

ANALYSIS OF CARDIOVASCULAR DISEASE DETECTION TECHNIQUES**Monika Gupta¹, Harsh Sadawarti², Sandeep Singla³**^{1,2}Department of Computer Science & Engineering, CT University, Ludhiana (Punjab), India³Department of IT, GNDEC, Ludhiana (Punjab), India**ABSTRACT**

Cardiovascular disease (CVD), the predominant reason of deaths across the globe, has been a significant challenge to healthful living all over the world, placing an immense social-economic load on patients, families and nations annually. A WHO (World Health Organization) report states that increase in cardiovascular risk factors such as high blood pressure, diabetes, overweight and smoking will lead to a high surge in mortality by 24.5 million in 2030. In many cases, the time before a doctor's visit and necessary hospitalization is relied upon significantly to save a patient's life; therefore, giving doctors frequent updates about the medical status of their patient will significantly reduce the case fatality ratio. To contain the risk of this disease, it is important to record the heart disease required for each type of cardiovascular disease (CVD) and build a framework to help physicians making accurate and effectual decisions during diagnosis. The physician attempts to differentiate a heart defect by analysing the values of various features while making the medical diagnostic. The work considers a range of classic methodologies such as ECG, occult, blood pressure, blood glucose and cholesterol measures. The techniques of cardiovascular disease techniques are reviewed in this paper.

Keywords: Cardiovascular Disease, ECG, CVD, WHO, Smoking

1. Introduction

The ageing population and the rising number of patients with chronic diseases are two of the biggest issues facing today's healthcare systems. These issues raise the price of prescription drugs and non-preventive healthcare services, which has an impact on the financial budgets of healthcare provider organisations and reduces the financial resources available to deliver better services and higher-quality healthcare. Chronic illnesses like cardiovascular disease already have a significant financial impact on low- and middle-income nations. Cardiovascular disease (CVD), which accounts for around one-third of all annual fatalities, continues to be the leading cause of morbidity and mortality globally despite substantial breakthroughs in diagnosis and treatment. The best way to improve CVD outcomes is by early and precise diagnosis [1]. Obtaining clinically relevant morphological and pathological information in an unambiguous, comprehensive, time-sensitive, and cost-effective manner remains a significant challenge for both clinicians and scientific researchers due to the heterogeneous symptomatology and intricate pathologic mechanisms of cardiovascular diseases. The detection of heart illness using machine

learning (ML) relies on algorithms and models that recognise hidden and complex imaging patterns and learn from prior clinical experiences. The substantial utility of cardiovascular diagnosis using ML for a number of significant illnesses, such as coronary artery disease (CAD) and heart failure, has already been shown in previous research (HF). By enabling quicker and more precise medical judgement, AI image analysis' superior diagnostic performance has the potential to significantly reduce the burden of cardiovascular disease [2].

1.1 Cardiovascular Disease Detection

The process of automatically recognising and categorising CVD using non-invasive data must adhere to an appropriate work direction. A machine learning-based expert judgement system is successfully diagnosing cardiac illness, which lowers the death ratio. For training and testing, the machine learning detection models require appropriate data. If balanced datasets are used for model training and testing, machine learning model performance can be improved. Moreover, by using appropriate and pertinent features from the data, the model detection capabilities can be enhanced [3].

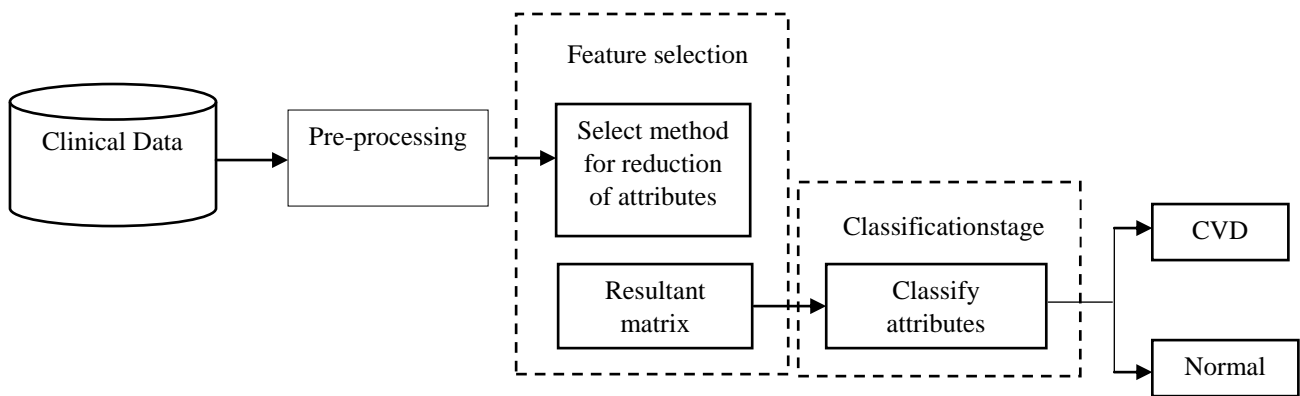


Figure 1: Cardiovascular Disease Detection

In the following part and in Figure 2, the complete workflow for developing ML tools for cardiovascular disease detection is schematically described.

i. Clinical data: For the purpose of detecting cardiovascular disease, several databases have been created, allowing researchers to assess their methodologies against a standardised database. The UCI machine learning repository database contains the Statlog and Cleveland datasets, which represent the most prevalent CAD illness cases. Those without coronary heart disease are considered to be in the negative class, whereas samples that do have it are considered to be in the positive class [4].

ii. Pre-processing: Any classification issue's performance is based on the dataset's standard. The input data is pre-processed using a variety of techniques to determine the integrity of the data. This section concentrates on effectively analysing the input data to obtain the desired results. The main goal of this process is to clean the data, find and eliminate redundant records, spelling mistakes, and dubious data. Outliers and missing data are treated using the same process. To highlight the missing values in the data, the mathematical filtering method is initially used. These strategies are used to cleanse the lengthy and short numerical data.

iii. Feature Selection: The choice of features is crucial in handling redundant features. One typically attains thousands of variables identifying a single patient after extracting features from many sources, such as demographic and clinical data, traditional indices, and imaging parameters [5]. This data is subsequently used to train ML models, but because there are so many input parameters and so few test samples (as is typically the case in the medical industry), the optimization

problem can be expensive and may reduce the generalizability of the CVD model. Three popular feature selection criteria consist of filter, wrapper and embedding. The filter approaches use statistical tools such as variance, mutual information, and chi-square test to determine the link between the features and the label (CHI2). The classifier and wrapper approaches are tightly correlated. The wrapper method's guiding idea is to choose the best subset in light of classifier performance. Furthermore, the impact of arbitrarily adjusting the number of features left in the feature set can be eliminated using recursive feature elimination with cross-validation (RFECV). The model procedure is connected with the embedding algorithms to choose features automatically. Due to its excellent efficiency, extreme gradient enhancement (XGB) has been frequently utilized as an embedded feature selection technique [6].

iv. Classification: Machine learning approaches for cardiovascular disease identification can be constructed once the set of features has been extracted and chosen from the dataset. ML, or machine learning, is the application of computer algorithms that may learn to carry out certain tasks from example data without the need for explicitly written instructions, in our instance, image-based cardiac diagnostics. To more precisely identify cardiovascular disorders [7], this area of AI employs sophisticated statistical approaches to discover discriminatory patterns from the training data.

1.2 Machine Learning Techniques for CVD Detection

Either supervised learning or unsupervised learning techniques can be used to create ML algorithms. Accurately labelled training

examples are necessary for supervised learning. The output is a binary variable that, in its most basic form, can take the value of 1 for a sick person and 0 for a control subject who is well. It is advised to employ a balanced training sample, consisting of an equal number of healthy and ill people, to produce a strong ML model. If multiple diseases or stages of disease are to be included in the ML model, it should be noted that the binary classification can be simply extended to the multi-class scenario. Algorithms for supervised learning connect input variables to labelled outputs in this way. Algorithms are trained via unsupervised learning, which has no defined output. The ML algorithm groups the sample using this strategy by identifying built-in patterns in the data. In general, supervised learning performs better than unsupervised learning, making it the favoured approach when the reality of the matter is known [8]. Unsupervised learning, however, is particularly valuable for identifying novel disease subtypes and patient stratification, such as the several pheno-groups of hypertensive heart disease or CVD. Here are some of the most well-known methods for detecting coronary artery disease that are commonly mentioned in literature:

i. Random Forest (RF): This well-liked method combines decision trees (DTs) trained on various random samples from the training set. Each DT consists of a collection of rules optimised for correctly categorising every component of the training set based on the input feature values. Since DTs are nonlinear models, their variation is frequently substantial. Overfitting issues may arise if the DT is grown very deeply since it can detect abnormalities in the training dataset. In an RF, this issue is resolved by training on various samples of the training dataset. In this manner, the variance is decreased as the number of DT is employed [9], minimising the generalisation error and making the process more effective. By choosing the mean (for regression issues) or the mode (for classification problems) of all guesses, the final prediction is determined. The number of DTs and the depth level for each DT are the two parameters that must be chosen for these models (i.e., the number of decisions). While the discriminate strength on the training dataset increases as the depth of the DT

increases, one must keep in mind that this frequently comes at the trade off of losing generalisation power. The problem is transformed into a collection of hierarchical inquiries expressed as DTs using RFs. RFs aren't particularly noise-resistant, though [10].

ii. Support Vector Machine (SVM): Support vector machines (SVMs) are supervised ML models that determine the ideal boundary, either linear or non-linear, for classifying the data into two or more groups. The function that will be used to separate the data, or the "kernel function," should be chosen before using SVMs. The Gaussian or linear functions are the most popular kernels. By training a number of models and preserving the parameters for the model with the lowest error, the remaining SVM model parameters are determined empirically [11]. A dimension reduction could be used to the input variables to facilitate training and get a better generalisation than with linear regression because this model is insensitive to non-discriminative dimensions. SVM has a significant limitation in that it uses a lot of memory when processing big amounts of data. To find non-linearity and sparsity in the input data, SVM is an excellent option. SVM is probably the most popular approaches among the ML techniques discussed in this article, and some studies show that this model performs the best.

iii. Cluster Analysis: A Clustering algorithm refers to a collection of methods that classify people as data points based on their similarity or proximity in the parametric space provided by quantitative data collected from input variables (image characteristics and/or clinical information) [12]. Given that patients with pathologies that appear to be similar when using existing image analysis techniques may belong to previously unrecognised subsets that can help understand disease pathophysiology and guide more effective targeted therapies, this technique is very helpful for assessing patients. Some clustering algorithms call for the defining of results, which falls under the purview of the ML group that focuses on unsupervised learning. Nevertheless, k-nearest neighbours (KNN) clustering, where k is the number of neighbour subjects to look at while finding subgroups, is a widely popular supervised clustering technique in

classification tasks. In this instance, the results for a new patient will depend on the neighboring diagnosed individuals [13].

iv. Artificial Neural Network (ANN): Biological neural networks' organisation and interactions serve as inspiration for ANNs. These systems distribute input data in a layered, hierarchical manner through internal nodes. During the training phase, a weight for each input line must be computed and repeatedly changed. The ANN adjusts until the weights that produce the best model performance are found. Each node applies a nonlinear function to the contribution from incoming connections to determine its value or activation (net input function). Due to the significant non-linear ratios of characteristics used in such models, weight optimization gives the model excellent resilience to complicated borders dividing classes. Furthermore, depending on the application, multiple networks can be designed using the connections between layers in an ANN [14]. The scarcity of a theoretical basis for determining the numbers of layers or nodes in each layer, which varies depending on each problem and the volume of training data, as well as the tendency of these models to adapt to the training set as a result of the significant disparity between the number of parameters/weights of the model and training instances are some caveats. When there is a huge amount of data accessible, ANNs are the right approach.

2. Literature Review

2.1 Machine Learning for Cardiovascular Disease Detection

C. R. M. Reñosa, et.al (2020) suggested a FL (fuzzy logic) algorithm effective of assessing several sets of medical data for pre-diagnosing the probable occurrence of a CVD (cardiovascular disease)[15]. A particular set of factors contained in the dataset was considered to construct this algorithm. The suggested algorithm was applicable in environments at which the interpretation of various datasets was done fast and in automatic way. For this, there was not any need to evaluate and assess the numeric values related to health status manually. MATLAB software and Microsoft Excel was employed for simulating the

suggested algorithm. The results exhibited that the suggested algorithm yielded a matching rate of 97.7% overall 304 data points.

L. Hao, et.al (2018) presented a new classifier Softmax regression framework for detecting the CVD (cardiovascular disease) and the known state data of two-layer NN (neural network) structure of the it was employed to train and learn the data [16]. After that, the presented framework emphasized on computing the probability of reclassifying the data belonging to every category. These kinds were decided according to the maximum probability. An analysis was conducted on the results after classifying the data. Moreover, a novel technique was presented to classify the coronary diseases at superior speed and accuracy. The presented framework was computed in the experimentation conducted on MIT-BIH dataset in which ECG (electrocardiogram) scans were contained. The accuracy of the presented framework was calculated 94.44% to detect the CVD.

R. Buettner, et.al (2019) investigated a technique of detecting possible heart disease for which RF(Random Forest) algorithm was implemented [17]. The reason of increasing mortality rate was CVD (cardiovascular disease) and around millions of people were died due to this disease. This technique was useful in the healthcare sector and capable of detecting the coronary disorder concerning medical data and testing the data from diverse patients. The experimental outcomes revealed that the investigated technique was applicable for classifying the patient as diseased or normal on the basis of information related to the clinical data. This technique helped the doctors to make the decisions for patient treatments.

A. Abdellatif, et.al (2022) projected an effectual technique relied on SMOTE(Synthetic Minority Oversampling Technique) for handling the issue of imbalance distribution [18]. Six diverse ML (machine learning) algorithms were employed for detecting the status of patient status, and HPO (Hyperparameter Optimization) algorithm was assisted in discovering the finest hyperparameter for the algorithm together with SMOTE. All attributes were considered for developing and testing the technique on 2 datasets. The experimental results indicated the

supremacy of the projected technique and ET (Extra Trees) optimized over others and offered the accuracy of 99.2% on public dataset and 95.73% Cleveland dataset for classifying the severity. The projected technique was assisted

the clinicians in determining the heart disease status of patient. Consequently, the heart disease-related mortality was prevented with the advance therapy.

2.1 Table

Author	Year	Technique Used	Findings	Limitations
C. R. M. Reñosa, et.al	2020	FL (fuzzy logic) algorithm	The results exhibited that the suggested algorithm yielded a matching rate of 97.7% overall 304 data points.	The efficacy of the suggested algorithm was mitigated due to the lower quality of rules extracted from the data and least amount of data points.
L. Hao, et.al	2018	Softmax regression framework	The accuracy of the presented framework was calculated 94.44% to detect the CVD.	This framework was not able to diagnose fault.
R. Buettner, et.al	2019	RF(Random Forest) algorithm	The experimental outcomes revealed that the investigated technique was applicable for classifying the patient as diseased or normal on the basis of information related to the clinical data. This technique helped the doctors to make the decisions for patient treatments.	The dataset employed in this work had contained inadequate information. The weighting of the attribute was not done effectively.
A. Abdellatif, et.al	2022	SMOTE(Synthetic Minority Oversampling Technique)	The experimental results indicated the supremacy of the projected technique and ET (Extra Trees) optimized over others and offered the accuracy of 99.2% on public dataset and 95.73% Cleveland dataset for classifying the severity. Consequently, the heart disease-related mortality was prevented with the advance therapy.	The technique was ineffective to detect and eliminate the outlier and classify the coronary disorder on real-time data.

2.2 Deep Learning for Cardiovascular Disease Detection

S. B. Shuvo, et.al (2021) introduced a new E2E (end-to-end) CRNN (convolutional recurrent neural network) called CardioXNet in order to detect 5 classes of cardiac disorders using raw PCG signal [19]. There were two stages: RL (representation learning) and SRL (sequence residual learning) employed in this approach. The initial stage employed 3 parallel CNN (convolutional neural network) for learning the CFG (coarse and fine-grained) attributes from the PCG and for investigating the salient attributes from variable

receptive fields such as 2D-CNN based squeeze-expansion. The latter stage made the deployment of Bi-LSTM (bidirectional long short term memory) for extracting the temporal attributes. The outcomes depicted that the introduced approach attained accuracy of 99.60%, precision of 99.56%, recall up to 99.52% and F1- score of 99.68% as compared to other techniques.

M. Fasihi, et.al (2020) established a new model known as 1-D CNN (convolution neural network) with the objective of diagnosing the arrhythmia, a kind of CVD (cardiovascular disease) disease in automatic way [20]. This model was planned on the basis of 4

convolutional layers on the arrhythmia dataset. The established model focused on classifying the normal individuals from the diseased ones. A multiclass classification was put forward with 2 categories of cardiac diseases and one class of normal people. A comparative analysis was conducted on the established model in contrast to other methods. The experimental outcomes depicted that the established model provided superior accuracy in comparison with the traditional algorithms.

F. F. Firdaus, et.al (2021) developed a technique of detecting coronary disease in which a DNN (deep neural network) with hyperparameter tuning [21]. The grid search, RS (random search), and BO (Bayesian optimization) employed to tune hyperparameter. RS model consumed least time in tuning as compared to others. The results indicated that the BO offered superior accuracy over others. Moreover, the developed

technique performed well with BO and its accuracy was counted 91.67%, sensitivity was 95.83%, specificity was 88.89%, precision was 85.19%, F1-score was 90.20%, and AUC value around 0.9514 for diagnosing CVD (cardiovascular disease).

A. Sharma, et.al (2021) recommended a CAD (computer aided diagnosis) framework to diagnose the coronary disease on the basis of CNN (Convolutional Neural Network) [22]. The computational technique was presented with DL (Deep learning) for detecting the coronary disorders so that the mortality rate was mitigated. Online resources were employed to gather the data as MRI (magnetic resonance imaging) images. The data was pre-processed and normalized by training the recommended framework. The experimental results reported that the recommended framework detected the CVD (cardiovascular disease) at 95%.

2.2 Table

Author	Year	Technique Used	Findings	Limitations
S. B. Shuvo, et.al	2021	E2E (end-to-end) CRNN (convolutional recurrent neural network) called CardioXNet	The outcomes depicted that the introduced approach attained accuracy of 99.60%, precision of 99.56%, recall up to 99.52% and F1- score of 99.68% as compared to other techniques.	This delay rate of this algorithm was increased while preventing other coronary diseases.
M. Fasihi, et.al	2020	1-D CNN (convolution neural network)	The experimental outcomes depicted that the established model provided superior accuracy in comparison with the traditional algorithms.	The established model detected only arrhythmia and unable to detect other kinds of coronary diseases.
F. F. Firdaus, et.al	2021	DNN (deep neural network)	Moreover, the developed technique performed well with BO and its accuracy was counted 91.67%, sensitivity was 95.83%, specificity was 88.89%, precision was 85.19%, F1-score was 90.20%, and AUC value around 0.9514 for diagnosing CVD (cardiovascular disease).	The major drawback of this technique was the restricted amount of data.
A. Sharma, et.al	2021	CAD (computer aided diagnosis) framework	The experimental results reported that the recommended framework detected the CVD (cardiovascular disease) at 95%.	This technique faced the issue of inconsistencies in data and missing values, noisy data and outliers.

2.3 Hybrid Techniques for Cardiovascular Disease Detection

C. Guo, et.al (2020) designed a RFRF-ILM (Recursion enhanced random forest with an improved linear model) for diagnosing the coronary disease [23]. This model concentrated on discovering the key attributes to predict the CVD (cardiovascular diseases) based on ML (machine learning) methods. A number of groups of attributes and several techniques were inserted to classify the CVD diseases. These attributes led to diagnose the CVD (cardiovascular disease). IoMT (Internet of Medical Things) platform was applied to compare the designed model against others to analyze the data. The designed model offered the accuracy of 96.6%, stability of 96.8% and F-measure up to 96.7% in comparison with other methods.

W. -H. Ho, et.al (2022) presented an innovative technique for converting PPG (Photoplethysmography) to ECG (Electrocardiogram) in precise manner [24]. The banded kernel ensemble technique was put forward and implemented for transforming the source PPG of least quality into ECG of higher quality. The computation efforts were not required in this technique after training a model. MIMIC III database was employed to evaluate the presented technique with regard to accuracy. The RRMSE (relative root mean squared error) was 0.314 below and KGE (Kling–Gupta efficiency) higher than 0.55. The accuracy of the presented technique was calculated 81% for diagnosing the CVD (cardiovascular disease).

M. A. Khan, et.al (2020) formulated an IoMT (Internet of Medical Things) mechanism

namely MSSO-ANFIS to diagnose the coronary disorder in which MSSO (modified salp swarm optimization) was integrated with ANFIS [25]. The LF (Levy flight) algorithm was exploited to enhance the potential of searching. The GBL (gradient-based learning) was considered to generate the regular learning process in ANFIS (adaptive neuro-fuzzy inference system) for its trapping in local minima. The MSSO algorithm utilized for the optimization of learning factors. Information related to diverse factors such as BP (blood pressure), age, sex, chest pain, cholesterol, blood sugar, etc. were considered for predicting the risk of coronary disorder. The formulated mechanism classified the received sensor data to determine the heart condition. This mechanism was quantified in the experimentation. The experimental outcomes revealed that the formulated mechanism yielded 99.45% accuracy and 96.5% precision in contrast to the existing methods.

A. Rath, et.al (2021) focused on detecting coronary disorders such as CVD (cardiovascular disease) [26]. Thus, a GAN (Generative Adversarial Network) algorithm was employed for tackling the imbalanced data. For this, additional fake data was produced to detect the coronary disease. Furthermore, GAN-LSTM, an ensemble model was devised in which LSTM (long short-term memory) was put together with GAN for diagnosing CVD. The standard MIT-BIH dataset was executed to simulate the devised algorithm. The results exhibited that the devised algorithm provided accuracy of 99.2%, F1-score of 98.7% and AUC (area under curve) of 98.4% in comparison with the traditional methods.

2.3 Table

Author	Year	Technique Used	Findings	Limitations
C. Guo, et.al	2020	RFRF-ILM (Recursion enhanced random forest with an improved linear model)	The designed model offered the accuracy of 96.6%, stability of 96.8% and F-measure up to 96.7% in comparison with other methods.	The community was depending on the visual inspection to obtain the disease codes for a waveform.
W. -H. Ho, et.al	2022	banded kernel ensemble technique	The RRMSE (relative root mean squared error) was 0.314 below and KGE (Kling–Gupta efficiency) higher than 0.55. The accuracy of	The matching procedure became complex because of storing of waveforms and disease codes in individual datasets. The

			the presented technique was calculated 81% for diagnosing the CVD (cardiovascular disease).	record association amid 2 portions of sources was not easily understandable.
M. A. Khan, et.al	2020	MSSO-ANFIS	The experimental outcomes revealed that the formulated mechanism yielded 99.45% accuracy and 96.5% precision in contrast to the existing methods.	The convergence was not obtained from this mechanism as its search space had lower capability.
A. Rath, et.al	2021	GAN-LSTM	The results exhibited that the devised algorithm provided accuracy of 99.2%, F1-score of 98.7% and AUC (area under curve) of 98.4% in comparison with the traditional methods.	This algorithm was incapable of classifying the heart disorders on datasets consisted of ICG, MCG, CT and heart sound signals of patients.

Conclusion

Subjects at high risk of having CVD can be identified through machine learning models that use stratification of risk for detection and prediction. Afterward, intercessions such as change of lifestyle, aimed to this target population and the introduction of stat in use can mitigate the risk of emerging CVD and encourage extraordinary measures of cardiovascular diseases. Series of guidelines on the evaluation and control of CVD recommend implementing detection and predictive models to classify high-risk populations and aid in medical decision-making. The data are

inspected for representing possible missing values and for the range of every feature. The commonly used CVD datasets include Kaggle, Statlog, and Cleveland and are relevant in the detection of CVD cases. The dataset obtained from Kaggle data repository includes 70000 registers of patients and 12 features considered desirable for disease identification. The Statlog and Cleveland Heart Disease datasets are retrieved from the UCI Machine Learning Repository database. The techniques of Cardiovascular disease detection are reviewed and it is analysed that computer vision techniques are most efficient techniques.

References

1. D. Nunes, P. Carvalho, J. Henriques and T. Rocha, "Multiparametric prediction with application to early detection of cardiovascular events," 2017 IEEE 3rd International Forum on Research and Technologies for Society and Industry (RTSI), 2017, pp. 1-4
2. D. Cornforth, M. P. Tarvainen and H. F. Jelinek, "Automated selection of measures of heart rate variability for detection of early cardiac autonomic neuropathy," Computing in Cardiology 2014, 2014, pp. 93-96.
3. M. U. Khan, S. Zuriat-e-Zehra Ali, A. Ishtiaq, K. Habib, T. Gul and A. Samer, "Classification of Multi-Class Cardiovascular Disorders using Ensemble Classifier and Impulsive Domain Analysis," 2021 Mohammad Ali Jinnah University International Conference on Computing (MAJICC), 2021, pp. 1-8
4. N. Rajesh, A. C. Ramachandra and A. Prathibha, "Detection and Identification of Irregularities in Human Heart Rate," 2021 International Conference on Intelligent Technologies (CONIT), 2021, pp. 1-5
5. S. M. Rayavarapu, D. Bikshapathi, S. L. Sabat and J. S. A. E. Fouda, "FPGA implementation of Ordinal Pattern Analysis algorithm for Early Detection of Cardiovascular diseases," 2019 IEEE 5th

- International Conference for Convergence in Technology (I2CT), 2019, pp. 1-4
6. R. Banerjee, S. Bhattacharya, S. Bandyopadhyay, A. Pal and K. M. Mandana, "Non-Invasive Detection of Coronary Artery Disease Based on Clinical Information and Cardiovascular Signals: A Two-Stage Classification Approach," 2018 IEEE 31st International Symposium on Computer-Based Medical Systems (CBMS), 2018, pp. 205-210
 7. B. D. Sekar, M. Chui Dong, J. Shi and X. Y. Hu, "Fused Hierarchical Neural Networks for Cardiovascular Disease Diagnosis," in IEEE Sensors Journal, vol. 12, no. 3, pp. 644-650, March 2012
 8. O. Terrada, A. Raihani, O. Bouattane and B. Cherradi, "Fuzzy cardiovascular diagnosis system using clinical data," 2018 4th International Conference on Optimization and Applications (ICOA), 2018, pp. 1-4
 9. D. J. Cornforth, M. P. Tarvainen and H. F. Jelinek, "Visualization methods for assisting detection of cardiovascular neuropathy," 2014 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2014, pp. 6675-6678
 10. T. Mandal, S. Bera and D. Saha, "A Comparative Study of AI-based Predictive Models for Cardiovascular Disease (CVD) Prevention in Next Generation Primary Healthcare Services," 2020 IEEE International Conference for Innovation in Technology (INOCON), 2020, pp. 1-5
 11. S. Xu, H. Shi, X. Duan, T. Zhu, P. Wu and D. Liu, "Cardiovascular risk prediction method based on test analysis and data mining ensemble system," 2016 IEEE International Conference on Big Data Analysis (ICBDA), 2016, pp. 1-5
 12. N. S. Rajliwall, G. Chetty and R. Davey, "Chronic disease risk monitoring based on an innovative predictive modelling framework," 2017 IEEE Symposium Series on Computational Intelligence (SSCI), 2017, pp. 1-8
 13. H. D. Calderon-Vilca, K. E. C. Callupe, R. J. I. Aliaga, J. B. Cuba and F. C. Mariño-Cárdenas, "Early Cardiac Disease Detection Using Neural Networks," 2019 7th International Engineering, Sciences and Technology Conference (IESTEC), 2019, pp. 562-567
 14. Victor Chang, Vallabhanent Rupa Bhavani, MA Hossain, "An artificial intelligence model for heart disease detection using machine learning algorithms", 2022, Healthcare Analytics
 15. C. R. M. Reñosa, R. R. P. Vicerra, E. P. Dadios, A. A. Bandala, R. A. R. Bedruz and J. L. Española, "Pre-detection of the Probable Occurrence of a Cardiovascular Disease Through Data Analysis using Fuzzy Logic," 2020 IEEE 12th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), 2020, pp. 1-6
 16. L. Hao, S. H. Ling and F. Jiang, "Classification of Cardiovascular Disease via A New SoftMax Model," 2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2018, pp. 486-489
 17. R. Buettner and M. Schunter, "Efficient machine learning based detection of heart disease," 2019 IEEE International Conference on E-health Networking, Application & Services (HealthCom), 2019, pp. 1-6
 18. A. Abdellatif, H. Abdellatif, J. Kanesan, C. -O. Chow, J. H. Chuah and H. M. Gheni, "An Effective Heart Disease Detection and Severity Level Classification Model Using Machine Learning and Hyperparameter Optimization Methods," in IEEE Access, vol. 10, pp. 79974-79985, 2022
 19. S. B. Shuvo, S. N. Ali, S. I. Swapnil, M. S. Al-Rakhami and A. Gumaei, "CardioXNet: A Novel Lightweight Deep Learning Framework for Cardiovascular Disease Classification Using Heart Sound Recordings," in IEEE Access, vol. 9, pp. 36955-36967, 2021
 20. M. Fasihi, M. H. Nadimi-Shahraki and A. jannesari, "Multi-Class Cardiovascular Diseases Diagnosis from Electrocardiogram Signals using 1-D Convolution Neural Network," 2020 IEEE 21st International Conference on

- Information Reuse and Integration for Data Science (IRI), 2020, pp. 372-378
21. F. F. Firdaus, H. A. Nugroho and I. Soesanti, "Deep Neural Network with Hyperparameter Tuning for Detection of Heart Disease," 2021 IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob), 2021, pp. 59-65
 22. A. Sharma, R. Kumar and V. Jaiswal, "Classification of Heart Disease from MRI Images Using Convolutional Neural Network," 2021 6th International Conference on Signal Processing, Computing and Control (ISPCC), 2021, pp. 358-363,
 23. C. Guo, J. Zhang, Y. Liu, Y. Xie, Z. Han and J. Yu, "Recursion Enhanced Random Forest With an Improved Linear Model (RERF-ILM) for Heart Disease Detection on the Internet of Medical Things Platform," in IEEE Access, vol. 8, pp. 59247-59256, 2020
 24. W. -H. Ho, C. -T. Liao, Y. J. Chen, K. -S. Hwang and Y. Tao, "Quickly Convert Photoplethysmography to Electrocardiogram Signals by a Banded Kernel Ensemble Learning Method for Heart Diseases Detection," in IEEE Access, vol. 10, pp. 51079-51092, 2022
 25. M. A. Khan and F. Algarni, "A Healthcare Monitoring System for the Diagnosis of Heart Disease in the IoMT Cloud Environment Using MSSO-ANFIS," in IEEE Access, vol. 8, pp. 122259-122269, 2020
 26. A. Rath, D. Mishra and S. C. Satapathy, "Heart disease detection using deep learning methods from imbalanced ECG samples", Biomedical Signal Processing and Control, vol. 12, no. 5, pp. 641-650, 31 May 2021

PLANT DISEASE DETECTION TECHNIQUES: A SURVEY

Randeep Kaur¹, Harmeet Singh², Sandeep Singla³

^{1,2}Department of Computer Science & Engineering, CT University, Ludhiana (Punjab), India

³Department of IT, GNDEC, Ludhiana (Punjab), India

ABSTRACT

The main difficulty faced in image processing is to detect the disease of plants. There are four phases in which plant disease is detected such as pre-processing, segmentation, feature extraction and classification. In the pre-processing stage, the contrast of the input image is de-noised or increased. The points which are not visible are highlighted; the PNSR (peak signal noise ratio) is maximized and the magnitude signal error value of the image is mitigated in this stage. The second stage is the segmentation. There are two kinds of segmentation methods: threshold and region-based segmentation. The various type of feature selection algorithms are used for the feature extraction. The various schemes which are already proposed for the plant disease detection are reviewed in this paper.

Keywords: Plant disease, Feature extraction, Segmentation, Classification

1. Introduction

Plant diseases seriously jeopardize the global food supply by significantly reducing crop output. According to the information supplied, plant diseases account for 20% to 40% of the global harvest loss. Therefore, stopping the spread of plant diseases and minimizing financial losses in farming depend heavily on the diagnosis of plant illness [1]. Most methods for detecting plant sickness heavily rely on atomic measurements or the presumption of the plant guardian. In any event, the first method is complicated and dependent on integrated laboratories, while the second is laborious and prone to mistakes. Image-based methods have so far been widely used to several multidisciplinary projects by analysing visible material such as clinical imaging, food processing, and cell image analysis. Utilizing current advancements in deep learning and machine learning, plant picture analysis and recognition may provide a more effective method of identifying plant diseases. The

development of image processing technology is progressed by applications in the identification of plant diseases based on vision. Aerial phenotyping and leaf fingerprinting are two examples of the plant image analysis research and survey that have started to emerge in this field. These methods, however, are less common because they heavily rely on either pricy equipment or challenging sub-atomic invention. Deep learning, a subclass of machine learning, consists of successive layers [2]. The output of the layer before is used as input in every layer. Deep learning can be thought of as a learning strategy based on neural networks. The potential of deep learning to automate the feature extraction process.

1.1 Characteristics of Plant Diseases

Real-time photos of plant diseases typically have three key characteristics that set them apart. A few instances of plant diseases with distinguishing characteristics are shown in Figure 1: Red boxes indicate the sick parts.

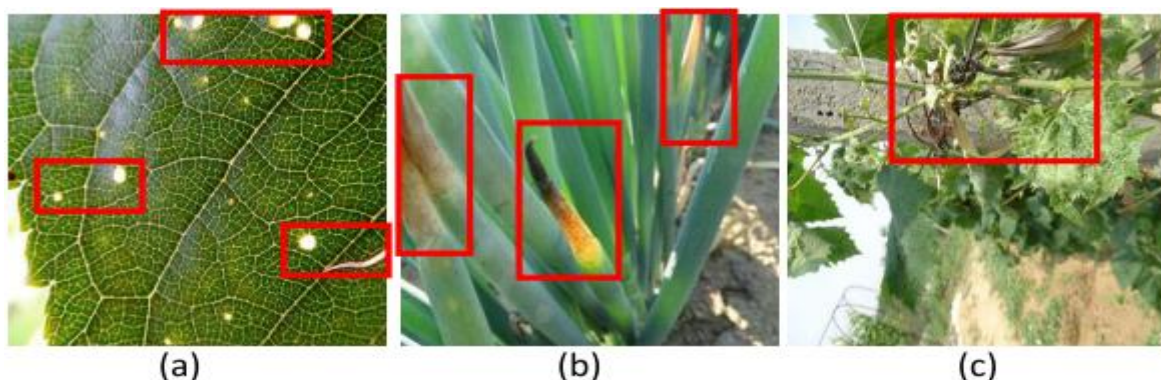


Figure 1: Plant disease with different characteristics

The following describes some characteristics of plant diseases:

- i. Randomly distributed lesions. Foliar lesions can randomly develop on a plant's leaves. The top, left, and right spots of the leaf are the three main locations where parasitic fungus shoot hole infection is found, as shown in Figure 1(a) [3]. Missing many lesions is straightforward since deep learning trained with image-level labels only concentrates on the most discriminatory regions while ignoring other areas of the item.
- ii. Diverse symptoms: In any event, different visual symptoms for similar types of plant diseases are likely to appear on the plant's leaves in various time frames. In Fig. 1(b), the *Allium fistulosum* black spot exhibits a variety of symptoms on different leaves of the same plant, indicating varying degrees of infection. While other leaves are only marginally impacted, the central leaf is severely affected. There are significant intra-class differences because appearance varies substantially at different illness stages [4].

Complex backgrounds: Real-time situations frequently involve different backdrop distortions. As seen in Figure 1(c), the background is made up of lots of leaves and other unsuitable items. On the other hand, the disease's symptoms are not obvious, complicating the procedure of finding plant diseases.

1.1.1 Plant Disease Detection based on Images

The most reliable and comprehensive source of information on phytopathology and morphological behaviour is leaf photographs. Therefore, it is crucial to thoroughly extract and analyse such data [5]. The diagnosis and investigation of foliar problems benefit greatly from image processing. The method used in the identification and classification of leaf disease is shown in Figure 2. It provides insight into the many approaches researchers have tried to diagnose diseases using machine learning and image processing.

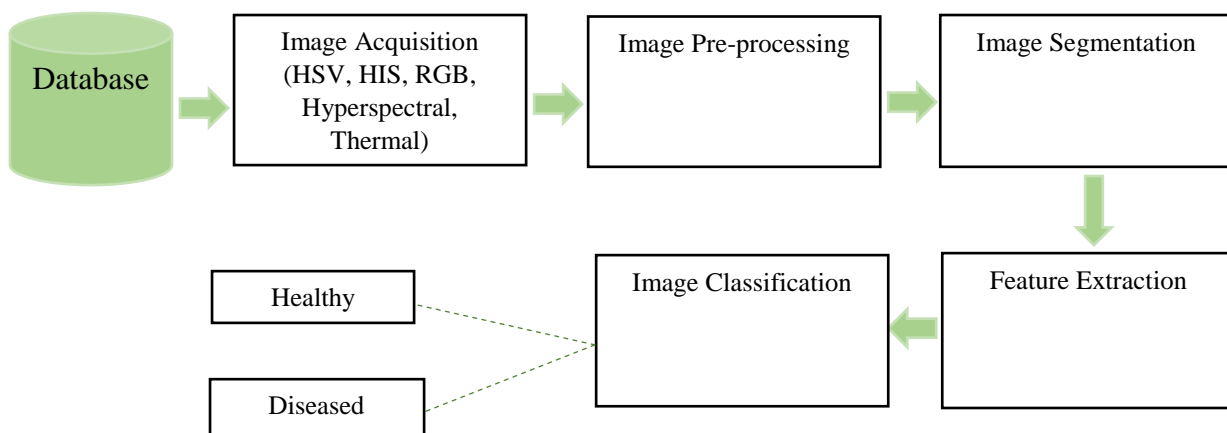


Figure 2: Plant Disease Detection

The first step in diagnosing an illness is to take images, as shown in Figure 2. Most of the time, either a digital camera or an imaging framework can be used to take pictures. Noise is present in rough images; thus, these errors must be eliminated. Therefore, the following stage is known as picture pre-processing, and it entails eliminating pointless distortions as well as enhancing contrast to make image features clearer and brighter [6]. For instance, it's extremely usual to employ a Gaussian function to create a subtle blur in photos to reduce

noise. The third phase, picture segmentation, entails removing the image from its background while segmenting the necessary area to highlight important characteristics [7]. The fourth phase, feature extraction, shows the details and information in a picture. Size, texture, and colour are the main leaf qualities that are important for diagnosing plants. As a result, the classification system receives an input feature vector made up of these chosen attributes. This vector may be used to

differentiate between different object categories.

The penultimate stage is to classify. It is important to remember that the optimal categorization architecture depends on the specific problem. The classification system's goal is to categorise the images according to a set of predefined classes based on the resultant feature vector obtained in step 4. Due to this, the classification work is divided into two phases: training and testing. Training's primary goal is to develop the classification system using the training dataset. This indicates that the accuracy rate increases with the number of training sets [8]. It is crucial to keep in mind that the outcome, which is the crop's healthy.

1.2 Detection Algorithms for Plant Diseases

Fast advances in technologies used in mobile devices and digital cameras have enabled people to obtain digital photographs of crop plants and disease-carrying organs more conveniently. In the meantime, the use of machine learning and deep learning technology has increased the viability of image processing and disease diagnosis as depicted in several studies. The frequently used machine learning and deep learning approaches for plant disease detection and classification are elaborated below: [9]:

i. **Decision Tree:** A non-parametric algorithmic design known as a decision tree recursively divides the entire sample space into equally small and full subsets (or levels). The collection of choice rules that begin the formation of any subset characterize it and set it apart from all other subsets. Decision trees are helpful for target variables that are both hierarchical and constant. The selection criterion and the halting rule are the two main parts of the DT algorithm. The selection criteria for an explicit target could be information entropy, Gini index, or misclassification error. The least squared error for a constant target often serves as the selection criterion. To find the optimal divisions that satisfy the selection criteria, DT searches all the predictor variables at all feasible divided locations starting with the complete training dataset [10]. Recursively repeating this process keeps going until the

withholding regulations take effect. The DT does not assume the distribution because it is non-parametric, and the predictors do not need to use a functional technique either.

- ii. **Random Forest:** Decision trees are fundamentally imbalanced because a minor change in the training dataset can significantly alter the topology of the tree [11]. It is typically suggested that several trees' findings can use volatility to find more signals in the data than a single tree can. RF is referred to as an ensemble framework because it is built from a number of models working together. As opposed to a single tree, RF makes an effort to demonstrate greater robustness by making use of many trees built on diverse samples that have been made significantly more random to lessen the impact of relationships between samples or across trees.
- iii. **Support Vector Machine:** Using hyperplanes, SVM linearly divides the mapped points in a high-dimensional space. Support vectors are the gathered data points that are used to construct these hyperplanes. The SVM seeks to achieve largest margin data parting, which in and of itself seeks to maximise the lowest margin and to isolate the dependent variable along a hyperplane. The margin depicts the separation between the senses and the hyperplane. However, finding the hyperplane that completely separates the response can occasionally be impossible or too difficult. In order to allow for a lower rate of misclassification, softer hyperplanes are used rather than rigid ones [12]. More descriptive terms are produced by a greater dimensional feature space (number of explanatory variables and their resulting terms). However, it will be challenging to provide a solution to an objective function if the size of the feature space is bigger than the number of perceptions. To address this, SVMs naturally adopt a kernel trick, which uses kernel functions to implicitly translate data to a different feature space. By having sufficient understanding of the pairwise internal products of the perceptions in the data, this feature space

can be characterised. The vectors or specific perceptions that will support the hyperplane are chosen in order to train the SVM.

- iv. ANN: In 1943, two scholars by the names of McCulloch and Pitts created ANN mainly. The goal of artificial neural networks (ANNs) was to replicate the neurophysiology of the human brain by combining many simplified computation modules (also known as perceptron, neurons, or nodes) into a highly interconnected architecture. The most common type of neural network system is the single-hidden layer feedforward network (SLFN) [13]. It is used to carry out the neural network analysis. The following is a possible mathematical representation of SLFN:

$$y = G \left(a_0 + \sum_{j=1}^h a_j v_j \right)$$

$$v_j = F \left(\beta_{0j} + \sum_{i=1}^k \beta_{ij} x_i \right)$$

where x_i , $i = 1, \dots, k$ and v_j , $j = 1, \dots, h$ respectively stand for the input units and the hidden units. The weight of similarity between the input-layer unit x_i and the hidden-layer unit v_j is indicated by the term β_{ij} . Additionally, a_j denotes the strength of the link between the output y and the hidden-layer unit v_j . $F(\cdot)$ and $G(\cdot)$ stand for the activation function of the hidden-layer units and the activation function of the output, respectively. The bias of the hidden-layer unit v_j is β_{0j} and the bias of the output y is a_0 . The output y 's bias is a_0 , while the hidden-layer unit v_j 's bias is β_{0j} . Activation functions are frequently sigmoid functions, which are s-shaped functions with limited values between $[0, 1]$ and $[-1, 1]$, such as logistic and hyperbolic tangents. As they can be distinguished, sigmoid functions are chosen as the activation functions because they enable the employment of Hessian-based optimization procedures to solve the weights.

2. Literature Review

2.1 Plant disease detection using Deep Learning

A. Abbas, et.al (2021) suggested a DL (deep learning)-based technique in order to detect the tomato disease for which C-GAN (Conditional Generative Adversarial Network) algorithm was implemented for generating the synthetic images of tomato plant leaves [14]. Subsequently, synthetic and real images were employed to train a DenseNet121 model so that the TL (transfer learning) algorithm classified the tomato leaves images into 10 classes of diseases. PlantVillage dataset executed for quantifying this technique. The suggested technique yielded an accuracy of 99.51% to diagnose 5 classes, 98.65% for 7 classes, and 97.11% for diagnosing 10 classes in comparison with the traditional methods.

M. H. Saleem, et.al (2022) introduced an optimized DL (deep learning) framework known as RFCN (region-based fully convolutional network) for diagnosing plant disease on the novel generated dataset [15]. The finest DL algorithm was discovered for computing the methods of augmenting the data. Thereafter, an analysis was performed on the impacts of image resizers due to interpolators, weight initializers, batch normalization, and DL optimizers. The results on external dataset indicated that the introduced framework was robust. Additionally, this framework offered mAP (mean average precision) of 93.80%.

Y. Zhao, et.al (2022) projected a DoubleGAN (double generative adversarial network) algorithm for producing images of unhealthy plant leaves for balancing such datasets [16]. This algorithm assisted in creating the images of higher resolution of infected leaves. The initial phase employed leaves for inputs. First of all, WGAN (Wasserstein generative adversarial network) deployed the healthy images for providing a pre-trained technique. After that, this technique used infected images for producing the images of unhealthy leaves of 64×64 pixel. The next phase made the implementation of SRGAN (superresolution generative adversarial network) for providing images of 256×256 pixels for extending the unbalanced dataset. The accuracy of projected algorithm was calculated 99.80% for detecting

plant species and 99.53% for recognizing the plant disorder.

S. Ashwinkumar, et.al (2021) designed an automated mechanism to diagnose and classify the plant leaf diseases based on an OMNCNN (optimal mobile network-based convolutional neural network) algorithm [17]. Various phases were executed such as to pre-process, segment the image, extract the attributes and classify the disease occurred on plants. The image was pre-processed using BF (bilateral filtering) and segmented on the basis of Kapur’s thresholding

method for recognizing the infected regions of leaf. Furthermore, MobileNet model utilized to extract the attributes for optimizing the hyperparameters. For this, EPO (emperor penguin optimizer) algorithm was exploited. At last, the labels were assigned to the plant images through ELM (extreme learning machine). The results of experiments exhibited that the designed mechanism attained 98.7% accuracy, 98.5% precision, 98.92% recall, 98.5% F-Score and 0.985 kappa value.

Table 2.1 : Plant disease detection using Deep Learning

Author	Year	Technique Used	Findings	Limitations
A. Abbas, et.al	2021	C-GAN (Conditional Generative Adversarial Network) algorithm	The suggested technique yielded an accuracy of 99.51% to diagnose 5 classes, 98.65% for 7 classes, and 97.11% for diagnosing 10 classes in comparison with the traditional methods.	This technique was not detected other portions of plants such as fruits, stems, and branches, and distinct stages of plant infection.
M. H. Saleem, et.al	2022	RFCN (region-based fully convolutional network)	The results on an external dataset indicated that the introduced framework was robust. Additionally, this framework offered mAP (mean average precision) of 93.80%.	The major limitation of this framework that it offered only one class for both grapevine and kiwifruit. This framework consumed much time to diagnose various disorders in a plant organ.
Y. Zhao, et.al	2022	DoubleGAN (double generative adversarial network) algorithm	The accuracy of projected algorithm was calculated 99.80% for detecting plant species and 99.53% for recognizing the plant disorder.	This algorithm employed large number of samples for creating the images of higher resolution.
S. Ashwinkumar, et.al	2021	OMNCNN (optimal mobile network-based convolutional neural network) algorithm	The results of experiments exhibited that the designed mechanism attained 98.7% accuracy, 98.5% precision, 98.92% recall, 98.5% F-Score and 0.985 kappa value.	The major issue was to improve the efficacy to diagnose the plant diseases.

2.2 Plant disease detection using Machine Learning

R. D. Devi, et.al (2019) developed a simple and effective IoT (Internet of Things) based system for detecting and classifying the bunchy top of banana and sigatoka diseases in hill banana plant [18]. The images were pre-processed, and the texture attributes were

extracted through image processing and IoT. The agriculturalists utilized RFC (Random Forest Classification) method for classifying and analyzing the diseases so that an optimal solution was generated. This system focused on monitoring the ecological metrics. The results reported the effectiveness of the developed system for detecting the disorders at accuracy of 99%.

S. Ahmed, et.al (2022) investigated a LTL (lightweight transfer learning)-based technique to diagnose the diseases from tomato leaves [19]. An efficient technique of image pre-processing helped in enhancing the leaf images via illumination correction to classify the images. A framework was implemented in which MobileNetV2 was integrated with a network to extract the attributes. The data was augmented for avoiding the data leakage and dealing with the issue related to the class imbalance. PlantVillage dataset executed to conduct the experiments. The results confirmed that the investigated technique diagnosed the diseases occurred on plants at an accuracy of 99.30%.

J. Chen, et.al (2020) established an innovative technique with the objective of diagnosing and classifying the diseases from the plant leaf automatically [20]. The images were processed to analyze the feature engineering, and an index system was adopted to formulate the predictive models. After that, GMDH-Logistic model put forward in which selected attributes were employed. This model emphasized on selecting the crucial attributes, and interpreting the determined variables. The outcomes depicted the applicability of the established technique for determining the plant as infected and normal.

Table 2.2: Plant disease detection using Machine Learning

Author	Year	Technique Used	Findings	Limitations
R. D. Devi, et.al	2019	A simple and effective IoT (Internet of Things) based system	The results reported the effectiveness of the developed system for detecting the disorders at accuracy of 99%.	This accuracy was decreased in case of harsh circumstances such as lighting in the field, image capturing angle.
S. Ahmed, et.al	2022	A LTL (lightweight transfer learning)-based technique	The results confirmed that the investigated technique diagnosed the diseases occurred on plants at an accuracy of 99.30%.	The images of the given dataset were captured in laboratory conditions due to which such images suffered from the occlusion and background clutter.
J. Chen, et.al	2020	an innovative technique	The outcomes depicted the applicability of the established technique for determining the plant as infected and normal.	The classifications results were differed because of some small deviations and some ambiguity was also there to label the data.

2.3 Plant disease detection using Hybrid Technique

P. Bedi, et.al (2021) recommended a new hybrid mechanism in which CAE (Convolutional Autoencoder) network combined with CNN (Convolutional Neural Network) in order to diagnose the plant disease automatically [21]. This mechanism was capable of diagnosing the disorders occurred on plants such as Bacterial Spot in peach plants. PlantVillage dataset employed to compute the recommended mechanism in the experimentation. The experimental outcomes proved that this mechanism offered an accuracy of 99.35% when the system was trained and 98.38% when the system was tested. In addition, few metrics were employed and the recommended mechanism consumed least time for diagnosing the diseases.

R. R. Patil, et.al (2022) formulated a new integrated system called Rice Transformer in which the inputs taken from the agricultural sensors and image data of the fields was integrated [22]. The sensor and image were two modalities of this system. The attributes were extracted from these modalities using an attention technique. Afterward, the cross-attention module took the extracted attributes as input to improve the potential of recognizing the particular attributes of rice disorders. Softmax algorithm was presented to pool, incorporate and transmit the extracted attributes for classifying the rice diseases. A dataset having 4200 samples employed to evaluate the formulated system. The experimental outcomes revealed that the formulated system detected the diseases at 97.38% accuracy.

A. Khattak, et.al (2021) intended an integrated technique that deployed CNN (convolutional neural network) model [23]. The intended technique focused on distinguishing the normal leaves of fruit plants from the leaves infected with black spot, canker, scab, greening, and Melanose. Various layers were integrated to extract discriminative attributes. the intended

technique was simulated on Citrus and Plant Village datasets. The experimental outcomes demonstrated that the intended technique was more effective in contrast to other methods, and offered an accuracy up to 94.55%. This technique was adaptable for farmers for classifying the diseases.

Table 2.3: Plant disease detection using Hybrid Technique

Author	Year	Technique Used	Findings	Limitations
P. Bedi, et.al	2021	Hybrid mechanism in which CAE (Convolutional Autoencoder) network combined with CNN (Convolutional Neural Network)	The experimental outcomes proved that this mechanism offered an accuracy of 99.35% when the system was trained and 98.38% when the system was tested.	The latency was increased when the leaf images of plants were transmitted to the cloud.
R. R. Patil, et.al	2022	Rice Transformer	The experimental outcomes revealed that the formulated system detected the diseases at 97.38% accuracy.	The datasets utilized in this system were small in size and it was complex to gather the data at field level in real time using this system.
A. Khattak, et.al	2021	an integrated technique	The experimental outcomes demonstrated that the intended technique was more effective in contrast to other methods, and offered an accuracy up to 94.55%. This technique was adaptable for farmers for classifying the diseases.	The dataset employed in this technique had 213 images only which was a restricted amount. Moreover, the diseases were detected using only one dataset in a single domain.

Conclusion

The plant disease detection models consist of four steps: pre-processing, segmentation, feature extraction and classification. The use of microscopes was quite popular in old times for the detection of plant diseases. However, every plant leaf can't be inspected individually in real-time. Therefore, a fast and consistent approach is devised for sensing the disease by means of remote sensing. Machine learning technique proves to be extremely proficient for

detecting the disease at early stages according to their symptoms. The plant pathologists can make use of the digital image processing technology for the detection of plant diseases using digital images. The computer processing is employed for detecting the infections in leaves and fruits in cultivation. All methods based on digital image processing capture the digital images using a digital camera. It is concluded that major data is published in the conferences related to plant disease detection.

