambda)$ by $A^T(\lambda)$, $A^*(\lambda)$ and $|A(\lambda)|$, respectively.

Normal Circulant Polynomial Matrices

In this section some of the properties of normal polynomial matrices are extended to normal circulant polynomial matrices. Some results of normal matrices found in $[2,5,6,7]$ are generalized to normal circulant polynomial matrices.

Definition 2.1

A circulant polynomial matrix $A(\lambda)$ is called normal circulant polynomial matrix if $A(\lambda)A^*(\lambda) = A^*(\lambda)A(\lambda)$.

Example 2.2

Let $A(\lambda) = \begin{pmatrix} 1+\lambda+i & 1+2i\lambda \\ 1+2i\lambda & 1+\lambda+i \end{pmatrix}$

$= A_0 + A_1\lambda$ where the coefficient matrix of $A(\lambda)$ are $A_0 = \begin{pmatrix} 1+i & 1 \\ 1 & 1+i \end{pmatrix}$, $A_1 = \begin{pmatrix} 1 & 2i \\ 2i & 1 \end{pmatrix}$

$$A(\lambda)A^*(\lambda) = \begin{pmatrix} 3+2\lambda+5\lambda^2 & 2+6\lambda \\ 2+6\lambda & 3+2\lambda+5\lambda^2 \end{pmatrix}$$

$= A^*(\lambda)A(\lambda)$

Hence, $A(\lambda)$ is a normal circulant polynomial matrix.

Theorem 2.3

If $A(\lambda)$ is a normal circulant polynomial matrix and α is a complex number, then

(i) $A(\lambda)+\alpha I_n(\lambda)$ is a normal circulant polynomial matrix.

(ii) $A(\lambda)-\alpha I_n(\lambda)$ is a normal circulant polynomial matrix.

Proof

Given that $A(\lambda)$ is a normal circulant polynomial matrix. We have

$$A(\lambda)A^*(\lambda)=A^*(\lambda)A(\lambda)$$

By using (3), we have $A(\lambda)=\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)$.

Proof of (i)

Now

$$\left[A(\lambda)+\alpha I_n(\lambda)\right]\left[A(\lambda)+\alpha I_n(\lambda)\right]^*$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]^*$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)^*+\left(\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right)^*\right]$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\left(\pi_n^{-1}(\lambda)\right)^*A^*(\lambda)\pi_n^*(\lambda)+\left(\pi_n^{-1}(\lambda)\right)^*I_n^*(\lambda)\pi_n^*(\lambda)\bar{\alpha}\right]$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\bar{\alpha}\right]$$

$$=\left(\pi_n(\lambda)\right)^2A(\lambda)A^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2+\alpha\left(\pi_n(\lambda)\right)^2I_n(\lambda)A^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2+$$

$$\left(\pi_n(\lambda)\right)^2A(\lambda)I_n(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2\bar{\alpha}+\alpha\left(\pi_n(\lambda)\right)^2\left(I_n(\lambda)\right)^2\left(\pi_n^{-1}(\lambda)\right)^2\bar{\alpha}$$

$$=\pi_n(\lambda)\left[\pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)\left[\pi_n(\lambda)I_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)+\pi_n(\lambda)\left[\pi_n(\lambda)A(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)\bar{\alpha}+\alpha\pi_n(\lambda)\left[\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)\bar{\alpha}$$

$$=\pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)+\alpha\pi_n(\lambda)I_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)A(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\bar{\alpha}+\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\bar{\alpha}$$

$$=A(\lambda)A^*(\lambda)+\alpha I_n(\lambda)A^*(\lambda)+A(\lambda)I_n(\lambda)\bar{\alpha}+\alpha I_n(\lambda)\bar{\alpha}$$

$$=A^*(\lambda)A(\lambda)+\alpha I_n(\lambda)A^*(\lambda)+\bar{\alpha}I_n(\lambda)A(\lambda)+\alpha\bar{\alpha}I_n(\lambda)$$

$$=A^*(\lambda)A(\lambda)+\alpha I_n(\lambda)A^*(\lambda)+\bar{\alpha}I_n(\lambda)A(\lambda)+\alpha\bar{\alpha}I_n(\lambda)$$

$$=A^*(\lambda)\left[A(\lambda)+\alpha I_n(\lambda)\right]+\bar{\alpha}I_n(\lambda)\left[A(\lambda)+\alpha I_n(\lambda)\right]$$

$$=\left[A^*(\lambda)+\bar{\alpha}I_n(\lambda)\right]\left[A(\lambda)+\alpha I_n(\lambda)\right]$$

$$=\left[\left(A(\lambda)\right)^*+\left(\alpha I_n(\lambda)\right)^*\right]\left[A(\lambda)+I_n(\lambda)\alpha\right]$$

$$=\left[A(\lambda)+\alpha I_n(\lambda)\right]^*\left[A(\lambda)+\alpha I_n(\lambda)\right]$$

Thus, $A(\lambda)+\alpha I_n(\lambda)$ is a normal circulant polynomial matrix.

Proof of (ii)

Now

$$\left[A(\lambda)-\alpha I_n(\lambda)\right]\left[A(\lambda)-\alpha I_n(\lambda)\right]^*$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)-\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)-\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]^*$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)-\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)^*-\left(\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right)^*\right]$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)-\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\left[\left(\pi_n^{-1}(\lambda)\right)^*A^*(\lambda)\pi_n^*(\lambda)-\left(\pi_n^{-1}(\lambda)\right)^*I_n^*(\lambda)\pi_n^*(\lambda)\bar{\alpha}\right]$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)-\alpha\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$\left[\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)-\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\bar{\alpha}\right]$$

$$=\left(\pi_n(\lambda)\right)^2A(\lambda)A^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2-\alpha\left(\pi_n(\lambda)\right)^2I_n(\lambda)A^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2$$
$$-\bar{\alpha}\left(\pi_n(\lambda)\right)^2A(\lambda)I_n(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2+\alpha\bar{\alpha}\left(\pi_n(\lambda)\right)^2\left(I_n(\lambda)\right)^2\left(\pi_n^{-1}(\lambda)\right)^2$$

$$=\pi_n(\lambda)\left[\pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$
$$-\alpha\pi_n(\lambda)\left[\pi_n(\lambda)I_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$
$$-\bar{\alpha}\pi_n(\lambda)\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$
$$+\alpha\bar{\alpha}\pi_n(\lambda)\left[\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$

$$=\pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)-\alpha\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)$$
$$-\bar{\alpha}\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\alpha\bar{\alpha}\pi_n(\lambda)I_n(\lambda)\pi_n^{-1}(\lambda)$$

$$=A(\lambda)A^*(\lambda)-\alpha A^*(\lambda)-\bar{\alpha}A(\lambda)+\alpha\bar{\alpha}I_n(\lambda)$$

$$=A^*(\lambda)A(\lambda)-\alpha A^*(\lambda)-\bar{\alpha}A(\lambda)+\alpha\bar{\alpha}I_n(\lambda)$$

$$=A^*(\lambda)A(\lambda)-\alpha A^*(\lambda)-\bar{\alpha}A(\lambda)+\alpha\bar{\alpha}I_n(\lambda)$$

$$=A^*(\lambda)\left[A(\lambda)-\bar{\alpha}I_n(\lambda)\right]-\bar{\alpha}I_n(\lambda)\left[A(\lambda)-\alpha I_n(\lambda)\right]$$

$$=\left[A^*(\lambda)-\bar{\alpha}I_n(\lambda)\right]\left[A(\lambda)-\alpha I_n(\lambda)\right]$$

$$=\left[\left(A(\lambda)\right)^*-\left(I_n(\lambda)\alpha\right)^*\right]\left[A(\lambda)-\alpha I_n(\lambda)\right]$$

$$=\left[A(\lambda)-I_n(\lambda)\alpha\right]^*\left[A(\lambda)-\alpha I_n(\lambda)\right]$$

$$=\left[A(\lambda)-\alpha I_n(\lambda)\right]^*\left[A(\lambda)-\alpha I_n(\lambda)\right]$$

Hence, $A(\lambda)-\alpha I_n(\lambda)$ is a normal circulant polynomial matrix.

Theorem 2.4

Let $A(\lambda)$ and $B(\lambda)$ be normal circulant polynomial matrices and that $A(\lambda)B^*(\lambda)=B^*(\lambda)A(\lambda)$ and $A^*(\lambda)B(\lambda)=B(\lambda)A^*(\lambda)$. Then $A(\lambda)+B(\lambda)$ is a normal circulant polynomial matrix.

Proof

Let $A(\lambda)$ and $B(\lambda)$ be normal circulant polynomial matrices and that $A(\lambda)B^*(\lambda)=B^*(\lambda)A(\lambda)$ and $A^*(\lambda)B(\lambda)=B(\lambda)A^*(\lambda)$.

By using (3), we have $A(\lambda)=\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)$.

$$\left[A(\lambda)+B(\lambda)\right]\left[A(\lambda)+B(\lambda)\right]^*$$
$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]^*$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)^*+\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)^*\right]$$

$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$\left[\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$=\left[\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)+\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$\left[\left(\pi_n^{-1}(\lambda)\right)^*A^*(\lambda)\pi_n^*(\lambda)+\left(\pi_n^{-1}(\lambda)\right)^*B^*(\lambda)\pi_n^*(\lambda)\right]$$
$$=\left(\pi_n(\lambda)\right)^2A(\lambda)A^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2+\left(\pi_n(\lambda)\right)^2B(\lambda)A^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2+$$
$$+\left(\pi_n(\lambda)\right)^2A(\lambda)B^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2+\left(\pi_n(\lambda)\right)^2B(\lambda)B^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^2$$
$$=\pi_n(\lambda)\left[\pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$
$$+\pi_n(\lambda)\left[\pi_n(\lambda)B(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]$$
$$+\pi_n(\lambda)\left[\pi_n(\lambda)A(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$
$$+\pi_n(\lambda)\left[\pi_n(\lambda)B(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right]\pi_n^{-1}(\lambda)$$

$$= \pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda) + \pi_n(\lambda)B(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda) + \pi_n(\lambda)A(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda) + \pi_n(\lambda)B(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)$$

$$= A(\lambda)A^*(\lambda) + B(\lambda)A^*(\lambda) + A(\lambda)B^*(\lambda) + B(\lambda)B^*(\lambda)$$

$$= A^*(\lambda)A(\lambda) + B(\lambda)A^*(\lambda) + A(\lambda)B^*(\lambda) + B^*(\lambda)B(\lambda)$$

$$= A^*(\lambda)\left[A(\lambda)+B(\lambda)\right] + B^*(\lambda)\left[A(\lambda)+B(\lambda)\right]$$

$$= \left[A^*(\lambda)+B^*(\lambda)\right]\left[A(\lambda)+B(\lambda)\right]$$

$$= \left[A(\lambda)+B(\lambda)\right]^*\left[A(\lambda)+B(\lambda)\right]$$

Hence, $A(\lambda)+B(\lambda)$ is a normal circulant polynomial matrix.

Theorem 2.5

Let $A(\lambda)$ and $B(\lambda)$ be normal circulant polynomial matrices and that $A(\lambda)B^*(\lambda) = B^*(\lambda)A(\lambda)$ and $A^*(\lambda)B(\lambda) = B(\lambda)A^*(\lambda)$. Then $A(\lambda)B(\lambda)$ is a normal circulant polynomial matrix.

Proof

Let $A(\lambda)$ and $B(\lambda)$ be normal circulant polynomial matrices and that $A(\lambda)B^*(\lambda) = B^*(\lambda)A(\lambda)$ and $A^*(\lambda)B(\lambda) = B(\lambda)A^*(\lambda)$.

By using (3), we have $A(\lambda) = \pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)$.

$$\left[A(\lambda)B(\lambda)\right]\left[A(\lambda)B(\lambda)\right]^*$$

$$= \left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]^*$$

$$= \left[\pi_n(\lambda)A(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]\left[\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)^* + \left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)^*\right]$$

$$= \left[\pi_n(\lambda)A(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right]\left[\left(\pi_n^{-1}(\lambda)\right)^* B^*(\lambda)\pi_n^*(\lambda)\left(\pi_n^{-1}(\lambda)\right)^* A^*(\lambda)\pi_n^*(\lambda)\right]$$

$$= \pi_n(\lambda)A(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\pi_n(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)$$

$$= \pi_n(\lambda)A(\lambda)B(\lambda)B^*(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)$$

$$= A(\lambda)B(\lambda)B^*(\lambda)A^*(\lambda)$$

$$= A(\lambda)B^*(\lambda)B(\lambda)A^*(\lambda)$$

$$= B^*(\lambda)A(\lambda)B(\lambda)A^*(\lambda)$$

$$= B^*(\lambda)A(\lambda)A^*(\lambda)B(\lambda)$$

$$= B^*(\lambda)A^*(\lambda)A(\lambda)B(\lambda)$$

$$= \left(A(\lambda)B(\lambda)\right)^*\left(A(\lambda)B(\lambda)\right)$$

Hence, $A(\lambda)B(\lambda)$ is a normal circulant polynomial matrix.

Theorem 2.6

If $A(\lambda)$ and $B(\lambda)$ are normal circulant polynomial matrices, then so is $A(\lambda)\otimes B(\lambda)$.

Proof

Given that $A(\lambda)$ and $B(\lambda)$ are normal circulant polynomial matrices.

We have to prove that $A(\lambda)\otimes B(\lambda)$ is a circulant polynomial matrix

$$\left(A(\lambda)\otimes B(\lambda)\right)\left(A(\lambda)\otimes B(\lambda)\right)^* = \left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\otimes\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\otimes\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]^*$$

$$= \left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\otimes\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)^*\otimes\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)^*\right]$$

$$= \left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\otimes\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]\left[\left(\left(\pi_n^{-1}(\lambda)\right)^* A^*(\lambda)\pi_n^*(\lambda)\right)\otimes\left(\left(\pi_n^{-1}(\lambda)\right)^* B^*(\lambda)\pi_n^*(\lambda)\right)\right]$$

$$= \left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\otimes\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\right]\left[\left(\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right)\otimes\left(\pi_n(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right)\right]$$

$$=\left[\left(\pi_n(\lambda)A(\lambda)\pi_n^{-1}(\lambda)\right)\left(\pi_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right)\right]\otimes \left[\left(\pi_n(\lambda)B(\lambda)\pi_n^{-1}(\lambda)\right)\left(\pi_n(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right)\right]$$

$$=\left[\left(\pi_n(\lambda)A(\lambda)I_n(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right)\right]\otimes \left[\left(\pi_n(\lambda)B(\lambda)I_n(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right)\right]$$

$$=\left[\pi_n(\lambda)A(\lambda)A^*(\lambda)\pi_n^{-1}(\lambda)\right]\otimes \left[\left(\pi_n(\lambda)B(\lambda)B^*(\lambda)\pi_n^{-1}(\lambda)\right)\right]$$

$$=\left(A(\lambda)A^*(\lambda)\right)\otimes\left(B(\lambda)B^*(\lambda)\right)$$

$$=\left(A^*(\lambda)A(\lambda)\right)\otimes\left(B^*(\lambda)B(\lambda)\right)$$

$$=\left(A^*(\lambda)\otimes B^*(\lambda)\right)\left(A(\lambda)\otimes B(\lambda)\right)$$

$$=\left(A(\lambda)\otimes B(\lambda)\right)^*\left(A(\lambda)\otimes B(\lambda)\right)$$

Hence, $A(\lambda)\otimes B(\lambda)$ is a normal circulant polynomial matrix.

Conclusion

Some of the properties of normal circulant polynomial matrices are discussed here. All other properties can also be extended in a similar way.

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A T-TEST ANALYSIS OF DEMOGRAPHIC PREDICTORS OF EMOTIONAL INTELLIGENCE: A STUDY ON THE HEALTHCARE EMPLOYEES OF HARYANA

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ABSTRACT

Introduction: *Emotions have a strong impact on the relationships at personal and professional level. Most valuable employees are those who have strong emotional intelligence. People with strong emotional intelligence is highly required in the field of nursing.*

Objectives: *The primary objective of the study is to identify the influence of age and gender on emotional intelligence.*

Method: *Structured questionnaire was used to collect the data from the 100 nurses from different hospitals of Haryana State. The data was collected from different age groups through non-probability convenience sampling technique. Further, collected data was statistically analyzed using SPSS, t-test.*

Result: *It is shown from the study that gender has no influence on the emotional intelligence of the employees working in different hospitals. However, it is also found from the results that female employees are more socially aware than the male employees. Age in comparison to emotional intelligence has significant difference.*

Conclusion: *It can be concluded that gender has no influence on the emotional intelligence. However, study reveals that as the age increases, nurses become more emotionally intelligent.*

Keywords: *Age, Demographic variables, Emotions, Emotional Intelligence, Gender*

Introduction

Emotions are the important traits in service industry. In nursing emotions build and cultivate relationships. Emotions have a strong impact on relationships at interpersonal and professional level. Even in some of the famous organizations most valued employees are those who have traits of emotional intelligence or those who are emotionally who are emotionally capable to handle any situation. In today's competitive era, emotional intelligence is very much required for the success of the organization. In fact some of the successful persons with higher IQ (Intelligence Quotient) fails in their professional life because they lack emotional intelligence in them.

Emotional intelligence is popularly known as EI. It is an ability of the person who is capable to identify, express and control his own emotions and also the emotions of others.[1]Mayer and Salovey describe emotional intelligence as an ability of a person to perceive, understand and control emotions in such a way that promote his growth. Goleman defined emotional intelligence as ability to know and control different types of emotions in different situations. He further explained that it is a personal trait of a person that makes him aware and regulate about his/her emotions and about others too.

Objective of the study

To identify the influence of age and gender on emotional intelligence.

Hypothesis of the Study

H01: There is no significant influence on the level of emotional Intelligence on the basis of age

H02 There is no significant influence on the level of emotional Intelligence on the basis of gender

Review of Literature

There are some studies in late 1990's, that shows older person possessed higher emotional intelligence as compared to the person who is younger, it also concluded that emotional intelligence of the person increases with the increase in their age.[2] The particular finding of the research was further supported by various studies conducted on emotional intelligence.[3] However, gender plays an important role in the level of emotional intelligence. Gender means how a woman and man creates their behavior There are numerous literature reviews that supports the idea if gender influence on emotional intelligence level.[4]It has been explained in their research that women are more skillful as compared to men.[5] Further in this, has also supported the results of Hargie et al. (1995).[6] In continuation to the above research, some researchers concluded that women are much more complex and more clearly expressed their emotions than men.[7]However further explained in his research that female

employees are more emotionally intelligent than male employees. He further revealed that emotional intelligence increases with the increases in the level of education.[8]Researcher conducted a study on bank employees and revealed that there is no role of demographic variables on emotional intelligence.[9] Papathanassiou et al.(2014) conducted a study on Greek employees that explained demographic variables such as age, gender, marital status of the employees affect the level of emotional intelligence among them.[10] A study concluded on retail employees revealed a significant difference on female employees score were high than male employees.[11] Researcher also supported the findings that in service sector female employees score higher level of emotional intelligence than male employees.[12] Age is related with the person's ability to be socially connected & adaptable .[13]They further elaborate in their study that older person are much more flexible & adaptable towards the societal changes as they have much experience in terms of numbers of age. So they are much more flexible with relation to their emotions. A study on lectures working in polytechnic concluded that emotional intelligence of the people increases with age up to 50 years and subject to decreases beyond 50 years. [14]Further a study on adults of China & USA that showed a positive relation between self-emotions & Self-regulation and same is negatively related with appraisal & use of emotions with others.[15]

Research Methodology

(i) Procedure & Methods

This study was conducted to know the impact of age and gender on emotional intelligence of the employees of health sector in Haryana. This research was conducted on the nurses on various hospitals in Haryana. The data was collected through structured questionnaire. The Questionnaire was divided into sections. The first section of the questionnaire was related with the demographic details of the respondents and the second part of the questionnaire was related with the emotional intelligence of the respondents under study.

(ii) Sample and Sampling Techniques

For the research 100 nurses were elected from the different hospitals of Haryana State. The data was collected through non -probability convenience sampling. Further the collected data was categories in different categories according to their age i.e. up-to 30years, 31-40 years and 51 and above.

(iii) Questionnaire/Tool used

The study was done by a self-constructed questionnaire that is divided into two parts. Part A of the questionnaire was related with the demographic information of the respondents and Part B was related with the Emotional intelligence. Emotional intelligence scale measure six factors of EI. These factors were Self-awareness, Self-Management, social-awareness, Relationship Management, social- competence and commitment

Data Analysis & interpretations

Analysis of EI (Emotional intelligence) with respect to gender:

To check the impact of Gender on dimensions of emotional intelligence, T-Test is used:

Group Statistics for Gender in comparison with EI

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Factor 1 Self Awareness	Male	4	4.6500	.30000	.15000
	Female	96	4.5583	.36002	.03674
Factor 2 Self-Management	Male	4	4.4643	.29451	.14725
	Female	96	4.3765	.24272	.02477
Factor 3 Social Awareness	Male	4	4.6000	.36515	.18257
	Female	96	4.0583	.46423	.04738
Factor 4 Relationship Management	Male	4	4.6250	.25000	.12500
	Female	96	4.4115	.23189	.02367
Factor 5 Social	Male	4	4.6250	.15957	.07979

Competence	Female	96	4.6753	.24823	.02534
Factor 6 Commitment	Male	4	4.9000	.11547	.05774
	Female	96	4.7354	.16286	.01662

Independent Samples T-Test for gender in comparison with EI

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Factor 1 Self Awareness	Equal variances assumed	1.547	.217	.501	98	.617	.09167	.18286	-.27121	.45455
	Equal variances not assumed			.594	3.370	.590	.09167	.15443	-.37062	.55396
Factor 2 Self-Management	Equal variances assumed	.703	.404	.704	98	.483	.08780	.12475	-.15977	.33537
	Equal variances not assumed			.588	3.172	.596	.08780	.14932	-.37315	.54875
Factor 3 Social Awareness	Equal variances assumed	.338	.562	2.300	98	.024	.54167	.23551	.07430	1.00904
	Equal variances not assumed			2.872	3.417	.055	.54167	.18862	-.01921	1.10254
Factor 4 Relationship Management	Equal variances assumed	.362	.549	1.800	98	.075	.21354	.11863	-.02188	.44896
	Equal variances not assumed			1.679	3.219	.186	.21354	.12722	-.17620	.60328
Factor 5 Social Competence	Equal variances assumed	.828	.365	-.401	98	.689	-.05035	.12553	-.29946	.19877

	Equal variances not assumed			-.601	3.634	.583	-.05035	.08371	-.29229	.19159
Factor 6 Commitment	Equal variances assumed	.199	.656	1.996	98	.049	.16458	.08247	.00092	.32825
	Equal variances not assumed			2.739	3.517	.060	.16458	.06008	-.01166	.34082

According to the significance of two tailed values factor 3 i.e., social awareness, factor 6 i.e., commitment is less than .05therefore there is significant difference in the opinion of male and female in term of social awareness and commitment. For the remaining factors the significance two tailed values is more than .05 hence there is no significant difference in the opinion of male and female in terms of Self -awareness, self - management, relationship management and social competence.

In Factor 1, Sig. 2-tailed value is 0.617. Hence, there is no significant difference in the opinion of male and female in terms of self-awareness.

Similarly, Sig. 2-tailed value is 0.024, which is less than 0.05. Hence, there is a significant difference in the opinion of male and female in terms of social awareness.

Analysis of Emotional intelligence with respect to Age:

To check the impact of Age on emotional intelligence t-Test was used:

Group Statistics in relation to age in comparison with EI

	Age	N	Mean	Std. Deviation	Std. Error Mean
Factor 1 Self Awareness	upto 30 yr	43	4.8140	.35023	.05341
	31-40 yrs	56	4.3750	.21930	.02930
Factor 2 Self-Management	upto 30 yr	43	4.2924	.29069	.04433
	31-40 yrs	56	4.4413	.17502	.02339
Factor 3 Social Awareness	upto 30 yr	43	3.7907	.54851	.08365
	31-40 yrs	56	4.3000	.23510	.03142
Factor 4 Relationship Management	upto 30 yr	43	4.4806	.27986	.04268
	31-40 yrs	56	4.3750	.18600	.02486
Factor 5 Social Competence	upto 30 yr	43	4.5078	.28395	.04330
	31-40 yrs	56	4.7976	.09382	.01254
Factor 6 Commitment	upto 30 yr	43	4.6372	.19642	.02995
	31-40 yrs	56	4.8179	.05755	.00769

Independent Samples T-Test for Age comparison with EI

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Factor 1 Self Awareness	Equal variances assumed	2.173	.144	7.636	97	.000	.43895	.05749	.32486	.55305
	Equal variances not assumed			7.205	66.493	.000	.43895	.06092	.31734	.56057
Factor 2 Self-Management	Equal variances assumed	21.619	.000	-3.163	97	.002	-.14897	.04710	-.24245	-.05549
	Equal variances not assumed			-2.972	64.801	.004	-.14897	.05012	-.24907	-.04886
Factor 3 Social Awareness	Equal variances assumed	56.440	.000	-6.248	97	.000	-.50930	.08151	-.67108	-.34752
	Equal variances not assumed			-5.700	53.867	.000	-.50930	.08935	-.68845	-.33015
Factor 4 Relationship Management	Equal variances assumed	17.200	.000	2.251	97	.027	.10562	.04691	.01251	.19873
	Equal variances not assumed			2.139	69.241	.036	.10562	.04939	.00710	.20414
Factor 5 Social Competence	Equal variances assumed	8.807	.004	-7.157	97	.000	-.28987	.04050	-.37025	-.20948
	Equal variances not assumed			-6.430	49.074	.000	-.28987	.04508	-.38046	-.19928
Factor 6 Commitment	Equal variances assumed	21.911	.000	-6.535	97	.000	-.18065	.02764	-.23551	-.12579
	Equal variances not assumed			-5.841	47.561	.000	-.18065	.03093	-.24284	-.11845

Interpretation:

The significance value for all factors is less than.05 so there is significant different in the opinion of people of different age group with respect to emotional intelligence. Although all values of factors are less than .05 but in

Relationship Management it is .036 that means there is less variance between the age group as compare to other factors. In spite of any difference in age the relationship with the patients and colleagues has less variance that means male and female employees has more or less same level of emotional intelligence with regard to their relationship with patients and with co-workers.

Conclusion

It may be concluded from the above analysis that Gender has no such influence on the emotional intelligence of the employees, however females are more socially aware as compare to male's employees. Emotional intelligence level of female employees are more than the male employees. Age with relation to emotional intelligence has a significant difference, that shows nurses with different age group has different level of emotional intelligence. However, study also reveals that as the age of the nurse increase they become more emotionally intelligent that somehow related with more experience that helps them to handle patients effectively and also their relationship with colleagues much smartly. Emotional intelligence area needs more attention and research as it has a direct impact on the behavior of the employees.

Author's contribution:

Nidhi Punj-Conceptualization, Methodology, Questionnaire, data collection, writing, reviewing and editing Dr.Priyanka Ranga-Data Analysis

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TO STUDY ABOUT VARIOUS YARDSTICKS PARAMETERS TO APPRAISE NURSING TRAITS IN HEALTH CARE INDUSTRY

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ABSTRACT

Patient satisfaction must consider as a vital element in effectiveness in health care industry. It must be taken into account when decisions are being made about changes for enhancements in health care services. Now in this new era patient satisfaction has become the yardstick parameter of assessing quality in nursing care. Patient satisfaction has become increasingly accepted element, as a critical factor in the measurement of quality of care in any health care organisation. Satisfaction can be treat as one of the best outcome for healthcare sitting which is more important and desirable for any health care provider. Patient Satisfaction with health care sitting is measure with a long history in the social science and its impact on patient behaviour. In a health care system nursing service can consider as one of the most important components of health care service. To make a better understanding how things are looking through the patient's eye should be consider as central part of quality improvement. The extent of patient satisfaction with nursing care will be a major indicator of quality of care provided by health care provider. Patient satisfaction is a broad term and having large area that can be interpreted differently by patients. Patient satisfaction meaning can also differ for one patient at different times in different situation. Patient's satisfaction must treat as an outcome measure of healthcare providers. A satisfied patient will be more willing to recommend the hospital that provides his or her care to others. Hence, it will be beneficial for that health care organisation. Patients are in the practice of giving high rates value on the interpersonal care provided by the nursing staff. In a health care system consumers demand high quality care, and one parameter of quality is patient's satisfaction. Patient's satisfaction can consider as important indicator of quality of care from patient's perspective as well as from health care service provider. Patient's satisfaction is the patient's evaluation of their cognitive and emotional reaction. It is a product of interaction between patient's expectation regarding ideal nursing care and their perceptions of actual nursing care. Core function of nursing care is to promote health and to provide support to patients, educate, motivate and develop patient by implementing his or her own perception and organisational resources. The quality of nursing care provided by nursing is regarded as most yardstick factor in assessment of patient satisfaction with health care provider. If patients are satisfied with health care received then it can treat as a motivating factor not only for individual but also for nurse and entire health care organization.

Concept of patient satisfaction

In a health care system Patients are those consumers who don't come with their own wish. We can able to delight and make an effort to persuade a general consumer by the way Advertisement and promotional activities and it will create a utility for them. But in other side a consumer of health care services is full of pain. Hence, patients will need more in term of satisfaction. In a health care sitting when patient will satisfy than they can have a good mouth of word for that health care provider. Thus they can contribute in increasing health organisation goodwill it will help in gaining more customers. Patient satisfaction will depends on various critical factors within and outside organisation. These factors will have a great impact on patient satisfaction which can vary according to situations.

Background of the study

Nursing consider as a career, which required certain special qualities. Florence Nightingale is considered as the founder of modern nursing. She assesses and described in her notes on nursing about the characteristics and traits of a nurse. She says "A nurse must be having traits like; no gossip, no vain talker and strictly sober and honest; but more than this, she must be devoted woman, she must have respect for her calling, she must be a sound, a close and a quick observer, and she must be a woman of dedicating nature and decent feeling". According to the American Nurses Association, "Nursing practice can be view as direct service; it is goal directed and need adaption to the needs of the individual, the family and community during health and illness. The nurse's primary responsibility is to those people who are in discomfort and require nursing care. Nursing care play a crucial role in patient satisfaction, patient satisfaction consider as an important measure of quality care. Healthcare service providers are interested in maintaining high levels of satisfaction in order. The core parameters for

assessment of patient satisfaction with nursing care are to explore area for improvement. During the process of hospitalization in a health care unit patient's satisfaction define a balance between patient's perception and exceptions of their nursing care. Patient's satisfaction is considered as important out come to measure. It is accepted as standard measure of quality of care and a core aspect of health care system. In a health care system nurse plays various roles in different inter related roles: - as care giver, advocate, critical thinker, act as a teacher, communicator, act as manager, researcher & rehabilitator. Patient satisfaction with nursing care will be correlated with overall satisfaction care. Patient's expectation of nursing care will play a important role. Patient's perception of actual nurse behaviour and characteristics will have strong impact on patient satisfaction. Nursing can be described as a process of recognizing; understanding and meeting health needs of patients. Nursing staff are working in a constantly changing the situations. In a health care sitting Nursing staff members and Doctors perceptions about good quality of care do not always agree with patients. Nursing can be treating as a responsible profession that will guided by science, theory, code of ethics and the art of care in efficient and effective manner. Nursing staff members comfort to treat human responses to health and ill. Patient's satisfaction with nursing care is considered as an important factor while explaining patient's perception and attitude of service quality. In a hospital nursing work environment and scope will be both directly and indirectly related to patient's satisfaction. Patient's satisfaction can be defined as an outcome measure of quality nursing care. In a health care sitting key determinants quality of nursing care will include: adequate human skill, caring attitudes, effective communication, efficient organizational and management systems, and effective participation in management will be consider as competent traits in nursing..

Need and significance of the study

Nursing care is considered as an area that subjected to competition, in a health care system the patient is seen both as a client and consumer of health care service. To make improvement in quality of nursing care, nurses need to know and explore the factors that have influence on patient satisfactions. Nursing care will play the key role in providing satisfaction in all aspect. Quality of nursing care is very important to patient need and safety. Patient satisfaction with nursing care will be strongly co-related with patients overall satisfaction with healthcare unit experience. In a hospital to make service improvement, firstly to understand factors which have influence on patient satisfaction with nursing cares. The assessment of patient satisfaction with nursing care play a vital role in determining and meeting patient's need in terms of care .

Statement of the problem

To study about various yardsticks parameters to appraise nursing traits in health care industry

Objectives of the study

To study various behaviour aspect of nursing care that influence patient satisfaction.

Literature review

Studies on patient satisfaction with nursing care

Findik et al., (2010) has been conducted a cross sectional study in an 1100 bed hospital in Turkey. The aim of the study was to assess patient satisfaction with nursing care. Study tries to define relationship between patient satisfaction and nursing care. In a health care sitting while the type of ward, sex, income, and education independently affected the satisfaction with Nursing Care Scale

Wagner [2009] conducted a study on patient satisfaction with nursing care. In his study he used a nursing model to measure patient satisfaction with nursing and clarify this concept. The aim of the study was to make a concept analysis of patient satisfaction with nursing care. Using a nursing model to measure patient satisfaction with nursing care delineates the concept from other parameters of patient satisfaction

Laschinger et al; [2005] has conducted a study on a psychometric analysis of patient satisfaction with nursing care. Questionnaire on quality was an actionable approach to measuring satisfaction. Patient satisfaction

with nursing care quality consider as an important indicator of quality of care provided in hospitals. The result of this study yielded actionable, patient-focused. These results can be used by managers to address areas requiring improvement.

Yildirim et al (2005) in his study identified the factors that associated with Patient satisfaction and dissatisfaction .Author tries to explore the demographic characteristics. The major cause of dissatisfaction with service providers was lengthy waiting time (27%)

Fahad [2005] conducted a survey study of a random sample of 420 patients to determine the extent of patient satisfaction with care provided at hospital. Overall patient satisfaction was linked with quality nursing care. Quality of leadership practiced at the institution play a significant role.

Johansson et al., [2002] has conducted a study on patient satisfaction with nursing care in the context of health care. The aim of this study was to describe and assess the influence on patient satisfaction with regard to nursing care in the context of health care.

O" Connel et al., [2002] has conducted a descriptive study on patient satisfaction with nursing care in two acute care surgical wards, using a revised 28- item La Monica- Oberst patient satisfaction scale with the help of telephone interviews.

Lindgren et al., [2011] conducted a prospective study on the Karen instruments for measuring quality of nursing care. Study area was medical and surgical wards at a hospital in Sweden. The objective of this study was to make further development in the instruments with regard to construct validity and internal consistency,

Lucero et al.,[2010] author tries to explain in his study that Nursing care quality and adverse events in US hospitals. To examine the association between nurses' reports of unmet nursing care needs. Author explains reports of patients' receipt of the wrong medication.

Lynn et al., [2007] conducted a study on Understanding of patients and measuring patients' assessment of the quality of nursing care. The objective of the study was to develop the Patient's Assessment of Quality Scale--Acute Care Version (PAQSACV). It provides a mechanism through which patients can evaluate meaningfully the nursing care they receive from a health care sitting.

Mrayyan et al., [2006] conducted a descriptive, cross-sectional, comparative design to assess Jordanian nurses. Author tries to explore job satisfaction, patient's satisfaction and quality of nursing care.

Muntlin et al., [2006] has conducted a prospective, descriptive survey, to identify patient's perceptions of quality of care at an emergency department. Study tries to find areas for quality improvement. Study design was adopted and the study took place in one emergency department at a Swedish university hospital in 2002.

Uys et al., [2004] has conducted a study on a Survey of the quality of nursing care in three health districts in South Africa from March to August 2002. The aim of this study was to explain and compare the quality of nursing service and care in three health districts in the KwaZulu Natal Province

Yim et al., [2008] has conducted a study on Evaluation of the satisfaction and usefulness of a web-based educational program. Study was conducted on breast cancer patients to evaluate the effectiveness of a web-based breast cancer educational program. This was consists of special features such as flash animations and online counselling as well as different categories of information on breast cancer.

Chang et al., [2003] has conducted a study on the impact of demographic variables and ward type on old age patients. Patient's perception about needs and satisfaction were observed during acute hospitalization. Aim of study was to determine whether demographic characteristics of patients such as age, gender and cultural background were associated. These are different perceptions of the importance and satisfaction with various aspects of nursing care.

Foss [2002] has conducted a study on Gender-related difference in patient satisfaction. Gender related difference with quality of nursing care. During the study researcher was using data from a Norwegian survey of patient-satisfaction.

Summary

From the literature reviewed, it is found that there many factors which have influence on patient satisfaction with quality of nursing care like age, gender difference etc.

Three key factor of patient satisfaction

1. Comfort
2. Care
3. Cure
4. In a health care sitting these three factors are playing a vital role in measuring patient satisfaction. If we think about general consumers they will be thinking only utility and its consumption. But in other side patients are in distress situation and want to get out from that painful situation. So, patients will have more expectations towards service provider. Hence to increase their satisfaction level, consumer's health care providers should focus on these aspects as well. If health care service providers will able to do well on these parameters then they can able to retain their consumers in an effective way. In a health care system each and every patient has certain kind of expectations towards facilities that he/she will receive from service provider. Hence, we can say that primary need of any health care provider is to satisfy their patients in a desired manner.

Care

Care can also consider as a important factor that have much influence on patient satisfaction. As we know each human being need some kind of care from other living being. But in this segment a patient will need much more care from health care system. Because as we are aware that patients are in distress, so patient except a better care from health care providers. The primary and secondary function of hospital can consider as patient care.

Cure

Cure is the most important and crucial factor from patients perspective. In a health care system each and every patient wants to get cure from diseases. To getting cure from diseases is an ultimate goal of every patient. Thus health care service providers consider these factors as a satisfaction tool for their customers. It will be beneficial for their organisation.

Factors that influence nursing care service quality

Attitude:

We can describe attitude as 'the way' you respond to any stimulation. In a hospital patient will face various kinds of problems. Patients usually ask various questions to nursing staff. In this situation attitude play will a vital role. Nursing staff member will have to respond in a positive manner. Their attitude will have impact on patient's satisfaction. Hence, to increase the level of patient satisfaction health care service providers must work on attitude.

Perception.

Perception can be defined as 'the way you think' .when we talk about patient satisfaction with nursing care then perception play a vital role and strongly correlated with satisfaction level. Nurse's staff members will have to think in positive manner. If they will have good perception only then they will be able to respond in a well desired manner. So, nursing staff members have to work on perception. Nursing staff can consider as a bridge between medical treatment and patients.

Knowledge

Knowledge can also consider as a critical factor for assessment of patient satisfaction towards nursing care. If nursing staff will sound well in term of knowledge then they will able to handle patients in a well and effective manner.

Skills

Skills can be defined as the 'ability to do something in a well manner. In a health care sitting nursing staff must be skill full. Nurse staff members will have to face various situations in a health care system; they must be aware that how to handle various situations in different conditioning. Hence skills of nurses will also have a great impact on patient satisfaction

Communication

The way you communicate is also having impact on effectiveness of any individual and organisation. Nursing staff have to communicate with patients in a regular manner. If their communication is good then it will have a positive impression on patients. Otherwise it will lead to dissatisfaction for

patients. So health care service provider need to be work on communication skills.

Courteous nature

Courteous nature is a key element in human personality; it will have positive impact on their attitude, perception, behaviour. In a health care sitting or in hospital we will able to find that patients are in full of pain. Hence, they will need care and love from staff members. In this regard nursing staff members have to show courteous nature towards their patients concern. It will be helpful in increase the satisfaction level of patients in a desired level.

Value

Values are a important aspect of human behaviour, in a health care system nursing staff members have to focus. Because if you are a men of value, then it will lead to a good perception of yours in others mind. Value plays an important role in character formation in a positive manner. Hence by increasing good moral values we can increase satisfaction level of patients up to a desired level.

Ethics

Ethics can be defined as 'your belief about just – unjust, Wright-wrong, good-bad. In a hospital all work force must work in an ethical manner to achieve desired effective results. If we talk about nursing staff, they must show ethical behaviour while dealing patients concern. It will lead to increase satisfaction level of patients.

Harmony

Harmony plays a vital role in shaping individual personality. Act in a well harmony manner will raise morale. It will help in creating a better environment. Nursing staff has to communicate with patient in a regular manner and try to create harmony in the process.

Tolerance

Nursing staff must have another trait that is tolerance capabilities. Nurses have to deal with patients who are in full of pain. Patients need more in term of care, comfort and quality of service. Hence nursing care staff must show good tolerance power.

Motivation

Motivation is also consider as an important factor of nursing staff traits. Nursing staff has to communicate with patients on regular basis. They must try to motivate patients and it will lead to increase satisfaction level. So, nursing staff members must try to learn about motivating skills.

Recommendations

The following recommendations were made for future research.

1. Similar study can be repeated in other intensive care units and in emergency ward.

Conclusion

From above study we can make following decisions.

The primary function of hospital is patient care and cure. The patients can consider as the ultimate consumer to the hospital. The level of the patient satisfaction is the real testimony to the efficiency of hospital administration. Hence, it is the responsibility of the hospital management, "put yourself in your patient's shoes," Top service hospitals are to be patient obsessed. In this regard nursing care is a vital parameter.

1. In a health care system Culture, subculture and social classes are important in determining the satisfaction levels. Culture can treat as fundamental determent of an individual's wants and behaviour. It refers to set of feeling of the patient or his relatives.
2. Social class, sex, income, occupation and education are some important factors in determining the satisfaction levels.
3. Patient satisfaction is greatly influenced by social factor like ideas, beliefs, and social environment. The patient satisfaction is influenced by the psychological factor such as perception, learning and attitudes.
4. Apart from the above, others factors that influences the patient satisfaction include availability of adequate staff, availability of physical facilities and equipment, design of the wards, cleanness, environment.

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LACTATIONAL COUNSELLING ON BREAST FEEDING BEHAVIOR AND BREASTFEEDING PROBLEM AMONG POSTNATAL MOTHERS: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Background:

Breast milk is the healthiest diet for a newborn, and nothing comes close to producing all of the nutrients that a child will require later in life. Pregnancy is one of the most transformative experiences a woman can have. Feeding counseling can assist a mother in gaining confidence while also recognizing their unique circumstances and preferences. The Counsel can make women overcome obstacles and avoid feeding concerns and care behaviors that interfere with effective breastfeeding.

Methods:

Non- equivalent control group design to evaluate the effectiveness of lactational counseling on breastfeeding behavior & breastfeeding problems among primi postnatal mothers & to find out the association between breastfeeding behavior & breastfeeding problems among primi postnatal mothers with selected variables.

Results

The mean post breastfeeding behavior score of primi postnatal mothers on day 1, 2, & 3 (13.33, 13.96 & 14.56) in the interventional group is significantly higher than the post breastfeeding behavior score in the control group. The mean post breastfeeding problem score of primi postnatal mothers on days 1, 2, & 3 (1.5, 1.06, 0.66) in the interventional group is significantly lower than the post breastfeeding problem score in control group. The mean difference on day 1, 2 & 3 (1.16, 1.7, & 2.26), standard deviation difference is 0.06, 0.20, & 1.30 respectively.

Conclusion

Hence, it can be concluded that lactational counselling was effective in improving in breastfeeding behavior and decrease breastfeeding problem of primi postnatal mothers in interventional group.

Key Words: *Lactational counselling, primi postnatal mothers, effectiveness, breastfeeding behavior, breastfeeding problems.*

Background

Pregnancy is a precious, memorable, and seldom pleasant moment in a mother's pregnancy since it demonstrates her great creative and nurturing talents while also acting as a bridge to the future. Pregnancy is not without its costs. In order to best support the health of her future child, a pregnant lady must be a responsible woman. When a woman is modelling a baby, she is immediately confronted with a plethora of options. These choices include where to take the child to day care, what kind of diapers to use, and which doctor to compel them to see. One of the most crucial decisions to make is whether or not to breastfeed. Breastfeeding has a number of advantages, according to doctors and nurses around the country. These advantages are not only helpful to the kid, but also to the mother.

It should be commenced within the first hour after birth, maintained for 6 months entirely, then continued for another two years or longer with the provision of safe and suitable supplementary meals. Improving worldwide breastfeeding rates has the potential to save the lives of 820,000 children below the age of five annually, with the majority (87%) under the age of six months. Breastfeeding promotion and assistance is a global goal that is also critical for diminishing new born death rates and ensuring child survival. Because of a lack of information and conviction in a mother's ability to breastfeed, the WHO encourages exclusive breastfeeding, breast engorgement, breast pain, insufficient milk supply, improper growth and development of the infant are some reason behind the early discontinuation of breastfeeding.

Professional counselling services can ensure that women and families get this support, as well as the facts, guidance, and comfort they need to properly nurture their kids. Feeding counselling can assist mother in gaining confidence while also recognising their unique circumstances and preferences. The Counsel can make women overcome obstacles and avoid feeding concerns and care behaviors that interfere with effective breastfeeding, such as providing babies and

young children with unneeded drinks, meals, and breast milk replacement. So, this problem can be prevented by giving counsel.

Methods:

Research approach: - Quantitative research approach

Research Design: Post-test only non-equivalent control group design

Table 1 Schematic presentation of research design

GROUP	**INTERVENTION (DAY1)**	**POST TEST**		
		1ST DAY	**2ND DAY**	**3RD DAY**
Interventional group (Primi postnatal mothers) N = 60	Lactational counselling Session on breastfeeding behavior and breastfeeding problem and its management among primi postnatal mothers	Administration of structured interview schedule for post-test to evaluate -Breastfeeding behavior -Breastfeeding problem	Administration of structured interview schedule for post-test to evaluate -Breastfeeding behavior -Breastfeeding problem	Administration of structured interview schedule for post-testto evaluate -Breastfeeding behavior -Breastfeeding problem
Control group	----------	Administration of structured interview schedule for post-test to evaluate -Breastfeeding behavior -Breastfeeding problem	Administration of structured interview schedule for post-test to evaluate -Breastfeeding behavior -Breastfeeding problem	Administration of structured interview schedule for post-testto evaluate -Breastfeeding behavior -Breastfeeding problem

Objective

- To evaluate the effectiveness of lactational counselling on breastfeeding behavior among primi postnatal mothers by comparing the finding of interventional and control group.
- To evaluate the effectiveness of lactational counselling on breastfeeding problems among primi postnatal mothers by comparing the findings of interventional and control group.
- To find out the association between the post interventional breastfeeding behavior score of primi postnatal mothers and selected demographic variables.
- To find out the association between the post interventional breastfeeding problem score of primi postnatal mothers and selected demographic variables.

Hypotheses of the Study

The following study hypotheses have been developed based on the objectives and literature review at the level of 0.05.

H1: There will be a significant improvement in the mean post interventional breastfeeding behavior of primi postnatal mothers in the interventional group after administration of lactational counselling and control group without administration of lactational counselling as compared by LATCH scale.

H2: There will be a significant decrease in the mean post interventional breastfeeding problem of primi postnatal mothers in the

interventional group after administration of lactational counselling and control group without administration of lactational counselling as compared by breastfeeding problem assessment scale at 0.05 level of significance.

H3: There will be a significant association between post interventional breastfeeding behavior of primi postnatal mothers and their selected demographic variables.

H4: There will be a significant association between post interventional breastfeeding problem of primi postnatal mothers and their selected demographic variables.

Variables

Independent Variable: it refers to the lactational counselling in the current study.

Dependent Variable: In the present study it refers to the breastfeeding behavior and breastfeeding problem.

Demographic Variable:

Demographic variables are features, properties, or characteristics of the research subject that are collected to describe the sample; these variables are also known as sample characteristics.

Age, education, religion, occupation, family type, family monthly income, place of residence, and previous knowledge of an illness were the demographic variables chosen for this study as well as their breastfeeding resource.

Setting of The Study

This study was conducted at SGT Hospital, Budhera road, and Signature Hospital, Gurugram, Haryana.

Sample

The sample for the main study is 60 primi postnatal mothers. (30 in interventional & 30 in control group).

In this study duration was from April 7, 2021 to May 3, 2021, those who were admitted to maternity and child health services met the requirements for inclusion criteria.

Sampling Technique

Purposive sampling technique.

Data Collection Procedure

The data was collected after obtaining the written informed consent of the sample and assured the confidentiality and anonymity of information provided by them. After obtaining the consent from the participants on day 1 lactational counselling session on breastfeeding behavior and breastfeeding problems and its management was administered to the group by using different type of AV aids only in the interventional group. The duration of the session was 30 – 40 minutes. Posttest of on breastfeeding behavior & breastfeeding problems and its management was administered to the both group (interventional & control). Structured interview schedule will be administered to collect the data about the demographic detail. Breastfeeding behavior scale (LATCH scale) and structured breastfeeding problems scale will be administered to collect the data about breastfeeding behavior and breastfeeding problems of primi postnatal mothers in both interventional and control group.

Result

- In the study and control groups, the majority (53.3%) and 60% of the samples are between the ages of 18 - 22, 36.6 percent and 30% of the samples were within the ages of 23 - 27, and 10% of the samples were only between the ages of 28 - 32.
- Educational status most of primi mothers 53.3% and 50% were primary education, 33.3% and 20% mothers were higher secondary education, 10% and 13.3% mothers were graduate, 1% and 16.6% mothers were illiterate in study and control group respectively.
- Religion to the most of sample 60% and 76.6% were Hindu, 26.6% were Muslim, 10% and 13.3% mothers were Christian, 3.33% and 10% mothers were Sikh in study and control group respectively.
- Maximum number of primi postnatal mothers 66.6% & 80% were house wife, followed by 16.6% and 10% were private employee, while 16.6% and 10% were self employee in interventional group and control group respectively.
- The type of family maximum number of primi mothers 70% and 56.6% were nuclear family, followed by 30% and 26.6% were joint family in study group and control group respectively.

- As per, monthly family income (in rupees), maximum number of sample 43.3% and 40% had monthly income range between 10001-15000 rupees, followed by 43.3% and 23.3% had monthly income range above 15000 rupees, and 13.3% and 36.6% had monthly income range between 5001-10000 rupees in experimental and control group respectively.
- Type of community majority of the sample 63.3% and 73.3% were rural area, followed by 36.6% and 26.6% were urban area in study group and control group respectively. Previous knowledge, maximum number of sample 80% and 86.6% had no previous knowledge followed by 20% and 13.3% had previous knowledge in interventional group and control group respectively.

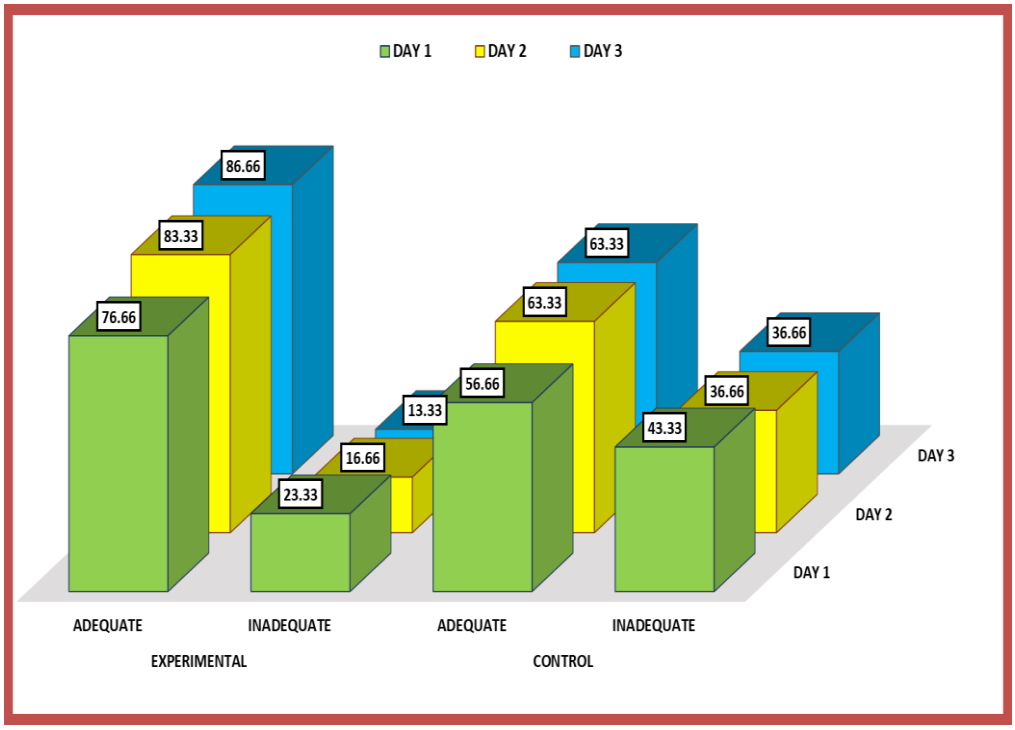

Fig.1 Bar graph showing the breastfeeding behavior in Interventional and Control group.

Fig 1 bar graph showed 76.66% of the sample inexperimental group had adequate breastfeeding behavior and 23.33% were having inadequate breastfeeding behavior during the first observation after giving lactational counselling. 83.33% of them had adequate breastfeeding and 16.66% were having inadequate breastfeeding behavior during second observation. And during third observation, 86.66% sample had adequate breastfeeding behavior and only 13.33% were having inadequate breastfeeding behavior in experimental group.

In Control group first observation 56.66 % sample were having adequate feeding behavior and 43.33% were having inadequate feeding behavior. During the second observation 63.33 % were having adequate feeding behavior and 36.66 % were having inadequate feeding behavior, during the third observation 63.33 % sample were having adequate feeding behavior and 36.66 % were having inadequate feeding behavior

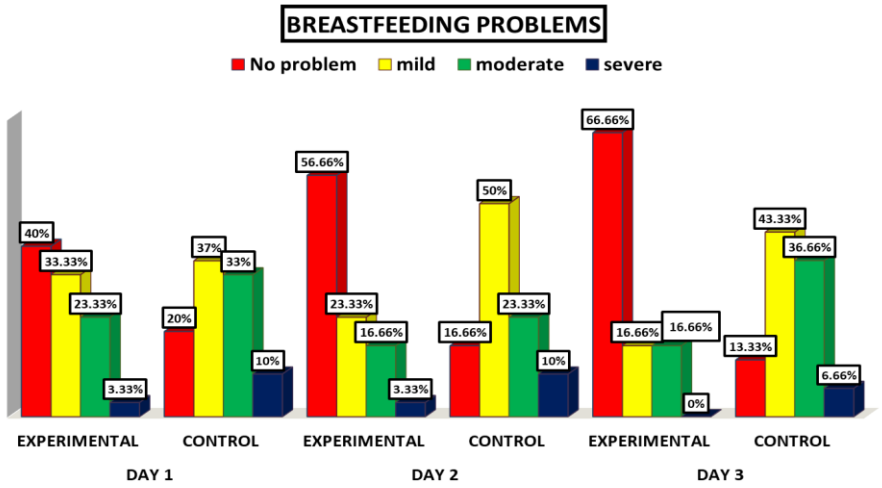

Fig.2 Distribution of Breastfeeding Problem Score

Fig. 2 Bar graph shows that during first observation 3.33% mothers were having severe problem, 23.33% were having moderate problem, 33.33% were having mild problem and 40% were having no problem after giving lactational counselling in experimental group. During second observation 3.33% mothers were having severe problem, 16.66% were having moderate problem, 23.33% were having mild problem and 56.66 % were having no problem. During third observation only 16.66% of the sample were having moderate problem, 16.66% were having mild problem and 66.66 % of the mothers having no problem in study group.

In control group first observation 10% mother were having severe problem and 33.33% were having moderate problem and 36.66 % were having mild problem and 20 % were having no problem in control group. Second observation 16.66% mothers were having severe problem and 23.33% were having moderate problem and 50 % were having mild problem and 16.66% were having no problem. Third observation 6.66 % were having sever problems and 36.66% were having moderate problem and 43.33 % of the sample were having mild problem and 13.33 % were having no problem.

TABLE: 2 Comparing of breastfeeding behavior in interventional and control group.

Group	Observation	Mean	Mean Difference	SD Difference	Experimental	Control	Table Value
					REPEATED ANOVA TEST (F value)		
Experimental	First	12.26					
Control	First	9.66	2.6	0.67			
Experimental	Second	12.93			17.77*	2.6	3.15
Control	Second	9.26	3.67	1.09			
Experimental	Third	13.46					
Control	Third	9.4	4.06	0.72			

Table 2. Shows the mean post breastfeeding behavior score in study & control group are 12.26 and 9.66. But in interventional group the mean breastfeeding behavior continue to increase, which present increase in breastfeeding behavior in interventional group after giving lactational counselling, as evident from breastfeeding behavior score of 12.26 & 13.46 first and third day respectively. The mean post breastfeeding behaviour score in the control group did not improve.

The mean post breastfeeding behaviour score of primi postnatal mothers on days 1, 2, and 3 (12.26, 12.93, and 13.46) in the study group is significantly higher than the post breastfeeding behaviour score of primi postnatal mothers on days 1, 2, and 3 (9.66, 9.26, and 9.4) in the control group. The mean difference on days 1, 2, and 3 (2.6, 3.67, and 4.06, respectively) is 0.67, 1.09, and 0.72, while the standard deviation difference is 0.67, 1.09, and 0.72. In the study group, the computed "F" value (17.77) for degree of freedom 58 was determined to be statistically significant at the 0.05 level. It is higher than the average of 3.15. As a result, it can be concluded that the difference in the mean post-breastfeeding behaviour of primi postnatal moms in the experimental and control groups is real and not accidental. As a result, the researcher dismissed the null hypothesis (H_{01}) in favour of the research hypothesis (H_1). Data indicates that lactational counselling is successful in enhancing postnatal mothers' breastfeeding behaviour.

Table 3. Comparing of breastfeeding problem in experimental and control group
n=60

Group	**Observation**	**Mean**	**Mean Difference**	**SD Difference**	**Experimental**	**Control**	**Table Value**
					Repeated ANOVA Test (F Value)		
Experimental	First	2.06	1.27	0.18	14.18*	2.40	3.15
Control	First	3.3					
Experimental	Second	1.66	1.84	0.25			
Control	Second	3.5					
Experimental	Third	1.16	2.5	0.35			
Control	Third	3.66					

Table 3 showed the mean post breastfeeding problem score of primi postnatal mothers on days 1, 2, and 3 (2.06, 1.66, 1.16) in the interventional group is significantly lower than the post breastfeeding problem score of primi postnatal mothers on days 1, 2, and 3 (3.33, 3.5, 3.66) in the control group.

The mean difference on day 1, 2 & 3 (1.27, 1.84, & 2.5), standard deviation difference is 0.18, 0.25, & 0.35 respectively. And in the interventional group, the computed "F" value (14.18) for degree of freedom 58 was determined to be statistically significant at the 0.05 level of significance. It is higher than the average of 3.15. As a result, it can be concluded that the difference in the mean post-breastfeeding problem score of primi postnatal women in the interventional and control groups is real and not coincidental. As a result, the researcher dismissed the null hypothesis (H_{02}) in favour of the research hypothesis (H_2). This demonstrates that lactational counselling is beneficial in addressing postnatal mother's breastfeeding problems.

Findings Related to Association of Post InterventionalBreastfeeding Behavior & breastfeeding problem with Selected Demographic Variables

The chi square value of age, education, religion, employment, family type, family monthly income, community type, and previous knowledge as tabulated value (x2=1.023), (x2=5.62), (x2=1.18),

(x2=.1.56), (x2=0.04), (x2=.574), (x2=.313), (x2=0.52) respectively.

At the 0.05 level of significance, the computed chi square values for the selected variables, such as age, religion, employment, family type, family monthly income, community type, and previous knowledge, are not significant with Breastfeeding Behavior. As a result, the researcher accepts the null hypothesis (H_{03}) and the research hypothesis was rejected (H_3).

The chi square value of age, education, religion, occupation, family type, family monthly income, community type, and previous knowledge as tabulated value (x2=2.83), (x2=5.62), (x2=2.65), (x2=3.75), (x2=0.40), (x2=3.55), (x2=1.29), (x2=0.52) respectively. At the 0.05 level of significance, the calculated chi square values for the other chosen variables, such as age, religion, employment, family type, family monthly income, community type, and previous knowledge, are not significant with breastfeeding problem. As a result, the researcher accepts the null hypothesis (H_{04}) and the research hypothesis was rejected (H_4).

DISCUSSION

The post breastfeeding behaviour score of primi postnatal mothers on days 1, 2, and 3 (12.26, 12.93, 13,46) in the study group is significantly greater than the post breastfeeding behaviour score of primi postnatal mothers on days 1, 2, and 3 (9.66, 9.26, 9.4) in the control group, according to the findings. In addition, there was a significant difference between the study and control groups' mean post-breastfeeding behaviour (F = 17.77, P,0.05).

The information presented above was compatible with the findings **by Ramesh Choudhary et al. (2015),** a quasi-experimental research on impact of lactational counselling regarding breastfeeding at tertiary care hospital of northern India. Breastfeeding start rates were substantially higher in the intervention group at discharge and follow-up. In the study participants, Prelacteal feed was substantially lower. Health care providers should take advantage of every chance for counselling in order to encourage breastfeeding.

The information presented above was compatible with the findings of a quasi - experimental research done by **Thomas Sindhu et al. (2018),** to evaluate the impact of antenatal lactational counselling on knowledge and breastfeeding practice among mothers. The findings suggest that moms in the study group had a mean post-test knowledge score of 23.32 percent compared to 13.58 percent in the control group at a p = 0.00 level. The study and control groups' mean post-test reported practise scores were 12.92 percent and 9.24 percent, respectively. Counseling has an incredibly role in improving breastfeeding knowledge and habits, according to the findings.

The information presented above was compatible with the findings of a quasi - experimental research, **Piro Safiya Sabri et al. (2018).**130 pregnant women were selected by randomized sampling techniques. A pre-designed investigation administered questionnaire was used to gather, evaluate, and record the study's data. The study's findings reveal that the interventional group's breastfeeding self-efficacy was considerably greater during pregnancy and two months after delivery. The second objective was to evaluate the effectiveness of lactational counselling on breastfeeding problems in study and control group.

The results of this study show that the post-breastfeeding problem score of primi postnatal mothers on days 1, 2, and 3 (2,06, 1.66, 1.16) in the study group is significantly lower than the post-breastfeeding problem score of primi postnatal mothers on days 1, 2, and 3 (3.3, 3,5, 3,66) in the control group, and that there is a significant variation among mean post-breastfeeding problem score.

The information presented above was compatible with the findings of a quasi - experimental research done **Reena, Rajeshwari et al. (2013)** to assess the effectiveness of lactational counselling on breast engorgement and newborn feeding behavior among 60 primigravida.. The findings showed substantial variation in breast engorgement and infant feeding behavior within primigravidae, with a p 0.001 significance level. The information presented above was compatible with the findings of a

quasi - experimental research done by **Thakur S, Gomathi B, Kanchan B (2018)** to assess the effectiveness of hot application with breast massage on breast engorgement among postnatal mothers. The study's findings reveal a significant variation within the two groups in terms of breast engorgement decrease (p0.05). According to the findings, heat application combined with breast stimulation is helpful in decreasing breast engorgement in postpartum women.

The information presented above was compatible with the findings of an experimental study done by **Pavithra E.J.P. et.al. (2015),** to assess the effect of structured teaching program on prevention and management of breast engorgement among 30 postnatal. The result shows the mean pre-test score was 10.43 + 3.19 and the mean post test score was 19.5 + 0.682. the difference between the pre and post test score was highly significant at $p<0.05$ level.

Conclusion

According to the findings of the study, lactational counselling was effective in improving nursing practice and reducing the breastfeeding problem among primi postnatal mothers. And the goal of this study was to reduce the problems that women have during breastfeeding and to encourage all women to breastfeed successfully. As a result, the study's goal is to increase postpartum women understanding of nursing practices and breastfeeding problems, which will help them to promote breastfeeding and prevent complications and reduce the infant mortality rate.

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DID THE ROOTS OF HIGH NPAS IN INDIAN BANKING SECTOR LIE IN THE REGULATORY FORBEARANCE POLICY: EVIDENCE FROM THE TRENDS IN NPAS OF POST-GFC?

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INTRODUCTION

The economic progression of a country depends upon the efficiency and health of the financial sector of the economy. Commercial banking undertakings are a vital part of the financial system as these undertakings are important instruments of capital mobilization for economic progression. Moreover, these institutions are used as a tool for controlling the inflation/ deflation in the economy and help in bringing economic stability. In modern days, banking institutions have a tactical role in the economy and their strategies and policies significantly affect the rate of economic progression, level of employment, price-level, growth of GDP, etc.

Before 2008, the booming economy in India paved the way for the creation of extra capacities in some sub-sectors (especially the infrastructure, power, real estate, cement, iron and steel, etc.). The emergence of the sub-prime crisis put the disruption on the economies worldwide. In India after the US-2008 crisis, a large amount of easy credit and a prolonged regulatory forbearance period was allowed for restructuring of advances by the banking undertaking. The high debts in the corporates' balance sheets became difficult to service by these corporates on account of lower than the expected demand in the various sub-sectors of the economy. The inability to service the debt by these corporates resulted in the high stressed assets in the banking system and become a twin-balance sheets problem in emerging economies like India. The large build-up of sub-standard assets has not only worsened the profitability of the banking sector (especially the public sector banks) but also resulted in capital erosion, thereby reducing the loss-bearing capacity of these undertakings. The economic progression of a country to a large extent depends upon the ability of its entrepreneur in the visualization and implementation of the new projects but equally important is the soundness of the banking system of the country which is an essential instrument of financing the economic progression. The rising sub-standard assets in the banking system have jeopardized the viability of these institutions as well as threatened the stability of the whole financial system of the country.

A large number of studies have been made in India, focusing on analyzing the NPAs from various prospective like sectoral distribution of the NPAs, identifying the causes of rising NPAs in the banking sector, gauging the effectiveness of the measures taken to resolve the issue of the high level of NPAs, and assessing the relationship among the credit growth, profitability, and level of NPAs in the banking sector. Rajaraman and Vasishtha (2002)[13] covering the period 1995-96 to 1999-2000 found the large variation within the homogenous group of 27 public sector banks in respect of NPAs. Reddy (2002)[16] scrutinized the level of NPA from the year 1992-93 to 2000-01 and found the Gross NPA to Gross Advance and Net NPA to Net Advance ratios improved during the period. The study indicated the legal obstacles and time-consuming nature of the disposal of assets, political influence used by debtors in manipulations were the main reasons for the problem of NPA in India. Rajan and Dhal (2003)[12] found that the term of credit has a significant effect on banks' NPAs in the presence of bank-size induced risk preference and macroeconomic shocks. The study inferred that the expectation of high growth lowers the level of NPAs of the bank, the growth rate of 4 percent has the potential of reducing the NPA by 1 percent in the banking sector. Ghosh (2005)[7] examine the association between corporate leverage and the level of NPA in India covering the manufacturing firm's data from 1993 to 2004

the study concluded that the lagged leverage was the important determinant of NPA of the banks. Das and Ghosh (2005)[5] found that higher productivity leads to a decrease in credit risk, the poor performing banks are more prone to risk-taking than better-performing banks, and inferred that the loan to the priority sector does not necessarily lead to high NNPA for the banks. Rajeev and Mahesh (2010)[14] studied the trend of NPA in the Indian banking sector from 2001-02 to 2008-09 found the NPA in the priority sector (especially the SSI sector) high in comparison to the non-priority sector. Kaur and Singh (2011)[8] found the level of NPAs in public sector banks high in comparison to private sector banks. Khanna (2012)[9] examined the level of NPAs in SBI and Associate banks, Nationalized Banks and Private Sector Banks covering the period from 2005-06 to 2009-10 and found that a major chunk of NPA of public sector banks occurred in priority sector instead of the non-priority sector, while in case of the private-sector reverse was the case. Rai (2012)[11] stressed that the weak legal framework was responsible for the rising NPAs in the Indian banking system. Siraj and Pillai (2013)[17] examined the growth of NPA using the exponential growth rate in different ownership groups of the Indian banking sector from 2000-01 to 2010-11 and found that the SBI and Associates followed by Nationalized Banks, was having the better performance in managing the NPA than the Privately-owned Banks and Foreign Banks. Singh (2016)[16] examined the NPAs in SCBs from 2001-02 to 2013-14 and recoveries of NPAs of SCBs through various channels from 2007-08 to 2013-14 and found the SARFAESI Act most effective channel of recovery of NPAs for the banks. D'Souza (2018)[6] attempted to analyze the NPA and assets securitization for the period from 2001-02 to 2015-16 and found no significant positive relationship between assets securitization and the decrease in NPA. Mittal and Suneja (2017)[10] analyzed the NPA of public sector banks and private sector banks covering the period from 2004-05 to 2015-16 and proposed that the advances should be sanctioned based on the projected rate of return on the projects and taking into account the credit-worthiness of the borrowers. Banerjee et al. (2018)[2] explored the level of NPA in SBI, PNB, HDFC Bank, and Axis Bank covering the period from 2008-09 to 2016-17. The study found the GNPA and NNPA levels in the SBI and PNB more than the private sector banks. Agarwala and Agarwala (2019)[1] explored the mean growth rate (Geometric Mean) of NPA of SBI Group, Nationalized Banks, and Private Sector banks for the period from 2010 to 2016-17 and found the mean growth rate phenomenally high in case of public sector banks. Bawa et al. (2019)[4] covering the period 2006-07 to 2013-14 studied the determinants of NPA in 26 public sector and 21 private sector banks in India based on 31 bank-specific financial ratios. Batra and Batra (2020)[3] explored the difference in the level of NPA using ANOVA on the NPA of public sector banks, private sector banks, foreign banks, and all SCBs covering the period from 2004-05 to 2017-18 and found that all SCBs have the declining trend till 2010, after that the NPA started rising for all the banks but at an accelerated rate for the public sector banks. The study concluded that the NPA of banking groups differ significantly.

Research Gap: An overview of the above studies indicates that the studies post-GFC are a few and no study has covered the post-GFC period of large enough to comprehend the status of NPAs, as the major rise in the NPAs is noticed after 2015-16 due to the withdrawal of regulatory forbearance on the restructuring of advances by banking undertakings. Moreover, the current study focuses on the status of the individual banks rather than the banking groups to identify the banks which are the poor performers relating to NPAs. The article addresses a contemporary issue of NPA in the banking sector and will help in understanding the status of NPA in a better way.

RESEARCH DESIGN

For the current study the mechanism of the research design is as follows:

Sample: The study is based on the thirty-nine commercial banking undertakings comprising twenty public sector banks (excluding the SBI Group) and nineteen private sector banks

continuously operating and reported financial results for the post-GFC period of ten years in India.

Period: The study is based on the secondary data of ten financial years (post-US-2008 crisis) from 2009-10 to 2018-19.

Nature and Source of Data: The published data have been compiled from Statistical Tables Relating to Banks (STRBs)-RBI Publications, IBA Bulletins, and Annual Reports of the different banks.

Key Variables: Gross NPAs, Net NPAs, Restructured Assets as a percentage of GNPA, Net NPA to Net Advance Ratio.

Research Methods: The study applies the parametric and non-parametric tests, arithmetic mean, standard deviation, CV, Compound Annual Growth Rate (CAGR), Growth Rate based on the Previous Year, and Growth Rate based on Base Year (2009-10) for analyzing and comparing the NPAs.

Hypothesis of the Study: To compare the net NPA to net advance ratio between the banking groups the following hypothesis is established:

Hypothesis H_1: public sector banks and private sector banks do not differ significantly with respect to the net NPA to net advance ratio.

Results and Discussion

1. Gross Non-performing Assets (GNPAs) of the Public Sector Banks (PSBs) and Private sector Banks (PrSBs):

TABLE 1

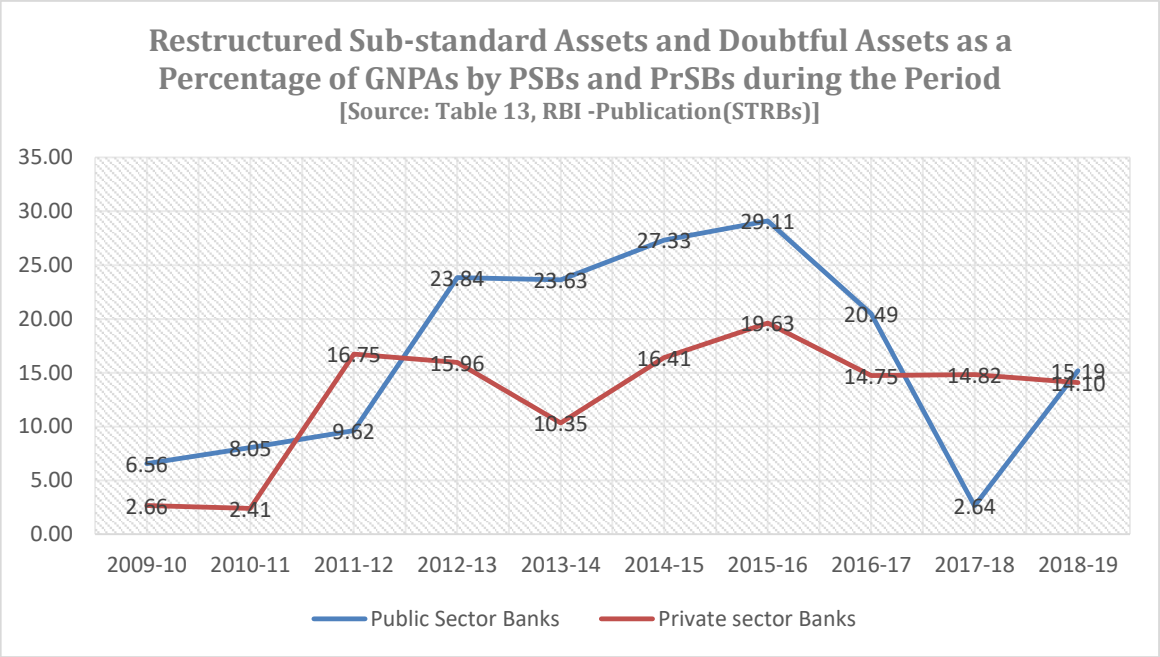
Gross Non-performing Assets of Public Sector Banks* and Private Sector Banks in India from 2009-10 to 2018-19						
Year	**GNPAs PSBs (Rs. Million)**	**Growth over Previous year (Percent)**	**Growth over Base year (Percent)**	**GNPAs PrSBs (Rs. Million)**	**Growth over Previous year (Percent)**	**Growth over Base year (Percent)**
2009-10	363948.0	-	-	182405.8	-	-
2010-11	442711.0	21.64	21.64	187678.1	2.89	2.89
2011-12	696245.1	57.27	91.30	210705.2	12.27	15.51
2012-13	1022272.3	46.83	180.88	245424.2	16.48	34.55
2013-14	1484572.1	45.22	307.91	341062.3	38.97	86.98
2014-15	2049594.7	38.06	463.16	561856.9	64.74	208.03
2015-16	4179877.9	103.94	1048.48	932092.2	39.72	411.00
2016-17	5069216.6	21.28	1292.84	1293352.4	38.76	609.05
2017-18	6721738.0	32.60	1746.90	1836036.6	41.96	906.57
2018-19	5667906.4	-15.68	1457.34	2095681.4	14.14	1048.91
Source: Data Compiled by the researcher from STRBs						***Excluding SBI Group**

The PSBs (excluding SBI Group) have the highest GNPAs of Rs. 6721738 million in the year 2017-18 reporting an increase of 17.47 times over the base year (2009-10). On the other hand, the PrSBs have the highest GNPAs of Rs.2095681.4 million in the year 2018-19, reporting an increase of 14.19 times over the base year (Table 1). The PSBs have reported the highest increase of 103.94 percent in the GNPAs over the previous year in the year 2015-16, while the PrSBs have reported the highest increase of 64.74 percent in the GNPAs over the previous year in the year 2014-15. The major rise in the GNPAs of the banking groups has been noticed between the years 2010-11 and 2017-18 when the GNPAs of the public sector banks have increased with a CAGR of 47.5 percent and the GNPAs of the private sector banks have increased with a CAGR of 37.5 percent during this period. Although both banking groups have grappled with the problem of the rising GNPAs but the problem of the rising GNPAs is noticed more critical in the case of the PSBs from the year 2009-10 to 2017-18.

1.1 Restructured Sub-standard Assets and Doubtful Assets as a percentage of GNPAs

of PSBs and PrSBs from 2009-10 to 2018-19:

FIGURE 1



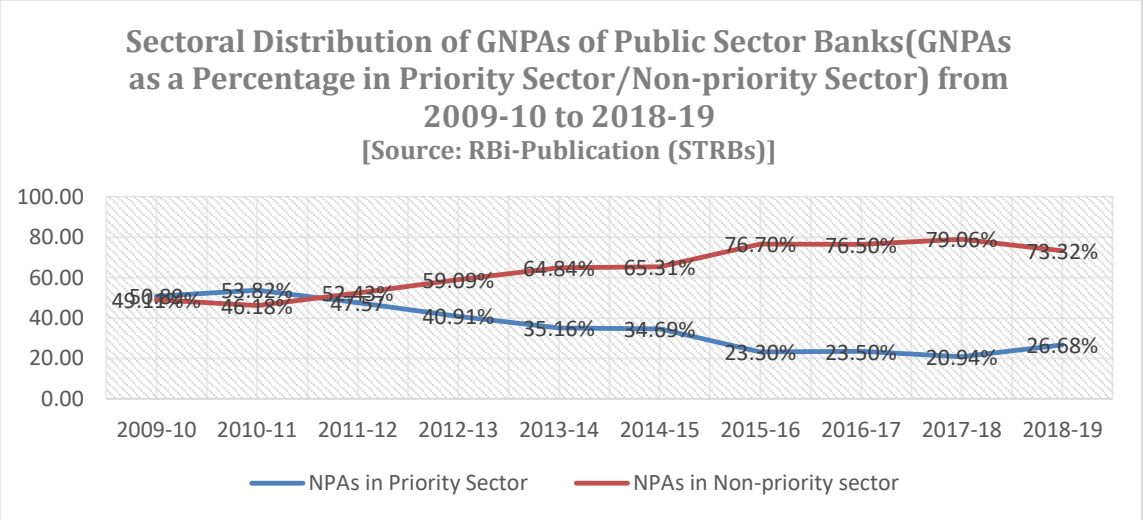
From the year 2010-11 onwards the restructured sub-standard and doubtful assets as a percentage of GNPAs has increased sharply due to the regulatory forbearance policy, as it increased from 6.56 percent (2009-10) to 29.11 percent (2015-16) in case of the PSBs and increased from 2.66 percent (2009-10) to 19.63 percent (2015-16) in case of the PrSBs (Figure 1). The high level of NPAs in Indian banking after the year 2014-15, is an outcome of regulatory forbearance policy on loan-restructuring adopted after the crisis.

Firstly, the projects in the infrastructure sectors like iron and steel, cement, power, and real estate enjoyed high credit disbursals. Many of these turn out to be non-viable due to the over-capacity creation and under-capacity utilization, leading to the highly debt-burdened corporates in these sub-sectors which failed to service their debt. Secondly, the regulatory forbearance period allowed after the US-2008 crisis has paved way for delaying the recognition of actual NPAs and piling up of NPAs in form of restructured loans in these undertakings. Moreover, the banking undertaking misused the tactic of loan-restructuring to report the high earning by avoiding the sufficient provisioning (by showing the NPAs as restructured loans even knowing the fact that the entities are un-viable) and to show the sufficient minimum capital as per the Basel accord. A prolonged policy of forbearance and the late resolution of actual NPAs has aggravated the situation of the NPAs in the banking undertaking.

FIGURE 2

1.2 Sectoral distribution of GNPAs of public sector banks from 2009-10 to 2018-19:

Some past studies indicated that the prime factor responsible for the high NPAs in the PSBs was the priority sector lending of these banks. Moreover, the major impact of the demonetization of currency in November 2016 which created hardship of cash in the Indian economy, can also be traced in the NPAs of priority sector lending because the transactions in this sector are heavily dependent on cash.



The major rise in the GNPAs in the post-GFC period is noticed in the non-priority sector lending. The GNPAs in the priority sector of the PSBs is showing a declining trend, as the GNPAs in this sector reduced from 53.82 percent in the year 2010-11 to 20.94 percent in the year 2017-18, while the GNPAs in the non-priority sector is showing a rising trend as these increased from 46.18 percent in the year 2010-11 to 79.06 percent in the year 2017-18 (Figure 2).

2. Net Non-performing Assets (NNPAs) of the PSBs and PrSBs:

TABLE 2

Net Non-performing Assets (NNPAs) of Public Sector Banks* and Private Sector Banks in India from 2009-10 to 2018-19						
Year	**NNPAs PSBs (Rs. Million)**	**Growth over Previous year (Percent)**	**Growth over Base year (Percent)**	**NNPAs PrSBs (Rs. Million)**	**Growth over Previous year (Percent)**	**Growth over Base year (Percent)**
2009-10	168131.0	-	-	44321.6	-	-
2010-11	212639.6	26.47	26.47	44012.1	-0.70	-0.70
2011-12	391546.2	84.14	132.88	59943.7	36.20	35.25
2012-13	619362.0	58.18	268.38	88615.4	47.83	99.94
2013-14	888197.3	43.41	428.28	141283.2	59.43	218.77
2014-15	1226733.5	38.11	629.63	266774.1	88.82	501.91
2015-16	2514807.6	105.00	1395.74	477802.2	44.17	978.03
2016-17	2861565.4	13.79	1601.99	643804.7	34.74	1352.58
2017-18	3436179.6	20.08	1943.75	673088.9	4.55	1418.65
2018-19	2192274.3	-36.20	1203.91	557458.7	-17.18	1157.76
Source: Data Compiled by the researcher from STRBs ***Excluding SBI Group**						

The PSBs have the highest NNPAs of Rs. 3436179.6 million, an increase of 19.44 times over the base year (2009-10). While the PrSBs have the highest NNPAs of Rs. 673088.9 million, have increased by 14.19 times over the base year. In the year 2015-16, the NNPAs of the PSBs have the highest increase of 105.00 percent over the previous year, while the NNPAs of the PrSBs have the highest increase of 88.82 percent over the previous year, in the year 2014-15 (Table 2).

A major rise in the NNPAs of the banking group is noticed between the years 2010-11 and 2017-18 when the NNPAs of both the banking groups have increased with a CAGR of nearly 48 percent. Although both the banking groups have been facing the problem of the rising NNPA but the problem of the rising NNPAs is noticed more grave (increase

by 19.44 times) in the case of the PSBs from the year 2009-10 to 2017-18.

3. Net NPA to Net Advances (NNPA/NA) Ratio of the Public Sector Banks and Private sector Banks:

The Net NPA does not convey much idea of the level of NPAs in these banking undertakings, so long as the net NPAs are not factored for the net advances. Net NPA to Net Advance ratio (NNPA/NA) shows the level of NNPAs in a better way as it reflects the percentage of net advances that have become irrecoverable, hence conveying the idea of the level of NPAs in the banking system in a much better way.

TABLE 3

Net NPA to Net Advances Ratio of Public Sector Banks and Private Sector Banks from 2009-10 to 2018-19
(Percent)

Name of Bank	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Average
ALLAHABAD BANK	0.66	0.79	0.98	3.19	4.15	3.99	6.76	8.92	8.04	5.22	4.27
ANDHRA BANK	0.17	0.38	0.91	2.45	3.11	2.93	4.61	7.57	8.48	5.73	3.63
BANK OF BARODA	0.34	0.35	0.54	1.28	1.52	1.89	5.06	4.72	5.49	3.33	2.45
BANK OF INDIA	1.31	0.91	1.47	2.06	2.00	3.36	7.79	6.90	8.28	5.61	3.97
BANK OF MAHARASHTRA	1.64	1.32	0.84	0.52	2.03	4.19	6.35	11.76	11.24	5.52	4.54
CANARA BANK	1.06	1.10	1.46	2.18	1.98	2.65	6.42	6.33	7.48	5.37	3.60
CENTRAL BANK OF INDIA	0.69	0.65	3.09	2.90	3.75	3.61	7.36	10.2	11.1	7.73	5.11
CORPORATION BANK	0.31	0.46	0.87	1.19	2.32	3.08	6.53	8.33	11.74	5.71	4.05
DENA BANK	1.21	1.22	1.01	1.39	2.35	3.82	6.35	10.66	11.95	8.02	4.80
IDBI BANK	1.02	1.06	1.61	1.58	2.48	2.88	6.78	13.21	16.69	10.11	5.74
INDIAN BANK	0.23	0.53	1.33	2.26	2.26	2.50	4.20	4.39	3.81	3.75	2.53
INDIAN OVERSEAS BANK	2.52	1.19	1.35	2.50	3.20	5.68	11.89	13.99	15.33	10.81	6.85
ORIENTAL BANK OF COMMERCE	0.87	0.98	2.21	2.27	2.82	3.34	6.70	8.96	10.48	5.93	4.46
PUNJAB AND SIND BANK	0.36	0.56	1.19	2.16	3.35	3.55	4.62	7.51	6.93	7.22	3.75
PUNJAB NATIONAL BANK	0.53	0.85	1.52	2.35	2.85	4.06	8.61	7.81	11.24	6.56	4.64

SYNDICATE BANK	1.07	0.97	0.96	0.76	1.56	1.90	4.48	5.21	6.28	6.16	2.94
UCO BANK	1.17	1.84	1.96	3.17	2.38	4.30	9.09	8.94	13.10	9.72	5.57
UNION BANK OF INDIA	0.81	1.19	1.70	1.61	2.33	2.71	5.25	6.57	8.42	6.85	3.74
UNITED BANK OF INDIA	1.84	1.42	1.72	2.87	7.18	6.22	9.04	10.02	16.49	8.67	6.55
VIJAYA BANK	1.40	1.52	1.72	1.30	1.55	1.92	4.80	4.36	4.32	3.08	2.60
Mean of PSBs	**0.96**	**0.96**	**1.42**	**2.00**	**2.76**	**3.43**	**6.63**	**8.32**	**9.84**	**6.56**	**4.29**
SD of PSBs	**0.60**	**0.40**	**0.58**	**0.77**	**1.26**	**1.14**	**1.95**	**2.76**	**3.75**	**2.14**	**1.24**
CV of PSBs	**62.38**	**41.71**	**40.6**	**38.44**	**45.78**	**33.29**	**29.33**	**33.24**	**38.14**	**32.59**	**28.98**
AXIS BANK	0.40	0.29	0.27	0.36	0.44	0.46	0.74	2.27	3.64	2.20	1.11
CATHOLIC SYRIAN BANK	1.58	1.74	1.10	1.12	2.22	3.85	4.40	5.51	4.46	2.27	2.83
CITY UNION BANK	0.58	0.52	0.44	0.63	1.23	1.30	1.53	1.71	1.70	1.81	1.15
DCB BANK	3.11	0.96	0.57	0.75	0.91	1.01	0.75	0.79	0.72	0.65	1.02
FEDERAL BANK	0.48	0.60	0.53	0.98	0.74	0.73	1.64	1.28	1.69	1.48	1.02
HDFC BANK	0.31	0.19	0.18	0.20	0.27	0.25	0.28	0.33	0.40	0.39	0.28
ICICI BANK	2.12	1.11	0.73	0.77	0.97	1.61	2.98	5.43	5.43	2.29	2.34
INDUSIND BANK	0.50	0.28	0.27	0.31	0.33	0.31	0.36	0.39	0.51	1.21	0.45
JAMMU & KASHMIR BANK	0.28	0.20	0.15	0.14	0.22	2.77	4.31	4.87	4.89	4.89	2.27
KARNATAKA BANK	1.31	1.62	2.11	1.51	1.91	1.98	2.35	2.64	2.96	2.95	2.13
KARUR VYSYA BANK	0.23	0.07	0.33	0.37	0.41	0.78	0.55	2.53	4.16	4.98	1.44
KOTAK MAHINDRA BANK	1.73	0.72	0.61	0.64	1.08	0.92	1.06	1.26	0.98	0.75	0.98
LAKSHMI VILAS BANK	4.11	0.90	1.74	2.43	3.44	1.85	1.18	1.76	5.66	7.49	3.06
NAINITAL BANK	-	-	-	-	-	-	1.05	1.25	1.16	5.77	2.31
RBL BANK	0.97	0.36	0.20	0.11	0.31	0.2	0.5	0.6	0.7	1.3	0.5

						7	9	4	8	8	6
SOUTH INDIAN BANK	0.39	0.29	0.28	0.78	0.78	0.96	2.89	1.45	2.60	3.45	1.39
TAMILNAD MERCANTILE BANK	0.24	0.27	0.45	0.66	1.22	0.67	0.89	1.74	2.16	2.40	1.07
THEDHANAL AKSHMI BANK	0.84	0.30	0.66	3.36	3.80	3.29	2.78	2.58	3.19	2.41	2.32
YES BANK	0.06	0.03	0.05	0.01	0.05	0.12	0.29	0.81	0.64	1.86	0.39
Mean of PrSBs	**1.01**	**0.55**	**0.56**	**0.80**	**1.07**	**1.22**	**1.61**	**2.07**	**2.51**	**2.66**	**1.479**
SD of PrSBs	**1.10**	**0.51**	**0.55**	**0.85**	**1.08**	**1.10**	**1.30**	**1.59**	**1.77**	**1.89**	**0.854**
CV of PrSBs	**108.8**	**92.29**	**98.2**	**107.1**	**100.7**	**90.03**	**80.86**	**77.06**	**70.43**	**70.78**	**59.63**
Source: Researcher's Reproduced Data from STRBs			(6%>NNPA<9%) PCA (Risk Threshold-1)			(9%>NNPA<12%) PCA (Risk Threshold-2)			(NNPA Above12%) PCA (Risk Threshold-3)		

Between the years 2010-11 and 2018-19, the combined average CAGR in the NNPA/NA ratio of both banking groups is 34.05 percent. The NNPA/NA ratio of the PSBs have increased with an average CAGR of 40.07 percent, while that of PrSBs have increased with an average CAGR of 24.22 percent. Among the PSBs, 14 banks have a CAGR in NNPA/NA ratio more than the combined average CAGR of 34.05 percent, while among the PrSBs, 7 banks have a higher CAGR in NNPA/NA ratio than the combined average during this period. From the year 2014-15 to 2017-18, the average net NPA to net advances ratio of the PSBs has been showing a steep rise. The ten-year average net NPA to net advance ratio of the PSBs is 4.29 percent, with a standard deviation of 1.24 and C.V. of 28.98, while the ten-year average of net NPA to net advance ratio of the PrSBs is 1.41 percent, with a standard deviation of 0.84 and C.V. of 59.63 during the study period (Table 3). The net NPA to net advance ratio of the PSBs has worsened more than that of the PrSBs (especially from the year 2014-15 onwards).