References

1. Sammy V. Militante, Bobby D. Gerardo, Nanette V. Dionisio, "Plant Leaf Detection and Disease Recognition using Deep Learning", 2019, IEEE Eurasia Conference on IOT, Communication and Engineering (ECICE)
2. UmutBarişKorkut, ÖmerBerkeGöktürk, OktayYildiz, "Detection of plant diseases by machine learning", 2018, 26th Signal Processing and Communications Applications Conference (SIU)
3. Hilman F. Pardede, EndangSuryawati, Rika Sustika, Vicky Zilvan, "Unsupervised

- Convolutional Autoencoder-Based Feature Learning for Automatic Detection of Plant Diseases”, 2018, International Conference on Computer, Control, Informatics and its Applications (IC3INA)
4. Abdul Hafiz Bin Abdul Wahab, Rahimi Zahari, Tiong Hoo Lim, “Detecting diseases in Chilli Plants Using K-Means Segmented Support Vector Machine”, 2019, 3rd International Conference on Imaging, Signal Processing and Communication (ICISPC)
 5. Jibrael Jos, K A Venkatesh, “Pseudo Color Region Features for Plant Disease Detection”, 2020, IEEE International Conference for Innovation in Technology (INOCON)
 6. Pushkara Sharma, Pankaj Hans, Subhash Chand Gupta, “Classification Of Plant Leaf Diseases Using Machine Learning And Image Preprocessing Techniques”, 2020, 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence)
 7. Krupa Spandan Raj Rayana, Lokesh Kumar Vajja, “A New Segmentation method for Plant Disease Diagnosis”, 2019, 2nd International Conference on Intelligent Communication and Computational Techniques (ICCT)
 8. B. Rajesh, M. Vishnu Sai Vardhan, L. Sujihelen, “Leaf Disease Detection and Classification by Decision Tree”, 2020, 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184)
 9. C Rajasekaran, S Arul, S Devi, G Gowtham, S Jeyaram, “Turmeric Plant Diseases Detection and Classification using Artificial Intelligence”, 2020, International Conference on Communication and Signal Processing (ICCSP)
 10. Jagadish Kashinath Kamble, “Plant Disease Detector”, 2018, International Conference on Advances in Communication and Computing Technology (ICACCT)
 11. ChaowalitKhitthuk, ArthitSrikaew, KittiAttakitmongcol, PrayothKumsawat, “Plant Leaf Disease Diagnosis from Color Imagery Using Co-Occurrence Matrix and Artificial Intelligence System”, 2018, International Electrical Engineering Congress (iEECON)
 12. S. Santhana Hari, M. Sivakumar, P. Renuga, S. karthikeyan, S. Suriya, “Detection of Plant Disease by Leaf Image Using Convolutional Neural Network”, 2019, International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN)
 13. Anton Louise P. de Ocampo, Elmer P. Dadios, “Mobile Platform Implementation of Lightweight Neural Network Model for Plant Disease Detection and Recognition”, 2018, IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)
 14. A. Abbas, S. Jain and S. Vankudothu, “Tomato plant disease detection using transfer learning with C-GAN synthetic images”, *Computers and Electronics in Agriculture*, vol. 25, no. 8, pp. 3073-3081, 29 June 2021
 15. M. H. Saleem, J. Potgieter and K. M. Arif, "A Performance-Optimized Deep Learning-Based Plant Disease Detection Approach for Horticultural Crops of New Zealand," in *IEEE Access*, vol. 10, pp. 89798-89822, 2022
 16. Y. Zhao et al., "Plant Disease Detection Using Generated Leaves Based on DoubleGAN," in *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, vol. 19, no. 3, pp. 1817-1826, 1 May-June 2022
 17. S. Ashwinkumar, S. Rajagopal and B. Jegajothi, “Automated plant leaf disease detection and classification using optimal MobileNet based convolutional neural networks”, *Materials Today: Proceedings*, vol. 16, no. 12, pp. 7791-7801, 12 July 2021
 18. R. D. Devi, S. A. Nandhini, R. Hemalatha and S. Radha, "IoT Enabled Efficient Detection and Classification of Plant Diseases for Agricultural Applications," 2019 International Conference on Wireless Communications Signal Processing and Networking (WiSPNET), 2019, pp. 447-451

19. S. Ahmed, M. B. Hasan, T. Ahmed, M. R. K. Sony and M. H. Kabir, "Less is More: Lighter and Faster Deep Neural Architecture for Tomato Leaf Disease Classification," in IEEE Access, vol. 10, pp. 68868-68884, 2022
20. J. Chen, H. Yin and D. Zhang, "A self-adaptive classification method for plant disease detection using GMDH-Logistic model", Sustainable Computing: Informatics and Systems, vol. 24, no. 7, pp. 2006-2015, 26 June 2020
21. P. Bedi and P. Gole, "Plant disease detection using hybrid model based on convolutional autoencoder and convolutional neural network", Artificial Intelligence in Agriculture, vol. 34, no. 1, pp. 451-458, 11 May 2021
22. R. R. Patil and S. Kumar, "Rice Transformer: A Novel Integrated Management System for Controlling Rice Diseases," in IEEE Access, vol. 10, pp. 87698-87714, 2022
23. A. Khattak et al., "Automatic Detection of Citrus Fruit and Leaves Diseases Using Deep Neural Network Model," in IEEE Access, vol. 9, pp. 112942-112954, 2021

SEASONAL FLUCTUATIONS, FEEDING GUILDS AND BREEDING BIOLOGY OF AVIAN SPECIES: A REVIEW

Taviqueer Un Nisa and Reetu Bhanot

Department of Zoology, CT University, Ludhiana (Punjab), India

ABSTRACT

Seasonal fall in avian clutch size are well documented, but seasonal changes in other set of facts of reproduction has received less attention. For instance, the probability to complete brood mortality typically explains much irregular rising in reproductive success and often fluctuates at a particular season of the year, but we know little about the underlying cause of that difference in condition. For organisms in seasonal environment, individuals that breed earlier in the season regularly attain higher wellbeing than their late breeding counterparts. The birds that breed early, are of better phenotypic quality or breed on higher quality colonies while the date supposition predicts that at a particular season declining reproductive success is a response to seasonal deterioration in the natural quality. In many species of birds, food availability is often proposed as very profound effect that influence the seasonal variation in reproductive favourable outcome. Seasonal variation in the risk of nest predation was found not to be analogous with seasonal changes in energetic insistence, conspecific nest density or cluster of the predators. It has been reported that seasonal imbalance in the risk of nest predation was related with the foliage density (in the early breeding occasion, but not late) and is found to be correlated with the seasonal variations in the availability of food to the nest predators. This study also reported that raise in climate warming is the another factor for many big changes in the ecological conditions and multi-brooded or incubated species that will apparently increase their reproductive capability. To determine the underlying causes of observed seasonal downturn in risk of nest predation, the present study is planned to study the nest predation of birds as a function of phenology, developmental stage, food availability for nest predators, seasonal fluctuations, breeding and nest biology.

Keywords: Seasonal fluctuations, breeding biology, feeding guilds, nesting

1. Introduction

The reproductive period is a challenging time for many organisms; individuals to find a solution when, where and how many offspring to turn out. Both the timing of reproduction and number of offspring produced per breeding venture can have important fitness reverberations and are considered predominant life history traits (Svensson, 1997). For example, reproductive success diminish with date in a variety of organisms including many fishes, insects, aves and mammals. Individuals that breed very late in the procreation season generally produce smaller baby birds or have progeny that are of lower classification. The expectation of complete brood mortality can also differ with the breeding date. (Perrins, 1965 and Landa, 1992).

Most studies that have inquire into seasonal patterns in bird reproductive success have focused on seasonal descend in avian clutch size. (Hochackhka, 1990 and Verhulst, Nilsson 2008). The risk of nest predation may diverge seasonally but partially few studies have examined how secular variation in probability

of nest predation bestow to seasonal fall in avian reproductive success. This oversight is surprising given that nest predation is the primary cause of nest failure in most avian species and affect the evolution of clutch proportions, seasonal variation in the risk of nest predation may also influence the phenology of breeding. For example, if the nest predation is very towering in the early breeding season, the growing risk of nest predation could counterweight benefits gained from a larger clutch of individuals that breed too soon in the breeding season. (Martin, 1992 and Ricklefs, 1969).

The significance of nesting stuff is identical to the momentousness of breeding chronology in bird species (Hilton *et al*, 2004) because breeding phenology, including nesting happenings, allows species predator avoidance and access to abundant resources (Martin 1987; Stone *et al*, 2017). Bird species select the breeding time during acceptable periods to ensure better breeding successfulness (Mansouri *et al*, 2020). On the other hand, many migrant birds select their breeding chronology during the relevant environmental

condition to safeguard nestlings against rasping climate (Moller *et al*, 2010). But in sedentary species, little consciousness was paid to the breeding chronology, despite its connotation in breeding attempts. Moreover, with the climate change, many avian species have transposed their breeding and migration dates as an accustoming to avoid the negative consequences of these new environmental constrains (Balbontin *et al*, 2009). The less adopted species have undergone turndown impacts, including nesting nonsuccess, loss of nesting and breeding success depletion. Therefore, the exploration of breeding chronology in avian species is climacteric to understanding their breeding ecology and impact of the climatic constrains on it.

2.Methods

2.1 Foliage phenology

Filliater *et al*, (1994) suggested that the foliage phenology hypothesis relies on the same contraption that underlies the nest-seclusion hypothesis, hypothesis that is often depicted as the cause of spatial or interspecific patterns in nest predation. This hypothesis suggests that dense foliage hamper the conveyance of auditory, visual or olfactory indication that predators maneuver to locate nests (Martin, 1992). The nest adjoining by dense foliage should have a lower probability of nest predation contrast to nests with lower foliage. If foliage density describes the seasonal dwindle in nest predation on our study site, then foliage density must build up with date, such that nests propounded early in the breeding season are abutting by less foliage in comparison to nests that are initiated later.

2.2 Developmental stage

Skutch (1949) reported that the interposed stage hypothesis suggests that nest predation is distinguishable among developmental stages of the nesting cycle. Although foregoing studies have discovered that the risk of nest predation is often higher during the nestling stage due to parental responsibility and nestling vocalizations around the nests that attract predators to participate.

Roper, Goldstein, (1997) and Farnsworth (1999) have reported higher chances of predation during the stage of gravidity. Risk of nest predation could be supplementary during laying and incubation period if, for instance, the commanding nest predators in the system are more likely to eat eggs than nestlings. If distinctness in the risk of nest predation among developmental stages express the seasonal decline in the risk of nest predation in our system, then:-

- a) Nest predation should be overhead during the stage of incubation than the nestling level.
- b) Probability of nest predation should not vary with date within each of the developmental stages of nesting cycle.

Avian species are proceeding their date laying in response to increase in climate temperature . Advanced timing of breeding is customarily analogous with a shift of whole breeding season (earlier initiation of breeding and earlier cessation of the reproductive period), without any change in fitness affiliated traits. In species in which the laying dates coordinate with clutch size, advanced breeding has sometimes resulted in an increased number of eggs and higher breeding outcome. In some studies, the refinement in laying dates has been found to be associated with a fall in productivity of breeding.

Climate change may exert influence on, not only the earliest or mean laying dates but also the length of uninterrupted breeding season. The later happening should have serious fitness reverberations, much more important than advancement in laying dates.

To amplify fitness, birds often breed throughout the whole duration when the likeliness of successfully raising young is relatively high all through the breeding season and they attempt to be multi-brooded only if ample food is available, but cold springs have fend off them from starting to breed earlier in the past. These three basic screenplays (extension, shortening and no change in the duration of the breeding season) may occur not only when the earliest laying dates are progressive, but also when the end of the season is respited.

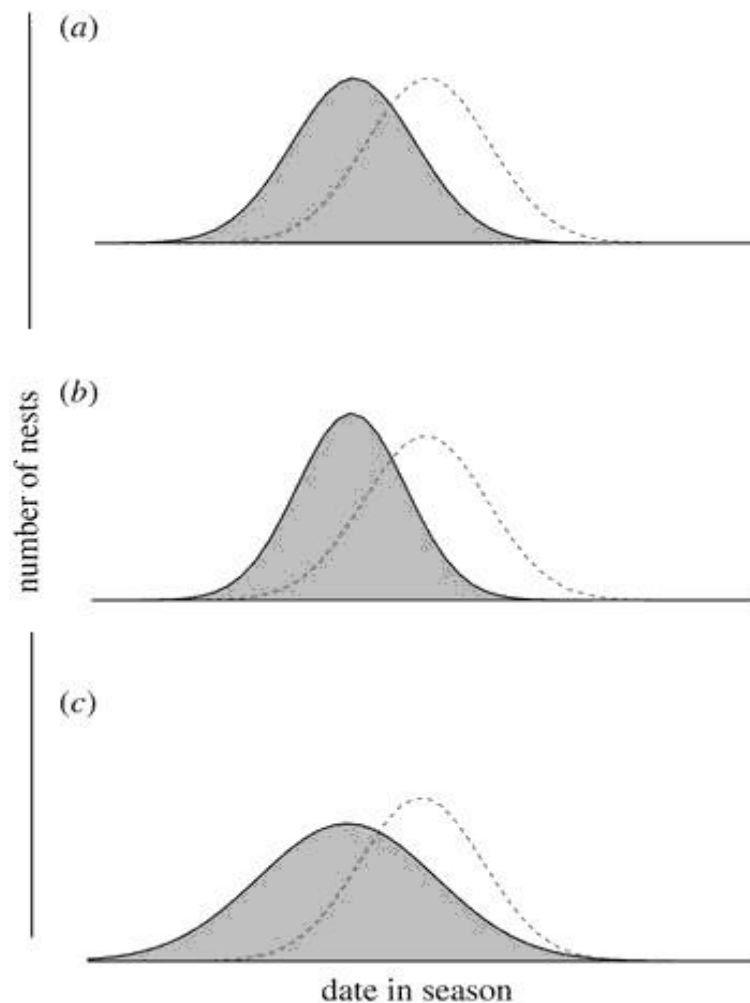


FIGURE 1. Three basic scenarios showing changes in the duration of breeding season in response to climate change, assuming the advancement in the earliest laying dates is of a single brooded species. Dashed graphs represent original distribution and grey ones the situation after some period of climate warming. (a) Duration of breeding season remains unchanged. Laying dates start and end earlier than in the past. (b) Breeding season become shorter. The earliest laying dates are advanced but the latest ones even more so. (c) Breeding season becomes extended. The earliest laying dates are advanced, but the latest ones remain unchanged. (Reference from “The effect of climate change on the duration of avian breeding seasons: A meta-analysis” by Lucyna Halupka and Konrad Halupka”)

3. Cooperative breeding

Emlen and Vehrencamp (1985), Arnold and Owens (1998) documented that Cooperative breeding of birds is a compounded behaviour by which offspring at one nest are nurtured by more than two birds. This breeding season is rehearsed by about 9% of bird species globally, peculiarly in the tropics (Koenig and Dickinson 2004, Cockburn 2006, Gill 2007). On the other hand, this breeding season reveals to have negative inference for lower-ranking non-breeders in the form of hindered reproduction and increased intraspecific conflict for food and nesting sites (Pen and Weissing 2000).

3.1. Seasonal Breeding and habitat

Follett and Robinson, (1980) suggested that scrutinization of breeding season in passerines illustrated that in birds, the seasonal breeding is constricted to the spring and summer months in Northern and Southern hemispheres. In most avian species, breeding is concluded in the middle or late summer by the promotion of some form of photorefractoriness. Thus, allowing the young to grow to a adequate size to survive seasonal paucity of food or to be able to migrate. A study of seasonal breeding in birds found at Varanasi (India) provides a

good example of breeding seasons in birds living in a sub-tropical sector with a yearly monsoon (Chandola *et al.*, 1983). At Varanasi some birds can be found breeding in all months of the year but at slightest breeding materialize during the coldest months, December and January. Some birds such as weaver finch (*Ploceus philippinus*), Cattle egret (*Bulbulcus ibis*), Red vented bulbul (*Pycnonotus cafer*), Common myna (*Acridotheres tristis*) and rose ringed parakeet (*Psittacula krameri*) begin gonadal growth in the spring so that breeding promptly yields or occur simultaneously with the first rains of the monsoon in June or July.

Another group of birds including the house sparrow (*Passer domesticus*), blue rock pigeon (*Columba livia*) and red turtle Dove (*Streptopelia tranquebarica*) has a bimodal breeding season with nesting materialize in spring and autumn, towards the end and promptly after the monsoon. Although breeding is non seasonal in some tropical birds, in many it is seasonal, be determined by primarily on the pattern of rainfall. Seasonal breeding also depends on the rainfall in other habitats, such as Savanna grasslands of Africa. For example, the red billed quelea (*Quelea quelea*) breeds only during the rainy season when there is an shoot up in the insect food supply (Jones and Wood, 1976). The birds migrate following the rain patterns as they pass across the continent, terminating to breed, when the occasion occurs.

3.2. Seasonal Breeding and maternal food supply

Ward, (1969) reported the bit part of food supply as a abutting factor providing essential complementary information to actuate the final reproductive ramifications is well understood in temperate zone breeders. Many species in tropical rain forests of Sarawak, in species such as the olive white throated bulbul (*Criniger phaecephalus*), the short-tailed jungle bladder (*Trichastoma malaccense*), and in Singapore, the yellow vented bulbul (*Pycnonotus goiavier*), the onset of egg production become visible to depend on an increase in muscle protein levels. The time when birds come to the conclusion to breed has a strong influence upon the likely success of raising their broods

to independence. Pairs of birds will generally take time in egg laying to heighten the food availability for their offsprings. However, one of the vigorous impact of climate change so far has been to alter the timing of spring. In response to milder temperatures, flowers and insects appear early than they used to. Songbirds struggle to match their timing to the changing climate could be facing population downfall.

3.3. Nesting biology studies

Hansel, (2000) suggested that nesting biology of some basic aspects has been described for majority of the Indian bird species. The nests of birds are condemning for successful reproduction. Nest microclimate can have an bump on egg development, Chick growth and fledgling success, look with favor that nest building behaviour should be under strapping selective pressure to nesting control. The internal microclimate of the nest is very condemnatory for avian fitness, it is expected that nest morphology is shaped by the local environment. The nests of birds that are good enough for sustaining the ideal microclimate conditions for egg and chick development, we discuss the diversity of nest morphologies found among species and individuals. we showed considerable substantiation of building transformation in nest size, lining and composition to local climate conditions. we recommend future or search ideas to improve our understanding of how word nest building behaviour evolved. There is general concurrence on the categories of classification for overall nest shape (Open cup, dome, cavity; (figure 2) and these grouping have been widely used. Broadly nests of birds can be classified as open cups and domes. There are also cavity nests, which may or not contain an open cup or Dome within them. Some nest shapes are hard to classify, like the pouches of some weavers, that are so deep that they are effectively more similar domed nest than an open nest. Similarly, the nests of some galliformes (like Bush Turkey malleefowl) are not conventional domed nests (With a roof and side entrance) but are, instead, large mounds on the ground where eggs are buried.

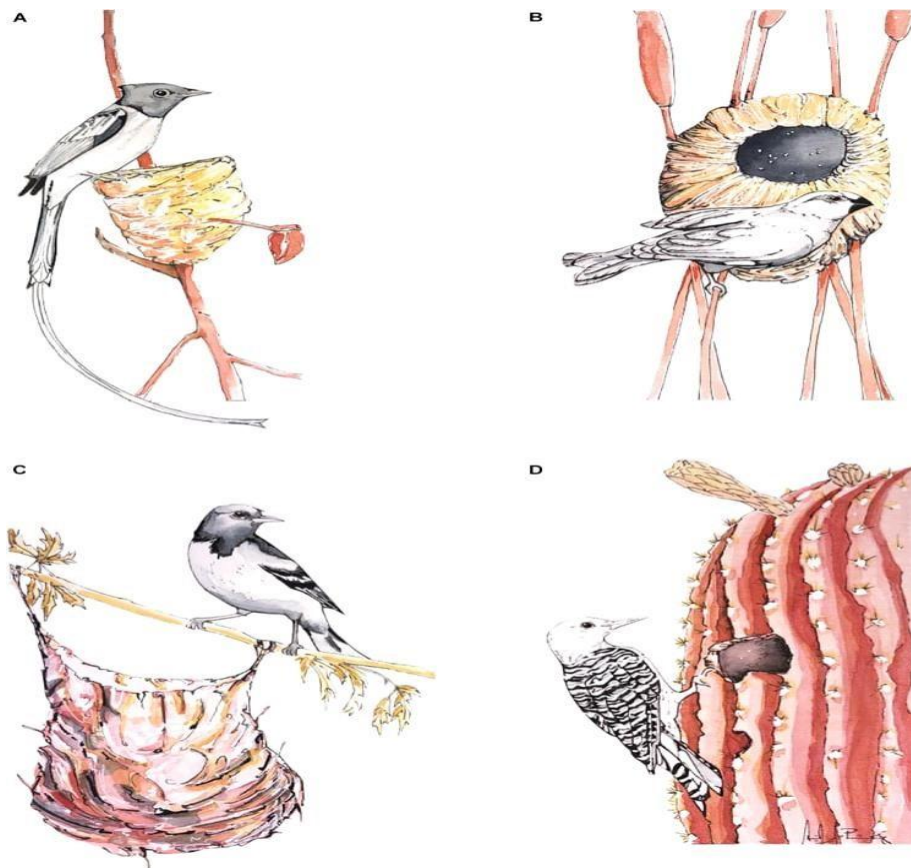


FIGURE 2. Bird nest shape classification (A) supported cup from *Terpsiphone mutata*; (B) dome from *Amblyospiza albifrons*; (C) suspended cup (pouch) from *Icterus galbula*; (D) cavity from *Melanerpes uropygialis*. Colors were chosen to contrast birds from nests and do not depict natural colours. Illustration by DMP. (Reference from “ *Climate as an Evolutionary Driver of Nest Morphology in Birds* ” by Daniela M. Perez, Janet L. Gardener, Ilaina Medina).

Fletcher *et al* (2006) suggested that the nest predation is a critical demographic parameter for declining grassland songbirds and control of multiple species of predators from large grassland tracts may increase the productivity of prairie-nesting ducks (Greenwood and Sovada, 1966). Although reason is for generally lower rates of predation on grassland bird nests in the North East may be difficult to discern, there is a clear relationship between rates for brown headed cowbird abundance and brood parasitism for obligate grassland breeding birds in the Midwest and Northeast.

3.4. Temperature variation and breeding

(Hurrell and Trenberth, 2010; IPCC, 2013) reported that Global Average temperatures are increasing, with significant rates of increase in

the past half century and the potential for global climate change (warming) to disrupt or otherwise effective the timing of breeding in migratory birds is substantial (Dunn and Winkler, 2010; Visser *et al*, 2010; Cohen *et al.*, 2018).

Migratory birds are thought to be particularly vulnerable because they may not be able to adjust their breeding phenology as global temperatures increase (Strode, 2003; Miller-Rushing *et al.*, Both *et al.*, 2010). To the contrary, a growing body of research is finding that warming in Temperate latitudes associated with global climate change in advancing the timing of clutch initiation in several species of migratory birds (Dunn and Winkler, 1999, 2010; Both *et al.*, 2004; Mazerolle *et al.*, 2011; Tomotani *et al.*, 2018). Earlier nesting may be a

by product of temperature- related advances in plant and insect phenology experienced by birds upon arrival and breeding grounds (Townsend *et al.*, 2013;Shave *et al.*, 2019). However earlier breeding can cause reductions in reproductive success, if the timing of breeding creators' mismatch between seasonal pulses in critical resources (Both *et al.*, 2010) (i.e, food) and peak demand for feeding young ones (Visser and Gienapp, 2019).

Mansouri *et al* (2020) recorded that bird species select the breeding time during suitable periods to ensure better breeding success. Moreover, with climate change, many avian species have shifted their breeding and migration dates as an adjustment to avoid the negative consequences of these environmental conditions (Balbontin *et al* 2009).

4. Conclusion

The present study contributes to the knowledge about Seasonal Fluctuations, Feeding Guilds and Breeding Biology of Avian Species. Variations in seasons has led to an immense change of the avifauna. Generally, bird diversity and abundance were largely influenced by the farming activities and bush fire, and the impact is varied according to the season and type of wetland. The overall impacts of these all-environmental determinants negate the role of the disturbance scenario and hence, may not be entirely recommended as conservation measure to increase bird population and diversity. Furthermore, our study is an attempt to detect a significant relationship between changes in the duration of breeding season and migratory habits.

6. References

1. Anderson BW, Ohmart RD, Rice J. Seasonal changes in avian density and diversities. *Stud Avian Biol.* 1981;6:262–4.
2. Anderson BW. Seasonal variations in forest birds of Western Oregon. *Northwest Sci.* 1972;46(3):194–206.
3. Balbontín J, Møller AP, Hermosell IG, Marzal A, Reviriego M, De Lope F (2009) Divergent patterns of impact of environmental conditions on life history traits in two populations of a long-distance migratory bird. *Oecologia* 159:859–872.
4. Berthold, P. (2001). *Bird Migration: A General Survey*, 2nd Edn. New York, NY: Oxford University Press.
5. Best LB. Seasonal changes in detection of individual bird species. *Stud Avian Biol.* 1981;6:252–61.
6. Blake JG. Temporal variation in point counts of birds in a lowland wet forest in Costa Rica. *Condor.* 1992;94:265–75.
7. Borgmann KL (2010) Mechanisms underlying intra-seasonal variation in the risk of nest predation: implications for breeding phenology. Tucson: University of Arizona.
8. Both C, Bouwhuis S, Lessells CM, Visser ME. Climate change and population declines in a long-distance migratory bird. *Nature.* 2006;441:81–3.
9. Both, C. (2010). "Food availability, mistiming, and climatic change," in *Effects of Climate Change on Birds*, eds A. P. Møller, W. Fielder, and P. Berthold (Oxford, UK: Oxford University Press), 129–147.
10. Both, C. (2010). "Food availability, mistiming, and climatic change," in *Effects of Climate Change on Birds*, eds A. P. Møller, W. Fielder, and P. Berthold (Oxford, UK: Oxford University Press), 129–147.
11. Both, C., and Visser, M. E. (2001). Adjustment to climate change is constrained by arrival date in a long-distance migrant bird. *Nature* 411, 296–298.
12. Both, C., Artemyev, A. V., Blaauw, B., Cowie, R. J., Dekhuijzen, A. J., Eeva, T., et al. (2004). Large-scale geographical variation confirms that climate change causes birds to lay earlier. *Proc. R. Soc. B* 271, 1657–1662.
13. Both, C., Artemyev, A. V., Blaauw, B., Cowie, R. J., Dekhuijzen, A. J., Eeva, T., et al. (2004). Large-scale geographical variation confirms that climate change

- causes birds to lay earlier. *Proc. R. Soc. B* 271, 1657–1662.
14. Both, C., Bouwhuis, S., Lessells, C. M., and Visser, M. E. (2006). Climate change and population declines in a long-distance migratory bird. *Nature* 441, 81–83.
 15. Both, C., van Asch, M., Bijlsma, R. G., van den Burg, A. B., and Visser, M. E. (2009). Climate change and unequal phenological changes across four trophic levels: constraints or adaptations? *J. Anim. Ecol.* 78, 73–83.
 16. Both, C., van Turnhout, C. A. M., Bijlsma, R. G., Siepel, H., van Strien, A. J. V., and Foppen, R. P. B. (2010). Avian population consequences of climate change are most severe for long-distance migrants in seasonal habitats. *Proc. R. Soc. B* 277, 1259–1266.
 17. Bulluck, L., Huber, S., Viverette, C., and Blem, C. (2013). Age-specific responses to spring temperature in a migratory songbird: older females attempt more broods in warmer springs. *Ecol. Evol.* 3, 3298–3306.
 18. Charmantier, A., and Gienapp, P. (2014). Climate change and timing of avian breeding and migration: evolutionary versus plastic responses. *Evol. Appl.* 7, 15–28.
 19. Coe, B. H., Beck, M. L., Chin, S. Y., Jachowski, C., and Hopkins, W. A. (2015). Local variation in weather conditions influences incubation behavior and temperature in a passerine bird. *J. Avian Biol.* 46, 385–394.
 20. Cohen, J. M., Lajeunesse, M. J., and Rohr, J. R. (2018). A global synthesis of animal phenological responses to climate change. *Nat. Clim. Change* 8, 224–228.
 21. Conway CJ, Martin TE (2000) Effects of ambient temperature on avian incubation behavior. *Behavioral Ecology* 11: 178–188.
 22. Conway CJ, Martin TE (2000) Evolution of passerine incubation behavior: Influence of food, temperature, and nest predation. *Evolution* 54: 670–685.
 23. Conway, C. J., and Martin, T. E. (2000). Effects of ambient temperature on avian incubation behavior. *Behav. Ecol.* 11, 178–188.
 24. Cotton, P. A. (2003). Avian migration phenology and global climate change. *Proc. Natl. Acad. Sci. U S A.* 100, 12219–12222.
 25. Cox, A., Robertson, R., Lendvai, Á, Everitt, K., and Bonier, F. (2019). Rainy springs linked to poor nestling growth in a declining avian aerial insectivore *Tachycineta bicolor*. *Proc. R. Soc. B* 286:20190018.
 26. Dodson, J. C., Moy, N. J., and Bulluck, L. P. (2016). Prothonotary warbler nestling growth and condition in response to variation in aquatic and terrestrial prey availability. *Ecol. Evol.* 6, 7462–7474.
 27. Drapeau P, Leduc A, McNeil R. Refining the use of point counts at the scale of individual points in studies of bird-habitat relationships. *J Avian Biol.* 1999;30(4):367–82.
 28. Dunn, P. O., and Winkler, D. W. (1999). Climate change has affected the breeding date of tree swallows throughout North America. *Proc. R. Soc. B* 266, 2487–2490.
 29. Dunn, P. O., and Winkler, D. W. (2010). “Effects of climate change on timing of breeding and reproductive success in birds,” in *Effects of Climate Change on Birds*, eds A. P. Møller, W. Fielder, and P. Berthold (Oxford, UK: Oxford University Press), 113–128.
 30. Dunn, P. O., and Winkler, D. W. (2010). “Effects of climate change on timing of breeding and reproductive success in birds,” in *Effects of Climate Change on Birds*, eds A. P. Møller, W. Fielder, and P. Berthold (Oxford, UK: Oxford University Press), 113–128.
 31. Franks, S. E., Pearce-Higgins, J. W., Atkinson, S., Bell, J. R., Botham, M. S., Brereton, T., et al. (2018). The sensitivity of breeding songbirds to changes in seasonal timing is linked to population change but cannot be directly attributed to the effects of trophic asynchrony on productivity. *Glob. Change Biol.* 24, 957–971.
 32. Grant TA, Shaffer TL, Madden EM, Pietz PJ (2005) Time-specific variation in passerine nest survival: New insights into old questions. *Auk* 122: 661–672.
 33. Gruebler MU, Naef-Daenzer B (2010) Fitness consequences of timing of breeding

- in birds: date effects in the course of a reproductive episode. *Journal of Avian Biology* 41: 282–291.
34. Halupka, L., Dyrzcz, A., and Borowiec, M. (2008). Climate change affects breeding of reed warblers *Acrocephalus scirpaceus*. *J. Avian Biol.* 39, 95–100.
 35. Hilton GM, Hansell MH, Ruxton GD, Reid JM, Monaghan P (2004) Using Artificial Nests to Test Importance of Nesting Material and Nest Shelter for Incubation Energetics. *The Auk* 121:777–787.
 36. Hoover, J. P. (2001). An Experimental Study of Behavioral Responses to Nest Predation and Brood Parasitism in a Migratory Songbird. Dissertation. Urbana: University of Illinois at Urbana-Champaign.
 37. Hoover, J. P. (2003b). Multiple effects of brood parasitism reduce the reproductive success of prothonotary warblers, *Protonotaria citrea*. *Anim. Behav.* 65, 923–934.
 38. Hoover, J. P., Davros, N. M., Schelsky, W. M., and Brawn, J. D. (2020). Local neighbor density does not influence reproductive output in a secondary cavity-nesting songbird. *The Auk: Ornithol. Adv.* 137, 1–15.
 39. Hurrell, J. W., and Trenberth, K. E. (2010). “Climate change,” in *Effects of Climate Change on Birds*, eds A. P. Møller, W. Fiedler, and P. Berthold (London, UK: Oxford University Press), 9–38.
 40. Järvinen O, Väisänen RA, Haila Y. Bird census results in different years, stages of the breeding season and times of the day. *Ornis Fenn.* 1977;54:108–18.
 41. Landa K (1992) Seasonal Declines in Offspring Fitness and Selection for Early Reproduction in Nymph Overwintering Grasshoppers. *Evolution* 46: 121–135.
 42. Lima SL (2009) Predators and the breeding bird: behavioral and reproductive flexibility under the risk of predation. *Biological Review* 84: 485–513.
 43. Mansouri I, Al-Sadoon MK, Rochdi M, Paray BA, Dakki M, Elghadraoui L (2019) Diversity of feeding habitats and diet composition in the turtle doves *Streptopelia turtur* to buffer loss and modification of natural habitats during breeding season. *Saudi Journal of Biological Sciences* 26:957–962.
 44. Mansouri I, Mounir M, Squalli W, Elhanafi L, Dakki M, El Ghadraoui L (2020) Migratory Dates, Breeding Phenology, and Reproductive Success of European Turtle Doves between Lowlands and Highest Breeding Habitats in North Africa. *International Journal of Zoology* 7pp.
 45. Marica PP, Francis CM, Mulvihill RS, Moore FR. The influence of climate on the timing and rate of spring bird migration. *Oecologia.* 2005;142:307–15.
 46. Martin TE (1987) Food as a limit on breeding birds: A life-history perspective. *Annual Review of Ecology and Systematics* 18:453–487.
 47. Martin TE (1992) Breeding productivity considerations: what are the appropriate habitat features for management? In: Haggan JM, III and D. W Johnson, editor. *Ecology and conservation of Neotropical migrant landbirds*. Washington DC.: Smithsonian Institute Press. 455–473.
 48. Martin TE (1995) Avian life-history evolution in relation to nest sites, nest predation, and food. *Ecological Monographs* 65: 101–127.
 49. Martin TE. Avian life history evolution in relation to nest sites, nest predation and food. *Ecol Monogr.* 1995;65:101–27.
 50. Miller-Rushing, A. J., Lloyd-Evans, T. L., Primack, R. B., and Satzing, P. (2008). Bird migration times, climate change, and changing population sizes. *Glob. Change Biol.* 14, 1959–1972.
 51. Moller AP (2006) Rapid change in nest size of a bird related to change in a secondary sexual character. *Behavioral Ecology* 17:108–116.
 52. Møller AP, Fiedler W, Berthold P (2010) Effects of climate change on birds. OUP Oxford.
 53. Møller, A. P., Flensted-Jensen, E., Klarborg, K., Mardal, W., and Nielsen, J. T. (2010). Climate change affects the duration of the reproductive season in birds. *J. Anim. Ecol.* 79, 777–784.
 54. Møller, A. P., Flensted-Jensen, E., Klarborg, K., Mardal, W., and Nielsen, J.

- T. (2010). Climate change affects the duration of the reproductive season in birds. *J. Anim. Ecol.* 79, 777–784.
55. Monkkönen, M., Helle, P., and Soppela, K. (1990). Numerical and behavioral-responses of migrant passerines to experimental manipulation of resident tits (*Parus* spp.) – heterospecific attraction in Northern breeding bird communities. *Oecologia* 85, 218–225.
56. Murphy MT (1986) Temporal components of reproductive variability in Eastern Kingbirds (*Tyrannus tyrannus*). *Ecology* 67: 1483–1492.
57. Newton I. The migration ecology of birds. London: Academic Press; 2007
58. Nsor CA, Obodai EA. Environmental determinants influencing seasonal variations of bird diversity and abundance in wetlands, northern region (Ghana). *Ann Exp Biol.* 2014;2(3):17–30.
59. Parejo, D. (2016). Informational mismatches: a neglected threat of climate change to interspecific interactions. *Front. Ecol. Evol.* 4:31.
60. Perrins CM (1965) Population fluctuations and clutch-size in the Great Tit *Parus major* L. *Journal of Animal Ecology.* 34: 604–647.
61. Perrins, C. M. (1970). The timing of birds' breeding seasons. *Ibis* 112, 242–255.
62. Poulin B, Lefebvre G, McNeil R. Tropical avian phenology in relation to abundance and exploitation of food resources. *Ecology.* 1992;73:2295–309.
63. Primack, R. B., Ibanez, I., Higuchi, H., Lee, S. D., Wilson, A. M., et al. (2009). Spatial and interspecific variability in phenological responses to warming temperatures. *Biol. Conserv.* 142, 2569–2577.
64. Ricklefs RE (1969) An analysis of nesting mortality in birds. *Smithsonian Contributions to Zoology* 9: 1–48.
65. Robbins CS. Bird activity levels related to weather. *Stud Avian Biol.* 1981;6:301–10.
66. Schmidt KA, Goheen JR, Naumann R (2001) Incidental nest predation in songbirds: Behavioral indicators detect ecological scales and processes. *Ecology* 82: 2937–2947.
67. Scott G. *Essential ornithology.* Oxford: Oxford University Press; 2010.
68. Seoane J, Villen-Perez S, Carrascal LM. Environmental determinants of seasonal change in bird diversity of Mediterranean oakwoods. *Ecol Res.* 2013.
69. Stone D, Cherry M, Martin J, Cohen B, Miller K (2017) Breeding chronology and social interactions affect ungulate foraging behavior at a concentrated food resource. *PLOS ONE* 12:e0178477.
70. Svensson E (1997) Natural selection on avian breeding time: causality, fecundity-dependent, and fecundity-independent selection. *Evolution* 51: 1276–1283.
71. Verhulst S, Vanbalen JH, Tinbergen JM (1995) Seasonal Decline in Reproductive Success of the Great Tit - Variation in Time or Quality. *Ecology* 76: 2392–2403.
72. Visser, M. E., Both, C., and Lambrechts, M. M. (2004). Global climate change leads to mistimed avian reproduction. *Adv. Ecol. Res.* 35, 89–110.
73. Visser, M. E., Perdeck, A. C., van Balen, J. H., and Both, C. (2009). Climate change leads to decreasing bird migration distances. *Glob. Change Biol.* 15, 1859–1865.
74. Winter M, Johnson DH, Shaffer JA (2005) Variability in vegetation effects on density and nesting success of grassland birds. *Journal of Wildlife Management* 69: 185–197.

SYNTHESIS AND ANTIMICROBIAL EVALUATION OF INDAZOLE: A REVIEW**Neeraj Pooni and Anshul Chawla**

Department of Pharmaceutical Chemistry, CT University, Ludhiana (Punjab), India

ABSTRACT

Indazole heterocyclic ring which can be used as potent antimicrobial agents. Furthermore, the research work on Schiff bases is engaging the attention of researchers due to good biological activity. Nitrogen-containing heterocycles are having a lot of significance due to their broad range of pharmacological and biological activity. The various five membered rings are Pyrrole, Furan and Thiophene with Nitrogen, Oxygen and Sulphur as heteroatom respectively. They have significant role in the medicinal chemistry, polymers, industries, agricultural sciences.

Keywords: Heterocycles, Indazole, Antimicrobial activity

Introduction

Antimicrobial agents are the important class of chemotherapeutic drugs that are essential to treat severe infections caused by microorganisms. It is obtained from synthetic, semi synthetic and natural sources. These agents work by two modes either kill the micro-organisms (*microbiocidal*) or stop the growth of microorganisms (*microbiostatic*) with minimal effects to the host. They target the DNA of microorganisms and causes alteration, disturb the metabolic processes and interfere with cell wall synthesis of microorganisms. As a result the normal functioning of microorganisms get disturbed and it's not able to divide further. There is a critical need for the development of new antimicrobial agents due to the short expectancy of already available drugs. These microbes undergo mutation and adapted its environment. In order to fight against the resistant strain the new antimicrobial agents are in great demand.

Types of antimicrobial therapy

Anti agents	Microbial	Microbial infections
Antiviral agents		To treat viral infection
Antibacterial agents		To treat bacterial infection
Antifungal agents		To treat fungal infection
Antiprotozoal agents		To treat protozoan infection
Antiparasitic agents		To treat parasitic infection

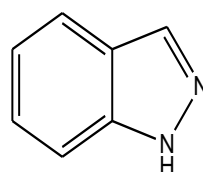
Types of antimicrobial therapy

Heterocyclic are the aromatic compounds containing heteroatoms (like sulphur, oxygen, nitrogen) in their ring structure. These compounds are further fused with other five membered and six membered rings. Pyridine,

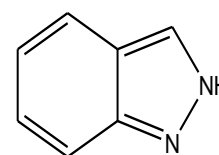
Pyrrole, Furan and Thiophene are some of the known heterocyclic compounds. The six membered heterocyclic compounds is Pyridine containing nitrogen as a heteroatom. The various five membered rings are Pyrrole, Furan and Thiophene with Nitrogen, Oxygen and Sulphur as heteroatom respectively. They have significant role in the medicinal chemistry, polymers, industries, agricultural sciences.

Indazole

The indazole is an aromatic heterocyclic compound containing nitrogen as a heteroatom. They are bicyclic in nature with 10 π -electrons system. They are fused with benzene and pyrazole making Indazole. They are also known as benzopyrazole or isoindazone. Indazole exists in two tautomeric forms such as 1H-indazole and 2H-indazole. This is due to transfer of protons between two nitrogen atoms of pyrazole ring which is fused with benzene ring.



1H-indazole

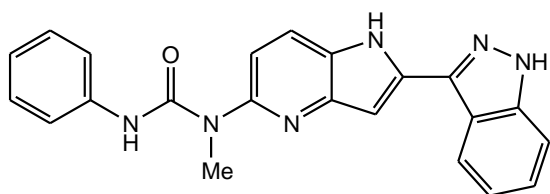


2H-indazole

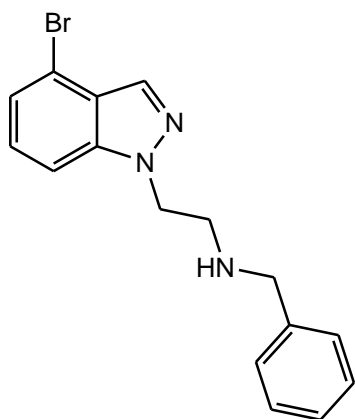
Structure of Indazole

Indazole has wide ranges of biological activities and found great importance in medicinal chemistry. Some of them are summarised below:

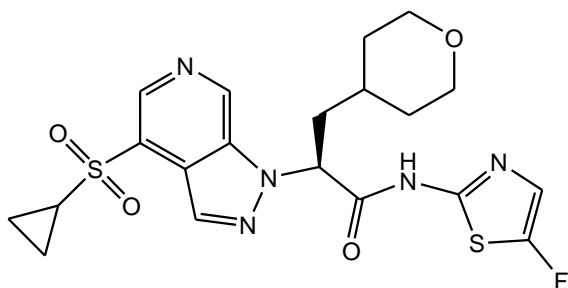
Antitumour activity – Various 3-(pyrrolopyridin-2 yl) indazole derivatives were found to possess potential antitubercular activity.

**Figure 1**

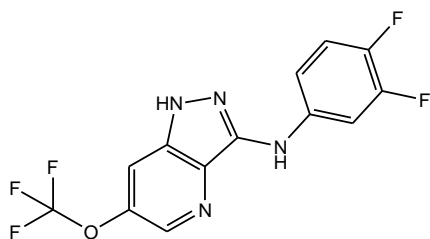
Antimicrobial activity- Various 4-bromo-1H-indazole derivatives act as potential antimicrobial agents with low toxicity.

**Figure 2**

Anti-Diabetic activity- Various 1, 4-disubstituted Indazole derivatives are found to have anti-diabetic effects.

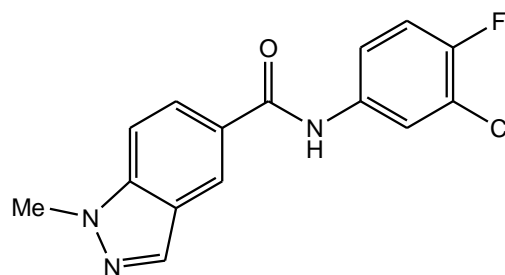
**Figure 3**

Antiinflammatory activity- The Indazole derivatives such as 1H-indazole derivatives are found to have anti-inflammatory activities.

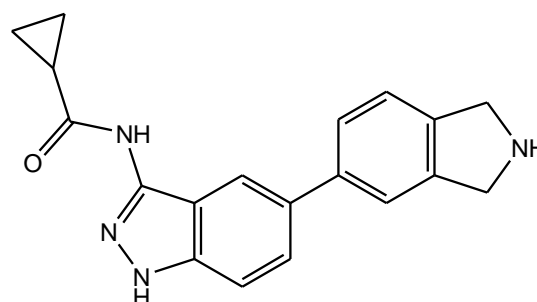
**Figure 4**

Antiparkinson's agents- The Indazole derivatives such as N-alkyl-substituted

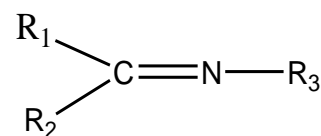
indazole-5-carboxamide derivatives are found to possess antiparkinsons activity.

**Figure 5**

Treatment of Anemia- Various Indazole derivatives like 5-substituted indazole derivative are used in the treatment of anaemia.

**Figure 6**

The schiff bases are also known as Azomethines. It is named to honour Hugo Schiff, who formed such compounds. These compounds contains -C=N- group in its structure. A Schiff base is very versatile compound in medicinal chemistry in which a carbon-nitrogen double bond act as a functional group, where the nitrogen atom bonded to aryl group or alkyl group (R) but not hydrogen. The general structure of Schiff base is given as

**Figure 7**

Where R₁, R₂, R₃ = phenyl or alkyl group

Review of Literature

Schiff bases are critically important in pharmaceutical fields due to a broad spectrum of biological activities. Research Studies enlightened that the schiff base played an influencing role in development of medicinal chemistry. The research work reported in literature are enlisted below

Essa et al., 2012 synthesised and evaluated Schiff bases by the condensation of salicylaldehyde and *o*-vanillin with 4,4-diaminodiphenylmethane, 4,4-diaminodiphenyl sulphide, and diethyl ester of terephthalic acid. The compounds are evaluated for antimicrobial activity *K. pneumoniae*, *E. coli*, *S. aureus*, and *S. typhimurium*. The novel synthesised compounds were found strongly active.

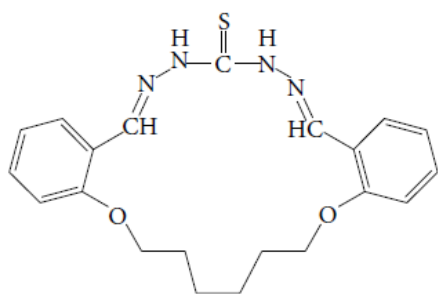


Figure 8

Shelke et al., 2012 prepared solid complexes with Schiff bases such as 4-hydroxy-3-(1-(2-(2-hydroxybenzylidene)-amino-phenylimino)-ethyl)-6-methyl-pyran-2-ones. It was evaluated for antimicrobial activity against *S. aureus*, *E. coli*, and *Bacillus* species and antifungal activity against *A. niger*, *Trichoderma*, and *F. oxysporum*. The complexes formed were found to be biologically active against these microorganisms.

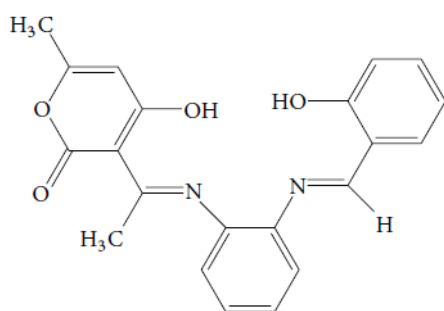


Figure 9

Malladi et al., 2013 synthesised and evaluated Schiff base derivatives, 4-[(3-substituted-1H-pyrazol-3-yl)methyleneamino]-5-substituted-4H-1,2,4-triazole-3-thiols. It was screened for antibacterial activity against the microbial strains of *S. aureus*, *P. aeruginosa*, *B. subtilis*, and *E. coli*. The compound which was found to be equally active as active as standard drug ceftriaxone against *P. aeruginosa*, *B. subtilis*, and *E. coli* and most active against *S. aureus* is shown in figure

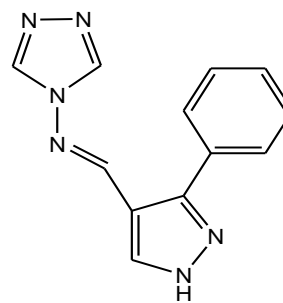


Figure 10

Parikh et al., 2013 synthesised and evaluated Schiff bases for antibacterial activity by growth dilution method. The compounds were screened against *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Staphylococcus pyogenes*. The compound 1 was biologically active against *E. coli* and moderately active against *S. aureus*. The Compound 2 was moderately active against *E. coli* and *P. aeruginosa*. The Compound SPVI-07 was moderately active against *E. coli* and *P. aeruginosa*. Compound SPVI-08 was moderately active against *S. aureus* and *S. Pyogenes*. Compound SPVI09 was good active against *E. coli* and moderately active against *P. aeruginosa*. Compound SPVI-12 was good active against *E. coli* and *P. aeruginosa*.

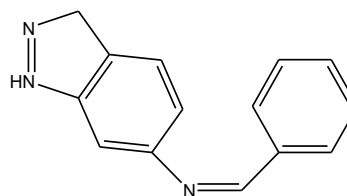


Figure 11

Qin et al., 2015 synthesised an aromatic carboxylic acid amides containing ¹H-indazole moiety based and evaluation of their activities against six phytopathogenic fungi. It was evaluated that all of the target molecules displayed moderate to good activity. The derivative, N-(2-(1H-indazol-1-yl)phenyl)-2-(trifluoromethyl)-benzamide exhibited the highest antifungal activity against *Pythium aphanidermatum* and *Rhizoctonia solani*. The molecular docking studies indicated that the fluorine and the carbonyl oxygen atom of formed hydrogen bonds with the hydroxyl hydrogens of TYR58 and TRP173.

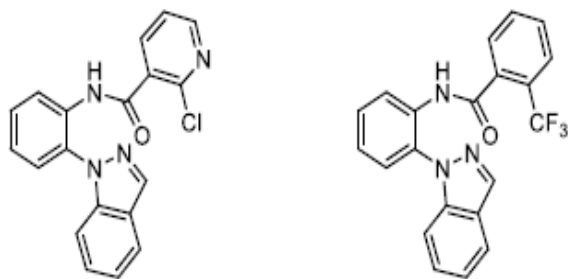


Figure 13

Ma *et al.*, 2015 synthesised series of novel 4-bromo-1H-indazole derivatives aiming the compounds were evaluated of their antibacterial activity and cell inhibitory activity against Gram-positive and Gram-negative bacteria. Among all the tested compounds shown below exhibited more potent activity than against penicillin-resistant staphylococcus aureus .

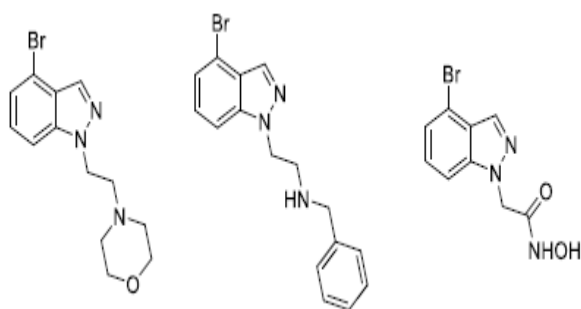


Figure 14

Pérez-Villanueva *et al.*, 2017 synthesised a new set of 2H-indazole derivatives and screened their activities against selected intestinal and vaginal pathogens, including the protozoa *Giardia intestinalis*, *Entamoeba histolytica*, *Trichomonas vaginalis*; the bacteria *Escherichia coli* and *Salmonella enterica serovar Typhi*; and the yeasts *Candida albicans* and *Candida glabrata*. Biological evaluations revealed that most of the synthesized compounds showed more potent antiprotozoal activity than metronidazole.

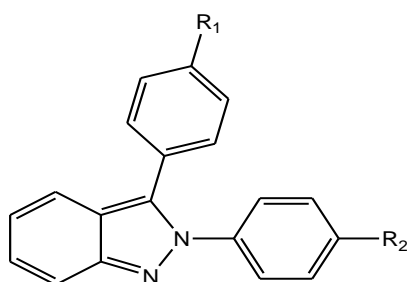


Figure 15

Compounds	R ₁	R ₂
Compound 1	-H	-SO ₂ CH ₃
Compound 2	-SO ₂ CH ₃	-H
Compound 3	-CO ₂ CH ₃	-H
Compound 4	-H	-CO ₂ CH ₃

Abbas *et al.*, 2018 synthesised and screened the antibacterial and anti-fungal activity by the agar diffusion method using two types of bacteria *Escherichia coli* and *Bacillus subtilis* and one type of fungal *Candida albicans*. The zones of inhibition formed were measured in millimeter. The synthesised compounds possess good antibacterial activities and anti-fungal activity in terms of minimum inhibitory concentration.

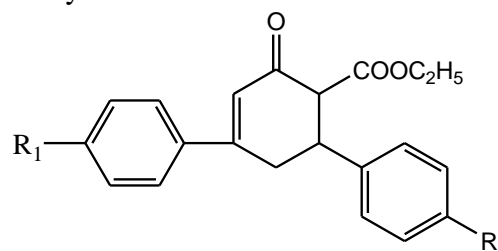


Figure 16

Compounds	R ₁	R ₂
Compound 1	-OH	-H
Compound 2	-OH	-OCH ₃
Compound 3	-CH ₃ -CH ₂ -COO-CH ₂ -CO-	-H
Compound 4	-CH ₃ -CH ₂ -COO-CH ₂ -CO-	-CH ₃
Compound 5	-CH ₃ -CH ₂ -COO-CH ₂ -CO-	-OCH ₃

Begic *et al.*, 2019 synthesised two new cationic complex compounds of Ru(III) with Schiff bases. Various derivatives of *N*-phenyl-5-X-salicylideneimine (where X = H or Br) and indazole were synthesized. The Schiff bases acted as anionic bidentate oxygen, Nitrogen donor ligands, while Indazole occurred as a monodentate Nitrogen ligand.

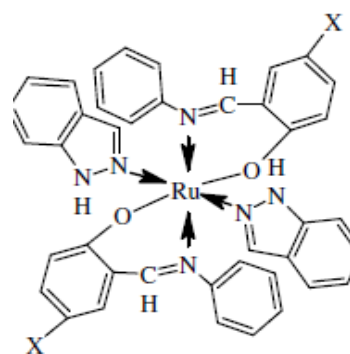


Figure 17

Bushra et al., 2021 synthesised various Indazole Schiff base. The newly synthesised structures were evaluated by EI-MS, HREI-MS, ^1H - and ^{13}C -NMR. The stereochemistry was synthesised by the software 2D-NOESY. The newly synthesised compounds were screened for α -glucosidase enzyme inhibitory activity, *in vitro*. It was evaluated that newly synthesised compounds showed potent α -glucosidase inhibitory.