TABLE 4

Net NPA to Net Advances of Public Sector Banks and Private Sector Banks form the Year 2009-10 to 2018-19
(Results of Parametric t-Test)

Year	Ownership Type	N	Mean	Std. Deviation	CV	t-value
2009-10	PSB	20	0.961	0.599	62.38	-0.381
	PrSB	18	1.069	1.105	103.39	
2010-11	PSB	20	0.965	0.402	41.71	2.608#
	PrSB	18	0.581	0.504	86.81	
2011-12	PSB	20	1.422	0.577	40.58	4.523#
	PrSB	18	0.593	0.550	92.74	
2012-13	PSB	20	2.000	0.769	38.44	4.403#
	PrSB	18	0.841	0.854	101.65	

2013-14	PSB	20	2.759	1.263	45.78	4.256#
	PrSB	18	1.129	1.076	95.25	
2014-15	PSB	20	3.429	1.142	33.29	5.914#
	PrSB	18	1.285	1.086	84.53	
2015-16	PSB	20	6.635	1.946	29.33	9.419#
	PrSB	19	1.612	1.303	80.86	
2016-17	PSB	20	8.318	2.765	33.24	8.595#
	PrSB	19	2.065	1.592	77.06	
2017-18	PSB	20	9.845	3.755	38.14	7.732#
	PrSB	19	2.512	1.769	70.43	
2018-19	PSB	20	6.555	2.136	32.59	6.016#
	PrSB	19	2.665	1.886	70.78	
Ten-year Average Net NPAs to Net Advances Ratio	PSB	20	4.289	1.243	28.98	8.184#
	PrSB	19	1.479	0.854	57.75	

Source: Researcher's Reproduced Data from STRBs **# INDICATES THE VALUE IS SIGNIFICANT**

TABLE 5

Net NPA to Net Advances of Public Sector Banks and Private Sector Banks form the Year 2009-10 to 2018-19
(Results of Mann-Whitney U Test)

Year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Ten-year Average Net NPAs to Net Advances Ratio
Mann-Whitney U	162.5	83	46	52	44	32	2	11	10	31	7
Wilcoxon W	333.5	254	217	223	215	203	192	201	200	221	197
Z	-0.512	-2.84#	-3.92#	-3.74#	-3.98#	-4.33#	-5.28#	-5.03#	-5.06#	-4.47#	-5.142#

Source: Researcher's Reproduced Data from STRBs
 # INDICATES THE VALUE IS SIGNIFICANT

The computed t-values of net NPA to net advance ratios of the PSBs and PrSBs for all the years from the year 2010-11 onwards, as well as for the ten-year average net NPA to net advances ratios are significant (Table 4). The assets quality of the public sector banks has worsened more than the privately-owned banks during the period of study. Similar results are supported by the Mann-Whitney U test (Table 5). Hence, hypothesis H_1 is rejected and concluded that the net NPA to net advance ratios differ significantly between the public sector banks and private sector banks.

CONCLUSIONS AND SUGGESTIONS

The study finds a significant difference in the net NPA to net advance ratio of the public sector banks and private sector banks. The assets quality of the public sector banks has worsened more in comparison to the privately owned banks, due to the large share enjoyed by the former in the big corporate lending projects. The steep rise in the stressed assets

of both the banking groups is noticed between the years 2010-11 and 2017-18.

The high level of NPAs in Indian banking after the year 2014-15, is the outcome of regulatory forbearance policy on loan-restructuring adopted after the crisis. The extended forbearance period following the eruption of the global financial crisis led to the concealment of the stressed assets in the banking system and the withdrawal of regulatory forbearance w.e.f. 01.04.2015 has forced the banks to report the hidden NPA in the banking undertakings. Moreover, the delay in recognizing the NPAs (due to the existence of forbearance policy) has resulted in the accumulation of NPA and the late resolution has increased them manifold.

The high stressed assets in the Indian banking sector indicate the poor governance practices prevailing in these entities (especially the public sector undertakings). The public sector banks with a majority stake with the government, these entities are prone to political influence and politically motivated lending and loan restructuring. The supervisor and government should ensure these banks be managed on the principles of sound corporate practices and a system of good governance should prevail in these public entities.

The lacuna in credit appraisals and credit monitoring is another vital problem with the public sector financial institutions. Moreover, these institutions for financing the projects, usually depend on the credit appraisal reports (project reports) prepared by the borrower's consultants, which may or usually are over-casted in respect of cash-flows and return from the projects. The public sector banking institutions need to appraise the projects on a scientific basis and considering the different economic scenarios. Further, these institutions should have their own well-functioning credit appraisals and credit monitoring departments with well-talented human resources for the credit appraisals and credit monitoring. A comprehensive system of credit appraisal and credit monitoring can help in reducing the level of NPAs and the generation of new NPAs in public sector banks entities.

The past experience in emerging economies tip-offs that the boom period usually remains associated with the less stringent credit appraisals and over-credit disbursals. In such a scenario banking institutions are more likely to overtrade and indulge in more risk-taking behavior to gain from the booming economy. The counter cyclic buffer (CCB) if fully implemented, will certainly be a tool with the supervisors to save the financial system from such a conduct of the financial institutions.

The concentrated lending by banking institutions may be another crucial factor responsible for the high NPAs in many of these institutions, which the present study has not covered. Although the RBI conducts stress testing and publishes reports on the concentrated lending of the banking institutions but these reports are based on the cumulative banking exposures and the RBI does not publish the reports on the bank-specific exposures on the concentrated lending.

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AN ANALYSIS OF GROWTH OF MSME'S IN INDIA: A CASE STUDY OF HARYANA AND PUNJAB

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ABSTRACT

Micro, Small and Medium Enterprises (MSMEs) are said to be the most important source of development in India as per the MSME Annual Reports. MSMEs are a leading source of employment generation as Ministry of MSME keeps on launching various policies and programs for skill development and training so that emerging entrepreneurs do not fall with short of skills to setup and run an enterprise successfully. This paper also aims around such an initiative for simplifying the registration process for MSMEs around the country named as UAM (Udyog Aadhar Memorandum). To find out the benefit of this scheme to enterprises, a comparative analysis of number of enterprises pre and post the UAM Scheme has been done which has resulted in a significance difference in number of registrations in the pre and post period. This scheme was launched in September 2015 and 5 year CAGR (Compound Annual Growth Rate) from that date up to 2020 has been calculated to find out the intensity of growth of MSMEs after UAM Scheme. Then the paper shifts its key focus on exploring the growth of MSMEs in Haryana and Punjab post the UAM scheme and to compare the growth of MSMEs in Haryana and Punjab, and the results obtained have highlighted that the growth pattern of MSMEs in Haryana and Punjab is almost the same. The facts and figures behind every objective has been identified through secondary sources like government websites and various journals, analyzed by using various statistical tools and presented with the help of tables and graphs.

Keywords: *MSME, UAM, growth, growth rate, entrepreneurship, states, districts*

Introduction

Micro, Small and Medium Enterprises (MSMEs) is emerging as the most supportive sector to the industrial growth in India. After agriculture, MSMEs are considered as the next best source of creating employment opportunities and fostering entrepreneurship in the country **(MSME Annual Report, 2018-19)**. Entrepreneurship is considered as the main driver of growth in developing nations and also leads to sustainable development **(Bidja and Mandizvidza, 2017).** MSMEs are also the source of innovations, industrial re-birth, export promotion, job creation and improving productivity with low cost of capital **(Doh and Kim 2014).**

For the smooth running of MSMEs, Micro, Small and Medium Enterprises Development Act (MSMED Act), 2006 has been framed to remove hurdles from the path of growth of MSMEs. One such initiative under this Act was starting of registration process for proposed and existing enterprises in the form of Entrepreneurs Memorandum Part I and II respectively. But the process involved certain limitations like lengthy paper work, difficulty in obtaining clearance certificates etc. Many steps were taken to improve it but the problems continued to persist. As a result, on the recommendations of Kamath Committee, the Ministry of MSME with its advisory board members created an online portal with one-page registration process and self declaration criteria and named it as Udyog Aadhar Memorandum (UAM) Portal replacing EM I and II w.e.f. 18-09-2015. The enterprises registered under this are issued an Udyog Aadhar Number similar to Aadhar Card Numbers of Indian nationals, which is a 12 digit number for unique identification of each entity. Though it is not mandatory for entrepreneurs to register their enterprises but the key benefits (like no cost, paperless, instant registration) attached with it are a source of motivation for registration **(Udyog Aadhar Booklet).**

The investment limit and UAM categories of MSMEs are as under:

Enterprises	UAM Category	Type	Investment in Plant & Machinery/ Equipments
MICRO	A	Manufacturing	Doesn't exceed 25 lakh rupees
	D	Services	Doesn't exceed 10 lakh rupees
SMALL	B	Manufacturing	More than 25 lakh rupees but doesn't exceed 5 crores

	E	Services	More than 10 lakh rupees but doesn't exceed 2 crores
MEDIUM	C	Manufacturing	More than 5 crores but doesn't exceed 10 crores
	F	Services	More than 2 crores but doesn't exceed 5 crores

(Source: www.msme.gov.in)

Review of literature

Micro, Small and Medium Enterprises (MSME) sector is a highly vibrant and dynamic sector of the Indian economy due to its economic and social development of the country. The study was conducted with an objective of analyzing the role of MSMEs in development of rural India, backward class people, women empowerment and women entrepreneurship. It was concluded that MSMEs are the second important avenue (first is agriculture) for promoting entrepreneurship and generating largest employment opportunities at comparatively lower capital cost. The study also discussed the influence of MSMEs in production and export of India **(Debasish 2019).** A research on Indian Coir Industry in relation to exports has shown that absence of appropriate technology is the reason of decrease in exports. The research also concluded the importance of investment in R&D, advanced technology, promotion of digital interface and improvement in accessibility of financial resources and liberty in doing business to face global competition **(Sonia Mukherjee 2018)**. These enterprises play a major role in industrial growth and development of the country through equitable distribution of wealth and coping with national and international demands. Low capital requirement and employability of labor at local level makes it an important tool for welfare of the society **(Manohar 2017).** A primary research conducted on exporters in Noida related to handicraft industry to know the problems in internationalization of MSMEs showed that lack of infrastructure, export promotion and subsidies are the major problems. It highlighted the need of subsidies for exports to face the price related global competition **(Ghouse 2017).** Micro enterprises have occupied a high rank in all the states but some states with good development like Haryana, Punjab, Odisha, Manipur, Mizoram etc have less number of small and medium enterprises as compared to rest of the states. UAM Scheme has increased the speed of registrations but still many of the enterprises are not able to take the advantage of it due to their unwillingness **(Manna and Mistri 2017).** Major challenges faced by MSMEs are lack of information technology support, information technology literacy, lack of formal procedure and discipline, uneven ITs awareness and management skills, raw material problems, production problems were observed to be the hurdles in the development of small scale industries. The reason for the above stated problems was found to be acute power shortage. The selected industrial units were found to be operating at fifty percent of their capacity which eventually turned the bad situation to worse and resulted in inability to pay workers salary **(Aruna 2016).** Development of small scale industries in Haryana is due to scientific marketing activities. Marketing has proved to be a reason for expansion of every organization in an economy so as for SSI concerns; however, sustainability of these enterprises has been a major problem **(Jitender Kumar 2016).** A survey on entrepreneurs in Delhi unveiled that the lengthy and time consuming process involved in availing financial aids is the main problem among MSMEs. Entrepreneurs are unaware of the benefits available to MSMEs and majority has not attended any EDP (Entrepreneur Development Program) which are conducted by government for creating awareness about the benefits among entrepreneurs **(Ilahi 2015).** In spite of all the hurdles, the growth in this sector is rapid and it is the epicenter of future growth in the developing nations but some aspects like performance factors, problems in growth of these industries in Indian economy should be paid attention for continuous research to maintain the pace of growth **(Venkatesh and Muthiah, 2012).**

Objectives of the Study

I) To compare the number of enterprises registered as MSME's in India pre and post the Udyog Aadhar Memorandum (UAM) Scheme

II) To analyze the growth of MSME's post UAM scheme (Sept 2015-2020)

III) To explore and compare the growth of MSME's post the UAM Scheme in Haryana and Punjab

Research Methodology

a) This paper is based on secondary data which has been collected from authentic data sources like government websites, MSME annual reports, Udyog Aadhar Portal etc.

b) The data has been analyzed using various statistical tests and tools & presented using tables and graphs in MS- Excel and SPSS.

Analysis & Results

a) In **Objective I**, the data for registration of MSME's for all the states and union territories of India (Sample Size 36) pre and post Udyog Aadhar Memorandum Scheme has been collected from MSME annual report (2014-15) and Udyog Aadhar portal. As the UAM scheme was launched in September 2015, the data post UAM has been taken from 2015-2020 and has been compared with pre UAM data from 2011-2015 when EM-I and EM-II filings were used for registration of MSME's. The following hypothesis has been framed:

H_o: There is no significant difference between number of MSME registrations pre and post the Udyog Aadhar Memorandum Scheme.

H_a: There is a significant difference between number of MSME registrations pre and post the Udyog Aadhar Memorandum Scheme.

The following table shows the data used in this objective:

Table 1: Number of Registered MSME's Pre and Post the UAM Scheme

S.No.	Name of State/UT	Pre UAM (2011-Sept 2015)*	Post UAM (Sept 2015-2020)**
1	ANDHRA PRADESH	14539	178834
2	ARUNACHAL PRADESH	130	1287
3	ASSAM	8233	18121
4	BIHAR	13332	263423
5	CHATTISGARH	7136	54413
6	GOA	578	6546
7	GUJARAT	279419	591798
8	HARYANA	9894	151593
9	HIMACHAL PRADESH	2739	11613
10	JHARKHAND	12945	82046
11	KARNATAKA	110193	262493
12	KERALA	60313	87382
13	MADHYA PRADESH	84382	811588
14	MAHARASHTRA	108706	1489688
15	MANIPUR	694	26669
16	MEGHALAYA	2041	1897
17	MIZORAM	845	2833
18	NAGALAND	787	1249
19	ODISHA	12269	62910
20	PUNJAB	13223	1795258
21	RAJASTHAN	70371	442603
22	SIKKIM	65	718
23	TAMIL NADU	506339	746947
24	TELANGANA	28909	217419
25	TRIPURA	792	3866
26	UTTAR PRADESH	184184	428662

27	UTTARAKHAND	11632	33118
28	WEST BENGAL	59419	119845
29	ANDAMAN AND NICOBAR ISLANDS	432	4652
30	CHANDIGARH	808	9345
31	DADAR AND NAGAR HAVELI	446	3925
32	DAMAN AND DIU	307	2193
33	DELHI	1994	129617
34	JAMMU AND KASHMIR	4833	6410
35	LAKSHADWEEP	33	72
36	PUDUCHERRY	416	8641

(*MSME Annual Report 2014-15, ** Udyog Aadhar Memorandum Portal)

Note: Ladakh has been considered a part of J&K in 2019-20 as well due to comparison limitations

For hypothesis testing, normality test for data has been done using Kolomogorov Smirnov Test as sample size is greater than 50, and p value came to be 0.000 which is less than 0.05, that means it is a not normal data distribution and non parametric tests will be used.

So, non parametric version of paired sample t-test which is Wilcoxon Signed Rank Test has been used for the comparison as there is only one group and the following results have been obtained:

VARIABLE	PRE UAM	POST UAM	p value
No. of MSME's registered	7684.50(51074)*	43765.50(203840)*	0.000**

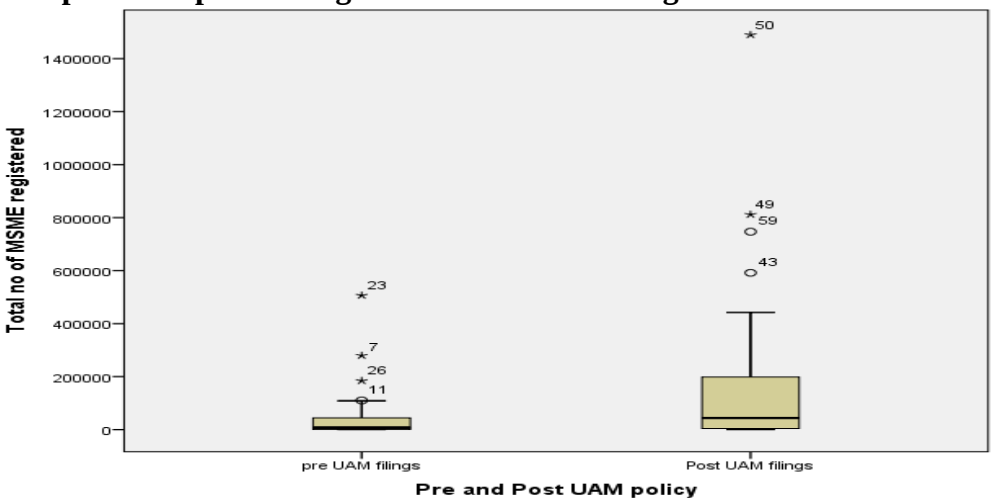
*Median (Inter Quartile Range)

**p value at 95% level of significance

As obtained from the above table the p value comes to be 0.000 which is less than 0.05 so the null hypothesis gets rejected and the alternate hypothesis gets accepted.

Hence, there is a significant difference between number of MSME registrations pre and post the Udyog Aadhar Memorandum Scheme. It is proved that simplification in registration process and various benefits offered to the holders of Udyog Aadhar number has certainly increased the number of registrations of enterprises as MSME's.

Graph 1: Graph showing Pre and Post UAM Registrations of MSME's



In the above Box and Plot Graph, the black line in the box depicts median, below the line is lower quartile range and above the line is upper quartile range. The black line outside the box is called whisker and the marks outside the whiskers are called outliers. The uneven division of box depicts that more of data lies between 25-75% of Inter quartile range and remaining lies below the range of 25%. The whiskers are constructed at a level

of 1.5 times of inter quartile range and the data which not even comes in this range are shown as outliers and hence are not involved in computation of results.

b) In **Objective II**, to find out the growth rate of MSME's post the UAM scheme, CAGR model has been used. CAGR stands for Compound Annual Growth Rate and here, CAGR has been calculated over a period of 5 years (2015-2020) post the UAM scheme for Micro, Medium and Small Enterprises separately. It depicts that how much growth has been achieved in the final year as compared to the initial year.

CAGR has been calculated using the following formula:

$$CAGR = (V_{final} / V_{begin})^{1/t} - 1$$

Here, V_{final} = value of the final year

V_{begin} = value of the initial year

t = time (in years)

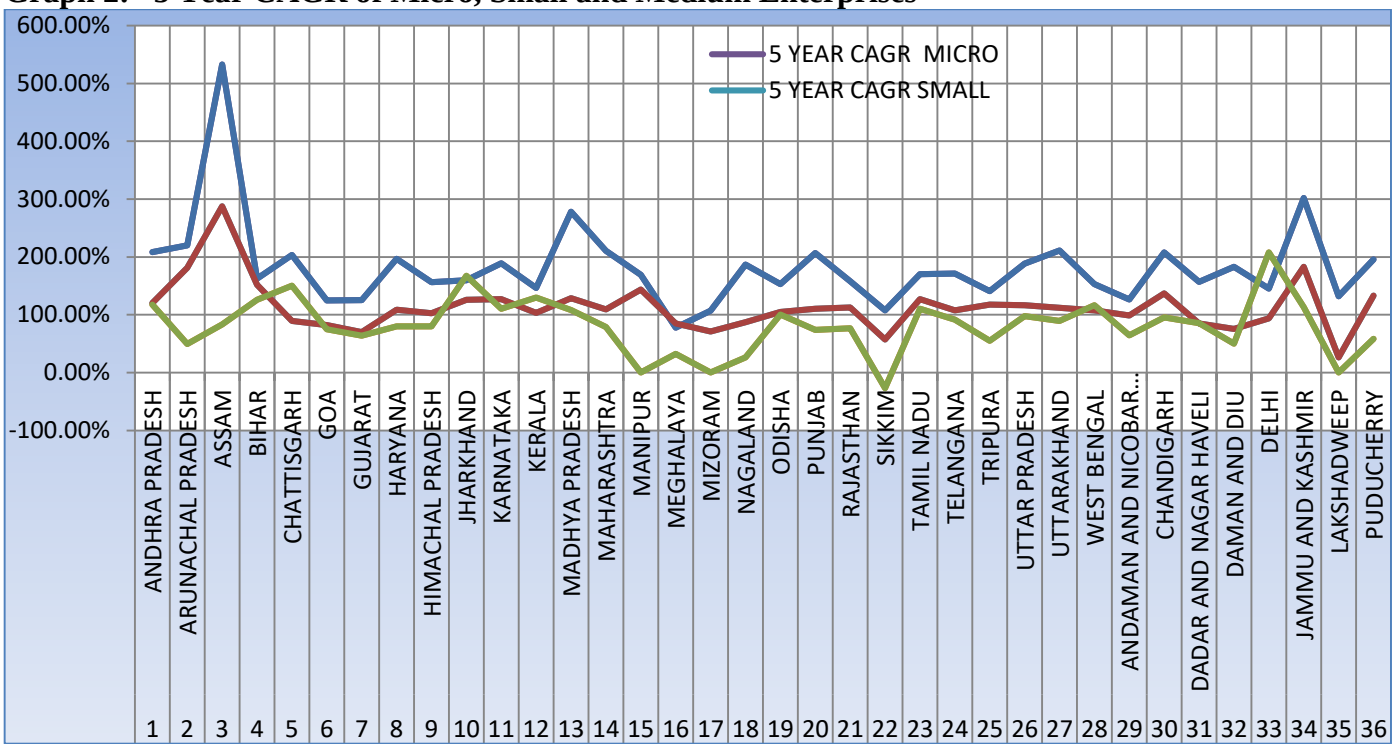
Table 2: CAGR of 5 years (2015-2020) Post UAM Scheme of Micro, Small and Medium Enterprises*

S.No.	Name of State/UT	Micro Enterprises	Small Enterprises	Medium Enterprises
1	ANDHRA PRADESH	208.20%	120.14%	117.79%
2	ARUNACHAL PRADESH	219.90%	180.94%	49.53%
3	ASSAM	532.74%	287.53%	83.48%
4	BIHAR	162.11%	152.14%	125.65%
5	CHATTISGARH	203.62%	89.44%	150.18%
6	GOA	124.66%	82.06%	74.83%
7	GUJARAT	125.12%	70.23%	63.94%
8	HARYANA	196.61%	108.93%	79.78%
9	HIMACHAL PRADESH	156.16%	102.63%	79.82%
10	JHARKHAND	159.83%	125.80%	167.51%
11	KARNATAKA	189.14%	127.10%	110.54%
12	KERALA	146.13%	102.90%	129.56%
13	MADHYA PRADESH	278.30%	128.71%	108.36%
14	MAHARASHTRA	210.72%	109.25%	78.77%
15	MANIPUR	168.86%	143.37%	0.00%
16	MEGHALAYA	77.48%	85.00%	32.29%
17	MIZORAM	107.07%	71.11%	0.00%
18	NAGALAND	186.59%	86.89%	25.99%
19	ODISHA	153.03%	104.74%	100.62%
20	PUNJAB	206.81%	110.58%	73.97%
21	RAJASTHAN	157.86%	112.65%	76.56%
22	SIKKIM	107.64%	57.10%	-26.89%
23	TAMIL NADU	170.36%	126.96%	110.40%
24	TELANGANA	171.34%	107.60%	91.40%
25	TRIPURA	140.86%	117.79%	55.18%
26	UTTAR PRADESH	188.12%	116.65%	97.38%
27	UTTARAKHAND	211.31%	112.26%	89.08%
28	WEST BENGAL	153.14%	107.68%	116.39%
29	ANDAMAN AND NICOBAR ISLANDS	126.43%	98.73%	64.38%
30	CHANDIGARH	207.86%	137.07%	95.14%
31	DADAR AND NAGAR HAVELI	157.08%	84.96%	85.56%
32	DAMAN AND DIU	183.07%	75.62%	50.29%
33	DELHI	145.45%	93.99%	207.74%
34	JAMMU AND KASHMIR	301.90%	182.91%	113.15%
35	LAKSHADWEEP	132.06%	25.99%	0.00%
36	PUDUCHERRY	195.50%	132.80%	58.11%

(*Data for registered MSME's used for calculating CAGR has been taken from Udyog Aadhar Portal)

Note: Ladakh has been considered a part of J&K in 2019-20 as well due to comparison limitations

Graph 2: 5 Year CAGR of Micro, Small and Medium Enterprises



From the above table and graph, states with the highest and lowest growth rates can be identified as follows:

CAGR ***MSME***	**MICRO**	**SMALL**	**MEDIUM**
HIGHEST	Assam (532.74%)	Assam (287.53%)	Jharkhand (167.51%)
LOWEST	Meghalaya (77.48%)	Lakshadweep (25.99%)	Manipur, Mizoram, Lakshadweep (0.00%)
NEGATIVE	NA	NA	Sikkim (-26.89%)

Assam has observed the highest growth rate in Micro and Small Industries. The main reason behind this is the strategies of AIDC (Assam Industrial Development Corporation), it has aimed at using immovable properties of sick and closed public sector undertakings for improving industrialization, developing more EOU's (Export-Oriented Units) for facilitating trade, project developments to earn maximum revenues etc.

Jharkhand has the highest growth rate in Medium Enterprises possibly because it enjoys several advantages in terms of location and availability of resources. Moreover, Jharkhand has been ranked in the top category of implementation of reforms by Ease of Doing Business Report, 2017 and ranked at 4th number among all the states.

But, the overall growth rate of Medium Enterprises in rest of the states is quite low as compared to Micro and Small Enterprises. The possible reason behind their low growth rate is huge requirement of finance and other facilities by these enterprises. Various constraints in availability of resources like finance, technology, skilled labor, market information and access create hurdles in growth of medium enterprises.

Lakshadweep has the lowest growth rate in small enterprises category and even 0% growth rate in Medium Enterprises category along with Manipur and Mizoram while Sikkim has recorded negative growth rate in the same category. Ease of Doing Business Report, 2017 supports this fact as these states are the bottom rankers among the 34 rankings of various states and UTs with Lakshadweep at 34, Sikkim at 33, Manipur at 31 and Mizoram at 30.

In Micro Enterprises category, Meghalaya has the lowest growth rate of 77.48% though micro enterprises involve less investment

compared to other two categories. The rank of Meghalaya in Ease of Doing Business Report, 2017 is 31 shared with Manipur, Arunachal Pradesh and Andaman & Nicobar Islands.

Also, on the basis of implementation of reforms, all these states have been classified into the lowest category.

In **Objective III,** the main aim is (a) to explore the growth pattern of MSME's in the states of Haryana and Punjab post the Udyog Aadhar Memorandum Scheme and (b) to compare the growth of MSME's in Haryana and Punjab.

For part (a) of this objective, year wise growth rate after the introduction of UAM Scheme has been calculated using the following formula:

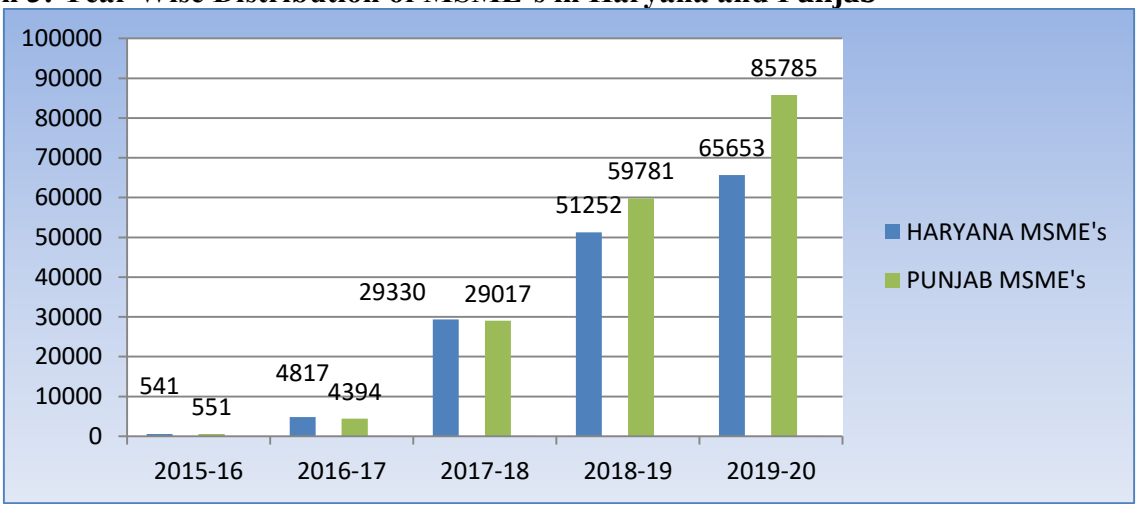
Growth Rate = Current Year – Previous Year / Previous Year

Table 3: Growth Rate of MSME's in Haryana and Punjab from Sept 2015-2020*

YEARS	HARYANA MSME's	GROWTH RATE	PUNJAB MSME's	GROWTH RATE
2015-16	541	-	551	-
2016-17	4817	790.39%	4394	697.46%
2017-18	29330	508.89%	29017	560.38%
2018-19	51252	74.74%	59781	106.02%
2019-20	65653	28.10%	85785	43.50%

(*Data Source: Udyog Aadhar Memorandum Portal**)**

Graph 3: Year Wise Distribution of MSME's in Haryana and Punjab*



(*Data Source: Udyog Aadhar Memorandum Portal**)**

From the above table and graph, it can be observed that the number of MSME's is seen to be in the increasing trend in both the states but the rate at which they are increasing i.e. the growth rate follows a declining trend. MSME's have always been an engine of growth for Indian Economy despite of many hurdles and have also achieved growth in number of units and employment **(Subina Sayal 2015)** but the declining growth rate can be due to the following reasons **(Ishu Garg, Suraj Walia 2012)**:

a) Non- availability of adequate financial funds and imported technology, lack of technical training & assistance, troubles in trade & investment promotion.
b) Lack of expertise in management, difficulty in providing credit terms to customers and red tapism by bureaucrats etc.
c) Lack of research & development, Skill formation, up gradation facilities and a tough competition due to foreign companies etc.

These are some of the reasons which slow down the growth of our small scale industrial sector.

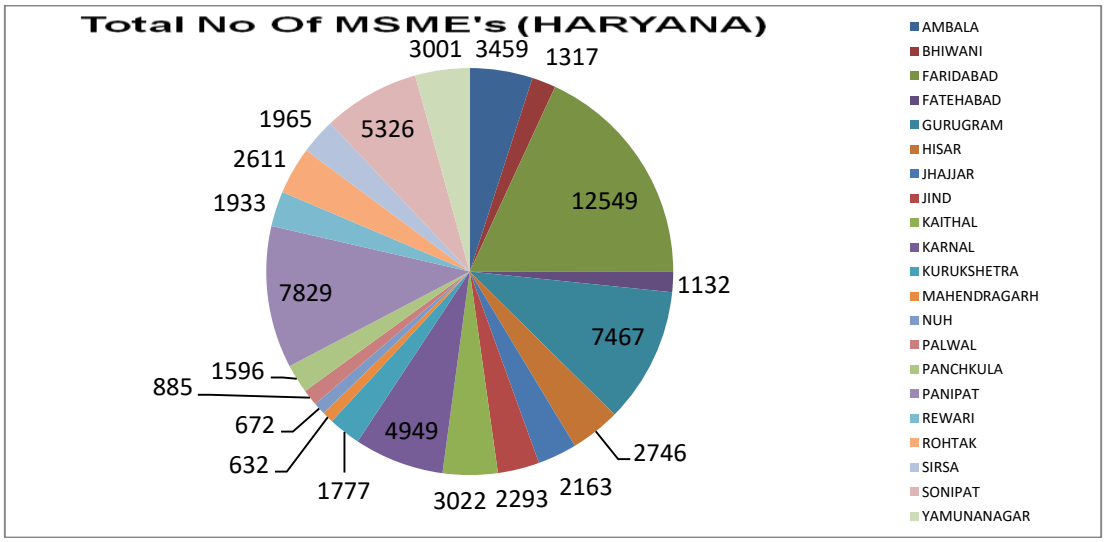
According to a report by FICCI named Vision 2020," Indian Economy has been always on a fluctuating trend of growth followed by a low GDP growth rate but still MSMEs have always played a crucial role in the development of the economy and also hold an important role in shaping the future of India." But, unfortunately the following factors hamper their growth -

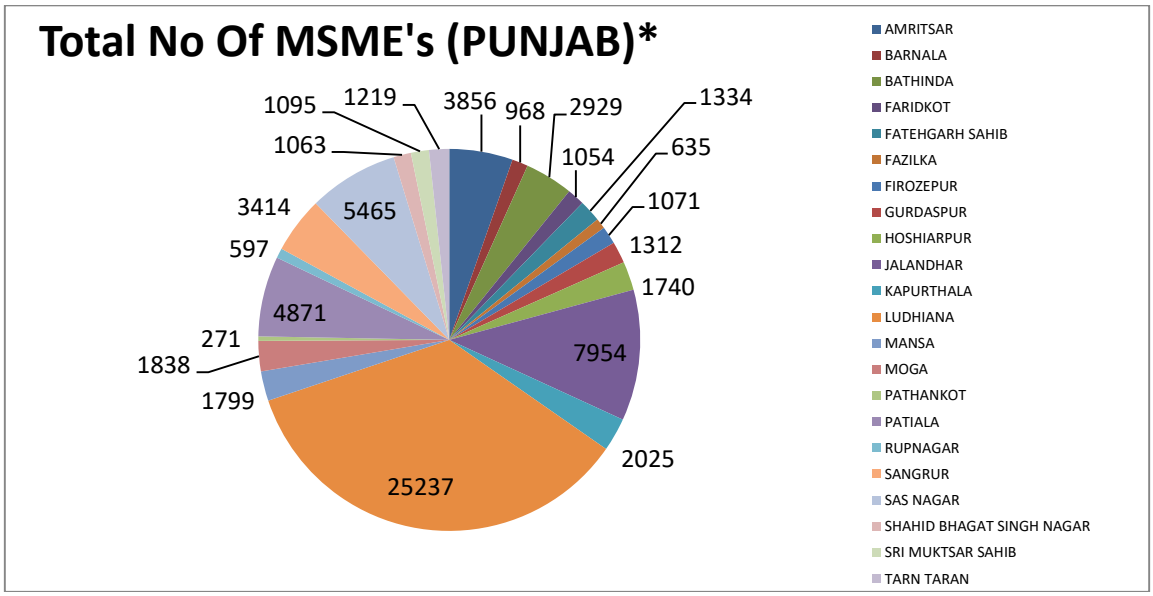
i) Access to Finance
ii) Access to Market
iii) Access to People
iv) Access to Infrastructure
v) Technology & Environmental Constraints
vi) Lack of facilitation of Regulations

This report also reveals that," There is a lack of awareness among MSME owners regarding the government schemes for them and moreover a gap bridges between what government thinks, plans and what is actually obtained as a result." These things are a major reason of low growth rate of these enterprises.

For part (b) of this objective, an analysis has been done using the district-wise registration data of MSMEs in Haryana and Punjab.

Graph 4 and 5: District wise distribution of MSMEs in Haryana and Punjab





(* Data as on 05-11-2019 taken from data.gov.in)

To compare the growth of MSMEs in Haryana and Punjab post the UAM Scheme, following hypothesis has been framed:

H_{01}: There is no significant difference between growth of MSMEs in Haryana and Punjab

H_{a1}: There is a significant difference between growth of MSMEs in Haryana and Punjab

As there are 21 districts in Haryana and 22 districts in Punjab, so sample size comes to be 43 which is less than 50, so for testing the normality of the population Shapiro Wilk Normality Test has been used. The p value for normality came out to be 0.000 which is less than 0.05 that means it is a not normal distribution and non parametric test has been applied.

The comparison is between two groups i.e. Haryana and Punjab and both are independent of each other. Therefore, non- parametric version of independent sample t-test which is Mann Whitney U-Test has been applied. The results obtained are as follows:

VARIABLE	**HARYANA (21)***	**PUNJAB (22)***	**p Value**
District-wise registration of MSMEs	2293(2748)** 19.55***	1537(2464)** 24.57***	0.190****

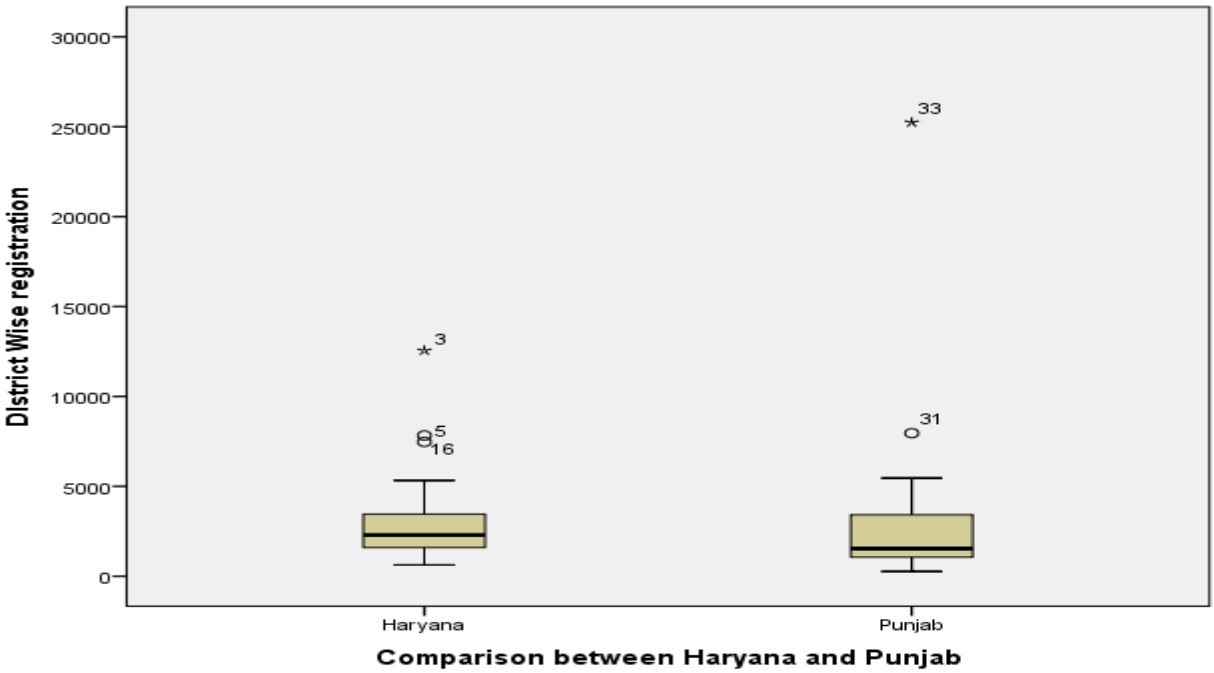
(* No of districts, **** Median (IQR), *****Mean Rank, ******p value at 95% level of significance)

The obtained p value is 0.190 which is more than 0.05 that means the null hypothesis gets accepted and there is no significant difference between the growth of MSMEs in Haryana and Punjab. The figures obtained from secondary data also shows that the growth of Haryana and Punjab is more or less on the same trend. The slight difference in figures can also be due to mild variation in number of districts of both the states.

The boxes and whiskers in the graph given below are almost of the same size which also shows that there is no difference between both the states in terms of growth of MSMEs. A slight difference in the height of box of Punjab can be possibly due to an additional district in Punjab.

The majority of districts in both the states lie above the Median Line and outliers in both the cases have not been taken in the computation of the results.

Graph 6: Box and Plot Graph showing Comparison of MSMEs in Haryana and Punjab



Conclusion

MSMEs are the growth engine of the economy and their working, performance and growth pattern are of great important to an economy therefore, it is necessary that government takes timely and effective initiatives to ensure that the working of MSMEs is not affected due to shortage of financial or non- financial resources. It should also be kept in mind that MSMEs are a great source of employment; hence, they nurture entrepreneurship so government should pay its extreme attention to the skill development programs so that entrepreneurs can take

advantage of the incentives available for them in MSME sector. Awareness Programs should also be conducted time to time to unveil the benefits of registration to the entrepreneurs who are hesitant in registering their enterprises. Moreover, government should work on easing down the norms for doing business in the states with low number of MSMEs and improve their rankings in Ease of Doing Business Report so that there can be a balanced growth of the economy.

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ENTREPRENEURSHIP IN VIET NAM TODAY: THE MAIN BARRIERS, CAUSES, AND SOLUTIONS TO REMOVAL

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ABSTRACT

Creative innovation is shifting to Asian regions. In the past years, China, India, the Philippines, and Viet Nam became economies, which have the fastest growth rate in global innovation ranking. And Viet Nam has risen to become a center for attracting innovation as well as innovation entrepreneurship, besides, it also attracts investment sources through an investment fund. If Viet Nam continues to maintain containment of COVID- 19 and shift to a growth-promoting structure the next time, it will promote its position. Innovation is a requirement not only for newly established enterprises but also for an existing enterprise. COVID- 19 is a challenge for enterprises to innovate their development model, mobilize, and adapt to breakthroughs. This article description and analysis theoretical and practical issues of the entrepreneurship in Viet Nam, it is expressed in aspect: Some basic concept of entrepreneurship, legal documents related to entrepreneurship activities, entrepreneurship in Vietnam today and the points need to be focused on solving in the next future to removing its barriers.

Key Words: *entrepreneurship, entrepreneurship activities, theory, practice; COVID*

Introduction

Over the years, entrepreneurship is being interested in researchers in the world and Viet Nam, especially, in the context of integration economic, entrepreneurship is focused in many countries and is an effective way to solve social problems and create new values for the economy. So, promoting entrepreneurship, searching for successful entrepreneurship solutions is one of the top priorities of policymakers. Besides, the recognition of barriers to entrepreneurship in Viet Nam in recent times is an issue of urgent theoretical and practical significance for entrepreneurship activities to create a breakthrough and value for the economy in the current condition of innovation and integration.

Question of research

Question 1: Where are the basic legal documents, which are related to the entrepreneurship activities of Viet Nam today?
Question 2: What are the basic contents of entrepreneurship activities in Viet Nam today? What are the barriers to focus on removing?
Question 3: Where are the solutions to remove barriers to entrepreneurship in Viet Nam today?
Purpose of the research:
Purposing of this article is to analyze and clarify the basic issue, which is related to entrepreneurship in Viet Nam currently.

Research methods

In this article, the author uses qualitative research base on reference to related research, analyzing, synthesizing, evaluating as well as documents and documents related to Viet Nam's entrepreneurship activities today. Simultaneously, to point out barriers and offer solutions to remove them to entrepreneurship in Viet Nam today, research methods such as deduction and induction, logic and history, comparison, comparing theory with the practice were also used in this research.

Result and discuss

The main concept of entrepreneurship

Entrepreneurship[1]: In essence, it can be understood that entrepreneurship is turning your business idea into reality. There are three types of entrepreneurship: small and medium entrepreneurship enterprises, innovation

[1] Entrepreneurship: is a verb that refers to start a career of one's own. The startup is different, it is a noun that refers to a person, an organization (also known as a company or enterprise). So, these are two different concepts, between them is not the same or similar and the comparison between entrepreneurship and start-up is lame.

entrepreneurship enterprises, and social entrepreneurship enterprises.

- ***The small and medium entrepreneurship enterprise***: it is a small and medium enterprise, which is established to carry out the idea base on the exploitation of intellectual property, technology, new business model, and ability to grow fast. The investors for it include creative entrepreneurship investment funds, domestic and foreign organizations, and individuals conducting business activities through funded and buy a stake.

- ***Innovation entrepreneurship enterprise***: According to the Prime Minister's Decision No.844/QD- TTg approving the Project "Supporting the national creative and innovation entrepreneurship ecosystem until 2025" (Project 844), innovation entrepreneurship enterprise is an enterprise entrepreneurship base on the exploitation of intellectual property, technology, new business model, and ability to grow fast. In Entrepreneurship Report 2012, Organization for Economic Cooperation and Development (OECD) has also stated that innovation entrepreneurship is associated with "seeking a way to create value through the creation or expansion of economic activities, by identifying and discovering a new product, process or market".

- ***Social entrepreneurship enterprise***: In Viet Nam, social enterprises in general and social entrepreneurship in particular, are unfamiliar concepts. Social entrepreneurship is the application of innovation methods, according to market orientation to solve the main causes of social and environmental issues, thereby creating systemic change and providing sustainable solves. So, social entrepreneurship enterprises are enterprises that do not operate to maximize profit, it was established to solve a social problem, which enterprises follow, most of the profit was used to serve social and environmental goals.

- ***Entrepreneurship ecosystem***: is a term that refers to a community consisting of symbiotic, shared, and complementary entities, it creates a good environment to promote the formation of innovative and fast-growth entrepreneurship enterprises. Entrepreneurship ecosystem includes individuals, groups of individuals, entrepreneurship enterprise, and entities that support the development of entrepreneurship enterprise, including policies and law of government (about establishing an enterprise, establish venture capital organization, tax,…); the infrastructure for entrepreneurship (co-working space, material facilities for experimentation and testing to create sample products,…); capital and finance (venture capitals, individual investors, banks, financial investment organization,…); entrepreneurship culture (entrepreneurial culture, culture of taking risks, venturing, and falling); organizations provide entrepreneurship support service, trainers and consultants entrepreneurship; universities; training for individual and group of individuals entrepreneurship; investors and human for entrepreneurship enterprise in the domestic and international market.

Incubators: are organizations that support individuals, groups of individuals, and enterprises from having a business idea to perfecting a business model, product, and service. This organization aims to create an environment that "nourishes" entrepreneurship for a certain time for they can get through hard times, affirm their existence, and develop as independent enterprises.

Accelerators: is an organization that supports individuals, groups of individuals, and enterprises to find investment sources for entrepreneurship, or connect with a business.

Venture capital: is a type of fund economy in which investors contribute capital to a newly established company, not yet listed on the stock exchange, but it has a rapid growth rate and often applies new technology. The role of venture capital is very important to create a start-up ecosystem in general and a source of life for entrepreneurship in particular.

Angel investors: are private investors, they provide capital for entrepreneurship, and usually in exchange for shares or buy shares of the enterprise. Angel investors usually invest in the period from when entrepreneurship has the idea to the completion of a business plan, and beginning sells products.

Overview of legal documents related to entrepreneurship activities

Viet Nam is a developing country, so the problem of entrepreneurship is always a concern of Viet Nam because this is one of the

root issues, which decide the prosperity of a nation. In the context that Vietnam's economy is increasingly integrating deeply, industrial revolution 4.0 created a lot of chances and challenges for development, so encouraging the spirit of entrepreneurship, creating a strong Vietnamese business team, and building a global national brand, all of are the way for Viet Nam to be able to catch up with and develop quickly, and sustainably in today's market.

Before that request, the government of Viet Nam tried to build and perfect a legal system and issuing related documents to support entrepreneurship activities. Typical like:

- Resolution No.35 of government in May 2016 on supporting business development until 2020 has focused on "entrepreneurship" with the rule is "State has specific policies to support small and medium enterprise, entrepreneurship, innovation enterprise with high growth potential to develop".

- Decision No.844/QD- TTg was issued on May 18th, 2016 by Prime Minister approving the Project "Supporting the national innovation entrepreneurship ecosystem until 2025" (Project 844). This is the first and most comprehensive policy document, it is the foundation of support policy for the start-up of Viet Nam. The project was build and performed by the Ministry of Science and Technology, and it's nationwide.

The target by 2025 are:

- Support development for 2.000 projects of innovation entrepreneurship;
- Support development for 600 innovation entrepreneurship;
- 100 enterprises join in The project called investment capital from a venture capitalist, mergers and acquisitions, with a total value of about 2.000 billion VND.
- Decision No.171/QD-BKHCN on February 7th, 2017 of Ministry of Science and Technology approving the list of top tasks with the Project "Supporting the national innovation entrepreneurship ecosystem until 2025" and start implemented since 2017, and Decision 3362/QD- TTg issued provisional regulations to for the processing of records, which join in the above Project. These two documents are issued by the Ministry to implement Project startups support through topics, projects of science and technology of national (the task of every year) and managed by The Ministry of Science and Technology
- Resolutions of Provincial People's Council, Decisions, Plans, and Program of Provincial People's Committee on entrepreneurship and innovation entrepreneurship in the provinces and the jurisdiction of the central government. Most of these documents were issued in 2017, implementing Decision No. 844/QD-TTg. October 2017, 22 provinces and the jurisdiction of the central government were had policy documents of this problem.

In addition, some other projects were approved by Prime Minister related to entrepreneurship. These projects are not associated with Project 844 and the target is to increase understanding and support, so that relevant groups can entrepreneurship (not necessarily associated with innovation). However, due to their wide scope, the supports in these Projects can also be used in part for innovative entrepreneurship.

- Decision 1665/ QD-TTg on October 30th, 2017 of Prime Minister approved Project "Supporting student and pupil to entrepreneurship until 2025". This is a Project, which chaired by the Ministry of Education and Training, not related to Project 844.
- Decision 939/QD-TTg on June 30th, 2017 of Prime Minister approved Project "Supporting women to entrepreneurship from 2017 to 2025"
- - Decision 1665/ QD-TTg on October 30th, 2017 of Prime Minister approved Project "Supporting student and pupil to entrepreneurship until 2025". The general objective of the Project is to promote the spirit of entrepreneurship among students and pupils, at the same time, equip them with knowledge and skills. Create an environment to support students and pupils to realize ideas and entrepreneurship Projects, contributing to creating jobs for them after graduation. On February 18th, 2020, The Prime Minister signed Directive No. 9/CT-TTg on creating conditions for innovative entrepreneurship. According to Directive, Resolution No.1/NQ-CP on January 1st, 2020 of Government has stated that the improvement of the investment and business environment and the enhancement of national competitiveness, the strong development of enterprise in quantity, scale, and quality, boosting enterprise restructuring, promoting innovation entrepreneurship is one of the

solutions to strategic breakthroughs, innovating the growth model based on application modern technology, increasing labor productivity, use effectively use resources and improve the autonomy of the economy. However, the entrepreneurship ecosystem of Viet Nam is still also difficult, barrier, and weak competitiveness. The limitation is mainly since the business environment is not really favorable for entrepreneurship, and the regulation on business conditions is not consistent with the 4th Industrial Revolution; lacking on support in facilities to research; the financial support from the state budget is limited and complicated; the human resources of technology are lacking on both quantity and quality… To create conditions for innovation entrepreneurship, the Prime Minister requested Minister, Deputy Ministers, and Chairmen of the People's Committees of provinces and cities under the central government to focus on guiding and organizing the implementation of solutions to create conditions for innovation entrepreneurship.

Lately, The government issued Decree 80/2021/ND-CP on August 26th, 2021, which regulation and guide the implementation some articles of the Law on supporting small and medium enterprise. In addition, Article 22 of Decree 80/2021 has added many maximum support levels for previously unspecified amounts of support, such as: Supporting 100% of the consulting contract value on the establishment, assignment, exploiting, and protect intellectual property rights in the country but not more than 30 million VND/contract/year/enterprise; Supporting 100% of the consulting contract value on Building a patent description, industrial design and brand identity system design but not more than 30 million VND/contract/year/enterprise; Supporting 100% of the cost of using equipment at technical facilities, incubators, and co-working general but not more than 20 million VND/year/enterprise.

Thus, through overviewing related to these legal documents, we can make some judgments:

- These contents are for oriented purpose only and do not bind the responsibility of any agency or organization, and there is no way of behavior in case the target is not achieved.
- There are issues of procedural detail, often only covered in local policies.
- About the content of solutions, the task is similar to the support measures of 21 OECD countries.
- The innovation entrepreneurship's issue is cared by Government, local and provinces. The orientations and support tools are indented. And innovation entrepreneurship had positive signals, this is shown that the topic of entrepreneurship is really becoming a common interest and a promising economic movement in Viet Nam.
- Regulations of legal and support policies to support entrepreneurship in Viet Nam are still lack synchronization and specificity, there are many conflicts. The regulations are also general, such as support on production ground, join in buy and supply public service, support train… Most of these policies support most small and medium enterprises.
- Besides, most regulations and guides still do not meet the requirements for specificity, especially for narrowing and focus on a certain target group.

The situation of entrepreneurship activities in Viet Nam

****In the past time, in our opinion, entrepreneurship activities in Viet Nam were achieved the main results:***

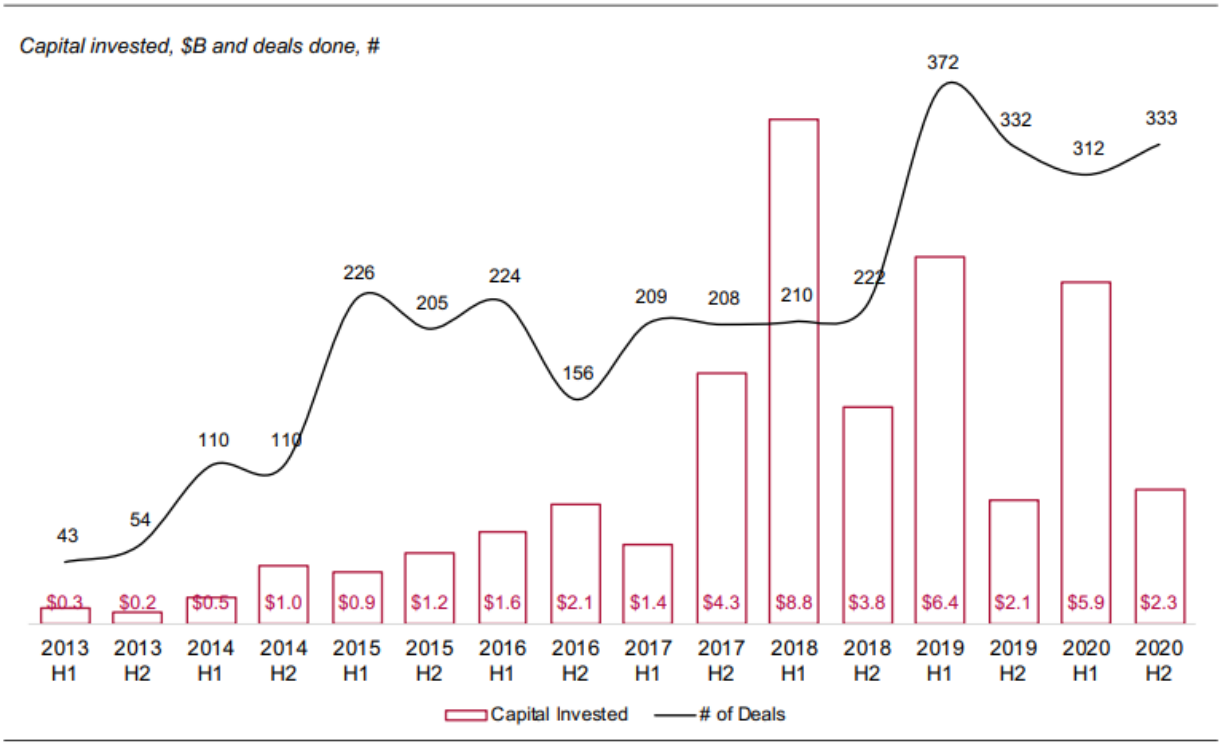
- Entrepreneurship activities have received the attention and take part in local government and departments as well as a system of university and enterprise.

- Entrepreneurship, embark on entrepreneurship activities, have ambitions, the spirit of innovation, and willingness to take risks in business is extremely strong. Today, Viet Nam has over 3.000 entrepreneurship enterprises. Most recently, the survey results of Global Entrepreneurship National (GEN) [11], Viet Nam ranks 3rd in Southeast Asia in a quantity of entrepreneurship and 20th in economic with the leading entrepreneurship.

- Ecosystem is related to entrepreneurship activities as the development of investment financial organizations, the ability to attract equity and intermediary organizations in recent years to develop, interact, supplement, and necessary for entrepreneurship activities. Until 2017, the entrepreneurship ecosystem in Viet

Nam has recorded 92 investment deals with a total value of nearly 300 million USD, an increase of nearly 2 times compared to the number of deals in 2016, and more than 9 times compared to 2011. In 2017, we also recorded the changes in investment trend in entrepreneurship enterprise compared to 2016, besides, until the end of 2017, the e-commerce sector take the lead with 83 million USD, which accounts for 33% in capital investment. The financial tech sector was received 57 million USD in investment, equal to 50% compared to 2016 [12]. 2020 is a year with a lot of challenges but also much chance for the context of innovation investment and global technology, and so is the Viet Nam market. The total investment capital in Viet Nam technology start-up reaches 451 million USD, down 48% compared to 2019, mainly due to the absence of investment that was closed by large companies in the previous year. Payments and retail continue to be the sector that receives the largest value investment because they play a key role in the development of the Internet economy. Some industries like HR tech (Human Resources technology), Proptech (Property technology) continue to attract investment capital, while industries such as EdTech (Education Technology), MedTech (Medical Technology), and SaaS (Software as a service) is increasing due to the change in behavior of consumers and enterprises after COVID- 19 [13].

- Along with the time and more and more rubbing with situations, it has contributed to making start-up more mature.



Source: Cento Ventures and Do Ventures Research [14]

**** Besides, although entrepreneurship activities in Viet Nam are received priority in policies, attention, support from socio-political organizations and entrepreneurs, it is still facing many difficulties as follows:***

- Although entrepreneurship in Viet Nam is very strong, Viet Nam is one of the countries with the lowest ability to implement business plans, and successful enterprises account for a very small percentage. It is a fact that compared to countries such as Isreal, the USA, China, and Singapore, entrepreneurship in Viet Nam is only in beginning.
- There is still a part of young people who have not yet been equipped with knowledge and skill about entrepreneurship, entrepreneurship activities,… have boldly "engaged" in it and then quickly get frustrated and give up. Or use projects that have participated in and won prizes in competitions and then establish enterprise while still in university.
- The work of building prerequisite activities to equip knowledge and spirit is still not popular and unprofessional and still has slogans, movements, and lacks orientations.

- In 2019, entrepreneurship activities has shown sign of slowing down, reflected in the reduction of competitions, and they struggle to invite and attract contestants on the large scale.
- The rate of entrepreneurship of small and medium enterprises accounts for a high percentage.
- Most projects have not focus on investments, research on packaging, design, or processing to achieve higher value. They just take advantage of local goods for industrial production and then sell to the market, but have not invested in packaging, design, or processing.
- The culture of entrepreneurship is not popular to encourage people to act with innovative entrepreneurship, even if they do not have a natural inclination to act.
- The process of entrepreneurship is still copycat products, services, and business models available in the market. This is not suitable for the relationship between entrepreneurship and innovation.
- Fact in Viet Nam, every year, the number of newly-established enterprises and the number of dissolves/ discontinued enterprises are constantly increasing, even if at any time with a large increase.

According to General Statistics Office, April 2020, there are only 7.885 newly established enterprises with the registered capital is 93,9 trillion VND and the registered labor is 72 thousand, down 35.7% in enterprises, down 28.6% in registered capital, and 16,8% in labor compared to March 2020 [15]. The newly registered enterprises in April 2020 was decreased 46.9% compared to the same period last year, while the registered capital decreased 43.8%. Including the first 4 months of the year, Viet Nam had 37,6 thousand newly registered enterprises, down 13.2%, especially, the number of enterprises temporarily suspending business for a definite time reached 22.7 thousand enterprises, up 33.6%. The average registered capital of a newly established enterprise in April reached 11.9 billion VND, up 11,2% compared to the same period last year and 5,9% compared to the same period 2019. In April 2020, Viet Nam had 3.810 enterprises come back, up 11,3% compared to last month and 40,4% compared to the same period 2019, this is a signal that a part of enterprises is restarting to prepare for new business opportunities when the Covid-19 epidemic is under control. In this April, the whole country had 4.121 enterprises temporarily suspending business for a definite time, up 68,1% compared to last month and 65,2% % compared to the same period last year; 2.166 enterprises suspending business to dissolution procedures, down 22.2% and up 13,8%; 980 enterprises completed dissolution procedures, down 51,6% and up 42,8% [14]. These are some of the factors which affect entrepreneurship activities in Vietnam today.

- The new projects lack experience and competitiveness. In addition, there is a lack of knowledge and practical experience in human resources, finance, business strategy… all of them are challenges in the entrepreneurship process.
- Entrepreneurship ecosystem in Viet Nam was attended by locals, but it is forming and building. The figures related to the entrepreneurship ecosystem in Viet Nam are mentioned in many different documents, but the common point is that the factors in the entrepreneurship ecosystem are still very modest.

The table of Vietnam's innovation entrepreneurship ecosystem

Factors	2016	2017
The number of accelerators	6	6
The number of Pre-seed/ Seed investors	22	22
The number of Series A, Series B	25	27
The number of the other investors	14	14
The number of funding/ incubator of Government	4	4
The number of co-working space	13	14
The number of big events of innovation entrepreneurship	13	13
The number of innovation entrepreneurship media	9	9

Sources: http://cesti.gov.vn/chi-tiet/8790/the-gioi-du-lieu/he-sinh-thai-khoi-nghiep-o-viet-nam [8]

Activities entrepreneurship are facing barriers

Entrepreneurship is becoming a strong wave, with a lot of opportunities related to the regulatory environment, business environment, infrastructure for development, but also many challenges and risks to face.

Firstly, financial constraints

According to Business condition ranking report of 54 countries, Viet Nam is leading in the index such as: active in the domestic market (5/54), culture and social norms (6/54), infrastructure 10/54… but weakness in the index: finance (39/54), business education after high school (40/54), technology transfer (34/54) [16]. Provincial Competitiveness Index (PCI) in 2016 was implemented by the Vietnam Chamber of Commerce and Industry, 41% of entrepreneurship enterprises said loans are one of their tops difficulties [16]. Many entrepreneurs when entrepreneurship have struggled with mobilizing initial financial resources to build products and services.

Entrepreneurship enterprises are approaching equities from banks, professional investment funds, or looking for private capital through acquaintances. However, how to get a bank loan when many entrepreneurship enterprises only start from zero? The bank loan is extremely difficult, especially at the time when banks are tightening lending management. Some banks have incentives, but very few enterprises approached due to credit procedural and request of hypothecated assets. In Viet Nam, the criminalization of economic relations is very popular, while investing for entrepreneurship is a high risk, and when the loan is lost, both the borrower and lender have problems.

Secondly, organizing support for entrepreneurship is not really effective

Conducting support activities in the entrepreneurship process is a necessary and objective requirement to improve the quality and efficiency of enterprises. Activities of entrepreneurship support organizations are still difficult due to insufficient network of specialist and professional services to serve for entrepreneurship; new supply services in basic level; transformation and associated between domestic and foreign enterprises, especially Vietnamese enterprises abroad is not high.

Thirdly, policies change constantly, business environment and legal regulations are often inconsistent and unclear that also caused enterprises and investors to face risks and barriers in their operation.

***Fourthly, facing barrier**s **due to administrative formalities*:** issues such as administrative formalities as well as its responsiveness to market entry (business and land registration, business license,…), intellectual property protection (register for protection of intellectual property products), commercialize products (register for standard, meet the technical standard), finance (accountant, bill, tax declaration, and tax incentives standard). All these issues are still slow and many unnecessary procedures, which have created barriers that make both enterprises and foreign investors hesitate to stay in Vietnam. The number of entrepreneurship projects in Vietnam that was invested by foreign is quite "modest". The ability of funding in Vietnam is limit compare to some countries in the Southeast Asia region such as Indonesia and Singapore.

Fifthly, though not the majority, there are still many paradoxes such as the spirit of mastery, most of the entrepreneurship in Vietnam began from those who to toss about practice, low education level, and those who with higher education tend to go to work, … So, this is also a large barrier for the formation of entrepreneurship in modern life of Vietnam in the context of integration.

Thus, these five barriers created “barriers” on the way of entrepreneurship of Vietnamese enterprises today. They not only struggle to mobilized capital but also have to bear administrative formalities, but were “alone” in regaining the market and calling the investors.

Causes of barriers

- ✓ The initiative in thinking towards integration and product commercialize is low level.
- ✓ State management is still scattered, there are still many ministers and branches managing a field.
- ✓ Enterprise, State, and union organizations have not coordinated to act.
- ✓ Enterprises are always "alone" in the fight of regaining the market.

- ✓ Legal awareness of enterprises is not systemic and updating.
- ✓ The government has not supported policies and create "sources of capital" in a practical and effective, create the premise for much other capital to invest.
- ✓ The entrepreneurship ecosystem is not professional.

Suggesting the specifics points that need to be focused on solving in the next time to removing entrepreneurship barriers:

Entrepreneurship activities are really the main solution to effectively respond, use chances, at the same time overcoming challenges that free trade agreements and industrial revolution 4.0 bring to Viet Nam. Shortly, we think we need to focus on solving main issues and feasibility such as:

Firstly, Government and branches need to companion with enterprises, see yourself as an incubator. Checking, synthesizing suggestions on modification, replacement, or construction of legal documents, to not only ensure consistency in the system but also an effective support for entrepreneurship.

Secondly, the Law of support for small and medium enterprises has to really towards enterprises, simultaneously, increase connection and coordination among state agencies, business representative organizations, lawyers associations, and bar federations to legal support in specific situations. Boosting legal support for entrepreneurship enterprises in many ways such as document, electronic network, telephone,… In addition, need to propagate the State's policies on supporting entrepreneurship through conferences, seminars, and seminars on legal topics for entrepreneurship to create favorable conditions for enterprises to access policies, legal information and raising awareness, sense of observance, and compliance with the law.

Thirdly, in regulation on activities of Funds, it needs to be shown:

+ Vertical Capital needs to the market management, The state does not intervene, but only recognizes this fund in the financial system of Vietnam.

+ Mutual funds should not be managed by Government agencies, but mainly for Non-governmental organizations and community organizations to manage, with strict regulations to avoid group interests being manipulated and dominated.

+ Fund with functions of **mobilized capital from domestic and foreign organizations and individuals to lend** to support and invest for entrepreneurship project, contribute capital to establish an entrepreneurship enterprise.

Fourthly, simplify, publicize administrative formalities and procedures related to the organization and activities of an entrepreneurship enterprise**.** Promoting solve administrative formalities related to enterprise on the electronic environment, at the same time innovating the way of working through the processing of work records on electronic environment.

Fifthly, synthesize, evaluate, discover and expand effective models to support entrepreneurship enterprises**,** promote dialogue between it and representatives of state agencies. In addition, promote the role of associations, which connect between State and s entrepreneurship enterprise**.** Well performing its role is important to refutation policies on enterprise, allowing enterprises to monitor and evaluate the activities of government agencies to serve as a basis for making recommendations and proposals to improve the quality of service.

Finally, focus on building national entrepreneurship culture, bringing entrepreneurship to young people; boosting research, and develop entrepreneurship in the education environment. Early introduction of entrepreneurship content into the education system right from the high school program helps young people to form the entrepreneurship and culture of entrepreneurship early. At the same time, the education system needs to be changed towards linking reality with theory, training education with practical activities to helps young people get close to entrepreneurship environment.

Conclusion

In the world, Israel is the country with the strongest entrepreneurship. With their practical and experience, Israel realized three direct causes to successful entrepreneurship are: policies of the government; the dynamism of citizens; contribution of the army environment. The most important factor is education. Singapore is one of the three promised lands of

entrepreneurship in the world[2]. Positive policies of Singapore'government changed the conservative culture[3] there, awakening the entrepreneurial spirit of the young generation based on education and legal system supporting entrepreneurship. The United States is the most dynamic society in innovation, they always need to promote startups to turn new inventions into products. To maintain its leading position in the economy, the USA must take "entrepreneurship" as its main competitive advantage. These contents are experience lessons that had a strong influence on entrepreneurship in Vietnam. Today, entrepreneurship become a driving force to social development, having policies to promote growth, focusing on the domestic private sector, and at the same time rapidly reforming institutions in the direction of reducing procedures, creating the most favorable conditions for entrepreneurship; having consistent and synchronous policies from the government; reforming education system from high school to university in direction of linking education- training with practical activities, upholding the spirit of mastery, promoting entrepreneurship are issues that need to be focused and implemented in the next time.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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[2] The other two countries are Israel and Denmark
[3] There is not really a culture of "failure" like the Israelis

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Representing Female Consciousness in John Fowles's *Mantissa* on Postmodern Perspectives: A Study

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ABSTRACT

John Fowles is a twentieth Century Postmodern British novelist and his writings mirror the complexity of life, the over whelmingness of experience in day-to-day experiences. Fowles's works are influenced by Jean-Paul Sartre and Albert Camus, among others. He expresses his sympathy toward women who are not only beautiful but also intelligent because they have to overcome the almost insurmountable hurdle of their sexual charm in their avenue to personal and professional success. The present paper highlights how Fowles novel Mantissa represents the female consciousness and howthe novel presents in the sense of postmodernism. The novel Mantissa reaffirms the ideologies and practices of patriarchal power and classic realism, and its parodic strategy of mixing an exaggerated image of postmodernist mutability in its female protagonist with an equally distorted depiction of a feminist, poststructuralist notion of subjectivity has much to offer a feminist reader. Postmodernism is both a continuation of modernism and an experiment on modernism. It shares certain common characteristics with modernism. They do not stick to the rigidity of genre distinctions, itdoes not follow the traditional ways of writing. There is no single truth or reality, and there can be many truths and realities. The novel takes place entirely within the mind of the novelist, Miles Green the protagonist of the novel who is in hospital following a stroke. The novelist's fantasies about the female hospital personnel turn into an amiable conversation with the Muses about art and ethics. Their traditional role as romantic inspiration for male writers has been rendered comical obsolete by their status as modern women; withering exchanges between them and the hapless Green provide comic relief.

Keywords: *Postmodernism, Parody, Post-structuralism, Patriarchal, Realism*

Introduction

Fowles's admiration for female consciousness intelligence and his claims to feminist consciousness. John Fowles was a British Postmodern poet, novelist, short story writer, essayist, and committed teacher. Fowles's writings are dominated by the consciousness of the writer and as a figure with his works, entering the narrative at a certain point to comment on the action. The characterization of women as "warm fact" is precisely the quality of Fowles emphasizes in his fictional characterizations of women. Fowles's female characters represent progression, vitality, creativity, independence, and authenticity. When we look at Fowles's writing about men and women, not only is an analysis of contemporary femininity and masculinity possible, but it is in the wilderness of gender and sexuality that the novels flourish. In dealing with his characters, Fowles values women for their sexually alluring mystery and the intuitive way of seeing and knowing. Therein lies the potential to expand the inauthentic male subject's consciousness and quality of life. Fowles's female characters encourage, support, awaken, and honour those divine feminine qualities. Due to his genuine feminist sympathies, Fowles attempts in his fictional works to explore women's sensibilities and to advocate women's ways of knowing and being.

In his depiction of women characters, Fowles uses his protagonist's perspective to frame and organize the narrative. Fowles demonstrates in his works the admiration for women and his acute dissatisfaction with masculinity. Fowles's female characters demonstrate that the masculine ethic of capitalism which rules the contemporary readers needs an infusion of the feminine virtues of intuition, subtlety, and experiment. Fowles deals with issues concerning the need to appreciate the healing, comforting influence of women. He believes that the industrial West has failed to temper the male virtues of bravery, ambition, and endurance with female benevolence and gentleness. The imbalance between male and female principles has had damaging reverberations, for besides blocking the interchange and freedom necessary to the formation of a civilization. The availability of the Fowles female protagonist is a crucial part of their greater capacity for faith and imagination. Fowles's women characters have healthier instincts than their male counterparts. Fowles's feminist advocacy determines his subject matter, characterization, and narrative technique. Fowles's attention to men's problems coupled with his feminist advocacy provides a textual territory that deserves close attention.

As post-structuralise philosophy has served to identify the systems of logo centric hierarchy and opposition that feminism needs to

challenge, postmodernism's concern with representing that which is excluded from representation by its structure offers feminism a set of fictional strategies to assimilate. As a result, the foundation of this challenge is a deconstruction of liberal humanism concepts of gender identity and difference, as well as a questioning of the cultural hierarchy founded on these notions. It will be useful to examine which of the problems identified by theorists are also addressed in fictional texts, and how postmodern strategies facilitate the creation of textual grounds in which such theories may be addressed without recourse to the contradictory maneuvers demanded by more traditional modes of fictional representation when assessing the combination of feminist ideological positions and postmodernist fictional strategies.

Review of Literature

Worthington, Marjorie (2017).“Sex-Consciousness” to “Self-Consciousness: Second-Wave Feminism and Postmodern Autofiction” reveals that Self-consciousness, self-reflexivity, and metafiction are terms typically used to define a particular trait common to postmodern fiction. Modernist masculinity crises reified High Modernist writing's self-abnegating aspirations at universality and objectivity, while postmodern masculinity crises contributed to the pervasive appearance of self-consciousness in postmodern literature. Until the late twentieth century, when feminist literary critique arrived, the implications of masculine privilege on literary endeavour were ignored. While male Modernist writers pondered and wrote a great deal about their aesthetic philosophies, they rarely acknowledged how much their views were influenced by masculine-gendered concerns. Late-twentieth-century Modernism historians examined historical relics as a correction, demonstrating the impact of evolving gender standards on historical events and artistic breakthroughs. But, once again, these revelations are only now emerging: the Modernist artists themselves appeared to be blissfully unaware of any impact the international Suffrage Movement or shifting conceptions of women's societal duties might have had on the artistic events of the day. In some ways, the spread of postmodern autofiction is a result of the second-wave feminist movement's increased awareness of gender. This relationship between postmodern self-consciousness and so-called "sex-consciousness" has rarely, if ever, been drawn, but autofiction is an ideal vehicle for charting this connection and gauging an increasing awareness of gender issues in contemporary writing.

John Haegert (1986). "Memoirs of a Deconstructive Angel: The Heroine as Mantissa in John Fowles' Fiction," explains that Fowles did not stop at landing the role of woman as a mysterious and fascinatingly other. He didnot want to present a woman as merely a supporting character in the wider action of male self-discovery and possession. In his most recent piece, Fowles attempted to internalize the authority of a woman by opening himself entirely to her ambiguous presence. In this way, he could give the woman a vital and equally creative role in the self-aware duty of eradicating everything that stands in the way of the artist's "whole reality." Mantissa's story, which is broken into four parts, is a clever metafiction. It seeks to investigate and dramatize the competing impulses that both precede and, in some ways, survive every act of creation, and is cast in the dreamy form of a surrealist cinema. Miles Green, the protagonist awakens in a mental institution called the Central, ostensibly suffering from a neurological collapse, in the first segment. He has no remembrance of his identity as a spouse and parent or as a commercially successful novelist at first, exhausted and disoriented. To make matters worse, he quickly learns that he is a virtual prisoner of the Central and that he is at the whim of the institution's main "neurologist," the proleptically called Dr.Delphie, and her black assistant, Nurse Cory. In an apparent effort to restore Miles' "damaged circuit" of memory, the two ladies execute rigorous sexual treatment on him, complete with scrotal rubs and oral stimulation. Meanwhile, the astute reader has begun to detect the metafictional truth behind this absurd premise: that the novel's amazing plot and characters are the creations of Miles' frenzied and delusional mind. Dr.Delphie has a complete and startling transformation. She finally reveals her true identity after a brief but explosive debut as a feminist rocker. She is Erato, Mnemosyne's daughter, and her torturing of Miles is a type of retributive justice, arising from her dissatisfaction with being restricted to a subordinate position in the creation process. The next sections of the novel consist of a more or less continuous dialogue between the two antagonists, interspersed by moments of erotic violence, in which they discuss the most pressing essential topics of our time.

Tukacs, Tamás(2015). "Authority and Authorship: The Writability of the Female Character in John Fowles's*Mantissa* and *The Collector*," portrays that male novelists are following a kind of lost figure. They are haunted by the idea of the unreachable female, and the mother is invariably the most unattainable female. Most male novelists' sentiments toward their heroines reflect some form of attitude toward the mother. As a result, writing fiction is motivated by an oedipal drive, which includes, by definition, a yearning for the mother and, at the same time, repression of that desire out of fear of castration and the authority of the castrating father. This suppressed yearning can be directed not only towards the mother but also at other women who may represent this forbidden and unattainable figure, such as the novelist's heroines. When a system needs to be augmented, its intrinsic flaws become apparent. In the context of Fowles' writings, such a binary opposition system may be built on the man/woman dichotomy. Considering them secondary may imply that the original system isn't perfect and that something needs to be added to make it, if not flawless, at least less inadequate. As a result, women appear in most of his works as both motivating energies and mysterious figures, as well as potentially subversive complements to the patriarchal pattern. Fowles appears to invert the usual idea of women as figures of secondary importance by providing them a key role in his narrative, imagining them as more active and catalytic than male characters. The difficulty is that if the author consistently gives his female characters the same, albeit positive, position, the characters' freedom, which he is attempting to rehabilitate, is jeopardised. Realizing the danger, Fowles wanted to keep his characters' personalities as free as possible.

Postmodern Feminism

The term Feminism is differ between Individuals and political activity such as 'equal rights' campaigns to academic efforts concerned with reinventing the literary tradition. Although feminism's object of resistance is easier to describe than postmodernism, it is noteworthy that both phenomena are intentionally oriented along lines of antagonism, and this shared position would appear to indicate an affinity that is never less difficult to perceive. The relationship between postmodernism and feminism is a long-standing and highly political event that is, to put it mildly, controversial. Postmodernism and feminism have more common issues than some of their practitioners would like to admit. Here problem is that both artistic and political representations of both events are preoccupied with the concept of identity. It is no coincidence that both postmodernism and feminism have been described as marginalized about Western culture's dominant discourses and ideologies. To avoid the processes of assimilation and absorption that come with centralization, these phenomena must necessarily situate themselves on the periphery of culture. However, there is an opposing process at work as well, because the explicit political concerns of feminism patriarchy, and postmodernism as a cluster of related concerns: avant-garde culture, non-Western cultures, Western sub-cultures (eg, ethnic, youth, working-class marginalized by liberal humanist ideology) are precisely those entities already defined as marginal by 'dominant Western culture.' This definition of marginality is based on the principle of non-definition. That which resists categorization by this ideology, which cannot be represented by this ideology, and which has no place within this ideological construction of' reality' is constantly defined as marginal by the prevailing ideology.

The viewpoints of postmodernism and feminism are marginalized cultures. These are decided on the one hand by self-maneuvering, and on the other hand by the dominant culture's excluding techniques, which can be regarded as defining itself by excluding that which it is not and rendering the 'other' external and marginal. This paradoxical state is concretized within the contradictory represent concretized identity both as the desirable condition and as a fictional fabrication within postmodernism and feminism. While the repudiation of the historically enforced notion of identity as unitary, coherent, and consistent is an expressly shared concern. Postmodernism and feminism are both involved in a continuous and self-reflexive investigation of their own identities, as well as their representations of identity in respective discourses. The breadth of this engagement and the diversity of its forms suggest that this interest may be significant enough to provide a framework for analyzing both postmodernist and feminist artistic creations.

Findings and Discussion

The problematization of Fowles' participation in the perpetuation of certain images of women in *Mantissa*. These visuals only serve the male author's purposes, and that is exactly

what they do. This issue is intimately tied to the theme of self-referentiality in the novel, as Erato'smajor woman character Mantissa tries to demonstrate in *Mantissa*. The story can keep enough critical distance from stereotyped representations of women to avoid perpetuating them. During the first part, when the protagonist, Miles Green, is represented lying in a hospital, suffering from a 'power cut,' as Dr.Delfie puts it, the reader must do some investigation. This has resulted in a loss of memory, as indicated by Green's inability to remember his former wife. As the story progresses, Dr.Delfie and nurse Cory attempt to deliver to Green a sort of therapy that involves Delfie and Green lovemaking. Delfie is revealed to be a manifestation of the muse Erato in the second section, who, after reading the first part, chastises him for perpetuating stereotypical and inaccurate stereotypes of women in his narrative works. The reader sees their discussion for the rest of the story, but the novelist's major goal is to show that the narrator is prone to spreading the same preconceptions that Green is being reproached.

In the novel *Mantissa*,Fowles wrote partly as a joke, an amnesic writer is involved in a test of wills with his shifting Muse. Erato is the most excitable of Fowles's female characters since she literally metamorphoses herself into a doctor, a nurse, a punk rock guitarist, a nymph, and a Japanese geisha. As an independent-minded twentieth-century woman, she engages the writer in a typical battle of the sexes. She reproaches the writer because she has no freedom to exist in her terms, dependent as she is, on the writer's will to create and transform her as a character. At other times, she is condescending toward him because he is such an incompetent writer that she is moved to help him. The writer ultimately exerts more power, the novel shows that the writer cannot generate texts without the inspiring energy of his Muse. In her various healing roles, Erato determined to rescue male protagonists, in this case, a blocked writer, from their professional or existential immobility. *Mantissa* shows a male protagonist whose sexual fantasies about women vary from a sensual female doctor applying erotic therapies to him to a submissive, almost "rapable" Japanese geisha. The novel also shows him wrestling with Erato in the guise of an aggressive and almost androgynous punk, who refuses to be cast into stereotypical female representations by men.

During their conversation, Erato recounts multiple incidents from her life involving various writers of a different period, spanning Greek mythology to contemporary literature. Some of the events are quite obscene, and they succeed in creating Green's overly sexualized imagination, which Erato both encourages and condemns. She has asked him not to tell anybody else about these stories at times, but considering that we are reading a Miles Green character, he has not considered her request. Green's standing is questionable, not only from an epistemological or ontological standpoint but also in terms of his state male chauvinism. As a character, he verifies Dr.Delfie's alias Erato's diagnosis while also convincingly contesting it. When she reproaches him for the chauvinism of his literary oeuvre, he retorts, "you're confusing me with Walter Scott" (*MT* 55). This is not completely implausible, given the rest of the narrative. Erato gets the places and names mixed up from time to time. As a result, Green is aware that chauvinism can manifest itself in a literary work, and this understanding is not restricted to other writers' works:"How you've always admired my sensitivity over women, how you realized I had literary problems ... all the rest of it'" (*MT* 165). Green, on the other hand, can display blatant chauvinism when sufficiently provoked by Erato.

Erato'sassessment on Green not only in general but also on a personal level. She objects to his depiction of women in particular because she perceives a tendency in his work to entrust women to the status of objects, and sexualized objects to suit the male imagination: "And I'll tell you what a modern satyr is. He's someone who invents a woman on paper so that he can force her to say and do things no real woman in her right mind ever would" (*MT* 85). Following her main assumption, there is a very complicated discussion of the roles that the two protagonists play in the story. As a muse, Erato has accomplished the impossible. She has entered the text that she was only supposed to inspire and has expressed her dissatisfaction with the way she was treated in it. As they both agree, muses are typically denied a voice, and one of the things she criticizes Green for is his ultimate power over her. However, her ultimate control is quickly questioned as it becomes evident that her appearance as a pun skinhead-gothic at the start of part two is one that Green finds disgusting and improper. He claims or at least tries to indicate that she would not have looked dressed in that manner. "I only seem real

because it is your nauseating notion that the unreal character I'm supposed to be impersonating should do so," she protests, and if he thinks she's real, it's because of his misguided notions: "I only seem real because it is your nauseating notion that the unreal character I'm supposed to be impersonating should do so" (*MT* 85). Erato also questions Green's status as the narrator and asks him whether or not there is an author behind him: "To say nothing of *your* character. I notice there's not been a single word about his exceedingly dubious status. I wonder who's pulling his strings." (MT 103). In*Mantissa*, reader, this statement is both true and false, because such a reader will have read many comments about the author's status. His status is questionable because it is unclear whether the text was reading is supposed to be a Green word or not. It is also possible that only the first section is Green's genuine text, and the rest is simply a portrayal of his quarrel with Erato. The self-reflective nature of *Mantissa* as a novel infers that the text we are reading is entirely written by Green.

After telling her that her changes to his novel went completely against the grain of almost everything that modern fiction can be about, and after symbolically containing her criticism with his greater knowledge of literary principles, he feels relaxed to say a few things that are clearly below the belt:

> All right. Then be a woman, and enjoy it. But don't try to think in addition. Just accept that that's the way the biological cards have fallen. You can't have a male brain and intellect, as well as a mania for, being the universal girl-friend. Does that sound unreasonable? (*MT* 121).

Green is both a victim and a perpetrator of masculinity's beliefs, as indicated by his belief in an almost inevitable link between masculinity and genius, as evidenced by his remark about Homer: "Obviously he [Homer] was a man. He was a genius" (*MT* 170). He is deeply hurt when she admits that she has never read a single word of what he has written thus far, a claim that runs counter to her assessment of his work as pornographic. His reasons for attacking her are purely personal. Indeed, Green's theory of excellent fiction principles will elucidate this argument in greater depth. Despite criticism that his writing is chauvinistic, it is evident that Miles Green is the controlling instance in Mantissa's description of events, which explains why some of the comments are written from an unmasked, male-biased point of view: " All male sympathies must go to Miles Green, or so Miles Green himself overwhelmingly feels" (*MT*181). His sense that he was far too important a person to be treated so dismissively. This supports Dr.Delfie's judgement that the disorders that go by the label of literature are solipsism and egotism.

At the end of the novel, it becomes clear that Erato's criticisms have been in vain, as she is unable to prevent Green from developing new variations of his old theme, in which Erato is forced to serve him in some of his more positively chauvinist fantasies: "When Erato is made jealous enough over Nurse Cory, he will (...) propose a new alternative" (*MT* 185). Which is that of an obedient, non-English-speaking, pious Japanese girl, a stereotype that shows Green's vulnerability to the fullest extent possible. Green's depiction of the Japanese girl that follows could be interpreted as proof that he, too, suffers from the Madonna whore-complex that has already been discussed. Despite Erato's criticism, it is Miles Green who ultimately defines the terms of the novel's representation. Even though he has some compassion for women, he is still promoting a male-biased view of writing. In keeping with the premise that all literature is a form of self-reliance, Green himself alluded to the potential that everything we're reading is only happening within Green's head. He reveals to Erato that the hospital's grey room was a symbol for grey cells in part one. Aside from the repeated references to the room's greyness, which would support such an interpretation, the novel has a prominent cuckoo clock. While Green's interpretation of part one is supported by the one symbol, the cuckoo is a symbol for shifting one's responsibility for one's progeny rather than comments. On the otherwise unacknowledged avoidance of responsibility that characterizes much of an author's relationship with his female characters, but it can also be interpreted as a symbol for an author's avoidance of taking responsibility for Fowles novel. This fact is the reference to Green's "sensitivity over women" (*MT* 165), which would also apply to Fowles. Fowlesdiscussed women's struggles and feminism in general in his interview, but his authorial attitude betrays dubious collaboration with the male reader. Metafictional devices are used by Fowles to accomplish this blend of complicity and evaluation. The meaning of the word 'mantissa,' is defined in a footnote as a comparably minor addition, especially to a literary effort or discourse.

Conclusion

Fowles attitude toward women, many women readers seem to have appreciated. His genuine fascination and archetypal characterization of women, such contradictory responses may reside within the same individual.Fowles' woman to be flattered by the reverence, he expresses for that Female characters, and simultaneously object to the limited and unrealistic definitions of womanhood embodied by the woman protagonist. The simultaneous presence of such divergent responses.Fowles did not stop at celebrating the role of woman as a mysterious and seductive Other in Mantissa. Fowles wants to present Erato as merely a supporting character in the broader spectacle of male self-discovery and possession. In his most recent work, he attempted to internalize the authority of a woman by opening himself entirely to her ambiguous presence. As a result, he could give her a vital and equally creative part in the self-conscious duty of removing anything that comes in the way of the artist's "whole reality." The muse as much as the novelist, crafts the text in *Mantissa*. Erato usurps Miles' authority as a maker in this story, exposing him to the radical indeterminacy of art once more. In this fluid and chaotic realm, the very profusion of potential "plots" in the author's mind before inscription prevents the establishment of any one of them as sovereign or inevitable, the absolute generator of the rest. Here it is that each of the stories already inscribed and executed by Miles finds it is repressed or reversed double, a vital element of "nuclear energy" ready to devote and discharge into new and unforeseen patterns of resonance and meaning. Erato criticizes Miles and by implication, Fowles for unduly circumscribing the authority of women in his fiction.