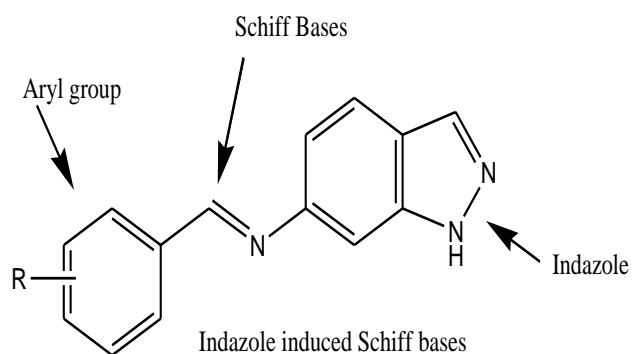


Figure 18

Chaudhari et al 2019 synthesized bicyclic pyrazole bearing heterocyclic compounds 2H-Indazole unit has been reorganized by a "privileged structure" and was an important pharmacophore in medicinal chemistry. Indazoles was rare in nature and to date only three natural products possessed the indazole ring has been isolated are Nigellicine, Nigeglanine and Nigellidine.

Figure 19

Gaikwad et al 2022 studied the silico design, synthesis and biological evaluation of novel effective phenyl, indole, 3, 4-dimethyl substituted 4, 5, 6, 7- tetrahydro-1H-indazole derivatives. The novel multi- substituted

indazole derivatives (5A-5J) were synthesized from the treatment of hydrazine hydrates in MeOH/H⁺ with multi substituted cyclohexanone derivatives (4a-4j). The final scaffold was characterized with the help of spectroscopic data such as IR, ^1H NMR, ^{13}C NMR, and mass spectra. The compound 5A, 5D, and 5F shows excellent antibacterial activity and the compounds 5B, 5C, 5H 5I and 5J exhibited moderate antibacterial activity against the *S. aureus*, *Bacillus subtilis* and *E.Coli*. Finally, the molecular docking studies shows that the compound 5D and 5F scaffolds display excellent bonding mode of interactions with the active site of DNA gyrase 1KZN enzyme.

Kim et al (2021) synthesized 1H-indazoles via Silver (I)-mediated Intramolecular Oxidative C-H Bond amination. Indazole and its derivatives were ubiquitously found in a broad spectrum of biological and pharmaceutical applications. In particular, as a surrogate of indole that was a central motif in natural and synthetic pharmacophores, indazole still has extensive space of derivatization to expand a new chemical territory for the acquisition of patents. Indeed, indazole moiety was found in a variety of FDA-approved drugs such as Granisetron (5-HT₃ antagonist) as an antiemetic drug and Lonidamine (antiglycolytic drug) for brain tumor treatment. In addition, indazoles are also found as a core structure in tyrosine kinase inhibitors such as Axitinib, Pazopanib, and Entrectinib for renal cell carcinoma treatment 3c, d or for ROS-1 positive, metastatic nonsmall cell lung cancer.

Keating et.al 2021 represented a promising pharmacophore, commonly incorporated in a variety of therapeutic drugs. Although indazole-containing drugs were frequently marketed as the corresponding N-alkyl 1H- or 2H-indazole derivative, the efficient synthesis and isolation of the desired N-1 or N-2 alkyl indazole regioisomer could often be challenging and adversely affect product yield. Thus, as part of a broader studied focusing on the synthesis of bioactive indazole derivatives.

Figure 20**Conclusion**

Microorganisms have injurious effects on our health. There is a noteworthy achievement of researchers in healthcare sector but still we are lacking behind in this area. Microbes undergo evolution and one of the leading causes of deaths in the world. So it is a matter of

scientific concern. There is a great demand for the development of new drugs to battle this problem. Significant researches have been carried out in the area of Schiff bases. Most of the research on the Schiff bases is based on metal complexes by coordination method. From the literature survey it is clear that there is a need of further research on the Schiff bases of indazole for antimicrobial activity. Moreover, it's quite challenging to form newly synthesised agents with good antimicrobial activity at lower concentrations. Researchers are devoted to synthesise the compounds that are effective towards the multidrug resistant microbial infections.

References

1. Abbas, S. F., & Tomma, J. H. (2018). New indazole compounds Derived from Ethyl-4-Hydroxy-4'-Substituted-Cyclohexen-6-One- carboxylate: Synthesis and Biological Activity. *Journal of Global Pharma Technology*, 10(11), 861–872.
2. Aboul-Fadl, T., Mohammed, F. A., & Hassan, E. A. (2003). Synthesis, antitubercular activity and pharmacokinetic studies of some Schiff bases derived from 1- alkylisatin and isonicotinic acid hydrazide (INH). *Archives of Pharmacal Research*, 26(10), 778–784.
3. Ali, S. M. M., Azad, M. A., Jesmin, M., Ahsan, S., Rahman, M. M., Khanam, J. A., Shahriar, S. M. (2012). In vivo anticancer activity of vanillin semicarbazone. *Asian Pacific Journal of Tropical Biomedicine*, 2(6), 438–442.
4. Arora, P., Arora, V., Lamba, H. S., & Wadhwa, D. (2012). Importance of heterocyclic chemistry: A review. *International Journal of Pharmaceutical Sciences and Research*, 3(9), 2947–2954.
5. Asif, M. (2017). Antimicrobial Agents . *Journal of Analytical and Pharmaceutical Research*, 4(3).
6. Azab, M. E., Youssef, M. M., & El-Bordany, E. A. (2013). Synthesis and antibacterial evaluation of novel heterocyclic compounds containing a sulfonamido moiety. *Molecules*, 18(1), 832–844.
7. Bader, N. R. (2010). Applications of Schiff's bases chelates in quantitative analysis: A review. *Rasayan Journal of Chemistry*, 3(4), 660–670.
8. Begic, S., Ljubijankic, N., Gojak-Salimovic, S., & Osmic, E. (2019). Novel complexes of ruthenium(III) with Schiff bases and indazole-Synthesis and characterization. *Rasayan Journal of Chemistry*, 12(1), 294 - 299
9. Broughton, H. B., & Watson, I. A. (2004). Selection of Heterocycles for drug design. *Journal of Molecular Graphics and Modelling*, 23(1), 51–58.
10. Bushra, S. s., Khan, K. M., & Ullah, N., Synthesis, Mohammad Mahdavi, Mohammad Ali Faramarzi, Bagher, Uzma Salar, Rafaila Rafique, Muhammad Taha, Shahnaz Perveen, 2021. In Vitro, and In Silico Evaluation of Indazole Schiff Bases as Potential α -Glucosidase Inhibitors. *Journal of molecular structure*. 4 June 2021, 130826.
11. Cao, X., Sun, Z., Cao, Y., Wang, R., Cai, T., Chu, W., Yang, Y. (2014). Design, synthesis, and structure–activity relationship studies of novel fused heterocycles-linked triazoles with good

- activity and water solubility. *Journal of Medicinal Chemistry*, 57(9), 3687–3706.
12. Chandramouli, C., Shivanand, M. R., Nayanbhai, T. B., Bheemachari, B., & Udipi, R. H. (2012). Synthesis and biological screening of certain new triazole Schiff bases and their derivatives bearing substituted benzothiazole moiety. *Journal of Chemical and Pharmaceutical Research*, 4(2), 1151–1159.
 13. Chaubey, A. K., & Pandeya, S. N. (2012). Synthesis and anticonvulsant activity (Chemo Shock) of Schiff and Mannich bases of isatin derivatives with 2-aminopyridine (mechanism of action). *International Journal of PharmTech Research*, 4(4), 590–598.
 14. Chen, Y., Yu, K., Tan, N. Y., Qiu, R. H., Liu, W., Luo, N. L., Yin, S. F. (2014). Synthesis, characterization and anti-proliferative activity of heterocyclic hypervalent organoantimony compounds. *European Journal of Medicinal Chemistry*, 79, 391–398.
 15. Cheruvallath, Z. S., Gwaltney, S. L., Sabat, M., Tang, M., Wang, H., Grimshaw, C. E. (2017). Discovery of potent and orally active 1,4-disubstituted indazoles as novel allosteric glucokinase Activators. *Bioorganic and Medicinal Chemistry Letters*, 27(12), 2678–2682.
 16. Chinnasamy, R. P., Sundararajan, R., & Govindaraj, S. (2010). Synthesis, characterization, and analgesic activity of novel Schiff base of isatin derivatives. *Journal of Advanced Pharmaceutical Technology and Research*, 1(3), 342–347.
 17. Desai, N. C., Dodiya, A., & Shihory, N. (2013). Synthesis and antimicrobial activity of novel quinazolinone–thiazolidine–quinoline compounds. *Journal of Saudi Chemical Society*, 17(3), 259–267.
 18. El-Sawy, E. R., Mandour, A. H., El-Hallouty, S. M., Shaker, K. H. H. M., & Abo-Salem, H. M. (2013). Synthesis, antimicrobial and anticancer activities of some new N-methylsulphonyl and N-benzenesulphonyl-3-indolyl heterocycles. *Arabian Journal of Chemistry*, 6(1), 67–78.
 19. Essa, H. H., Kandil, F., & Falah, A. (2012). Synthesis and identification of Schiff bases and biological activity new study. *Iraqi Journal Of Science*, 53(2), 230–240.
 20. Fukuda, T., Ueda, K., Ishiyama, T., Goto, R., Muramatsu, S., Hashimoto, M., Tanaka, N. (2017). Synthesis and SAR studies of 3,6-disubstituted indazole derivatives as potent hepcidin production inhibitors. *Bioorganic and Medicinal Chemistry Letters*, 27(10), 2148–2152.
 21. Gomtsyan, A. (2012). Heterocycles in drugs and drug discovery. *Chemistry of Heterocyclic Compounds*, 48(1), 7–10.
 22. Malladi, S., Isloor, A.M., Isloor, S., Akhila, D.S., & Fun, H. (2013). Synthesis, characterization and antibacterial activity of some new pyrazole based Schiff bases. *Arabian Journal of Chemistry*, 6(3), 335–340
 23. Miri, R., Razzaghi-Asl, N., & Mohammadi, M. K. (2013). QM study and conformational analysis of an is at in Schiff base as a potential cytotoxic agent. *Journal of Molecular Modeling*, 19(2), 727–735.
 24. Mounika, K., Pragathi, A., & Gyanakumari, C. (2010). Synthesis, characterization and biological activity of a Schiff base derived from 3-ethoxy salicylaldehyde and 2-amino benzoic acid and its transition metal complexes. *Journal of Scientific Research*, 2(3), 513–524.
 25. Parikh, K. S., & Vyas, S. P. (2013). In vitro biological evaluation of indazole-clubbed Schiff base derivatives. *Journal of Chemical and Pharmaceutical Research*, 5(2), 216–219.
 26. Pryde, D.C., Marron, B.E., West, C.W., Reister, S., Amato, G., Yoger, K., Gerlach, A.C. (2017). Discovery of a series of indazole TRPA1 antagonists. *ACS Medicinal Chemistry Letters*, 8(6), 666–671.
 27. Saini, M., Kumar, A., Dwivedi, J., & Singh, R.A. Review: Biological significances of Heterocyclic compounds. *International Journal of Pharmaceutical Sciences and Research*, 4(3, March).
 28. Salem, M. S., Sakr, S. I., El-Senousy, W. M., & Madkour, H. M. F. (2013). Synthesis, antibacterial, and antiviral evaluation of new heterocycles containing the pyridine moiety. *Archiv Der Pharmazie*, 346(10), 766–773.

29. Sathe, S., Jaychandran, E., Jagtap, V. A., & Sreenivasa, G. M. (2011). Synthesis characterization and anti-inflammatory evaluation of new fluorobenzothiazole Schiff's bases. *International Journal of Pharmaceutical Research and Development*, 3(3), 164–169.
30. Shelke, V. A., Jadhav, S. M., Patharkar, V. R., Shankarwar, S. G., Munde, A. S., & Chondhekar, T. K. (2012). Synthesis, spectroscopic characterization and thermal studies of some rare earth metal complexes of unsymmetrical tetradentate Schiff base ligand. *Arabian Journal of Chemistry*, 5(4), 501–507.
31. Sondhi, S. M., Singh, N., Kumar, A., Lozach, O., & Meijer, L. (2006.b). Synthesis, anti-inflammatory, analgesic and kinase (CDK-1, CDK-5 and GSK-3) inhibition activity evaluation of benzimidazole/benzoxazole derivatives and some Schiff's bases. *Bioorganic and Medicinal Chemistry*, 14(11), 3758–3765.
32. Song, P. R., Chen, M., Ma, X. D., Xu, L., Liu, T., Zhou, Y. B., & Hu, Y. Z. (2015). Identification of novel inhibitors of Aurora A with a 3-(pyrrolopyridin-2-yl)indazole scaffold. *Bioorganic and Medicinal Chemistry*, 23(8), 1858–1868.
33. Teixeira, F. C., Ramos, H., Antunes, I. F., Curto, M. J. M., Teresa Duarte, M., & Bento, I. (2006). Synthesis and structural characterization of 1-and 2-substituted indazoles: Ester and carboxylic acid derivatives. *Molecules*, 11, 867–889.
34. Tzvetkov, N.T., Stammler, H.G., Neumann, B., Hristova, S., Antonov, L., & Gastreich, M. (2017). Crystal structures, binding interactions, and ADME evaluation of brain penetrant N-substituted indazole-5-carboxamides as subnanomolar selective monoamine oxidase B and dual MAO-A/B inhibitors. *European Journal of Medicinal Chemistry*, 127, 470–492.
35. Venkatesh, P. (2011). Synthesis, characterization and antimicrobial activity of various Schiff bases complexes of Zn(II) and Cu(II) ions. *Asian Journal of Pharmaceutical and Health Sciences*, 1(1), 8–11.
36. Wang, Y., Yan, M., Ma, R. X., & Ma, S. T. (2015). Synthesis and antibacterial activity of novel 4-bromo-1H-indazole derivatives as FtsZ inhibitors. *Archiv der Pharmazie*, 348(4), 266–274.
37. Wei, D., Li, N., Lu, G., & Yao, K. (2006). Synthesis, catalytic and biological activity of novel dinuclear copper complex with Schiff base. *Science in China Series B*, 49(3), 225–229.
38. Du, S. J., Lu, H. Z., Yang, D. Y., Li, H., Gu, X. L., Wan, C., ... Qin, Z. H. (2015). Synthesis, antifungal activity and QSAR of some novel carboxylic acid amides. *Molecules*, 20(3), 4071–4087.
39. Wang, Y., Yan, M., Ma, R. X., & Ma, S. T. (2015). Synthesis and antibacterial activity of novel 4-bromo-1H-indazole derivatives as FtsZ inhibitors. *Archiv der Pharmazie*, 348(4), 266–274.
40. Pérez-Villanueva, J., Yépez-Mulia, L., González-Sánchez, I., Palacios-Espinosa, J. F., Soria-Arteche, O., Sainz-Espuñes, T. D. R., Estrada-Castro, D. B. (2017). Synthesis and biological evaluation of 2H-indazole derivatives: Towards antimicrobial and anti-inflammatory dual agents. *Molecules*, 22(11), 1864
41. J. Keating (2021) *Beilstein Journal of Chemistry* Regioselective N-alkylation of the 1H-indazole scaffold; ring substituent and N-alkylating reagent effects on regioisomeric distribution 17, 1939–1951
42. M.Gaikwad (2022) *Journal of medicinal and chemical sciences* Synthesis of Novel Series of 1-(6-Hydroxy-4-(1H-indol-3-yl)-3, 6- dimethyl- 4, 5, 6, 7-tetrahydro-1H-indazol-5-yl) ethan-1-one as Evaluations of their Antimicrobial Activity with Insilco Docking Study 239-248

PSYCHOLOGICAL WELL-BEING OF COLLEGE TEACHERS IN RELATION TO THEIR SPIRITUAL INTELLIGENCE

Harpreet Kaur and Namesh Kumar

Department of Education, CT University Ludhiana (Punjab), India

Abstract

The purpose of conducting this study was to find out the Psychological well-being of college teachers in relation to their spiritual intelligence. A sample of 600 women college teachers (300 humanities and 300 science stream) from 4 districts was selected through Stratified Random sampling technique. Psychological Well-being Scale developed by D.S. Sisodia and Pooja Choudhary (2019) and spiritual intelligence by Prof. Roquiya Zainuddin and Ms. Anjum Ahmed (2011) was used for data collection. Mean, SD and t-test were used to compare the psychological well-being and professional development of humanities and science stream of women college teachers. The findings of the study revealed that the increase in Psychological Wellbeing of College Teachers tends to increase the Spiritual Intelligence of the College Teachers whereas the decrease in the Psychological Wellbeing of college teachers tends to decrease the Spiritual Intelligence of college teachers.

Keyword: Psychological well being, Spiritual intelligence, College teachers

1. Introduction

Education is the most powerful weapon which helps the pupils to become good human beings. The quality of citizens depend more upon the quality of their teachers as compare to their quality of education. Teacher's personality, character qualities, well-being, attitudes, teaching efficiencies and life style creating effective teaching learning situations and helps to contribute in society. The quality of education and the standard of achievement are inseparably inter-related with the quality of teachers. The success of the learner mainly depends on the ability of the teacher.

Teacher is the weapon for every contribution and invention. Our whole education system is controlled by teacher. The nation's well-being depends upon teacher's well-being. Teachers play the important role for transmission and spreading the knowledge and intellectual power in every human being. Naturally, they are the heart and soul of education system. The best teacher is not only imparts the whole educational modules allotted to him/her in the best and most efficient manner but also ensures the best possible academic performance.

A teacher will be able to function effectively if he/she has a balanced personality and a sound mental state, thus well-being of teachers is important for their effective functioning. Ryff (1989) operationally defined psychological well-being as self-acceptance and personal growth. High psychological well-being is about feeling happy and doing well. High self-

efficacy is related to high self-esteem, positive well-being and better physical condition, regulation of stress and recovery from diseases (Bandura, 1997; Bisschop, Knegsman, Beekman, & Deeg, 2004; Kuijer & de Ridder, 2003).

Spiritual intelligence allows the intrapersonal and the interpersonal emotions to fill the gap between self and the other. Goleman (1995) wrote about interpersonal, or within the self, emotions and interpersonal emotions- those we share with others or use to relate to others. Spiritual Intelligence combines spirituality and intelligence structures in a new structure. Whereas spirituality is associated with searching and experiencing sacred elements, peaked intelligence, excellence and essence. Spiritual intelligence requires capabilities which use such spiritual issues in order to making compliance and effective action and producing high-value products and outcomes. Generally the development of spiritual intelligence structure can be considered as using the capacities and spiritual resources in practical situation.

1.1 Psychological well-being

The term Well-being is mostly used for specific variety of goodness, Well-being requires cooperation between mind and body. It understands a sense of relief to reduce the pressures in person's life. Well-being is not only physical well-being rather it includes all aspects of a man. For example, living in good environment, being of worth for world, being

able to cope with life, enjoying life, etc. Well-being is one of the most important goals which individuals as well as societies strive for. Well-being can be specified in two ways: first by specifying the „what“ and second by spelling out the criteria of wellness. Psychological well-being includes individual's relationship with life goals, if he is aware of his potential, the quality of his relationship with others, and what he feels about his own life (Ryff and Keyes, 1995).

Psychological well-being takes an important part in personality and development theories both theoretically and practically. Psychological wellbeing, which guides clinical studies that will help advisors to make their advisees reach their goals, informs about the goals and purposes regarding psychology consulting.

(Myers et al., 2003) Well-being is a way of life. Especially in terms of life ideally inclined to health and wellness; unifying body, mind, and soul; individually full of purposeful attitude and aim to live life more fully; and a functional life in all social, personal, and environmental aspects

Carr (2004) defines subjective well-being as “a positive psychological state characterized by a high level of satisfaction with life, a high level of positive affect and low level of negative affect”.

Huppert (2009), “Psychological well-being is about lives going well. It is the combination of feeling good and functioning effectively.”

Psychological well-being is defined as “.....a dynamic state, in which the individual is able to develop their potential, work productively and creatively, build strong and positive relationships with others and contribute to their community”(Foresight Mental Capital and Well Being Project 2010)

Psychological Well-being is an effort to be peaceful and enjoy life, connect to life, establish satisfying relationships with others, aim for a purpose and make life valuable. In addition, an individual's satisfaction with his /her life refers to having positive feelings about the future and continuing the life functionally **(Seligman, 2011)**.

Marks (2012) explained well-being (as cited in Dodge, Daly, Huyton and Sanders, 2012) well-being is not a beach you go and lie on. It's a

sort of dynamic dance and there's movement in that all the time and actually it's the functionality of that movement which actually is true levels of well-being.

The concept of well-being has a multidimensional constitution, it could be a representation of positive feelings, individuals experience as well as aspects of life characterized by optimal functioning and flourishing (Fredrickson and Losada, 2005). It has been asserted that it is practical to assume that the concept of health is comparable to the concept of well-being (Essen and Martensson, 2014).

Psychological well-being is attained by achieving a state of balance affected by both challenging and rewarding life events. Researchers also have found that the absence of distress doesn't necessarily indicate a person has high psychological well-being. People with high psychological well-being report feeling capable, well-supported, and satisfied with life. People with higher psychological well-being are more likely to live healthier and longer lives. They are also more likely to enjoy a better quality of life. Better psychological well-being also is associated with fewer social problems.

1.1.1 Six-factor Model of Psychological Well-being

The Six-factor Model of Psychological Well-being is a theory developed by [Carol Ryff](#) in 1989 which determines six factors which contribute to an individual's psychological [well-being](#), contentment and happiness. The following are the factors of psychological well-being:

- a. [Self-acceptance](#)
- b. [Personal growth](#)
- c. [Purpose in life](#)
- d. Environmental mastery
- e. [Autonomy](#)
- f. Positive relations with others

a. Self-acceptance- Self-acceptance requires the maintenance of esteem for one's self while facing complex and sometimes unpleasant personal aspects of the self. In addition, individuals accumulate a past and have the capacity to recall and remember themselves through time.

b. Personal growth- Personal growth is the ability and desire to enhance existing skills and talents and to seek opportunities for further personal development. Healthy individuals are open to experience and have the capacity to identify challenges in a variety of circumstances.

c. Purpose in life- Purpose in life captures the adult's perception of having direction in life, even when the world offers none or provides unsatisfactory alternatives. Healthy individuals see their daily lives as fulfilling a direction and purpose and therefore they view their personal lives as meaningful.

d. Environmental mastery- Environmental mastery is the active engagement of the environment to mould it to meet one's needs and wants. Healthy individuals recognize personal needs and desires and permitted to take an active role in getting what they need from their environment.

e. Autonomy- Autonomy measures the degree to which people seek self-determination and personal authority in a society that at times requires obedience and compliance. However, healthy individuals seek to understand their own values and ideals.

f. Positive relations with others- consists of the ability to cultivate warm, intimate relationships with others. It also includes the presence of satisfying social contacts and relations.

1.1.2 Role of teachers

Teachers' expectations determine the understanding of their own role, as the sense of efficiency in the work that teachers experience can also depend on how they see themselves as professionals. **Beijaard (1995)** stated that a teacher's professional identity is composed of three factors: the subject they teach, their relationship with pupils, and their role or role conception. The latter is built in relation to the object and the relation with pupils and therefore cannot be considered independently of the other two factors.

1.1.3 Importance of teachers well being

Psychological well-being consists of positive relationships with others, personal mastery, autonomy, a feeling of purpose and meaning in

life, and personal growth and development. Teachers who feel heard and valued for their ideas, have opportunities to collaborate and feel supported by colleagues feel a greater sense of well-being within the workplace. Teachers who feel secure to explore innovative teaching practices are able to provide students with deeper learning experiences in ways that promote their curiosity and creativity.

- Teacher well-being help to ensure teachers can flourish, this can promote better classroom climates
- Teacher wellbeing enables high quality teaching that leads to success for students.
- Teacher wellbeing is also linked to student wellbeing.
- Teacher wellbeing is an important first step in wellbeing programs to promote student well-being.

Grenville-Cleave and Boniwell (2012) found that teachers rated their wellbeing significantly lower than other professional occupations such as health, social work, finance and human resources.

Acton and Glasgow (2015), teacher wellbeing is defined as "an individual sense of personal professional fulfilment, satisfaction, purposefulness and happiness, constructed in a collaborative process with colleagues and students".

1.2 Spiritual intelligence

Spiritual intelligence is concerned with the inner life of mind and spirit and its relationship to being in the concerned world. It appears to connect the personal to the transpersonal and the self to spirit. Spiritual intelligence stands in the middle of cognitive intelligence, emotional intelligence, and psychological intelligence and is the fundamental one that guides the others. Spiritual intelligence is the bond and the meaning between inner self and the eternal. It helps us to understand the main principles of our conscience. It allows the integration between intrapersonal and interpersonal in order to surpass the gap between self and other. Spiritual intelligence is more than individual mental ability. It appears to connect the personal to the trans-personal and the self to the spirit. The term "Spiritual Intelligence" was coined by Zohar in 1997. In 2004, the author upgraded the concept with the notion of

'spiritual capital' and demonstrated the crucial link between spiritual quotient (SQ), spiritual capital and sustainability. According to this definition spiritual intelligence is the intelligence with which we acquire our deepest meaning, purpose and higher motivations. Spiritual intelligence as the underlying beliefs of the individual could play a substantial role in various fields; particularly the promotion and provision of mental health that optimism and psychological wellbeing are its symptoms. Therefore, attention to spiritual intelligence and explaining it can assist teachers to understand the value and meaning of life, solving problems related to the self, others and the world, a sense of security and satisfaction with living.

Zohar and Marshall (2000) described Spiritual Intelligence as "The intelligence with which we address and solve problems of meaning and value; the intelligence with which we can place our actions and our lives in a wider, richer, meaning giving context; the intelligence with which we can assess that, one course of action or one life-path is more meaningful than another". It also plays an important role in psychological well-being.

Sisk and Torrance (2001) stated that spiritual intelligence can be defined as a deep self-awareness in which one becomes more and more aware of the dimensions of self, not simply as a body, but as the mind, body and spirit. A somewhat different framework is offered by Vaughan (2002) who defined spiritual intelligence as a capacity for a deep understanding of existential questions and insight into multiple levels of consciousness. It implies awareness of our relationship to the transcendent, to each other, to the earth and all beings. Hence, Vaughan's (2002) model may be seen to imply three components of spiritual intelligence:

- a) The ability to create meaning based on deep understanding of existential questions.
- b) An awareness of and the ability to use multiple levels of consciousness in problem solving.
- c) An awareness of the interconnection of all beings to each other and to the transcender.

According to Wigglesworth (2002), the emotional abilities come earlier than spiritual abilities. Both of these abilities are related to

each other. They strengthen each other's abilities.

Ruiz (2005) gave amazing results about the spiritual dimension in educational leadership. This study explored the use of spirituality by successful educational leaders, to strengthen their effectiveness as it related to schools and their performance. The suggestions of Belouso (2005) include spiritual literacy as a cross-curriculum issue, spiritual paradox as an image that provided balance, and experiential spirituality as a practise to nourish teachers' spirituality.

As reported in Times in India (2010), Spiritual intelligence increases an individual's capacity to understand others at a higher level. Spiritual understanding allows an individual to discern both the 'true cause' of behaviour without judgment, and serve the 'true needs' of others until they themselves learn to meet their own needs. This capacity is developed by first learning to free oneself from attachment and neediness and being able to meet our own inner needs. Attachment and neediness are the opposite of being spiritually intelligent.

Wigglesworth, Cindy (2012) defines spirituality as "the innate human need to be connected to something larger than ourselves, something we consider to be divine or of exceptional nobility. This innate desire for that connection transcends any particular faith or tradition. It does not require a belief in a divinity by any description, nor does it preclude belief in God or Spirit or the divine"

1.3.1. Model of spiritual intelligence

King in 2008 proposed a new model of spiritual intelligence. According to him, spiritual intelligence is a set of adopting mental capacities based on non-material and transcendent aspects of reality. King propose four core abilities of spiritual intelligence:-

- a) **Critical existential thinking-** The capacity to critically contemplate the nature of existence, reality, the universe, space, time and other existential/ metaphysical issues, also the capacity to contemplate non-existential issues in relation to one's existence.
- b) **Personal meaning production-** The ability to derive personal meaning and purpose from all physical and mental experience

including the capacity to create and master a life purpose.

- c) **Transcendental awareness**- The capacity to identify transcendent dimensions/pattern of the self (i.e., a transpersonal or transcendent self), of others, and of the physical world (e.g. non materialism) during normal states of consciousness, accompanied by the capacity to identify their relationship to one's self and to the physical.
- d) **Conscious state expansion** -The ability to enter and exit higher states of consciousness (e.g., pure consciousness, cosmic consciousness, unity and oneness) and other states of trance at one's own discretion (as in deep contemplation, meditation, prayer, etc.).

The Relationship between Psychological Well-Being and spiritual intelligence

Psychological well-being is very important for individuals whether they are living in the community, at work, or dealing with a crisis in life. Spiritual intelligence is defined as the integrated relationship between us and the world in which we live. It results in an increase in psychological well-being of individuals as well as having a goal in their life. In working to improve psychological well-being, in addition to preventing and treating mental and behavioral disorders, efforts are needed to reduce common environmental or mental stresses. Spiritual intelligence helps individuals to fight with the fear of a change as the fear of any change originates from individuals' own mind and not from their surrounding environment. Spiritual intelligence is necessary for discernment in making spiritual choices that contribute to psychological well-being and overall healthy human development.

2. Literature review

2.1 Studies related to Psychological Well Being

Razia (2016) assessed the level of emotional intelligence and well-being of pupil teachers. For the purpose of conducting the study, sample comprising 120 pupil teachers (B Ed students) was selected from the department of Education of Aligarh Muslim University and two private colleges in Aligarh. It was found

that male and female pupil teachers were similar in their emotional intelligence but difference exists in relation to well-being. The study further brought into light that emotional intelligence had positive and significant relationship with overall well-being of pupil teachers.

Zaki (2016) conducted a study of psychological well-being. This paper attempted to explain the promotion of awareness of psychological well-being in beginning teachers as well as in-service teachers for their optimal functioning in teaching. This paper also explains relationship between psychological well-being and self-determination theory which involves human motivation, very useful for effective teaching. In the end author suggests to facilitate psychological well-being of teachers in teacher education programs.

Gangadharan (2017) investigated the psychological well-being among teaching and nonteaching employees. The findings of the study revealed significant difference in the dimensions of autonomy, personal growth and purpose in life. The overall psychological well-being of teaching staff was higher than the non-teaching employees. On the whole, the present study concluded that, women in the teaching profession had the highest psychological well-being scores as compared to other women employees, in relation to their working conditions and nature of job.

Lamba & Som. (2020) conducted in this study on the psychological well-being and mental health problems in college teachers and school teachers. Samples of 160 school teachers were taken from Delhi NCR. The study reported that the male school teachers have a better psychological well-being and they have a less mental health problem which indicates that if an individual have a less mental health problems then they have better psychological well-being and are more satisfied with their lives. These findings can be used in Indian context and thus essential steps can be taken to educate the people to make their lives better.

2.2 Studies related to Spiritual intelligence

Sahebalzamani, Farahani and Abasi (2013) explored "The relationship between spiritual intelligence with psychological well-being and purpose in life of nurses." The study used

descriptive correlation method. Sample of the study consisted of two hundred seventy nurses from a few hospitals within the Tehran University 84 through convenient sampling. A four-section questionnaire including demographic characteristics, a 24-item questionnaire of spiritual intelligence with four components, psychological well-being questionnaire with six subscales and the questionnaire of purpose in life was used to collect the data. The outcomes showed that there was a significant relationship between spiritual intelligence with psychological well-being and having a purpose in life.

Kushwaha, S.S. (2014) Conducted a research on prospective teachers to analyze their Spiritual Intelligence in relation to Sex, Caste and SES. For the purpose a sample of 300 (150 male and 150 female) prospective teachers was selected from the B.Ed. Colleges affiliated to Bundelkhand University, Jhansi by using semi probability sampling techniques. Spiritual Intelligence Scale constructed by Roquiya Zainuddin and Anjum Ahmed was used to collect the data. Results revealed that there is no significant difference in the mean of spiritual intelligence scores of the male and female prospective teachers. The prospective teachers belong to GEN category scored high on Spiritual Intelligence Scale as compared to the OBC & SC prospective teachers. The levels of SES of prospective teachers do not cause significant variation in Spiritual intelligence.

Tiwari, J (2014) studied Spiritual Intelligence and Mindfulness of 100 Secondary School Teachers in Relation to their Psychological well-being. The findings of the study revealed a significant positive relationship between these variables. A significant difference was observed between spiritual intelligence and mindfulness of public school and government aided secondary school teachers.

Behloli, A.A., et.al, (2015) Investigate in his study the role of spiritual intelligence on optimism and psychological wellbeing of teachers. The research design was correlative descriptive and included all the teachers in city Taibad, and 310 of them were selected by multistage random sampling. For data collection the questionnaire spiritual intelligence of AbdollahZadeh et al. in 2008, Shearer and Carver's direct - orientation test of

life in 1985 and Psychological well-being scale of Ryff in 1989 were used. Data analysis using Pearson correlation and regression analysis showed there was a significant relationship between the spiritual intelligence and its components and optimism and psychological well-being at level. Based on these results, providing support factors to enhance the spiritual intelligence can lead to optimism and psychological well-being.

Razia, B. (2019) Spiritual Intelligence is one of the novel constructs which is found to affect well-being. It is vital to explore such variables in order to know the dynamics in the personality make up of Prospective teachers. The researcher attempted to examine the effect of Spiritual Intelligence on Prospective teacher's Well-being. Sample comprising of 203 B. Ed students studying in 4 different colleges of Education including Department of Education, AMU in Aligarh city of Uttar Pradesh state was selected randomly. Standardized tools were administered to collect the data. Results revealed that Spiritual Intelligence is significantly correlated with mental, emotional and spiritual dimensions of Well-being but not with its physical and social dimensions. There is a significant effect of Spiritual Intelligence on the Well-being of Prospective teachers. Higher the Spiritual Intelligence of trainees better is their Well-being.

Rani & Sharma (2020) The present study was conducted with an objective to find out the relationship between occupational stress, teacher self-efficacy and spiritual intelligence of women teachers. The sample of the study was 500 women teachers randomly selected from the five districts from the state of Punjab. The findings of the study reveal that- A significant and negative relationship was found between occupational stress, teacher self-efficacy and spiritual intelligence of women teachers. It is quite apparent from the regression model summary that teacher self-efficacy and spiritual intelligence of women teachers both independently as well as conjointly predicts occupational stress. Hence, it is obvious from the results that the teacher self-efficacy and spiritual intelligence are the most significant and influential contributor in

predicting occupational stress of women teachers.

3. Justification of the study

Teachers play an important part in the teaching – learning process. A teacher influences a student to a great extent. The challenges faced by a teacher in a globalized world are difficult to manage. It is essential that teachers have a balance between their life and work and therefore need to possess higher psychological well-being. The foundation of building a healthy and sound society is layered to greater extent by educating the youngsters of that society. Thus, teachers are the architects in building healthy nation. They do give the shape for growing individuals and prepare them to be useful to the society in various ways of life, thus teachers have been rendering a valuable service to the nation.

Psychological well-being is an important aspect for effective performance in any organization, as it determines the internal feelings to persuade the external actions. Low psychological well-being is obvious to effect any domain of our life may it be academic or work life. The best teacher is one who possesses good psychological well-being and who is fully satisfied with his/her occupation. Ryff (1989) operationally defined psychological well-being as self-acceptance and personal growth. High psychological well-being is about feeling happy and doing well. High self- efficacy is related to high self-esteem, positive well-being and better physical condition, regulation of stress and recovery from diseases (Bandura, 1997; Bisschop, Knegsman, Beekman, &Deeg, 2004; Kuijer & de Ridder, 2003).

Progress of any nation depends largely on Psychological well-being of its students. All intellectual creative, educational, social and cultural advancement are possible if the individual of the nation do possess well-being. Due to advancement in every field, life of teachers has become more challenging, complicated and tough. If at all we expect the teachers to contribute significantly, it is essential that they should have higher work motivation, professionally developed, self-efficacy, commitment etc. The role of a teacher does not limit itself to imparting knowledge

alone, but in broadening the national outlook enhancing a sense of efficacy and competency among the future citizens, and preparing individuals for the right type of profession.

4. Objectives

1. To investigate the significance of relationship between psychological well-being and spiritual intelligence of college teachers with respect to streams of study.
2. To investigate the significance of relationship between psychological well-being and spiritual intelligence of college teachers with respect teaching experience.

5. Hypothesis

1. There exists no significant relationship between psychological well-being and spiritual intelligence of college teachers with respect to streams of study.
2. There exists no significant relationship between psychological well-being and spiritual intelligence of college teachers with respect to teaching experience.

6. Methodology

6.1 Method and Procedure

The descriptive method of educational analysis for the completion of the present paper is followed in the context of the study.

Sample

Representative samples of 600 women college teachers from four districts of Punjab were chosen for the present analysis. Out of which, 300 Women college teachers from humanities stream and 300 Women College teachers from science stream.

6.2 Tools for data collection

1. Psychological Well-being Scale developed by D.S. Sisodia and PoojaChoudhary (2019).
2. Spiritual Intelligence scale by Prof. Roquiya Zainuddin and Ms. Anjum Ahmed (2011)

Statistical Techniques

Mean, SD and t-test has been computed for analyzing the present data.

7. Result and discussion

Correlation between Psychological Wellbeing and Spiritual Intelligence of College Teachers with respect to Stream of Study: Coefficient of correlation was calculated between scores of Humanities stream and Science stream College Teachers on the two variables Psychological Wellbeing and

Spiritual Intelligence using Pearson’s Product Moment method and the findings have been presented below:

Hypothesis 1

There exists no significant relationship between psychological well-being and spiritual intelligence of college teachers with respect to streams of study.

Table 1: Correlation Analysis of Psychological Wellbeing and spiritual intelligence of college teachers with respect to streams of study.

Stream of Study	Variable	N	Mean	SD	r value	p value	Result
Humanities Stream College Teachers	Psychological Wellbeing	300	169.93	21.17	0.85	.000	Sig at .05 level
	Spiritual Intelligence		269.40	43.11			
Science Stream College Teachers	Psychological Wellbeing	300	173.07	22.26	0.88	.000	Sig at .05 level
	Spiritual Intelligence		271.60	43.92			

Interpretation: The correlation analysis of Psychological Wellbeing and Spiritual Intelligence of college teachers with respect to stream of study depicts a significant positive relationship between Psychological Wellbeing and Spiritual Intelligence with respect to stream of study. For the Humanities stream of College Teachers, the ‘r’ value for the Correlation Analysis of Psychological Wellbeing with Spiritual Intelligence is positive 0.85 with p value .000 indicating a strong significant and positive relationship between the two variables. For the Science stream of College Teachers, the ‘r’ value for the Correlation Analysis of Psychological

Wellbeing with Spiritual Intelligence is positive 0.88 with p value .000 indicating a strong significant and positive relationship between the two variables. The findings conclude that there is a strong, significant and positive correlation between Psychological Wellbeing and Spiritual Intelligence of college teachers with respect to stream of study.

Hypothesis 2

There exists no significant relationship between psychological well-being and spiritual intelligence of college teachers with respect to teaching experience.

Table 2: Correlation Analysis of Psychological Wellbeing and spiritual intelligence of college teachers with respect to teaching experience.

Teaching Experience	Variable	N	Mean	SD	r value	p value	Result
Less than 5 Years	Psychological Wellbeing	300	165.65	21.77	0.90	.000	Sig at .05 level
	Spiritual Intelligence		261.78	44.47			
More than 5 Years	Psychological Wellbeing	300	177.35	20.15	0.89	.000	Sig at .05 level
	Spiritual Intelligence		279.22	40.73			

Interpretation: The correlation analysis of Psychological Wellbeing and Spiritual Intelligence of college teachers with respect to Teaching Experience depicts a significant positive relationship between Psychological Wellbeing and Spiritual Intelligence with respect to Teaching Experience. For the College teachers having Teaching Experience of Less than 5 Years, the ‘r’ value for the

Correlation Analysis of Psychological Wellbeing with Spiritual Intelligence is positive 0.90 with p value .000 indicating a strong significant and positive relationship between the two variables. For the College teachers having Teaching Experience of More than 5 Years, the ‘r’ value for the Correlation Analysis of Psychological Wellbeing with Spiritual Intelligence is positive 0.89 with p

value .000 indicating a strong significant and positive relationship between the two variables. The findings conclude that there is a strong, significant and positive correlation between Psychological Wellbeing and Spiritual Intelligence of college teachers with respect to Teaching Experience.

Conclusion

All intellectual creative, educational, social and cultural advancement are possible if the individual of the nation do possess well-being. Spiritual intelligence is a set of mental capabilities which contributes to awareness,

integration and adaptive application to the non-material and transcendent aspects of one's existence, leading to outcomes such as deep existential reflection, recognition, transcendent self-mastery of spiritual states (King 2007). Due to advancement in every field, life of teachers has become more challenging, complicated and tough. If at all we expect the teachers to contribute significantly, it is essential that they should have higher work motivation, professionally developed, self-efficacy, commitment etc.

References

1. Acton, R., & Glasgow, P. (2015). Teacher wellbeing in neoliberal contexts: A review of the literature, *Australian Journal of Teacher Education*, 40(8).
2. Behloli1, A.A., et.al, (2015).” Examine the Role of Spiritual Intelligence on Optimism and
3. Psychological Well-Being of Teachers in City Taibad of Iran, *Journal of Applied Environmental and Biological Sciences*, 5(7)163-170.
4. Christopher, J. C. (1999). Situating psychological wellbeing: Exploring the cultural roots of its theory and research. *Journal of Counselling and Development*, 77, 141–152.
5. Friedman, H. S., and Kern, M. L. (2014). Personality, well-Being, and Health. *Annu. Rev. Psychol.* 65, 719–742
6. Gall, M. D., Renchler, R. S. et al. (1985). Effective staff development for teachers: A research-based model (ERIC). College of Education, University of Oregon.
7. Gangadharan, P. (2017). Psychological Well-being among teaching and non-teaching employees: A Comparative study. *International Journal of Applied Research*, 3(5), 513-516.
8. Garet, M., Porter, A., Desmone, L., Birman, B. & Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Education Research Journal*, 38 (4), 915- 945.
9. Kushwaha, S.S. (2014) Spiritual Intelligence of Prospective Teachers in Relation to Their
10. Biographical Factors, *Journal of Humanities and Social Science*, 19 (10), 14-17.
11. Rani, R. & Kaur, S. (2018) A Study of Psychology Well-Being of Senior Secondary School Students in Relation to their Location, *Online International Interdisciplinary Research Journal*, 8 (2).
12. Rani, A. &sharma, S. (2020). Occupational Stress in Relation to Teacher Self - Efficacy and
13. Spiritual Intelligence of Women Teachers, *Bioscience Biotechnology Research Communications* 12(4):2217-2225.
14. Razia, B. (2019) “Effect of spiritual intelligence on well-being of prospective teachers”.
15. *Research and Reflections on Education*, 17(3).
16. Srivastava, P.S. (2016). Spiritual Intelligence: an overview. *International Journal of*
17. *Multidisciplinary Research and Development*, 3(3) 224-227.
18. Zaki, S. (2018). Enhancing Teacher Effectiveness Through Psychological Well-Being: A Key to Improve Quality of Teachers, *International Journal of Research in Social Sciences*, 8 (7).

DEVELOPING AN ALGORITHM FOR A SOCIAL MEDIA AND UNEMPLOYMENT BUSINESS INDICATOR BASED ON MACHINE LEARNING CLASSIFIER

Meenakshi and Jaspreet Kaur

Department of Computer Applications, CT University, Ludhiana (Punjab), India

ABSTRACT

Big data is a product of the rapidly expanding digital data gathering and is particularly valuable now that social media accounts for over 70% of all data collection worldwide. Thus, it is crucial to thoroughly investigate online social network services. In order to comprehend the actual economic condition, we apply sentiment analysis in this study, which identifies opinions and feelings regarding social topics reported on social media. Two steps are recommended to achieve this. Sequence vector, Feature vector, and sequence vectors are the three types of feature sets we take into consideration after providing the sentiment classifications with initial training data, social networking datasets from numerous big data sources. Then, the effectiveness of six classifiers Naive Bayes(NB), MaxEnt(ME), MaxEnt-L1(ML), Ada-boost(AB), decision Tree(DL), and SVM-kernel(SK), is evaluated. The public uses a number of economic terms to convey their thoughts directly, thus in the second stage, we collect statistics that are pertinent to those terms. In order to validate our hypothesis, we employ a vector auto-regression analysis. The findings demonstrate the statistically significant association between societal perception and economic performance. In other words, KOSPI is caused by "depression" and "unemployment." Additionally, it demonstrates that the exchange rates are influenced by the sentiment analysis's retrieved phrases, including "pricing," "year-end taxes," and "budget deficit." The experiment is based on python and google cloud and dataset is used on twitter in social media. Our findings demonstrate that economically sound economic data can be created using publicly accessible social media statistics.

Keywords: Supervised learning, Sentiment analysis, Machine learning, social media

1. Introduction

The financial market and economy are both influenced by numerous causes. Particularly, the use of technological devices and social networking sites is fast rising. Twitter users have doubled in numbers 2021, and is projected to rise 3.75 billion members in 2022, up from 0.98 billion in 2022, based on studies by Official statistics [2] and Pew Research Center [1]. In addition, social media data are anticipated to be produced in 2020 [3-4]. Big data analytics that are drawn using digital social media sites provide insightful information about real-world presentations [5]. Predominantly, the society's views expressed on social networking sites on a certain problem have an impact on our society. By classifying subjective contents as good, neutral, or negative feelings in relation to particular societal issues, sentiment analysis allows one to capture these sentiments. As a result, the method is frequently utilized in many fields, including marketing and the financial market for projecting sales. According to Zhang et al research [5], the attitude on social media offers statistics that are relevant to a stock price. In the sentiment analysis is used to examine the connection between societal attitudes. To do this, we use massive sources of data gathered

from multiple news articles, twitter, social media sites, blogs, to train sentiment classifiers. Next, we take into account three distinct feature sets, properties of the phrase order's lexicon, negative word dictionaries, emoticons, feature vector containing positive and along with the expression patterns. The accuracy of six classifications is then assessed, including maximum entropy, decision tree, Naive Bayes, MaxEnt-L1, Ada-boost, and SVM-kernel. The findings demonstrate that MaxEnt outperforms other classifiers in a sustained manner. The next stage is to use trained classifiers to forecast the sentiments of the datasets that have been collected. This paper's contribution is not to provide a new methodology, but rather to thoroughly examine the relationship connecting economic significance and time-series data emotive worth of social data that was gathered using particular keywords.

2. Related work

2.1 Sentiment analysis

The study of sentiment identifies the ways in which various texts communicate their feelings as well as whether or not positive or negative feelings or opinions may be found there. In other words, the relationship between the subjects, the expression's direction and

intensity, and the sentiment expressions are all included in the sentiment analysis [6]. Sentiment analysis has received research attention in both academic and commercial settings of natural language processing (NLP) discipline. To determine how people feel about something, sentiment analysis is primarily used. Additionally, a lot of businesses that have gathered a lot of data about their clients and employees utilize sentiment analysis to understand their reputation and create their business plans. [7]. Sentiment analysis was developed in many fields during the 2000s. To address sentiment analysis, Pang and Lee [8] researched many theories and approaches. According to Liu [9], the widespread use of social media is a crucial factor in the rise of sentiment analysis studies. Advanced sentiment analysis methodologies and applications are necessary to comprehend clients, as stated in [8]. Classifiers for sentiment analysis have been particularly proposed in a number of papers. According to [7], the most often used method for sentiment analysis is SA based on supervised learning. K-nearest neighbors (KN), NB classifier, Support Vector Machine (SVM), neural network, maximum entropy and decision tree, are examples of typical classifier types. Pang et al. [10] examined the effectiveness of three new comedy classifications containing rating indicators, such as a number of stars (Naive Bayes, maximal entropy, and SVM). In their training datasets, they also employed Rankings as polarization indicators. The context-dependent polarization of emotional manifestations was categorised by Wilson et al. [11] and Nasukawa Yi [6] and In particular, [11] used manually created rules to classify the polarity of utterances about particular items. According to O'Hare et al. [12], Multinomial Nave Bayes outperformed the Support Vector Machine (SVM) on blogs that dealt with finance. Both binary and ternary classifications of sentiments are used in their study [13] came to the conclusion that machine learning methods like Nave Bayes provided an accurate result (larger than 79%) utilizing symbols in a training Tweet remark for classifying the senti- ment of tweets. However, the same word can denote various sentiments, sentiment classification is frequently said to

have the domain-dependent problem. In order to train sentiment analyzers for numerous domains concurrently, [14] proposed . They specifically divided a global classifier and a copyright classifier. The Distributional Correspondence Indexing (DCI) approach for domain adaptation in sentiment categorization was put forth by Fernández et al. [15]. The DCI outperforms the most recent Algorithms for categorization of cross-language and merge sentiments, according to the experiment of [15]. DCI also significantly lowers the cost of computation and necessitates less human interaction. Additionally, [16] develops a sentiment-related index (SRI) to assess the relationships connecting diverse lexical elements in a specific domain utilizing website properties therefore as means of connecting diverse fields . The authors then propose SentiRelated, A novel SRI-based approach for bridge sentiment analysis, to assess the sentiment polarity of brief texts. Additionally, [17] describes a creative method for sentiment prediction through Latent Semantic Indexing (LSI), which may switch from a "concept space," containing documents in many languages without translation. They design and carry out the tests that look at how much each subject's and sentiment's specific contributions to categorization accuracy. They therefore attempt to clarify the issue of whether subjects and sentiment may be recognized rationally.

2.2 Literature regarding the use of social network sentiment by businesses

Different firms incorporate textual and sentiment classification throughout their procedures due to its efficacy and precision. Manek et al. [18] devised a statistical technique employing weight by Gini Methodology with Support Vector Machine (SVM) for extracted features in sentiment classification utilizing large movie review data and data sets. Recent years have seen an increase in the frequency with which businesses use Twitter and Facebook data to communicate with their clients. Culnan et al. [19] presented the use of four among the most prominent social media platforms by the Top 500: Facebook, LinkedIn, blogging, and customer forums. They presented case histories of several Fortune 100 companies to illustrate way they managed the distinct social media platforms. In generally,

the majority of social media-based activities involve selling, customer support, promotion, advertising, design and development, and research [20]. He et al. [21] analyzed the instructional text material on the Twitter and Facebook pages of a third biggest pizza places: Pizza Hut, Tesco pizza, and Pope Jim's Pizza. Yu et al. [22] investigated the impact of traditional and social media, as well as their relative value and relationships with the brief share price performance of businesses. Beyond the amount of references, they utilized extensive sentiment algorithms to examine daily the overall sentiment of each communication source forward towards a specific company.

3. Methodology

An outline of this work can be shown in Figure 1. The procedure can be split into two sections, as demonstrated. The sentiment classifiers are trained in the first section, which also determines how well they perform across six different classifier types. The emotional score for every piece of material source is used in the second section to determine whether macroeconomic statistics come first or second. We determine Variables include if there was an antecedents or an aftermath. after testing The

assumption disproved at an alpha value of many parameters. The temporal difference between before and after is then determined using a vector autoregressive analysis of the two variables. So, in this investigation, both the vector autoregressive analysis and the Granger causality test were run concurrently.

3.1 Collected data

We aimed to index consumer responses to the social economics utilizing the following variables a straightforward frequency of economic phrases in order to construct An assessment of social networks that can be utilized detect the public economy from social media data. For each medium, we gathered 28 words from Twitter, blogs, and news sources. To be more specific, from January 2, 2021, to October 30, 2022, we took into account 9,780,930 tweets from Twitter, 960,540 NAVER blogs, and 74,329 news items. So because Sewol ferry catastrophe occurred in 2020 and the Middle East respiratory syndrome (MERS) virus was rife in 2022, we focus on the years between 2021 and 2022. The terms relating to the economy and events were gathered as search terms during the data collection process, as indicated in Table 1.

Data Validation Process Incorporated into Organizational FOA Process

This slide is 100% editable. Adapt it to your needs and capture your audience's attention.