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HYDROGEO CHEMICAL PROCESSES AND THE EFFECT OF SALINE WATER ON GROUNDWATER QUALITY IN THE KORATTALAIYAR WATERSHED, TAMIL NADU, INDIA.

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ABSTRACT

The goal and purpose of this article were to investigate the geochemical weathering processes and the effect of saline water on groundwater quality in the Korattalaiyar river basin in Tamil Nadu, India. Approximately 31 groundwater samples were obtained from the near coastline and hard rock area between January and July (2019). APHA advanced analytical producer followed to be analysed major cations and anions. The analytical result of major ions decrease follow in order: Cl > Na > HCO_3 > Ca > SO_4 > Mg > K during both period. The EC concentration regarded around 48% (January) and 45% (July) of the samples to have been in the brackish water category. The concentration of Na, Cl, HCO_3, and SO_4 increases in July as a result of mineral dissolution for groundwater level reduction. Since the influence of saline water intrusion and anthropogenic activities, about 70% of the groundwater samples in this region are Na-Cl types during both periods. The silicate weathering and cation exchange activities control the majority of groundwater chemistry. The bivariate plot of (Ca+Mg) versus (SO_4+HCO_3) and Mg/Ca versus Cl indicates dissolution of dolomite and calcite minerals effect of freshwater zone in throughout seasons. Because of the influence of saline water intrusion, the molar ratio of Na/Cl versus Cl indicated that the majority of the samples were found around the seawater ratio value.

Keywords: *Groundwater, Geochemical weathering, salinewater intrusion, Multivariate statistical analysis, Major Ionic ratio.*

Introduction

Water is a most significant natural resource, it is an essential human need and is a precious national asset (Ramamoorthy et al.2018). Surface water and groundwater are important in the world and are used for a variety of purposes including drinking, agriculture, and industry. Groundwater is utilised for drinking by about one-third of the world's population (Nickson et al., 2005). In both urban and rural India, groundwater is the major source of drinking water. The human population is steadily expanding throughout the world (USCB, 2003). With about 4% of the world's freshwater resources, India sustains more than 16% of the world's people (Singh, 2003). Surface water and groundwater quality changed based on the physical (pH, EC, Colour, Temperature) and chemical parameters (Cations, Anions and Trace elements).The physical-chemical parameters of the groundwater changed is organized by different issues such as precipitation, agriculture activities, sewage disposal, seawater intrusion, industrial activities, and geological processes. Sewage solid waste dumping in open land can also contribute substantial amounts of metals to groundwater via batteries, disposable home items, plastics, paints, pharmaceuticals, and household insecticides (Tran et al., 2002; Beiras et al., 2003; Bardos, 2004; Anderson et al 2005). Local hydraulically associated with the sea the immigration of saline water derived from the sea into the aquifer is known as seawater intrusion. The mixing of seawater and freshwater zones is caused by a variety of factors such as coastal hydraulic gradients, tidal and estuarine activity, sea level increases, low infiltration, excessive withdrawal, and local hydrogeological condition (Rajmohan *et al*., 2000; Saxena *et al*., 2004; Melloul and Collin, 2006; Sherif and Kacimov, 2007; Mondal *et al*., 2008 and Kim *et al*., 2009; Kanagaraj et al., 2018). During hydrogeochemical processes, the chemical properties of groundwater change geographically and temporally (Lakshmanan et al., 2003). In general, mineral weathering has a significant impact on groundwater chemistry (Kenoyer and Bowser, 1992; Bullen et al., 1996; Kim, 2002). Chemical weathering crops in two stages such as; the first phase rotten rocks or saprolites produces geochemical weathering derived from inorganic processes. The second stage the decomposition of the saprolite material is called pedogeochemical

weathering (Caroll 1962; Raghunath, 1992). Nurnberg (1982) reported the naturally occurring minerals dissolution and absorption of substances in contact, including calcium, magnesium, silica and fluoride due to the influence of freshwater pollution. Although metals like zinc, chromium, manganese, cadmium, and cobalt play a biochemical function in aquatic life, their excessive presence is poisonous and non-biodegradable. Hence, it is obvious that the hydrogeochemical processes that control the groundwater chemistry have been attempted by various authors (Mondal *et al*., 2010; Packialakshmi and Ambujam, 2012; Sathish *et al*., 2012; Sridhar *et al*., 2013a; Li *et al*. 2013; Qi Guo et al. 2014; Fredy et al. 2015; Kanagaraj et al., 2018). Therefore, the present study was carried out to understand the geochemical weathering processes and influence of saline water in freshwater aquifers Korattalaiyar river basin.

Study area

The study area is located in the districts of Thiruvallur and Vellore in Tamil Nadu, India. Total geographical area is 1144.13 sq.km. Korattalaiyar river is the only main river drain in the watershed **(Fig 1)**. Ambattur, Chennai, Ponneri, Tiruvallur and Uthukottai taluks are fall in Tiruvallur district and Arakkonam taluk fall in Vellore district. The watershed encompasses a total of 294 villages, out of which 177 villages are in Thiruvallur district and 17 villages in Vellore district. The watershed is bordered to the north by the Araniyar watershed, towards the east by the Bay of Bengal, to the south by the Cooum watershed, and also to the west by the Mandi watershed. Korattalaiar river originates from Panapakkam forest in Andhra Pradesh State. The Nagari and Nandi are the main tributaries of this river. The main river runs for roughly 155 kilometres from its headwaters. It confluence with Bay of Bengal in the Ennore estuary, where untreated industrial effluents discharge, in turns this estuary, a highly polluted one. Kesavaram anicut, Poondi reservoir, Tamarapakkam anicut and Vallur anicut are the major irrigation sources in Korattalaiar river. Poondi reservoir, Puzhal lake and Sholavaram lake spread over in the study area. The slope of this terrain is west to east, and the drainage pattern is dendritic. All of the rivers are ephemeral in character, carrying considerable volumes during the monsoon season. In the study area receives the rain during both seasons (southwest and northwest). Having heavy precipitation in the form of cycloneic stoms created by the storms in the Bay of Bengal during the northwest monsoon. Generally, the pre monsoon period of the water level is 2.38 – 7.36 m and during post monsoon depth of water level is 0.79 – 5.30 (CGWB 2007). This area's geological formation is made up of coastal alluvium, sand and silts, sandstone, clay, and conglomerate. This area most of the region covered by coastal alluvium and alluvium formation. The alluvium was found in the central, northern, and southern parts of the research region, whereas coastal alluvium was found in the eastern section **(Fig 2**). Significant water-bearing formations are granitic gneisses that have weathered and fractured. Porous formations in the region include Upper Gondwana sandstones and clays, Cretaceous marine deposits, Tertiary sandstones, and recent alluvial formations. The majority of ground water occurs in aquifers with phreatic to semi-confined conditions (CGWB 2007).

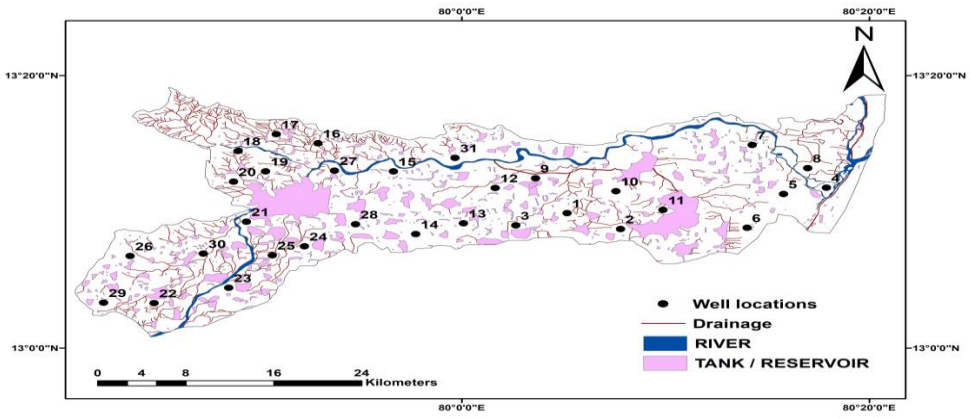

Fig.1. Base and well locations Map

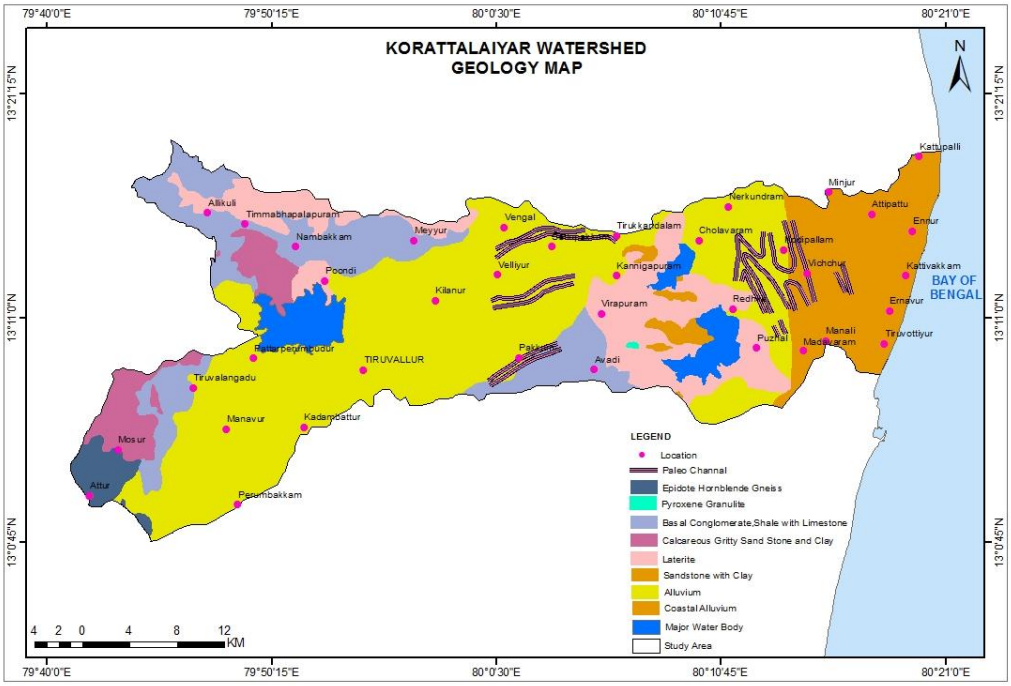

Fig .2. Geology map of the study area

Methodology

Field and laboratory methods

Based on the toposheet and SRTM data, the research area and drainage map were generated. The well locations were identified using a GPS device, and the sample locations map was generated using ArcGIS 10.1 software. During January 2019 and July 2019, 31 groundwater samples were taken from shallow wells for the study **(Fig 1).** In both seasons, groundwater samples were collected in high density 500ml plastic bottles. The polyethylene bottles were pre-washed with hydrochloride (HCL) acid and distilled water before to sampling. During sampling, bottles were washed with the water to be collected before even being filled to the rim and carried to the laboratory. Temperature, pH, and electrical conductivity (EC) were all measured in the field with hand-held metres. According Caroll (1962) Total Dissolved Solids (TDS) were calculated by dividing EC by 0.64. The main cations (Ca, Mg, Na, K) and anions (HCO_3, Cl, SO_4) were analysed in the chemical laboratory following the APHA (2004) recommended standard technique for chemical analysis. The calcium and magnesium concentrations were determined using the EDTA titration technique. The flame photometer has been used to determine the sodium and potassium values. The absorption of sulphate value was measured using spectrophotometer. Bicarbonate and chloride concentrations were analysed titration method. The ion balance error (IBE) was also computed to confirm the correctness of the major ion analysis, and it was around 5% of each sample. The spatial variation map was generated using the inverse distance weightage (IDW) interpolation techniques available in ArcGIS 10.1 software. Rocksworks 17.1 software was used to identify the hydrochemical faces founded by groundwater chemistry parameters. Using SPSS version 17.0, the correlation matrix, factor analysis, component analysis, and cluster analysis were used to evaluate the connection between the hydrochemical parameters.

Result and discussions

The analytical results of physical-chemical parameters in the study region of groundwater samples in lowest, maximum, and average value were presented in **Taple.1** and compared to WHO standard drinking water standards (2012). In the research region, the pH of groundwater samples ranged between 6.2 and 7.7 in January and 6.5 and 7.9 in July. The majority of groundwater samples are alkaline in character. EC concentrations in this area ranged from 418

µS/cm to 3338 µS/cm with an average of 1608 µS/cm in January to 630 and 4326 µS/cm with an average of 1838 µS/cm in July. In the study area 48% in January and 45% in July of the samples were located in brackish water category (1,500–3,000 µS/cm). TDS levels vary from 268 to 2137 mg/L in January, with an average of 1029 mg/L, and from 403 to 2769 mg/L in July, with an average of 1176 mg/L. EC and TDS levels rise in the northern and southern parts of the study region throughout July **(Fig. 3)**. The naturally occurring minerals dissolution concentration of EC and TDS increases, because groundwater level decreases of this area. Calcium varied between 16 and 268 mg/L during January, 20 and 264 mg/L in July. According to Rajmohan and Elango (2005) and Halim et al. (2009), the concentration of sodium in the freshwater zone rises during geochemical processes of silicate weathering and anthropogenic activities. In the study region, sodium concentrations ranged from 28 to 461 mg/L with an average of 191 mg/L in January and 47 to 541 mg/L with an average of 214 mg/L in July. The spatial distribution of sodium revealed a high concentration in the northern and southern parts of the area throughout the seasons (**Fig 3**). Sodium levels in the freshwater zone rise in July as a result of geochemical processes such as silicate weathering and human activity. In this current location, the analytical result of chloride in groundwater ranged between 35 and 780 mg/L with an average of 295 mg/L in January and 74 and 1248 mg/L with an average of 384 mg/L in July. The content of chloride in the groundwater increase in northern and southern part of the region, because that sample located near coastal and industrial region due to freshwater zone to saline zone it could be influence of salinity **(Fig. 4)**. When hard rock minerals such as carbonate, calcite, dolomite, and gypsum dissolve, then the concentration of bicarbonate and sulphate in groundwater rises (Hem 1985). The amount of bicarbonate with a high degree of changeability in groundwater ranges from 99 to 458 mg/L in January to 92 to 580 mg/L in July, according to experience. Sulphate concentrations ranged from 10 to 396 mg/L with an average of 122 mg/L in January to 19 and 461 mg/L with an average of 147 mg/L in July in the study region. High bicarbonate and sulphate absorption in groundwater indicated the northern and southern parts of the area **(Fig 4)**. Sulphate and bicarbonate levels in groundwater rise as a result of mineral dissolution and anthropogenic activities in the vicinity of the leather manufacturing sector.

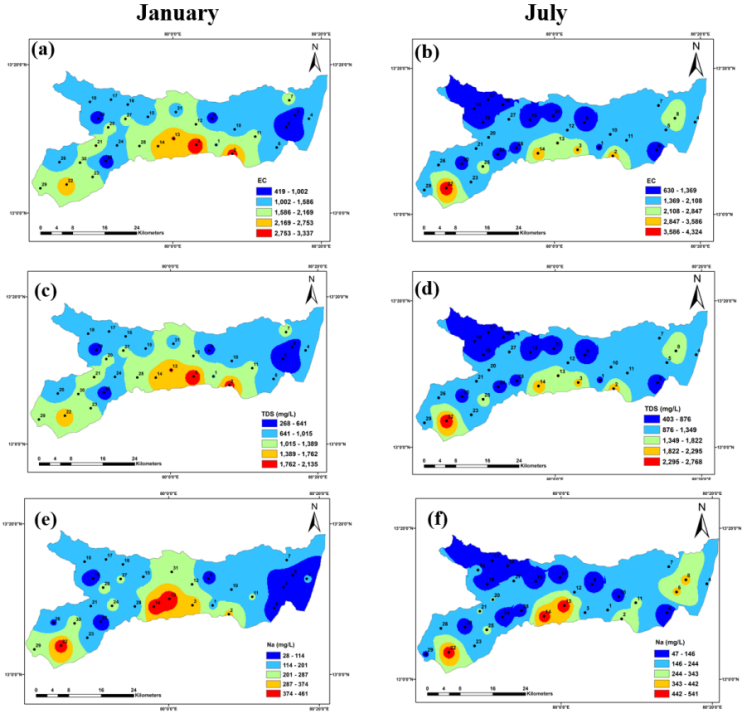

Fig.3.Spatial distribution map of EC, TDS and Na

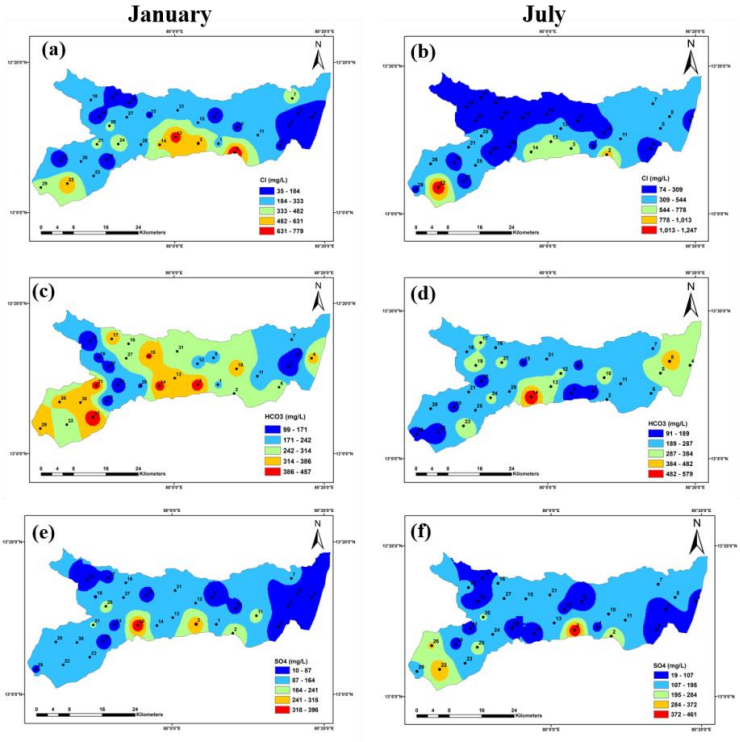

Fig.4.Spatial distribution map of Cl, HCO_3 and SO_4

Types of groundwater

The quality of ground water in its natural state indicates the hydrogeochemical nature of groundwater with respect to aquifer (Ramamoorthy and Rammohan,2014). Based on groundwater chemistry, the Piper (1953), Chadda (1999), and Durov (1948) plots have been used to distinguish between different types of groundwater. Piper plot (1953) has comprised two types of diagrams such as two triangles and one diamond shaped. Diamond shaped plots had covered nine type of groundwater (Back and Hanshaw 1965; Todd 1983). Piper plots show that around 70% of groundwater samples in the research region fall into Na-Cl types throughout the seasons **(Fig 5a),** and other minor faces are given in **Table 2**. Normally, Chadda plots specifies four type of groundwater such as 1 (Ca^{2}- HCO_3^-), 2 (Ca^{2+}-Mg^{2+}-Cl^-), 3 (Na^+-Cl^-), and 4 (Na^+ - HCO_3^-). These plot show majority of the groundwater samples were lying in Na-Cl types during both season **(Fig. 5b)** and other minor types are represented in **Table 2**. Similarly, Durov's (1948) figure clearly shows that the majority of the samples are Na-Cl, and mixing type dissolution has been seen for both seasons **(Fig. 5c)**. Because groundwater chemical composition is regulated by salinewater intrusion, mineral dissolution, and tannery effluents, most groundwater chemistry in the study region is extremely variable.

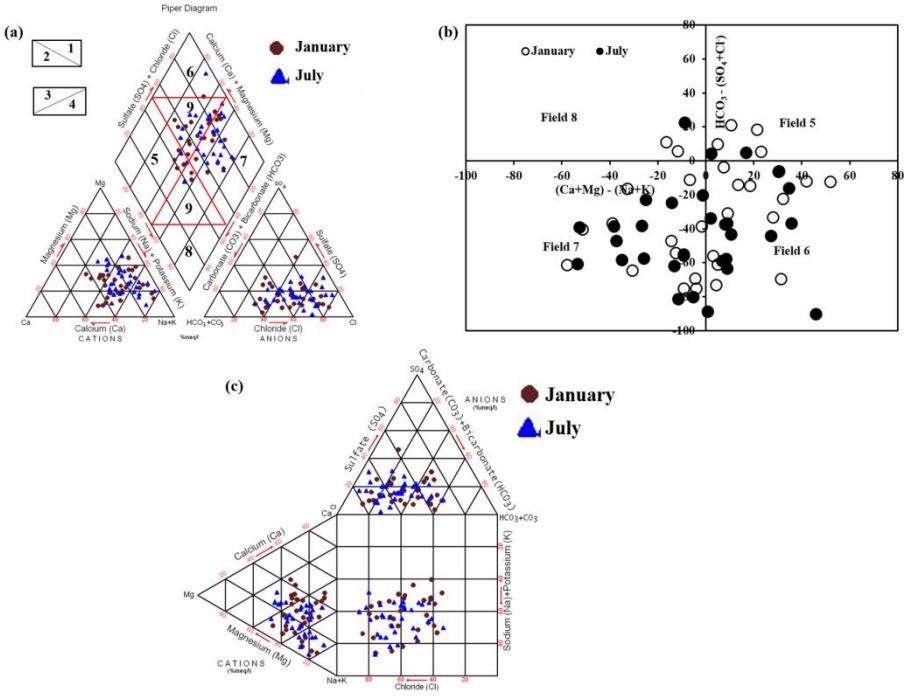

Fig.5.Types of groundwater (a) piper plot,(b) Chadda plot (c) Durov plot

Hydrogeochemical processes

Gibb's graphic (1970) depicts three processes: evaporation, rock-water interaction, and precipitation. Normally, an increase in the content of Na and Cl in a freshwater aquifer specifies precipitation; naturally, the concentration of Ca and HCO_3 in groundwater chemical composition changes indicates rock water interaction and evaporation/crystallization processes raises the content of Na and Cl. Because this location experiences dry and semi-arid climatic conditions, the ratios (Na+K) / (Na+Ca+K) and Cl/(Cl+HCO3) vs TDS were used to determine the rock-water interaction mechanisms **(Fig 6).** Because no mineral species are precipitated while the evaporation process is dominating, the Na/Cl ratio is unchanged (Jankowski and Acworth, 1997). The Na/Cl vs EC ratio reveals that evaporation mechanisms regulate the majority of groundwater chemistry in the study region throughout the seasons. Similarly, the bivariate plot of Na versus Cl it's clearly indicates majority of the samples was lying above freshwater evaporation line during both seasons (**Fig 7a).**The silicate weathering processes have been determined using the relationships between (Na+K) and total cations, (Ca+Mg) and total cations, and Ca+Mg versus

SO_4+HCO_3 ratio. The concentration of sodium in the freshwater aquifer zone rises as silicate minerals weather. The silica in groundwater was released as a result of weathering of quartz, feldspars, and ferromagnesian silicates (Halim et al. 2009). The connection between (Na+K) and total cations implies two processes: silicate weathering below the 1:1 equal line and carbonate weathering above the agreed line. The bulk of the samples in the research region were decreased below the 1:1 equal line, indicating silicate weathering over both seasons (**Fig 7b**). Stallard and Edmond (1983), as well as Sarin et al. (1989), proposed geochemical processes of silicate weathering to increase the amount of sodium and potassium ions in the freshwater zone. Furthermore, the bivariate plot of (Ca+Mg) against TC clearly shows silicate weathering in the area throughout both time periods **(Fig 7c)**. Because of silicate weathering processes that result in the disintegration of silicate minerals, the concentration of Ca+Mg in groundwater rises. The geological development of rock linked with silicate minerals such as pyroxene, amphibole, plagioclase, and hornblende dissolving the concentration of Ca and Mg discharged into groundwater in this location. The connection between (Ca+Mg) and (SO_4+HCO_3) indicates three processes: calcite and dolomite dissolution, reverse ion exchange or carbonate weathering, and silicate ion exchange mechanisms (Cerling et al. 1989; Fisher and Mulican 1997). Similarly, in the region most of the groundwater samples derived towards right side specifies excess of due to silicate weathering and few of the samples was located 1:1 equal lines indicates dissolution of dolomite and calcite minerals in throughout seasons **(Fig 7d)**.Weathering of silicate minerals, dissolution of carbonate minerals, and cation exchange have all been observed in the research region, is indicated by the plot Ca/Cl versus Cl support (**Fig 8a**). The corresponding bivariate plot of Mg/Ca vs Cl shows that the bulk of the samples are above the seawater ratio, indicating cation exchange and calcite precipitation. A few of the samples are dolomite, and dissolution has been identified in the research region for both seasons (**Fig. 8b**).

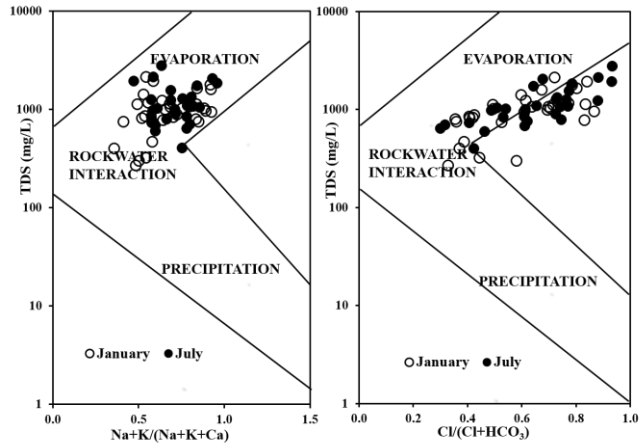

Fig .6. Gibb's plot

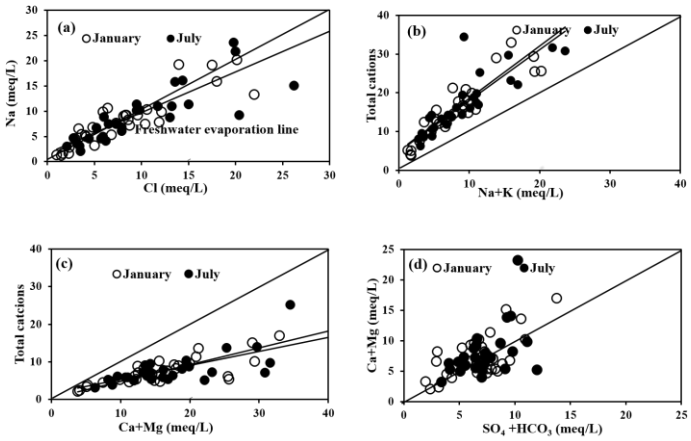

Fig .7 (a-d). Silicate weathering

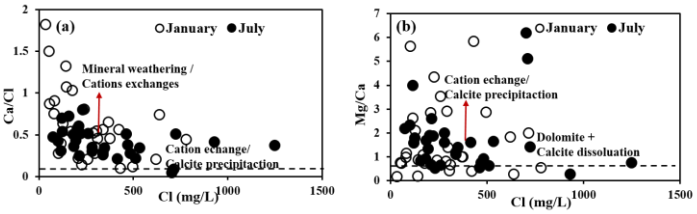

Fig 8(a-b) Dissolution of minerals

Multivariate statistical analysis

In this study, multivariate statistical approaches such as correlations matrix, factor and cluster analysis were utilised to understand the source of pollution and the connection of groundwater physicochemical characteristics. Many studies have utilised this approach to determine the source of pollution in various aquifers (Prasanna et al., 2010; Mondal et al., 2011; Thilagavathi et al., 2012; Kanagaraj and Elango 2016; Magesh et al., 2017; Kanagaraj et al., 2018). The correlation matrix had three types of correlation: high positive correlation (> 0.7), moderate correlation (0.5 to 0.7), and poor positive correlation (0.5 to 0.25). **Tables 3a and 3b** show the relationship between the physicochemical parameters of groundwater in

the research region. The absorption of Na associated with Ca, Mg and HCO_3 throughout seasons which is specifies cation exchange and silicate weathering. The concentration of SO_4 is having moderate positive correlation with Ca, Mg, Na and K during both seasons it's clearly indicate silicate weathering. This proposes that Ca, Mg and Na are derived from natural weathering processes from source rock. Positive correlation was obtained for Cl^- versus Ca, Mg, Na and SO_4 due to the impact of seawater intrusion and tannery effluents. Subsequently tannery industries used varied of chemicals and salt during leather processes. The HCO_3 having negative correlation with Ca and Mg indicate carbonate mineral absent in the region. The concentration of HCO_3 had moderate positive correlation with Na^+ and K^+ during both seasons indicates reverse ion exchange processes. Physical-chemical properties of groundwater of this area having two factors in January with total variance of 74% and three factors in July with total variance 89% are represented in **Table 4a and b**. Factor 1 were associated with Ca, Na, Cl and SO_4 were extracted 54 % variance shows moderate positive during both seasons. The factor 1 indicates the absorption of Ca, Na, Cl and SO_4 increases in this groundwater due to the influence of geogenic weathering processes and anthropogenic activities. Factor 2 has positive values with Na, K and HCO_3 specify ion change and dissolution of minerals from source rock. Further, hierarchical cluster analyses (HCA) indicate the groundwater chemistry is controlled by three groups of cluster analyses **(Fig. 9)**. Cluster I and II clearly indicate geochemical weathering and tannery effluents have been observed in the study area.

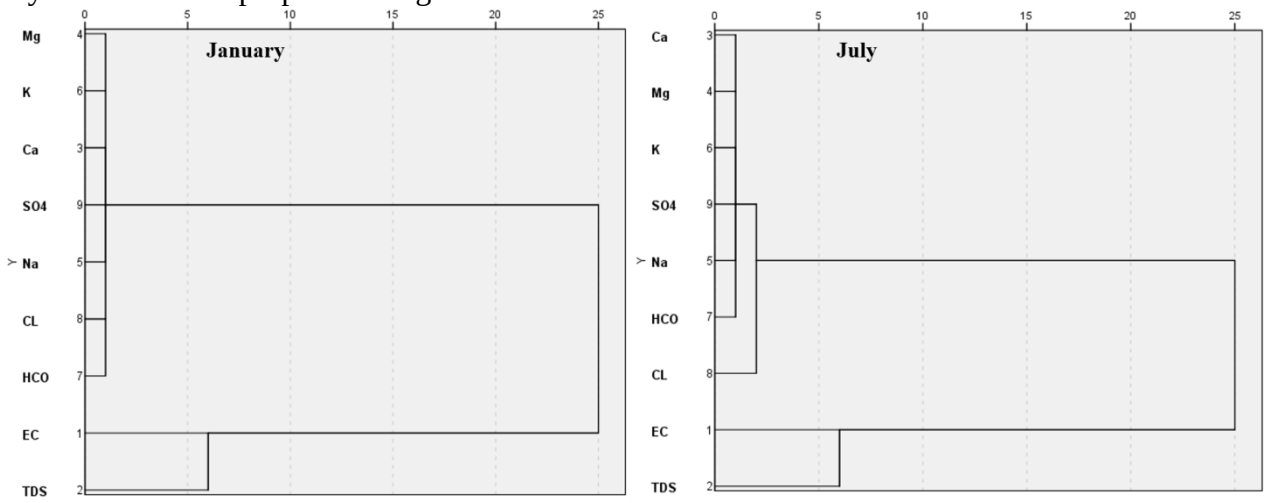

Fig .9. Cluster diagrams

Determine the saline water intrusion with freshwater zone

The molar ratios Na/Cl vs Cl, SO_4/Cl versus Cl, and Cl/HCO_3 versus Cl were utilised to calculate the saline water incursion with groundwater in the region. Due to the mixing of saltwater and groundwater, Vengosh and Rosenthal (1994) and Kanagaraj et al. (2018) proposed molar ratios of Na/Cl versus Cl values approaching the seawater ratio (0.86). Since of the influence of saline water and industrial effluents, the relationship of Na/Cl towards Cl implies that most of the samples were found around the seawater ratio value and a few of the samples were located in an anthropogenic impact zone **(Fig 10a).** In general, the bivariate plot of SO_4/Cl against Cl is divided into two classes: those that are unaffected by seawater intrusion (>0.1) and those that are impacted by salty water intrusion (< 0.1). In the study region, the majority of the samples with values more than 0.1 suggest that they are unaffected by saline water intrusion, whereas a few samples with values less than 0.1 show that they are affected by saltwater intrusion (**Fig 10b**). The mixing of saline water with freshwater aquifers may have had a strong impact on the samples found along the coastline. Furthermore, the Cl / HCO_3 against Cl molar ratio concentration indicates three categories of groundwater: unaffected (0.5), slightly and moderately impacted (0.5–6.6), and highly affected (>6.6) (Revelle 1941 and Todd 1959). Similarly, the molar ratio of Cl/HCO_3 vs Cl shows that most of the groundwater samples are

moderately impacted by saline water, and with remaining of the samples having strongly affected due to the intrusion of seawater with freshwater (**Fig 10c**).

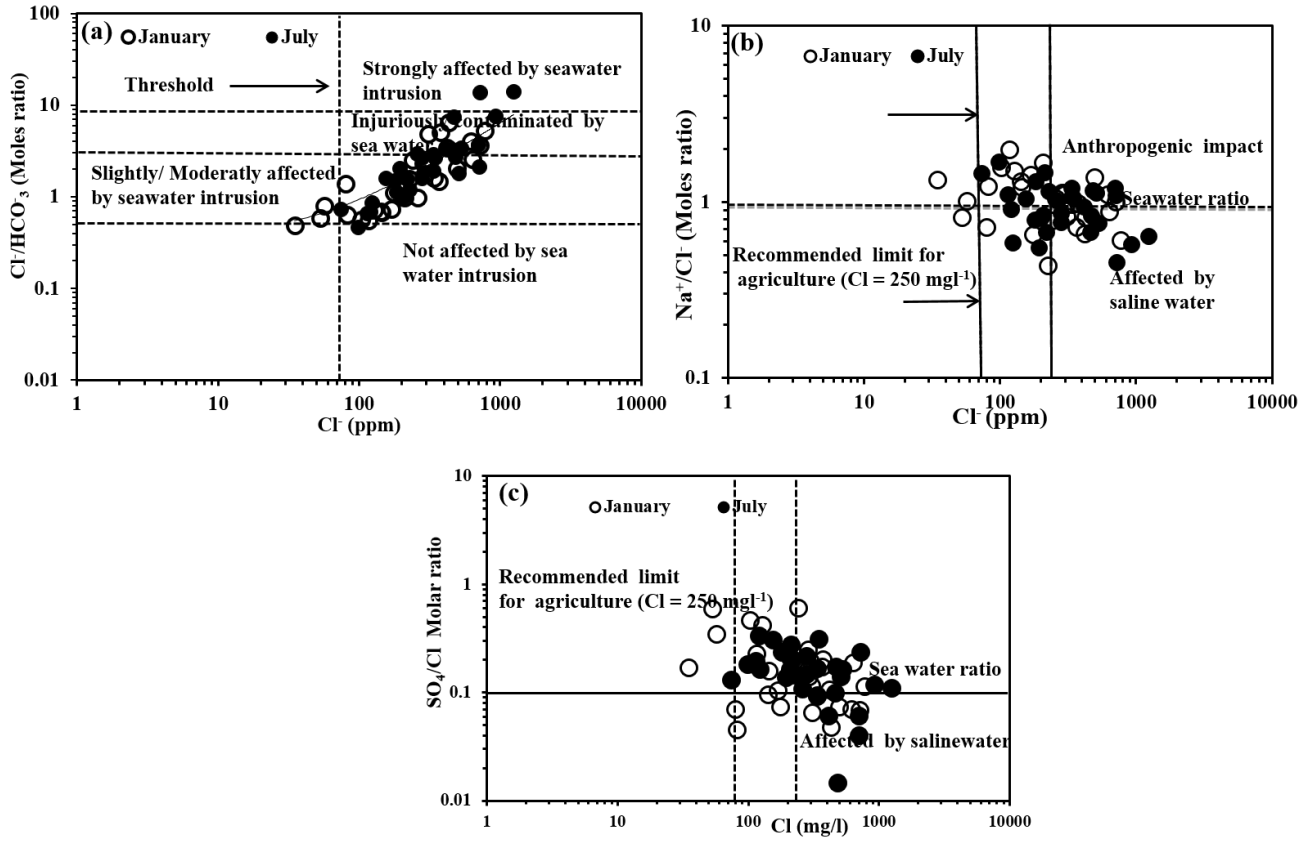

Fig .10 (a-c). Major ratio ions diagram

Conclusion

Spatial distribution, Ionic ratio, Multivariate statistical analysis and Molar ionic ratio has been used to identified the geochemical weathering processes and impact of saline water intrusion were carried out Thiruvallur and Vellore districts, Tamil Nadu, India. The naturally occurring minerals dissolution the concentration of EC and TDS increases, because groundwater level decreases of this area. However, to salinewater intrusion and anthropogenic activities, sodium and chloride levels rise in the freshwater zone in July. Spatial distribution it clearly shows that all main ions are increasing in the northern and central parts of the area. For both seasons, the Durov plot shows that the majority of the samples were in Na-Cl and dissolution of mixed type. The Na/Cl versus EC indicates most of the groundwater chemistry is controlling by evaporation processes. The concentration of SO_4 correlated moderately positive with Ca, Mg, Na and K during both seasons indicates silicate weathering. Geological formation of rock associated with silicate minerals of pyroxene, amphibole, plagioclase and hornblende dissolute the concentration of Ca, Mg and Na released into the groundwater in this area. The bulk of the samples lay above the seawater ratio in a bivariate plot of Mg/Ca versus Cl, indicating cation exchange and calcite precipitation. The molar ratio of Na/Cl versus Cl indicates that most of the samples are affected by seawater and just a few are affected by anthropogenic activities due to the influence of saline water and tannery effluents. Similarly, the relationship of Cl/HCO_3 vs Cl shows that saline water and industrial wastes have a moderate impact on the majority of groundwater samples. In this area most of the groundwater chemistry is highly variability, since the groundwater chemical composition is controlled by silicate weathering, saline water intrusion and tannery effluents.

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MULTIPLE SCLEROSIS LESIONS LINGUISTIC SEGMENTATION USING DEEP LEARNING

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ABSTRACT

This research study is based on the detection and diagnosis of multiple sclerosis through the usage of deep learning. In this research study, the researcher has elaborated the concept of MRI and the way it aids in the detection and diagnosis of multiple sclerosis. As presented in this study, recently several medical institutes are using the deep learning approach in their MRI process to detect MS in a more efficient manner. Moreover, to gather the data regarding the conduction of this research study the researcher has adopted a secondary qualitative method of data collection. On the other hand, the key findings of this research study are that the usage of patch wise segmentation of DL technique can assist the detection of multiple sclerosis.

Keywords: *Deep learning, MRI, MS, Machine Learning, Medical, Disease*

Introduction

The term "Multiple sclerosis" may be classified into four subtypes, each of which has its own clinical progression. Mostly, due to the physiological limits of such traits are unknown and the therapeutic stratification is limited. In this scenario, "machine learning" can assist the researcher to identify "multiple sclerosis" through the comparable third-dimensional understanding of victimization possibilities. In this research study, the researcher tends to use unsupervised machine learning for brain tomography scans to identify MS subtypes supported pathogenic possibilities. In order to define MRI-based subgroups; researcher used a large dataset of MS patients, as well as a freelancing cohort of patients for validation. Researchers tend to categorize MS subtypes as cortex-led, perpendicularly "white matter-led, and lesion-led", based on the first aberrations. Furthermore, the lesion-led subtype has the maximum probability of verified disability progression as well as the maximum incidence of recurrence. In certain clinical trials, patient with the lesion-led MS subtype demonstrate a favorable treatment response for the patient. However, in this research study the researcher will try to demonstrate the importance of deep learning to detect and diagnose MS.

Aim: *The aim or purpose of this research article is to critically analyze the usage of deep learning to detect and diagnose multiple sclerosis through the utilization of MRI images.*

The concept of MRI images

In accordance with the words of Finck*et al.* (2020), "magnetic resonance imaging" (MRI) is a diagnostic technique that now provides the most sensitive and effective method of examining the neural structure, human brain or other body parts. Nonetheless, MRI is a common imaging tool for detecting the process of an MS diagnosis and tracking the disease's progression. On the contrary Afzal *et al.* (2020) stated that "Magnetic resonance imaging" has made it possible to provide a better overview regarding the disease's underlying path physiology. However, the process of MRI has a positive nature of impact on the detection of MS, in this following part a brief overview will be presented regarding the working process of MRI.

Working procedure of MRI

The process of MRI does not use the radiation like other CT scans or conventional X-ray. However, the process of MRI uses magnetic fields and radio frequency or wave instead of using radiation. As per the words of Rezaee*et al.* (2020),the utilization of magnetic fields can measure the water contained in human body cells as well as it also measures the quantity of normal and abnormal tissue in human body cells. However, the process of MRI is stated below:

- A highly strong field of force causes a very tiny percentage of the H electrons in hydrogen atoms to line up in the field's orientation. Furthermore, the portion that has been lined up is small, but it is large enough to provide a strong indication for scanning.
- The gas atoms are thrown out of alignment through radio waves and weaker magnetic

fields once they have been aligned in this way.

- The protons get back into line once the radio waves have been stopped. However, while the protons have gotten back in line then protons release resonance signals to the computer, which assist the researcher to analyze the essential data through the image form.

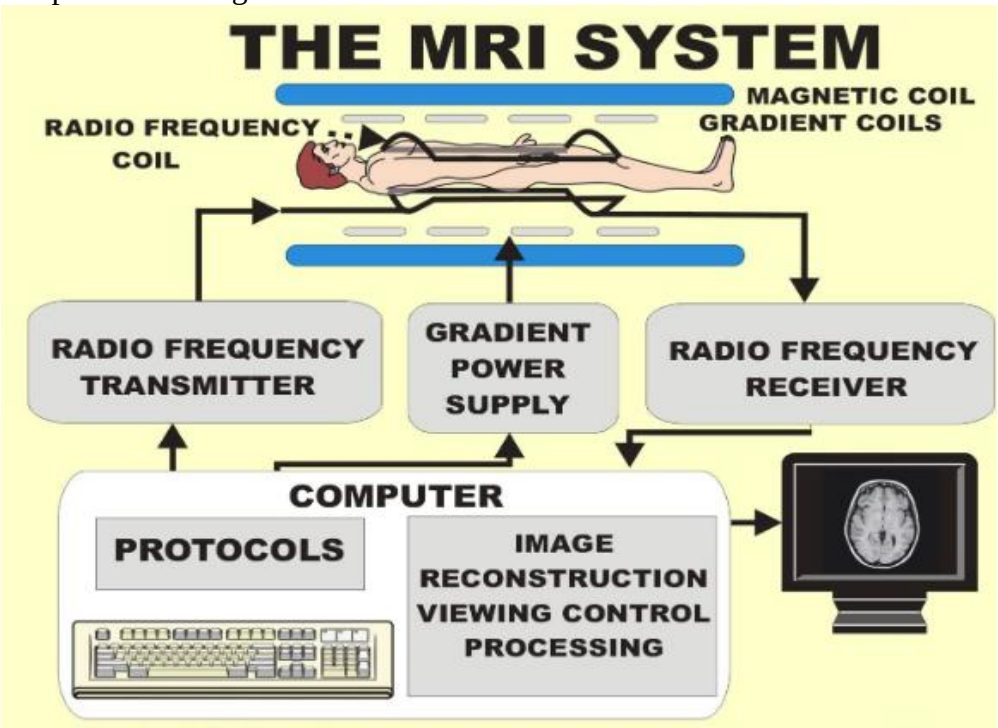

Figure 1: The process of MRI system

(Source: Rakić*et al.* 2021)

Water molecules are repelled through the fatty coating of myelin that protects the neuron fibers of the human body. As per the words of Rakić*et al.* (2021), areas in thatmyelin has been discontinues through MS, the fat of those places are stripped away. Moreover, while the fat has been removed, the tissue contains additional water, which shows up an excellent white spot or darker space on associate in nursing image scan, however, it deepens on the infrastructure of the scan.

Uses of MRI on MS

As MRI can help a medical expert to identify a distinctive degenerative disorder within the central system nervous, hence, the MRI will be a justifiable method to detect and diagnose MS. Here, in the following part a brief overview will be presented regarding the usage of MRI to detect and diagnose MS.

Diagnosis of MS through the usage of MRI

As mentioned by McKinley *et al.* (2020), the lesions of MRI units can assist the medical experts to detect any brain injury or compare the link between what's seen on the MRI scan and the clinical indications and symptoms of the patient. Nonetheless, the smaller lesions of MRI aid the neural structure, second cranial nerve and medulla spinals to identify the symptoms and signs of MS. Furthermore, as individuals get older, the tiny regions of imaging in healthy persons seem similar. However, MS literally connected to the ageing method appears additional usually. Moreover, patients that suffer migraine headaches could have aberrant regions on their imaging that appeases as the sign or symptoms of MS.

The process of using deep learning to detect multiple sclerosis

Multiple sclerosis (MS) can be a chronic type of health problem that affects the central system and has significant clinical implications. According to the words of La Rosa *et al.* (2020), MS is a chronic health problem in which the medullar sheath ruptures, causing changes in the morphology and infrastructure of the human brain, and it will be a significant handicap for young people because of its pathological possibilities, it has a significant impact on the standard of living of patients and their family. The detection and segmentation of

MS lesions exploitation resonance imaging (MRI) is clinically and technologically vital.

Automatic MS lesion segmentation is essential for helping within the identification of diagnostic manuals for the sickness that has the special characteristics of MS lesions in MRI and thus the looks of recent MS lesions. On the contrary, the machine-controlled segmentation of MS lesions is essential for the qualitative analysis of the sickness that is essential for deciding the disease's course and medical aid decisions. As a result, distinguishing and segmenting MS lesions may be an important step in characterizing the sickness and deciphering a range of psychological feature harm measures.

In accordance with the words of Eichinger*et al.* (2019), MS lesions were mesmeric by trained neuro-radiologists before the automatic segmentation of MS lesions became obtainable. Manual segmentation, on the other hand, will be a long and dull operation, with low effectiveness thanks to intraobserver and inter-observer variability. As a result, production of a superior technique for automatically segmenting MS lesions is of nice engineering importance. Thereby, it can be easily defined that the inclusion of deep learning can enhance the process of MRI for detecting multiple sclerosis.

Methods and materials

Method of a research study plays an important role to provide insights regarding the key findings of a research study. In accordance with the words of Wolffsohn*et al.* (2017), to conduct a credible and reliable research study a researcher must need to adapt adequate research methods. In this research study through analyzing the nature of this research study the researcher has adapted positivism research philosophy and descriptive research design. Moreover, to understand the connection among MRI scan and multiple sclerosis the researcher has utilized deductive format of research approach. Furthermore, the researcher has gathered the data regarding the conduction of this research study through the adaption of secondary qualitative data collection methods. Through generating graphs and diagrams the researcher has gained sufficient knowledge regarding the purpose of this research study. As a result, that has imposed a positive format of impact on the result of the research study. In addition, the secondary sources of data have been collected from ***verified articles, peer review journals, Google scholar, ProQuest and news articles*** from 2017 to 2021.

Result

Presently, several medical institutes are utilizing the deep learning system on their MRI scanning process to identify the spread of multiple sclerosis disease. The MS lesion segmentation role is comparable to linguistic segmentation therein every picture element of the input image should be categorized as a lesion or a non-lesion. Patch-wise segmentation and semantic-wise segmentation are the 2 varieties of segmentation techniques researchers tend to sometimes explore. Patch-wise segmentation teaches a CNN classifier to categorize pixels into 2 teams supporting the data of the pixel-centered patch. Linguistics segmentation provide a completely network convolution to anticipate the input image's lesion mask directly, permitting it to categorize every picture element in a very single forward propagation.

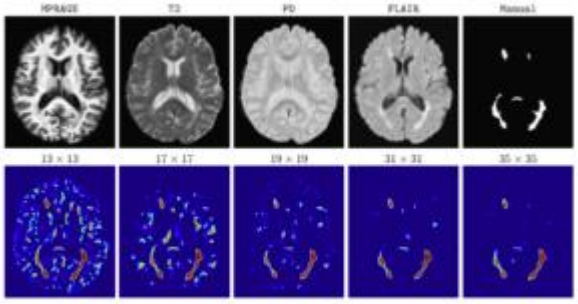

Figure 2: Detection of MS through deep learning

(Source: Schwenkenbecher*et al.* 2019)

As per the words of Schwenkenbecher*et al.* (2019), patch wise segmentation is a process that supports the MRI scanning to detect MS disease in a simple manner. However, patch wise segmentation is one of the most simple segmentation techniques to use deep learning on the process of segmentation of MS lesions. Moreover, the segmentation process starts from the center of an MRI scan image and then releases a tiny low patch of size “N” as the classifier input. Once the process of classifier input has been done then the researcher can use the classifier to traverse the scan image of a patient. In addition, the utilization of deep learning can enhance the usage of discourse knowledge within the space of pixels.

For example, the picturing is employed to extract 15 x 15, /15 patches encompassing each vowel as input that leads the process through two 3D convolution layers. However, in healthcare an overabundance of unnecessary computations has been generated through overlapping patches in "patch-wise-segmentation" that substantially reduces the calculation performance. The full imaging volume or a somewhat large patch is generally used as the input for "semantic wise segmentation". However, due to the implication of semantic wise segmentation patches there will be no unnecessary calculations due to overlapping. As the entire image volume is used as an input to forecast the lesion mask, feed the data into a network that includes a convolutional layer and a deconvolutional layer.

Discussion

In recent years, the usage of AI and DL techniques has been enhanced up to an extreme level due to its significant benefits in MRI for detecting MS. Normal machine learning and deep learning is two approaches that aid to detect and diagnose MS through MRI. However, the primary goal of CADS supported conventional machine learning is to integrate completely diverse algorithms in order to obtain maximum accuracy. According to the words of Salem *et al.* (2018), in the process of MS identification, metric capacity measurement techniques have been given a special place. In contrast to traditional machine learning approaches, metric capacity unit algorithms are extremely successful in detecting MS. On the other hand, deep layers are used to extract the choices in CADS approved metric capacity measurement methods. The efficiency of CARDS in MS designation was amplified as a result of this. However, the usage of metric capacity measurement methods has given rise to the possibility of correctly identifying MS victimization through deep learning techniques.

Conclusion

MS is a chronic illness that affects the central nervous system, including the brain, funiculars, and peripheral nerves. Early detection of MS is critical since it can halt the course of the disease and save lives. Imaging neuro-imaging techniques give specialized clinicians with critical information about brain tissue and structure. As a result, "magnetic resonance imaging" (MRI) techniques are widely used to detect MS lesions. The MS pattern will be diagnosed in a variety of methods, including "magnetic resonance imaging" modalities and machine learning approaches. In addition, the researcher has demonstrated the way deep learning influences MRI to detect MS disease in a more succinct way.

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PERCEPTION AMONG ORGANIC AND INORGANIC FARMERS ON MARRIAGE SYSTEM – A COMPARATIVE ANALYTICAL STUDY.

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ABSTRACT

Marriage is widely recognized in all the societies across the globe. Marriage, as the close association between two individuals plays a significant role in one's life. In terms of financial support, settlement and close bonding, the social institution of marriage comes to the fore. In case of marriage of farmer community, several aspects like marriage among close relations, dowry has direct impact on the livelihood of the farmers. Farmers, agricultural labourers and allied workers of the farming community are heavily impacted monetarily in the marriage process. When there is crop failure due to monsoon failure, drought, farmers are immensely affected and are forced to marry off their daughters. The social evil called dowry system has also painfully impacted on the daily lives of farmers. Against this backdrop, the present study has been taken up to analyse the opinion on marriage and its related aspects among the organic and inorganic farmers in Tamil Nadu.

Keywords: *Marriage, Farming Community*

INTRODUCTION

Marriage, as the close association between two individuals plays a significant role in one's life. In terms of financial support, settlement and close bonding, the social institution of marriage comes to the fore. In case of marriage of farmer community, several aspects like marriage among close relations, dowry has direct impact on the livelihood of the farmers. Farmers, agricultural labourers and allied workers of the farming community are heavily impacted monetarily in the marriage process. When there is crop failure due to monsoon failure, drought, farmers are immensely affected and are forced to marry off their daughters. The social evil called dowry system has also painfully impacted on the daily lives of farmers. Against this backdrop, the present study has been taken up to analyse the opinion on marriage and its related aspects among the organic and inorganic farmers in Tamil Nadu.

OBJECTIVES OF THE STUDY

- To study the opinion of farmers on Marriage and its related aspects
- To analyse the opinion of farmers on various marriage related aspects by using appropriate statistical tools
- To summarize and present the results

METHODOLOGY

A well designed interview schedule was administered among the farmers. A sample of 150 organic farmers and 150 in organic farmers, (in total 300) were surveyed, in Tamil Nadu across the five major districts. The respondents were contacted through chain-referral system by adopting snowball sampling technique and the researcher administered the interview schedule among the farmers. The collected data were classified and analyzed by using relevant statistical tools. The socio economic factors like Age, Education and Community were taken as independent variables and analysis were made on the dependent variables such as attitude on marriage among close relations, marriage by selection, dowry system, widow remarriage and divorce .

RESULTS AND DISCUSSION

Significant association between the Age group of organic and inorganic farmers and Marriage among close relations

An attempt has been made to test the significant association between the age group of organic and inorganic farmers and marriage among close relations, a two-way classification table with age group of organic and inorganic farmers and marriage among close relations was formed. Accordingly, sample organic and inorganic farmers have been categorized into five groups on the basis of their age group. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between age group of organic and inorganic farmers and marriage among close relations

The age group wise classification of the sample organic and inorganic farmers on the basis of marriage among close relations is shown in Table1.

Table - 1

Chi-square test for significant association between age group of organic and inorganic farmers and marriage among close relations

Type of farmers	Opinion	Age group					Total	Chi-square Value	p Value
		20-30 years	30-40 years	40-50 years	50-60 years	Above 60 years			
Organic farmers	Strongly Agree	1 (0.7)	6 (4)	3 (2)	10 (6.7)	7 (4.7)	27 (18)	21.850	0.148
	Agree	3 (2)	4 (2.7)	8 (5.3)	16 (10.7)	10 (6.7)	41 (27.3)		
	No Opinion	3 (2)	7 (4.7)	26 (17.3)	11 (7.4)	12 (8)	59 (39.3)		
	Disagree	-	3 (2)	3 (2)	6 (4)	2 (1.3)	14 (9.3)		
	Strongly Disagree	-	2 (1.3)	3 (2)	4 (2.7)	-	9 (6)		
	Total	**7 (4.7)**	**22 (14.7)**	**43 (28.7)**	**47 (31.3)**	**31 (20.7)**	**150 (100)**		
Inorganic farmers	Strongly Agree	1 (0.7)	6 (4)	3 (2)	9 (6)	8 (5.3)	27 (18)	25.905	0.055
	Agree	3 (2)	9 (6)	13 (8.7)	20 (13.3)	13 (8.7)	58 (38.7)		
	No Opinion	4 (2.7)	4 (2.7)	22 (14.7)	7 (4.7)	12 (8)	49 (32.7)		
	Disagree	-	5 (3.3)	4 (2.7)	3 (2)	1 (0.7)	13 (8.7)		
	Strongly Disagree	-	-	2 (1.3)	-	1 (0.7)	3 (2)		
	Total	**8 (5.3)**	**24 (16)**	**44 (29.3)**	**39 (26)**	**35 (23.3)**	**150 (100)**		

Source: Primary data

Table clearly highlights that among the total 150 sample organic farmers surveyed, 26 (17.3%) of the sample organic farmers are in the age group between 40-50 years have no opinion to marriage among close relations, whereas 16 (10.7%) of the sample organic farmers are in the age group between 50-60 years have agreed to marriage among close relations and they support to marriage among close relations and 10 (6.7%) of the sample organic farmers are in the age group between 50-60 years have strongly agreed to marriage among close relations.

Table further highlights that among the total 150 sample inorganic farmers surveyed, 22 (14.7%) of the sample inorganic farmers are in the age group between 40-50 years have no opinion to marriage among close relations, whereas 20 (13.3%) of the sample inorganic farmers are in the age group between 50-60 years have agreed to marriage among close relations and they support to marriage among close relations and 13 (8.7%) of the sample inorganic farmers are in the age group between 40-50 years have agreed to marriage among close relations. Table discloses that the calculated chi square value for marriage among close relations among different age group of sample organic and inorganic farmers is 21.850 and 25.905 which is not significant at the 'p' value of 0.148 and 0.055. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the age group of organic and inorganic farmers and marriage among close relations.

Significant association between the Educational qualification of organic and inorganic farmers and Marriage among close relations

An attempt has been made to test the significant association between the educational qualification of organic and inorganic farmers and marriage among close relations, a two-way classification table with educational qualification of organic and inorganic farmers and marriage among close relations was formed. Accordingly, sample organic and inorganic farmers have been categorized into five groups on the basis of their educational qualification. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between educational qualification of organic and inorganic farmers and marriage among close relations

The educational qualification wise classification of the sample organic and inorganic farmers on the basis of marriage among close relations is shown in Table 2.

Table - 2

Chi-square test for significant association between Educational Qualification of Organic and Inorganic Farmers and Marriage among close relations

Type of Farmers	Opinion	Educational Qualification					Total	Chi-square Value	p Value
		Illiterate	Primary	HSC	Higher Education	Technical			
Organic Farmers	Strongly Agree	6 (4)	6 (4)	6 (4)	6 (4)	3 (2)	27 (18)	12.235	0.728
	Agree	4 (2.7)	8 (5.3)	15 (10)	11 (7.3)	3 (2)	41 (27.3)		
	No Opinion	14 (9.3)	15 (10)	12 (8)	16 (10.7)	2 (1.3)	59 (39.3)		
	Disagree	3 (2)	4 (2.7)	3 (2)	4 (2.7)	-	14 (9.3)		
	Strongly Disagree	2 (1.3)	4 (2.7)	2 (1.3)	1 (0.7)	-	9 (6)		
	Total	**29 (19.3)**	**37 (24.7)**	**38 (25.3)**	**38 (25.3)**	**8 (5.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	3 (2)	8 (5.3)	10 (6.7)	5 (3.3)	1 (0.7)	27 (18)	12.576	0.703
	Agree	8 (5.3)	16 (10.7)	17 (11.3)	13 (8.7)	4 (2.7)	58 (38.7)		
	No Opinion	11 (7.3)	8 (5.3)	11 (7.3)	17 (11.3)	2 (1.3)	49 (32.7)		
	Disagree	2 (1.3)	4 (2.7)	3 (2)	4 (2.7)	-	13 (8.7)		
	Strongly Disagree	-	2 (1.3)	-	1 (0.7)	-	3 (2)		
	Total	**24 (16)**	**38 (24.7)**	**41 (27.3)**	**40 (26.7)**	**7 (4.7)**	**150 (100)**		

Source: Primary data

Table clearly highlights that among the total 150 sample organic farmers surveyed, 16 (10.7%) of the sample organic farmers who are higher education have no opinion to marriage among close relations, whereas 15 (10%) of the sample organic farmers who are HSC qualification have agreed to marriage among close relations and they support to marriage among close relations and 15 (10%) of the sample organic farmers who are primary education have no opinion to marriage among close relations.

Table further highlights that among the total 150 sample inorganic farmers surveyed, 17 (11.3%) of the sample inorganic farmers who are HSC qualification have agreed to marriage among close relations, whereas 17 (11.3%) of the sample inorganic farmers who are higher

education have no opinion to marriage among close relations and they support to marriage among close relations and 16 (10.7%) of the sample inorganic farmers who are primary education have agreed to marriage among close relations.

Table discloses that the calculated chi square value for marriage among close relations among different educational qualification of sample organic and inorganic farmers is 12.235 and 12.576 which is not significant at the 'p' value of 0.728 and 0.703. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the educational qualification of organic and inorganic farmers and marriage among close relations.

Significant association between the Community of organic and inorganic farmers and Marriage among close relations

An attempt has been made to test the significant association between the community of organic and inorganic farmers and marriage among close relations, a two-way classification table with community of organic and inorganic farmers and marriage among close relations was formed. Accordingly, sample organic and inorganic farmers have been categorized into four groups on the basis of their community. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between community of organic and inorganic farmers and marriage among close relations

The community wise classification of the sample organic and inorganic farmers on the basis of marriage among close relations is shown in Table 3.

Table -3

Community of Organic and Inorganic Farmers and marriage among close relations

Type of Farmers	**Opinion**	**Community**				**Total**	**Chi-square Value**	**p Value**
		OC	BC	MBC	SC/ ST			
Organic Farmers	Strongly Agree	8 (5.3)	9 (6)	10 (6.7)	-	27 (18)	18.465	0.102
	Agree	5 (3.3)	15 (10)	19 (12.7)	2 (1.3)	41 (27.3)		
	No Opinion	19 (12.7)	15 (10)	25 (16.7)	-	59 (39.3)		
	Disagree	1 (0.7)	4 (2.7)	9 (6)	-	14 (9.3)		
	Strongly Disagree	5 (3.3)	2 (1.3)	2 (1.3)	-	9 (6)		
	Total	**38 (25.3)**	**45 (30)**	**65 (43.3)**	**2 (1.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	8 (5.3)	12 (8)	7 (4.7)	-	27 (18)	18.755	0.095
	Agree	7 (4.7)	34 (22.7)	15 (10)	2 (1.3)	58 (38.7)		
	No Opinion	13 (8.7)	14 (9.3)	20 (13.3)	2 (1.3)	49 (32.7)		
	Disagree	1 (0.7)	5 (3.3)	7 (4.7)	-	13 (8.7)		
	Strongly Disagree	1 (0.7)	-	2 (1.3)	-	3 (2)		
	Total	**30 (20)**	**65 (43.3)**	**51 (34)**	**4 (2.7)**	**150 (100)**		

Source: Primary data

Table clearly highlights that among the total 150 sample organic farmers surveyed, 25 (16.7%) of the sample organic farmers belong to MBC have no opinion to marriage among close relations, whereas 19 (12.7%) of the sample organic farmers belong to MBC have agreed to marriage among close relations and they support to marriage among close relations and 15 (10%) of the sample organic farmers belong to BC have agreed to marriage among close relations.

Table further highlights that among the total 150 sample inorganic farmers surveyed, 34 (22.7%) of the sample inorganic farmers belong to BC have agreed to marriage among close relations, whereas 20 (13.3%) of the sample inorganic farmers belong to MBC have no opinion to marriage among close relations and they support to marriage among close relations and 15 (10%) of the sample inorganic farmers belong to MBC have agreed to marriage among close relations.

Table discloses that the calculated chi square value for marriage among close relations among different community of sample organic and inorganic farmers is 18.465 and 18.755 which is not significant at the 'p' value of 0.102 and 0.095. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the community of organic and inorganic farmers and marriage among close relations.

Age group of Organic and Inorganic Farmers and Marriage by Selection

In order to examine the relationship between age group of organic and inorganic farmers and marriage by selection, a two way table with age group of organic and inorganic farmers and marriage by selection was constructed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between age group of organic and inorganic farmers and marriage by selection

The age group wise classification of the sample organic and inorganic farmers on the basis of marriage by selection is shown in Table 4.

Table - 4

Chi-square test for significant association between age group of organic and inorganic farmers and marriage by selection

Type of farmers	**Opinion**	**Age group**					**Total**	**Chi-square Value**	**p Value**
		20-30 years	30-40 years	40-50 years	50-60 years	Above 60 years			
Organic farmers	Strongly Agree	4 (2.7)	13 (8.7)	26 (17.3)	35 (23.3)	19 (12.7)	97 (64.7)	16.166	0.441
	Agree	3 (2)	6 (4)	5 (3.3)	8 (5.3)	9 (6)	31 (20.7)		
	No Opinion	-	2 (1.3)	8 (5.3)	3 (2)	3 (2)	16 (10.7)		
	Disagree	-	1 (0.7)	3 (2)	1 (0.7)	-	5 (3.3)		
	Strongly Disagree	-	-	1 (0.7)	-	-	1 (0.7)		
	Total	**7 (4.7)**	**22 (14.7)**	**43 (28.7)**	**47 (31.3)**	**31 (20.7)**	**150 (100)**		
Inorganic farmers	Strongly Agree	4 (2.7)	13 (8.7)	26 (17.3)	31 (20.7)	19 (12.7)	93 (62)	18.156	0.315
	Agree	3 (2)	7 (4.7)	10 (6.7)	6 (4)	15 (10)	41 (27.3)		
	No Opinion	1 (0.7)	2 (1.3)	5 (3.3)	1 (0.7)	1 (0.7)	10 (6.7)		
	Disagree	-	2	2	1	-	5		

			(1.3)	(1.3)	(0.7)		(3.3)
	Strongly Disagree	-	-	1 (0.7)	-	-	1 (0.7)
	Total	**8 (5.3)**	**24 (16)**	**44 (29.3)**	**39 (26)**	**35 (23.3)**	**150 (100)**

Source: Primary data

Age group-wise analysis of marriage by selection reveals that among the total 150 sample organic farmers surveyed, 35 (23.3%) of the sample organic farmers who are in the age group between 50-60 years have strongly agreed that marriage by selection, 26 (17.3%) of the sample organic farmers who are in the age group between 40-50 years have strongly agreed to marriage by selection and 9 (6%) of the sample organic farmers who are in the age group of above 60 years have agreed to marriage by selection.

Age group-wise analysis of marriage by selection reveals that among the total 150 sample inorganic farmers surveyed, 31 (20.7%) of the sample inorganic farmers who are in the age group between 50-60 years have strongly agreed that marriage by selection, 26 (17.3%) of the sample inorganic farmers who are in the age group between 40-50 years have strongly agreed to marriage by selection and 15 (10%) of the sample inorganic farmers who are in the age group of above 60 years have agreed to marriage by selection.

Table discloses that the calculated chi square value for marriage by selection among different age group of sample organic and inorganic farmers is 16.166 and 18.156 which is not significant at the 'p' value of 0.441 and 0.315. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the age group of organic and inorganic farmers and marriage by selection.

Educational qualification of Organic and Inorganic Farmers and Marriage by Selection

In order to examine the relationship between educational qualification of organic and inorganic farmers and marriage by selection, a two way table with educational qualification of organic and inorganic farmers and marriage by selection was constructed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between educational qualification of organic and inorganic farmers and marriage by selection

The educational qualification wise classification of the sample organic and inorganic farmers on the basis of marriage by selection is shown in Table 5

Table -5

Chi-square test for significant association between Educational Qualification of Organic and Inorganic Farmers and Marriage by Selection

Type of Farmers	**Opinion**	**Educational Qualification**					**Total**	**Chi-square Value**	**p Value**
		Illiterate	Primary	HSC	Higher Education	Technical			
Organic Farmers	Strongly Agree	22 (14.7)	26 (17.3)	20 (13.3)	23 (15.3)	6 (4)	97 (64.7)	14.843	0.536
	Agree	3 (2)	6 (4)	9 (6)	11 (7.3)	2 (1.3)	31 (20.7)		
	No Opinion	4 (2.7)	3 (2)	7 (4.7)	2 (1.3)	-	16 (10.7)		
	Disagree	-	2 (1.3)	1 (0.7)	2 (1.3)	-	5 (3.3)		
	Strongly Disagree	-	-	1 (0.7)	-	-	1 (0.7)		
	Total	**29 (19.3)**	**37 (24.7)**	**38 (25.3)**	**38 (25.3)**	**8 (5.3)**	**150 (100)**		
	Strongly	17	23	25	23	5	93	6.811	0.977

Inorganic Farmers	Agree	(11.3)	(15.3)	(16.7)	(15.3)	(3.3)	(62)		
	Agree	5 (3.3)	12 (8)	9 (6)	13 (8.7)	2 (1.3)	41 (27.3)		
	No Opinion	1 (0.7)	2 (1.3)	4 (2.7)	3 (2)	-	10 (6.7)		
	Disagree	1 (0.7)	1 (0.7)	2 (1.3)	1 (0.7)	-	5 (3.3)		
	Strongly Disagree	-	-	1 (0.7)	-	-	1 (0.7)		
	Total	**24 (16)**	**38 (24.7)**	**41 (27.3)**	**40 (26.7)**	**7 (4.7)**	**150 (100)**		

Source: Primary data

Educational qualification-wise analysis of marriage by selection reveals that among the total 150 sample organic farmers surveyed, 26 (17.3%) of the sample organic farmers who are primary education have strongly agreed that marriage by selection, 23 (15.3%) of the sample organic farmers who are higher education have strongly agreed to marriage by selection and 22 (14.7%) of the sample organic farmers who are illiterates have strongly agreed to marriage by selection.

Educational qualification-wise analysis of marriage by selection reveals that among the total 150 sample inorganic farmers surveyed, 25 (16.7%) of the sample inorganic farmers who are HSC qualification have strongly agreed that marriage by selection, 23 (15.3%) of the sample inorganic farmers who are higher education have strongly agreed to marriage by selection and 23 (15.3%) of the sample inorganic farmers who are primary education have strongly agreed to marriage by selection.

Table indicates that the calculated chi square value for marriage by selection among different educational qualification of sample organic and inorganic farmers is 14.843 and 6.811 which is not significant at the 'p' value of 0.536 and 0.977. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the educational qualification of organic and inorganic farmers and marriage by selection.

Community of Organic and Inorganic Farmers and Marriage by Selection

In order to examine the relationship between community of organic and inorganic farmers and marriage by selection, a two way table with community of farmers and marriage by selection was constructed. Accordingly, sample organic and inorganic farmers have been categorized into four groups on the basis of their community. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between community of organic and inorganic farmers and marriage by selection

The community wise classification of the sample organic and inorganic farmers on the basis of marriage by selection is shown in Table 6

Table -6

Community of Organic and Inorganic Farmers and marriage by selection

Type of Farmers	**Opinion**	**Community**				**Total**	**Chi-square Value**	**p Value**
		OC	BC	MBC	SC/ ST			
Organic Farmers	Strongly Agree	29 (19.3)	28 (18.7)	40 (26.7)	-	97 (64.7)	24.603	0.017
	Agree	1 (0.7)	12 (8)	16 (10.7)	2 (1.3)	31 (20.7)		
	No Opinion	7 (4.7)	4 (2.7)	5 (3.3)	-	16 (10.7)		

	Disagree	-	1 (0.7)	4 (2.7)	-	5 (3.3)		
	Strongly Disagree	1 (0.7)	-	-	-	1 (0.7)		
	Total	**38 (25.3)**	**45 (30)**	**65 (43.3)**	**2 (1.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	23 (15.3)	36 (24)	30 (20)	4 (2.7)	93 (62)	17.375	0.135
	Agree	3 (2)	24 (16)	14 (9.3)	-	41 (27.3)		
	No Opinion	3 (2)	2 (1.3)	5 (3.3)	-	10 (6.7)		
	Disagree	-	3 (2)	2 (1.3)	-	5 (3.3)		
	Strongly Disagree	1 (0.7)	-	-	-	1 (0.7)		
	Total	**30 (20)**	**65 (43.3)**	**51 (34)**	**4 (2.7)**	**150 (100)**		

Source: Primary data

Community-wise analysis of marriage by selection reveals that among the total 150 sample organic farmers surveyed, 40 (26.7%) of the sample organic farmers who belong to MBC have strongly agreed that marriage by selection, 29 (19.3%) of the sample organic farmers who belong to OC have strongly agreed to marriage by selection and 28 (18.7%) of the sample organic farmers who belong to BC have strongly agreed to marriage by selection.

Community-wise analysis of marriage by selection reveals that among the total 150 sample inorganic farmers surveyed, 36 (24%) of the sample inorganic farmers who belong to BC have strongly agreed that marriage by selection, 30 (20%) of the sample inorganic farmers who belong to MBC have strongly agreed to marriage by selection and 23 (15.3%) of the sample inorganic farmers who belong to OC have agreed to marriage by selection.

Table indicates that the calculated chi square value for marriage by selection among different community of sample organic farmers is 24.603 which is significant at the 'p' value of 0.017. Since the 'p' value is less than 0.05, the null hypothesis is rejected. It is concluded that there is a significant relationship between the community of organic farmers and marriage by selection.

Table further indicates that the calculated chi square value for marriage by selection among different community of sample inorganic farmers is 17.375 which is not significant at the 'p' value of 0.135. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the community of inorganic farmers and marriage by selection.

Significant association between the Age group of Farmers and Dowry System

An attempt has been made to test the significant association between the age group of farmers and dowry system, a two-way classification table with age group of farmers and dowry system was formed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between age group of farmers and dowry system

The age group wise classification of the sample farmers on the basis of dowry system is shown in Table 7.

Table - 7

Chi-square test for significant association between age group of organic and inorganic farmers and Dowry System

Type of farmers	**Opinion**	**Age group**					**Total**	**Chi-square Value**	**p Value**
		20-30 years	30-40 years	40-50 years	50-60 years	Above 60 years			

Organic farmers	Strongly Agree	5 (3.3)	18 (12)	38 (25.3)	44 (29.3)	24 (16)	129 (86)	8.667	0.371
	Agree	2 (1.3)	3 (2)	5 (3.3)	3 (2)	6 (4)	19 (12.7)		
	No Opinion	-	-	-	-	-	-		
	Disagree	-	1 (0.7)	-	-	1 (0.7)	2 (1.3)		
	Strongly Disagree	-	-	-	-	-	-		
	Total	**7 (4.7)**	**22 (14.7)**	**43 (28.7)**	**47 (31.3)**	**31 (20.7)**	**150 (100)**		
Inorganic farmers	Strongly Agree	6 (4)	21 (14)	39 (26)	34 (22.7)	27 (18)	127 (84.7)	7.949	0.789
	Agree	2 (1.3)	1 (0.7)	5 (3.3)	3 (2)	6 (4)	17 (11.3)		
	No Opinion	-	-	-	-	-	-		
	Disagree	-	1 (0.7)	-	1 (0.7)	1 (0.7)	3 (2)		
	Strongly Disagree	-	1 (0.7)	-	1 (0.7)	1 (0.7)	3 (2)		
	Total	**8 (5.3)**	**24 (16)**	**44 (29.3)**	**39 (26)**	**35 (23.3)**	**150 (100)**		

Source: Primary data

The age group of organic farmers' wise analysis of dowry system highlights that among the total 150 sample organic farmers surveyed, it is noted that 44 (29.3%) of the sample organic farmers who are in the age group between 50-60 years have strongly agreed to dowry system and they support to dowry system, whereas 38 (25.3%) of the sample organic farmers who are in the age group between 40-50 years have strongly agreed to dowry system and 24 (16%) of the sample organic farmers who are in the age group of above 60 years have strongly agreed to dowry system.

The age group of inorganic farmers' wise analysis of dowry system highlights that among the total 150 sample inorganic farmers surveyed, it is surprising to note that 39 (26%) of the sample inorganic farmers who are in the age group between 40-50 years have strongly agreed to dowry system, whereas 34 (22.7%) of the sample inorganic farmers who are in the age group between 50-60 years have strongly agreed to dowry system and they support to dowry system and 27 (18%) of the sample inorganic farmers who are in the age group of above 60 years have strongly agreed to dowry system.

Table discloses that the calculated chi square value for dowry system among different age group of sample organic and inorganic farmers is 8.667 and 7.949 which is not significant at the 'p' value of 0.371 and 0.789. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the age group of sample organic and inorganic farmers and dowry system.

Significant association between the Educational Qualification of Farmers and Dowry System

An attempt has been made to test the significant association between the educational qualification of organic and inorganic farmers and dowry system, a two-way classification table with educational qualification of organic and inorganic farmers and dowry system was formed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between educational qualification of organic and inorganic farmers and dowry system

The educational qualification wise classification of the sample organic and

inorganic farmers on the basis of dowry system is shown in Table 8

Table -8

Chi-square test for significant association between Educational Qualification of Organic and Inorganic Farmers and Dowry System

Type of Farmers	**Opinion**	**Educational Qualification**					**Total**	**Chi-square Value**	**p Value**
		Illiterate	Primary	HSC	Higher Education	Technical			
Organic Farmers	Strongly Agree	25 (16.7)	35 (23.3)	28 (18.7)	34 (22.7)	7 (4.7)	129 (86)	9.046	0.338
	Agree	3 (2)	2 (1.3)	9 (6)	4 (2.7)	1 (0.7)	19 (12.7)		
	No Opinion	-	-	-	-	-	-		
	Disagree	-	-	-	-	-	2 (1.3)		
	Strongly Disagree	1 (0.7)	-	2 (1.3)	-	-	3 (1)		
	Total	**29 (19.3)**	**37 (24.7)**	**38 (25.3)**	**38 (25.3)**	**8 (5.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	22 (14.7)	35 (23.3)	28 (18.7)	35 (23.3)	7 (4.7)	127 (84.7)	21.027	0.050
	Agree	-	2 (1.3)	11 (7.3)	4 (2.7)	-	17 (11.3)		
	No Opinion	1 (7)	-	2 (1.3)	-	-	-		
	Disagree	1 (0.7)	1 (0.7)	-	1 (0.7)	-	3 (2)		
	Strongly Disagree	-	-	-		-	3 (2)		
	Total	**24 (16)**	**38 (24.7)**	**41 (27.3)**	**40 (26.7)**	**7 (4.7)**	**150 (100)**		

Source: Primary data

The educational qualification of organic farmers' wise analysis of dowry system highlights that among the total 150 sample organic farmers surveyed, it is noted that 35 (23.3%) of the sample organic farmers who are primary education have strongly agreed to dowry system and they support to dowry system, whereas 34 (22.7%) of the sample organic farmers who are higher education have strongly agreed to dowry system and 28 (18.7%) of the sample organic farmers who are HSC qualification have strongly agreed to dowry system.

The educational qualification of inorganic farmers' wise analysis of dowry system highlights that among the total 150 sample inorganic farmers surveyed, it is surprising to note that 35 (23.3%) of the sample inorganic farmers who are primary education have strongly agreed to dowry system, whereas 35 (23.3%) of the sample inorganic farmers who are higher education have strongly agreed to dowry system and they support to dowry system and 28 (18.7%) of the sample inorganic farmers who are HSC qualification have strongly agreed to dowry system.

Table reveals that the calculated chi square value for dowry system among different educational qualification of sample organic and inorganic farmers is 9.046 and 21.027 which is not significant at the 'p' value of 0.338 and 0.050. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between

the educational qualification of sample organic and inorganic farmers and dowry system.

Significant association between the Community of Farmers and Dowry System

An attempt has been made to test the significant association between the community of farmers and dowry system, a two-way classification table with community of farmers and dowry system was formed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between community of farmers and dowry system

The community wise classification of the sample farmers on the basis of dowry system is shown in Table 9.

Table -9

Community of Organic and Inorganic Farmers and Dowry System

Type of Farmers	**Opinion**	**Community**				**Total**	**Chi-square Value**	**p Value**
		OC	BC	MBC	SC/ ST			
Organic Farmers	Strongly Agree	36 (24)	41 (27.3)	52 (34.7)	-	129 (86)	20.205	0.003
	Agree	2 (1.3)	4 (2.7)	11 (7.3)	2 (1.3)	19 (12.7)		
	No Opinion	-	-	-	-	-		
	Disagree	-	-	2 (1.3)	-	2 (1.3)		
	Strongly Disagree	-	-	-	-	-		
	Total	**38 (25.3)**	**45 (30)**	**65 (43.3)**	**2 (1.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	27 (18)	60 (40)	37 (24.7)	3 (2)	127 (84.7)	11.612	0.236
	Agree	2 (1.3)	4 (2.7)	10 (6.7)	1 (0.7)	17 (11.3)		
	No Opinion	-	-	-	-	-		
	Disagree	1 (0.7)	-	2 (1.3)	-	3 (2)		
	Strongly Disagree	-	1 (0.7)	2 (1.3)	-	3 (2)		
	Total	**30 (20)**	**65 (43.3)**	**51 (34)**	**4 (2.7)**	**150 (100)**		

Source: Primary data

The community of organic farmers' wise analysis of dowry system highlights that among the total 150 sample organic farmers surveyed, it is noted that 52 (34.7%) of the sample organic farmers who belong to MBC have strongly agreed to dowry system and they support to dowry system, whereas 41 (27.3%) of the sample organic farmers who belong to BC have strongly agreed to dowry system and 36 (24%) of the sample organic farmers who belong to OC have strongly agreed to dowry system.

The community of inorganic farmers' wise analysis of dowry system highlights that among the total 150 sample inorganic farmers surveyed, it is surprising to note that 60 (40%) of the sample inorganic farmers who belong to BC have strongly agreed to dowry system, whereas 37 (24.7%) of the sample inorganic farmers who belong to MBC have strongly agreed to dowry system and they support to dowry system and 27 (18%) of the sample inorganic farmers who belong to OC have strongly agreed to dowry system.

Table reveals that the calculated chi square value for dowry system among different community of sample organic farmers is 20.205 which is significant at the 'p' value of 0.003.

Since the 'p' value is less than 0.05, the null hypothesis is rejected. It is concluded that there is a significant relationship between the community of sample organic farmers and dowry system.

Table further reveals that the calculated chi square value for dowry system among different community of sample inorganic farmers is 11.612 which is not significant at the 'p' value of 0.236. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the community of sample inorganic farmers and dowry system.

Significant association between the Age group of Farmers and Widow Remarriage

An attempt has been made to test the significant association between the age group of farmers and widow remarriage, a two-way classification table with age group of farmers and widow remarriage was formed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between age group of farmers and widow remarriage

The age group wise classification of the sample farmers on the basis of widow remarriage is shown in Table 10.

Table - 10

Chi-square test for significant association between age group of organic and inorganic farmers and Widow Remarriage

Type of farmers	**Opinion**	**Age group**					**Total**	**Chi-square Value**	**p Value**
		20-30 years	30-40 years	40-50 years	50-60 years	Above 60 years			
Organic farmers	Strongly Agree	5 (3.3)	14 (9.3)	34 (22.7)	32 (21.3)	20 (13.3)	105 (70)	7.329	0.835
	Agree	2 (1.3)	8 (5.3)	6 (4)	12 (8)	9 (6)	37 (24.7)		
	No Opinion	-	-	2 (1.3)	2 (1.3)	2 (1.3)	6 (4)		
	Disagree	-	-	1 (0.7)	1 (0.7)	-	2 (1.3)		
	Strongly Disagree	-	-	-	-	-	-		
	Total	**7 (4.7)**	**22 (14.7)**	**43 (28.7)**	**47 (31.3)**	**31 (20.7)**	**150 (100)**		
Inorganic farmers	Strongly Agree	7 (4.7)	15 (10)	34 (22.7)	23 (15.3)	24 (16)	103 (68.7)	7.303	0.504
	Agree	1 (0.7)	8 (5.3)	6 (4)	12 (8)	9 (6)	36 (24)		
	No Opinion	-	1 (0.7)	4 (2.7)	4 (2.7)	2 (1.3)	11 (7.3)		
	Disagree	-	-	-	-	-	-		
	Strongly Disagree	-	-	-	-	-	-		
	Total	**8 (5.3)**	**24 (16)**	**44 (29.3)**	**39 (26)**	**35 (23.3)**	**150 (100)**		

Source: Primary data

The age group of organic farmers' wise analysis of widow remarriage highlights that among the total 150 sample organic farmers, 22.7% of the sample organic farmers who are in the age group between 40-50 years are strongly agree with widow remarriage and 21.3% of the sample organic farmers who are in the age group between 50-60 years are strongly agree with widow remarriage. Only 6% of the sample organic farmers who are in the age group of above 60 years are agree with widow remarriage and 5.3% of the sample farmers who

are in the age group between 30-40 years are agree with widow remarriage.

The age group of inorganic farmers' wise analysis of widow remarriage highlights that among the total 150 sample inorganic farmers, 22.7% of the sample organic farmers who are in the age group between 40-50 years are strongly agree with widow remarriage and 16% of the sample organic farmers who are in the age group of above 60 years are strongly agree with widow remarriage. Only 6% of the sample organic farmers who are in the age group of above 60 years are agree with widow remarriage and 5.3% of the sample farmers who are in the age group between 30-40 years are agree with widow remarriage.

Table depicts that the calculated chi square value for widow remarriage among different age group of sample organic and inorganic farmers is 7.329 and 7.303 which is not significant at the 'p' value of 0.835 and 0.504. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the age group of sample organic and inorganic farmers and widow remarriage.

Significant association between the Educational qualification of Organic and Inorganic Farmers and Widow Remarriage

An attempt has been made to test the significant association between the educational qualification of organic and inorganic farmers and widow remarriage, a two-way classification table with educational qualification of organic and inorganic farmers and widow remarriage was formed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between educational qualification of organic and inorganic farmers and widow remarriage

The educational qualification wise classification of the sample organic and inorganic farmers on the basis of widow remarriage is shown in Table 11.

Table -11

Chi-square test for significant association between Educational Qualification of Organic and Inorganic Farmers and Widow Remarriage

Type of Farmers	**Opinion**	**Educational Qualification**					**Total**	**Chi-square Value**	**p Value**
		Illiterate	Primary	HSC	Higher Education	Technical			
Organic Farmers	Strongly Agree	20 (13.3)	24 (16)	29 (19.3)	26 (17.3)	6 (4)	105 (70)	9.046	0.338
	Agree	7 (4.7)	10 (6.7)	7 (4.7)	11 (7.3)	2 (1.3)	37 (24.7)		
	No Opinion	1 (0.7)	3 (2)	1 (0.7)	1 (0.7)	-	6 (4)		
	Disagree	1 (0.7)	-	1 (0.7)	-	-	2 (1.3)		
	Strongly Disagree	-	-	-	-	-	-		
	Total	**29 (19.3)**	**37 (24.7)**	**38 (25.3)**	**38 (25.3)**	**8 (5.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	14 (9.3)	28 (18.7)	27 (18)	29 (19.3)	5 (3.3)	103 (68.7)	5.349	0.720
	Agree	8 (5.3)	6 (4)	10 (6.7)	10 (6.7)	2 (1.3)	36 (24)		
	No Opinion	2 (1.3)	4 (2.7)	4 (2.7)	1 (0.7)	-	11 (7.3)		
	Disagree	-	-	-	-	-	-		
	Strongly Disagree	-	-	-	-	-	-		

	Total	**24 (16)**	**38 (24.7)**	**41 (27.3)**	**40 (26.7)**	**7 (4.7)**	**150 (100)**	

Source: Primary data

The educational qualification of organic farmers' wise analysis of widow remarriage highlights that among the total 150 sample organic farmers, 19.3% of the sample organic farmers who are HSC qualification have strongly agreed with widow remarriage, 17.3% of the sample organic farmers who are higher education have strongly agreed with widow remarriage and 16% of the sample organic farmers who are primary education have strongly agreed with widow remarriage.

The educational qualification of inorganic farmers' wise analysis of widow remarriage highlights that among the total 150 sample inorganic farmers, 19.3% of the sample inorganic farmers who are higher education have strongly agreed with widow remarriage, 18.7% of the sample inorganic farmers who are primary education have strongly agreed with widow remarriage and 18% of the sample inorganic farmers who are HSC qualification have strongly agreed with widow remarriage.

Table depicts that the calculated chi square value for widow remarriage among different educational qualification of sample organic and inorganic farmers is 9.046 and 5.349 which is not significant at the 'p' value of 0.338 and 0.720. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the educational qualification of sample organic and inorganic farmers and widow remarriage.

Significant association between the Community of Farmers and Widow Remarriage

An attempt has been made to test the significant association between the community of farmers and widow remarriage, a two-way classification table with community of farmers and widow remarriage was formed. Accordingly, sample farmers have been categorized into four groups on the basis of their community. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between community of farmers and widow remarriage

The community wise classification of the sample farmers on the basis of widow remarriage is shown in Table 12.

Table -12

Community of Organic and Inorganic Farmers and Widow Remarriage

Type of Farmers	**Opinion**	**Community**				**Total**	**Chi-square Value**	**p Value**
		OC	BC	MBC	SC/ ST			
Organic Farmers	Strongly Agree	28 (18.7)	30 (20)	47 (31.3)	-	105 (70)	16.866	0.051
	Agree	5 (3.3)	15 (10)	15 (10)	2 (1.3)	37 (24.7)		
	No Opinion	4 (2.7)	-	2 (1.3)	-	6 (4)		
	Disagree	1 (0.7)	-	1 (0.7)	-	2 (1.3)		
	Strongly Disagree	-	-	-	-	-		
	Total	**38 (25.3)**	**45 (30)**	**65 (43.3)**	**2 (1.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	20 (13.3)	42 (28)	38 (25.3)	3 (2)	103 (68.7)	9.331	0.156
	Agree	5 (3.3)	21 (14)	9 (6)	1 (0.7)	36 (24)		

	No Opinion	5 (3.3)	2 (1.3)	4 (2.7)	-	11 (7.3)		
	Disagree	-	-	-	-	-		
	Strongly Disagree	-	-	-	-	-		
	Total	**30 (20)**	**65 (43.3)**	**51 (34)**	**4 (2.7)**	**150 (100)**		

Source: Primary data

The community of organic farmers' wise analysis of widow remarriage highlights that among the total 150 sample organic farmers, 31.3% of the sample organic farmers who belong to MBC have strongly agreed with widow remarriage, 20% of the sample organic farmers who belong to BC have strongly agreed with widow remarriage and 18.7% of the sample organic farmers who belong to OC have strongly agreed with widow remarriage.