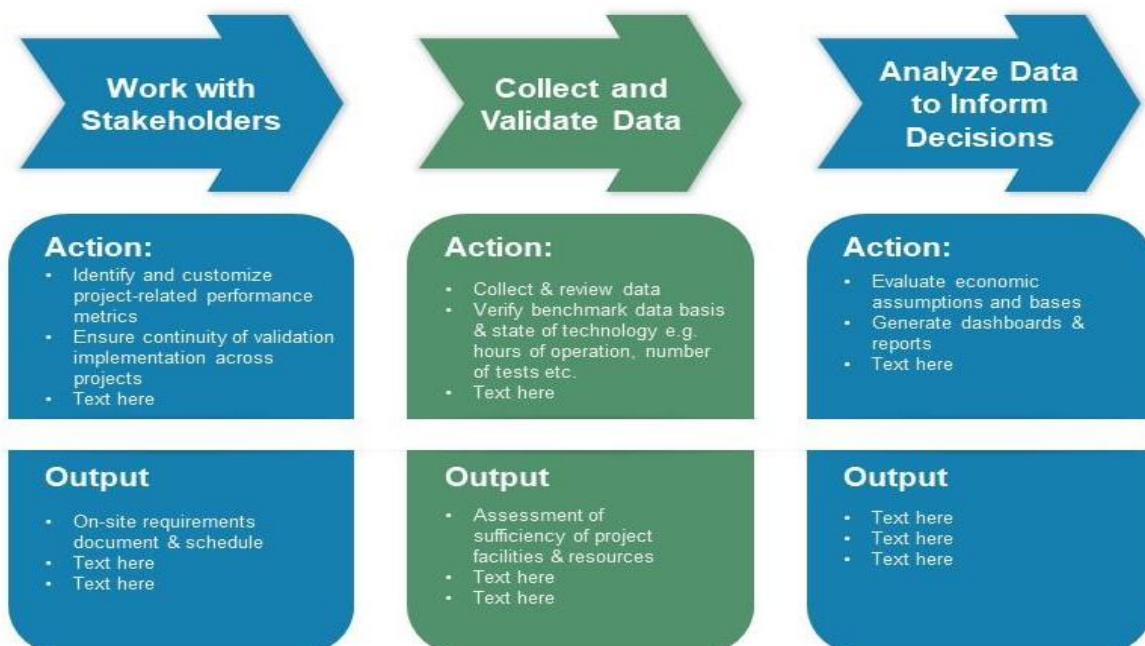
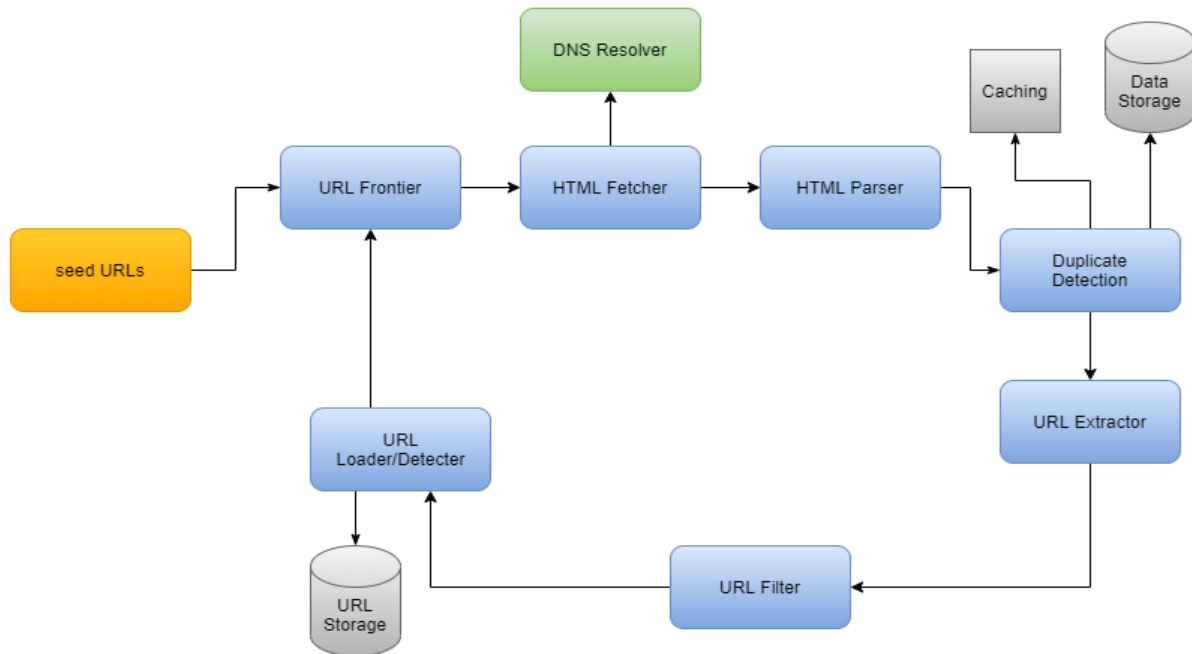


Figure.1 the Framework for the Data Validation Process Flow Chart

Table.1 Economic terms

Pizza Hut, Papa And Mcdonald's and Yu et al. [22] investigated the impact of both traditional and social media, as well as their relative importance and relationships with the short-term share price performance of companies. Beyond the amount of mentions, they utilized extensive sentiment classification algorithms to examine daily the common opinion of each media source toward a specific company.

**Figure.2 Web crawling**

The acquired data must be divided into sentence units because each document unit is made up of data. By means of the smart contracts process, which eliminates whitespace as well as measuring string and divides the language into words, we were able to break dividing the phrase into symbols, which seem to be semantic components. Lemmatization is a method for combining several spellings of the same word into a single form. The process of removing pointless words like conjunctions, prepositions, postpositions, and articles is known as stop word elimination. The representation of the text's words, sentences, and paragraphs as processable data is known as morpheme analysis. It is feasible to comprehend the phrase morpheme components and ultimately comprehend how sentences are put together. The identifying elements of communication by analyzing words and categorizing each word is known as part of speech (POS), and it is carried out in this manner.

3.3 Algorithms for machine learning

3.3.1 Algorithms for machine learning

In this research, we focus on choosing the best classifier based on several feature set generating techniques. As a result, we use MaxEnt-L1, MaxEnt, SVM kernels, Naive Bayes, Ada-boost, and decision trees, six different machine learning-based classification techniques, for evaluation. MaxEnt, also known as Max Entropy, is an exponential model and probabilistic classifier that determines maximal entropy's distribution [23]. MaxEnt, which can be used for sentiment analysis, topic categorization, and language identification, is based on the maximization of entropy. We utilize MaxEnt-L1 since we enhance MaxEnt's functionality. The MaxEnt model, according to [24], consists of a one-to-one correspondence among sets of parameters to utilize in constraints and Subsets of parameters that result again from model's specified parameters. Since the conditions for

extended expectations are derived from of the model that incorporates MaxEnt-L1, and generalized expectation terms, which adopts generalised expectations criterion for tractor trailer learning as well as the ability to separate the one-to-one connection . Additionally, generalized expectation criteria have several benefits, including being straightforward and simple to utilize [25]. There is no need for a separate procedure, such as creating a pre-clustering reversed indicator for unsupervised learning , when using the generalized expectation criteria. In order to analyze the measurements, we additionally add MaxEnt-L1. We also employ the C4.5 decision tree classifier, widely used algorithm, utilizing a decision tree to approximation finite property right [26]. We employ the quick and easy to program Ada-boost classifier as a second option [27]. Ada-boost can be used in conjunction with any other technique to identify the base classifiers because it doesn't require any prior knowledge of the base learner. We also employ NB, a Bayes theorem-based probabilistic classifier [28]. Nave Bayes forecasts the needs to fulfill from training data Using clue words from the secret accessing information. In order to identify a hyper - plane that divides the negative and positive subgroups by the maximum variance, we then utilize the SVM [29]. F-measure, precision, recall, and Accuracy are the four indicators used to evaluate these classifiers. First, accuracy is the proportion of correctly classified items in all classifications. Recall is calculated by dividing the total number of allocated exact categories by the number of assigned proper classifications. The proportion of accurate classifications in the overall classification is known as precision. The combination of recall and precision is indicated by the F-measure.

3.4 VAR analysis

In this section, we employ a VAR analysis to determine the connection between monetary information, such as the KOSPI, and the sentiment exchange rate on social media. The random process known as vector autoregression (VAR) makes it possible to identify the linear dependencies between various time-series data. A VAR model uses the previous

values of k variables to describe how they change over time.

A pth order VAR, represented by the symbol VAR(p), is:

$$x_t = \alpha + A_1 x_{t-1} + A_2 x_{t-2} + \dots + A_p x_{t-p} + u_t$$

u_t is an error term that satisfies $E(u_t) = 0$, $E(u_t, U_s) = m$, and $E(u_t, U_f) = 0$ where is the covariance matrix of error terms. x_{t-j} is the pth lag of x, is a vector of constants, and u_t is an error term.

The prices of chosen stocks are used to create the weighted average used to calculate the Korea Composite Stock Price index (KOSPI), which was originally introduced in 1983 with a base value of 100. According to Levin and Zerovs [30], the stock market consistently forecasts economic growth. KOSPI can therefore be a crucial indication of economic activity.

3.5 The regression test

The regression test causal relationship between variable X and variable Y suggests that changes in the past X may have an impact on changes in the present Y. The regression test with various time lags can be used to determine the regression test as well as the priority between variables Y and X . Only two time series are required for the regression test causality test to be chosen. The delayed time is set to 5, 4, 3, 2, or 1 days, for example. The relative the regression test between the two variables can be estimated using p, that decides the hypothesis test outcome based on the delay time. The alpha value (α) in this investigation was adjusted to 0.1, 0.05, and 0.01. We first check to see if amongst some of the elements, there is a predecessor or a consequence. after discovering The theory was rejected at an alpha value of several variables.. The time interval between the two variables' before and after states is then determined using a vector autoregressive analysis. So, in this investigation, both the vector autoregressive analysis and the regression test were run concurrently.

4. Results

4.1 Performance outcomes of the sentiment analysis

Table 2 offers suggestions for the sentiment categorization performance outcomes. The three feature set categories with the greatest F 1

in MaxEnt are 0.9296, 0.7456, and 0.7351. The ME classifier the maximum accuracy when we employ feature set (0.9296) When we combine the feature, in particular in figure 3 and Figure.4.

Table 2 Sentiment classification

Model	Recall_Precision	Accuracy
MaxEnt(ME)	0.9296	.74
Decision tree(DT)	.623	.75
SVM-kernel(SK)	.734	.63
Ada-boost(AB)	.745	.61
Naïve Bayes(NA)	.543	.54
MaxEnt-L1(ML)	.9100	.75

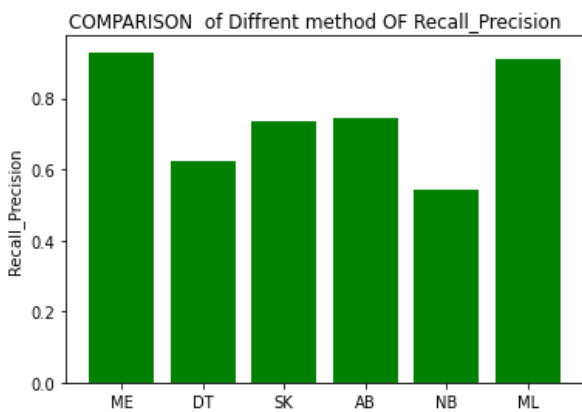


Figure.3 Comparison of different method of recall precision

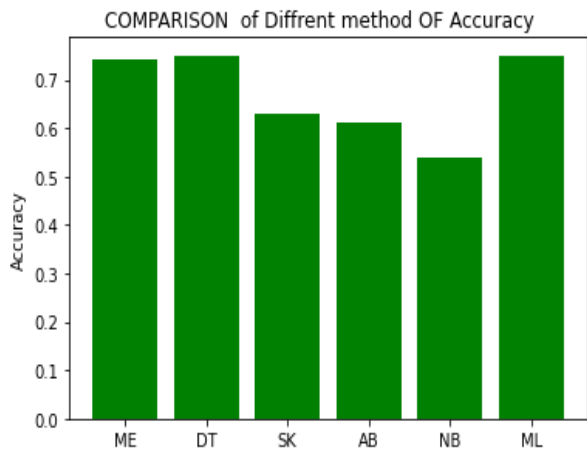


Figure.4 Comparison of different method of Accuracy

The greatest scores in MaxEnt are for recall, precision, and vector. As a consequence, MaxEnt outperforms five other classifiers in terms of performance.

4.2 VAR analysis

Value at Risk, also known as VaR, is a monetary term that calculates an estimate of

the risk associated with an investment. To be more explicit, value at risk, or VaR, is a statistical technique that could occur in an investment portfolio over a certain amount of time. The Value at Risk metric calculates the likelihood of a portfolio experiencing a loss of more than a certain amount.

4.2.1 VAR analysis with Asian market KOSPI

Changes in the KOSPI plus financial search terms like "boom," "depression," and "unemployment" were chosen VAR analysis will be used to study the connection between the financial marketplace and emotional scores , as implied by the Granger causation linking parameter Y to variable X . The VAR model is renowned as an effective method for policy analysis, structural inference, and the prediction of related time-dependent variables. In this study, we take into account KOSPI, "boom," "depression," and "unemployment" as four independent variables are used for the Varmodel . Additionally, we employ The regression test to establish a link between the KOSPI and four additional terms taken from social media. The regression test approach is sensitive to the lag length, hence it is crucial to establish the ideal lag length before doing the causality test. The 5-number length is chosen as an adequate nature of varying delays based on the findings of the Akaike information criterion (AIC). The following series of regressions are estimated as part of The regression test technique. In this system, each variable is dependent both based on its own lags and other parameters' lags.

$$Y_t = c + \sum_{i=1}^n A_i Y_{t-i} + \epsilon_t, i=1 \tag{1}$$

where Y_t is a vector variable with length $n+1$. The KOSPI , extracted keywords "boom," "depression," and "unemployment," which are denoted by b_t , d_t , and u_t , respectively, are all included in the vector of variables in the VAR, $Y_t = [y_t b_t d_t u_t]T$.

Table 3 Pair-wise The regression test:

F-Stat	Hypothesis of Null
KOSPI-KSE	15.41
KSE-NIKKIE	14.23
KOSPI-NIKKEI	13.21
KOSPIE-SSE	14.56

According to the aforementioned hypotheses, The test examines the null hypothesis that: (1) "boom," "depression," and "unemployment" are not causes of KOSPI; and (2) "boom" and "depression" are not causes of KOSPI, respectively. Therefore, as shown by the test findings in Table 3, KOSPI is caused by "boom" and "unemployment," not "depression" and "unemployment." As a result, there is a bi-directional causal relationship between KOSPI and "unemployment" in the short-run dynamics. The findings show a one-way association between "depression" and KOSPI as well as a one-way relationship between "unemployment" and KOSPI. If we reject I as the null hypothesis, we can infer is a causal relationship between "boom" and KOSPI. Table 3 displays the results of the Granger causality test to ascertain the interaction between KOSPI, "boom," "depression," and "unemployment" for the given period. The findings support both of the null hypotheses, disproved. KOSPI is a result of "depression" and "unemployment." "Boom" with lags of 1 and 3 are statistically significant at the 10% level for each parameter estimate in Table 4, whereas "depression" with lags of 2 and 4 are statistically different from zero. At t 1 and t 2, "unemployment" has a statistically significant impact on the KOSPI. Therefore, the price of KOSPI is significantly impacted by the chosen keywords referring to economic concepts like "boom," "depression," and "unemployment" with lags. Furthermore, the KOSPI index coefficients with lag 3 deviate significantly from zero. The findings of the AIC and BIC values, which were employed as a criterion for model selection, are shown in Table 5. We favor the model with the lowest AIC or BIC value in light of the findings. The sixth lag with the lowest AIC or BIC is therefore the one we favor.

4.2.2 VAR analysis with exchange rates

In this analysis, we take into account the exchange rates, pricing, year-end tax, and budget deficit as four endogenous factors. As determined by the Akaike information criterion (AIC), lag 2 is selected as the ideal lag length. Table 6 shows the results of the Granger causality test to ascertain the interaction between the exchange rate, "price," "year-end

tax," and "budget deficit" for the given time. The outcomes show that the keywords that were extracted.

Table .4 : Vector auto-regression estimates

KOSPI	price	year-end tax	budget deficit	BOOM
KOSPI(-1)	15.41	2018	12345	1
KOSPI(-2)	14.23	2019	12345	2
KOSPI(-3)	13.21	2020	12345	3
KOSPI(-4)	14.56	2021	12345	4
KOSPI(-5)	13.21	2022	12345	5

Table 5. AICandBICvalues:

Number	AIC	BIC
	11.40967	9.000771
	10.40967	8.000771
	09.40967	7.000771
	08.40967	6.000771

The exchange rates are influenced by factors from sentiment analysis, including "pricing," "year-end tax," and "budget deficit. and Boom" The calculated coefficients for "price" and "year-end tax" with number are statistically different from zero at least at the 10% level, as shown in Table 5. The "price" is strongly impacted by the lagged value of currency rates. Granger causality, as a result, goes in a single direction from price, "year-end tax," and "budget deficit" to exchange rate (Table 5). We favor the second lag that minimizes both AIC and BIC values in the VAR analysis of exchange rates. In light of this, we choose the second lag for the VAR analysis.

5 Conclusion

Sentiment analysis is a particularly fascinating area of study in the subject of economics. Using six classifiers, we ran trials in this study to examine how the public felt about various economic terms on social media. We merged statistical analysis, machine learning, and the Korean economy. Then, using The regression test and a vector auto-regression model, we investigated the relationship between the feelings from three different media and actual economic indices like the KOSPI and currency rates. We investigated the long-term relationships between the sentiment scores obtained from extensive datasets and the economic index. The outcomes demonstrate that MaxEnt outperforms alternative classifiers that we anticipate. The relationship between public opinion and the real economic situation

relating was also examined using a VAR analysis. We can attest that the public's perception of some economic concepts is tied to the state of the economy. In other words, studying public opinion can lead to accurate economic predictions or beneficial data for businesses. In fact, a business that uses social

media to evaluate and use public sentiment has a bigger impact on operations. As a result, it is anticipated that businesses will benefit if they acknowledge the value of public sentiment analysis and incorporate it into customer service, their marketing, and operational strategies.

References

- Perrin A (2015) Social media usage. Pew research center, pp 52–68
- Statista, Number of social network users worldwide from 2010 to 2021 (in billions). <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/>
- Jay Jacobs, CFA (2016) Social Media: Tech's Growth Industry. <https://www.globalxfunds.com/social-media-techs-growth-industry/>
- Jin S, Lin W, Yin H, Yang S, Li A, Deng B (2015) Community structure mining in big data social media networks with MapReduce. *ClustComput* 18(3):999–1010
- Zhang G, Xu L, Xue Y (2017) Model and forecast stock market behavior integrating investor sentiment analysis and transaction data. *ClustComput* 20(1):789–803
- Nasukawa T, Yi J (2003) Sentiment analysis: capturing favorability using natural language processing. In: *Proceedings of the 2nd International Conference on Knowledge Capture*. ACM, pp 70–77
- Appel O, Chiclana F, Carter J (2015) Main concepts, state of the art and future research questions in sentiment analysis. *ActaPolytech Hung* 12(3):87–108
- Pang B, Lee L (2008) Opinion mining and sentiment analysis. *Found Trends InfRetr* 2(1–2):1–135
- Liu B (2012) Sentiment analysis and opinion mining. *Synth Lect Hum Lang Technol* 5(1):1–167
- Pang B, Lee L, Vaithyanathan S (2002) Thumbs up?: Sentiment classification using machine learning techniques. In: *Proceedings of the ACL-02 Conference on Empirical Methods in Natural Language Processing*-Volume 10. Association for Computational Linguistics, pp 79–86
- Wilson T, Wiebe J, Hoffmann P (2005) Recognizing contextual polarity in phrase-level sentiment analysis. In: *Proceedings of the Conference on Human Language Technology and Empirical Methods in Natural Language Processing*. Association for Computational Linguistics, pp 347–354
- O'Hare N, Davy M, Birmingham A, Ferguson P, Sheridan P, Gurrin C, Smeaton AF (2009) Topic-dependent sentiment analysis of financial blogs. In: *Proceedings of the 1st International CIKM Workshop on Topic-Sentiment Analysis for Mass Opinion*. ACM, pp 9–16
- Go A, Bhayani R, Huang L (2009) Twitter sentiment classification using distant supervision. *CS224N Project Report*, Stanford, vol 1, no 12
- Wu F, Yuan Z, Huang Y (2017) Collaboratively training sentiment classifiers for multiple domains. *IEEE Trans Knowl Data Eng* 29(7):1370–1383
- Fernández AM, Esuli A, Sebastiani F (2016) Distributional correspondence indexing for cross-lingual and cross-domain sentiment classification. *J ArtifIntell Res* 55(1):131–163
- Wang L, Niu J, Song H, Atiqzaman M (2018) SentiRelated: a cross-domain sentiment classification algorithm for short texts through sentiment related index. *J NetwComputAppl* 101:111–119
- Bader BW, Kegelmeyer WP, Chew PA (2011) Multilingual sentiment analysis using latent semantic indexing and machine learning. In: *IEEE 11th International Conference on Data Mining Workshops*, pp 45–52

18. Manek AS, Shenoy PD, Mohan MC, Venugopal KR (2017) Aspect term extraction for sentiment analysis in large movie reviews using Gini index feature selection method and SVM classifier. *World Wide Web* 20(2):135–154
19. Culnan M, McHugh P, Zubillaga J (2010) How large U.S. companies can use twitter and other social media to gain business value. *MIS Q Executive* 9(4):243–259
20. Di Gangi PM, Wasko M, Hooker RE (2010) Getting customers' ideas to work for you: learning from dell how to succeed with online user innovation communities. *MIS Q Executive* 9(4):163–178
21. He W, Zha S, Li L (2013) Social media competitive analysis and text mining: a case study in the pizza industry. *Int J InfManag* 33(3):464–472
22. Yang Y, Duan W, Cao Q (2013) The impact of social and conventional media on firm equity value: a sentiment analysis approach. *Decis Support Syst* 55(4):919–926
23. Phillips SJ, Anderson RP, Schapire RE (2006) Maximum entropy modeling of species geographic distributions. *Ecol Model* 190(3):231–259
24. Sun CJ, Yao L, Lin L, Sha XJ, Wang XL (2011) Semi-supervised biomedical relation classification using generalized expectation criteria. In: 2011 International Conference on Machine Learning and Cybernetics (ICMLC), vol 4. IEEE, pp 1949–1952
25. Mann GS, McCallum A (2010) Generalized expectation criteria for semi-supervised learning with weakly labeled data. *J Mach Learn Res* 11:955–984
26. Polat K, Güneş S (2009) A novel hybrid intelligent method based on C4.5 decision tree classifier and one-against-all approach for multi-class classification problems. *Expert SystAppl* 36(2):1587–1592
27. Schapire RE (2003) The boosting approach to machine learning: an overview. In: *Nonlinear estimation and classification*. Springer, New York, pp 149–171
28. Lewis DD (1998) Naive (Bayes) at forty: the independence assumption in information retrieval. In: *European Conference on Machine Learning*. Springer, Berlin, pp 4–15
29. Vapnik V (2013) *The nature of statistical learning theory*. Springer, Berlin
30. Levine R, Zervos S (1998) Stock markets, banks, and economic growth. *Am Econ Rev* 88:537–558

β -CITRONELLOL AMELIORATES GLOBAL CEREBRAL ISCHEMIA-INDUCED COGNITIVE IMPAIRMENT IN RATS: POSSIBLE MECHANISM

Mandeep Kaur and Saurabh Sharma

Department of Pharmacology, CT University, Ludhiana (Punjab) India

ABSTRACT

Cerebral ischemia-induced neurological dysfunction dominantly accounts for the largest proportion of disability-adjusted life years globally. It is characterized by hypoperfusion in brain which leads to neurological dysfunction because of oxidative stress and mitochondrial dysfunction and further cognitive impairment. β -Citronellol, a volatile acyclic monoterpene naturally found in various plant species globally such as *Cymbopogon citrates*, has been reported to possess potent antioxidant and neuroprotective properties when used in aromatherapy. The present study was designed to investigate therapeutic potential of inhalational β -Citronellol in BCCAO induced focal cerebral ischemia-associated neurological dysfunction in rats. BCCAO surgery was performed on day 1 in male Wistar rats and β -Citronellol was administered by inhalational route diluted 100 \times in water (Low Dose) and diluted 50 \times in water (High Dose) 72 hrs after the surgery up to 24th day. Administration of L-NAME (10mg/kg., p.o) and L-Arginine (50mg/kg., p.o) was employed to confirm its role in NO Pathway. and donepezil, was used as a standard drug. Morris water maze and object recognition task were used to assess cognitive competence in rats. Acetylcholinesterase (AChE) activity and the levels of oxidative stress markers were determined in hippocampal and cortical regions of rat brain. BCCAO produced significant cognitive impairment, cholinergic deficit and oxido-nitrosative stress in rats which was improved by β -Citronellol treatment significantly and dose-dependently. The observed improvement of cholinergic functions and cognitive competence following β -Citronellol may be due to its antioxidant, anti-inflammatory and Nitric Oxide inhibitory activity.

Keywords: β -Citronellol, cerebral ischemia, oxidative stress, Bilateral Common Cerebral artery occlusion, Monoterpenes, Mitochondrial dysfunction.

1. Introduction

Recently, a group of phytochemicals like polyphenols, flavonoids, and terpenoids are found to be an emerging target of drug development for learning and memory (Bhardwaj et al. 2021). β -Citronellol (3, 7-dimethyl-6-octen-1-ol) (Fig.1) is a volatile acyclic monoterpene found naturally as an essential oil in various plant species globally such as *Cymbopogon Citrates*, *Cymbopogon Winterianus*, and *Lippia Alba* (Wang and Heinbockel 2018). R-(+) isomer of β -Citronellol has been documented to have anti-hyperalgesic, orofacial antinociceptive, and anti-inflammatory properties along with anticonvulsant activity in rodents by reducing excitotoxicity and blocking voltage-dependent Na⁺ channels (Nayebi et al. 2017). LD50 of β -Citronellol in rats is found to be 3.45g/kg orally (Vasconcelos et al. 2015).

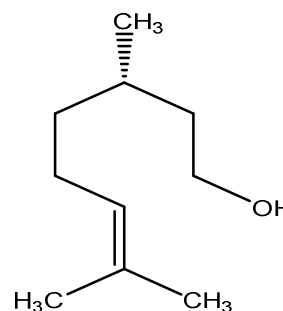


Fig 1: Structure of β -Citronellol

Cerebral ischemia and its associated neurological dysfunctions are the leading cause of disability in developed countries. The cortical region of the brain, which is linked to cognition, experiences neuronal death as a result of the diminished blood supply (Kaur and Sharma 2022a). Recombinant tissue plasminogen activator (rt-PA) thrombolysis has been the only proven effective treatment for occlusive cerebral ischemia. The acceleration of neurological diseases linked to cerebral ischemia has been attributed in part to oxidative stress brought on by an increased generation of ROS. The currently available pharmacological therapies offer little symptomatic alleviation and preventative interventions. Drugs that

block the dysfunctional processes, specifically the deterioration in memory and cognitive abilities, are therefore desperately needed. A decrease in acetylcholine (ACh) levels has also been proposed as a pathogenesis-related mechanism. However, cholinesterase inhibitors only effectively treat symptoms rather than the neuronal damage brought on by ischemic stroke, and they also have a number of negative side effects. As a result, extensive drug discovery research is being done on pharmacological interventions for treatment derived from natural or synthetic sources. Therefore, in view of the need to identify new sources of drugs that are more effective and have fewer side effects, and given the fact that β -Citronellol inhibited NO production, as well as the expression of the proinflammatory enzymes cyclooxygenase-2 (COX-2) and induced nitric oxide synthase (iNOS) in primary cultures of activated microglial cells could have several beneficial pharmacological and neuroprotective effects with significant effects on disease modulation (Wojtunik-Kulesza et al. 2019). This study aimed to investigate its possible role in prevention/treatment of neurodegenerative diseases where neuroinflammation is part of the pathophysiology.

2. Material and methods:

2.1 Experimental animals: The Institutional Animal Ethical Committee (IAEC) gave its approval to the experimental protocol used in this work (Protocol number. IAEC-CTIPS/2019/XII/0083 (PCL-D)). In this investigation, male Wistar rats weighing 200–220 g were used. They were housed in a typical environment with a 12 hour light/dark cycle and room temperature of $22 \pm 2^\circ\text{C}$ and relative humidity of 50% - 60%. The food in the form of dry pellets and water was made available ad libitum.

2.2 Drugs and chemicals: β -Citronellol was obtained from Sigma-Aldrich Ltd., Bangalore, India. Donepezil was obtained as ex-gratia from Albro Pharmaceuticals Pvt. Ltd., Sri Muktsar Sahib, Punjab, India. Analytical grade materials were employed for all other compounds and reagents in this study. Drug and chemical solutions were always freshly made before usage.

2.3 Experimental protocol: Male Wistar rats were divided into six groups: (n=8). Description of each group is given in table 1

Table 1: Experimental Grouping

Groups	Treatment description
Group I	Sham Control
Group II	Bilateral common carotid artery occlusion (BCCAO)
Group III	BCCAO + β -Citronellol diluted 100 \times in water (Low Dose) by inhalational route
Group IV	BCCAO + β -Citronellol diluted 50 \times in water (High Dose) by inhalational route
Group V	BCCAO + β -Citronellol (High Dose) + L-NAME (10 mg/kg, p.o)
Group VI	BCCAO + β -Citronellol (High Dose) + L-Arginine (50 mg/kg, p.o)

2.4 Inhalation of β -Citronellol: Inhalation was carried out in a sealed container. β -Citronellol occurs widely in nature and animals may be exposed when breathing in air. 2 mL of β -Citronellol was diluted 100 \times in water (Low Dose) and diluted 50 \times in water (High Dose) for inhalation (Batubara et al. 2015). A piece of absorbent cotton (4 \times 4 cm) impregnated with 2 mL of β -Citronellol was placed in a stainless-steel container (60 \times 60 \times 35 mm) capped by a lid with holes. The rats were exposed to β -Citronellol for 30 minutes daily starting from day 3rd to 24th. (Zhuang et al. 2022)

2.5 Induction of Global cerebral ischemia: Bilateral common carotid artery occlusion (BCCAO):

Ketamine (80 mg/kg i.p.) and xylazine (5 mg/kg i.p.) were used to anaesthetize the animals. A 3-cm-long midline skin incision was created in the neck prior to the bilateral common carotid artery occlusion (Nandagopal et al., 2010). With a surgical blade, the fur on the rat's neck was totally removed. Ethanol was used to clean the operating area. With surgical scalpel blade number 11, a 3 cm-long incision was created in the centre of the neck. Adipose tissue was then separated to locate the carotid arteries. Common carotid arteries were isolated. Curved forceps were used to separate the tissue while taking care not to injure the vagal nerves. Using a 4-0 suture line, the common carotid arteries on either side were ligated. After ligation, the carotid arteries were placed in their normal position. Using sterile sutures, the wound was stitched shut in two layers (muscle and skin). One absorbable suture (Ethicon

chromic sutures-3/0, Johnson & Johnson Ltd., India) was used to sew the muscle layer, and one non-absorbable suture was used to stitch the skin. After suturing, Povidone Iodine was used to clean the area and disinfect the skin. The entire procedure was conducted with a high level of asepsia (Khajuria et al., 2012)

2.6 Assessment of cognitive impairment

2.6.1 Spatial learning and Memory evaluation (Morris water maze test): To evaluate the spatial learning and memory loss in rats caused by cerebral ischemia, the Morris Water Maze (MWM) test was performed (Morris 1984).

2.6.2 Object recognition test (ORT): The rats were familiarized with the apparatus (60×60×40 cm for rats) without objects for 30–45 min before the experiment. Two trial sessions (T1 and T2) with 24-hour inter-trial period was included in ORT (Akkerman et al., 2012). After each trial, the equipment and the objects were carefully cleaned to remove any odour cues. In the first trial each animal was given a pair of cylindrical objects to examine. One of the objects shown in first trial was swapped out for a new object in second trial. Exploration was considered as directing the nose to the objects at a distance ≤ 2 cm and/or touching it with the nose (van Goethem et al. 2012).

Brain homogenate preparation: Biochemical estimation was performed using brain homogenate. Animals were sacrificed by decapitation, and brains were removed and rinsed with 0.9 % ice-cold normal saline. Then, ice-cold 0.1 mol/l phosphate buffer (pH 7.4) was used to homogenize brain cortex and hippocampus tissue samples ten times (w/v). The supernatant was then collected from the homogenate and utilized for biochemical evaluation after being centrifuged for 20 min at 10,000g at 4°C (Kaur et al. 2016).

2.6.3 Estimation of brain acetylcholinesterase (AChE) activity: The Ellman et al. method of measuring AChE activity in the hippocampus and cortical area, based on the reaction of thiocholine with dithiobisnitrobenzoate ions, was used to determine cholinergic dysfunction (Ellman et al. 1961).

2.7 Assessment of oxidative stress

2.7.1 Estimation of brain and carotid artery thiobarbituric acid reactive species (TBARS) level:

The concentration of TBARS was evaluated in order to assess a lipid peroxidation index (Ohkawa et al. 1979).

2.7.2 Estimation of brain nitrite level: By using the Griess reaction, the nitrite concentration was determined. A colorimetric test using the Griess reagent (0.1% N-(1-naphthyl) ethylenediamine dihydrochloride, 1% sulphanilamide, and 5% phosphoric acid) was used to measure the accumulation of nitrite in the supernatant (Toczewska et al. 2020).

2.7.3 Estimation of brain-reduced glutathione (GSH) level: Brain tissue homogenate (in 0.1-M phosphate buffer, pH 7.4) was obtained in order to test the GSH level and Ellman's method was used for spectroscopical analysis (Ellman 1959).

2.8 Statistical analysis: All values were expressed as mean±SD. Neurological score, TBARS, nitrite, glutathione, AChE activity, TNF- α and Na⁺K⁺ATPase activities were statistically analyzed using one-way ANOVA followed by Tukey's multiple comparison tests. MWM and ORT parameters were analyzed using two-way ANOVA followed by Bonferroni's post hoc test. The P<0.05 was considered statistically significant.

3. Results

3.1 Effect of pharmacological interventions on escape latency time (ELT) and mean time spent in the target quadrant (TSTQ) using Morris water maze (MWM): When compared to the ELT of rats given a sham operation, BCCAO surgery resulted in a significantly higher ELT from day 1 to day 4. Additionally, these animals demonstrated memory impairment as seen by a substantial decrease in day 5 TSTQ when compared to day 5 TSTQ of sham control rats. Treatments with β -Citronellol significantly and dose-dependently slowed the increase in ELT, indicating a lessened degree of acquisition memory impairment (Fig. 2(a)). Additionally, β -Citronellol raised the day 5 TSTQ, demonstrating a notable improvement in memory (Fig. 2(b)). This ameliorative effect of

β -Citronellol in decreasing ELT was reduced by L-Arginine (50mg/kg., p.o) and enhanced by L-NAME (10mg/kg., i.p) when given concurrently with β -Citronellol (High Dose) in BCCAO rats. Moreover, L-Arginine

(50mg/kg., p.o) also blocked the effect of β -Citronellol and L-NAME (10mg/kg., i.p) in increasing day 5 TSTQ as compared with the BCCAO group.

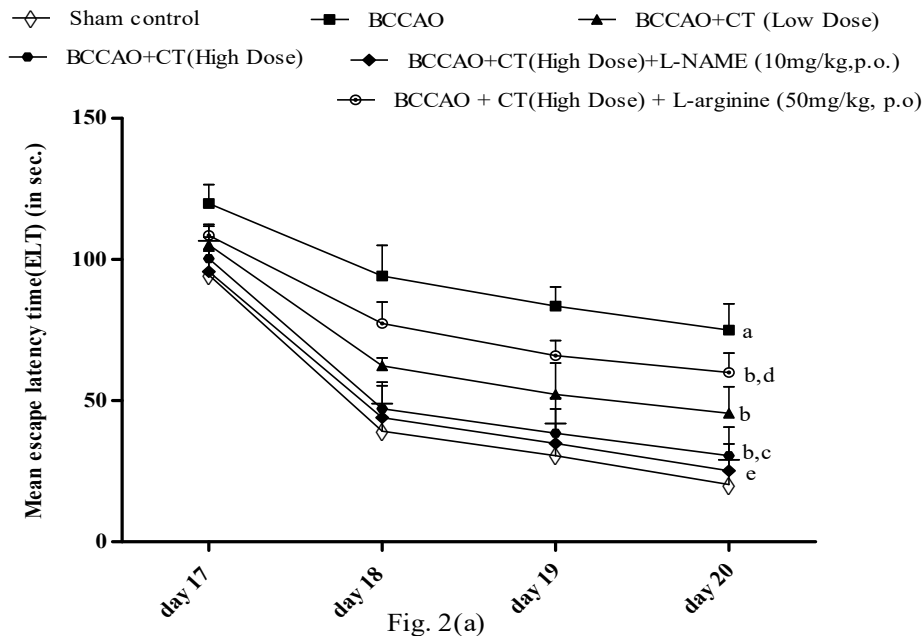


Fig. 2(a)

Fig 2 (a) Effect of pharmacological interventions on mean escape latency time (ELT) in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β -Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β -Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β -Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean \pm SD (n=8)

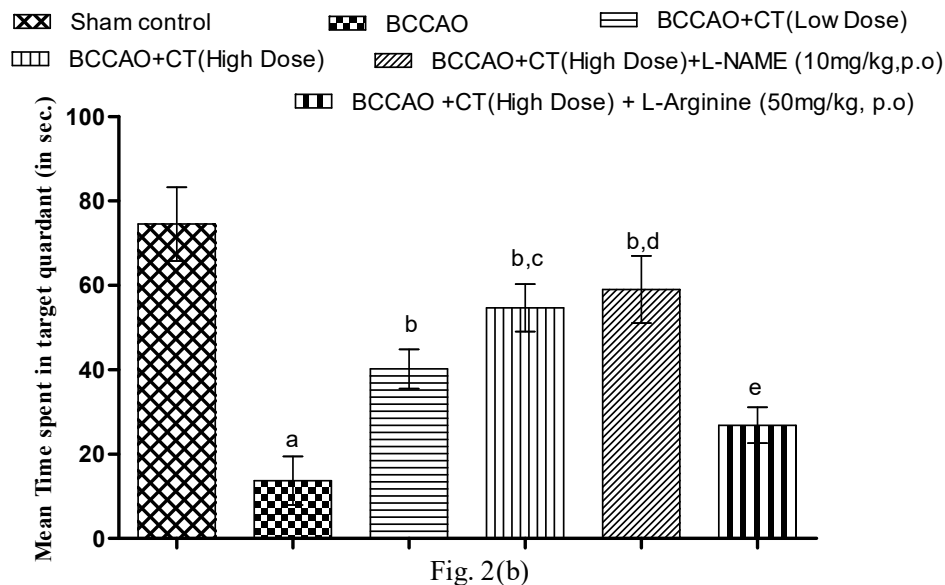


Fig. 2(b)

Fig 2(b) Effect of pharmacological interventions on mean time spent in target quadrant (TSTQ) in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β -Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β -Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β -Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean \pm SD (n=8).

3.2 Effect of pharmacological interventions on time to explore objects in object recognition test (ORT): In the retention trial, sham control rats spent more time exploring novel objects as compared with a familiar object. BCCAO rats showed no significant difference in time to explore novel objects as compared with a familiar object (Fig. 3(a)). Inhalational administration of β -Citronellol (diluted 100 \times in water (Low Dose)

and diluted 50 \times in water (High Dose)) individually, significantly and dose-dependently increased time spent in exploring novel object as compared with the familiar object (Fig. 3(b)). This ameliorative effect of β -Citronellol was blocked by L-Arginine (50mg/kg., p.o) and was enhanced by L-NAME (10mg/kg., i.p) when given concurrently with β -Citronellol therapy in BCCAO rats.

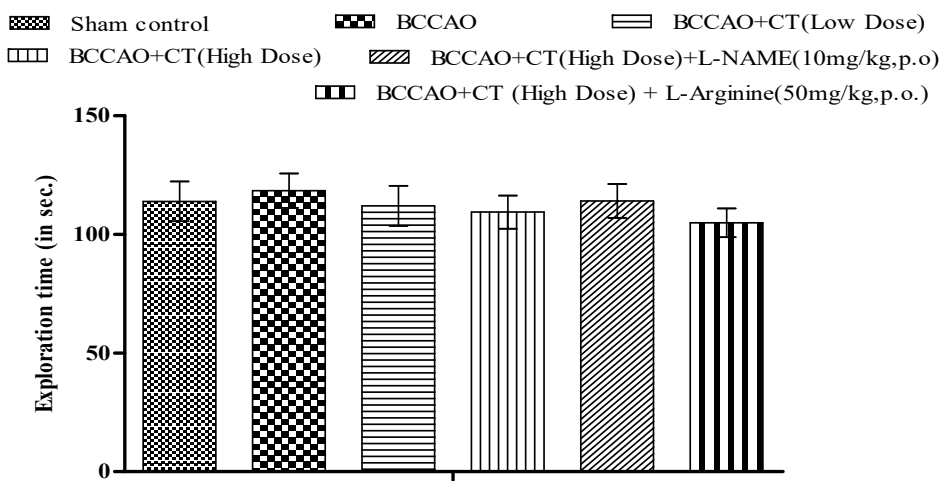


Fig. 3(a)

Fig 3 (a) Effect of pharmacological interventions on exploration time (ORT) in bilateral common carotid occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β -Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β -Citronellol (High Dose). All values are expressed as mean \pm SD (n=8).

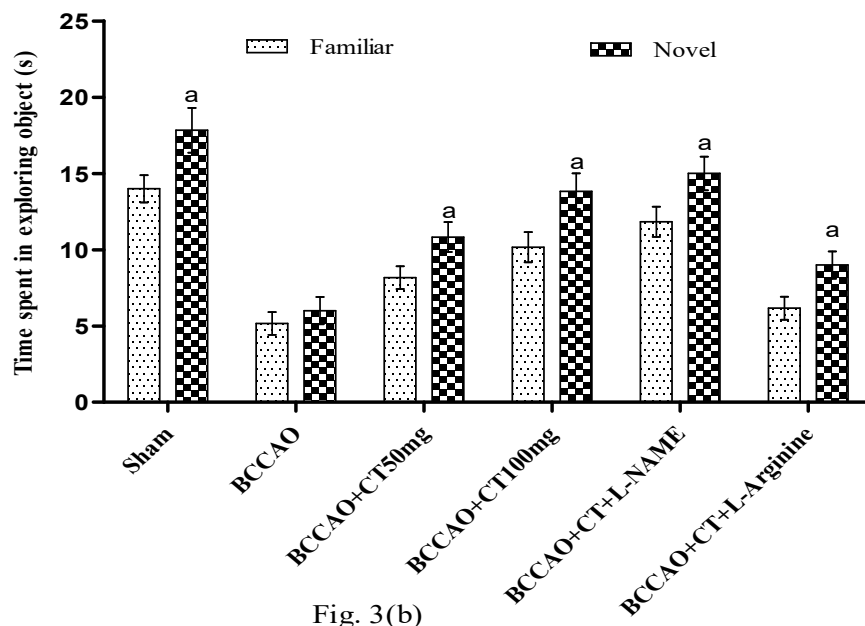


Fig. 3(b)

Fig 3(b). Effect of pharmacological interventions on mean spent to explore objects (ORT) in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Familiar objects. All values are expressed as mean \pm SD (n=8).

3.3 Effect of pharmacological interventions on brain acetylcholinesterase (AChE) activity: BCCAO significantly increased AChE activity in comparison to the sham control. Inhalational administration of β -Citronellol (diluted 100 \times in water (Low Dose) and diluted 50 \times in water (High Dose) significantly and dose-dependently reduced

AChE activity both in the cortex and hippocampus compared with the BCCAO group (Fig.4). However, this ameliorative effect of β -Citronellol was blocked by L-Arginine (50mg/kg., p.o) and was enhanced by L-NAME (10mg/kg., i.p) when given concurrently with β -Citronellol (High Dose) in BCCAO rats.

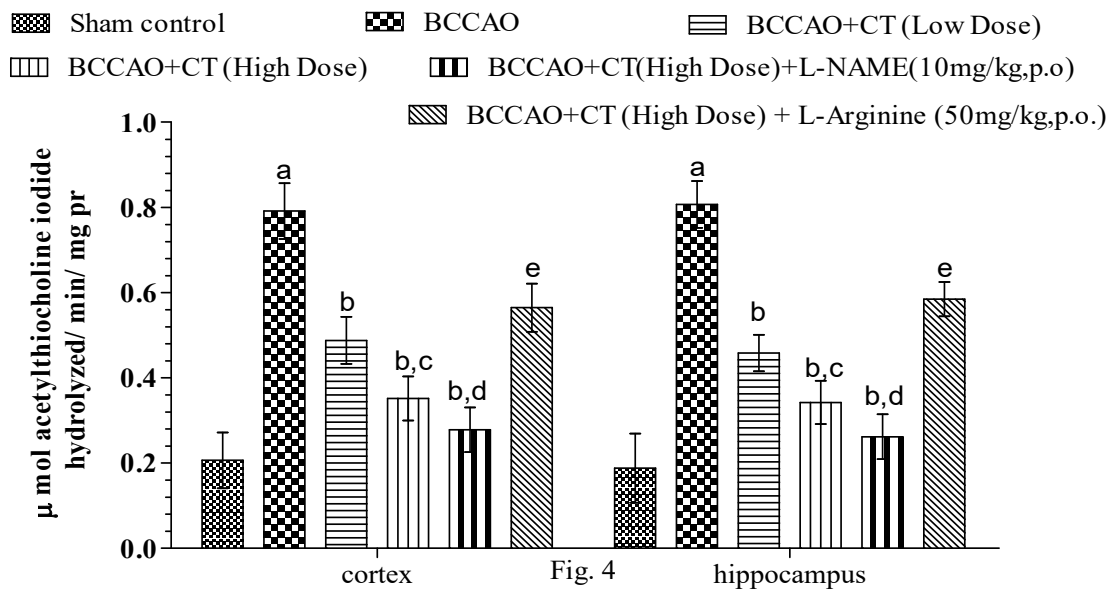


Fig 4: Effect of pharmacological interventions on brain AchE activity in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β -Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β -Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β -Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean \pm SD (n=8)

3.4 Effect of pharmacological intervention on brain and carotid artery TBARS level: In comparison to the sham control, BCCAO considerably raised the levels of TBARS in the brain (Fig. 5(a)) and carotid artery (Fig. 5(b)). The amount of TBARS was significantly and dose-dependently reduced

following administration of β -Citronellol (Low dose and High dose). This ameliorative effect of β -Citronellol was blocked by L-Arginine (50mg/kg., p.o) and was enhanced by L-NAME (10mg/kg., i.p) when given concurrently with β -Citronellol (High dose) in BCCAO rats.

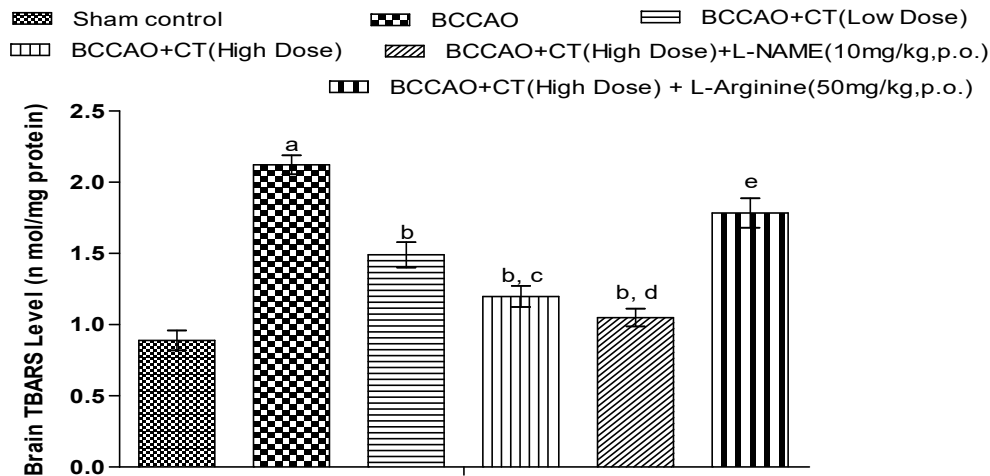


Fig. 5(a)

Fig 5(a): Effect of pharmacological interventions on brain TBARS in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β -Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β -Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β -Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean \pm SD (n=8)

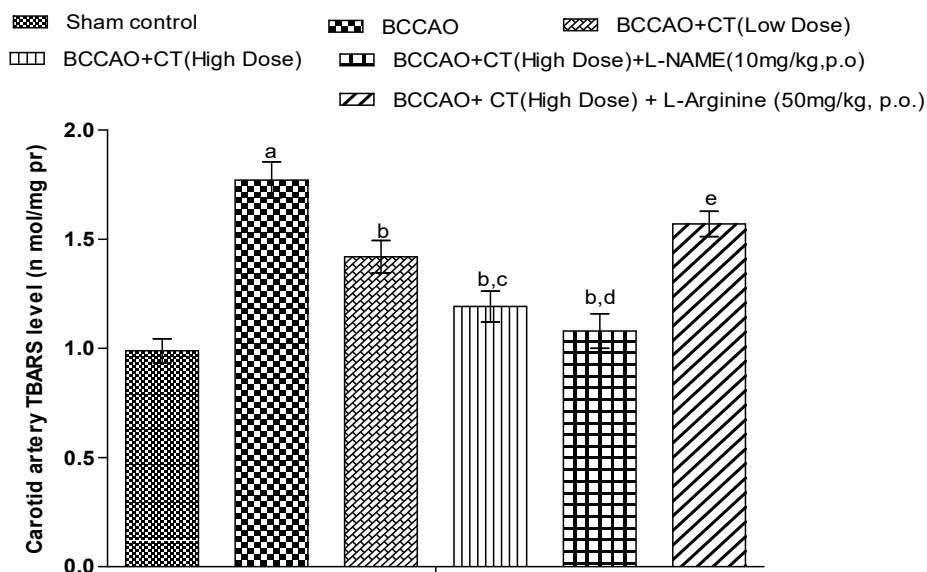


Fig.5(b)

Fig 5(b): Effect of pharmacological interventions on carotid artery TBARS in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β -Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β -Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β -Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean \pm SD (n=8)

3.5 Effect of pharmacological interventions on brain nitrite concentration: When compared to the sham control, the brain nitrite level in the BCCAO group was considerably higher. Brain nitrite content in BCCAO rats was considerably and dose-dependently reduced after receiving β -

Citronellol inhalational administration. (Fig. 6). This ameliorative effect of β -Citronellol was blocked by L-Arginine (50mg/kg., p.o) and was enhanced by L-NAME (10mg/kg., i.p) when given concurrently with β -Citronellol (High dose) in BCCAO rats.

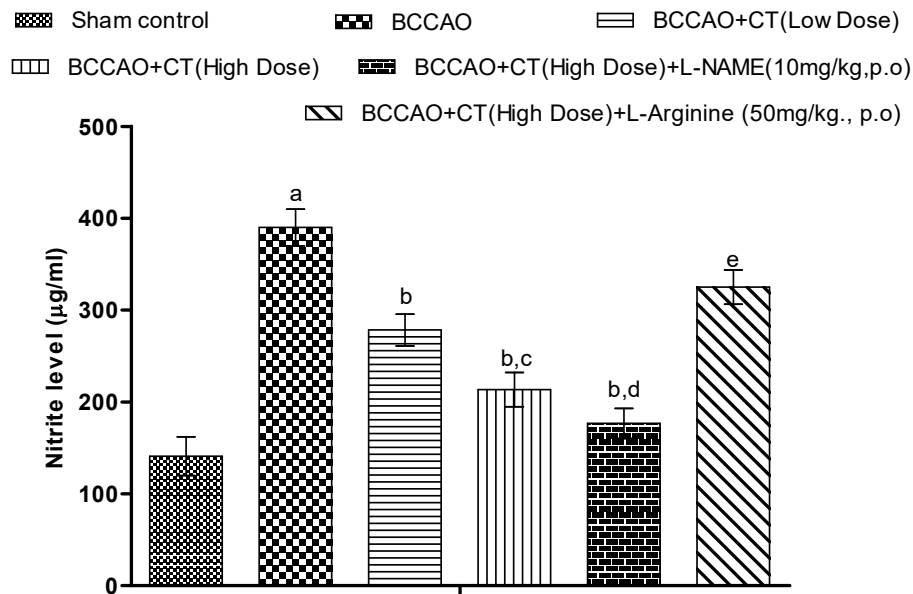


Fig. 6

Fig 6: Effect of pharmacological interventions on brain nitrite levels in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β-Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β-Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β-Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean ± SD (n=8)

3.6 Effect of pharmacological intervention on brain reduced glutathione (GSH) level: In comparison to the sham control, the GSH level was considerably lower in the BCCAO group. β-Citronellol administrations enhanced GSH levels in

BCCAO rats considerably and dose-dependently (Fig. 7). This ameliorative effect of β-Citronellol was blocked by L-Arginine (50mg/kg., p.o) and was enhanced by L-NAME (10mg/kg., i.p) when given concurrently with β-Citronellol (High Dose) in BCCAO rats.

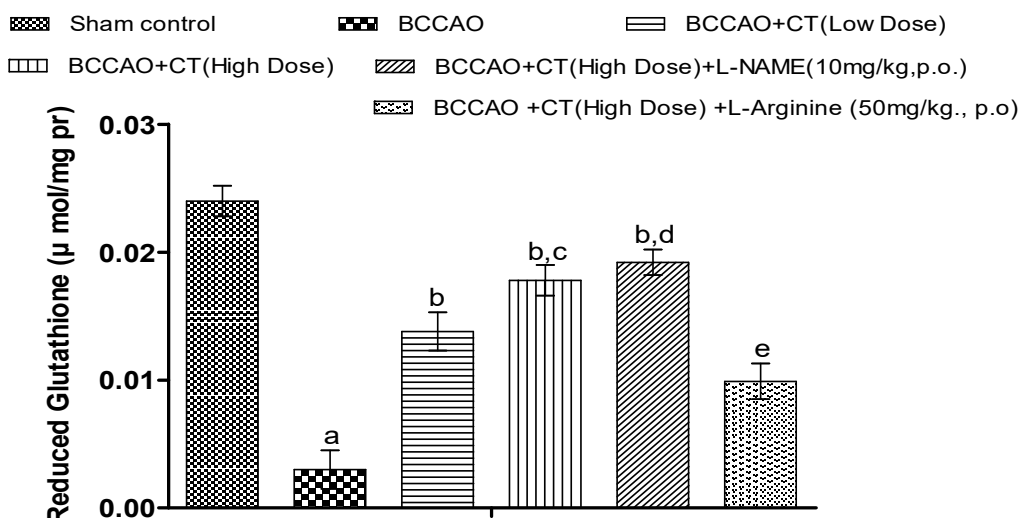


Fig. 7

Fig 7: Effect of pharmacological interventions on brain reduced glutathione levels in bilateral common carotid artery occlusion (BCCAO) rats. ^aP<0.05 vs Normal control; ^bP<0.05 vs BCCAO; ^cP<0.05 vs BCCAO+ β-Citronellol (Low Dose), ^dP<0.05 vs BCCAO+ β-Citronellol (High Dose). ^eP<0.05 vs BCCAO+ β-Citronellol (High Dose) + L-NAME (10mg/kg., p.o). All values are expressed as mean ± SD (n=8)

4. Discussion

β -Citronellol is a volatile acyclic monoterpene that occurs naturally as an essential oil. Its antioxidant, anti-inflammatory, and anticholinergic properties have been shown to have neuroprotective effects probably by encouraging mitophagy and providing resistance to oxidative stress-mediated mitochondrial permeability transition (Silva-Correa et al. 2021). ROS accumulation by cerebral ischemia has been shown to suppress antioxidation-related transcription factors such nuclear factor-erythroid 2-related factor-2 (Nrf2). Terpenes are documented as Nrf2 inducers which restored the mitochondrial membrane potential and prevent mitochondrial permeability transition pore (mPTP) opening and further DNA fragmentation and neuronal cell death (Liang et al. 2021). β -Citronellol has also been demonstrated to exert a neuroprotective effect against pentylentetrazol, picrotoxin and maximal electroshock-induced seizures and have the ability to reduce neuronal excitability by blocking voltage-dependent Na^+ channels in rodents (Silva-Correa et al. 2021). Indeed, β -Citronellol has also been reported to have several pharmacological activities such as anticonvulsant, antihyperalgesic, and orofacial antinociceptive properties. In rodents, it exerted antinociceptive and anti-inflammatory effects also (Sharma et al. 2020). Recently, through its anti-oxidant effect, it has been reported to mitigate memory impairment and neurotoxicity induced by zinc oxide nanoparticles in male Wistar rats (Farokhchah et al. 2021).

In present study, group of animals were operated with bilateral common carotid artery occlusion (BCCAO) to induce global cerebral ischemic stroke. β -Citronellol was used to evaluate its neuroprotective potential based on fact that it was documented to increase endothelial Nitric oxide synthase (eNOS) and has the potential to provide neuroprotection via aromatherapy in cerebral ischemia induced neuronal damage (Lu et al., 2019). To confirm and optimize the same, it was administered with L-NAME (10mg/kg., p.o) and L-Arginine (50mg/kg., p.o). It was found that β -Citronellol was able to alleviate neurological and cognitive deficits and oxidative stress significantly and in dose-dependent manner. Spatial and non-spatial

learning paradigms, such as the Morris water maze (MWM) and the object recognition test (ORT) were utilized in the study to evaluate the AChE inhibitory property of β -Citronellol. According to longer escape latency times and barely different exploration times for unfamiliar and familiar objects in the Morris water maze and the object identification task, respectively, BCCAO in rats significantly impaired both spatial and non-spatial memory. The MWM performance of BCCAO rats treated with β -Citronellol improved in a dose-dependent manner, and the rats were able to distinguish between familiar and novel objects, whereas administration of β -Citronellol along with L-Arginine drastically reduced the protective effect of β -Citronellol.

Reactive oxygen species (ROS) and their participation in oxidative damage to the hippocampus, amygdala, and cortical regions of the brain are definitely the reason of memory impairment associated with cerebral ischemia. Cognitive issues in these regions of the rat brain have already been connected to synaptic oxidative damage. (Shahmohamady et al., 2018). BCCAO significantly increased nitrite levels and significantly decreased glutathione (GSH) levels, indicating an increase in oxidative-nitrosative stress. Contrarily, β -Citronellol dramatically and dose-dependently reduced the oxidative-nitrosative stress caused by BCCAO and restored levels of an antioxidant enzyme (GSH), indicating that it may have antioxidant activity. When administered along L-NAME, effect was potentiated and L-Arginine reversed the protective effect of β -Citronellol. This suggests that the neuroprotection offered by β -Citronellol is due to anti-oxidant and anti-inflammatory properties.

The β -Citronellol treatment produced a significant and dose-dependent decrease in elevated AChE activity and attenuated cognitive impairment in BCCAO rats. The current study's findings are consistent with other studies showing natural monoterpene compounds, such as geraniol, limonene, eugenol and citral etc., decreasing the AChE activity in various experimental models as an aromatherapy (Wojtunik-Kulesza et al. 2019).

5. Conclusion

Our findings complement and provide evidence for cognition-enhancing and anti-oxidant effects of inhalational β -Citronellol. In conclusion, the observed cognitive enhancement and protection against neurological dysfunction following β -Citronellol in BCCAO rats may be due to its antioxidant, anti-inflammatory, and neuromodulatory actions over cholinergic neurons and reduced NO which probably helps

to restore Ach activity. Nonetheless, the findings of the present study suggest the therapeutic potential of β -Citronellol, an essential oil for aromatherapy in neurological dysfunctions associated with cerebral ischemia.

Ethical Approval: The Institutional Animal Ethical Committee (IAEC) gave its approval to the experimental protocol of this research work (Protocol number. IAEC-CTIPS/2019/XII/0083 (PCL-D)).

References

1. Akkerman, S., Blokland, A., Reneerkens, O., van Goethem, N.P., Bollen, E., Gijsselaers, H.J., Lieben, C.K., Steinbusch, H.W. and Prickaerts, J., 2012. Object recognition testing: methodological considerations on exploration and discrimination measures. *Behavioural brain research*, 232(2), pp.335-347.
2. Batubara, I., Suparto, I.H., Sa'diah, S., Matsuoka, R. and Mitsunaga, T., 2015. Effects of inhaled citronella oil and related compounds on rat body weight and brown adipose tissue sympathetic nerve. *Nutrients*, 7(3), pp.1859-1870.
3. Bhardwaj, K., Silva, A.S., Atanassova, M., Sharma, R., Nepovimova, E., Musilek, K., Sharma, R., Alghuthaymi, M.A., Dhanjal, D.S., Nicoletti, M. and Sharma, B., 2021. Conifers phytochemicals: a valuable forest with therapeutic potential. *Molecules*, 26(10), p.3005.
4. Ellman, G.L., Courtney, K.D., Andres Jr, V. and Featherstone, R.M., 1961. A new and rapid colorimetric determination of acetylcholinesterase activity. *Biochemical pharmacology*, 7(2), pp.88-95.
5. Ellman, G.L., 1959. Tissue sulfhydryl groups. *Archives of biochemistry and biophysics*, 82(1), pp.70-77.
6. Farokhchah, M., Hejazian, L., Akbarnejad, Z., Pourabdolhossein, F., Hosseini, S.M., Mehraei, T.M. and Soltanpour, N., 2021. Geraniol improved memory impairment and neurotoxicity induced by zinc oxide nanoparticles in male wistar rats through its antioxidant effect. *Life Sciences*, 282, p.119823.
7. Kaur, J., Sharma, S., Sandhu, M. and Sharma, S., 2016. Neurokinin-1 receptor inhibition reverses ischaemic brain injury and dementia in bilateral common carotid artery occluded rats: possible mechanisms. *Inflammopharmacology*, 24(4), pp.133-143.
8. Kaur, M.M. and Sharma, S., 2022. of article: Mitochondrial repair as potential pharmacological target in cerebral ischemia. *Mitochondrion*.
9. Khajuria, D.K., Razdan, R. and Mahapatra, D.R., 2012. Description of a new method of ovariectomy in female rats. *Revista brasileira de reumatologia*, 52, pp.466-470.
10. Liang, Z., Currais, A., Soriano-Castell, D., Schubert, D. and Maher, P., 2021. Natural products targeting mitochondria: emerging therapeutics for age-associated neurological disorders. *Pharmacology & Therapeutics*, 221, p.107749.
11. Lu, J.X., Guo, C., Ou, W.S., Jing, Y., Niu, H.F., Song, P., Li, Q.Z., Liu, Z., Xu, J., Li, P. and Zhu, M.L., 2019. Citronellal prevents endothelial dysfunction and atherosclerosis in rats. *Journal of Cellular Biochemistry*, 120(3), pp.3790-3800.
12. Morris, R., 1984. Developments of a water-maze procedure for studying spatial learning in the rat. *Journal of neuroscience methods*, 11(1), pp.47-60.
13. Nandagopal, M., Muralidharan, P., Thirumurugan, G. and Nagar, C., 2010. Behavioral assessment studies in Cerebral ischemia induced by Bilateral carotid artery occlusion in Rats. *Ann Biol Res*, 1(1), pp.208-223
14. Nayeibi, N., Khalili, N., Kamalinejad, M. and Emtiazy, M., 2017. A systematic review of the efficacy and safety of Rosa

- damascena Mill. with an overview on its phytopharmacological properties. *Complementary therapies in medicine*, 34, pp.129-140.
15. Ohkawa, H., Ohishi, N. and Yagi, K., 1979. Assay for lipid peroxides in animal tissues by thiobarbituric acid reaction. *Analytical biochemistry*, 95(2), pp.351-358.
 16. Shahmohamady, P., Eidi, A., Mortazavi, P., Panahi, N. and Minai-Tehrani, D., 2018. Effect of sinapic acid on memory deficits and neuronal degeneration induced by intracerebroventricular administration of streptozotocin in rats. *Polish Journal of Pathology*, 69(3), pp.266-277.
 17. Silva-Correa, C.R., Campos-Reyna, J.L., Villarreal-La Torre, V.E., Calderón-Peña, A.A., Sagástegui-Guarniz, W.A., Guerrero-Espino, L.M., González-Siccha, A.D., Aspajo-Villalaz, C.L., González-Blas, M.V., Cruzado-Razco, J.L. and Hilarío-Vargas, J., 2021. Potential Neuroprotective Activity of Essential Oils in Memory and Learning Impairment. *Pharmacognosy Journal*, 13(5).
 18. Toczewska, J., Konopka, T., Zalewska, A. and Maciejczyk, M., 2020. Nitrosative stress biomarkers in the non-stimulated and stimulated saliva, as well as gingival crevicular fluid of patients with periodontitis: review and clinical study. *Antioxidants*, 9(3), p.259.
 19. van Goethem, N.P., Rutten, K., van der Staay, F.J., Jans, L.A., Akkerman, S., Steinbusch, H.W., Blokland, A., van't Klooster, J. and Prickaerts, J., 2012. Object recognition testing: rodent species, strains, housing conditions, and estrous cycle. *Behavioural brain research*, 232(2), pp.323-334.
 20. Vasconcelos, T.B., Ribeiro-Filho, H.V., Lucetti, L.T. and Magalhães, P.J.C., 2015. β -Citronellol, an alcoholic monoterpene with inhibitory properties on the contractility of rat trachea. *Brazilian Journal of Medical and Biological Research*, 49.
 21. Wang, Z.J. and Heinbockel, T., 2018. Essential oils and their constituents targeting the gabaergic system and sodium channels as treatment of neurological diseases. *Molecules*, 23(5), p.1061.
 22. Wojtunik-Kulesza, K.A., Kasprzak, K., Oniszczyk, T. and Oniszczyk, A., 2019. Natural monoterpenes: Much more than only a scent. *Chemistry & biodiversity*, 16(12), p.e1900434.
 23. Zhuang, Q., Zhuang, S., Gong, Y. and Li, S., 2022. Chronic β -Citronellol Inhalation Rescues Parvalbumin Expression Loss in Prefrontal Cortex of Chronic Restraint Stress Mice. *Journal of Shanghai Jiaotong University (Science)*, 27(4), pp.512-520.

A REVIEW ON ETHNOMEDICINAL, PHYTOCHEMICAL AND PHARMACOLOGICAL ASPECTS OF *ARMORACIA LAPATHIFOLIA*

Surinder Kaur Sidhu¹, Anshul Chawla¹ and Munish Goyal²

¹Department of Pharmaceutical sciences, CT University, Ludhiana, Punjab, India

²Akash Institute of Medical Sciences, Nalagarh, Himachal Pradesh, India

ABSTRACT

Armoracia lapathifolia commonly known as horseradish has been known since ancient times as a folk medicinal herb and as a plant of culinary and nutritional value with a pungent aroma and thick fleshy roots. It has been used to treat a wide range of diseases in several parts of the globe. The plant has been used to cure a variety of ailments, including pain relief, scurvy treatment, baldness, boils, gout, rheumatism, heartache, epilepsy, sciatica, and stomach disorders. It is grown in India both in the south and north hill stations. Phytochemical examinations of the plant and its parts revealed a number of beneficial phytoconstituents like glucosinolates in abundance, isothiocyanates, flavonoids, phenolic compounds, vitamin C, myrosinase and peroxidase enzymes, coumarins as well as minerals. Countless noteworthy pharmacological effects of the plant, like antimicrobial, anticancer, antihypertensive, antitumor, antioxidant, hypoglycaemic, analgesic, and anti-inflammatory activity have been found to exist. The objective of this review paper is to compile all relevant published information on the therapeutic benefits, phytochemistry, and traditional uses of this Brassicaceae plant of immense worth and emphasizes its potential in modern medicine which needs to be explored further.

Keywords: Horseradish, phytoconstituents, glucosinolates, pharmacology, *armoracia rusticana*, pharmacology, traditional uses.

Introduction

Traditional medical frameworks provide an incredible wealth of information that can be used to create new drugs and natural products, which are currently essential sources of pharmacotherapeutics (Newman *et al.*, 2000). *Armoracia lapathifolia*, a member of the mustard family Brassicaceae (Cruciferae), is a native of western Asia and south-eastern Europe (Courter *et al.*, 1969). It is a perennial plant that goes by the name "horseradish" and is quite hardy (Weber WW, 1949). It has been discovered that this plant was grown during the Roman and Greek eras for its white, extremely pungent root, which was used largely as a spice, a natural preservative, and a common herb with a number of therapeutic applications. (Rivelli *et al.*, 2017, Rosengarten 1969). This plant is grown commercially in some regions of North America and now primarily by small farms in China. It is also found in tropical areas of Asia as well as in Russia. (Agneta *et al.*, 2013). All around Europe, *A. lapathifolia* can be found growing in wet areas like fields, gardens, weedy areas, roadside ditches, and farmland (Lucaj *et al.*, 2013). The USA is currently the largest horseradish grower in the world, cultivating the crop on over 1600 hectares. (Stillo *et al.*, 2018). Horseradish is propagated

vegetatively by taking cuttings, and the yield varies with cutting length. Numerous names, including horseradish, creole, German mustard, red cole, and red horseradish, are given to this plant in different regions (Sampliner *et al.*, 2009). It is planted in northern Indian gardens and southern Indian hill stations (Khare CP, 2007). Horseradish has a wide range of pharmacological effects and phytotherapeutic qualities, which has drawn attention for its multiple uses as food, medicine as well as in other sectors (Wedelsbäck *et al.*, 2011)

Etymology

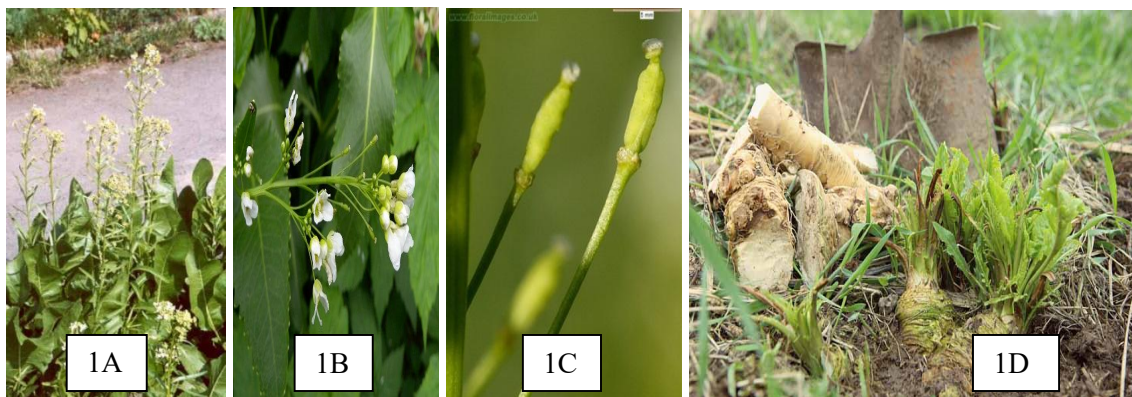
Chren was the most primitive name for horseradish. In German and French dialects different names for horseradish are found which are less ancient than the name chren (Sampliner *et al.*, 2009). The term horseradish appears to be derived from "meerettich" which signifies "sea radish" in German and this mistranslation might have resulted from confusing 'meer' (sea) for 'mare' or 'mähre' (Old horse) (Shehata *et al.*, 2009). The first use of the term horseradish was made by John Gerard in his popular English herbal. Some suggest that this plant spreads rapidly in a 'galloping' behavior plant, so the English called the plant horseradish. There is also chance that it was called harsh radish due to its

bitterness on the tongue. The name *Armoracia* denotes a plant growing "near the sea" (Courter, 1969).

Description

Horseradish is an upright, robust, perennial herb that can grow up to 120 cm in height. Cauline leaves have wavy margins (fig.1A) and grow directly from the stem in a circular pattern (basal rosette). Long-petioled basal leaves have a crenate edge. The stalked leaves are smaller in size, have thinner bases, and have serrated edges all the way around (Mohlenbrock RH, 2006). Leaf morphology varies depending on the environment. It's interesting to see how the season affects the morphology of the leaves (Shehata *et al.*, 2008). From late spring to early summer, little white flowers arranged in branching clusters are seen. The flowers (fig.1B) of this Brassicaceae family have six stamens, four

corollas grouped in a cruciform arrangement, and four sepals. (Sampliner *et al.*, 2009). A silique (fig.1C) is its fruit. At most six smooth, ripe brown seed or none at all are present in each angustiseptate fruit (pod). Rarely does it produce viable seeds (Weber WW, 1949; Stokes GW, 1955) The plant's roots are grayish-yellow on the outside and white on the inside, with a tapering main root and several thin lateral roots (fig.1D). Old plants are inappropriate for human consumption because they have extremely robust roots that are prone to deterioration. While the cutting has a scent similar to that of mustard, the intact roots have no flavor of their own. The "regular" version of horseradish, which has broad, wavy leaves and superior roots, and the "Bohemian" variant, which has thin, smooth leaves and poor-quality, disease-resistant roots, are the two different types of this condiment (Bratseh, 2009).



Morphology: fig 1: (A) Leaves, (B) Flowers: (C) Fruit (Pod); (D) Roots

Taxonomy

Botanical classification

Kingdom: Plantae ;Subkingdom: Viridiplantae;
Infra kingdom: Streptophyta; Super division:
Spermatophytina; Division: Tracheophyta;
Class: Magnoliopsida; Order: Brassicales;
Family: Brassicaceae; Genus: *Armoracia*;
Species: *Armoracia lapathifolia*

Synonyms:

Armoracia armoracia (L.) Britton; *Cochlearia armoracia* L.; *Nasturtium armoracia* (L.) Fr;
Radicula armoracia (L.) B.L. Rob; *Rorippa armoracia* (L.) Hitchc.

Common names:

English: Horse Radish; French: Cranson, Raifort cran; Raifort sauvage; German: Meerrettich; Spanish: Rábano picante; Rábano rusticano; Rábano salvaje

Growing Conditions

In chilly temperate climates, horseradish often requires little support and grows best in full sun to partial shade. Horseradish can grow in almost any type of soil, although for maximum growth it needs well-drained soils, especially with a groundwater level of around 150 cm. In heavy and light soils, horseradish comes out to be actually spicy and almost bland, respectively. Fertile soils with pH values

between 5.5 and 7.0 produce the largest yields. (**Filipović V et al., 2004**) Both annual and perennial horseradish crops thrive in soils with a deep, silty topsoil. Planting should start in the early spring since roots require warm summer temperatures (15–27 °C) at first and then cooler summer and fall temperatures (11–22 °C). Since lighter finished soils dry more quickly and regularly permit field digging during the rainy seasons of fall, winter, and spring, their advantages become obvious as soon as they are collected. In contrast to heavy soils, lighter soils also adhere less to the root mass. Horseradish depletes the soil of substantial amounts of nutrients as a result of its prolonged growing season. (**Swiader JM, 1992**)

Cultivation

It has been discovered that this plant was grown in ancient Greece and Rome. Around 2000 years ago, throughout the Roman and Greek eras According to estimates, 11,000 tonnes of horseradish are grown year in the USA, yielding around 27 million kg of horseradish that can be processed for a variety of uses (**Filipović V et al., 2015**). The "Horseradish Capital of the World" is Illinois (**Walters SA, 2010**) Aside from this, Canada, China, and South Africa are other temperate countries that produce a significant amount of horseradish (**Shehata et al., 2009**). Through root cuttings, horseradish is vegetatively grown; the length of the cuttings influences the yield. (**Cobalac et al., 2009**) For vegetative multiplication, side roots with diameters between 0.5 and 0.8 millimetres and lengths between 10 and 16 inches should have the principal root of the previous year's produce removed (**Courter et al., 1969**) In order to ensure optimum expansion during sowing, space the rows horizontally 60 to 70 cm apart. This encourages good yield and higher quality (**Shehata et al., 2009**). Adventitious buds are formed during asexual method of cultivation. (**Kamada et al., 2009**). Horseradish plants do not generate viable seed even when they bloom with fragrant petals (**Stokes GW, 1955**). A viable seed can be developed in the right circumstances. (**Moravec J, 1963**). Horseradish cultivation is dangerous when white rust is present (**Kadow KJ et al., 2009**) Internal root discoloration is a big issue in the horseradish

industry. Some horseradish roots that are left in the ground after harvesting and gathering spontaneously develop and transform into subsequent crop (**Babadoost M et al., 2015**)

Uses Of Horseradish As A Spice

Ancient people frequently used horseradish as a condiment to cover up the taste of meat in several European countries, including Russia, (**Small E, 1997**). Horseradish is widely made as a paste or sauce or added to salads. Additionally, chrain is used to represent a heated ground horseradish glue in Jewish and Slavic traditions. Sauces often contain powdered, dried horseradish root tissue. The typical white chrain is made of ground horseradish with additions of vinegar, salt, and occasionally sugar, whereas the red chrain includes beet to give it a red colour (**Marks G, 2010**). Horseradish roots are still used in some parts of Albania to pickle pears. Pickled pears with horseradish flavouring can be kept safely for 6 to 8 months, and the pickled pears' juice is used as a hangover remedy. (**Stillo et al., 2018**) It is frequently used as a base for meals during the carnival season and has numerous traditional culinary uses in southern Italy, particularly in the Basilicata region (**Sarli G et al., 2012**). Traditional dishes typically included horseradish's springtime leaves, either alone or in combination with other wild plants. (**Shehata A, 2009**) Numerous horseradish products are commonly available in supermarkets and specialty food stores. Cocktail sauce, cheese, speciality mustards, and other sauces, dips, spreads, hummus, relishes, and salads are just a few products that contain horseradish. These consist of dehydrated horseradish, beet horseradish, shredded horseradish, horseradish sauce, and cream-style prepared horseradish (**HIC, 2021**) Throughout the year, ground roots are regularly combined with oil and used, along with being spread on grilled bread. Because of its bitterness, horseradish was employed by European Jews as a symbolic food in the traditional dinner of Passover. (**Sarli G et al., 2012**) When added to milk, freshly squeezed horseradish juice is supposed to keep it from spoiling (**Czarnowski A**)

Traditional Uses of Horseradish As Medicine

Ever since the ancient Greeks, horseradish has been used as a back rub and an aphrodisiac. The numerous health benefits of it are mentioned in early herbals and old medical texts. (Courter *et al.*, 1969) In his book "De Materia Medica," the Greek physician Pedanius Dioscorides (AD 40–90) described horseradish as a diuretic and diuretic-like material. (Bostock J *et al.*, 1856) Horseradish might be blended with warm wine or water to alleviate lung conditions, according to German abbess Hildegard of Bingen (1098-1179). Botanist and herbalist John Gerard claimed that horseradish relieved colic, increased urine, and killed in addition to reducing sciatica pain, children's worms. For respiratory problems, it was supposed to be relaxing and expectorant. (Wedelsbäck *et al.*, 2011). William Coles (1626–1662), a herbalist, also suggested using horseradish as a scurvy therapy, particularly for sailors on extended voyages who did not have access to fresh produce; as a result, the diet's lack of vitamin C frequently led to outbreaks of the disease on board (Shehata *et al.*, 2009) Native Americans used horseradish as a diuretic, to treat kidney stones, to relieve toothaches, to treat asthma, cough, and bronchitis, as a respiratory aid, and as a urinary assist for gravel. It was also used to treat asthma, cough, and bronchitis. (Moerman DE, 1998) In countries like Bulgaria, Romania, and a tiny area of Russia, grated roots or leaves are applied to the skin to reduce pain. Instead, a paste made from the root is applied to the neck to aid in breathing problems. The Robinia pseudo acacia honey is used to cure bronchitis and coughs as well as to lower blood pressure when combined with vinegar, salt, and sugar. (Sampliner D) Horseradish leaves were one of the herbs used in Russian sauerkraut, a popular herbal treatment for liver and fever. (Pieroni A *et al.*, 2004)

Phytochemistry

Unbroken horseradish has no fragrance, but when it is sliced, ground, or chewed, the flavour and lachrymatory odour are released. (Nguyen *et al.*, 2006 ; Jiang ZT *et al.*, 2006). It is cultivated expressly to deliver a hot, spicy flavor (Sultana T *et al.*, 2003) The

characteristic taste and odour are brought on by substances like GLSs and the predominantly volatile breakdown products of these substances. (Mucete D *et al.*, 2006; Redovniković IR *et al.*, 2006) Several distinct compounds, including isothiocyanates, nitriles, thiocyanates, epithionitriles, and oxazolidines, are produced when the common enzyme myrosinase hydrolyzes GLSs. (Bones AM *et al.*, 2006) Products that are most common are isothiocyanates. GLSs are secondary metabolites that are distinguished by their central sulfated isothiocyanate group conjugated to thioglucose and an extra R-group produced from an amino acid. (Clarke DB, 2010) GLSs can be divided into three groups based on the structural characteristics of different amino acid precursors: (1) aliphatic GLSs produced from methionine, isoleucine, leucine, or valine; (2) aromatic GLSs produced from phenylalanine or tyrosine; and (3) indole GLSs produced from tryptophan. (Redovniković IR *et al.*, 2006) Among the Brassicaceae, black mustard seed (*Brassica nigra*) and horseradish roots (over 10% by dry weight) had the highest GLS levels. (Li X, 2004) A preliminary analysis of the horseradish roots' GC-MS results revealed the presence of 30 GLSs, which is more than any other species that has been recorded. The chromatograms also indicated that there may be many more structures in horseradish. (Grob K, 1979), 12 GLSs in the roots and 16 GLSs in the sprouts of horseradish were identified (Agneta *et al.*, 2012). Out of the total GLSs, Aliphatic GLS 2-propenyl-GLS (sinigrin) accounted for more than 80%. Lower amounts of phenyl ethyl-GLS (gluconasturtiin) and of the three indole compounds 3-indolylmethyl-GLS (glucobrassicin), 4-methoxy-3-indolylmethyl-GLS (4-methoxyglucobrassicin) and 4-hydroxy-3-indolylmethyl-GLS (4-hydroxyglucobrassicin) were found in horseradish plantlets leaves (Redovnikovic *et al.*, 2008a; D'auria M, 2004). GLSs are hydrolysed by the enzyme commonly known as myrosinase to a variety of compounds as isothiocyanates, nitriles, thiocyanates, epithionitriles, and oxazolidines of which the most common are isothiocyanates (Bones and Rossiter, 2006).

ITC profile for 100g root of fresh horseradish

(*Armoracia lapathifolia*) includes allyl isothioeyanate (96.6mg), 2-phenylethyl isothioeyanate (22.5mg), n-butyl isothioeyanate (0.42 mg), 3-butenyl isothioeyanate (0.81mg), 4-pentenyl isothioeyanate (0.1mg), 5-hexenyl isothioeyanate (0.18mg), 5-ethylsulphinylpentyl isothioeyanate (0.81mg), 6-methylsulphinyhexyl isothioeyanate (0.9mg), and 7-methylsulphinyheptyl isothioeyanate (0.78mg) (Agneta *et al.*, 2012). Coumarins (aesculetin, scopoletin), phenolic acids, ascorbic acid, asparagin and resin are other substances that were also found in horseradish (Shehata *et al.*, 2009).

Chief nutrients of 100g horseradish root are 3.3g dietary fiber, 11.29 g carbohydrate, 56 mg calcium, 314mg sodium, 246mg potassium, 27mg magnesium, 31mg phosphorus, 24.9mg vitamin C, and 57mg folate (source: United States Department of Agriculture [USDA] National Nutrient Database).

Prominent compounds in the aqueous extract from horseradish root were the amino acids arginine and proline, citric acid, phenolic compounds (caffeic acid and kaempferol derivatives), the main glucosinolates, 2-propenyl-GLS and 3-methylsulfinyl-propyl-GLS, and fatty acid derivatives (Herz *et al.*, 2017). Highest content of sinigrin reported in the methanol extract from horseradish root (Marzocco *et al.*, 2015). The methanol aqueous extract of horseradish root was rich in polyphenols i.e. malic acid, gallic acid, ferulic acid and epigallocatechin-3-gallate. The most abundant compound of the extract was allylisothiocyanate (Aissani *et al.*, 2013).

The GC-MS showed that the main component of the essential oil from *A. rusticana* was allyl isothiocyanate (97.81%). (Chen *et al.*, 2011).

HRE (Horseradish Extract) also contains other isothiocyanates (ITCs), such as phenethyl ITC (PEITC), butenyl ITC and pentenyl ITC (Cho, *et al.*, 2016). The Glucosinolates are present in the roots of *Armoracia rusticana* Sinigrin, glucobrassicin, neoglucobrassicin and gluconasturin were detected in major quantities (Li and Kushad, 2004). The roots also contain ascorbic acid (vitamin C) that is very important for humans who are not able to synthesize it. Ascorbic acid is a very strong antioxidant and it also plays a role in collagen synthesis (Prockop and Kivirikko, 1995). *Armoracia*

rusticana contains a small amount of flavonoids like kaempferol and quercetin (Fursa *et al.*, 1969; Cho *et al.*, 2003; Cirimbei *et al.*, 2013). The other study was investigated that identified Sinigrin (Allyl isothiocyanate) 240µg/g and Gluconasturtiin 55 respectively (Rosa Agneta *et al.*, 2013).

Major Polyphenolic compounds present in investigated horseradish root juice and extracts were identified and quantified by HPLC analysis. Phenolic acids (gallic acid, protocatechuic, caffeic, ferulic, isoferulic, chlorogenic, p-hydroxybenzoic, p-coumaric, syringic and synapic acid) and flavonoids (catechin, epicatechin, quercetin, kaempferol, luteolin, apigenin and isorhamnetin) were identified by matching their on-line ultraviolet spectra (UV) and retention times (RT) with those of standards. The content of total and individual phenolic compounds, quantified at 280, 330 or 360 nm, depending on their maximal response. The Catechin (flavan-3-ol) was detected at relatively high levels in all samples (0.75-33.17mg/g), p-hydroxybenzoic (6.68 mg/g), syringic (3.65 mg/g) and gallic acid (3.34 mg/g) and epicatechin (2.80mg/g). The horseradish juice contained mostly catechin and gallic acid. Horseradish extracts obtained from juice contained higher concentrations of epicatechin, ferulic and chlorogenic acid (Petrović V *et al.*, 2021). Horseradish peroxidase (HRP) has been successfully extracted, purified, and described, with the c isoenzyme of HRP (HRPc) being the most prevalent (Veitch NC, 2004). The isoenzyme C for horseradish peroxidase is a single polypeptide with 308 amino acid residues. (Welinder, 1976)

Pharmacology

Researchers have always been driven by *Armoracia lapathifolia*'s traditional applications to conduct pharmacological screening utilising crude extracts of the plant's many components to confirm its efficacy. Different bioactive substances have been assessed for a variety of biological functions, including antibacterial, antioxidant, and Several in vitro and in vivo animal models have been used to evaluate different bioactive compounds for various biological activities, including antimicrobial, antiasthmatic, antioxidant, antiinflammatory,

antidiabetic, antiulcer, anticarcinogenic, and hypotensive activity, which scientifically supports the plant's traditional use.

Allyl isothiocyanates is the most active compound from horseradish (*Armoracia lapathifolia*) which strongly inhibits the growth of *Escherichia coli*, *Listeria monocytogenes*, *Salmonella typhimurium*, *Serratia grimesii* and *Staphylococcus aureus* (Lin *et al.*, 2000).

The another great potential of Allyl isothiocyanates which is released when the plant cells in horseradish are crushed inhibit different kinds of cancer such as human prostate cancer (Srivastava *et al.*, 2003) as well as induction of lung cancer and development of tumors in liver and fore stomach (Kosson & Horbowicz, 2008). Allyl isothiocyanates has shown to be effective against the fish infecting oomycete *Saprolegnia parasitica* which causes problems in the fish industry (Khomvilai *et al.*, 2006). Isothiocyanates extracted from horseradish root have strong antibacterial activity and may be a candidate for use as a natural disinfectant against oral microorganisms (Park *et al.*, 2013).

The antimicrobial and antioxidant effects of horseradish are also used by the cosmetics industry as strengthening and bleaching substances (Ilsi Beautifying Herbs Ltd., 2014) also leaf and root extracts have been showed antioxidant property (Majewska *et al.*, 2004). The Horseradish root methanol water extract has showed nematicidal activity (Aissani *et al.*, 2013) and Dietary horseradish reduces plasma cholesterol in mice (Balasinska *et al.*, 2005).

For treatment of nasal and sinus dysfunction, a preparation with horseradish, sinigrin or allyl isothiocyanates was patented in 1995 (Friedman, 1995). The extract from *Armoracia rusticana* and its Flavonoid Components Protect Human Lymphocytes against Oxidative Damage Induced by Hydrogen Peroxide (Gafrikova *et al.*, 2014) and have been reported allyl isothiocyanates possess gastro-protecting activity (Matsuda *et al.*, 2007).

It is also used to treat nonspecific urinary tract infections and seems to inhibit the growth of colon and lung cancer cells (Agneta *et al.*, 2012 and weil *et al.*, 2005). This plant contains several isothiocyanates, which are known for

their antibacterial, antifungal, and insecticidal activities (Tedeschi *et al.*, 2011).

ITCs (isothiocyanates), including benzyl ITC (BITC) and PEITC, have been shown to possess chemo preventive properties against chemically induced carcinogenesis in one or more organ sites of rodents, including the urinary bladder, colon, lung, esophagus, mammary glands, pancreas and fore stomach, when given to animals during and/or before carcinogen exposure (Cho Y.M. *et al.*, 2016;). According to studies, allyl isothiocyanate may prevent many types of human prostate cancer. (Zhang Y, 2010). One food item that may prevent cancer is horseradish root. (Talalay, 2001) Horseradish's impact on non-specific UTIs and the antibacterial properties of its essential oils have been studied in German studies. For topical use as a spray or administered with a swab to the afflicted mucosa, a horseradish-based remedy comprising sinigrin or allyl isothiocyanate was patented in 1995 to treat nasal and sinus dysfunction. (Friedman 1995) In Germany, horseradish has been licenced for the treatment of urinary tract infections and infections of the respiratory tract. The root is the primary component of Rasapen, a medication used to treat urinary infections, in the United States (Shehata *et al.*, 2009) In mice, the components of horseradish reduce plasma cholesterol. (Balasinska *et al.*, 2005). It has been discovered that horseradish inhibits the growth of tumour cells and inhibits cyclooxygenase activity (Hara *et al.*, 2008) A large amount of defence was offered by allylisothiocyanate against ethanol-induced stomach lesions. (Mastuda *et al.*, 2007) Horseradish root-derived volatile oil showed more antioxidant capacity than pure allyl isothiocyanate. (Majewska 2004)

Horseradish essential oil has long been known to have antibacterial properties against pathogenic bacteria like *Staphylococcus aureus*, *Escherichia coli*, and *Serratia grimesii*. (Ward *et al.*, 1998). It has been discovered that allyl isothiocyanate exhibits fungicidal properties against the fish-pathogen oomycete *Saprolegnia parasitica*. (Khomvilai *et al.*, 1998) It was shown that the essential oil and allyl isothiocyanate of horseradish have potent insecticidal effects on *Lycoriella ingenua*

larvae. (Park *et al.*, 2006) The main components of *Armoracia rusticana* oil or the oil itself may function as effective fumigants and be used in conjunction with other pest control techniques. (Chen *et al.*, 2011) Additionally, horseradish has few calories and little fibre, both of which are crucial for improving digestive health and avoiding constipation. (Charles DJ, 2011)

Conclusion

For all of its potential as a medicinal plant for enhancing human health, horseradish is a species that is underutilised. For thousands of years, horseradish has been utilised as a plant species to treat a wide range of illnesses. Despite the fact that many of this plant's medicinal qualities have recently been verified by scientific investigation, it is still an

underestimated species of medicinal plant today. Since horseradish is a particularly rich source of this sulfur-containing secondary metabolite, glucosinolates, which have attracted the attention of the scientific community in recent years for their various medicinal and anti-carcinogenic properties, products derived from horseradish have a great deal of potential to be promoted as "super health foods." A highly adaptable plant species, horseradish has the potential to significantly improve human health and can also be used to increase biodiversity in food and landscape systems. For a variety of reasons, but particularly because of its potential to boost human health, horseradish is genuinely an underappreciated, underexploited, and neglected species.

References

1. Newman D.J. Cragg G.M. Snader K.M. The influence of natural products upon drug discovery Nat Prod Rep. 2000; 17:215–234
2. Courter JW, Rhodes AM. Historical notes on horseradish. Economic Botany. 1969 Apr; 23(2):156-64
3. Weber WW. Seed production in horseradish. Journal of Heredity. 1949 Aug 1; 40(8):223-7.
4. Rivelli AR, Caruso MC, De Maria S, Galgano F. Vitamin C content in leaves and roots of horseradish (*Armoracia rusticana*): Seasonal variation in fresh tissues and retention as affected by storage conditions. Emirates Journal of Food and Agriculture. 2017 Nov 4:799-806.
5. Rosengarten Jr F. The book of spices. The Book of Spices.. 1969
6. Agneta R, Möllers C, Rivelli AR. Horseradish (*Armoracia rusticana*), a neglected medical and condiment species with a relevant glucosinolate profile: a review. Genetic resources and crop evolution. 2013 Oct; 60(7):1923-43.
7. Łuczaj Ł, Szymański WM. Wild vascular plants gathered for consumption in the Polish countryside: a review. Journal of Ethnobiology and Ethnomedicine. 2007 Dec; 3(1):1-22.
8. Stillo PA, Icka PI, Damo RO. *Armoracia rusticana* Gaertn. Mey. & Scherb. A neglected multiuseful species. BSHN (UT). 2018; 26:312-22.
9. Sampliner D, Miller A. Ethnobotany of horseradish (*Armoracia rusticana*, Brassicaceae) and its wild relatives (*Armoracia* spp.): reproductive biology and local uses in their native ranges. Economic botany. 2009 Sep; 63(3):303-13.
10. Khare CP. Indian Medicinal Plants: An Illustrated Dictionary Springer-Verlag. Berlin pg. 2007:699-700.
11. Wedelsbäck Bladh K, Olsson KM. Introduction and use of horseradish (*Armoracia rusticana*) as food and medicine from antiquity to the present: emphasis on the Nordic countries. Journal of herbs, spices & medicinal plants. 2011 Jul 1; 17(3):197-213.
12. Shehata A, Mulwa RM, Babadoost M, Uchanski M, Norton MA, Skirvin R, Walters SA. Horseradish: botany, horticulture, breeding. Horticultural reviews. 2009; 35:221-61.
13. Mohlenbrock RH. Flowering Plants: Willows to Mustards. SIU Press; 1980 Jan 21
14. Shehata AM, Skirvin RM, Norton MA. Leaf morphology affects horseradish regeneration in vitro. International journal

- of vegetable science. 2008 Nov 18; 15(1):24-7.
15. Stokes GW. Seed development and failure in horseradish. *Journal of Heredity*. 1955 Jan 1;46(1):15-21
 16. Bratseh, A. Specialty Crop Profile: Horseradish; Publication: 438-104; Virginia Cooperative Extension: Danville, VA, 2009.
 17. Filipović V, Jevđović R. Influence of vegetative area upon horseradish grown using methods of organic production. 3rd International ECO-Conference 2004: „Safe food “. Ecological movement of Novi Sad, Thematic proceedings, Book II. 2004:67-72
 18. Swiader JM, Ware GW, McCollum JP. Producing vegetable crops. Interstate Printers and Publishers Inc.; 1992.
 19. Filipović V, Popović V, Aćimović M. Organic production of horseradish (*Armoracia rusticana* Gaertn., Mey., Scherb.) in Serbian metropolitan regions. *Procedia Economics and Finance*. 2015 Jan 1;22:105-13.
 20. Schaffer A. The history of horseradish as the bitter herb of Passover. *Gesher*. 1981;8:217-37.
 21. Walters SA, Wahle EA. Horseradish production in Illinois. *HortTechnology*. 2010 Apr 1;20(2):267-76
 22. Shehata A, Mulwa RM, Babadoost M, Uchanski M, Norton MA, Skirvin R, Walters SA. Horseradish: botany, horticulture, breeding. *Horticultural reviews*. 2009;35:221-61
 23. Cobalas, B., Jidav, L. O metoda de inmultire rapida a hreanului. *Productia vegetala – Horticultura*, 1980; 4; 3-6
 24. Kamada H, Tachikawa Y, Saitou T, Harada H. Effects of light and growth regulators on adventitious bud formation in horseradish (*Armoracia rusticana*). *Plant cell reports*. 1995 Jul;14(10):611-5.
 25. Moravec J. The possibilities to improve yield and quality of horseradish (*Armoracia rusticana* Lam.). *Vyzk. Ustav Zelin. Olomouc Bull*. 1963;7:1-9.
 26. Kadow KJ, Anderson HW. A study of horseradish diseases and their control. *Bulletin/University of Illinois (Urbana-Champaign campus)*. Agricultural Experiment Station; no. 469. 1940.
 27. Babadoost M, Wahle E. Development of internal discoloration of horseradish roots in commercial fields. *Horseradish Research Review and Proceedings from the Horseradish Growers School*. 2006 Jan 26:5-6.
 28. Small E. *Armoracia rusticana*. *Culinary herbs*. National Research Council of Canada, Ottawa. 1997:126-33.
 29. Marks, G. Horseradish. In *Encyclopedia of Jewish Food*; John Wiley & Sons: Hoboken, NJ, USA, 2010; pp. 265–266.
 30. Sarli G, De Lisi A, Agneta R, Grieco S, Ierardi G, Montemurro F, Negro D, Montesano V. Collecting horseradish (*Armoracia rusticana*, Brassicaceae): local uses and morphological characterization in Basilicata (Southern Italy). *Genetic resources and crop evolution*. 2012 Jun;59(5):889-99.
 31. Sampliner D, Miller A. Ethnobotany of horseradish (*Armoracia rusticana*, Brassicaceae) and its wild relatives (*Armoracia* spp.): reproductive biology and local uses in their native ranges. *Economic botany*. 2009 Sep;63(3):303-13.
 32. Horseradish Information Council. What Is Horseradish? 2021. Available online: <https://horseradish.org/horseradish-facts/whatis-horseradish/> (accessed on 6 May 2021)
 33. Czarnowski A. *Zielnik lekarski*. Księgarnia J. Przeworskiego, 193
 34. Bostock J, Riley HT. *The Natural History of Pliny, Volume V (translation to English)*. Henry G. Bohn, London. 1856;4.
 35. Moerman DE. *Native american ethnobotany*. Timber press; 1998.
 36. Pieroni A, Quave CL, Santoro RF. Folk pharmaceutical knowledge in the territory of the Dolomiti Lucane, inland southern Italy. *Journal of Ethnopharmacology*. 2004 Dec 1;95(2-3):373-84.
 37. Nguyen NM, Gonda S, Vasas G. A review on the phytochemical composition and potential medicinal uses of horseradish (*Armoracia rusticana*) root. *Food Reviews International*. 2013 Jul 3;29(3):261-75.
 38. Jiang ZT, Li R, Yu JC. Pungent components from thioglucosides in *Armoracia rusticana* grown in China, obtained by enzymatic hydrolysis. *Food*

- Technology and Biotechnology. 2006 Mar 15;44(1):41-5
39. Sultana T, Savage GP, McNeil DL, Porter NG, Clark B. Comparison of flavour compounds in wasabi and horseradish. *J. Food Agric. Environ.* 2003 Apr 1;1:117-21.
40. Mucete D, Poiana M, Jianu I, Radu F. Myrosinase activity in *Armoracia rusticana*. *Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Agriculture.* 2006;62.
41. Redovniković IR, Peharec P, Krsnik-Rasol M, Delonga K, Brkić K, Vorkapić-Furać J. Glucosinolate Profiles, Myrosinase and Peroxidase Activity in Horseradish (*Armoracia lapathifolia* Gilib.) Plantlets, Tumour and Teratoma Tissues. *Food Technology & Biotechnology.* 2008 Jul 1;46(3).
42. Bones AM, Rossiter JT. The enzymic and chemically induced decomposition of glucosinolates. *Phytochemistry.* 2006 Jun 1;67(11):1053-67.
43. Clarke DB. Glucosinolates, structures and analysis in food. *Analytical methods.* 2010;2(4):310-25.
44. Li X, Kushad MM. Correlation of glucosinolate content to myrosinase activity in horseradish (*Armoracia rusticana*). *Journal of agricultural and food chemistry.* 2004 Nov 17;52(23):6950-5.
45. Grob K, Matile PH. Vacuolar location of glucosinolates in horseradish root cells. *Plant Science Letters.* 1979 Apr 1;14(4):327-35.
46. U.S. Department of Agriculture, Agricultural Research Service. Nutrition for horseradish. In National Nutrient Database for Standard Reference, (2012) release 25. U.S. Department of Agriculture: Washington, DC, 2012
47. D'auria M, Mauriello G, Racioppi R. SPME-GC-MS ANALYSIS OF HORSERADISH (*ARMORACIA RUSTICANA*). *Italian journal of food science.* 2004 Oct 1;16(4).
48. Redovniković IR, Peharec P, Krsnik-Rasol M, Delonga K, Brkić K, Vorkapić-Furać J. Glucosinolate Profiles, Myrosinase and Peroxidase Activity in Horseradish (*Armoracia lapathifolia* Gilib.) Plantlets, Tumour and Teratoma Tissues. *Food Technology & Biotechnology.* 2008 Jul 1;46(3).
49. Herz C, Tran HT, Márton MR, Maul R, Baldermann S, Schreiner M, Lamy E. Evaluation of an aqueous extract from horseradish root (*Armoracia rusticana* Radix) against lipopolysaccharide-induced cellular inflammation reaction. *Evidence-Based Complementary and Alternative Medicine.* 2017 Jan 1;2017.
50. Marzocco S, Calabrone L, Adesso S, Larocca M, Franceschelli S, Autore G, Martelli G, Rossano R. Anti-inflammatory activity of horseradish (*Armoracia rusticana*) root extracts in LPS-stimulated macrophages. *Food & function.* 2015;6(12):3778-88.
51. Aissani N, Tedeschi P, Maietti A, Brandolini V, Garau VL, Caboni P. Nematicidal activity of allylisothiocyanate from horseradish (*Armoracia rusticana*) roots against *Meloidogyne incognita*. *Journal of Agricultural and Food Chemistry.* 2013 May 22;61(20):4723-7
52. Chen H, Akinkulere RO, Zhang H. Fumigant activity of plant essential oil from *Armoracia rusticana* (L.) on *Plodia interpunctella* (Lepidoptera: Pyralidae) and *Sitophilus zeamais* (Coleoptera: Curculionidae). *African Journal of Biotechnology.* 2011;10(7):1200-5.
53. Prockop DJ, Kivirikko KI. Collagens: molecular biology, diseases, and potentials for therapy. *Annual review of biochemistry.* 1995 Jul;64(1):403-34.
54. Fursa NS, Litvinenko VI, Krivenchuk PE. Flavonoids of *Armoracia rusticana* and *Barbarea arcuata*. *Chemistry of Natural Compounds.* 1969 Jul;5(4):270-270
55. Cho EJ, Yokozawa T, Rhyu DY, Kim HY, Shibahara N, Park JC. The inhibitory effects of 12 medicinal plants and their component compounds on lipid peroxidation. *The American journal of Chinese medicine.* 2003;31(06):907-17.
56. Zhang Y. Allyl isothiocyanate as a cancer chemopreventive phytochemical. *Molecular nutrition & food research.* 2010 Jan;54(1):127-35.
57. Talalay P, Fahey JW. Phytochemicals from cruciferous plants protect against cancer by modulating carcinogen metabolism. *The*

- Journal of nutrition. 2001 Nov 1;131(11):3027S-33S.
58. Kumar G, Tuli HS, Mittal S, Shandilya JK, Tiwari A, Sandhu SS. Isothiocyanates: a class of bioactive metabolites with chemopreventive potential. *Tumor Biology*. 2015 Jun;36(6):4005-16.
59. Cirimbei MR, Dinică R, Gitin L, Vizireanu C. Study on herbal actions of horseradish (*Armoracia rusticana*). *J. Agroaliment. Proc. Technol.* 2013;19:111-5.
60. Petrović V, Četojević-Simin D, Milanović M, Vulić J, Milić N. Polyphenol rich horseradish root extracts and juice: in vitro antitumor activity and mechanism of action. *Vojnosanitetski pregled*. 2021; 78(7): 745-54.
61. Veitch NC. Horseradish peroxidase: a modern view of a classic enzyme. *Phytochemistry*. 2004 Feb 1;65(3):249-59
62. Welinder KG. Covalent structure of the glycoprotein horseradish peroxidase (EC 1.11. 1.7). *FEBS letters*. 1976 Dec 15;72(1):19-23.
63. Lin CM, PRESTON III JF, Wei CI. Antibacterial mechanism of allyl isothiocyanate. *Journal of food protection*. 2000 Jun;63(6):727-34.
64. Srivastava SK, Xiao D, Lew KL, Hershberger P, Kokkinakis DM, Johnson CS, Trump DL, Singh SV. Allyl isothiocyanate, a constituent of cruciferous vegetables, inhibits growth of PC-3 human prostate cancer xenografts in vivo. *Carcinogenesis*. 2003 Oct 1;24(10): 1665-70.
65. Kosson R & Horbowicz M (2008). Effect of long term storage on some nutritive components and isothiocyanates content in roots of two horseradish types. *Veg Crops Res Bull*, 69: Page No. 155-164.
66. Khomvilai C, Kashiwagi M, Yoshioka M. Fungicidal activities of horseradish extract on a fish-pathogen oomycetes, *Saprolegnia parasitica*. *Bulletin of the Faculty of Bioresources-Mie University (Japan)*. 2006.
67. Park, H.W, Choi, K.D, & Shin, I.S., (2013). Antimicrobial activity of isothiocyanates extracted from horseradish (*armoracia rusticana*) root against oral microorganisms. *Biocontrol science*, 18(3), 163–168.
68. Balasinska B, Nicolle C, Gueux E, Majewska A, Demigne C, Mazur A. Dietary horseradish reduces plasma cholesterol in mice. *Nutrition research*. 2005 Oct 1;25(10):937-45.
69. Ilcsi Beautifying Herbs Ltd. Organic skincare in Hungarian The natural choice.
70. Majewska A, Bałasińska B, Dąbrowska B. Antioxidant properties of leaf and root extract and oil from different types of horseradish (*Armoracia rusticana* Gaertn.). *Folia Horticulturae*. 2004;16(1):15-22.
71. Aissani, N., Tedeschi, P., Maietti, A., Brandolini, V., Garau, V. L., & Caboni, P. (2013). Nematicidal Activity of Allylisothiocyanate from Horseradish (*Armoracia rusticana*) Roots against *Meloidogyne incognita*. *Journal of Agricultural and Food Chemistry*, 61(20), 4723–4727.
72. Friedman WH, inventor; Horseradish Spray Inc, assignee. Horseradish preparation for the treatment of nasal and sinus dysfunction. United States patent US 5,385,734. 1995 Jan 31.
73. Ward SM, Delaquis PJ, Holley RA, Mazza G. Inhibition of spoilage and pathogenic bacteria on agar and pre-cooked roast beef by volatile horseradish distillates. *Food Research International*. 1998 Jan 1;31(1):19-26
74. Matsuda H, Ochi M, Nagatomo A, Yoshikawa M. Effects of allyl isothiocyanate from horseradish on several experimental gastric lesions in rats. *European journal of pharmacology*. 2007 Apr 30;561(1-3):172-81
75. Khomvilai C, Kashiwagi M, Yoshioka M. Fungicidal activities of horseradish extract on a fish-pathogen oomycetes, *Saprolegnia parasitica*. *Bulletin of the Faculty of Bioresources-Mie University (Japan)*. 2006.
76. Park IK, Choi KS, Kim DH, Choi IH, Kim LS, Bak WC, Choi JW, Shin SC. Fumigant activity of plant essential oils and components from horseradish (*Armoracia rusticana*), anise (*Pimpinella anisum*) and garlic (*Allium sativum*) oils against *Lycoriella ingenua* (Diptera: Sciaridae). *Pest Management Science: formerly Pesticide Science*. 2006 Aug;62(8):723-8.

77. Chen H, Akinkulere RO, Zhang H. Fumigant activity of plant essential oil from *Armoracia rusticana* (L.) on *Plodia interpunctella* (Lepidoptera: Pyralidae) and *Sitophilus zeamais* (Coleoptera: Curculionidae). *African Journal of Biotechnology*. 2011;10(7):1200-5.
78. Tedeschi P, Leis M, Pezzi M, Civolani S, Maietti A, Brandolini V. Insecticidal activity and fungitoxicity of plant extracts and components of horseradish (*Armoracia rusticana*) and garlic (*Allium sativum*). *Journal of Environmental Science and Health, Part B*. 2011 Aug 1;46(6):486-90.
79. Weil MJ, Zhang Y, Nair MG. Tumor cell proliferation and cyclooxygenase inhibitory constituents in horseradish (*Armoracia rusticana*) and Wasabi (*Wasabia japonica*). *Journal of agricultural and food chemistry*. 2005 Mar 9;53(5):1440-4.

INVESTORS' PERCEPTION TOWARDS INVESTMENT IN FINANCIAL INSTRUMENTS: A STUDY OF PUNJAB

Priya Saini, Kamalpreet Kaur

Department of Commerce, CT University, Ludhiana (Punjab)

ABSTRACT

Investors' perception has been a bigger attribute in developing investment flexibility within a country. In India, lesser knowledge of financial context has integrated issues in effective investment. Different financial instruments have played a key role in Indian investment process. Awareness of those factors has been introduced in this paper to acquire a clear perception of Punjab's financial literacy context. Additionally, different articles have been analysed to shed light on investors' mindsets on savings and investing concepts. In this paper development of a theoretical framework can be supportive for an understanding general mindset of investors.