The community of inorganic farmers' wise analysis of widow remarriage highlights that among the total 150 sample inorganic farmers, 28% of the sample inorganic farmers who belong to BC have strongly agreed with widow remarriage, 25.3% of the sample inorganic farmers who belong to MBC have strongly agreed with widow remarriage and 13.3% of the sample inorganic farmers who belong to OC have strongly agreed with widow remarriage.

Table depicts that the calculated chi square value for widow remarriage among different community of sample organic and inorganic farmers is 16866 and 9.331 which is not significant at the 'p' value of 0.051 and 0.156. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the community of sample organic and inorganic farmers and widow remarriage.

Age group of Organic and inorganic farmers and Opinion on Divorce System

In order to examine the relationship between age group of organic and inorganic farmers and opinion on divorce system, a two way table with age group of organic and inorganic farmers and opinion on divorce system was constructed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between age group of organic and inorganic farmers and opinion on divorce system

The age group wise classification of the sample organic and inorganic farmers on the basis of opinion on divorce system is shown in Table 13

Table -13

Chi-square test for significant association between age group of organic and inorganic farmers and Opinion on Divorce System

Type of farmers	**Opinion**	**Age group**					**Total**	**Chi-square Value**	**p Value**
		20-30 years	30-40 years	40-50 years	50-60 years	Above 60 years			
Organic farmers	Strongly Agree	4 (2.7)	4 (2.7)	21 (14)	21 (14)	19 (12.7)	69 (46)	50.843	0.000
	Agree	1 (0.7)	10 (6.7)	10 (6.7)	14 (9.3)	7 (4.7)	42 (28)		
	No Opinion	-	3 (2)	11 (7.3)	4 (3)	2 (1.3)	20 (13.3)		
	Disagree	-	5 (3.3)	1 (0.7)	7 (4.7)	3 (2)	16 (10.7)		
	Strongly Disagree	2 (1.3)	-	-	1 (0.7)	-	3 (2)		
	Total	**7 (4.7)**	**22 (14.7)**	**43 (28.7)**	**47 (31.3)**	**31 (20.7)**	**150 (100)**		
Inorganic	Strongly	5	10	22	13	22	72	27.693	0.006

farmers	Agree	(3.3)	(6.7)	(14.7)	(8.7)	(14.7)	(48)		
	Agree	3 (2)	11 (7.3)	11 (7.3)	12 (8)	8 (5.3)	45 (30)		
	No Opinion	-	-	9 (6)	3 (2)	2 (1.3)	14 (9.3)		
	Disagree	-	3 (2)	2 (1.3)	11 (7.3)	3 (2)	19 (12.7)		
	Strongly Disagree	-	-	-	-	-	-		
	Total	**8 (5.3)**	**24 (16)**	**44 (29.3)**	**39 (26)**	**35 (23.3)**	**150 (100)**		

Source: Primary data

It could be seen from the above table that there is a relationship between the age group of organic and inorganic farmers and opinion on divorce system. The age group of organic farmers' wise analysis of opinion on divorce system highlights that among the total 150 sample organic farmers surveyed, it is surprising to note that 21 (14%) of the sample organic farmers who are in the age group between 50-60 years have strongly agreed to divorce system, whereas another 21 (14%) of the sample organic farmers who are in the age group between 40-50 years have strongly agreed to divorce system and only 7 (4.7%) of the sample organic farmers who are in the age group between 50-60 years have disagreed to divorce system.

The age group of inorganic farmers' wise analysis of opinion on divorce system highlights that among the total 150 sample inorganic farmers surveyed, it is surprising to note that 22 (14.7%) of the sample inorganic farmers who are in the age group of above 60 years have strongly agreed to divorce system, whereas another 22 (14.7%) of the sample inorganic farmers who are in the age group between 40-50 years have strongly agreed to divorce system and only 11 (7.3%) of the sample inorganic farmers who are in the age group between 50-60 years have disagreed to divorce system.

Table discloses that the calculated chi square value for opinion on divorce system among different age group of organic and inorganic farmers is 50.843 and 27.693 which is significant at the 'p' value of 0.000 and 0.006. Since the 'p' value is less than 0.05, the null hypothesis is rejected. It is concluded that there is a significant relationship between the age group of organic and inorganic farmers and opinion on divorce system.

Educational qualification of Organic and Inorganic Farmers and Opinion on Divorce System

In order to examine the relationship between educational qualification of organic and inorganic farmers and opinion on divorce system, a two way table with educational qualification of organic and inorganic farmers and opinion on divorce system was constructed. Chi-square test is applied with the null hypothesis as,

H_o: There is no significant association between educational qualification of organic and inorganic farmers and opinion on divorce system

The educational qualification wise classification of the sample organic and inorganic farmers on the basis of opinion on divorce system is shown in Table 14.

Table -14

Chi-square test for significant association between Educational Qualification of Organic and Inorganic Farmers and Opinion on Divorce System

Type of Farmers	**Opinion**	**Educational Qualification**					**Total**	**Chi-square Value**	**p Value**
		Illiterate	Primary	HSC	Higher Education	Technical			
	Strongly Agree	10 (6.7)	12 (8)	17 (11.3)	23 (15.3)	7 (4.7)	69 (46)	39.877	0.001

Organic Farmers	Agree	7 (4.7)	12 (8)	15 (10)	8 (5.3)	-	42 (28)		
	No Opinion	11 (7.3)	4 (2.7)	4 (2.7)	2 (1.3)	1 (0.7)	20 (13.3)		
	Disagree	-	7 (4.7)	7 (4.7)	5 (3.3)	-	16 (10.7)		
	Strongly Disagree	1 (0.7)	2 (1.3)	2 (1.3)	-	-	3 (2)		
	Total	**29 (19.3)**	**37 (24.7)**	**38 (25.3)**	**38 (25.3)**	**8 (5.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	7 (4.7)	19 (12.7)	20 (13.3)	22 (14.7)	4 (2.7)	72 (48)	15.901	0.196
	Agree	7 (4.7)	9 (6)	14 (9.3)	13 (8.7)	2 (1.3)	45 (30)		
	No Opinion	6 (4)	5 (3.3)	1 (0.7)	1 (0.7)	1 (0.7)	14 (9.3)		
	Disagree	4 (2.7)	5 (3.3)	6 (4)	4 (2.7)	-	19 (12.7)		
	Strongly Disagree	-	-	-	-	-	-		
	Total	**24 (16)**	**38 (24.7)**	**41 (27.3)**	**40 (26.7)**	**7 (4.7)**	**150 (100)**		

Source: Primary data

The educational qualification of organic farmers' wise analysis of opinion on divorce system highlights that among the total 150 sample organic farmers surveyed, it is surprising to note that 23 (15.3%) of the sample organic farmers who are higher education have strongly agreed to divorce system, whereas 17 (11.3%) of the sample organic farmers who are HSC qualification have strongly agreed to divorce system and 15 (10%) of the sample organic farmers who are HSC qualification have agreed to divorce system.

The educational qualification of inorganic farmers' wise analysis of opinion on divorce system highlights that among the total 150 sample inorganic farmers surveyed, it is surprising to note that 22 (14.7%) of the sample inorganic farmers who are higher education have strongly agreed to divorce system, whereas 20 (13.3%) of the sample inorganic farmers who are HSC qualification have strongly agreed to divorce system and 19 (12.7%) of the sample inorganic farmers who are primary education have strongly agreed to divorce system.

Table discloses that the calculated chi square value for opinion on divorce system among different educational qualification of sample organic farmers is 39.877 which is significant at the 'p' value of 0.001. Since the 'p' value is less than 0.05, the null hypothesis is rejected. It is concluded that there is a significant relationship between the educational qualification of organic farmers and opinion on divorce system.

Table further discloses that the calculated chi square value for opinion on divorce system among different educational qualification of sample inorganic farmers is 15.901 which is not significant at the 'p' value of 0.196. Since the 'p' value is higher than 0.05, the null hypothesis is accepted. It is concluded that there is no significant relationship between the educational qualification of inorganic farmers and opinion on divorce system.

Community of Organic and inorganic farmers and Opinion on Divorce System

In order to examine the relationship between community of organic and inorganic farmers and opinion on divorce system, a two way table with community of organic and inorganic farmers and opinion on divorce system was constructed. Chi-square test is applied with the null hypothesis as,

H_0: There is no significant association between community of organic and inorganic farmers and opinion on divorce system

The community wise classification of the sample organic and inorganic farmers on the basis of opinion on divorce system is shown in Table 15

Table - 15
Community of Organic and Inorganic Farmers and Opinion on Divorce System

Type of Farmers	Opinion	Community				Total	Chi-square Value	p Value
		OC	BC	MBC	SC/ ST			
Organic Farmers	Strongly Agree	14 (9.3)	21 (14)	34 (22.7)	-	69 (46)	79.911	0.000
	Agree	6 (4)	11 (7.3)	24 (16)	1 (0.7)	42 (28)		
	No Opinion	17 (11.3)	1 (0.7)	2 (1.3)	-	20 (13.3)		
	Disagree	1 (0.7)	11 (7.3)	4 (2.7)	-	16 (10.7)		
	Strongly Disagree	-	1 (0.7)	1 (0.7)	1 (0.7)	3 (2)		
	Total	**38 (25.3)**	**45 (30)**	**65 (43.3)**	**2 (1.3)**	**150 (100)**		
Inorganic Farmers	Strongly Agree	13 (8.7)	32 (21.3)	26 (17.3)	1 (0.7)	72 (48)	32.420	0.000
	Agree	4 (2.7)	19 (12.7)	19 (12.7)	3 (2)	45 (30)		
	No Opinion	10 (6.7)	3 (2)	1 (0.7)	-	14 (9.3)		
	Disagree	3 (2)	11 (7.3)	5 (3.3)	-	19 (12.7)		
	Strongly Disagree	-	-	-	-	-		
	Total	**30 (20)**	**65 (43.3)**	**51 (34)**	**4 (2.7)**	**150 (100)**		

Source: Primary data

It could be seen from the above table that there is a relationship between the community of organic and inorganic farmers and opinion on divorce system. The community of organic farmers' wise analysis of opinion on divorce system highlights that among the total 150 sample organic farmers surveyed, it is surprising to note that 34 (22.7%) of the sample organic farmers belong to MBC have strongly agreed to divorce system, whereas 24 (16%) of the sample organic farmers belong to MBC have agreed to divorce system and 21 (14%) of the sample organic farmers belong to BC have agreed to divorce system.

The community of inorganic farmers' wise analysis of opinion on divorce system highlights that among the total 150 sample inorganic farmers surveyed, it is surprising to note that 32 (21.3%) of the sample inorganic farmers belong to BC have strongly agreed to divorce system, whereas 26 (17.3%) of the sample inorganic farmers belong to MBC have strongly agreed to divorce system and 19 (12.7%) of the sample inorganic farmers belong to BC have agreed to divorce system.

Table discloses that the calculated chi square value for opinion on divorce system among different community of sample organic and inorganic farmers is 79.911 and 32.420 which is significant at the 'p' value of 0.000 and 0.000. Since the 'p' value is less than 0.05, the null hypothesis is rejected. It is concluded that there is a significant relationship between the community of organic and inorganic farmers and opinion on divorce system.

CONCLUSION

The present study has effectively analysed the opinion of organic and inorganic farmers towards marriage and its related aspects. The demographic variables like Age, Education and Community were taken to be analysed with marriage related variables. On the basis of the study, it can be concluded that the marriage has significantly impacted on the lives of farming community at large.

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"A STUDY ON SUICIDE ATTEMPTS: AN ALARMING SPIKE AMONG THE YOUTH OF NORTH EAST INDIA"

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ABSTRACT

The research was undertaken to study and determine the rate and pattern of suicide attempts in North-East India and the factors behind such acts. It was completely based on secondary data sources as it was carried out during the CoVID-19 Pandemic (lockdown). The study outlined its focus on the fact that youth (age 15–34) had the highest rate of suicide attempts and it was comparatively higher in females. Self-poisoning was the most commonly used method. There exist an association between suicide and mental health as depressive disorder was found to be the predominant cause of suicidal attempts in this study.

***KEYWORDS**: Suicide, Suicide attempts, Suicidal behaviour, Risk factors, WHO, Depressive disorder.*

INTRODUCTION

Suicide, from Latin suicidium, means "the act of taking one's own life". It is the act of intentionally causing one's own death. Suicide means ending one's own life. Sometimes it is a way for people to escape pain or suffering. (Canadian Mental Health Association: 2012).

The Government of India classifies death as suicide if it meets the following three criteria:

- an unnatural death,
- the intent to die began within the person,
- there is a reason behind for the person to end his or her life, which may have been specified in a suicide note or unspecified.

Suicidal behavior refers to talking about or taking actions related to ending one's own life. It is any action that could cause a person to die. Suicidal thoughts and behaviors should be considered a psychiatric emergency.

A suicide attempt can be defined as an attempt where a person tries to die by suicide but survives. It may be denoted as a failed suicide attempt or nonfatal suicide attempt.

Methods: Some methods of suicides have higher rates of lethality than others. Suicide attempt by the use of firearms results in death 90% of the time. Wrist slashing has a much lower lethality rate, comparatively. 75% of all the attempts are by drug overdose, a method that is often thwarted because the drug is nonlethal, or is used at a nonlethal dosage. These people are found to be survived 97% of the time.

Suicide is analyzed in terms of motivations to escape from aversive self-awareness. The casual chain begins with events that fall severely short of standards and expectations. These failures are caused internally, which makes self-awareness painful. Awareness of one's own inadequacies generates negative affect, and the individual therefore desires to escape from self-awareness and the associated affect. The individual seeks to achieve a state of cognitive deconstruction (constricted temporal focus, concrete thinking, immediate or proximal goals, cognitive rigidity, and rejection of meaning), which helps prevent meaningful self-awareness and emotion. The deconstructed state shows irrationality and disinhibitions, making drastic measures seem acceptable. Suicide is seen as an ultimate step in the effort to escape from self and world. (Baumeister: 1990)

Suicide is a worldwide phenomenon. This review is built on a literature search of the World Health Organization (WHO) databases and PubMed. WHO stated that about 800,000 suicides were documented worldwide, and globally 78% of all completed suicides occur in low and middle-income countries in 2015. Overall, 1.4% of premature deaths worldwide are due to suicides. There exist differences between regions and countries with respect to the age, gender, and socioeconomic status of the individual and the respective country. Suicidal attempts are up to 30 times more common than suicides; they are however considered to be important predictors of repeated attempts as well as completed suicides (Bachmann: 2018).

Several terms have been used to describe suicidal and self-harming behaviours in the scientific literature. Definitions of terms used in the literature to describe thoughts of suicide and suicidal behaviours are outlined in the table below (Mental Health Commission of Canada: 2018) –

Category	Definition
Suicide	A fatal self-injury act with some evidence of intent to die
Suicidal behaviour	Ranges from thoughts of suicide to suicide attempts to death by suicide
Suicide attempt	A potential self-injurious behaviour associated with some intent to die
Active thoughts of suicide	Thoughts about taking action to end one's life, which may include identifying a method, having a plan, and/or having intent to act
Passive thoughts of suicide	Thoughts about death. Or wanting to be dead, without any plan or intent
Non-suicidal self-injury	Self-injurious behaviour with no intent to die
Suicidal events	The onset or worsening of thoughts of suicide or an actual suicide attempt or an emergency referral for thoughts of suicide or suicidal behaviour
Deliberate self-harm	Any type of self-injurious behaviour, including thoughts of suicide without the intent to die

'Adolescence', is a Latin word from adolescere, which means to 'grow up' is a transitional phase of physical and psychological development that occurs during the period from puberty to legal adulthood (age of majority). In studying adolescent development, adolescence can be defined biologically, as the physical transition marked by the onset of puberty and the termination of physical growth; cognitive, as changes in the ability to think logically and multi-dimensionally; or socially. The World Health Organization (WHO) has defined adolescents as any person between ages 10 and 19. This range of age also falls within WHO's definition of young people, which includes individuals between ages 10 and 24 (The Sentinel : 2019).

The United Nations defines youth as person between the ages of 15 and 24 with all UN statistics based on this range, the UN states education as a source for these statistics. The UN also acknowledges that this age group varies without prejudice to other age groups listed by member states such as 18-30.

The National Youth Policy (2003) defined the youth as persons in the age group of 13–35 years. However, National Youth Policy (2014) altered it and defined 'youth' as persons in the age group of 15–29 years (Youth in India: 2017). India is expected to have 34.33% share of youth in total population by the year 2020.

Factors or causes which lead to suicide, suicidal attempts, and suicidal ideation:

Precipitating Factors: Precipitating factors are stressful events that can trigger a suicidal crisis in a vulnerable person. Example includes: End of a relationship or marriage, death of a loved one, an arrest, serious financial problems (Open Journal Psychiatry & Allied Sciences : 2018).

Risk Factors: Risk factors are characteristics of a person or his or her environment that increases the likelihood that he or she will die by suicide (i.e., suicide risk). Major risk factors for suicide include:

Family history of suicide, Previous suicide attempt(s), Negative stress or Distress, Misuse and abuse of alcohol or other drugs, Mental illness/disorders, particularly depression and other mood disorders, Environmental risks such as access to lethal means, Knowing a person who died by suicide, particularly a family member, Social

isolation, Family stress/dysfunction, Feeling of hopelessness, Situational crisis, e.g., physical or sexual abuse, family violence, Chronic disease and disability, Lack of access to behavioural health care, Cultural and religious beliefs, etc. Risk factors also vary by age group, culture, sex and other characteristics of people. Stress that results from prejudice and discrimination (family rejection, bullying, violence) acts as s risk factor for suicide attempts among lesbian, gay, bisexual, and transgender (LGBT) youth.

Social media and suicide: There lies a strong connection between Social Media and Suicide, though it is a relatively new phenomenon. There is increasing evidence that the internet and social media can cause suicide-related behaviour. Cyberbullying has led to attempting and committing suicides.

Online games and suicide: Online games have also driven teenagers to self-harm and even suicide. The Blue Whale Challenge was one of the games which caused suicide and suicidal attempts.

Suicide in India is a national social issue. India recorded 1,33,623 suicides, an increase of 1.4% from 2014's 1,31,666 suicides in the year 2015. The rate of suicide as on 2015 is calculated as number of suicides per 1 lakh (100,000) people. The top three States with highest suicide rates are Puducherry, Sikkim and Andaman and Nicobar Islands with suicide rates 43.2, 37.5 and 28.9 respectively, while Bihar with 0.5 recorded lowest suicide rates as per Suicidal Deaths in India report published by National Crime Records Bureau (NCRB), Government of India. Nagaland becomes the second least suicide state in the country with 0.9 per cent cases (21 suicides) in 2015 behind Bihar with 0.5 per cent (Northeast Now, 2018). According to a report published by National Crime Record Bureau (NCRB), however, said there was an increase in the number of suicides compared to 2014, which recorded only 13 cases. NCRB recorded 12,801 cases from 2001 to 2012, with men showing more suicidal tendencies than women in North East India.

Youth (18 and above - below 30 years) is one of the vulnerable groups in the matter of suicide with 33% share of total police recorded suicide cases (Youth in India : 2017).

As suicide is a multifaceted problem so the prevention programmes should also be multidimensional. Collaboration, coordination and commitment are needed to develop and implement a national plan, which is cost-effective, appropriate and relevant to the needs of the community.

Research has also found that the rate of suicidal attempts and suicidal ideations among lesbian, gay, bisexual, transgender, (LGBT) youth is significantly higher than among the general population. Bullying of LGBT youth has been shown to be a contributing factor in many suicides, even if not all of the attacks have been significantly regarding sexuality or gender.

MATERIALS AND METHODS

The aim of the study was to emphasize on the rate of suicide attempts by the adolescents and youth so that the causes or factors that lead to suicidality can be determined.

The study was conducted in North-East India, to ascertain the determinants of suicide attempts and how mental health is related to the causes of the suicidal attempts. The researcher selected descriptive research design in order to carry out the study and fulfill the objectives of the research. The researcher decided to conduct the study in the North Eastern regions of India entitling the research as "A study on Suicide: an alarming spike in its Attempts among the Youth of North East India".

The researcher selected Non-probability (Purposive) sampling to conduct the study. The sample size included 111 individuals who attempted suicide. The age group of the selected sample was from 15–64 years. But the emphasis of the study was given more on the youth with age group 15–24 and 25–34. The researcher used secondary sources of data to conduct the study Some of the data were taken from research studies, reference from books, journals, internet, Government reports and statistics.

Limitation of the Study:

The research was fully based on the secondary sources of data as it was done during the CoVID-19 Pandemic (lockdown). The data required for attempted suicides is

less available as compared to the availability of data on cases of committed suicides in the secondary sources of data collection.

RESULTS AND DISCUSSION

The researcher decided to analyze and interpret the data by using the following methods:

- Tabulation of data
- Tables & Graphs

Table 4.1 – Age distribution of the suicide attempters

Sl. No.	Age group	No. of subjects
1.	15–24	67
2.	25–34	20
3.	35–44	15
4	45–54	6
5.	55–64	3

Fig 1 : Field Survey, 2021

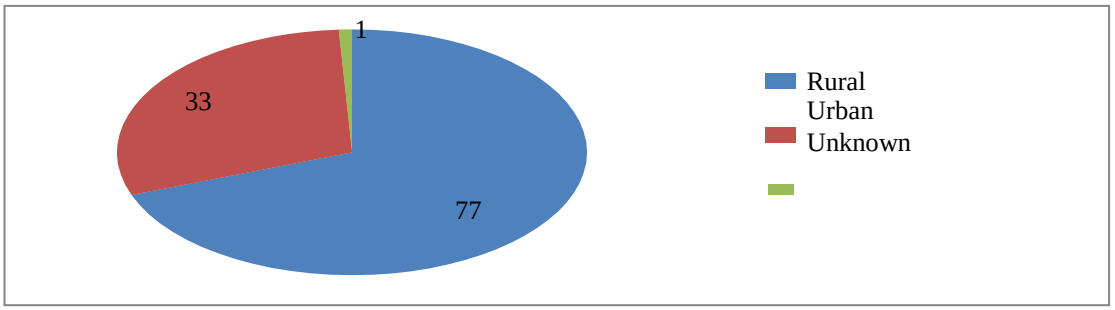

Table 4.2 – Gender distribution of the suicide attempters

Sl. No.	Gender	No. of subjects
1.	Male	50
2.	Female	61

Fig 2 : Field Survey, 2021

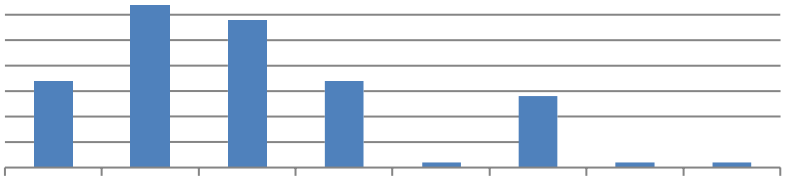

Table 4.3 – Domicile distribution of the suicide attempters

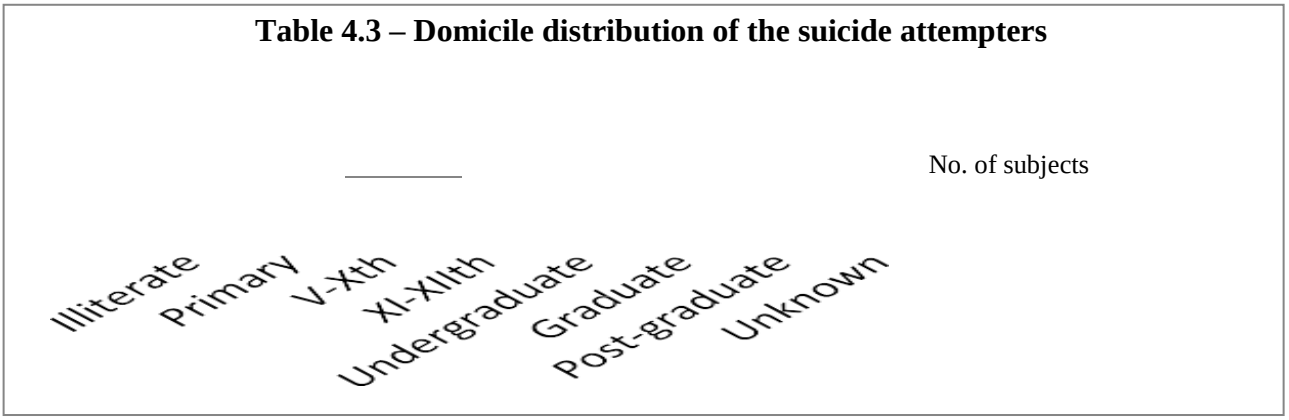

Fig 3 : Field Survey, 2021

Table 4.4 – Education level of the suicide attempters

Fig 4 : Field Survey, 2021

Table 4.5 – Occupation of the suicide attempters

Fig 5 : Field Survey, 2021

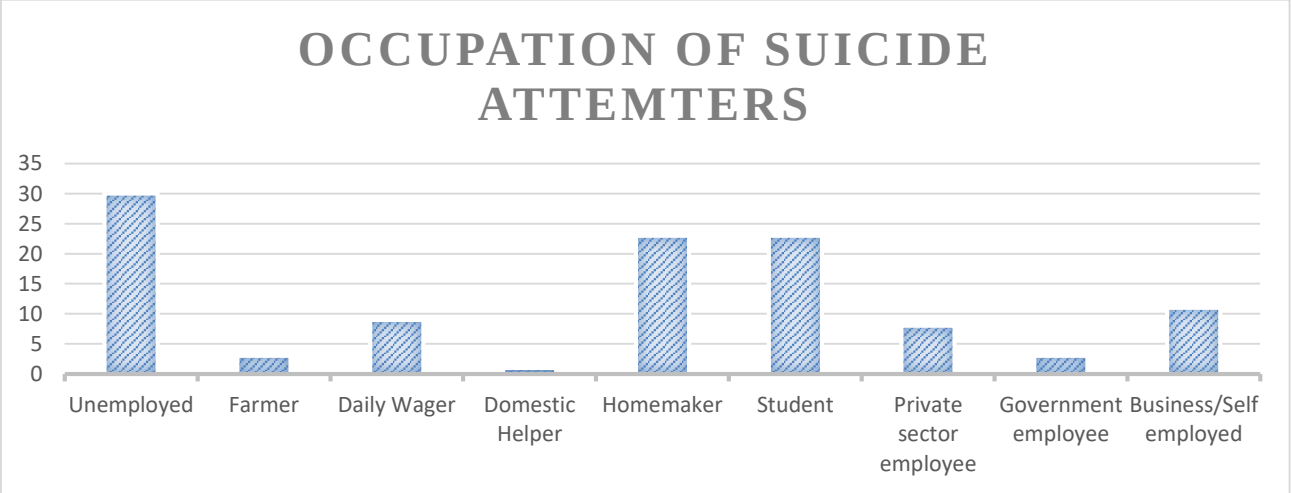

Table 4.6 – Economic status of the suicide attempters

Fig 6 : Field Survey, 2021

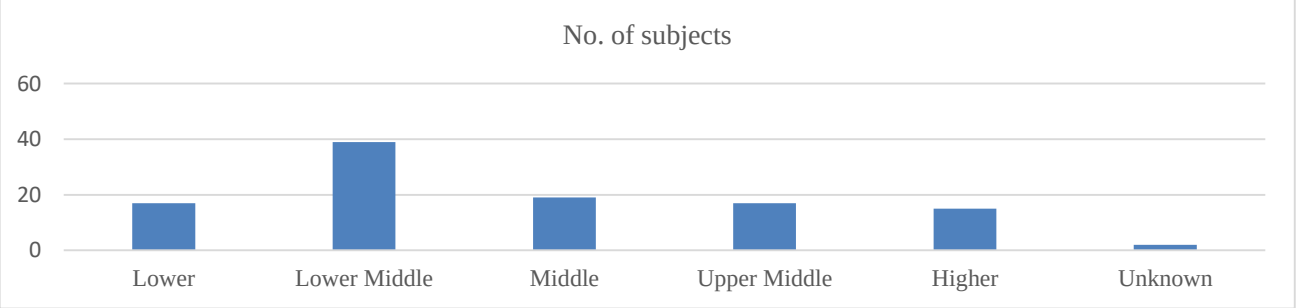

Table 4.7 – Precipitating factors of the attempted suicides

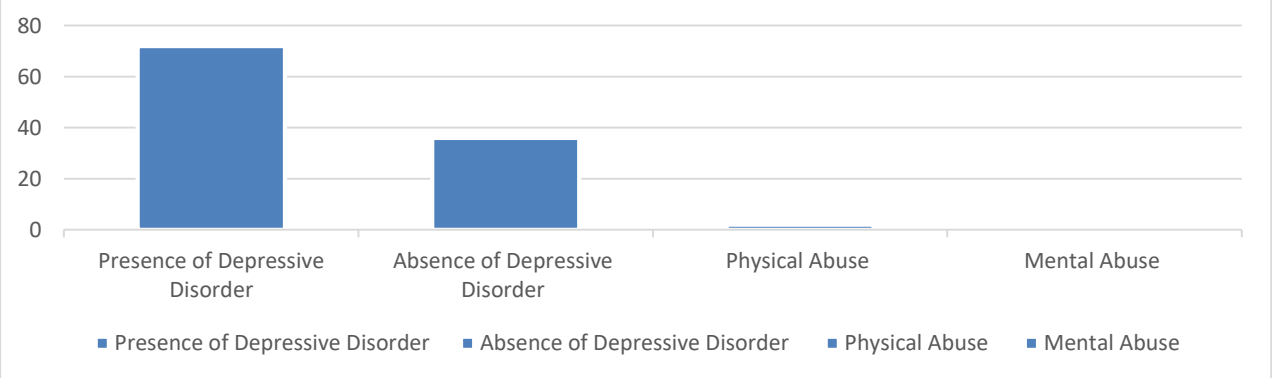

Fig 7 : Field Survey 2021

Table 4.8 – Comparison in terms of methods of attempts, age and gender distribution of the suicide attempters

Sl. No	Modes of attempts	Age (in years) (%)		Gender (%)	
		<35	>35	Male	Female
1.	Poisoning	54 (62.06)	13 (54.17)	28 (56)	39 (63.93)
2.	Hanging	11 (12.64)	7 (29.17)	7 (14)	11 (18.03)
3.	Drug overdose	12 (13.80)	2 (8.33)	8 (16)	6 (9.84)

4.	Physical injury, jumping from heights and drowning	6 (6.90)	1 (4.17)	5 (10)	2 (3.28)
5.	Burning	4 (4.60)	1 (4.16)	2 (4)	3 (4.92)

Fig 8 : Field Survey 2020

RESULTS AND DISCUSSIONS

From Table 4.1, it is seen that out of the 111 subjects in the study who attempted suicide, 67 belonged to the age group of 15 to 24 years, 20 belonged to the age group of 25 to 34 years, 15 belonged to the age group of 35 to 44 years, 6 belonged to the age group of 45 to 55 years and 3 belonged to the age group of 55 to 64 years.

From Table 4.2, it is seen that out of the 111 subjects who were included in the study, 50 were males and 61 were females.

From Table 4.3, it is seen that out of 111 subjects in the study who attempted suicide, 77 were from rural area, 33 were from urban area and 1 person's domicile was not known.

From Table 4.4, it is seen that out of 111 no. of subjects in the study who attempted suicide, 17 belonged to illiterate category, 32 belonged to primary level of education, 29 belonged to class Vth to Xth level of education, 17 belonged to class 11th to 12th level, 1 was undergraduate level, 14 were graduate, 1 belonged to post-graduate level and 1 person's education level was not known.

From Table 4.5, it is seen that out of 111 no. of study subjects, 30 belonged to the unemployed category, 3 were farmers, 9 were daily wagers, 1 was a domestic helper, 23 were homemakers, 23 were students, 8 were employees of private sector, 3 were government job holders and 11 belonged to business/self-employed category.

From Table 4.6, it is seen that out of 111 no. of study subjects who attempted suicide, 17 belonged to lower economic status, 39 were from lower middle class, 19 were from middle class, 17 belonged to upper middle class, 16 belonged to higher economic class and 3 person's economic status were not known.

From Table 4.7, it is seen that out of 111 no. of study subjects, 72 were identified with having depressive disorder and 36 were identified with absence of depressive disorder fulfilled by the ICD-10 criteria, 2 suffered from physical abuse and 1 from mental abuse respectively.

From the above comparison in Table 4.8, it is seen that out of 111 no. of study subjects, 87 were below the age of 35 years and 24 were above the age of 35 years. The result shows that out of 111, 50 were males and 61 were females. Out of 111, 54 males and 13 females attempted suicide by taking poison, 11 males and 7 females took the hanging method, 12 males and 2 females used overdose of drug, 6 males and 1 females injured themselves physically and jumped from heights and attempted by drowning, 4 males and 1 females attempted by burning themselves.

Major Findings

The study shows the following results:

• Majority of the suicide attempters belonged to the age group of 15–24 and 25–34. It clearly shows that youth were the ones who attempted suicides more than the other age group. Youth had the highest rate of suicide attempt with 78.37% of the total, whereas 2.70% suicide was attempted by people of age group 55–64.

• Including all the age group, majority of the people who attempted suicides were females. Rate of suicide attempted by females was 54.94%.

• The study shows that individuals belonging from rural areas attempted suicides more than the individuals from urban areas. Suicide attempters belonging from rural domicile constituted 69.39% of the total study subjects.

• Majority of the people (28.82%) with education up to primary level were the ones who attempted suicides more. Whereas undergraduate and post-graduate people had least rate of suicide attempt with 0.90% each.

• Majority of the individuals who attempted suicides were found to be unemployed. Students and homemakers constituted 20.72% each. Domestic helper constituted 0.90%. Whereas 27.02% belonged to the category of unemployed.

• Suicide attempts were found to be higher among people from the economic background of lower middle class with 35.13% of the total.

Whereas 17.11% belonged to middle class next to lower middle class.

• Majority of the suicide attempters (64.86%) suffered from depressive disorder which led to attempting suicides.

The results concerning the youth which can be drawn from the Table 4.8 showing the comparison in terms of methods of suicide attempts, age and gender distribution of the suicide attempters are:

• The rate of suicide attempt was highest among the youth with 78.37% of the total.

• In terms of gender the rate of suicide attempt was seen to be highest among females than males with 54.95% of the total.

• Poisoning was the most preferred mode of attempting suicides among the youth with 62.06% of the total. Burning was the least used method, it constituted for 4.06% of the total.

• The rate of suicide attempt by poisoning method was highest among females with 63.93% of the total.

CONCLUSION

A suicide attempt is a non-fatal act in which an individual deliberately causes self-injury and should be recognized as a method of communication from a youth who may be experiencing severe problems. The study in general shows that majority of the people who attempted suicides were under the age group of 15–34 years. The rate of suicidal attempt was seen higher in females as compared to males according to the findings of the study. The study also emphasizes on the fact that majority of the suicide attempters were found to be suffering from depressive disorder. This clearly shows that mental disorders can occupy a premier position in the matrix of causation of suicide. A suicide attempt which is non-fatal is known to be the strongest clinical predictor of eventual suicide. The risk of suicide among self-harm patients is found to be hundreds of times higher than in the general population. It is believed that about 10–15 % of suicide attempters eventually die by suicide. The first months and years after the attempt have the highest mortality risk: almost 1% of suicide attempters are successful in ending their own lives if the attempt is being repeated by them within one year.

Depression is one of the leading factors which cause individuals developing suicidal thoughts and behaviours leading to suicides and suicide attempt. The study shows that majority of the suicide attempters were diagnoses with the presence of depressive disorder fulfilled by the ICD-10 criteria. There is an agreed list constituting ten depressive symptoms used by Diagnostic criteria for depression (ICD-10). Key symptoms are - persistent sadness or low mood, loss of interest or pleasure, fatigue or low energy (at least one of these, most days, most of the time for at least 2 weeks). If any of these symptoms are present then associated symptoms are asked about, which includes: disturbed sleep, poor concentration or indecisiveness, low self-confidence, poor or increased appetite, suicidal thoughts or acts, agitation or slowing of movements, and guilt or blame.

RECOMMENDATIONS

Youth are the backbone of a nation but unfortunately they are the ones who are more prone to attempting and committing suicides and are at high risk. The rate of suicides and suicide attempts increases from time to time which needs to be given due importance and needs to be prevented.

1. Suicide is a serious health issue but people have some misconceptions about it. One of the myths about suicide that people who talk about suicide won't really do it should not be believed and one should extend help to the person who speaks about it. Any suicidal talk or behaviour should be taken seriously because it is not just a warning sign that the person is thinking about suicide but it is often a cry for help.

2. Adolescents spend a considerable part of their day in schools under the supervision of school personnel. Therefore, it is crucial for all staff members to be familiar with, and watchful for, risk factors and warning signs of suicidal behaviour, and if found any risks in students, they should inform their parents. An environment where students feel safe sharing such information should be created by the school staffs. School psychologist or Counselor should be appointed by every school so that students can share their thoughts and problems.

3. Adolescents should not be forced to do those things which can affect their mental health. Teachers and parents should not say such things to adolescent which can make them feel discriminated.

4. Parents should take the threats seriously if they witness any suicidal behaviours and/or attempts in their son/daughter. Parents should keep any lethal means of suicide out of their reach if they find any suicidal tendencies in them. They should be taken to specialists without any neglecting the matter lightly or ignoring it worrying that what other people will think if they come to know.
5. Instead of berating someone who has survived a suicide attempt, they should be heard and give emotional and mental support as criticism might make them more vulnerable out of shy and they might attempt to kill themselves again.
6. More Awareness Programmes on Mental Health and Suicide Prevention should be held in remote areas by Government and Non-governments Organizations (NGOs). Because in such places parents and even youth themselves are not aware of many things related to mental health and disorders and suicidal behaviours. Social workers play an important role in this context, they can act like an Educator to impart knowledge to the people and make them aware of the warning signs.
7. Paying attention to warning signs for mental health challenges that can be associated with increased risk for suicide is important. The causes which drive youth to commit or attempt suicides are complex and involve many factors. Warning signs for those at risk of suicide include: talking about wanting to die, feelings of helplessness and hopelessness, having no reason to live, feelings of being trapped or in unbearable pain, seeking revenge, and being a burden on others. Knowing and identifying the warning signs is also critical but is important at the same time because the causes of suicide among youth are complex and involve many factors.
8. Strong connections with family, friends and loved ones can protect against suicidal ideation and suicide attempts.
9. Parents should talk to their son or daughter about suicide in a calm and non- accusatory manner. Conveying to them how important he or she is.
10. There should be easy access to health care services.
11. Learning and developing skills to cope up with stress, and skills in problem solving and conflict resolution.
12. It is necessary to take help for those who are going through a stressful time and have suicidal tendencies from the Suicide Prevention Helpline available in the area. They can provide aids to the distressed ones.
13. Seeking professional help for self is equally as important as taking others. If we are mentally and emotionally disturbed for a very long time then we should go to the specialists.

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THE ROLE OF THE HINDU ENGLISH NEWSPAPER IN EDUCATION

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Introduction

In general the term 'education' means the advancement of the mental, aesthetic, physical and moral faculties of an individual. Acquisition of knowledge is the basic purpose of education. Education is not merely a preparation for living but it is living itself. In a democratic country, the fundamental aims of education are considered to be the development of the personality, training of the character and making of the best citizens.

Education has always been used as a process, as a powerful instrument for effecting desirable social changes. Education brings about a change not only in an individual or a society but also in the entire nation. All eminent scholars and educationists have acknowledged the importance of education in the economical, social and political development of a nation. Education is being no longer considered just a matter of formal schooling, but it in all ways to influence in shaping the character of the society.

Education in Ancient India

The whole educational system of Ancient India was the Teacher and the student based on their functions. The teacher was called as Acharya, Guru, Upadhyaya and it was known as the Gurukula system. The teacher is superior to the father. Education was not to all but limited to a certain section of society.

Education in Medieval India

During the Medieval period, large parts of India were ruled by Muslims such as the Delhi Sultans and Mughal rulers. The scheme of Education of this period was flourished for a period of five hundred years till the British introduced their own system. The rulers provided aid to schools called as Maktabs and Madarassas. Maktabs were known as elementary schools and it is regularly given financial aid. Madarassas were the higher educational institutions that existed during the Muslim and Mughal rulers.

Both education in the Ancient period and education in the Muslim period was also influenced by religion. In the Hindu Kingdoms, education was based on Hindu scriptures and in the Muslim kingdoms, education was based on Khuran. The concept of secular education came to India only after the advent of the British.

Education in Modern India

The combine contribution of two British servants called Macaulay and Harding in the field of education creates important landmark in the history of modern education system in India.

He further deals with the important matter, the medium of instruction, where he formulates both the language as a medium of instruction. In primary level the vernacular language takes as a medium of instruction and the modern Indian language consider as medium of instruction at the secondary stage.

After Independence, India needed immediate reforms in the education system which is an important instrument for social change and national upliftment. Several committees and commissions were required to review the educational problems and make recommendations in order to adjust them to the changing needs, aspirations of the people, structure, and strategy of education. Free India needs an effective Constitution to provide Justice, Liberty, and Equality and to provide free education to the people of India. Finally, some of the articles in the free India constitution deal with education in the republic. The Five aspects of the Indian Constitution towards the Education is:

1. Provide Free and Compulsory education for all children until, they completed the age of fourteen years. 2. The Indian Constitution safeguards the Secular

Education because India is a secular state and every religion has got the right to popularize and spread its religious ideals. 3. The Indian Constitution guarantees the minorities, equality of opportunity in educational institutions, cultural and educational rights to establish and administer educational institutions of their choice, whether based on religion or language. 4. The Indian Constitution guarantees the educational interest of the weaker sections of the Indian community, that is, socially and educationally backward classes of citizens and scheduled castes and scheduled tribes. 5. Any section of the citizens, residing in the territory of India or any part thereof having a distinct language, script or culture of its own shall have the right to construe the same.

Kothari Commission Report and Primary Education

To construct a fresh and more effective system in the field of education, the Education Commission (Kothari Commission) was appointed in 1964-66 to advise the Government on the national pattern of education for the development of education at all stages and in all aspects. According to Kothari Commission, education is an important instrument for change, while the development of physical resources is means to an end, of human resources is an end in itself and without it; even the adequate development of physical resources is not possible.

Kothari Commission observes that the quality of Primary Education was very poor. What is expected is that Primary Education should lay the foundation for a child to grow into a responsible and useful citizen of the country. Kothari Commission recommended Seven years of compulsory education and suggested certain practical measures to implement. After long proceedings, our Education system was framed to develop the four objectives of education for democracy are Self Realisation ,Civil Responsibility, Economic Efficiency and Human Relationships.

Education does not mean formal education alone. Education is meant for the all-round development, especially for improving the thought process. We know that necessity is the mother of invention and a mind that thinks is the mind which can create things. This is the sole purpose of imparting education. This quality of imparting education is not the process owned by a set of institutions or an attribute of schools or colleges. Every day is a day of learning for individuals and the role of newspapers towards the same is unending and advantageous. All Human Rights give a prominent place to Rights to Education and also stress the importance of education in promoting human rights.

In India, there are hundreds of villages that are not able to maintain a village school at a very moderate cost. There are thousands of people who are unable to pay the very small fees payable in such schools. The study of the history of Indian education is the best to consider as a part of the wider study of the history of The Hindu to Enhance the Education System. The role played by The Hindu, the English daily in educating the masses is huge. It could be well explained if we have got into a deeper understanding of the systems and practices in India, then move on to the promising role played by The Hindu in promoting Education in India.

I. HEARING IMPAIRMENT

An inability to hear as well as someone with normal hearing is Hearing impairment and people can be Hard of Hearing is (HOH) deaf. People who cannot hear at all, then they have deafness.

Education for Physically Challenged

The Hindu showed its care to physically challenged children. In the world, we could see some abnormal, exceptional or non normal types of human beings. One of the said categories is deaf children. The terms deafness and hearing impairment have been defined from a variety of different perspectives including audiological, cultural and behavioral criteria. The term hearing-impaired is often used to denote the entire spectrum of hearing loss from mild to profound.

The Hindu had taken serious effort for the Hearing Impaired Students by issuing the news under the headline that Hearing impaired students suffer for want of teachers. To educate hearing impaired students, qualified teachers are wanted by the government. In our State, we had 11 schools for the hearing impaired. In nine of 11 schools across the State, the delay in hiring affects the students' performance. The student-teacher ratio was eight to one. So it is unable to maintain the requirement.

In Salem, they had only five teachers and they don't have Maths and Science teachers to teach. In Virudhunagar, 13 teachers were there to teach for 75 to 80 students and also in Thanjavur , 10 teachers are there for 180 students but the sanctioned strength is 150. More than 10 teaching post vacant was here. The same problem is prevailed in Dharmapuri also. In Ooty, there are seven teachers for 23 students. The lack of teachers affects the impaired students to get training.