Keywords: Financial Literacy, Financial Instruments, Awareness, Investors, Loss and gain, Mutual funds, PPF and Savings

1. Introduction

Financial instruments play a crucial role in investors' perception of profit and loss. Along with investment capability, investment preferences have evolved in this digital era. Shareholders, professionals and other investors have been attracted to gathering liquid profit margins through investment in financial instruments such as Public Provident Fund, Mutual Fund, and Fixed Deposits and so on. High-yielding savings, share market and different corporate bonds create different decision-making processes and attitudes toward investment choices.

The aim of this paper is to analyse investors' perceptions of investing in PPF, Mutual Funds and other financial instruments in Punjab investors. The paper has focussed in assessing financial literacy level and awareness of financial instruments that will induce investment. Literature review has focussed on organising perception of financial investment over theoretical approach. It will further highlight existing literature to analyse financial literacy of investors and awareness of investors on financial instruments. The paper has further developed the concept of inducing efficacy in investment though significant level of financial literacy. Furthermore, it has highlighted awareness of different financial instruments used for potential investments.

2. Literature Review

The section includes literature that has contributed in developing significant concept.

It has highlighted investor perception over a theoretical perspective. It has further briefed financial literacy in Punjab to understand financial level of investors. It has showed significant level of financial literacy. Furthermore, it has highlighted awareness of investors on financial instruments.

2.1 Theoretical Perspective

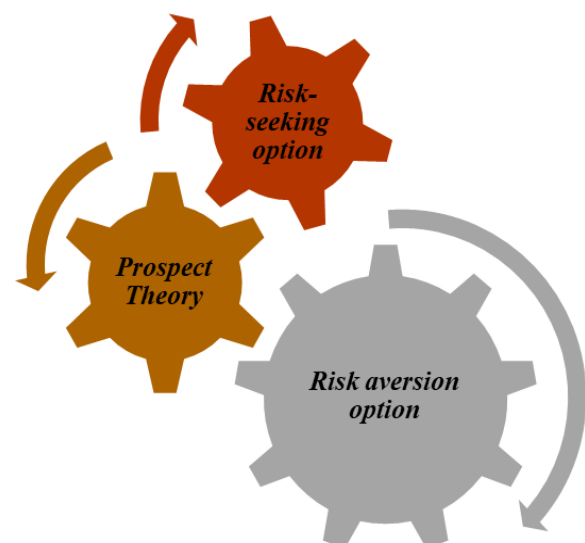


Figure 1 Prospect Theory

Investors' behaviour towards decision-making for profitable investment can be well acknowledged with the help of **Prospect Theory**. This theory assumes that perceptions of individuals on loss and gain vary and that decisions on investment change according to that differentiation. Moreover, the investors' behaviour in case of confronting profit from investment has been observed to choose a **risk**

aversion option (Fortin and Hlouskova, 2022). In case of encountering loss, it has been seen that investors choose a **risk-seeking** option. This type of concept change can be seen in most investors in the case of optimal asset

allocation. In this aspect, this theory can also be called **Loss-aversion Theory**. It means that investors exhibit more sensitivity towards loss rather than their profit or gain attribute in financial wealth.

2.2 Conceptual Framework

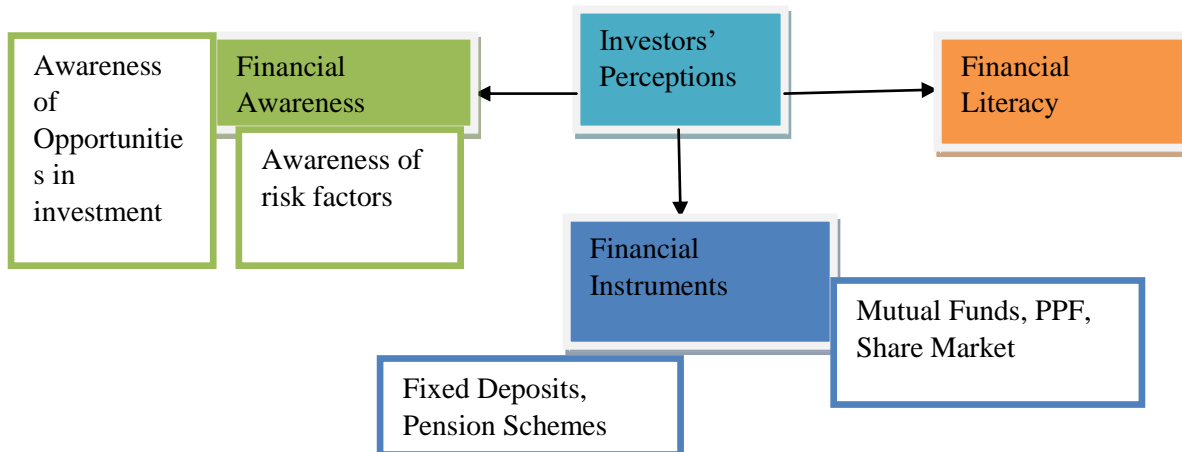


Figure 2 Conceptual Framework

The framework signifies the factors that contribute in developing investor's perceptions. These factors include financial literacy, financial instruments and financial awareness. Financial literacy will contribute in developing significant concept over different financial instruments such as mutual funds, share markets, fixed deposits and pension schemes. Perception of investment is based on the awareness of different opportunities that can be exploited to make successful investment and its associated risk factors.

2.3 Financial Literacy of Investors

Financial literacy level in India is low in multiple regions. It has been found that not more than one-third population of India is financially literate. Most of population lacks basic awareness of banking and micro financing. This has contributed to creating a lack of opportunities in profit margin during investment in modern financial instruments such as PPF, mutual funds and bank fixed deposits. According to the Reserve Bank of India, 24% of women acquire financial literacy within the country. Around 27% of adults have minimum financial literacy (Adb.org, 2022). These statistics can be helpful to understand financial level of investors in Punjab. Lower

financial literacy can be critical for investors to manage decisions for effective monetary inclusion. Gathering awareness of profit and loss can only be acquired with the help of financial literacy factors within investment practice.

It can be evident from Renuka and Raju (2020), that the West region of India has greater financial literacy than any other region in India. This can be helpful to understand literacy level of Punjab, which is situated in that region. In accordance with Laxmi and Maheshwary (2019), financial literacy among women in Punjab has been observed to be around 69% in fixed-income investments. Moreover, 34% of women are found to be literate in investment options in variable income investment modes. However, in stock market, this literacy level is too low among Indians. Investors lack knowledge of stock market and newly developed crypto-currency has integrated difficulties within investment process in Punjab.

2.4 Investors' Awareness of Financial Instruments

Financial literacy and awareness are correlated and can be evolved through gathering information on investing practices. It can be

found that investors’ awareness and availability of information on financial instruments such as mutual funds have been analysed to affect the investment decision-making process. That is why an increase in financial awareness can be fruitful for financial prosperity. In accordance with Gandhi (2021), high-risk investment has been increased in India due to an effective increment in awareness of financial climate.

Further, awareness of financial context has been increased due to infusion of confidence factors within investment through ethical and transparent attributes inclusion. Although Indian investors mainly concentrate on low-risk investment, high-risk investment has also been seen to be increased effectively in the 21st century.

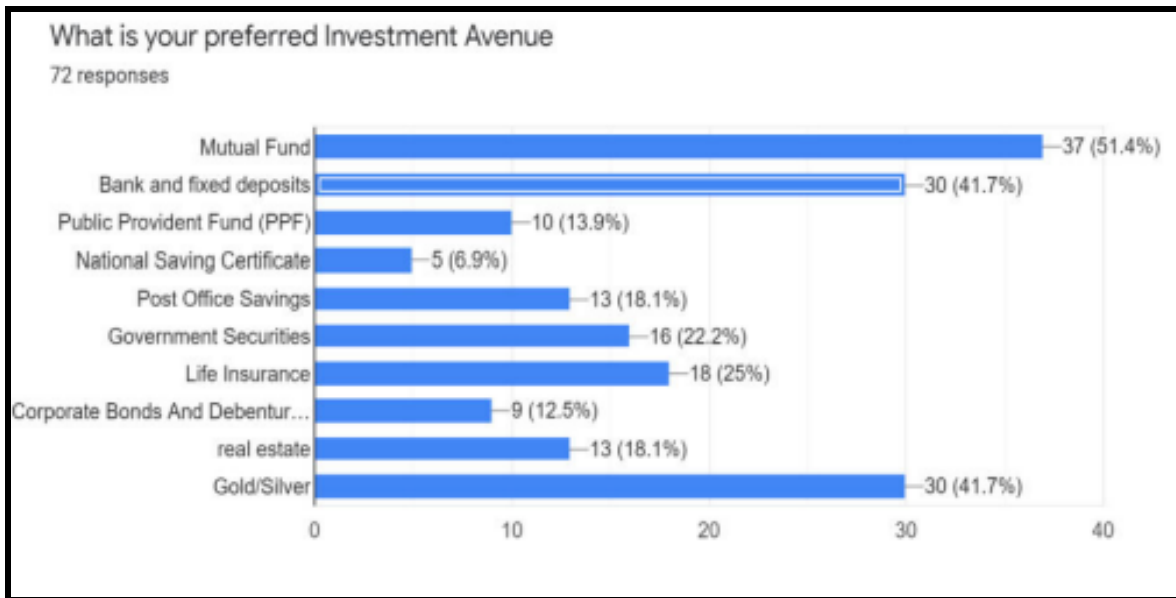


Figure 3 Preferable Financial Instrument (Gandhi, 2021)

In the above figure, the choice of different financial instruments in India has been shown. This result has been shown in work of the author where 51% of the population has voted toward obtaining awareness of mutual funds. This type of awareness and literacy can be effective for investment in high and low risks instruments. In addition, investors' perception of high-risk investment is seen to be lesser compared to high-risk investment. As per opined by Syal (2018), this kind of awareness can be observed in higher numbers of women in Punjab. The author has suggested that issue can be mitigated by increasing awareness of

new financial factors to acknowledge risks in a better way and ascertain avoidance of investment decision-making. According to Kaur and Kaur (2020), about 36% of the respondents from the study sample from Punjab have an awareness of financial investment and avenues.

3. Critical Analysis

Table 1 shows the critical analysis. The critical analysis of existing literature is done based on their method, sample size, tool, and influence drawn from it.

Table 1 Critical analysis

Author Name	Technique	Sample Size	Tool	Influence Drawn
Vibha SuhasBhilawadikar and Ema Garg	Primary Data and Collection Analysis	500 households in Mumbai	Qualitative and Quantitative Data Analysis	This study demonstrates awareness of investors of Cryptocurrency

Manohar Giri	Primary Data and Collection Analysis	971 urban neighbourhoods and 1503 villages across India	Quantitative Data Analysis	This study highlights the financial literacy level across India.
Sakshi Rajesh Gandhi	Primary Data and Collection Analysis	71 professional and common people	Quantitative Data Analysis	
Dr N. Senthilkumar & L. Balasubramanian	Primary Data and Collection Analysis	336 employees from post and banks	Quantitative Data Analysis	Investors' perception of profitable margin acquisition has been highlighted
Raja Rehan, Saba Naz, Imran Umer, Omais Ahmed	Primary Data and Collection Analysis	150 respondents	Quantitative Data Analysis	This study has shed light on perception of Indian investors in mutual fund investment.
Sewak Pradhan and G Raghavender Raju	Secondary Data and Collection Analysis	N/A	Quantitative Data Analysis	This study has helped to acquire insight into financial literacy of Indian people.
Mahabub Basha S, M. Kethan, T. Jaggaiah, and Mohammed Khizerulla	Primary Data and Collection Analysis	100 Respondents	Quantitative Data Analysis	Financial literacy and its impact on decision-making processes for investors have been depicted
Renuka S and K V Raju	Secondary Data and Collection Analysis	N/A	Quantitative Data Analysis	This study has shed light on stock market participation of investors in Indian context and their financial literacy level.
Subina Syal	Primary Data and Collection Analysis	500 women investors in Punjab	Quantitative Data Analysis	This study has helped to obtain a clear perception of Punjab women's investing perception and financial risk awareness.
Arya P.	Secondary Data and Collection Analysis	N/A	Qualitative Data Analysis	Financial literacy level of Indian people and awareness of risk and opportunities have been demonstrated in this article.
Rakhi Arora and Shivani Mahna	Primary Data and Collection Analysis	58 respondents	Quantitative Data Analysis	This study helps to acknowledge risk factors of investment.

Maqsood Ahamed and Bharmappa T	Primary and Secondary Data Collection and Analysis	60 respondents	Qualitative and Quantitative Data Analysis	Investors' perception of PPF has been highlighted to understand awareness level of Indian people on tax saving schemes.
Amandeep Kaur and Ramanjot Kaur	Primary and Secondary Data Collection and Analysis	50 respondents	Quantitative Data Analysis	The perception of investors on saving and investment has been highlighted

4. Findings and Discussion

This section shows the finding and discussion based on the literature survey and critical analysis is conducted in the previous sections.

4.1 Financial Literacy induces efficacy in investment

According to Pradhan and Raju (2020), financial literacy score of India is lower than the average score of G20. Different governments have been adopting policies to measure and increase financial literacy factors in the world. Without an advantageous impact on financial literacy, induction of *National Centre for Financial Education* has been a waste of money for the government. Therefore, it can be understood that financial literacy has a positive impact on investment process of Punjab people. Additionally, this factor can impact investors' perception of investment in different financial factors. On the other hand, financial literacy can help to develop a country's economic conditions by introducing return factors with monetary inclusion. In India, it has been found that households mainly contribute towards the savings of a family. Their literacy on currency, bank deposits, life insurance savings, mutual funds and provident and pension fund savings can be crucial for incrementing overall financial investment.

As per opined by Devkate Balaji and Uddhav (2022), households' savings in financial assets which are 40.6% of total savings, can be utilised by them properly in case financial literacy and information regarding investment

process is integrated. In Punjab, this type of activity can be effective to increase financial literacy. In other words, this can be crucial for increasing number of investors. According to Khanna (2018), low literacy factors among young people can lead to misallocation of monetary wealth within investment and money management process. As a result, it can be stated that a lack of financial literacy can lead to improper management of money throughout one's life. Moreover, this factor can similarly influence investors' decision-making in future.

4.2 Investor's awareness of different financial instruments

Investors' awareness of financial instruments such as mutual funds, PPF and other governmental and private company schemes can play a crucial role in investment. In accordance with, Ahamed and Bharmappa (2019), it has been found that among the entire investment processes PPF is the most fruitful process. Additionally, risk factor for this investment is also very low as per these authors' opinions. Further, awareness increment strategies of government have integrated better efficiency within increasing awareness of this financial instrument. Increment in awareness can therefore make a progressive outcome from effective decision-making on different investments. Financial literacy on those factors can increase proficiency in economic decision-making within choosing different financial factors.

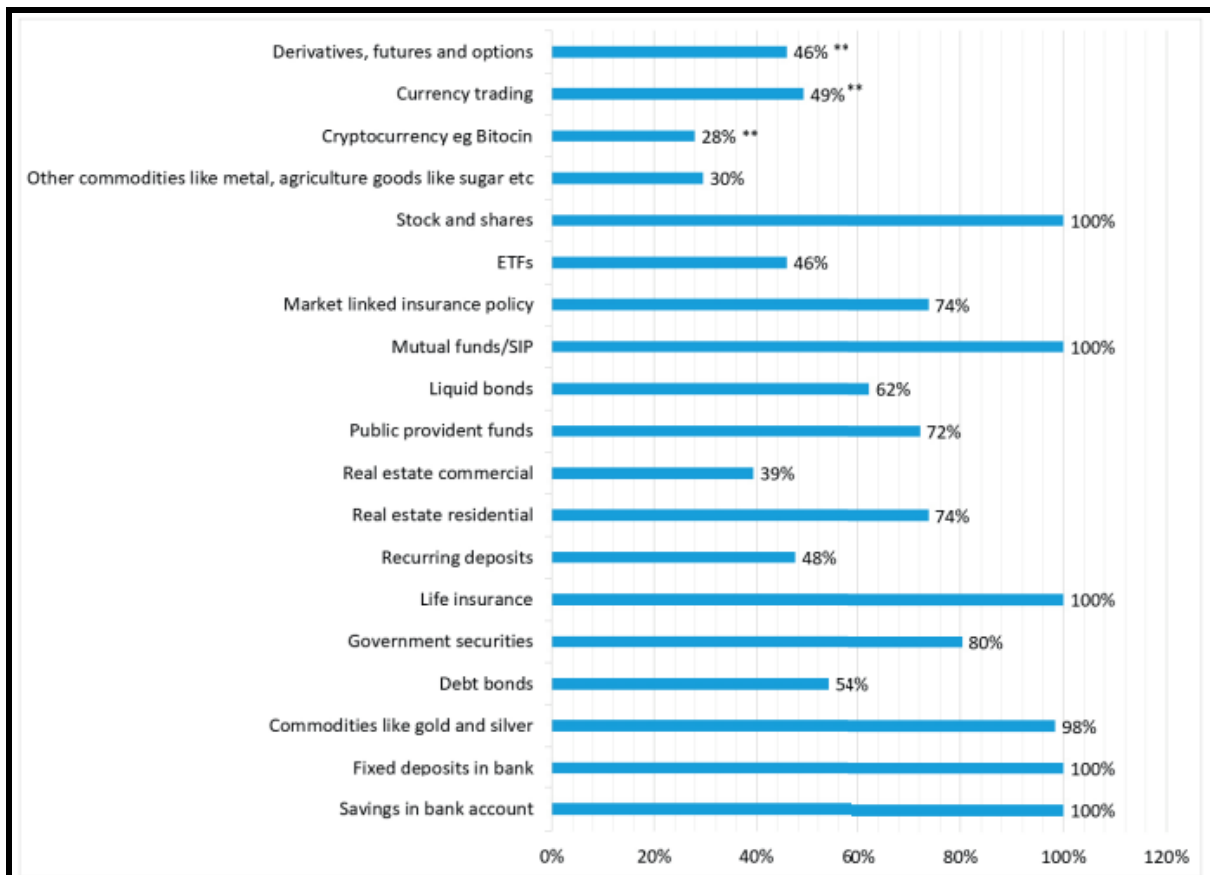


Figure 4 Awareness of Different Investment Factors among Age Group 18-35 Years (Bhilawadikar and Garg, 2020)

From the Figure 4, it can be evident that investment in currency trading derivatives and future options has been observed to be around 49% and 46% respectively. Additionally, awareness of mutual funds and cryptocurrency among the sample population of the study has been seen to be fully aware of investment process. As per opined by Mahna (2018), although there is a gap in awareness among male and female investors, greater return on investment can opt with the help of a prerequisite awareness factor in investment process. Information regarding risks and time factors plays a vital role in investment decision-making. That is why awareness of financial instruments is required for gathering greater ROI.

5. Conclusion

This study has been developed while discussing financial literacy level of Indian people. Additionally, awareness of financial instruments has been developed in this conference paper to acquire knowledge on different perceptions of investors in Punjab. It also can be seen that effective analysis of this study has helped to find a linkage between financial literacy and investment in instruments such as PPF, mutual funds, fixed deposits, share market and cryptocurrency. Investors’ risk-taking condition has been analysed in this context, which helps to direct this study towards financial knowledge development within Indian context.

Reference

1. Adb.org, 2022. In India, Financial Literacy Programs Are Lifting Families Out of Debt and Fueling New Prosperity Available at: <https://www.adb.org/results/india-financial-literacy-programs-lifting-families-out-debt-fueling-new-prosperity#:~:text=Only%2027%25%20of%20Indian%20adults,the%20Reserve%20Bank%20of%20India.> [Accessed on: 23rd September, 2022]
2. Ahamed, M. and Bharmappa, T., 2019. Public Perception Towards PPF as a Tax

- Saving Scheme–A Study. Think India Journal, 22(14), pp.15826-15843.
3. Arya, P., 2018. Financial literacy and financial education in India: An assessment. International Research Journal of Commerce Arts and Science, 9(3), pp.72-80.
 4. Bhilawadikar, V.S. and Garg, E., 2020. Investment attitude of millennials towards cryptocurrencies. Social Business, 10(4), pp.383-410.
 5. Devkate Balaji, N. and Uddhav, T.A., 2022. The Study Of Different Factors Which Affect Investment Decision Of Investors In Financial Asset.
 6. Fortin, I. and Hlouskova, J., 2022. Prospect theory and asset allocation (No. 42). IHS Working Paper.
 7. Gandhi, S.R., 2021. A Study of Mutual Fund as an Investment Avenue (Doctoral dissertation, Rashtrasant Tukadoji Maharaj Nagpur University).
 8. Giri, M., 2018. A behavioral study of life insurance purchase decisions. Research Thesis, IIT Kanpur, (March 2018), https://www.iitk.ac.in/imt/devlina/data/Manohar%20Giri%20PhD%20Thesis%20_Final-4-10-19.pdf.
 9. Kaur, A. and Kaur, R., 2020. A study of saving and investment pattern of individuals with special reference to ludhiana district, punjab (India). Journal Homepage: <http://ijmr.net.in>, 8(07).
 10. Khanna, N., 2018. Investment Pattern and Legal Provisions in India.
 11. Laxmi, V. and Maheshwary, N.K. 2019. "Level Of Financial Literacy Among Women Working In Different Work Sectors In Urban Punjab", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.6, Issue 5, page no.399-407, May-2019, Available at: <http://www.jetir.org/papers/JETIR1905N59.pdf> [Accessed on: 23rd September, 2022]
 12. Mahna, R.A.S., 2018. Financial Thinking of Working Professionals: A Gender Based Study.
 13. Pradhan, S. and Raju, G.R., 2020. Monetary Policy Shocks and Macroeconomic Variables: Evidence from India. Journal of Economic Policy and Research, 16(1), pp.2-17.
 14. Rehan, R., Naz, S., Umer, I. and Ahmed, O., 2018. Awareness and perception of investors towards mutual funds industry. RADS Journal of Social Sciences & Business Management, 5(1), pp.01-14.
 15. Renuka, S. and Raju, K.V., 2020. Financial Literacy and Stock Market Participation in India: An Overview. Journal of Economic Policy and Research, 16(1), pp.18-30.
 16. Senthilkumar, N. and Balasubramanian, L., 2021. A Study On Investor's Attitude Towards India Post Payment Bank Savings Schemes In Namakkal District, Tamil Nadu.
 17. Shaik, M.B., Kethan, M., Jaggaiah, T. and Khizerulla, M., 2022. Financial Literacy and Investment Behaviour of IT Professional in India. East Asian Journal of Multidisciplinary Research, 1(5), pp.777-788.
 18. Syal, S., 2018. Awareness and Risk Perception About Financial Services: With Special Reference to Women Investors of Punjab. Journal of Commerce and Accounting Research, 7(3), p.45.

A STUDY OF JOB SATISFACTION AMONG SECONDARY SCHOOL TEACHERS IN RELATION TO PROFESSIONAL COMMITMENT: AN EMPIRICAL STUDY OF UDHAMPUR DISTRICT

Ankush Jasrotia and Namesh Kumar

Department of Education, CT University, Ludhiana (Punjab) India

ABSTRACT

Teaching is a prestigious profession, and teachers are always beneficial to society. Job satisfaction and commitment to one's profession among teacher educators are the most crucial factors in generating exceptional teachers, who then have an impact on the quality of education in schools. Job satisfaction and professional commitment of teachers are crucial in the sectors of education since they serve as role models for their students. Hence, the researcher felt compelled to look into secondary school teachers' job happiness in relation to their professional commitment. In this study, 300 instructors from Punjab, India, served as the sample. The data was gathered using Professional Commitment Scale for Secondary School Teachers by Ravinder Kaur, Sarbjit Kaur Ranu and Sarveet Kaur Brar (2011) and Teacher's Job Satisfaction Questionnaire for Secondary School Teachers by Malik and Madan (2019). The findings show that there is no significant difference in professional commitment between male and female secondary school teachers, but there is a substantial difference between the two groups in terms of job satisfaction.

Introduction

Education is the method for eradicating all forms of social problems. The country's development depends on both education and the need for skilled and committed teachers, but only when society and the government work together to establish an environment that is conducive to teachers working there. Teaching is an incredibly noble job and instructors are constantly valuable to society. The fundamental element of education might be distilled down to a meaningful exchange between the teacher and the students (Bashir, 2017). Teachers play a vital role in each country's educational system. Teachers are usually referred to as nation builders because they ultimately determine a country's development trajectory. The backbone of the educational system is the teacher, who performs out a variety of crucial tasks (Basu, 2016). The significance of educators' job satisfaction cannot be emphasized because it directly affects students' academic performance and future employment opportunities.

Job Satisfaction

Work satisfaction is a term used to describe how happy or successful a person feels in their employment. Our level of contentment is based on the proportion of things we have to things we want. These include age, sex, salary, employment history, tenure, working conditions, job security, and social standing.

Job comprises a significant portion of each employee's day and is not only their primary source of revenue but also an essential aspect of their lives. Because for many people, employment plays a crucial role in their lives, job satisfaction plays a significant influence in overall wellbeing. According to research, job satisfaction or discontent has a number of effects. Several studies (Kirsch, 1990; Knoop, 1995; McNeese-Smith, 1996) have shown that employee happiness increases productivity, fosters high standards of care, and encourages employees to want to stay with the company. On the other hand, it was discovered that job unhappiness increased absenteeism, turnover, excessive stress, and complaints (Mc Neese-Smith, 1996). According to Locke (1976), it is "the pleasurable emotional state that results from perceptions of one's job as fulfilling or as allowing the fulfillment of one's extremely important values, stipulated these are compatible with one's needs."

Professional Commitment

An attitude that fosters a physical, mental, and emotional connection to one's work is referred to as professional commitment. Also, it is the congruence of a person's convictions and commitment to practice their professional. Dave has emphasized the significance of teachers' dedication in the context of the teaching profession (1998). Effectiveness as a teacher is not always guaranteed by professional competence and practical skills

alone. One of the causes of the phenomena is the fact that a trained teacher's ability to consistently perform well in a classroom or school depends at least as much—if not more—on their dedication to doing so. This commitment element is the one that is crucial. Rani (2014) investigated no discernible differences between government and private secondary school instructors in terms of professional commitment. Madhu and Indu (2015) demonstrated a substantial difference between teacher educators who work in government-aided and self-financing B.Ed. colleges in their level of professional dedication. Compared to government teachers, teachers from self-financing institutions were shown to be more dedicated to their work. Skidmore (2007) Investigated teachers are individuals who: a) are committed to their own professional development by pursuing graduate degrees and standards-based professional growth opportunities; b) are critically reflective in their practice by seeking meaningful feedback and conversation, as well as engagement in action research; c) promote the training profession by establishing professional learning communities and teachers' contributions to leadership roles.

Review of Literature

Emami (2012) investigated of staff members' levels of job satisfaction and commitment to their careers in Kermanshah. In this study, job satisfaction is measured using briefed questions worth 18 questions, and professional commitment and organizational commitment are measured using briefed questions worth 83% static and 87% static, respectively. Because the crownbakh in both question airs is greater than 0/7, both question air are required static in this study. 150 individuals from Kermanshah's private banks made up the sample group. The results showed that test was used to determine the normality of the data, and that the test results confirmed the data's normality, approving a meaningful association between them.

Akram et al (2015) find out how, at the secondary school level, the quality of the teacher affects the students' devotion to their career and their contentment with their jobs. It was a descriptive study that collected data

using a survey method. For data gathering, multistage sampling techniques were employed. Three questionnaires—the Teacher Competence Questionnaire, the Professional Commitment Questionnaire, and the Job Satisfaction Questionnaire—each with reliability coefficients of 0.94, 0.76, and 0.85—were used to assess the teacher competence, professional commitment, and job satisfaction among secondary school teachers. In order to examine the data, Pearson correlation was used. The association between teacher competency and professional commitment, as well as the relationship between professional commitment and job happiness, was significantly favorable.

Khan (2015) found a considerable mean difference between teachers in public and private schools in terms of organizational commitment. Teachers in private schools were shown to be more committed than those in public schools.

Gupta and Nain (2015) discovered a substantial difference between the professional dedication of teacher educators working in government-/government-aided and self-financing B.Ed. colleges, with the results favoring the latter.

(Basu, 2016) examined the relationship between secondary school teachers' dedication to their career and job happiness. 98 secondary school teachers from the Bareilly district were the subject of the study. Data for the current inquiry were gathered using the Job Satisfaction Questionnaire (JSQ), created by Dr. Pramod Kumar and D. N. Mutha, and the Professional Commitment Scale for Teachers (PCST), produced by Ravinder Kaur, Sarbjit Kaur Ranu, and Sarvjeet Kaur Brar. The raw scores thus collected were analyzed, and conclusions were drawn using statistical measures of mean, S.D., t-test, and Pearson's product moment correlation. The results of the current study showed that, while gender and amount of teaching experience had an impact on secondary school teachers' professional dedication, the kind of school had no discernible effect. Also, it has been discovered that the teachers' job happiness is significantly influenced by their gender, type of school, and duration of teaching experience. Also, a

significant positive association between secondary school teachers' commitment to their career and their sense of job satisfaction was discovered.

Bashir (2017) examined the relationship between secondary school teachers' job happiness and commitment to their career. In this study, 300 instructors were chosen from the Indian province of Punjab as the sample. The data was gathered using the Dr. (Mrs.) Meera Dixit (1993) Work Satisfaction Scale and the Dr. Ravinder Kaur and Sarabjit Kaur (2011) Professional Commitment Scale. The results showed that there is no significant difference in professional commitment between male and female secondary school teachers, but there is a substantial difference between the two groups in terms of job satisfaction. Further findings indicate a considerable positive association between professional commitment and job happiness. This demonstrates the strong correlation between professional devotion and job satisfaction.

Dorenkamp and Ruhle (2018) formulated and tested hypotheses to clarify the effects of work-to-life and life-to-work conflicts on job satisfaction and how affective, normative, and continuous professional commitments influence these interactions. Our findings confirmed theoretical hypotheses that work-to-life conflict and continuance commitment act as stressors that lower job satisfaction, while affective commitment serves as a resource because it lowers job satisfaction directly and mitigates the effects of a work-to-life conflict on job satisfaction. These findings were supported by data gathered from German academics. Life-to-work conflict and normative commitment didn't directly affect how satisfied people were with their jobs, but their interaction did.

Sharma (2019) investigated the degree of job happiness and professional commitment among teacher educators as well as the relationship between job satisfaction and commitment. 100 teacher educators who attended 25 different educational institutions in the province of Jammu made up the sample for the current study. The 'Scale for Work Satisfaction of Teacher Educators', developed and standardized by Y. Mudgil, I.S. Mubar, and P.

Bhatia, and 'Scale for Professional Commitment of Teacher Educators', developed and standardized by Vishal Sood, were used to collect the data. The statistical measurements mean, standard deviation, correlation coefficient, and Pearson's product moment were used. The study's findings showed that more than 60% of teacher educators had average or below average work satisfaction. In a similar vein, 50% of teacher educators had average or below average levels of professional dedication. Teacher educators who are single report much better levels of job satisfaction and dedication to their careers.

Objectives of the Study

1. To study the level of Professional commitment among secondary school teachers on the basis of gender.
2. To study the level of professional commitment among secondary school teachers with and without experience
3. To investigate secondary school teachers' level of job satisfaction among male and female
4. To assess the level of job satisfaction among secondary school teachers with and without experience

Hypotheses of the Study

HO1: There is no statistically significant difference in the level of professional commitment between male and female secondary school teachers.

Ha1: There is statistically significant difference in the level of professional commitment between male and female secondary school teachers.

HO2: There is no significant difference between the level of professional commitment with experienced and without experienced among secondary school teachers.

Ha2: There is significant difference between the level of professional commitment with experienced and without experienced among secondary school teachers.

HO3: There is no significant difference between the level of job satisfaction among male and female of secondary school teachers.

Ha3: There is significant difference between the level of job satisfaction among male and female of secondary school teachers.

H04: There is no significant difference between the level of job satisfaction among with experienced and without experienced secondary school teachers.

Ha4: There is significant difference between the level of job satisfaction among with experienced and without experienced secondary school teachers.

Research Methodology

Keeping in view the research evidences, objectives and hypotheses, the researcher found it suitable to go through descriptive survey method, through which data was collected.

Population

The population of the current study included male and female secondary school teachers from the Udhampur district who taught classes VI to VIII in Government secondary schools.

Sample

The descriptive survey method was used for the research. The current study involved 300 teachers, with 150 male and 150 female teachers from state Jammu, India, included in the sample. The current study's data was gathered using a stratified random sampling technique.

Tools Used

- A) Professional Commitment Scale for Secondary School Teachers by Ravinder Kaur, Sarbjit Kaur Ranu and Sarvjeet Kaur Brar (2011).
 B) C) Teacher's Job Satisfaction Questionnaire for Secondary School Teachers by Malik and Madan (2019).

Statistical Analysis of Data

The statistical measurements of mean, S.D., t-test, and Pearson's product moment correlation were used to examine the raw scores so collected and draw conclusions after the tool's data collecting and scoring were complete.

Results and Discussion

Objective: 1 To study the level of Professional commitment among secondary school teachers on the basis of gender.

HO-1 There is no statistically significant difference in the level of professional commitment between male and female secondary school teachers.

Table-1 Professional commitment among male and female teachers of secondary schools.

Category	N	Mean	SD	df	t-value
Male teacher	150	103.81	16.11	296	2.86
Female teacher	150	98.83	13.52		

Source: Field Survey

Following table 1 shows that male and female instructors scored on average 103.81 and 98.83 points, respectively, while the standard deviations (SD) for male and female teachers were 16.11 and 13.52 points, respectively. The computed t-value for 150 male instructors and 150 female teachers is discovered to be 2.86. Table value for t is 1.97 at 0.05 levels and 2.86 at 0.01 levels. As a result, both levels of significance determine that the calculated number is significant. Hence, it is believed that there are major differences between secondary school teachers who are male and female in their professional backgrounds.

Objective-2 To study the level of professional commitment among secondary school teachers with and without experience.

H02: There is no significant difference between the level of professional commitment with experienced and without experienced among secondary school teachers.

Table 2: Professional commitment among male and female teachers of secondary schools on the basis of experience

Category	N	Mean	SD	df	t-value
Experienced teachers	150	116.07	14.56	296	0.96
Without experienced teachers	150	109.28	8.56		

Source: Field Survey

According to Table 2, the mean scores for groups that included and excluded experienced teachers were 116.07 and 109.28, respectively, while the standard deviations (SD) for these groups were 14.56 and 8.56, respectively. The computed t-value for 150 male instructors and 150 female teachers was 0.96.

As a result, both degrees of significance determine that the calculated value is not significant. Consequently, the claim that there is no discernible difference in the level of professional dedication between secondary school teachers with and without experience is supported. So, it may be stated that there are no discernible differences between experienced and inexperienced instructors' levels of professional dedication. Although the mean difference indicates that there is a difference, this may simply be the result of chance since it reveals that experienced teachers scored higher on the professional commitment scale than less experienced ones, with a mean value of 116.07 compared to 109.28.

Objective: 3 To investigate secondary school teachers' level of job satisfaction among male and female.

H03: There is no significant difference between the level of job satisfaction among male and female of secondary school teachers.

Table-3 Job satisfaction among male and female teachers of secondary schools.

Category	N	Mean	SD	df	t-value
Male teacher	150	104.76	15.10	286	2.82
Female teacher	150	100.80	11.45		

Source: Field Survey

The average score for male and female instructors was 104.76 and 100.80 points, respectively, according to Table 1, and their corresponding standard deviations (SD) were 15.10 and 11.45 points. For 150 male instructors and 150 female teachers, the computed t-value is found to be 286. At 0.05 levels, the table value for t is 1.97, and at 0.01 levels, it is 2.82. The estimated value is therefore determined to be significant at both levels of significance. As a result, it is thought that male and female secondary school teachers have very different professional histories.

Objective4: To assess the level of job satisfaction among secondary school teachers with and without experience

H04: There is no significant difference between the level of job satisfaction among with experienced and without experienced secondary school teachers.

Table 4: job satisfaction among male and female teachers of secondary schools on the basis of experience

Category	N	Mean	SD	df	t-value
Experienced teachers	150	105.07	12.06	293	0.93
Without experienced teachers	150	99.57	7.32		

Source: Field Survey

Table 4 shows the average scores for male and female instructors, with the associated standard deviations (SD) being 12.06 and 7.32 points. The average score for male instructors was 105.07, while that of female instructors was 99.57. Table value for t is 0.93 at 0.05 levels. The determined t-value is 293 for 150 male instructors and 150 female professors. Hence, it is found that the predicted value is significant at both levels of significance. Male and female secondary school teachers are believed to have substantially diverse professional histories as a result.

Conclusion

The purpose of this study was to explore and compare the level of job satisfaction and professional commitment among male and female of secondary school teachers. The results of present show that male respondents were more professional commitment than female (table-1). As the result that there is a major difference between male and female teacher educators in their level of professional commitment. Males have more professional commitment rather than female which first hypothesis has been rejected. . It may be inferred that there is a considerable difference between male and female teacher educators in terms of their job satisfaction since the hypothesis that there is such a difference was accepted. Female have more satisfaction regarding their jobs as compare to male. Ghazi (2004) examined the job satisfaction of

primary school principals in the district of Toba Tek Singh, Punjab, and discovered that female principals scored higher than male counterparts. Principals who were women reported being substantially happier than their male counterparts. On the basis of experience

the result showed that experience teachers have more professional commitment and job satisfaction rather than less experience or without experience teachers. The hypothesis has been rejected.

Reference

1. Akram, M., Malik, M. I., Sarwar, M., Anwer, M., & Ahmad, F. (2015). Relationship of teacher competence with professional commitment and job satisfaction at secondary level. *The AYER*, 4(2015), 58-70.
2. Bashir, L. (2017). Job satisfaction of teachers in relation to professional commitment. *The International Journal of Indian Psychology*, 4(4), 52-59.
3. Basu, S. (2016). Professional commitment and job satisfaction among secondary school teachers. *Educational Quest-An International Journal of Education and Applied Social Sciences*, 7(3), 255-259.
4. Dorenkamp, I., & Ruhle, S. (2019). Work-life conflict, professional commitment, and job satisfaction among academics. *The Journal of Higher Education*, 90(1), 56-84.
5. Emami, M. (2012). Investigating the job satisfaction and professional commitment. *Elixir Human Resource Mgmt*, 48, 9652-9655.
6. Khan, S. (2015). Organizational Commitment among Public and Private School Teachers. *International Journal of Indian Psychology*, 2(3), 17-19
7. Kirsch, J. C. (1990). Staff Development Opportunity and Nurse Job Satisfaction, Organizational Commitment, and Intent to Remain in the Organization: Implications for Staff Development. *Journal for Nurses in Professional Development*, 6 (6), pp. 279-282
8. Knoop, R. (1995). Relationships among Job Involvement, Job Satisfaction, and Organizational Commitment for Nurses. *The Journal of Psychology*, 129 (6), pp. 643-649.
9. Kumar, D. (2021). Job Satisfaction of School Teachers of Different Streams in Relation to Mental Health. *Vidhyayana-An International Multidisciplinary Peer-Reviewed E-Journal-ISSN 2454-8596*, 6(6).
10. Locke, E. A. (1976). The nature and causes of job satisfaction. *Handbook of industrial and organizational psychology*
11. Madhu, G. & Indu, N. (2015). An Exploratory Study of Professional Commitment among Teacher Educators Working in B.Ed. Colleges. *Bhartiyam International Journal of Education & Research*, 5(1), 40-53
12. Madhu, G. & Indu, N. (2015). An Exploratory Study of Professional Commitment among Teacher Educators Working in B.Ed. Colleges. *Bhartiyam International Journal of Education & Research*, 5(1), 40-53
13. McNeese-Smith, D. (1996). Increasing Employee Productivity, Job Satisfaction, and Organizational Commitment. *Hospital and Health Services Administration*, 41 (2), pp. 160-175.
14. Rani, M. (2014). Relationship of Professional Commitment of Secondary School Teachers with Personality, Locus of Control and Attitude towards Teaching. Ph. D. thesis, Maharishi Dayanand University, Rohtak.
15. Sharma, D. (2019). Job satisfaction and professional commitment of teacher educators: An empirical study. *International Journal of Recent Scientific Research*, 10(09), 34651-34657.
16. Sharma, D. (2019). Job satisfaction and professional commitment of teacher educators: An empirical study. *International Journal of Recent Scientific Research*, 10(09), 34651-34657.
17. Skidmore, S., T. (2007). Professionally committed teachers (PRISE White paper Number 2007-9). Retrieved January 10, 2017 from <http://price.tamu.edu/white.papers.html>.

HEALTH COMMUNICATION: AN EFFECTIVE TOOL FOR PREVENTING THE COVID-19 PANDEMIC

Baldeo Pandey and Azamat Ali

Department of Journalism and Mass Communication, CT University, Ludhiana (Punjab), India

ABSTRACT

In March 2020, the COVID-19 pandemic broke out and brought about significant changes in human life, which were unprecedented. At the beginning, it only affected a few countries, namely China, Italy, and Iran. However, other nations were worried that they might also be impacted. By the end of March, COVID-19 had rapidly spread in affected countries, causing panic, and leading to exceptional measures such as the implementation of partial and complete lockdowns, the closure of schools and businesses, and curfews. Companies required employees to work from home, and students of all ages began to adopt online learning as the new normal. Consequently, certain terms such as Quarantine, Personal Hygiene, Hand Washing, Sanitizer, Mouth & Nose Masks, Social or Physical Distancing became commonly used. This article investigates how health communication plays a role in enhancing health literacy and averting the COVID-19 pandemic crisis.

Keywords: Health communication, Health literacy, Mass media, COVID-19

Introduction

The response to the COVID-19 pandemic by governments has led to a significant increase in information flow through various media channels such as television, radio, online and print media. This has resulted in increased health literacy among the general public, with everyone from ordinary people to religious leaders, news analysts, health experts, doctors and social workers taking advantage of these communication platforms to discuss and educate the masses. The response and information flow has been unprecedented and diverse (National Center for Biotechnology Information, 2020).

Interestingly, young people prefer to obtain information from social media platforms like Facebook, YouTube and Instagram, while older people still rely on traditional sources such as television, radio and newspapers. People living in foreign countries may receive updates from their leaders and news sources in their respective nations. In times of a catastrophic pandemic, timely and accurate information is crucial for people worldwide (World Health Organization, 2020a). An editorial in the Lancet in February 2021 emphasized the importance of verified information as the most effective means of preventing panic during a pandemic, stating that “There may be no way to prevent a COVID-19 pandemic in this globalized time, but verified information is the most effective

prevention against the disease of panic”(Lancet, 2020).

Amidst the current unprecedented pandemic, the public and community health leaders are expected to disseminate accurate information and implement effective measures to treat those affected by the virus, while also preventing the infection from spreading through changes in the behavior of the general public. Health communication is crucial in raising awareness and educating people about this crisis. As a result, health communication has played a crucial role in promoting health literacy among the masses, particularly among those who are illiterate and residing in rural and suburban areas (Centers for Disease Control and Prevention, 2020).

Due to health communication efforts during the COVID-19 pandemic, people have learned to adopt new behaviours such as social distancing, wearing masks, quarantine, working from home, and maintaining a healthy diet. These changes have become the new normal as a result of increased health literacy from various sources (Centers for Disease Control and Prevention, 2020). Effective health communication has also helped people restore their confidence in times of panic and uncertainty by providing scientific knowledge and responses to fight the pandemic. Health professionals have a responsibility to provide accurate information to the public during such distressing times, so that people can adjust

their behaviours accordingly (Bavel et al., 2020).

Reducing Scepticism and Angst

The COVID-19 pandemic was highly infectious and caused widespread fear and anxiety due to its fast transmission rate and lethality, particularly among the elderly (Mizumoto & Chowell, 2020). Furthermore, the virus had an asymptomatic incubation period that lasted almost a week for most infected individuals, during which they could spread the virus unknowingly (Lauer et al., 2020). This made it seem like an invisible enemy and led people to feel like they had no control over their lives. As a result, political leaders and health experts faced difficulties in convincing the public that they were safe in the midst of the uncertainty.

The health communicators faced challenges during the COVID-19 pandemic in providing credible and accurate information due to their limited experience and knowledge. Despite sharing information about the contagiousness and fatality of COVID-19 with the public, there was still a lack of awareness regarding the mutation rate of the virus and the likelihood of achieving herd immunity to protect lives. There were also questions surrounding the effectiveness of COVID-19 vaccines, although they were seen as a glimmer of hope (Wilson and Wiysonge, 2020).

During the COVID-19 pandemic, the lockdowns implemented to control the spread of the virus had negative impacts on many people. Effective communication was critical in this situation, and four important suggestions were identified to guide health information communication to the public. Firstly, it was emphasized that information should be shared honestly and transparently, clearly stating what was known and unknown and focusing on the facts as much as possible. It was noted that the facts themselves were subject to change, and would be updated as new evidence and symptoms emerged. Secondly, it was important that the source of information be accurate and reliable. Finally, it was essential to clarify that when recommendations change, it is based on new, previously unknown evidence, given the rapidly changing nature of the pandemic (Van der Bles et al., 2020).

Secondly, it was crucial to provide consistent and precise information. Even if we acknowledged that there were gaps in our knowledge, it was important not to be vague. Studies on severe illnesses had revealed that uncertainty about illness, which is a patient's inability to comprehend the meaning of illness-related events, may arise from ambiguity, complexity, and unpredictability (Mishel, 1990; Han and Arora, 2011). Hence, it was necessary to communicate the information using clear, precise, unambiguous, and understandable language. Additionally, it was important to limit the number of spokespersons and ensure consistency in messaging. The third suggestion for effective health communication during the pandemic was to display confidence in decision-making despite the prevailing uncertainty, and to communicate decisions honestly and transparently even if they might be proven wrong in the future. This type of leadership in the health communication field would involve recognizing and praising frontline community leaders, politicians, scientists, and health workers for their efforts in resolving immediate issues for the well-being of all (Kurita, et al., 2013).

Fourth, it is important to recognize and address emotions. Uncertainty related to illness has been linked to feelings of anxiety, depression, and distress, which can lead to panic and inaction rather than proactive efforts to reduce the risk of COVID-19 (Eisenberg et al., 2015). Information should be delivered with empathy, showing concern and acknowledging the impact of the situation on individuals' lives, rather than being distant and solely factual (Lunn et al., 2020). This can be challenging for healthcare professionals, but building reciprocal trust can help. Ignoring fear is not the solution, as it can lead to greater anxiety. Instead, it is easier to manage fear when it is acknowledged (Tannenbaum et al., 2015). Petersen has suggested the concept of "optimistic anxiety," which means citizens should be anxious enough to follow the advice from authorities, but also optimistic enough to believe that their actions can make a difference (Petersen, 2020).

Health Literacy and Behaviour Change

To combat the spread of COVID-19, it was crucial to develop effective strategies for promoting behavioural changes among individuals and communities. The way these recommendations were presented was important to ensure compliance, as past research on pandemics had shown that official guidance was often met with distrust by some people (Bish and Michie, 2010). The necessary behavioural changes to control the pandemic were already well-known, such as coughing into a tissue or elbow, regularly washing hands, practicing social distancing, refraining from touching one's face, and cleaning surfaces.

Even though the messages to reduce COVID-19 transmission were straightforward, ensuring that people followed them was not easy. Even if everyone had access to the same information, changing one's behaviour was difficult because it required altering ingrained behavioural routines. We had to recognize that shifting from initial behaviour to sustained behaviour required a shift in self-regulation. Intentional behaviour planning was needed to initiate changes in behaviour, while maintenance became more automatic and required less self-regulation. To promote the necessary behavioural changes, it was important to understand the factors that influence behaviour, such as social norms and personal beliefs. Health communication efforts needed to address these factors in order to effectively promote the desired changes. Furthermore, the messages needed to be delivered in a way that was accessible and relatable to the target audience. For example, using language and images are resonating with the cultural and social context of the community (Bavel, et al., 2020).

In addition to addressing individual behaviour change, it was also important to consider the role of community engagement. Community-based approaches, such as involving community leaders and organizations, could help to promote and sustain behavioural changes. This could include initiatives such as community education programs and peer-led interventions, which have been shown to be effective in promoting behaviour change in other public health campaigns (World Health Organization, 2020b). Ultimately, the success

of health communication efforts in promoting behaviour change during the COVID-19 pandemic depended on the coordinated efforts of health professionals, government officials, and community leaders. By working together and leveraging a variety of communication channels and strategies, it was possible to promote the necessary behavioural changes and reduce the spread of the virus (Merchant et al., 2020).

Challenges for the Health Professionals

To effectively implement health communication during the COVID-19 crisis, it was crucial to comprehend the challenges that health workers faced when interacting with patients, whether in-person or virtually (Huang et al., 2020). COVID-19 has presented numerous challenges for health professionals worldwide. Some of the key challenges include:

- **Lack of Personal Protective Equipment (PPE):** Health professionals, especially those working in high-risk areas such as intensive care units (ICUs) and emergency departments, require adequate PPE to protect them from infection. However, during the early stages of the pandemic, there was a shortage of PPE, which put health professionals at risk (Ranney et al., 2020).
- **Increased workload and stress:** The pandemic has led to an increase in the workload of health professionals, especially those working in COVID-19 wards and ICUs. They have to work longer hours and under more stressful conditions, leading to burnout and mental health issues (Lai et al., 2020).
- **Risk of infection:** Health professionals are at a higher risk of contracting COVID-19 due to their exposure to infected patients. This risk is compounded by the shortage of PPE and inadequate training on infection prevention and control measures (Chu et al., 2020).
- **Limited resources:** In some parts of the world, health systems were already overstretched before the pandemic, with limited resources such as hospital beds, ventilators, and medical personnel. The influx of COVID-19 patients has put a

strain on these resources, making it challenging to provide adequate care to all patients ((Ranney et al., 2020).

- Ethical dilemmas: Health professionals have faced ethical dilemmas during the pandemic, such as triaging patients and deciding who receives life-saving interventions when resources are limited (World Health Organization, 2020c).

Overall, the COVID-19 pandemic has placed unprecedented demands on health professionals, requiring them to adapt to new working conditions and take on additional responsibilities while also dealing with their own personal and professional challenges. Therefore, it is the responsibility of experts in communication, education, and health behaviour change to carefully evaluate the available knowledge and new insights. This approach could help health communication become an effective tool in preventing the spread of the COVID-19 pandemic.

Conclusion

In the midst of the frightening COVID-19 crisis, health communication played a vital role in providing much-needed support to the suffering population through appropriate information. However, the health information had to be constantly updated and modified during this transitional period due to the lack of experience with such a traumatic event, with

the exception of the dreaded Spanish Influenza outbreak that occurred after World War I and was almost forgotten by the world. Health communication effectively served as a bridge between the suffering and the government and health authorities, enhancing health literacy and facilitating behavioural changes among people worldwide, leading to the adoption of new norms everywhere.

One of the biggest challenges in implementing health communication during the pandemic was the need to constantly update the information as new data emerged. The scientific community was learning more about the virus with each passing day, and this new information needed to be communicated to the public in a timely and effective manner. Health communication experts had to work tirelessly to ensure that the public had access to accurate and up-to-date information. In summary, the role of health communication in the COVID-19 crisis has been critical in mitigating the spread of the virus and providing support to the public. It has served as a vital link between the government, health authorities, and the general population, providing information and guidance that has been crucial in containing the virus. Health communication has also contributed to the adoption of new norms and behaviours that will be crucial in preventing future pandemics.

References

1. Bavel, J. J. V., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., ... Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour*, 4(5), 460-471. <https://doi.org/10.1038/s41562-020-0884-z>
2. Bish A, Michie S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology*, 15(4), 797-824. doi: 10.1348/135910710X485826
3. Centers for Disease Control and Prevention. (2020). Social distancing. Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>
4. Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H. J., & COVID-19 Systematic Urgent Review Group Effort (SURGE) study authors. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-

- analysis. *The Lancet*, 395(10242), 1973-1987.
5. Eisenberg, S., Kurita, K., Taylor-Ford, M., Agus, D., Gross, M., & Meyerowitz, B. (2015). Intolerance of uncertainty, cognitive complaints, and cancer-related distress in prostate cancer survivors. *Psycho-Oncology*, 24, 228–235. doi: 10.1002/pon.3622
 6. Han, P., Klein, W., & Arora, N. (2011). Varieties of uncertainty in health care: A conceptual taxonomy. *Medical Decision Making*, 31, 828–838.
 7. Huang C, Wang Y, Li X, et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*, 395(10223), 497-506. doi:10.1016/S0140-6736(20)30183-5.
 8. Kurita, K., Garon, E., Stanton, A., & Meyerowitz, B. (2013). Uncertainty and psychological adjustment in patients with lung cancer. *Psycho-Oncology*, 22, 1396–1401. doi: 10.1002/pon.3176
 9. Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., ... & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, 3(3), e203976.
 10. *Lancet*. (2020). COVID-19: Fighting Panic with Information, 295, 537.
 11. Lauer, S. A., Grantz, K. H., Bi, Q., Jones, F. K., Zheng, Q., Meredith, H. R., Azman, A. S., Reich, N. G., & Lessler, J. (2020). The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. *Annals of Internal Medicine*, 172. <https://doi.org/10.7326/M20-0504>
 12. Lunn, P., Belton, C., Lavin, C., McGowan, F., Timmons, S., & Robertson, D. (2020). Using behavioural science to help fight the coronavirus. Working Paper, 656. Economic and Social Research Institute. Retrieved from <https://www.esri.ie/system/files/publications/WP656.pdf>
 13. Merchant, R. M., Lurie, N., & Social, Medicine Task Force on Covid-19. (2020). Social media and emergency preparedness in response to novel coronavirus. *Jama*, 323(20), 2011-2012.
 14. Mishel, M. (1990). Reconceptualization of the Uncertainty in Illness Theory. *Journal of Nursing Scholarship*, 22, 256–262.
 15. Mizumoto, K., & Chowell, G. (2020). Estimating risk for death from 2019 novel coronavirus disease, China, January–February 2020. *Emerging Infectious Diseases*, 26. <https://doi.org/10.3201/eid2606.200233>
 16. National Center for Biotechnology Information. (2020). COVID-19: Communication and Community Engagement Strategies to Enhance the Public Health Response. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK554776/>
 17. Petersen, M. B. (2020, March 9). The unpleasant truth is the best protection against coronavirus. *Politiken*. <https://politiken.dk/indland/art7708270/The-unpleasant-truth-is-the-best-protection-against-coronavirus>
 18. Ranney, M. L., Griffeth, V., & Jha, A. K. (2020). Critical supply shortages—the need for ventilators and personal protective equipment during the Covid-19 pandemic. *New England Journal of Medicine*, 382(18), e41.
 19. Tannenbaum, M. B., Hepler, J., Zimmerman, R. S., Saul, L., Jacobs, S., Wilson, K., & Albarracín, D. (2015). Appealing to fear: A meta-analysis of fear appeal effectiveness and theories. *Psychological Bulletin*, 141, 1178–1204. doi: 10.1037/a0039729
 20. Van der Bles, A. M., van der Linden, S., Freeman, A. L. J., & Spiegelhalter, D. J. (2020). The effects of communicating uncertainty on public trust in facts and numbers. *Proceedings of the National Academy of Sciences*, 117(14), 7672-7683. <https://doi.org/10.1073/pnas.1913678117>
 21. Wilson, S. L., & Wiysonge, C. (2020). Social media and vaccine hesitancy. *BMJ Global Health*, 5(10), e004206. <https://doi.org/10.1136/bmjgh-2019-004206>
 22. World Health Organization. (2020a). Risk communication and community engagement (RCCE) action plan guidance COVID-19 preparedness and response. <https://www.who.int/publications/i/item/ris>

- k-communication-and-community-engagement-(rcce)-action-plan-guidance
23. World Health Organization. (2020b). Risk communication and community engagement readiness and response to coronavirus disease (COVID-19): interim guidance, 19 March 2020. World Health Organization.
24. World Health Organization. (2020c). Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health.

AWARENESS ABOUT MOBILE BANKING AND NET BANKING AMONG RURAL CUSTOMERS

Neeraj Gupta and Sachin Sharma

Department of Commerce, CT University, Ludhiana (Punjab), India

ABSTRACT

Green Banking which means promoting environment friendly practices and reducing carbon footprints from banking activities. Use of green banking services like paperless banking, online transactions, mobile banking, ATMs for cash with drawl and deposit has helped to a great extent to the phenomenon of green banking. However the performance of banks largely depends upon the performance of its clients. The awareness among customers about various green banking services and their benefits will not only help them save their time and but will also help to sustain the environment. Mobile banking and Net banking are two such services which can be used while sitting anywhere at any place. Thus the present investigation was conducted to find out awareness about such initiatives among rural customers of Punjab. Hundred bank customers from each of the five districts were selected as respondents.

Introduction

The banking sector can play an important role for promoting environmentally sustainable and socially responsible investment through Green Banking which means promoting environment friendly practices and reducing carbon footprints from banking activities. Use of green banking services like paperless banking, online transactions, mobile banking, ATMs for cash with drawl and deposit has helped to a great extent to the phenomenon of green banking. However the performance of banks largely depends upon the performance of its clients. The awareness among customers about various green banking services and their benefits will not only help them save their time and but will also help to sustain the environment. Thus there is a need to find out awareness about such initiatives among rural customers. According to Cholasseri (2016) the future of green banking seems to be very promising in India as lots of green products and services are expected in the future. As providers of finance, banks can ensure that businesses adopt environment friendly practices. Incentives by way of offering cheaper funds for adopting green technologies will have a long-term beneficial impact on the environment. As major implementers of technology, banks themselves can adopt green practices and thereby lead the way in this global initiative (Ganesan & Bhuvaneshwari, 2016). If Indian banks desire to compete in the global markets, it is important that they recognize their environmental and social responsibilities.

Therefore, Indian banks should adopt effective strategies for green banking by considering it as a strategic imperative and need of the hour (Bahl, 2012). However creation of green banking services is of no use, unless people are aware of these. Mobile banking and Net banking are two such services which can be used while sitting anywhere at any place. Thus the present investigation was conducted to find out awareness about such initiatives among rural customers of Punjab.

Methodology

For the current study, five districts from Punjab state were selected randomly. Two public banks were selected randomly and from each district fifty customers were selected as respondents. Thus, from each district a sample of 100 respondents was selected. Total sample size for the study was 500. The secondary data was collected from the bank's reports, websites, literature etc. to formulate the structured questionnaire. The Primary data was collected from the rural customers through direct investigation method. The data were analysed using percentages and mean scores.

Result and discussion

Demographic profile

The age of the respondents in the study varied from 18 to 78 years. The respondents were classified into three categories i.e., 18-38, 39-58 and 59-78 years using class interval method. Majority of the respondents (78.60%) were in the age group i.e., 39-58 years, followed by

18.60 per cent who were in the age group of 39-58 years and rest 02.60 per cent were between age from 59-78 years, (Table1).

As regards the educational qualification of the respondents, majority were qualified up to graduate level (36.20%) followed by Senior Secondary (32.40%), post-graduate (16.00%) and matric level (07.80%). Few were educated up to middle standard (02.40%), diploma (02.20%) and primary standard (02.00%) whereas only one per cent of the respondents were illiterate.

As depicted in Table 1, maximum respondents were engaged in private service (30.20%) followed by 27.60 per cent respondents who were students whereas, 18.40 per cent respondents were doing agriculture and 12.40 per cent were home makers. Only 9.80 per cent of the respondents were doing government service.

Table 1 : Demographic profile of the respondents (n=500)

Parameters		f	%
Age (Years)	18-38	393	78.60
	39-58	94	18.80
	59-78	13	02.60
Educational Qualification	Illiterate	5	01.00
	Primary	10	02.00
	Middle	12	02.40
	Matric	39	07.80
	Senior Secondary	162	32.40
	Graduate	181	36.20
	Post Graduate	80	16.00
Occupation	Diploma	11	02.20
	Agriculture	92	18.40
	Dairy	8	01.60
	Government Service	49	09.80
	Private Service	151	30.20
	Homemaker	62	12.40
Any Other (Student)	138	27.60	

Data pertaining to awareness level of the respondents regarding the services provided under mobile banking has been presented in Table 4.2.

From the collected data, it was found that 69.2 per cent of the respondents were fully aware about checking balance or account statement through mobile banking followed by twenty-six per cent of the respondents who were totally unaware about the mentioned service. Regarding the transfer of funds, more than half of the respondents were fully aware that they can transfer funds into their self-accounts within the bank (54.4%), third party accounts within the bank (55.6%), transfer funds to other bank accounts (58.80%) and transfer to mobile (55%) whereas, almost one fourth of the respondents were totally unaware about transferring funds by using mobile banking. Further, sixty-one per cent of the total respondents found to be fully aware to recharge mobile phones through mobile banking followed by the respondents who were not aware (24.8%) for the same. For paying bills like electricity/loan payment/DTH dish/cable TV/ LPG cylinder booking through mobile banking, fifty-eight per cent of the respondents stated that they are fully aware followed by unaware (24.2%) and partially aware (17.8%). For fixed deposit, only 32, 32.6 and 30.6 per cent of the respondents were fully aware about opening FD/RD, viewing receipt of FD/RD and closure of FD/RD, respectively. So Overall, accept about FD, more than 50% rural respondents were aware of various mobile banking services. However respondents were aware partially about these services as the Mean score was below 1.5 for each of the dimension.

Ramya and Promoth (2020) studied the awareness about mobile banking among people and found that majority of the consumers were aware that mobile banking is available in India, but very few were aware and familiar with various banking transactions that can be done with the help of mobile banking.

Table 4.2 Awareness among respondents about the services provided under Mobile Banking

Dimension	Fully aware <i>f</i> (%)	Partially <i>f</i> (%)	Not aware <i>f</i> (%)	Mean
Check balance/ account statement	346 (69.2)	24 (04.8)	130 (26.0)	1.43
Transfer funds within bank:				
Self-accounts (PPF, RD, Loan)	272 (54.4)	96 (19.2)	132 (26.4)	1.28
Third party (account within your bank)	278 (55.6)	100 (20.0)	122 (24.4)	1.31
Transfer funds to other banks:				
Transfer to account	294 (58.80)	86 (17.20)	120 (24.00)	1.35
Transfer to mobile	275 (55.0)	106 (21.2)	119 (23.8)	1.31
Recharge:				
Recharge Mobile	305 (61.00)	71 (14.20)	124 (24.8)	1.36
Pay various bills:				
Electricity/Loan payment/Post-paid mobile/DTH Dish/cable TV/LPG cylinder booking/Any other	290 (58.00)	89 (17.80)	121 (24.2)	1.34
Fixed deposit:				
Opening FD/RD	160 (32.0)	128 (25.6)	212 (42.4)	0.90
View receipt of FD/RD	163 (32.6)	128 (25.6)	209 (41.8)	0.91
FD/RD closure	153 (30.6)	116 (23.2)	231 (46)	0.84
Overall Mean				1.20

Data pertaining to awareness level of the respondents regarding the services provided under mobile banking has been presented in Table 4.2.

From the collected data, it was found that 69.2 per cent of the respondents were fully aware about checking balance or account statement through mobile banking followed by twenty-six per cent of the respondents who were totally unaware about the mentioned service. Regarding the transfer of funds, more than half of the respondents were fully aware that they can transfer funds into their self-accounts within the bank (54.4%), third party accounts within the bank (55.6%), transfer funds to other bank accounts (58.80%) and transfer to mobile (55%) whereas, almost one fourth of the respondents were totally unaware about transferring funds by using mobile banking. Further, sixty-one per cent of the total

respondents found to be fully aware to recharge mobile phones through mobile banking followed by the respondents who were not aware (24.8%) for the same. For paying bills like electricity/loan payment/DTH dish/cable TV/ LPG cylinder booking through mobile banking, fifty-eight per cent of the respondents stated that they are fully aware followed by unaware (24.2%) and partially aware (17.8%). For fixed deposit, only 32, 32.6 and 30.6 per cent of the respondents were fully aware about opening FD/RD, viewing receipt of FD/RD and closure of FD/RD, respectively.

Ramya and Promoth (2020) studied the awareness about mobile banking among people and found that majority of the consumers were aware that mobile banking is available in India, but very few were aware and familiar with various banking transactions that can be done with the help of mobile banking.

Table 4.3: Awareness among respondents about the services provided under Net Banking

Dimension	Fully aware <i>f (%)</i>	Partially <i>f (%)</i>	Not aware <i>f (%)</i>	Mean
Create net banking log in for accessing our bank	263 (52.6)	75 (15.0)	162 (32.4)	1.20
Check balance / statement	272 (54.4)	69 (13.8)	159 (31.8)	1.23
Transfer funds by:				
IMPS (Immediate Payment service)	135 (27.0)	142 (28.4)	223 (44.6)	0.82
NEFT (National elec fund transfer)	153 (30.6)	142 (28.4)	205 (41.0)	0.90
RTGS (more than 2 lacs)	132 (26.4)	163 (32.6)	205 (41.0)	0.85
Pay bills online:				
Electricity bill/Mobile/telephone bill/Gas bill/Insurance premium/Mutual Funds	234 (46.8)	110 (22.0)	156 (31.2)	1.16
Credit card outstanding can be paid.	125 (25.0)	163 (32.6)	212 (42.4)	0.83
Use demat account for purchase and sale of shares	138 (27.6)	170 (34.0)	192 (38.4)	0.89
Do mutual fund investment	151 (30.2)	167 (33.4)	182 (36.4)	0.94
Take Insurance plan Health/Children/Retirement	160 (32.0)	172 (34.4)	168 (33.6)	0.98
Loans				
Check loan eligibility amount	142 (28.4)	158 (31.6)	200 (40.0)	0.88
Avail personal automobile	144 (28.8)	151 (30.2)	205 (41.0)	0.88
Overall Mean (%)				0.96

4.3 Awareness among respondents about the services provided under Net Banking

Table 4.3 depicted the data on awareness level of the respondents about the services provided under net banking.

It was found that almost half of the total respondents were fully aware that they can create net banking login for accessing the bank services (52.6%) and check their account balance (54.4%) with the help of net banking while the rest were not aware or partially aware. Out of total respondents, a greater number of respondents stated that they are totally unaware to transfer funds by IMPS

(44.6%), NEFT (41%) and RTGS (41%) with the help of net banking. However, 27, 30.6 and 26.4 per cent of the respondents reported that they are fully aware of transferring funds through IMPS, NEFT and RTGS through net banking while, the rest were partially aware. For paying bills through net banking, 46.8 per cent respondents affirmed that they are totally aware followed 31.2 per cent who were completely unaware for the same. Only one fourth of the respondents were fully aware that they can pay credit card's outstanding through net banking and use demat account for purchase/sale of shares. Further, it was observed that almost same number of

respondents i.e., 30.2 and 32 per cent were fully aware that they can go for mutual fund investment and insurance plans, respectively, through net banking. Around twenty-eight per cent of the respondents avowed that they are fully aware about the loan related services that can be availed through net banking however, around forty per cent stated that they are totally aware and rest of the respondents were partially aware of such services provided under net banking. The mean score was 0.96 which shows that rural people are partially aware of net banking.

Bendigeri and Hulgar (2014) analyzed the awareness level of internet banking services among the customers of private and public sector banks. They found that 63% of the respondents were partially aware about the internet banking services and 16% of them were totally unaware.

Thus it can be concluded that the respondents were more aware of the mobile banking than internet banking as they were using mobile banking more than the internet banking for fund transfer, paying bills etc.

Conclusion

Majority of the respondents were graduate in the age group of 39-58 years engaged in private service followed by the respondents who were students. For paying bills like electricity/loan payment/DTH dish/cable TV/ LPG cylinder booking through mobile banking, fifty-eight per cent of the respondents stated that they are fully aware. A greater number of respondents stated that they are totally unaware to transfer funds by IMPS, NEFT and RTGS with the help of net banking. Thus awareness was partial for both mobile banking as well as net banking, however comparatively awareness about mobile banking was more as compared to net banking. Though majority of the respondents were young and qualified to a good extent, yet the awareness level Overall the study highlights the need to create educational programmes, digital literacy programmes/workshops for rural customers about use of these services to save them from wasting their time and energy by going to banks physically.

References

1. Bahl, S.(2012).Green banking –The new strategic imperative. *Asian Journal of Research in Business Economics and Management*, 2(2),176-185.
2. Bendigeri M and Hulgar V (2014) Awareness and knowledge of internet banking services among the customers of private and public sector banks in Hubli city. *Asian Journal of Research in Banking and Finance*, 4(8): 222-236.
3. Cholasseri, S. (2016). Green banking – an overview. *International Journal of Advance Research and Innovative Ideas in Education*, 1(4),108-111.
4. Ganesan, R. & Bhuvanewari, A.(2016). Customer perception towards green banking, *IOSR Journal of Economics and Finance*,7(5), 5-17.
5. Ramya N and Promoth N (2020) A study on customer awareness and usage of e-banking services through mobile phones with special reference to Coimbatore city. *EPR International Journal of Research and Development*, 5(12): 4-8.

AI MAPPING IN DIGITAL COMMUNICATION SYSTEM : IN SPECIAL REFERENCE TO DIGITAL BRAND STORES

Bandana Pandey¹, Vineet Kumar^{2*} and Sanchita Chakraborty²

¹Professor, Department of Mass Communication and Media Studies, Gautam Buddha University

²Research Scholar, Department of Mass Communication and Media Studies, Gautam Buddha University

²Research Scholar, Department of Mass Communication and Media Studies, Gautam Buddha University

ABSTRACT

Artificial intelligence is a transformational technology of the digital age and increasingly capturing the world. Apart from robotics, this technology is also useful in the Marketing and Communication sector. AI-based digital Communication System is nowadays very popular in big brands. They use AI technology to attract customer to the brands. This AI technology predicts the time to reach your destination and provides you suggestions for shopping, a real-time trail of products, and customer support. So, in this study, the researcher describes the assimilation of Artificial Intelligence in Digital Communication System. Researchers identify the most frequently used AI interface in digital brand stores to determine the reach & availability of AI tools to consumers in Digital Communication System (DCS) and to evaluate the knowledge, attitudes, and experiences of consumers related to AI. A survey method was used to gather the data. In this research quantitative approach is used and researchers use random sampling method for the selection of samples.

Keywords: Artificial Intelligence, Digital Communication, Digital Marketing, Chatbots, Consumers, Technology, Brand.

Introduction

The global economic impact of AI has enabled policymakers, professionals, and organizations to introduce and change practices in support of better economic gains. However, convincing people to be aware and adopt new technologies and systems has never been an easy task. Therefore, it is important to trawl the scope of technology and present it to the people in such a way that its intervention can result in attention, acceptance, and action.

Artificial intelligence is a new and emerging field of research that has been divided into subfields. These sub-fields are based on technical and social consideration of machine learning, deep learning, cognitive psychology, communications network etc. Further development and research in the field of AI has facilitated learning and building knowledge which to an extent altered pre-existing relationships and identities of this society. There is a shift towards a more integrated and interdependent world economy that substantially trying to merge distinct and separate identities of human and machine into one huge virtual marketplace. Such changes effect patterns of communication and business models. Therefore, many sectors have been

attempting to incorporate AI-techniques over time.

Understanding the meaning of artificial intelligence and establishing the right context for its implementation may help detect patterns in large volumes of data and model complex, interdependent systems to improve associative memory and be capable of judgment and decision making. Artificial intelligence involves using methods based on the intelligent behaviour of humans and other animals to solve complex problems (Coppin, 2004, p.4).

Adoption of artificial intelligence is a dominant trend that manifest the rapid proliferation and use of smart technologies. As society turns more tech-savy, now people have a better chance to interact with technology and experience efficient services offered by the organisations. These changes force organizations to create business strategies which can meet consumer's expectations related to a more targeted, responsive, personalized and quality services. It will also help augment organisation's most valuable asset that is its brand identity in the digital platform. Further it also leads to a successful use of AI-interface to reach audience specific goals.

An understanding of artificial intelligence by the digital brand stores requires reflection on

its application, receptivity, range of capabilities and assistance. More and more customers are looking AI-enabled features as an interesting avant-garde and also as a valuable source of information. Brands, are thus facing a completely new challenge to capacitate the ambit of artificial intelligence with all consumer related content and try to take advantage of it as much as possible. AI- makes consumer's choices easier and concerns are more promptly handled. Thus, AI can prove to be one of the main asset in which companies have to invest in. This can help brands to develop their business and retain its already existing customers as well.

Review of literature

John McCarthy, Marvin L. Minsky, Nathaniel R and Claude E. Shanon (1955) conducted a study on 'A proposal for the Dartmouth Summer Research Project on Artificial Intelligence'. The study expounded that the understanding of learning and intelligence can be precisely described via programming it by a machine that can be made to stimulate. This approach can be delineated by emphasizing on how machines can use language, image recognition, form abstractions and concepts to solve difficult problems.

J.R. Quinlan (1986) in the study 'Induction of Decision Trees' focuses on technology for building decision trees which is characterized by their representation of acquired knowledge. The study recognized that the current commercial systems have the potential for building high performance systems based on artificial intelligence. This is marked by the advent of knowledge based expert systems that can monitor their performance and can thereby improve the algorithms by adjusting internal parameters. Therefore, the systems are presented in a way that can generate knowledge in the form of decision trees that is capable of solving difficult problems of practical significance.

Adiwardana D., et al. in the study 'Towards a Human- like Open- domain chatbot' explore the aspect of artificial intelligence via open-domain chatbots. It highlights that "unlike closeddomain chatbots, which respond to keywords or intents to accomplish specific tasks, opendomain chatbots can engage in

conversation on any topic". The attributes of chatbots have complex frameworks such as dialog managers with knowledge -based, retrieval-based or rulebased systems. However, often open-domain chatbots function in ways that do not make sense, or respond with vaguely and generically. To converse properly like a human, the chatbots are programmed and tested for social conversation style, including common sense, basic knowledge, asking and sharing about personality, likes/disliked, opinions, feelings, hobbies, pleasantries etc. The datasets also need to focus on deeper question answering in terms of basic math and knowledge tests designed to examine machines.

Urvashi Aneja et. al (2020) in the study 'AI on the ground: A snapshot of AI use in India' focuses on adoption of AI in several sectors. "NITI Aayog has identified private enterprise as one of the three market segments for increased AI adoption". As per the study, AI in private enterprise is used for data driven business intelligence, customer engagement services, process and task optimisation and automation as well as for targeted advertising and content marketing. AI-enabled enterprise solutions aid in increased internal efficiency of enterprises, business growth and productivity, enable personalisation of products and services as well as improve products and services discovery for consumers. The study explicitly mentions that 'The role of AI within the enterprise sector is very critical to the realisation of this vision, given that India is a rapidly growing market for AI-based business solution'.

P. Klaus and J. Zaichkowsky (2020) in the paper 'AI voice bots: a services marketing research agenda' documented how AI can potentially change the way consumers make decisions and proposed the effect of changes that can impact service marketing, service research and service management. AI has taken convenience to new level for consumers by enabling voicebots in their feature and by giving minimum attention to traditional consumer decision making models and brand emphasis. This further feed on the consumer's need for convenience and ease of use. "The consumer can engage the Bot in a long conversation which can provide the speaker

with a very pleasant positive emotional feeling through that interaction”. Companies are well aware of the importance of the voice bots and are now working on the quality to give users a memorable experience while interacting with AI-systems through Voicebots.

Objectives

1. To identify the most frequently used AI-interface in digital brand stores.
2. To determine the reach and availability of AI-tools to consumers in digital brand stores.
3. To evaluate knowledge, attitudes and experiences of consumers related to AI.

Methodology

The researcher conducted Descriptive research using survey as methods of enquiry. Survey method proved very germane to the matter in hand by providing baseline data needed to

discern the customer experience regarding the AI-usage on brand’s online store.

Universe – Delhi/NCR is the ‘Universe’ of the study. National Capital Region Planning Board Act of 1985 defined the NCR as being the whole of NCT of Delhi and several districts surrounding it from the states of Haryana, Uttar Pradesh and Rajasthan.

Sample – In the present study ‘youth’ between the age group of 18-30 are identified as respondents.

Sample Size – The researcher conducted survey of 100 people residing in Delhi/NCR.

Sampling Technique – Simple random sampling method was adopted to conduct the research.

Research Tool

The researcher used a questionnaire as the tool to study the consumer experience related to the usage of artificial intelligence as designed by online brand stores.

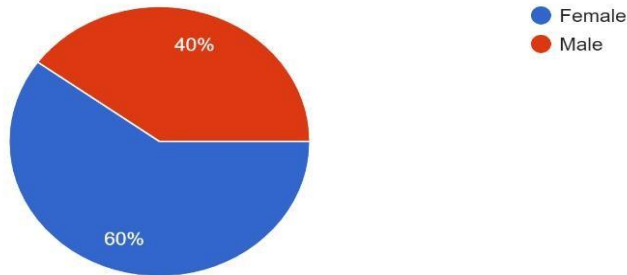
Findings

Profile of Respondents

Pie Chart 1

Gender

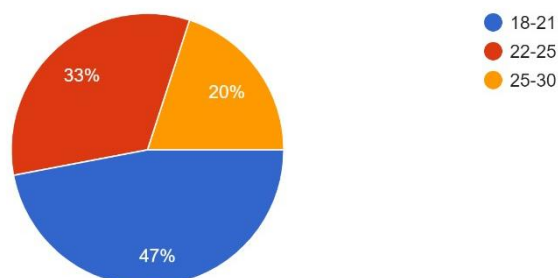
100 responses



Pie Chart 2

Age

100 responses

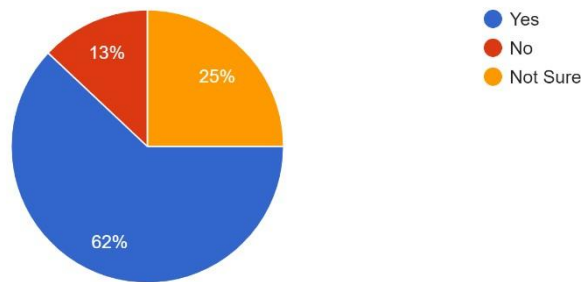


The respondents were from different age groups: 47% of the respondents were 18-21 years old, 33% were 22-25 years old and 20% were 25-30 years old. In terms of gender,

the majority of the participants were females (60%), while 40% were males. Pie chart 1 and 2 shows the descriptive statistics of the sample.

Pie Chart 3

Can you call yourself AI-aware?
100 responses

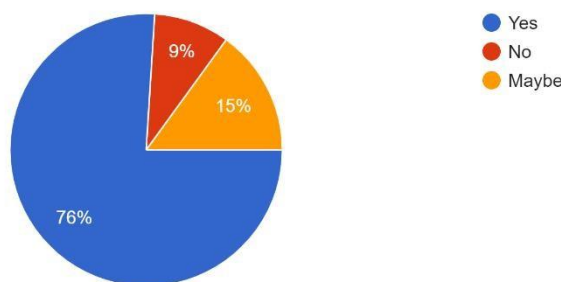


An increasing number of youths consider themselves AI-aware i.e. 62% respondents are aware about artificial intelligence; 25% respondents are not well acquainted with the basics of AI so they are unsure about its functionality and 13% respondents have still not levelled up the self-awareness of AI. The data indicates that awareness related to

artificial intelligence among consumers is dramatically increasing. However, they are many people who are still unfamiliar with the utility and functionality of artificial intelligence in the digital platforms. Pie Chart 3 shows AI-awareness among the participants in the sample.

Pie Chart 4

Do you know digital brand stores use AI to increase customer experience?
100 responses



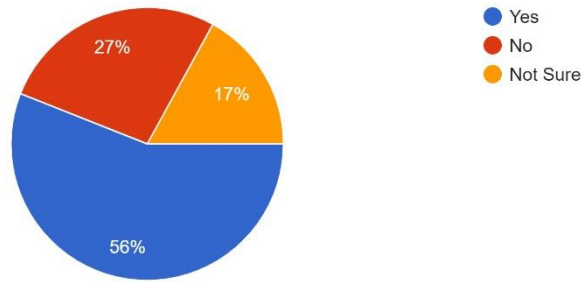
Pie chart 4 shows that consumers are becoming increasingly aware about the usage of AI in digital brand stores to increase customer experience. 76% respondents are familiar that digital brands are now frequently using artificial intelligence techniques for predictable and quotidian issues. 15% respondents are still unsure about the AI application, while 9%

respondents are completely unaware of the contribution of AI in augmenting the customer experience in digital brand stores. It is evident from the pie chart 3 and 4 that despite deficit in understanding the AI- algorithms, consumers are still conscious of the prevalence of artificial intelligence in digital brand stores.

Pie Chart 5

Have you ever engaged in interactions enabled by AI on any digital brand store?

100 responses



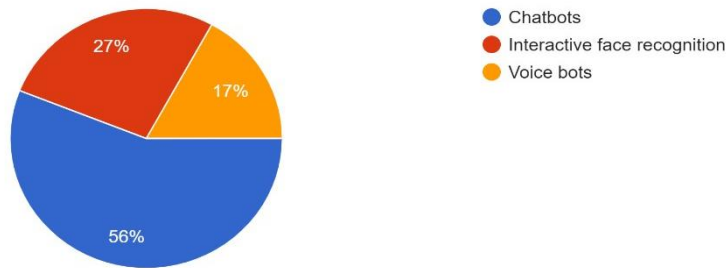
Pie chart 5 shows that 56% respondents are engaged in interactions enabled by AI. 27% respondents have not yet interacted, while 17% respondents are unclear whether they have interacted with AI-enabled systems while

visiting digital stores or not. This explicitly indicates that now digital brand stores are increasingly trying to use AI techniques that can enable computers to understand human language and can engage in conversation.

Pie Chart 6

Which type of AI-interface do you utilize more often in digital brand stores?

100 responses



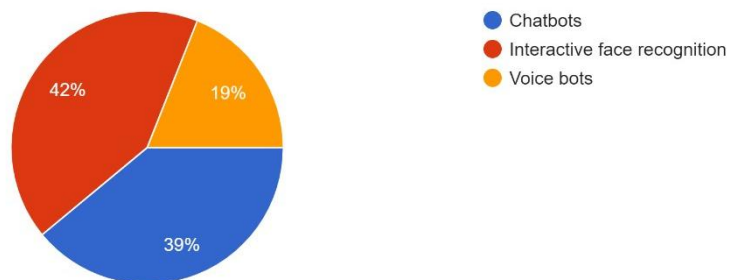
Pie chart 6 indicates that nearly 56% respondents use AI-enabled chatbots for communication, 27% use interactive face recognition services, while only 17% respondents use voice bots. The data reveals

that digital brand stores have designed various AI-interface to engage consumers fully in conversation in such a way that would be indistinguishable from human conversation.

Pie Chart 7

Which of the AI-interface would encourage you to revisit the brand's digital page?

100 responses



Pie chart 7 shows various AI-enabled interface that cajole respondents to revisit brand's digital

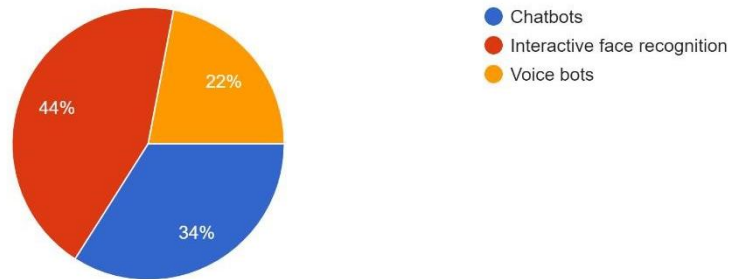
page. 42% respondents opted for interactive face recognition, 39% believe that chatbots are

better and 19% respondents believe that voice bots prompt them to revisit the brand’s digital page. The chatbots, interactive face recognition and voice bots are extremely important part of

artificial intelligence. The most interactive and modern AI-interface compel audience to increase the traffic in digital brand stores.

Pie Chart 8

Which AI- interface is more effective?
100 responses

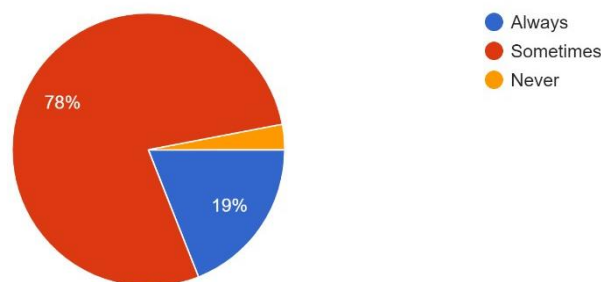


Pie chart 8 shows the preference of respondents in terms of effectiveness of various AI interface such as chatbots, interactive face recognition and voice bots. 44% respondents trust the effectiveness of interactive face recognition then chatbots

(34%) and voice bots (22%). The data indicates that incorporation of all the AI-interface can be more effective way to solve a wide range of consumer related issues and can provide mechanisms that can be at par with the changing conditions and concerns.

Pie Chart 9

How often do you think AI gives faster resolution of support issues than human representative in a digital brand store?
100 responses

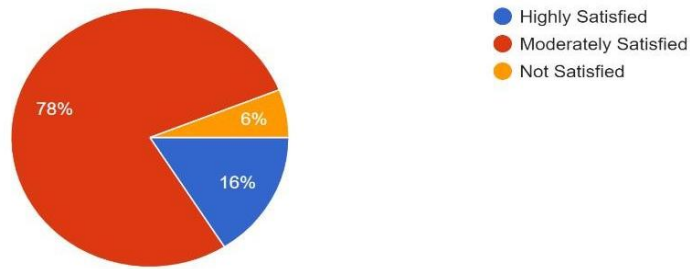


Pie chart 9 shows that 78% respondents believe that AI sometimes gives faster resolution than human representative in digital brand store, while only 19% respondents believe that AI always gives faster resolution. 3% respondents believe that human representatives give faster resolution than AI. The ability to deal with new situations, or existing problems and the ability to solve them are integral part of more complex AI system. The data shows encouraging figure,

howbeit AI-interface agents need to impel its performance in terms of faster resolution of simple or complex problems. Respondents believe that digital brand stores are trying to decrease the resolution time by enabling sufficient AI-processing power and by providing it with enough intelligence so that they can perform tasks on behalf of human agents.

Pie Chart 10

How satisfied are you with the AI-enabled interactions in digital brand stores?
100 responses

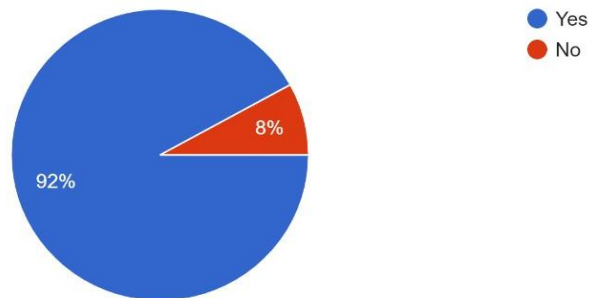


Pie chart 10 shows the level of satisfaction of respondents with AI-enabled interaction in digital brand stores. 78% respondents are moderately satisfied, 16% are highly satisfied and 6% and not satisfied. The data adduce that AI- enabled interactions is associated with a

level of credibility, quality and satisfaction. There is a higher level of satisfaction among consumers which in turn retains consumers and create a basis for future consociation with them.

Pie Chart 11

Do you see any benefits in these interactions powered by AI?
100 responses

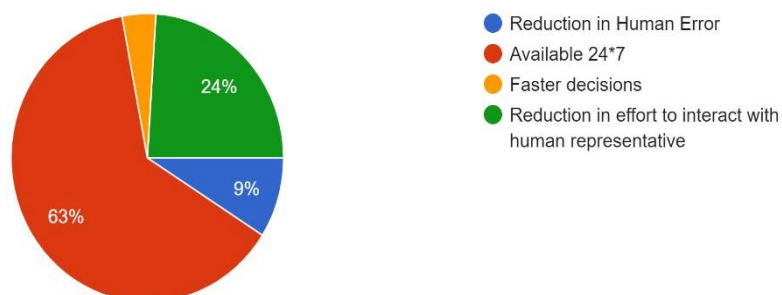


Pie chart 11 shows 92% respondents are increasingly becoming aware of the benefits in the interactions powered by artificial intelligence and 8% cannot see any advantages in applying evolutionary techniques of AI in brand’s digital platform. Customers will be

loyal to the brand as long as they recognize the value in an AI-enabled interaction. Furthermore, it will also generate future sales and revenue. This also indicates long term sustainability of the brand in the digital platform.

Pie Chart 12

What benefits do you get in AI-enabled interactions in digital brand stores?
100 responses

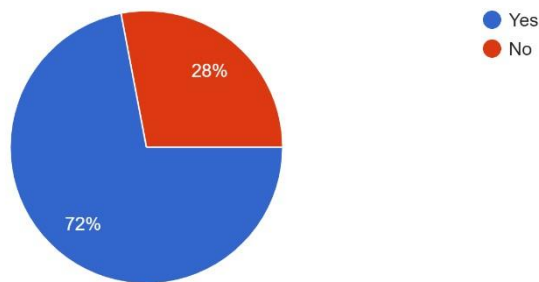


The way brands communicate to solve problems offer value proposition to the consumers. Pie chart 12 depicts that the focus of the most digital brands is now towards AI-enabled interactions that can provide assistance to the consumers 24*7. 63% respondents find AI enabled interactions beneficial because of its availability. 24% respondents feel that it is beneficial since it reduces effort to interact

with human representative. 9% respondents opted for reduction in human error and 3% believe that faster decision makes AI-enabled interactions easy and effective. This indicates that today’s consumers compare and contrast several factors that can ease their communication effort. New AI-waves surpass human factor, yet centres on dynamic and technical interaction in virtual world.

Pie Chart 13

Are there any limitations of using Artificial Intelligence in digital brand stores?
100 responses

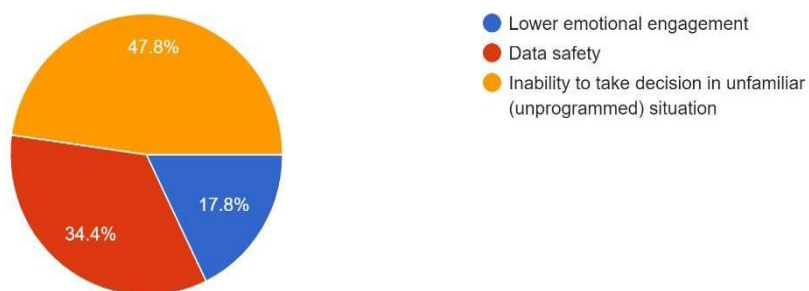


It is important identify various risks or limitations which may encounter in the performance of the AI program. Pie chart 13 indicate that 72% respondents agree that there

are limitations of using artificial intelligence whereas 28% respondents believe that there are no limitations to AI-enabled services offered by the digital brand stores.

Pie Chart 14

If Yes, what bothers you the most about using AI in digital brand store?
90 responses

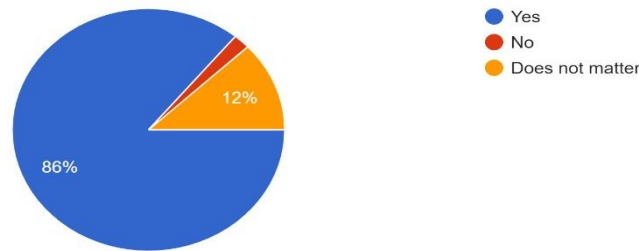


Pie chart 14 enumerate the limitations of using AI in digital brand stores. 48% respondents believe that AI-enabled systems cannot take decisions in unfamiliar or unprogrammed situation. 34% respondents are concerned about their data safety, while 18% mentions that lower emotional engagement with AI

restricts consumer’s engagement with brand. Though consumers want to reduce the effort to interact with human representative yet they want to build interactive environment. Perhaps the effort of creating AI with emotional intelligence and affectionate expressions can increase its heuristic value.

Pie Chart 15

Do you feel that digital brand stores should aware customers when enabling interactions via AI?
100 responses

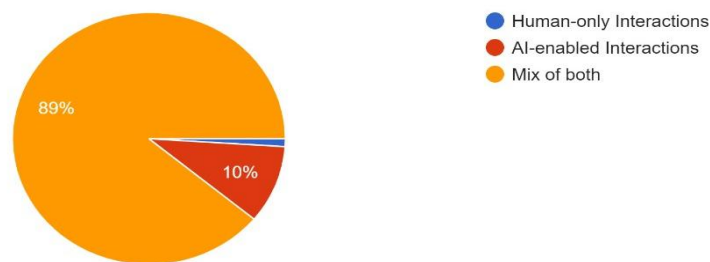


There is a common practice to formally introduce a human agent before engaging in a conversation for a brand's product or services. Similarly, almost all consumers prefer a formal introduction of AI agent in chatbots or voice bots. 86% respondents want digital brand

stores to aware customers when enabling interactions via AI. 12% says it doesn't matter till the issues are being resolved and only 2% categorically mentioned that they don't want brands to inform them before enabling interactions with AI-enabled system.

Pie Chart 16

What type interaction would you prefer in digital brand stores?
100 responses



Pie chart 16 indicates the preference of consumers in terms of which interaction they believe could be better. 89% respondents want integration of both AI-enabled as well as human managed interactions. 10% respondents want only AI-enabled interactions while only 1% respondent want human-managed interactions. This suggest that a collaboration of AI and human agent can be useful in managing a great deal of information as well as solve problems, make decisions, draw conclusions and carry out other intelligent tasks.

Conclusion

The data indicates that awareness related to artificial intelligence among consumers is dramatically increasing. However, they are many people who are still unfamiliar with the utility and functionality of artificial intelligence in the digital platforms. It is evident from the data that despite deficit in understanding the AI- algorithms, consumers

are still conscious of the prevalence of artificial intelligence in digital brand stores. Perhaps, consumers are becoming increasingly aware about the usage of AI in digital brand stores to increase customer experience. The data also indicates that now digital brand stores are increasingly trying to use AI techniques that can enable computers to understand human language and can engage in conversation. Digital brand stores have designed various AI-interface to engage consumers fully in conversation in such a way that would be indistinguishable from human conversation. The chatbots, interactive face recognition and voice bots are extremely important part of artificial intelligence. The most interactive and modern AI-interface compel audience to increase the traffic in digital brand stores. The data indicates that incorporation of all the AI-interface can be more effective way to solve a wide range of consumer related issues and can provide mechanisms that can be at par with the changing conditions and concerns.

Howbeit, AI-interface agents need to impel its performance in terms of faster resolution of simple or complex problems. Respondents believe that digital brand stores are trying to decrease the resolution time by enabling sufficient AI-processing power and by providing it with enough intelligence so that they can perform tasks on behalf of human agents. AI-enabled interactions is associated with a level of credibility, quality and satisfaction. There is a higher level of satisfaction among consumers which in turn retains consumers and create a basis for future consociation with them. Customers will be loyal to the brand as long as they recognize the value in an AI-enabled interaction. Furthermore, it will also generate future sales and revenue. This also indicates long term sustainability of the brand in the digital platform. The way brands communicate to solve problems offer value proposition to the

consumers. Today's consumers compare and contrast several factors that can ease their communication effort. New AI-waves surpass human factor, yet centres on dynamic and technical interaction in virtual world. Though consumers want to reduce the effort to interact with human representative yet they want to build interactive environment. Perhaps the effort of creating AI with emotional intelligence and affectionate expressions can increase its heuristic value.

There is a common practice to formally introduce a human agent before engaging in a conversation for a brand's product or services. Similarly, almost all consumers prefer a formal introduction of AI agent in chatbots or voice bots. A collaboration of AI and human agent can be useful in managing a great deal of information as well as solve problems, make decisions, draw conclusions and carry out other intelligent tasks.

References

1. Aneja, U., Mathur, V., Chamuah, A., Reddy, A., Ghildiyal, H., & D'Cunha, J. (Eds.). (2020). AI on the ground: A snapshot of AI use in India. Tandem Research. https://tandemresearch.org/assets/AI_Landscape1-11.pdf
2. Campbell, C., Sands, S., Ferraro, C., Tsao, H.Y.J., & Mavronmmatis, A. (2020). From data to action: How marketers can leverage AI. *Business Horizons*, 63 (2), 227-243. https://www.researchgate.net/publication/338290896_From_data_to_action_How_marketers_can_leverage_AI
3. Coppin, B. (2004). *Artificial Intelligence Illuminated* (Jones and Bartlett Illuminated). Jones & Bartlett Learning.
4. Daniel Adiwardana, Minh-Thang Luong, David R So, Jamie Hall, Noah Fiedel, RomalThoppilan, Zi Yang, ApoorvKulshreshtha, Gaurav Nemade, Yifeng Lu, et al. 2020. Towards a human-like open-domain chatbot. arXiv preprint arXiv:2001.09977
5. Earley, S., & Davenport, T. (2020). *The AI-Powered Enterprise: Harness the Power of Ontologies to Make your business smarter, faster and more profitable*. LifeTree.
6. Kanna, P. V., & Bernoff, J. (2019). *The Age of Intent: Using Artificial Intelligence to Deliver a Superior Customer Experience*. Amplify.
7. Klaus, P. and Zaichkowsky, J. (2020). AI voice bots: a services marketing research agenda. *Journal of Services Marketing*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/JSM-01-2019-0043>
8. McCarthy, J., et al. A proposal for the Dartmouth summer research project on artificial intelligence. *AI Magazine*, vol.27, no. 4 (2006).
9. Quinlan, J.R. Induction of decision trees. *Mach Learn* 1, 81-106 (1986).
10. Rada, R. (1986). *Artificial Intelligence*. *Artificial Intelligence*, 28(1), 119-121.
11. Sidaoui, K., Jaakkola, M., & Burton, J. (2020). AI feel you: customer experience assessment via chatbot interviews. *Journal of Service Management*, 31(4), 745-766. <https://doi.org/10.1108/josm-11-2019-0341>

POSTCOLONIALISM, GLOBALIZATION, AND RESISTANCE: THEORETICAL AND LITERARY PERSPECTIVES

Syed Farkhanda Suman and Shafayat Hussain

Department of English, CT University, Ludhiana (Punjab), India

ABSTRACT

Postcolonial theory emerged as a field of inquiry to analyse the inequalities between East and West brought about by colonialism. Currently postcolonial theory can prove to be a powerful tool for retrospection of political, economic and cultural relations of the world. This retrospection is imperative since the relations between these two parts of the world are still characterised by inequalities which have been exacerbated by globalisation. Globalisation has been problematised by postcolonial scholars like Sanskara Krishna and Robert Young as it has intensified certain issues which can be situated within the postcolonial framework. These include new forms of colonialism and essentialising discourses reinforcing the east/west divide. These are also the major contributors of refugee crisis for being highly prevalent in the postcolonial states. Apart from this, there are intricate connections between these issues which are important to understand Refugee Crisis particularly in Syria. The aim of this paper is to analyse Atia Awabi's "A Land of Permanent Goodbyes," from postcolonial perspective. It is a refugee novel and highlights the impact of war, migration, and displacement on people. By exploring these postcolonial issues in the novel, the relevance of postcolonial theory to study refugee novels can also be realised.

Keywords: Globalization, Resistance, Colonialism, Refugee crisis, war, migration

Introduction

Colonialism and globalisation are two completely different phenomenon nonetheless both of them are known to shape the world relations in their respective eras particularly between east and west. Besides the imbalance of capital and power created by globalisation suggests its intricate connection with colonialism. Postcolonial theory developed as a multidisciplinary approach during the latter half of 20th century to examine the consequences of European colonialism on its former colonies. It focused on the economic, political, and cultural inequalities brought about by the exploitation of native peoples by colonial powers. In the current world, the inequalities have increased drastically due to the uneven distribution of capital across the world by globalisation thereby also increasing the relevance of postcolonial theory. Postcolonial theory can prove to be an important tool for the retrospection of the complex economic, political and cultural relations of the world. This retrospection is imperative because the current world relations are shaped by the enduring legacy of colonialism. According to Robert Young (2003), today's world is characterised by inequalities and much of the difference is found between Western and non-western countries. This sharp line of divide between

these two parts of the globe was reinforced in the 19th century when European empires expanded their influence and gained control over much of the world (p.2). In today's world the inequalities between developing and developed countries have been exacerbated by globalisation. In fact, the very idea of globalisation is rooted in capitalist development which in turn is related to the colonial domination of non-western countries by West. Robert Young (2012) argues that the end of postcolonial theory could only be determined if colonialism and imperialism cease in all forms, but as we see the lingering effects of imperial, colonial, and neocolonial rule persist in present times, postcolonial theory also remains as an important tool to examine these effects (p.20). Therefore, According to Young (2012), postcolonial theory "has abandoned its former narrow national focus to turn to an interest in globalization in the present" (p.22). Postcolonial scholars maintain that Western states continue to exert power and influence on their former colonies even after the formal end of colonialism although in different forms. This neocolonial power is exerted through economic, political, and cultural means, which create and reproduce global inequalities. (McGlinchey et al. 2022.p.1). According to Anne Norton (2015), Postcolonial theory aids in understanding the

condition of nations, peoples, and individuals after the achievement of political independence from their colonial rulers. She argues that the newly independent states of Africa, Asia, the Middle East, and the Caribbean did not achieve true independence. Instead they remained intellectually, culturally, and economically bound to their former colonial overlords. This is due to the fact that their social, economic, political and educational institutions and systems were shaped and guided by their colonisers. Postcolonial theory recognizes that the formal end of colonial authority, government and institutions did not put an end to the power dynamics of domination and subordination that were present during colonial rule (p.1). In fact, after the end of classical European colonialism in these states the notion of internal colonialism and neo-colonialism emerged. Postcolonial theory therefore becomes significant in studying the forms of colonialism that are persistent and continue to define the current relations between Western and non-Western people. In this context the interest Postcolonial theory lies in the shapes of neocolonial domination (Phillips, 2016, p. 1) According to Edward Said (1978), the pioneer of postcolonial theory, the cultural attitudes and assumptions of the colonizers towards the colonized which he called orientalism played a key role in justifying and continuing colonialism. Orientalism portrayed East as backward, degenerate, uncivilized, and retarded and led to a sense of superiority among west which they used to justify the subjugation and domination of the east. (p. 207). Orientalism therefore, created the cultural domination intertwined with political domination during colonial era. Today globalisation has increased the cultural domination manifolds with the economically developed and dominant nations setting the standards/models against which all other nations are being evaluated. Ironically it is again the western culture which has been homogenised and is dominating the non-western world. Apart from increased homogenization of western culture, globalisation has led to the accumulation of wealth and resources in the possession of dominant groups. This has resulted in the marginalization and destitution of subordinate

groups/communities and has contributed to the rise of internal colonialism in postcolonial states. According to Sanskara Krishna (2009), the dominant narratives have led the world to associate modernisation with civilization, development, and progress which at times becomes repressive and domineering when used by elites of nation-states in the third world postcolonial states. These elites of nation-states sometimes may use the concept of this so-called modernization to defend their rule and take privilege in perpetuating cultural domination over their own people. Modernization as such becomes a technique to continue oppression and maintain dominance within a nation-state by its elites (p.4). Furthermore, in return for access to resources and key military bases, the powerful countries support dominant groups, especially in the Middle East, through their neocolonial policies. This may enable powerful dominant groups to marginalise and oppress weaker groups and stifle dissent and resistance. The local communities in different parts of the world view globalisation as a threat to their socio-cultural values by means of its contribution to the political and cultural hegemony of the west. Consequently, it has resulted in hostility against Western culture as the people in non-western countries prefer their own cultural values and practices. This hostility or rejection of western culture with an urge to foster their own cultural and national values has been referred to as Occidentalism by some. It is kind of reverse image of Orientalism. The present paper will highlight certain postcolonial constructs which are unresolved till date and in fact have grown tremendously during the last two decades of twenty-first century particularly in the wake of globalisation. These include neo-colonialism, internal-colonialism, neo-orientalism and Occidentalism. The paper will explore how all of these phenomena which ordinarily appear distinct from each other are intricately related and reinforce each other. Apart from this they particularly attract the attention when it comes to understanding the contemporary refugee crisis from postcolonial perspective. Since this study involves the exploration of Syrian refugee crisis it will help to comprehend the above-mentioned issues as postcolonial

constructs and their relevance in understanding this Crisis with a particular emphasis on Atia Awabi's novel "A Land of Permanent Goodbyes". The paper will conclude by showing interrelation between these concepts and how this interconnectedness is central to understanding the unequal power dynamics in a globalized world.

Globalisation

Globalisation is normally perceived as a process which makes people more connected and interdependent. According to Ashcroft et.al (2007). "globalisation is the process by which local communities and people's daily lives are impacted by forces that work on a global scale in the economic and cultural spheres (p.100). Postcolonial theorists have problematized the notion of globalisation by questioning the new power dynamics it has created leading to indirect forms of colonialism. This view is based on the fact that capitalist development and colonial conquest or domination occurred simultaneously and were closely intertwined historical phenomena. According to Sanskara Krishna (2009) "if globalization is the reigning or hegemonic ideology in the world today, Postcolonialism, at its best, constitutes one of its main adversaries or forms of resistance to its sway" (p.2). Globalization is readily understood as a part of the ongoing history of imperialism, in fact, of capitalist development and expansion from a postcolonial perspective (Akoh,2010, p. 163). Ashcroft et al. (2007) argue that the views on globalization among analysts vary. While some analysts see globalisation as a way to benefit local communities by giving them access to markets, technology, and information services, ultimately bringing about universal prosperity, peace, and freedom, others see it as a way for wealthy nations to dominate least wealthy ones, erasing cultural and societal differences, and further integrating local economies into a global capitalist system. Critics contend that globalisation does not evenly affect all communities and originates from capitalist centres of power. Globalization is significant for post-colonial studies because it shows how Western imperialism has left a lasting framework of global power relations (p.101).

Internal colonialism

Internal colonialism is a term used to describe the relationship between two groups of individuals within a single nation-state in which one group (the dominant group) exercises authority and control over the other group (Subordinate group). The superordinate group frequently exploits and subjugates the subordinate group in order to further its own interests in such relationships. In other words, Internal colonialism depicts "intranational" (Casanova 1965, p. 27) exploitation of heterogenous/subordinate groups within a nation state. The term "internal colonialism" was first used in the 1960s by scholars and activists in the United States to refer to the historical and continuing oppression of African Americans, Native Americans, and other marginalised groups within the nation (Gutiérrez, 2004, p.1). The origin of the idea of internal colonialism can be traced as far back to 1850's when African American activists Martin Delany and Frederick Douglass coined the phrase "nation within a nation". Lenin (and subsequently Gramsci) used the term "internal colonialism" in 1899 to refer to the in-country subordination of regions to one another (Pinderhughes, 2017, p.1).

In current times the concept of Internal colonialism has become increasingly relevant for analysing economic, social and political inequalities among various regions and ethnic groups, particularly in the context of global capitalism. There has been a growing recognition that global capitalism has exacerbated economic and social inequalities both within and between countries (Dey, 2015, p. 2). As a result, weaker communities have been oppressed and marginalised, natural resources have been exploited, and a small global elite has accumulated wealth. Internal colonialism therefore, has become a useful tool for analysing these developments, particularly in the context of the ways in which global capitalism has contributed to the marginalization and exploitation of certain regions and ethnic groups.

The term Internal colonialism may also be applied to the exploitative relationship between the authoritarian ruling class and their subjects (Safi,). This exploitative relationship between the government and the public is mostly seen

in the former colonies of Europe particularly middle eastern and north African countries. It naturally points toward the fact that some traces of colonialism are persistent and lingering in these postcolonial states. In fact, the reason for using the term colonialism for this kind of relationship is that it likens to colonial forms of exploitation of the subjects. According to Alam & Purakayastha, (2019) the postcolonial state has failed to empower its subjugated populations and has continued the legacies of repression and authoritarianism from colonial rule. Power dynamics were shifted through electoral battles and pre-existing power structures were never completely overthrown. This led to mutinies and violence in postcolonial nations, causing severe traumas and injuries to the citizens (p.15). According to Casanova (1965) "with the disappearance of the direct domination of foreigners over natives, the notion of domination and exploitation of natives by natives emerged" (p.27). Emerson claims that the end of colonialism resolves the issues brought on by foreign dominance but domestic oppression of some groups by others persists and can sometimes be even worse than earlier colonial rule. Hoselitz argues that the higher classes, including many government intellectuals, who are willing to manipulate the unprotected masses in a manner similar to that of the foreign masters whose authority they have overthrown, are responsible for this oppression. (cited in Casanova, 1965, pp.27-28) Young (2012) has also used the term "deep colonialism" (p.25), to refer to the continued domination and exploitation of individuals by their leaders in newly independent nations.