In accordance with norms for teaching the hearing impaired the new building would come upon 50 cents with a plinth area of 4,150 square feet and it would have a spacious class room, kitchen dormitory, dining hall and warden room also.

The site for the construction of a school for the hearing impaired was inspected by the State Commissioner for Differently abled at Pudukkottai , because the present private building was quite inadequate to cater to their needs. So in the Town area, the district administration had identified a site for the construction of a government school.

Smart Classroom for Hearing Impaired

The Hindu happily issued the information about a Smart Classroom which had been opened at the Government Middle School for the Hearing Impaired at Pudukottai town. The new classroom had been set up at a cost of Rs. 1.20 lakh with public contribution amounting to Rs. 40,000. The District Collector inaugurated the smart classroom. It showedthat how The Hindu was much care about the physically challenged students**.**

Pre-Primary Education

The first five years of a child is considered to be of great importance by the psychologists. Those years experience of the child had got influenced over the years to come in its life. This period had influences on child's physical emotional, intellectual and environmental adjustments. As a result, Pre-Primary Education is important for the child. Children with unsatisfactory home environment, the working mothers all find the need of this particular stage of Education. It had been found that children who had been to a Pre-primary school show better progress at the primary stage.

Over the years, The Hindu, the English daily covered practically the entire educational field right from Pre-school education to pursuit of Research degrees at the university level and to vocational and professional education

Primary Education

The Hindu stated that strengthening of Primary Education is the first imperative to tone up the Education System. The Central Budget 1995-96, stresses the aspect. It enhances allocation to primary education and includes several incentives and concessions for elementary and adult education. Upgrading human resources is a high priority. Improvement of Primary and Adult education in rural and semi-urban areas is the fundamental need where facilities are deficient. In addition to public funding, we have to encourage private contributions for this purpose.

Importance of Elementary Education

In order to improvise the quality of the Elementary Education, The Hindu stated that the Elementary education obviously requires maximum attention in respect of academic, administrative and financial inputs. According to The Hindu, the 24% rise in allocation to the private sector is a welcome stepand the incentive to individuals and voluntary organizations for investment in this area were praiseworthy.

Compulsory Education

According to The Hindu, in India Compulsory Education of children in the age group of 6 to 14 is made free and become a Fundamental Right.. Elementary Education should be preceded by a year or more of early

childhood education, to prepare pupils for school by developing habits, attitudes, and skills. Middle schools must further develop the skills acquired in elementary school, and equip students with additional knowledge, skills, and techniques for advanced work in high school. High schools must prepare students to be responsible citizens, and to earn a living or to pursue additional academic work. The structure of School education in Tamil Nadu has four levels namely Primary, Upper Primary, Secondary and Higher Secondary. In Tamil Nadu, elementary school is generally divided into two parts with five years of Primary schooling, Std I-V followed by three years of Upper Primary Std VI – VIII.

The Government Efforts to Learn Tamil

The Hindu gives more importance to teach mother tongue in the schools, so it happily published that The State Assembly on Wednesday passed the Tamil Nadu Essential Services Maintenance (Repeal) Bill, 2006 and also the Bill to provide Learning of Tamil as one of the subjects in all schools in the State. As per the scheme, students would learn Tamil in part 1; English in part 2 and other subjects (Mathematics, Science, Social Science etc) in part 3. In part 4, students, who do not have either Tamil or English as their mother tongue can study their mother tongue as an optional subject.

Giving prominence to School Enrolment

The Hindu showed its interest in basic education with an objective to increase the school enrolment rate, reduce the number of dropouts, and to abolish child labour. The training programme on free and compulsory education as part of the Right to Education Act, 2009, was conducted by the St. Thomas Mount Panchayat Union (also called St. Thomas Mount Block), along with Sarva Shiksha Abhiyan (SSA) and Hand-in-Hand, a voluntary organisation.

The Hindu told that even today there are many schools in the city and its southern suburbs where children did not enjoy comfortable amenities. It was the duty of the elected representatives' to raise these issues .Elected representatives could walk the extra mile to rope in the support of corporate firms and local industries to help in improving the amenities in the schools. The Hindu pointed out that the various programmes would be carried out throughout the year to ensure cent per cent school enrolment rate and a zero per cent school dropout rate.

II. PROGRAMME FOR CHILDREN

The Hindu showed much interest on the safety of the school children to educate service of the Aram Foundation over 10,500 children on safe touch (good and bad) in the Coimbatore district. The children pursuing their studies in Corporation Schools and Government Schools aged between 5 and 10 were sensitised to good and bad touch. This was one of the Happy Child Programmes of the foundation.

As it was a sensitive issue, the Foundation had conducted extensive training sessions in the most informal and personalised manner among the children. About 100 trained college students, who study social work in leading institutions in Coimbatore, volunteered for the programme. Videos played, explained the importance of being safe and taught the students, the three important messages “Say No, Run and take help”. The help line number also published by The Hindu to help the children.

Secondary Education

Secondary Education which is a link between the Primary Education and the University Education plays a vital role in any programmes of education for national development. It provides teachers for primary education, prepares pupils for the universities and other institutions of higher learning. Besides this, a vast majority of students complete their education at this stage. Unless the students have received sound education at the secondary stage, they could not take full advantage of the university education Hence, Secondary Education, being the terminal point must be the highest quality.

The Hindu, published Annual Survey of the Education (ASER) that showed that the system was unable to give quality education to a large section of the population. The data it presents is shocking on the learning levels of over 26,000 students across 29 districts in Tamil Nadu. Only about

32 per cent of the students in class V could read a simple story in Tamil. The study covered class IV students, only 40. 6 per cent could perform subtraction of two-digit numbers, while the current curriculum expects them to be able to perform multiplication and division as well. The ASER study, facilitated by non-governmental Organization Pratham, seeks to look at learning outcomes in children in the age group 6 to 14, by testing their ability in reading and arithmetic, using simple tests.

Presenting some of the Report's findings at the launch of the State-level ASER-2011 it should be considered a "Himalayan failure" that a large section of the population was unable to get quality education from the system. The surveys also showed us that it was a myth, the private schools were better. The findings clearly showed that students, going to the private schools do not perform better than their counterparts in Government Schools. The Hindu asked that what could be a major reform in school education in **Tamil Nadu** since 1979. The State government decided to introduce Board Examinations for Class XI from the coming academic year 2017-18, and also to issue a consolidated mark sheet and based on this marks secured in Classes XI and XII for students passing out in 2019.

Promotes Reading

Lee, J.,& Schallert, D.L. explored the reading–writing connection in a year-long classroom-based experimental study of middle school students developing literacy in a new language find out that first and foremost, The Hindu newspaper instils a habit of reading in the individuals. It was a proven fact that reading improves the literacy of an individual.

The Hindu gives much importance to promote reading habits and for that it has taken the special intiative on on January 11, 2019, ,"Read and Rise", a reading movement to empower youth. KSR Educational Institutions donated books to Government School libraries. To promote reading habits among the school children The Hindu distributed more than 8000 books to the 144 Government School libraries as a part of its "Read and Rise" programme in Cuddalore.

Newspapers in Education (NIE)

Newspapers have been the main apparatus in moulding the development and improvement of any general public. The Hindu Newspaper In Education (NIE) programmed for the 2008-09 academic year at the St. John's International Residential School (SJIRS), Palanjur, near Chennai was launched.

The Hindu also published its NIE version for students which was used as a teaching material by teachers in English Language Teaching. It was also used for teaching and learning about the scientific advancements, the art and culture of the nation through the impressive and attractive pictures and articles and also gains knowledge of the scenario of the world they lived in by reading from their comfort zones. The NIE was a special initiative taken by The Hindu to shape young minds. NIE modules were designed to enhance the soft skills and personality of students besides improving general knowledge. This was yet another milestone in the history of The Hindu in promoting education in the society.

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AN IOT BASED WATER AND NOISE POLLUTION MONITORING & CONTROL SYSTEM

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ABSTRACT

In organization and company plants, the fast growth growing ecological difficulties like pollution (Water, Noise), climate change, damaged and has particularly final outcomes for the requirement of an, operationally flexible, efficient, cheap and smart checking systems. In this context wherein combination of many annoying conditions of pc knowledge, WI-FI verbal exchange and electronics; the Smart Sensor Networks are an growing problem of research. In this Project a way to reveal show display the noise, water pollution ranges in employer environment or thru manner of technique of the use of WI-FI embedded computing device a particular place of interest is proposed. The technology like Internet of Things (IOT) is covered with inside the form of solution this is very last outcomes of merged problem of pc technology and electronics. For monitoring the variation of parameters like noise and water pollution ranges from their everyday ranges in this case the sensing devices are associated with the embedded computing device. For the requirement of non-save you monitoring, controlling and conduct assessment this model is adaptable and distributive for any infrastructural environment. For or three limits like noise, radiation ranges the implementation is tested with recognize to the everyday conduct ranges or given specifications which give a monitoring over the pollution effect to make the environment smart and Biodegradable.

Keywords- *water, noise, IOT, pollution. Monitoring*

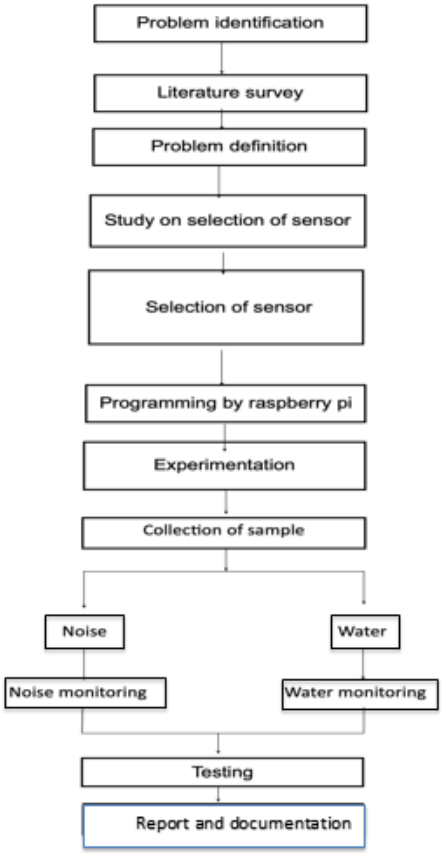
Introduction

With the rapid growth of Thrift Providence, many environmental issues arise. Water pollution is this kind of problem. Typical monitoring of water parameters is Conductivity, pH, turbidity, oxygen dissolution, oxygen demand, chemical demand for oxygen, ammonia nitrogen, nitrate, nitrite, phosphate, iron ions, and much more. An unusual way to find those limits is to create samples by hand and give them a lab to discover and read. Ensuring regular delivery of the old drink should be considered in real-time. Our project makes a powerful feature of the following limitations such as pH value, humidity, and water temperature that can be determined in the afternoon and day. A distinguishing Turbidity Heavy and pH method is to make samples by hand and deliver them to the board for water testing. However, it seemed that the samples would not win without unresolved water readings in real-time. Cheap real-time tracking and water control machine using IOT. This device includes physiochemical sensors requesting water chemistry and Temperature, Turbidity, pH, and Flow. First, water pollution is a useful tool that exploits those feelings. Subsequent facts about a useful sensory source were converted into visual arrangements using ADC and sent to the Raspberry Pi module. The sensor values are managed on the device using the Raspberry Pi module and sent to the cloud. Finally, visual values are displayed in the cloud using cloud computing. Also, with sensory values, the flow and flow of water inside the pipe are continuously controlled. There are different parameters that can be determined in water, but those three limitations of humidity, pH, and temperature are important to get the same antique. These structures are measured to be the highest limits for outstanding water testing. All in all, this project recompenses to finding the same water antique at the end of a simple, man-made, or first-rate method. This method uses a lot of power as a useful tool and contains rules for sample collection, long-term study, sit-in of apparatus, and problems of some kind. The nerve is actually the best way to treat those problems. Cannot convert power data into enabled signals. Every day we visit a place where we decide on cutting- edge technology. After a while, I look at the dirt actually at the end of the selected area has turned into a very tedious

assignment that will be green again. With the increase in pollution and evolving technology, many new systems have been introduced to live in harmony with the environment where pollution is faster and more efficient. The Internet of Things is one of the most sought-after modern jobs. Increased net use and as a result, human integration has increased in IOT. Allows some facts among many gadgets like fridge, washer, cars, clocks, etc. These are some of the facts that happen with the help of sensory servers. The IOT account achieves its normal functionality and makes it a less expensive technology. Water and noise pollution are important factors that have a far greater impact on people than the rest of the world. Therefore, it is very important to look at it and treat it. Old-style techniques join works of art where real designers use the internet to create facts, test them and make comparisons transformed into a time-consuming and time-consuming process without much efficiency. The tracking system uses sensors that receive a focus on noise pollution. By comparing using facts that have been stored in a database and output is stored in the cloud to make it accessible from far away to everyone. This page includes a description of the Io-assisted download machine where a man or woman can access their web page and access it where needed. This tool can be a very useful tool to save the lives of many people and the surrounding property. After that people were made to clean up the area and moved to a more powerful region. Mo Deqing et al. [1] discusses that due to the acceleration of India's economic development, this will lead to increased pollution and destruction. Some villages put rubbish Throw it into the river. Water, it will affect the quality of the water. The common method of measuring water quality remains toward manually accumulate illustrations and direct them towards the laboratory aimed at study. Yet, this is the case. It is impossible to manually take water samples every hour to make laboratory measurements and check the water quality. Therefore, this document proposes an automated system for measuring and reporting water quality. This configuration consists of PIC microcontroller, water quality sensor, base station, Monitoring center and other systems. Parameters used to determine water quality, such as PH, DO, turbidity and temperature. The water quality control system can measure the required water quality in real time. First, all data can be sent to the microcontroller for processing, and then the data can be sent to the monitoring station in the form of SMS via GSM. If an error occurs, the records determination exist directed to the monitoring center and the control mobile phone on the similar period. The system performs data mining and information transmission through the network.

Professor Sachin et al. [2] discusses the use of sensor networks to monitor waste air pollutants Global Paper of Progressive Study in Electronics and Communications "Technology", "Volume", August 2014, page 11. With the fast development of industrialized activities happening the island, air pollution is fetching a most important health concern. We have planned an innovative system called Wireless Sensor Network Air Pollution Monitoring System to display air pollution in Mauritius using a large amount of wireless sensors installed on the island. The Air Quality Index (AQI) used by the proposed system is currently not existing in Mauritius. In order to develop the competence of WAPMS, we consume developed and employed a new data accumulation procedure called Recursive Convergence Quartile (RCQ). The procedure is used toward combine statistics to remove reproductions, strainer out unacceptable understandings and generalize them in an easier way, thereby greatly reducing the amount of data. Transmit to the receiver to save energy. We have used a layered routing protocol in WAPMS to achieve better energy management. This puts the spot to sleep when it is idle.Patel et al. [3], In today's world, we face many different environmental emergencies. Responding to such emergencies is essential to protect resources, including human life, and to ensure that property is not harmed. In this article, we introduced a wireless sensor network for temperature monitoring. Screen,

mobile phone text messages, etc. The flexibility of the report allows them to use cheap wireless sensors The network is ready for future emergency systems. In this work, we will design three wireless sensor nodes, which will need to be placed in other locations in the building, and need to inform the master node or monitoring node of the available temperature of each node. Sensor nodes in the future, we will also focus on temperature control and monitoring. P. Vijnatha Raju et al. [4] discusses the world



continues to develop industrialization rapidly And the process of urbanization is facing issues such as global warming, which happens when carbon dioxide (CO2) and additional glasshouse gases collect in the atmosphere and fascinate the sunlight and solar radiation they reflect from the earth. The effects are rising sea levels, seasonal changes, rising temperatures, and more frequent droughts and heavy rainfall.

Experimental flowchart

Experimental methodology

Figure 1. Methodology

software requirement:

RASPIAN OS

Beneath are a number of the Effective structures that a Pi can track but, on this object, we can best find out about Raspbian.Raspbian OS is one of the authorized functioning organizations that can be downloaded and used for free. The organization is based on Debian Linux and improved for the efficient work of Raspberry Pi computers. As we all distinguish, an operating system is a collection of plans. A utility that turns on specific the hardware (Pi.Debian in this case) is very good important insubstantial and a good excellent aimed at Pi. Raspbian contains implements fr looking, software design in Python, and a desktop with a graphical user interface. The Raspbian desktop location is called "Lightweight X11 Desktop Environment" or LXDE. It consumes a very good-looking user boundary created using X Window System

software, and remains a conversant opinion as well as snap boundary.

Setting Up Raspbian OS:

First, possession's attach the card to altogether the decorations needed to connect and track the effective organization.

Step 1. Take the Pi ready of the ESD protective shelter and place it on a non-metal table.

Step 2: Link the monitor and link the HDMI cable. Plug it into the HDMI port of the Pi, and then plug it into the other end of the HDMI cable. To the HDMI port on the TV.

Step 3: Link the Ethernet cable from the router to Pi's Ethernet port. Step 4: Link the USB mouse to one of the Pi's USB ports.

Step 5: Link the USB keyboard to the other USB ports on the Pi.

Step 6: Link the Micro USB charger to the Pi, but it has not been plugged into the power source.

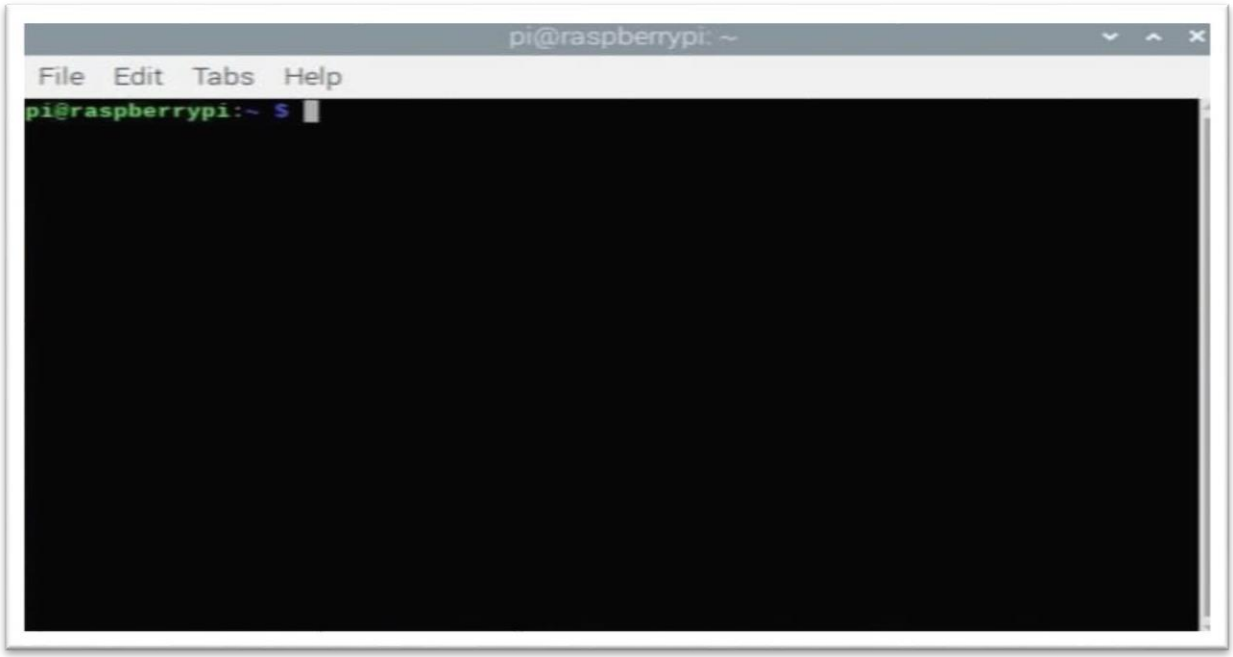
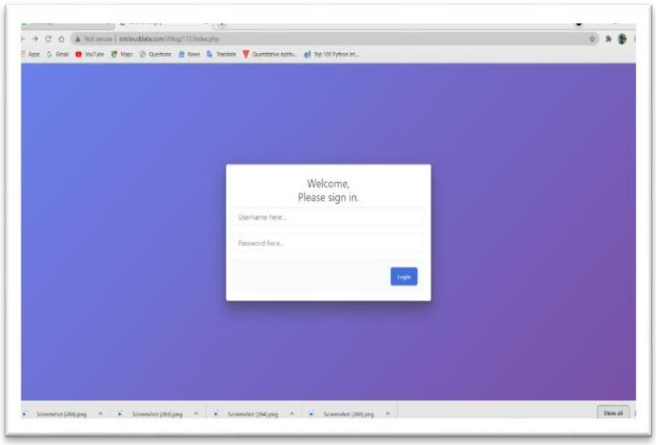


Figure:2. Working Through CMD(Command Prompt)

OPEN CV

Open-Source Computer Vision Library is an Application Encoding Interface (API) evolved with the aid of using Intel which may be used for plenty picture processing and laptop imaginative and prescient applications. Open CV formally released in 1999 and the venture became to start with an Intel Research initiative to increase CPU-extensive applications. Open CV library is a set of procedures and C/C++ capabilities then some instructions that put in force a few Image processing and laptop imaginative and prescient procedures. There is active improvement on interfaces for C, C++, Python, Garnet, MATLAB and different idioms. Open CV became calculated for computational performance and with a sturdy cognizance on actual time tenders. Open CV is written in optimized C and may take improvement of multicore computers. Open CV carries over 500 characteristic that span many regions in imaginative and prescient, inclusive of manufacturing facility product inspection, scientific imaging, protection, person interface, digital numerical calibration, stereo imaginative and prescient and robotics. The concepts in the back of the advent of the library are to useful resource industrial makes use of supercomputer imaginative and prescient in human supercomputer interface, robotics, monitoring, biometrics and protection with the aid of using imparting a unfastened and open infrastructure wherein the allotted efforts of the imaginative and prescient network may be consolidated and

overall performance optimized. Open-Source Computer Vision Library assist for imaginative and prescient is considerably inclusive of recurring assist for input, display, and garage of films and unmarried images.



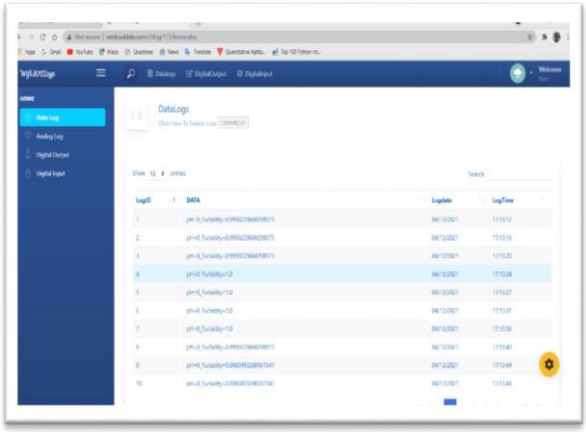
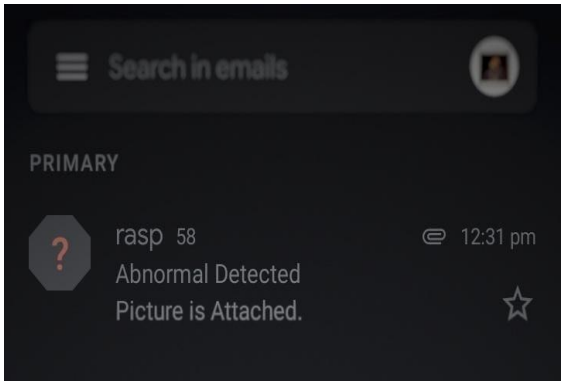


Figure:3. Website Login Page
Figure:4. Collated Data In The Server Through IOT

Figure:5. Abnormal Detected Mailing Send From The Server Through IOT



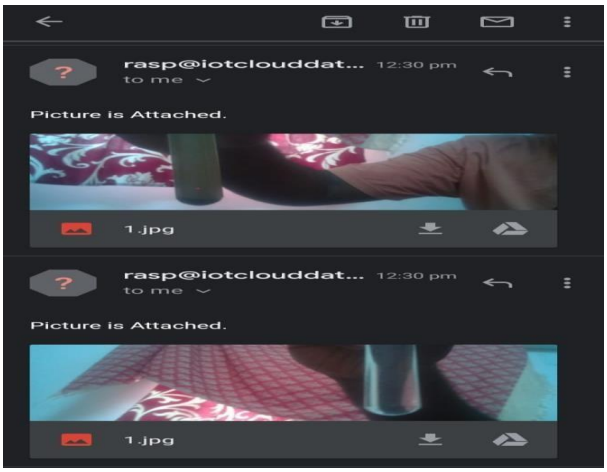


Figure:6. Abnormal Images Send By IOT Through Mail

1. Results and discussions

This section provides a detailed implementation. The simulation of the experiment was performed using Python 3.3 with a back-end voltage flow. The purpose of this organization is to assistance in dropping pollution difficulties due to huge pollution in water and engineering events and to screen the equal of water and noise contamination. The key effort is on definition answers to the cumulative problem of damaging water pollution amounting from manufacturing performs in the nation. In our investigation, we applied sensors to be used to detect the attendance of water and noise pollution in the housing areas near workshops and manufacturing activities. The sensors provide nonstop checking and record data for water and noise pollution endlessly, where these results are described and studied using Internet of Belongings knowledge.

Figure.7. Test-tube Of Dirty Water

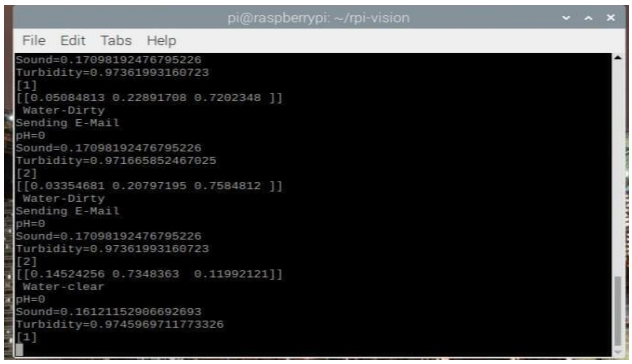


Figure:8.Abnormal Values Of Water, Sound &Turbidity In CMD

Figure:9. Test Tube Of Clear Water

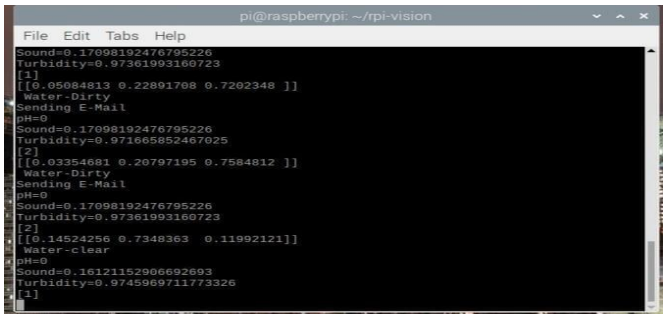


Figure:10. Normal Values Of Water, Sound &Turbidity In CMD

Conclusion

The Involuntary water & noise control machine is a leap onward to make contributions a technique to the most important danger. The water & noise tracking machine overpowers the trouble of the highly-polluted regions that's a main problem. It helps the unused generation and correctly helps the wholesome existence idea. This machine has functions for the humans to display the quantity of pollutants on their cell telephones the usage of the IOT website submission. So, it turns into very dependable and green for the Municipal officers alongside the Civilians to display surroundings. Hire citizens additionally concerned on this method provides an additional price to it. As civilians at the moment are similarly conscious and curious approximately their surroundings, this idea of IOT is useful for the prosperity of the civilization. Within their miles, the avant-garde generation is used. The water and sound pollutants tracking machine video display units water and noise pollutants the usage of a IOT application. By tracking the water and noise with inside the surrounding surroundings and to ship the info to IOT page. And store the machine for processing, and the industry noise level will rise. It indicates the virtual price of water and sound pollutants and person can examine it in IOT page. It turns into very smooth for us to correct the tiers and water and noise impurities round and strategy for a wholesome dwelling and nearby.

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INTELLIGENT WALKING GADGET FOR VISUALLY IMPAIRED PERSON WITH VOICE ASSISTANCE

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ABSTRACT

This paper is used to implement an ideal blind stick which will detect object and intimate to visually impaired people. This paper is proposing a sophisticated blind stick that enables visually defied individuals to maneuver easily using improved machinery which will also enable them to rest when required. The stick is incorporated with a ultrasonic sensor, a GPS, bluetooth and foldable chair. Our proposed model can first detect obstructions using ultrasonic sensors which sends ultrasonic waves ahead. Upon detecting the obstacle the sensor sends the data to the Rasberry pi 3, in raspberry pi 3 the data is processed and calculation is done to determine the closeness of the obstacle. If the obstacle is close, the raspberry pi 3 sends a warning noise which is produced from a buzzer. If the detected obstacle is not close enough the circuit does not respond. The stick has also A GPS system set up on it.The handle of the stick is modified such that it can be unfolded to provide a flat enough surface which will enable individuals to sit on it.

INTRODUCTION

Visual perception is a very crucial human emotion to be aware of the surroundings. Its deficiency can make an uneducated passenger, object recognition, and movement in a different position a challenging task. In a recent article by the World Health Organization (WHO), some 2.2 billion people in the world were said to have some form of visual impairment. The cause of any kind of visual impairment is a slow disease or poor errors that can be reactivated. Of the two billion people who are blind, 52 million are blind. Blindness is a very common and growing problem today due to the aging population. For older people, there is a greater risk of visual impairment which increases the difficulty of moving independently. For most experienced individuals, there is a significant risk of visual disturbance that exacerbates the problem of self-directed attention. For some people with visual impairment, helping find an important function in social interaction. The invisibility of strong gadgets for people with visual disabilities makes them overconfident in their relatives. In addition, the cost of recovery is probably not unreasonable for low-income nations due to unemployment. Auxiliary Development is a valuable asset for recovery, which improves the functioning, support and freedom of disabled people abroad. Environmental relevance: A large number of aid gadgets are offered to low-cost nations of the universal network without providing the necessary types of assistance. They were dismissed on the grounds that they could not meet the needs of the weak foreigners in their position. 2) Client Eligibility: End-in customer organization for demand-side research and needs assessment is a fundamental factor in reducing gadget disengagement due to the interruption between gadget use and customer needs. In addition, including retrieval staff, social experts, or network staff in planning and developing the framework increases the likelihood of approval of the auxiliary framework.

PROBLEM DEFINITION

There are numerous difficulties confronted while utilizing a NavCane stick or strolling stick. The essential issue looked by individuals while exploring is the thick group. Individuals frequently don't give a lot of consideration to dazzle individuals while strolling around and now and then they find them or visually impaired individual excursions over. More often than not, while voyaging, during security registration at air terminals, hounds appear to nibble the stick thinking it as a weapon or the like. Self-route is frequently difficult for daze or outwardly weakened individuals. In this way getting knocks or scars is basic with such individuals. The sticks are painted white, so it is effectively noticeable in open territories. Along these lines, natural data of headings, courses, and positions must be known to the individual for a more secure route. While moving different articles, opening doors, stepping and vehicles are progressing which

makes it hard for an individual to stroll with the stick. More often than not the individual is curious about the open-air condition. They likewise face issues in the home condition. While strolling down a hall and the end shows up the individual needs to conclude whether to turn left or right. Understanding the troubles confronted both indoor and open-air was investigated while structuring the Iwamcane

METHODOLOGY

As it was noted before the embedded keen strolling stick plot relates to a few subsystems. These subsystems are on a very basic level sensor-based. The fundamental plan is planned with a hardware fundament on a Rasberry Pi 3 small scale controller. This small scale controller functions (Figure-1) Physical Construction of Savvy stick. The sensor-based hardware comprising sensors, for example, Ping Sonar Sensor, which is utilized to distinguish ranges from obstructions, GH311 Ultrasonic Impediment Sensor, which applies to see what's at the base of the stick, for example, the landscape, a couple of cathodes that are utilized to watch moisture underneath it, a Rasberry Pi 3 micro-controller which analyzesrs these sensors and drives a signal, Guide, and an engine with PWM.

Fig-1

The vibratory module includes a Small scale Pager Engine whose yields are guaranteed by means of PWM to acquire the numerous vibratory examples. The sound yield is assigned through a ringer of caution. The yield indicators are worked by using PWM to preserve unmistakable sound structures simply as to illustrate the plan's status. The yield symptoms which can be given through the small scale controller are unmistakable in step with sensor. Because of the quality of the vibration of the engine, the blaring of the bell, or the flickering of Drove implanted with the stick an incapacitated person may decide whether he/she is strolling towards a sewer vent or an edge or a huge opening at the close by base or something comparative. Simultaneously, he/she may get the feeling of his/her good ways from close by objects and on the off chance that he/she is strolling in wet or sloppy or possibly tricky territory. The smaller scale controller and force hardware (ideally battery-based) are a critical piece of the plan. The effortlessness of the structure makes it simple to use by any individual and simultaneously, the expense of assembling such sticks is kept low

GENERAL DESCRIPTION OF EQUIPMENT

Micro-controller

A miniaturized scale controller is a machine that can be customized for various extraordinary purposes. For our first rate on foot stick, we've got utilized Rasberry Pi 3 Miniaturized scale controller. Raspberry Pi 3 Model B is the maximum recent form of the Raspberry Pi PC. The Pi isn't being concerned for your commonplace machine, in its least highly-priced structure, it doesn't have a case and is simply a rate card measured digital board - of the sort you could find out inside a PC or PC, yet lots littler. The Raspberry Pi is a nominal effort, charge card expected PC that connects to a PC display or television utilizations a preferred console and mouse. It is a proficient little machine that empowers individuals of any age to analyze registering and to determine out the way to program in languages like Scratch and Python. It can do all that you'd expect that a PC should do, from perusing the web and playing superior quality video, to organizing spreadsheets, word-handling, and experimenting around.

Raspberry Pi can connect with the outdoor global and has been utilized in a huge cluster of superior manufacturer ventures, from track machines and discern identifiers to climate stations and tweeting aviaries with infra-pink cameras.

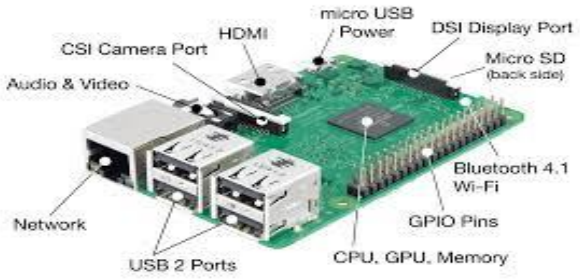

Fig-2

Ping Sonar Sensor

The Parallax PING ultrasonic sensor gives exact, non-contact separation estimation from around 2 cm to 3 meters. It is extremely simple to associate with miniaturized scale controllers requiring just a single I/O pin . The figure beneath shows the Ping Sonar Sensor. It is utilized to identify ranges from hindrances. The PING sensor works by transmitting an ultrasonic(well above human hearing extent) burst and giving a yield beat that compares to the time required for the burst reverberation to come back to the sensor. By estimating the reverberation pulse width, the separation to the objective can unquestionably be determined.

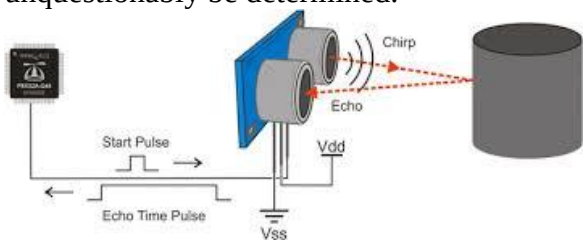

Fig-3

GH-311 Ultrasonic Sensor

The GH-311 ultrasonic sensor gives exact, non-contact separation estimation from around 2 cm (0.8 inches) to 3 meters (3.3 yards) . In a savvy strolling stick structure, it is utilized to outline's at the base of the stick. Figure 4 shows the GH-311 ultrasonic deterrent sensor. The GH-311 sensor distinguishes objects by transmitting a short ultrasonic burst and then tuning in" for the reverberation. Massively influenced by a host smaller scale controller (trigger heartbeat), the sensor radiates a short 40kHz (ultrasonic) burst. This burst passes through the air, hits an article, and afterward ricochets back to the sensor. The GH-311 sensor gives a yield beat towards the host that will end when the reverberation is distinguished; subsequently the width of this pulse equals to the separation to the objective. The following Figure shows a GH-311 ultrasonic sensor module.

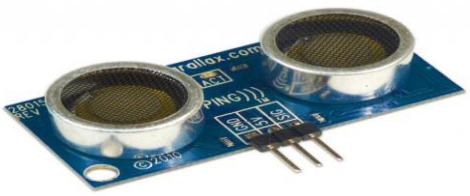

Fig-4

Vibrating Motor

The shrewd strolling stick plot has an extra vibratory input component which is urgent for numerous handicap people groups, for example tangible handicap related with an engine incapacity or scholarly inability. This improves the general criticism got by the client who gets the yield in various organizations of vibration; unmistakable according to sensors.

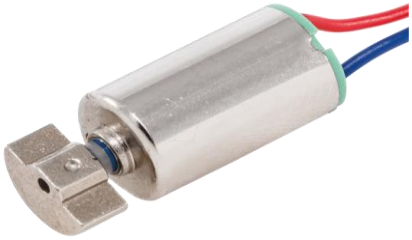

Fig-5

FEATURES OF SMART WALKING ASSISTANCE MECHANISM (IWAM) STICK SYSTEM

1. Smarter than the other standard white canes.
2. Completely robotized.
3. It can be kept up and worked without any problem.
4. Exceptionally comfortable to work with.
5. Authentic and Strong.
6. Low force for utilization.
7. The Microcontroller can be coded.
8. The effortlessness of the structure makes it a viable route partner.
9. Obstacle and opening can be resolved effectively by sensor readings.

10. Wet, sloppy or conceivably elusive landscape can be distinguished by a couple of anodes.
11. A vibratory sign is vital for numerous impair people to get careful data from the yield.
12. Separated from other visually impaired direction frameworks; it has a hook controller; which gives mechanical bit of leeway past anybody's creative mind.
13. Extra highlights like a computerized compass, GPS, voice direction can be consolidated.
14. Extraordinary lineaments like additional auxiliary IR/laser sensor bundle, remote checking bundle, a climate observing bundle, and other equipment can likewise be coordinated.

The above are a couple of features of a shrewd walking stick that can help weakened with peopling to have a fitting presence without struggling with any setbacks. The model of the stick that we are proposing can be some help with various people's life by virtue of the totally motorized structure nearby GPS and voice heading.

FLOW CHART

Below is the flow chart explaining all the process

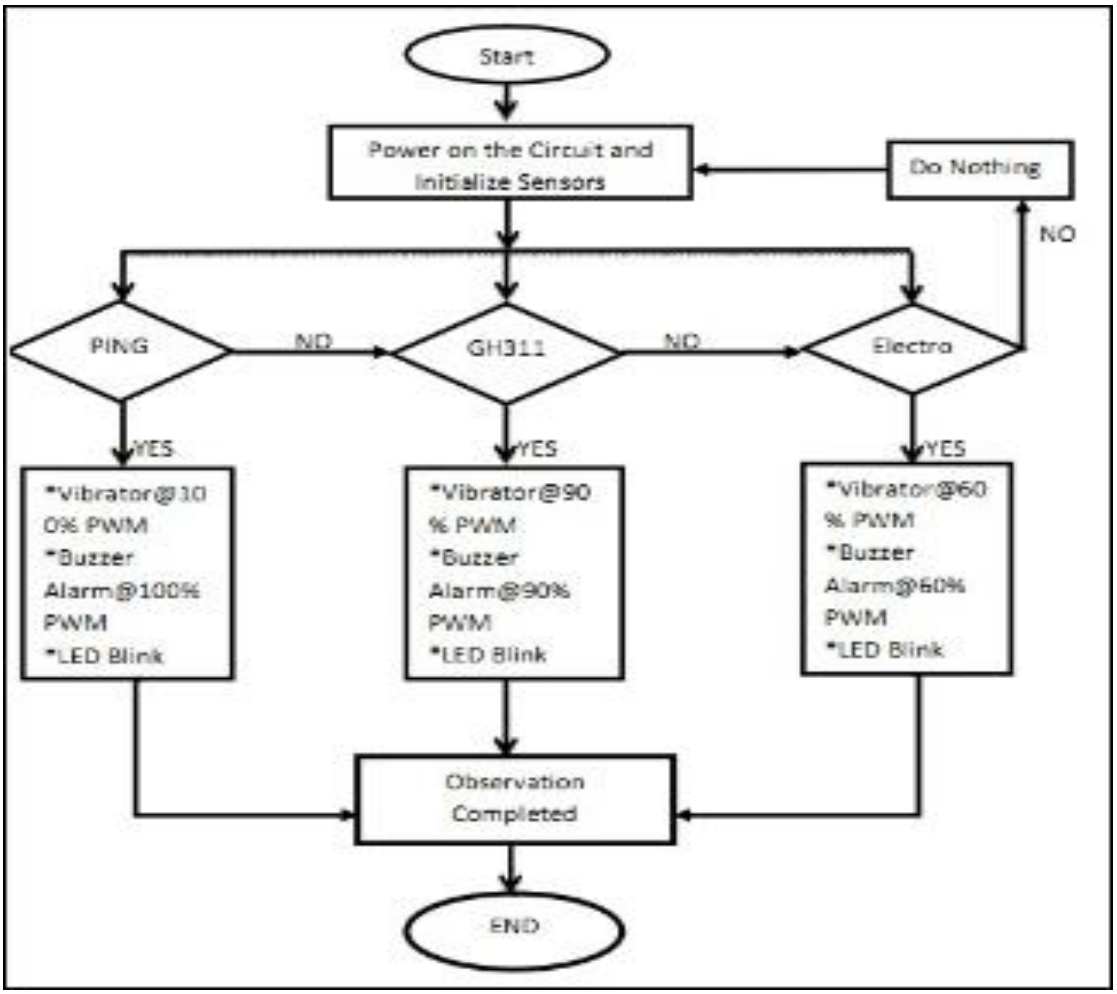

Fig-10

ENGINEERING OF THE IWAMCANE

The IwamCane setup is convinced by the measures of the comprehensive arrangement, for instance,

Versatility to oblige to an extent of features and capacities.

The correspondence of need information in a grouping of conditions. The basic goal of arranging an electronic course is to help outwardly hindered, and elderly people in obstacle finding, and safe course.

The IwamCane is expected to have several functionalities. Such as:

1. Helping ostensibly debilitated people in acknowledgment and evading of obstacles at different heights and situations, for instance, foot, midriff, and chest levels, and up to chest level.
2. Assisting in finding routes in indoor and outside circumstances.
3. Allowing a person to press and send auto alerts through SMS and email to watchmen or relatives if any emergency occurs.
4. Identifying things and the shades of articles of clothing.
5. Providing material info using vibration and sound-related analysis using headphones.
7. And last helping customers in the disclosure of falling and climbing stairwells.

The IwamCane perceives impediments the forward route by using ultrasonic sensors. In an indoor environment, it can identify obstacles by using an RFID peruser. By recognizing the closeness of checks in front and any event information from the sensors, the IwamCane helps a person aware of the reference centers around the general condition. to sensor, is used to understand inclines and plunging stairwells. A sensor for detecting wet floors is used to understand moist floors. The figuring works in two areas—one component is for catch revelation and the other component which is in opposite diection is for difficulty identification.

Range-based sensors are used to gather intelligence from the earth. The collected data is composed, and the person gets the information as required. Ultrasonic sensors and a wet sensor are used to detect the obstacle disclosure part of imaging. The course edge of the IwamCane is directed with the help of an accelerometer. If the IwamCane is tilted either in the x-rotate or the they-center point, the customer is incited to hold the stick straight utilizing sound info. The foot, knee, midriff, and chest-level obstructions and the chest-level stage is distinguished by an obstacle recognizable proof estimation. On the exposure to obstacles while on course, material and sound analysis is given to the customer. People with low vision or ostensibly hindered people face issues in recognizing objects. The tangle identification is done using a RFID pursuer. It is used to recognize objections by using the RFID names which are appended to them. The things are identified by an RFID peruser which examines the message set aside in the RFID names affixed to the articles. The information set separately in the RFID marks joins the names of things, for instance, lounge chairs, seats, and desks. Furthermore, the RFID was configured to store the shade of attire, for instance, t-shirts and trousers. The RFID names are then combined with the clothing, which grants the customer to perceive the concealing and kind of their articles of clothing and as necessities are pick which concealing pieces of clothing to wear.

Inference

The development behind outwardly impeded sticks is refreshing bit by bit. Besides, the model promises to make the task of moving comfortable and pleasant for a person with visual impairment. The stick is furthermore especially light and advantageous to pass on. Moreover, the sections and components in the stick are available at low cost. The assembling cost is a low that makes the stick moderate for each class of people.

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