Neo-colonialism

The after effects of World War Two and the frequent uprisings in colonies that sought independence posed significant challenges for the colonial powers to continue their direct rule. As a result, they were forced to grant these countries their freedom. The colonial period had considerably drained the wealth and resources of these colonies, which meant that they had to rely on their former colonizers, particularly in terms of economic support, creating a situation where the colonizers still held significant influence over these newly

independent countries. (Figler, 2016, pp. 1-5). This new relationship based on indirect control of the former colony by its coloniser was termed as **Neo-colonialism** by Kwame Nkrumah, the first president of Ghana in his *Neo-Colonialism: The Last Stage of Imperialism*. Nkrumah (1965), defined the neocolonial condition as: "modern attempts to perpetuate colonialism while at the same time talking about 'freedom' (p.41). According to Ashcroft (2015), Ghana continued to be influenced by former colonial powers as well as burgeoning superpowers like the United States even after attaining freedom. Through a variety of means, including international monetary organisations, multinational corporations, and cartels that manipulated prices in global markets, these external forces exercised control over Ghana's cultures and economies. NGOs involved in culture and education also contributed to Ghana's indirect influence (pp, 4-5). Therefore, neo-colonialism is an imperial practise founded on former colonies' political, economic, cultural, and psychological reliance on the institutions of the colonial masters (Nwachuku, 2016, p. 1). According to Ashcroft (2015), In reality, Nkrumah argued that neocolonialism was subtler and challenging to recognise and resist than the direct control practised by classic colonialism. Neo-colonialism is a term that the authors use to describe the dependency of developing countries on more developed nations in the situation at hand. The term has recently become more closely associated with the position of the United States, a new superpower whose expansionist past and present, it is argued, constitutes a new form of imperialism. (p.4). Ashcroft also asserts that those who see the rise of capitalism after the fall of the Soviet Union as a continuation of earlier forms of imperial rule are the ones who are most worried about globalisation. The ongoing dominance of a globalised capitalist economy, which is primarily affiliated with the United States, over developing countries, is referred to as "neo-imperialism" rather than "neo-colonialism" because the United States is frequently seen as a representative of neo-liberal capitalism (p.147). Since then, the phrase has been extensively used to describe all

manners of control over the former colonies following political independence.

Neo- orientalism

Before discussing neo-orientalism, it is important to shed some light on Orientalism. The term Orientalism was first introduced by Edward Said in his ground-breaking work with the same name "Orientalism" published 1978. It is considered as key postcolonial text as it initiated the development of postcolonial theory. According to Said, Orientalism refers to a set of assumptions, practices, and representations that create a divide between the West and the East, simplifying and generalizing about the East and justifying Western power and domination over the region. Orientalism is characterized by a focus on the exotic and the unfamiliar aspects of Eastern particularly Muslim and Arab cultures, which are often presented as static and unchanging. Orientalism is also characterized by a tendency to simplify and generalize about the Arab world, reducing complex cultural and historical phenomena to simplistic stereotypes. This approach often ignores the diversity and complexity of the region, treating it as a homogenous and uniform entity. The stereotypes and simplified views of the Muslims/Arabs created by Orientalism have been used to justify colonialism, imperialism, and other forms of political and economic domination over the region (pp. 152- 155).

It should be noted here that following the tragic events of 9/11, the conversation surrounding Muslims and Arabs underwent a significant shift. A new form of discourse developed in which rather than being viewed as simply backward or uncivilized, Muslims were now often portrayed as violent and threatening. This discourse is referred to neo-orientalism and is more of an American creation that classical Orientalism which according to Edward Said was a European invention. Therefore, the term "neo-Orientalism" refers to a modern revival or continuation of Orientalist perceptions and attitudes towards the Middle East and North Africa region, especially in the wake of the 9/11 attacks and the ensuing "war on terror" launched by the United States. It includes the use of stereotypical and essentialist representations of Muslims and Arabs as

primitive, violent, and irrational, as well as the portrayal of the region as a whole as being innately hostile to the West and modernity. According to Altwaiji & Alwuraafi (2021) many academics contend that neo-orientalism is a synthesis of American cultural and imperial practises through which neo-colonial outlines are created; it is an imperial discourse in which politics and literature are tightly intertwined (pp. 4-5).

Occidentalism

The term Occidentalism describes the ways in which non-Western cultures and societies understand, represent, and relate to the West. It is characterised by a variety of cultural, political, and historical factors that shape non-Western understandings of the West. Occidentalism can take many forms, ranging from fascination and emulation to rejection and resistance. It is a matter of fact that any discourse aimed at disapproving other civilisations or communities will attract opposite discourse with a similar aim. According to Wang (1997), any overemphasis on a national or regional culture's supremacy could result in new cultural conflicts (p. 63). Occidentalism in this sense can be seen as a revolt against Orientalism or Western perception of East. It usually tries to present a counter image of the west in a similar way that west has created of the east. According to Abdullah Metin (2020) Occidentalism is the reverse of Orientalism, i.e., just like Orientalism is a Western interpretation of the East, Occidentalism is a Eastern interpretation of the West (p.181). It should be noted that Occidentalism is a loosely conceived idea and is not characterised by a consensus among scholars. Therefore, some scholars have dismissed the term Occidentalism and prefer to use Orientalism-in-reverse for this countermovement.

Wang (1997), argues that the manifestation of Occidentalism varies from place to places. In regions where Islamic cultures are prevalent, such as Middle Eastern and Arab nations, Occidentalism takes on a confrontational character, actively opposing Western control, particularly embodied by the United States, and may even lead to violent confrontations and significant armed conflicts. From the

perspective of the Orient, this form of Occidentalism is marked by anti-colonial and anti-hegemonic tendencies. As a result, Occidentalism is seen as a "decolonizing" and anti-colonial discourse that aligns with local decolonizing movements, in contrast to Orientalism. (p. 62-63). Occidentalism, according to Sadiq Al Azam (1981), is Orientalism in reverse. He claimed that both ideologies are historical phenomena of the post-World War II era. It has its roots in the anti-colonial and anti-imperialist movements of the 20th century and was a response to the colonialist tactic of imitation, or that "authorised version of otherness" (p.58). Ian Buruma and Avishai Margalit (2004), in their book *Occidentalism: The West in the Eyes of Its Enemies* refer to Occidentalism as "the dehumanizing picture of the West painted by its enemies" (p.5). They are the two most prominent persons who consider Occidentalism as a hostility against the West. The form of Occidentalism which is characterized by a hatred or rejection of the West and its values is rooted in the idea that the West represents a cultural and political 'Other', that is seen as fundamentally different from, and in opposition to, non-Western cultures. From this perspective, Occidentalism is a form of cultural nationalism, in which non-Western cultures assert their own cultural identity and resist Western cultural domination. It is also important to note that not all forms of Occidentalism are not rooted in hatred or rejection of the West. Some forms of Occidentalism are characterized by a fascination with the West, and a desire to emulate Western cultural elements and practices. In these cases, Occidentalism is not necessarily a rejection of the West, but rather a desire to be part of it (Metin,2020, p.190).

It must be noted that Occidentalism and Orientalism are examples of essentializing tendencies where Western and Eastern cultures respectively are depicted in homogenized and reductive ways, which can lead to a number of problems. Wang believes that promoting Occidentalism and treating it as an alternative to Orientalism is not a good idea currently as no culture is capable of replacing another culture, even if it is very influential. This is because national coexistence and cultural

exchange have become inevitable trends in history

Syrian Refugee Crisis

The Syrian Civil War is a conflict that began in 2011 as a result of widespread protests against the government of President Bashar al-Assad. The protests were part of the wider Arab Spring movement and were fuelled by anger over government corruption, repression, and a lack of economic opportunity. The government's violent response to the protests sparked a civil war that has since drawn in numerous regional and international actors, including the United States, Russia, Iran, and various Islamist militant groups. The conflict has resulted in a massive humanitarian crisis, with millions of people displaced from their homes and hundreds of thousands of deaths. It has also created a power vacuum that has allowed extremist groups like the Islamic State to establish a foothold in the country. The war has been marked by widespread atrocities, including the use of chemical weapons against civilians, and the targeting of medical facilities and personnel (Britannica,2019).

The Syrian Civil War highlights the lingering effects of colonialism and imperialism on the region. Postcolonial theorists hold that colonialism has left a legacy of economic, political, and cultural domination in the form of entrenched authoritarian regimes in the Global South, including the Middle East. Lava Assad (2019), argues that independence from colonial powers did not free the nation from the colonial continuum (p.31). In fact in Syria colonialism has resulted in the accumulation of wealth and power in the hands of the Alawites (a small minority), which dominates the Syrian government leaving the majority of the population marginalized and without a voice in the political process. The Syrian government, has been accused of using its military and security forces to oppress and discriminate against the country's majority Sunni population. The suppression of its own people by authoritarian regime using colonial power policies in a postcolonial state like Syria is a manifestation of internal colonialism. This has contributed to the widespread anger and frustration that fuelled the initial protests against the government (Safi,2015). According

to Young (2012), "The civil wars and the often-continuing civil unrest that, in many cases, followed independence have often been the product of the nationalist creation of a deep colonialism" (p.25).

In addition to this the influence of outside powers in Syria have complicated the efforts to find a peaceful resolution to the conflict and have contributed to its prolongation. In fact, the foreign countries mainly the United States and Russia, have been accused of pursuing their own interests in the country and supporting various factions in the conflict. The involvement of external powers in the conflict can also be seen as a continuation of colonial and imperial interests in the region. The U.S. and Russia, for example, have used the conflict as an opportunity to advance their strategic interests in the Middle East, further exacerbating the crisis and perpetuating regional instability (Charap,2013, pp. 35-36). The Syrian war has turned into a proxy war which is a direct manifestation of neocolonialism, as external powers and interests have played a significant role in shaping the outcome of the conflict by continuing the economic, political, and cultural domination in the country (Hillstorm, 2015,pp.2-4). Assad (2019), believes that the Arab Revolution required a rebellion against not only the authoritarian governments, but also against a pervasive system of worldwide neo-colonialism and capitalism (p.31).

According to Douglas Garrison (2016), the Arab world's history with colonialism and anti-colonialism is complex and extensive. Though European colonialism ended in Arab countries the remnants of colonialism persist in various aspects such as economic pressures, cultural exports, Cold War politics, and US foreign policy. Western powers never stopped to interfere in socio-political affairs of the Arab world, leading to movements like Islamist groups challenging Western influence. These groups aim to restore Arab and Islamic values and traditions that they believe have been threatened by Western colonialism and cultural imperialism. The consequences of colonialism include political instability, economic inequality, and cultural homogenization. Arab nations struggle to balance their cultural and

political identities with the pressures of globalization and Western influence (p. 7).

In fact, some scholars have argued that the rise of ISIS is rooted, in part, in a sense of resentment and rejection of the Western domination in the region. Nafisa Abdulhamid (2017), argues that 'IS' is projecting a reversed version of (neo)Orientalist discourses that view Western values as incompatible with the true nature of Islam. This reversed image is termed as Orientalism-in-reverse and is problematic as it reinforces (neo)Orientalism and allows IS to thrive in the region. ISIS is also determined to demolish the Iraq-Syrian border, which they believe is an artificial construct resulting from the Sykes-Picot agreement in 1916. They view its destruction as the trigger for the end of the modern-state system, which was imposed by colonial powers after the First World War. (pp, 1-12). It should be noted while the legacy of colonialism and ongoing Western intervention in the Middle East have certainly contributed to the rise of ISIS, the group cannot be reduced to a simple anti-colonial struggle. Rather, the rise of ISIS is the result of a complex interplay of historical, political, economic, and cultural factors.

A Land of Permanent Goodbyes

"A Land of Permanent Goodbyes," is a refugee novel by Atia Awabi which examines the themes of migration, displacement, and the human cost of war and conflict. It offers a postcolonial viewpoint on the effects of political and economic exploitation and the aftermath of colonialism through its depiction of refugees fleeing conflict in the Middle East. The characters' experiences shed light on how political and social institutions influence people's lives and communities. Awabi challenges popular misconceptions about immigration and poses significant queries about the obligation of the international community to those impacted by conflict and displacement by providing a nuanced and humanising portrayal of refugees.

The events of the novel narrated by destiny unfold in the year 2015 when the war in Syria has crumbled the whole country. The novel's protagonist Tareq bids seemingly permanent goodbye to his homeland after his house is bombarded killing most of his family members

and starts his journey as a refugee with his father and baby sister, his only surviving family members.

The novel makes it clear that the ordinary Syrian is not involved in the conflict there. The family of Tareq is very modest and humble, and they play no part in the war that has engulfed Syria. However, the Syrian conflict upends their entire universe. The novel addresses the ways in which the West and its governments have failed to address the refugee crisis instead perpetuating a system of domination and exploitation that forces the innocent people out of their homes. Through the experiences of its protagonist Tareq the novel highlights how colonialism in its entrenched forms has created instability and led to destruction of one of the oldest civilisations of the world. It highlights the impact of this geopolitical war between intra and interstate powers on the lives of ordinary Syrian people and how they are forced their homelands and become undesired individuals of the world. Hughes claims that the Syrian civil conflict is turning into a "proxy war," with both the government and rebel groups looking to outside powers for assistance. These external powers can pursue their foreign policy goals through proxy conflict without having to endure the financial and human costs of direct military involvement.

In the novel, this is how Tareq's cousin Musa describes the whole situation of Syria to him.

"This is the city of the walking dead. Even in the areas that still have people in them—they're not living, they're just surviving.....It feels like our whole country is living in an alternate reality. You've got Russia, Assad and even America in the air, and Daesh, the Free Syrian Army and militias on the ground.....this city has been taken over by the world. (p.49).

The above lines from the novel suggest that the city is a site of neocolonial and internal colonial struggles, where external and internal forces have combined to create a situation where the city's inhabitants are struggling to survive and maintain their autonomy. The description of the city as being taken over by the world implies that there is a lack of

sovereignty or control over the city's affairs. This lack of control can be seen as a consequence of neocolonialism, where external powers exert their influence on a nation's economic and political affairs, often to their own benefit. The novel depicts that external powers such as Russia and America are all involved in its affairs, suggesting a lack of autonomy and self-determination. The mention of Assad suggests internal colonialism, as his government (superordinate Alawaite group) exploits and oppresses the (subordinate) Sunni population. The city's inhabitants are struggling to survive due to the actions of both external and internal forces, such as militias and the Free Syrian Army.

Apart from this, Daesh or ISIS has been openly criticised for perpetuating violence and instability in the Syria. They have forcefully taken possession of the certain regions of Syria and impose their own brutal laws which are threatening the lives of ordinary citizens in the novel. In the novel, Daesh or ISIS has been openly criticised for perpetuating violence and instability in the Syria. They have forcefully taken possession of the certain regions of Syria and impose their own brutal laws which are threatening the lives of ordinary citizens in the novel. The novel also shows how ISIS's actions have a significant effect on the region's cultural and religious identity, with the organisation portrayed as trying to impose its own twisted interpretation of Islam on the local populace. This is demonstrated by the struggles the main character and other characters face adjusting to life in a society where their religious and cultural customs are under threat. The ideology of ISIS in the novel characterises the extreme form of Occidentalism as it outrightly portrays hatred and animosity of Daesh against west in every action of theirs in the region. For them anything which is western is anti-Islamic and therefore deserving to be destroyed. An example of this from the text is given below wherein one of the characters in the novel warns another against daesh.

You really are an idiot if you don't know how much Daesh hates jeans" "They symbolize the West to them." (37)

Conclusion

The postcolonial theory is highly relevant today as the issues discussed in this paper viz, internal colonialism, neo-colonialism, neo/Orientalism and Occidentalism remain unsettled till date and are of a growing concern. Its relevance can also be justified as these issues are highly prevalent in the postcolonial states particularly middle east thereby pointing towards the enduring legacy of colonialism. Besides these issues have been explored here due to their shared historical roots and the ways in which they relate to power dynamics between the West and non-Western societies particularly Middle East and North African countries. The West particularly United States has created a neo-orientalist discourse primarily to justify and perpetuate its neo-colonial policies in the middle east. Neo-colonialism at the same time is intertwined with internal-colonialism as both of these phenomena contribute to maintaining the power and control of developed countries over developing countries. The connection between neo-colonialism and internal colonialism can be thought of as being reciprocal as on one hand the colonial masters aided in installing the authoritarian regimes in these nations by raising their power in order to maintain their control (neocolonialism) over the region. On the other hand, these governments procure the assistance of foreign powers in order to exert and uphold control over their own people (internal colonialism). Occidentalism, at the same time is a critical perspective that seeks to challenge and resist the neo/orientalist discourse. It can be broadly viewed as a resistance against neo-orientalism, neo-colonialism and internal colonialism which are threatening the local socio-cultural values. According to Ashcroft, the new elites who came to power after independence and were often educated and trained by the colonial powers, were not representative of the people and acted as agents for the former colonial rulers, either knowingly or unknowingly. This term, known as "compradors," has come to signify the inability of developing economies, previously known as Third World economies, to establish their own independent economic and political identities under the pressures of

globalization. In this perspective, Occidentalism is the main adversary against the western hegemony and highhandedness particularly America exacerbated by globalisation. These postcolonial issues which are interconnected by their common history related to colonialism are central to understanding the unequal power dynamics in a globalized world.

Besides all of these phenomena have contributed to the development of new forms of power structures in the current times and Syrian refugee crisis is a clear manifestation of this power dynamics. *A land of Permanent Goodbyes* provides a powerful postcolonial critique of the ongoing impact of internal colonialism, neo-colonialism, neo/orientalism and orientalism in reverse discourse on the people of Syria. By focusing on the experiences of refugees and the human cost of war and conflict, the novel offers a nuanced and compassionate view of those affected by the war and raises important questions about the responsibilities of the global community.

It should also be noted that here that neo/Orientalism and Occidentalism both rely on essentialism because they perpetuate stereotypes and oversimplifications about Eastern and Western cultures, respectively. Orientalism essentializes Eastern cultures as exotic, mystical, and inferior to the rational, scientific, and progressive West. It assumes that all people from the East share a fixed set of traits and characteristics that distinguish them from the West. Occidentalism, on the other hand, essentializes Western cultures as arrogant, materialistic, and lacking in spirituality or tradition. It assumes that all people from the West share a fixed set of traits and characteristics that distinguish them from the East. By reducing complex and diverse cultures to a set of fixed and unchanging characteristics, Orientalism and Occidentalism reinforce harmful stereotypes and perpetuate cultural misunderstandings. It should also be understood that Edward Said while criticising orientalist discourse actually dismissed all forms of essentialisms and outrightly said that "I hope to have shown my reader that the answer to Orientalism is not Occidentalism (328).

References

1. Ph.D. Thesis: Abdulhamid, N. (2017). The Islamic State in Context: A Postcolonial Approach to Understanding of Its Emergence in Iraq and Syria. ERA.
2. Research Paper: Akoh, A. D. (2010). What is Globalization to Post-colonialism? An Apologia for African Literature. *Journal of Global Initiatives: Policy, Pedagogy, Perspective*, 3(2), 163-175.
3. Research Paper: Alam, M., & Purakayastha, A. S. (2019). Globalectics of the Border-Subaltern: Postcolonial Justice in a Time of Crisis Diaspora. *Postcolonial Interventions*, 4(2).
4. Research Paper :Al-Azm, S. J. (1981). Orientalism and Orientalism in Reverse. *Khamsin, Journal of the Revolutionary Socialists of the Middle East*, 8, 6-25.
5. Research Paper : Altwaiji, M., & Alwuraafi, E. (2021). The Fallacy of Neo-Orientalism and the Risk of Imperialism: How American Politics Mobilize Novelists. *International Critical Thought*, 11(3), 424-438.
<https://doi.org/10.1080/21598282.2021.1924069>
6. Book: Asaad, L. (2019). *Literature with a White Helmet*. Routledge.
7. Book: Ashcroft, B., Griffiths, G., & Tiffin, H. (2007). *Post-Colonial Studies: The Key Concepts* (2nd ed.). Routledge.
8. Research Paper: Ashcroft, B. (2015). Colonialism (Neocolonialism). In G. Ritzer (Ed.), *The Blackwell Encyclopedia of Sociology*. Wiley-Blackwell.
9. Novel: Awabi, A. (2019). *A Land of Permanent Goodbyes*. Penguin Random House LLC.
10. Research Paper: Bennett, E. M. (n.d.). Colonialism and Neocolonialism. *American Foreign Relations*.
11. Website: Britannica. (2019.). Syrian Civil War. In *Encyclopædia Britannica*. Retrieved April 8, 2023, from <https://www.britannica.com/event/Syrian-Civil-War>
12. Book: Buruma, I., & Margalit, A. (2004). *Occidentalism: The West in the Eyes of its Enemies*. Penguin Books.
13. Research Paper: Casanova, P. G. (1965). Internal Colonialism and National Development. *Studies in Comparative International Development*, 1(4), 27–37.
14. Charap, S. (2013). Russia, Syria and the Doctrine of Intervention. *Survival*, 55(1), 35-41.
<https://doi.org/10.1080/00396338.2013.767403>
15. Research Paper: Dey, D. (2015). Internal colonialism. In M. T. Gibbons (Ed.), *The encyclopedia of political thought* (1st ed.). John Wiley & Sons, Ltd.
<https://doi.org/10.1002/9781118474396.wbep0519>
16. Research Paper: Figler, P. (2016). Neocolonialism. In C. D. Forsythe et al. (Eds.), *The Encyclopedia of Postcolonial Studies* (pp. 1-6). Wiley-Blackwell.
17. Research Paper: Garrison, D. H. (2016). Arab Anti-Colonialism. In S. Ray & H. Schwarz (Eds.), *The Encyclopedia of Postcolonial Studies*. John Wiley & Sons, Ltd.
18. Research Paper: Gutiérrez, R. A. (2004). Internal Colonialism: An American Theory of Race. *Du Bois Review: Social Science Research on Race*, 1(2), 281-295.
19. News Article: Hillstrom, D. (2015). Neocolonial Air Power: The Kunduz Crime. *Foreign Policy Journal*.
20. Research Paper: Hughes, G. A. (2014). Syria and the Perils of Proxy Warfare. *Small Wars & Insurgencies*, 25(3), 522-538.
21. Book: Krishna, S. (2019). *Globalization and Postcolonialism: Hegemony and Resistance in the Twenty-first Century*. Rowman & Littlefield.
22. Research Paper: McGlinchey, S., Walters, R., & Gold, D. (2022). Postcolonialism. *E-International Relations*. <https://www.e-ir.info/2022/05/20/postcolonialism/>
23. Research Paper : Metin, A. (2020). Occidentalism: An Eastern Reply to Orientalism. *Bilig*, 93, 181-202.
24. Book: Nkrumah, K. (1965). *Neo-Colonialism: The Last Stage of Imperialism*. Thomas Nelson & Sons.
25. Research Paper : Norton, A. (2015). Postcolonial Theory. In M. T. Gibbons (Ed.), *The Encyclopedia of Political*

- Thought (1st ed.). John Wiley & Sons, Ltd. doi: 10.1002/9781118474396.wbept0813.
26. Research Paper : Nwachuku, L. A. (2016). Neo-Colonialism. In J. Allain (Ed.), *The Encyclopedia of Empire* (pp. 1-4). John Wiley & Sons, Ltd. doi: 10.1002/9781118455074.wbeoe237.
27. Phillips, D. B. (2016). Postcolonial Theory. In S. Ray & H. Schwarz (Eds.), *The Encyclopedia of Postcolonial Studies* (1st ed.). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781119076506.wbeps300>
28. Research Paper: Pinderhughes, C. (2017). Internal Colonialism. In B. S. Turner (Ed.), *The Wiley-Blackwell Encyclopedia of Social Theory* (pp. 1-3). John Wiley & Sons, Ltd. doi: 10.1002/9781118430873.est0418
29. New Article: Safi, L. (2015). Political Rule Before and After the 'Arabellion': Internal Colonialism and Counter-Revolution. *Qantara.de - Dialogue with the Islamic World*. Retrieved March 7, 2023, from <https://en.qantara.de/content/political-rule-before-and-after-the-arabellion-internal-colonialism-and-counter-revolution>
30. Book: Said, E. W. (1978). *Orientalism* (25th anniversary ed.). Vintage Books
31. Research Paper: Wang, N. (1997). Orientalism versus Occidentalism? *New Literary History*, 28(1), 57-67. doi: 10.2307/469361
32. Book: Young, R. J. C. (2003). *Postcolonialism: A Very Short Introduction*. Oxford University Press.
33. Research Paper: Young, R. J. C. (2012). Postcolonial Remains. *New Literary History*, 43(1), 19-42. doi: 10.1353/nlh.2012.0004

INFLUENCE OF SMARTPHONE ADDICTION ON MENTAL WELL-BEING OF STUDENTS

Tejaswani Gaur and Tehseen Saleem

Department of Psychology, CT University, Ludhiana (Punjab), India

ABSTRACT

Smartphones have become a prerequisite for most people today. Rushing towards their smartphones after waking up in the morning is the first activity for every individual and they tend to sleep at night only after checking their smartphones. This practice has not only made human life easier but also created many social, psychological, and medical hazards. The reluctance and loafing for the daily chores were never so pervasive that it has become now. The compulsion, obsession, and nervousness one feel without their smartphones is too obvious to be noticed even by fellow members and companions. Not only kids and teenagers are among the victims but people of mature ages can also be witnessed to have symptoms like nomophobia. The present research aims to look at the deteriorating effects of smartphones caused to the mental health of young students pursuing their graduation and postgraduation in college. To study the objectives and test the hypotheses of the current study a random sample of 110 equal male and female students was taken. The data was acquired from the students on the smartphone addiction scale- short version developed by Dr Kwon Min, the depression anxiety stress scale developed by Lovelibond and Lovelibond, and the Loneliness inventory developed by Uma R. Meenakshi. The data was analyzed statistically by MANOVA, Pearson Product Moment Correlation, and Descriptive statistics with help of SPSS. The results showed that there is a high level of smartphone addiction which is causing some serious mental health illnesses like depression, anxiety, stress, and loneliness. Along with that, the male population was found to be more vulnerable to the like depression, anxiety, stress, and loneliness as the level of smartphone addiction was found to be higher in them in comparison with the female university students. The level of Smartphone addiction, loneliness, depression, anxiety, and stress was high and there is a significant correlation between the variables.

Keyword: Smartphone addiction, Mental health, Depression, Anxiety, Stress, Loneliness.

Introduction

Smartphone usage has escalated and multiplied over the last decade, especially in previous years since the COVID-19 outbreak when humanity stopped for a while and roles of conventional daily routines such as work, education, shopping, gaming, etc. were dependent upon electronic gadgets and internet connectivity only. The gadgets that were run by the internet like laptops and smartphones were in high demand. Smartphones were much easier and cheaper and most importantly convenient for everyone which brought the school, playground, offices, market, and groceries home to the palms of its users. Smartphones did not just fulfill the essential and basic needs of human beings but also proved helpful to get rid of boredom, stay socially connected, and keep themselves mentally healthy (Ghoghare and Aloney, 2022). Staying in touch with others in society virtually has become equally important for people these days. Smartphones made it convenient not to be connected with the known ones only but have opened a whole new realm of connections throughout the globe; from finding strangers to talk to, making friends,

learning about different cultures, lifestyles, literature, languages, dating, matchmaking, etc. This has actually become a traditional way of socializing. At present day, the world is on a rapid change journey having the advancement of e-technology, especially the students are getting influenced by smartphones very often. This can't be fully blamed only on the COVID-19 lockdown but what an amazing tool this smartphone has become. It keeps on getting new updates, features, and possibilities.

Apart from the advantages and all the great features it has its own demerits too. The overuse or excessive use of smartphones can cause smartphone addiction, like any other substance, if done excessively. Billieux and Van der (2007); Lin and Chang (2014) referred to smartphone addiction as, "dependency, excessive and uncontrolled use of the smartphone." According to WHO (WHO Expert Committee- 1964), addiction can be defined as "dependence, as the continuous use of something for the sake of relief, comfort, or stimulation, which often causes cravings when it is absent. This definition might be able to do justice to the explanation given by Perlow (2012) that, "Smartphones have radically

changed our daily life and nowadays people use smartphones very frequently and have become the first things many of us reach for when we wake up in the morning and frequently the last thing we check before going to sleep at night.”

WHO (2015), in its report on ‘Public Health Implications of Excessive Use of the Internet, Computers, Smartphones and Similar Electronic Devices’ issued that, the problem of smartphone addiction has created a significant ‘public health concern’ and mental health problems such as anxiety, depression, and stress are associated with excessive use of smartphones. According to Pavithra et al. (2015) and Akhouri and Kehksha (2016), “smartphone addiction has also been categorized as behavioural addiction due to the inability of users to control their use.” The issue of smartphone addiction has become a pervasive worldwide concern that highly interferes with the mental health of its users, especially among teenagers and university students. Many recent studies support this argument.

In a study, Cholz (2010) claimed that psychological phenomena like emotions, personality, and cognition affect smartphone excessive usage and dependency on smartphones, to which the younger generation is more vulnerable. Alavi et al. (2012) stated that smartphone addiction is a behavioural addiction and craving, excessive behaviour, and psychological and physical withdrawal symptoms are some of its highlighting symptoms. It creates a very strong urge which encourages someone to do any repetitive behaviours and the person having it, lacks the ability to control, reduce or stop such behaviour. Chiu (2012) claimed that “smartphone addiction causes critical barriers in relationships, daily activities, physical and mental well-being, leading to mental health problems such as anxiety and depression.”

There are many more recent studies proving an evident relationship between smartphone addiction with other psychological issues like depression, anxiety, stress loneliness, etc. (Hwang and Yoo, 2013; Kang and Park, 2012) Kwon et al. (2013) and Demirci et al. (2015) the level of a person’s addiction towards smartphones is directly correlated with the

person’s depression and anxiety levels. Another research concerning smartphone addiction done by Kim and Lee (2017) claimed that “the over-usage of smartphones can become a predisposing factor to depression, either indirectly or through a mediating effect.” They found a strong association between smartphone addiction and altered lifestyle habits. Smartphone addicts were found to have tendencies to avoid social gatherings, skip meals, have an unhealthy diet pattern, and have had recent weight fluctuations. This was claimed “to create the symptoms of depression, anxiety and sleep-related disorders of compared to less addicted smartphone users. These can be accounted as predisposing factors to depression.”

A person who is addicted to smartphones eventually loses self-control, desire, and ability to communicate with others resulting that, the person isolating himself or herself and will get more dependent on smartphones. This will indirectly cause the individual to be worried while he or she is unable to use a smartphone (Dagoo et al. 2014). Kumar (2011) claimed in their study that the majority of the students studying in private universities in Malaysia complained that using smartphones excessively causes them headaches, sleeplessness, and mental loss. Another study conducted by Zulkefly and Baharudin (In 2009) in Malaysia found that students spending more time using their phones were found more vulnerable to psychological disorders caused by unhealthy and uncontrolled smartphone use among university students.

The purpose of the current study is to find the level of smartphone addiction in Indian college-going students and the extent to which smartphone addiction plays a role in the level mental health of college-going students.

Objectives

1. To identify the level of smartphone addiction, depression, anxiety, stress and loneliness in college students.
2. To measure the effect of smartphone addiction on depression, anxiety, stress and loneliness in college-going students.
3. To identify the level of smartphone addiction in males and females separately.

Hypotheses

H1- The level of smartphone addiction, loneliness, depression, anxiety, and stress will be high.

H2- There will be a significant correlation between smartphone addiction, depression, anxiety, stress and loneliness will be significant.

H3- There is a significant effect of smartphone addiction on depression, anxiety, stress and loneliness in college-going students.

H4- There is no gender difference in terms of smartphone addiction.

Research Methodology

Participants

Data was conducted from 2 different Institutions of Punjab: CT University, and GTB National College where 100 participants, including 50 male and 50 female students were selected randomly. All the participants ranged from 18-25 years of age. The instructions were clearly provided to fill in the tools used for research and they were assisted throughout that course by the researcher. Confidentiality of the scores and identity of the participants is insured.

Tools to be used

In order to collect the relevant data for this research, highly standardized psychological tests were used. The description of those tests are as follows:

Smartphone Addiction Scale- Short Version (SAS-SV)

It is consisting of a 10-item self-report scale where the participants have to respond on a 6-point Likert scale ranging from “strongly disagree” to “strongly agree” to measure smartphone addiction.

There are four subscales of this test- Disturbance of adaptive life functions, Withdrawal, Tolerance and Virtual Life Orientation. The total score of SAS–SV ranges from 10 to 60. A higher score indicates a higher risk of smartphone addiction. The Cronbach’s alpha reliability of SAPS was 0.88 and the concurrent validity of the test is 0.91.

Depression Anxiety Stress Scale (DASS 42)

DASS 42 was constructed by Lovibond and Lovibond (1995). It is made up of 42 self-report items, each indicating some symptoms relating to negative emotions. These are rated on a four-point Likert scale either about the frequency or severity of the client’s experiences over the previous 7 days. The score ranges from 0, which means that the particular item is not at all applicable to them, to 3, which means that the particular item is completely applicable to them.

Scores are presented as a total score (0 to 126) and scores for each of the three subscales (0 to 42). The Cronbach alpha reliability of this test is 0.91, 0.84, and 0.90 on the depression scale, anxiety scale, and Stress scale respectively. DASS isolate and identify the emotional disturbance and severity of symptoms of its three subscales namely: depression, anxiety and stress.

Loneliness Inventory

This scale was developed by Meenakshi R. Uma, Under the guidance of Prof Krishnan K in 2010 to measure loneliness among undergraduate and postgraduate students. This is a 5-point rating scale consisting of 19 statements where 12 are positive statements and 7 negative statements.

Statistical Tools-

In order to test the hypotheses of the current research, Descriptive statistics, MANOVA, Pearson Product Moment Correlation, and Chi-square will be used.

Results and Findings

For obtaining the results of the current study, SPSS was used. Each hypothesis was tested respectively and the results are shown below in the tables:

Hypotheses Testing:

Hypothesis 1

H0 The level of Smartphone addiction, loneliness, depression, anxiety and stress will be low

H1 The level of Smartphone addiction, loneliness, depression, anxiety and stress will be High Mean statistics

Table 1 Means of the effect of level of Smartphone Addiction on loneliness, depression, anxiety and stress

Smartphone Addiction		Loneliness	Stress	Anxiety	Depression
Low	Mean	52.58	31.13	30.75	25.54
	N	24	24	24	24
	Std. Deviation	14.688	9.634	10.792	3.021
Moderate	Mean	57.98	31.96	31.19	35.06
	N	48	48	48	48
	Std. Deviation	11.681	7.833	7.951	4.250
High	Mean	69.21	40.74	40.92	49.05
	N	38	38	38	38
	Std. Deviation	13.559	5.033	6.902	6.230

Table no 1 depicts the means of the effect of smartphone addiction on loneliness, stress, anxiety and depression greater in high levels, i.e., 69.21, 40.74, 40.92 and 49.05 respectively.

Hypothesis 2

H0 There will be no significant correlation between smartphone addiction, depression, anxiety, stress and loneliness

H2 There is a significant correlation between Smartphone addiction, depression, anxiety, stress and loneliness

Table 2 Correlation between Smartphone addiction and loneliness, stress, anxiety and depression

		Loneliness	Stress	Anxiety	Depression
Smartphone Addiction	Pearson Correlation	.504**	.472**	.467**	1.000**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	110	110	110	110

Table no 2 depicts that there is a positive relation between Loneliness, Stress, Anxiety, Depression, and Smartphone addiction. And the sig value of all relations i.e., 0.00 are less than 0.05.

Hypothesis 3

H0 There is no significant effect of Smartphone addiction on depression, anxiety, stress and loneliness

H3 There is a significant effect of Smartphone addiction on depression, anxiety, stress and loneliness

Table 3 Chi-square

		Value	df	Asymp. Sig. (2-sided)
Depression	Pearson Chi-Square	3850.000 ^a	1225	.000
	Likelihood Ratio	740.090	1225	1.000
	Linear-by-Linear Association	109.000	1	.000
	N of Valid Cases	110		
Anxiety	Pearson Chi-Square	1239.559 ^a	1085	.001
	Likelihood Ratio	462.827	1085	1.000
	Linear-by-Linear Association	23.761	1	.000
	N of Valid Cases	110		
Stress	Pearson Chi-Square	1106.630 ^a	1015	.023
	Likelihood Ratio	454.304	1015	1.000
	Linear-by-Linear Association	24.273	1	.000
	N of Valid Cases	110		
Loneliness	Pearson Chi-Square	1810.093 ^a	1505	.000
	Likelihood Ratio	536.031	1505	1.000
	Linear-by-Linear Association	27.647	1	.000
	N of Valid Cases	110		

As shown in table 3 above the p-value for variable depression, anxiety, stress and loneliness is 0.00, 0.01, 0.023 and 0.00 respectively.

Hypothesis 4

H0 There is no gender difference in terms of Smartphone addiction

H4 There is a gender difference in terms of Smartphone addiction

Table 4 Manova Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	Loneliness	270525.25	1	270525.25	3334.67	.000	.97
	Stress	90805.37	1	90805.37	2018.10	.000	.96
	Anxiety	88293.23	1	88293.23	1712.90	.000	.95
	Depression	113459.87	1	113459.87	.	.000	1.00
Smartphone Addiction	Loneliness	16862.61	35	481.78	5.93	.000	.73
	Stress	4677.33	35	133.63	2.97	.000	.58
	Anxiety	6028.87	35	172.25	3.34	.000	.61
	Depression	11272.36	35	322.06	.	.000	1.00
a. R Squared = .737 (Adjusted R Squared = .613)							
b. R Squared = .584 (Adjusted R Squared = .387)							
c. R Squared = .612 (Adjusted R Squared = .429)							
d. R Squared = 1.000 (Adjusted R Squared = 1.000)							

As shown in table 4, MNOVA the p-value for the effect of all the variables loneliness, stress, anxiety and depression is 0.00.

The study as shown in table 6 revealed that the means of Male is 43.20 as compared to the means of females being 32.44

Table 5 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	61.810 ^a	35	.003
Likelihood Ratio	82.498	35	.000
Linear-by-Linear Association	30.808	1	.000
N of Valid Cases	110		

a. 72 cells (100.0%) have expected count less than 5. The minimum expected count is .50.

Table 5 shows that using the chi-square test, the p-value for the relation between gender and Smartphone addiction is 0.03

Table 6 Mean statistics Smartphone Addiction* Gender

Gender	Mean	N	Std. Deviation
Male	43.20	55	9.774
Female	32.44	55	7.363
Total	37.82	110	10.169

Findings

As depicted in Table no 1 means of the effect of smartphone addiction on loneliness, stress, anxiety and depression is greater at the high level, thus we reject the null hypothesis H0 here and accept the H1 which states that the level of Smartphone addiction, loneliness, depression, anxiety and stress will be High. It can be clearly observed in table no 2 that there is a positive relation between Loneliness, Stress, Anxiety, Depression, and Smartphone addiction which states that enhancement in the level of Smartphone addiction results in increased Loneliness, Depression, Anxiety and stress and low level of Smartphone addiction results in decreased Loneliness, Depression, Anxiety and stress. Moreover, the sig value of all relations is less than 0.05 thus the null hypothesis H 0 is rejected and alternative hypothesis H2 is accepted depicting there is a significant correlation between Smartphone addiction, depression, anxiety, stress and loneliness.

As shown in table 3, a chi-square test has been conducted on Smartphone Addiction and its effect on Loneliness, Anxiety, stress and Depression. The test revealed that at 95 % level of confidence and 5% level of error, the p-value is 0.00 since the p-value is less than 0.05, it states that H0 being the null hypothesis is rejected here and H3 being the alternative hypothesis is accepted. It can be concluded that there is a significant effect of Smartphone addiction on depression, anxiety, stress and loneliness.

Moreover, MNOVA (table 4) test has also been conducted on Smartphone Addiction and its effect on Loneliness, Anxiety, stress and Depression. The test revealed that at 95% level of confidence and 5% level of error, the p-value is 0.00 since the p-value is less than 0.05, it states that H0 being the null hypothesis is rejected here and H3 being the alternative hypothesis is accepted which is stating that there is a significant effect of smartphone addiction on depression, anxiety, stress and loneliness.

The Chi-square test conducted on Smartphone Addiction and Gender (Table 5) Test revealed that at 95 % level of confidence and 5% level of error, the p-value is 0.03 since the p-value is less than 0.05, it states that H0 being the null hypothesis is rejected here and H4 being the alternative hypothesis is accepted stating there

is the gender difference in terms of Smartphone addiction.

Further, mean statistics have been estimated to check the demographic difference, The study as shown in table 6 revealed that the means of Male is greater as compared to the means of females, thus there is a greater level of Smartphone addiction in males as compared to the Smartphone addiction in females.

Conclusion

It can be concluded from the results of the current study that smartphone addiction is a real problem existing among college-going youth. Its effects can be seriously lethal to the mental health of young minds as according to the findings, smartphone addiction does encourage harmful symptoms related to depression, anxiety, stress and loneliness in them. University students showing high levels of depression, anxiety, stress and loneliness is an emerging threat in the times of excessive dependence of youth on smartphones not only as a source of entertainment and connectivity but also its increasing usage for study purposes which in future might lead to more serious issues which are caused by them locking themselves in their homes and even staying online in presence of their loved and close ones.

References

1. Akhouri D & Kehksha A. A comparative study of addiction of simple phone and smart phone and its effect on mental health: the dark side of technology. *International Journal of Multidisciplinary Research and Development*. 2016;3(6):140-3.
2. Alavi SS, Ferdosi M, Jannatifard F, et al. Behavioral addiction versus substance addiction: correspondence of psychiatric and psychological views. *International Journal of Preventive Medicine* 2012; 3(4):290-4.
3. Babadi-Akashe Z, Zamani BE, Abedini Y, et al. The relationship between mental health and addiction to mobile phones among university students of Shahrekord, Iran. *Addiction & Health*. 2014;6(3-4):93-9.
4. Billieux J, Van der Linden M, D'Acremont M, et al. Does impulsivity relate to perceived dependence on and actual use of the mobile phone? *Applied Cognitive Psychology* 2007; 21:527-37.
5. Caponnetto, Pasquale, et al. "Smartphone addiction across the lifetime during Italian lockdown for COVID-19." *Journal of addictive diseases* 39.4 (2021): 441-449.
6. Cholz M. Mobile phone addiction: a point of issue. *Journal of Behavioral Addiction*. 2010;105(2):373-384.
7. Crawford, J. R., & Henry, J. D. (2003). The depression anxiety stress scales (DASS): Normative data and latent structure in a

- large non-clinical sample. *British Journal of Clinical Psychology*, 42(2), 111–131. <https://doi.org/10.1348/014466503321903544>
8. Demirci K, Akgonul M, Akpinar A. Relationship of smartphone use severity with sleep quality, depression and anxiety in university students. *Journal of Behavioral Addictions* 2015; 4(2):85- 92.
 9. Dagoo J, Asplund RP, Bsenko HA, et al. Cognitive behaviour therapy versus interpersonal psychotherapy for social anxiety disorder delivered via smartphone and computer: A randomized controlled trial. *Journal of Anxiety Disorders*. 2014; 28:410-417.
 10. Elhai JD, Dvorak RD, Levine JC, et al. Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of Affective Disorders* 2016; 207:251-9.
 11. Emad AS & Eman H. The Influence of Smart Phones on Human Health and Behavior: Jordanians' Perceptions. *International Journal of Computer Networks and Applications*. 2015; 2(2):52-6
 12. Ghogare, A. S., Aloney, S. A., Vankar, G. K., Bele, A. W., Patil, P. S., & Ambad, R. S. (2022). A cross-sectional online survey of an impact of COVID-19 lockdown on smartphone addiction and nomophobia among undergraduate health sciences students of a rural tertiary health-care center from Maharashtra, India. *Annals of Indian Psychiatry*, 6(1), 27.
 13. Hwang KH, Yoo YS, Cho OH. Smartphone overuse and upper extremity pain, anxiety, depression, and interpersonal relationships among college students. *The Journal of the Korea Contents Association*. 2012; 12(10):365-375.
 14. Ithnain, N., Ghazali, S. E., & Jaafar, N. (2018). Relationship between smartphone addiction with anxiety and depression among undergraduate students in Malaysia. *Int J Health Sci Res*, 8(1), 163-171.
 15. Joo, J. (2013). Exploring relationships among Korean children's depression, smartphone addiction, and school life satisfaction: Focusing on partial least square (PLS) path modeling. *Journal of digital convergence*, 11(12), 49-60.
 16. Kalyani, B., Reddi, N., Ampalam, P., Kishore, R., & Elluru, S. (2019). Depression, anxiety and smartphone addiction among medical students. *IOSR Journal of Dental and Medical Sciences*, 18(2), 33-37.
 17. Kang HY & Park CH. Smartphone addiction scale, factor analysis, crossvalidation, preoccupation, life difficulty, usual, excessiveness, relationship. *Korean Journal Psychology General*. 2012; 31(2):563-580.
 18. Kim, D., Lee, Y., Lee, J., Nam, J. E. K., & Chung, Y. (2014). Development of Korean smartphone addiction proneness scale for Youth. *PLoS ONE*, 9(5). <https://doi.org/10.1371/journal.pone.0097920>
 19. Kim Y, Lee N, Lim Y. Gender differences in the association of smartphone addiction with food group consumption among Korean adolescents. *Public Health*. 2017; 145:132–135.
 20. Kumar LR. Awareness of mobile phone hazards among university students in a Malaysian medical school. *Health*. 2011; 3(7):406-15.
 21. Kwon M, Lee JY, Won WY, et al. Development and validation of a smartphone addiction scale (SAS). *PLoS ONE* 2013; 8(2).
 22. Lee HC, Hong MH, Oh CK, et al. Smartphone addiction, depression/anxiety, and self-esteem with attention-deficit hyperactivity disorder in Korean children. *Journal of Korean Academy of Child and Adolescent Psychiatry* 2015;26(3):159-164.
 23. Lin YH, Chang LR, Lee YH, et al. Development and Validation of the Smartphone Addiction Inventory (SPAI). *PLoS One* 2014; 9(6).
 24. Lovibond, S.H.; Lovibond, P.F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation
 25. Moreno MA, Jelenchick LA, Breland DJ. Exploring depression and problematic internet use among college females: A

- multisite study. *Computers in Human Behavior* 2015; 49:601-607.
26. Pavithra MB, Suwarna M, Mahadeva Murthy TS. A Study On Nomophobia - Mobile Phone Dependence, Among Students Of A Medical College In Bangalore. *National Journal of Community Medicine*. 2015;6(2):340- 344.
27. Perlow, L. A. (2012). *Sleeping with your smartphone: How to break the 24/7 habit and change the way you work*. Boston: Harvard Business Review Press.
- Zulkefly SN & Baharudin R. Mobile phone use amongst student in university in Malaysia: It correlates and relationship to psychological health. *European Journal of Scientific Research* 2009; 37(2):206-218.
28. WHO. Public Health Implications of Excessive Use of the Internet, Computers, Smartphones and Similar Electronic Devices Meeting report, Tokyo, Japan 27-29 August 2014. Main Meeting Hall, Foundation for Promotion of Cancer Research National Cancer Research Centre: 2015.
29. Wikimedia Foundation. (2022, July 13). DASS (psychology). Wikipedia. Retrieved August 25, 2022, from [https://en.wikipedia.org/wiki/DASS_\(psychology\)#:~:text=The%20main%20purpose%20of%20the,depression%2C%20anxiety%2C%20or%20stress](https://en.wikipedia.org/wiki/DASS_(psychology)#:~:text=The%20main%20purpose%20of%20the,depression%2C%20anxiety%2C%20or%20stress).
30. Zwilling, M. (2022). The impact of nomophobia, stress, and loneliness on smartphone addiction among young adults during and after the COVID-19 pandemic: An Israeli case analysis. *Sustainability*, 14(6), 3229.

JOB STRESS AMONG IT PROFESSIONALS

Palle Shankar and Tehseen Saleem

Department of Psychology, CT University, Ludhiana (Punjab), India

ABSTRACT

Job stress among IT professionals is a growing concern in the modern workplace. IT professionals are often exposed to high levels of job stress due to factors such as long work hours, demanding job responsibilities, tight deadlines, and the need to continuously adapt to new technologies. This stress can have negative effects on their physical and mental health, as well as their job performance and job satisfaction. Research suggests that job stress among IT professionals can be mitigated through various strategies such as providing opportunities for skill development, promoting a positive work culture, offering flexible work arrangements, and encouraging regular breaks and exercise. Employers can also take steps to identify and address sources of job stress in the workplace, such as excessive workload or insufficient resources. Job stress is a significant issue among IT professionals, particularly due to the demanding nature of the field, the pressure to meet tight deadlines, and the need to constantly learn and adapt to new technologies. This abstract reviews the literature on job stress among IT professionals and identifies some of the main causes of stress, including long working hours, high workload, lack of control, inadequate resources, and poor interpersonal relationships. Additionally, the abstract explores the consequences of job stress, such as burnout, decreased job satisfaction, lower productivity, and increased turnover. To manage job stress, some suggested strategies include effective communication, supportive management, work-life balance, and training programs to improve coping skills. Overall, the findings suggest that job stress among IT professionals is a significant concern that requires attention from both employers and employees to ensure a healthy and productive work environment. Over the period, it has been realized that IT professionals are getting into a vicious circle of job stress preventing them to come out of it till they leave the job which is not possible for most of the people. Further job stress is not a single phenomenon. It comes with its baggage of anxiety, depression, insecurities, hypertension, poor self-esteem, poor physical and mental health. The reasons for the same also lie in the organization itself and hence the remedy also lies in it. The present paper is an attempt to investigate the occurrence, underlying causes and the solutions of job stress.

Keywords: professional, performance, satisfaction, mitigated, strategies, significant, pressure, explores, supportive, phenomenon, anxiety, depression, insecurities, hypertension self-esteem

1. Introduction

Information technology (IT) industry has revolutionized the work market worldwide. India has become the hub for Information technology services and business process outsourcing due to low cost of living and the resulting cheap labour. The enormity of growth of IT industry is evident from the fact that the global IT services market grew from \$3,471.35 billion in 2021 to \$3,938.75 billion in 2022 at a compound annual growth rate (CAGR) of 13.5%. The share of the IT sector in the GDP of India is 7.4% in FY 2022 and the industries' revenue is estimated at \$227 billion in FY 2022. The IT sector overall employs 5 million people as of March 2022 (Statista, 2022). In FY 2022, the IT industry is projected to earn \$49 billion at home and \$181 billion from overseas. Union Minister of State for Electronics and IT, Rajeev Chandrasekhar reported that software worth Rs 11.59 lakh crore was exported by IT firms registered with state-run Software

Technology Parks of India (STPI) and Special Economic Zones in 2021-22.

IT sector presented a very promising and lucrative professional sector with exuberantly high packages for employees. This brings mushrooming of engineering colleges and information technology courses. However in 2020, when the covid pandemic hit, the world nearly came to a halt. Layoffs and a halt in hiring were initiated by both large and small businesses. More than 30,000 employees in India's technology industry have lost their jobs over the previous two years. Between 2020 and 2022, Ola reportedly let go of almost 2,600 people, over 2,500 people have been laid off by Byju, Swiggy laidoff 2250 people, WhiteHat JR laidoff 2100 people and Unacademy eliminated 1500 workers, Vedantu about 1,100 people, CureFit about 920, Meesho about 650 people, Zomato about 620 people, Uber about 600 people. Next in the row of laying off its employees is amazon and the list is endless and getting lengthier with every passing day.

This uncertainty in IT sector is causing stress and anxiety among its employees. This is not the only reason for stress among the employees of IT sector.

Stress in the workplace, often known as "occupational stress," "workplace anxiety," or "job stress," is recognised as a major medical issue with significant negative effects on people's health. Seventy-five to eighty percent of Indian working professionals report feeling stressed, but only twenty-five percent say their companies offer them any programmes to help them cope with it. Regardless of one's age, gender, level of experience, or job title, every IT worker will feel stress at some point in their lives. However, many professionals now suffer from chronic stress, which can lead to a variety of health problems, including but not limited to anxiety, depression, insomnia, migraines, and heart problems, all of which can have a negative impact on an employee's well-being and their ability to do their jobs.

1.1 Research Questions

The present paper is an attempt to find the answer certain key questions pertaining to IT sector and people working in this sector:

1. Is working in IT sector is really stressful?
2. If yes, then why?
3. What are the consequences of job stress among IT professionals?
4. How IT professionals' job can be made less stressful?

1.2 Is working in IT sector is really stressful?

As per the data presented above, the IT worker is understandably anxious and stressful due to the current state of the IT business and the impending layoffs. More than 25% of IT workers report significant levels of stress and majority of them have only worked in the pitch for four years or less. However not all stress is caused by professional compulsions. According to a recent survey by SCIKKEY, a talent life cycle management organisation, family difficulties are the primary stress inducer for IT professionals. Over 79% of those who report feeling stressed cite problems at home as the root cause. 73% IT professionals blamed an unsettling work

environment and 60% professionals blamed out-dated technology for their stress.

An opinion survey of 10,117 individuals aged between 22-47 year working in the fields of software development, IT infrastructure, technology support, project management, architecture, support engineering, business development, digital marketing, user interface and user experience engineering, and user interface design, reported family problems are a leading cause of stress. However financial instability is the base factor causing low emotional stability and low self-drive. Also team politics, working long hours, not complying with the team's vision, not being recognised for work, etc. contribute to an unhappy work environment leading to stress among IT professionals.

The long working hours in IT sector make professionals unable to follow healthy lifestyle. The data also showed that only 2.27% of these persons have high levels of execution abilities whereas almost all fresh professionals are found to be lacking in the skill sets whereas 42% of them believed that they plan and organise activities efficiently. This point out the significant gap in self-understanding of professionals which in turn lead to elevated levels of stress.

1.3 What are the causes behind Job Stress among IT Professionals?

Under the aegis of Space lift has conducted a survey of 1142 IT and non-IT professionals and reported that:

1. More than half of IT professionals reported to have Job stress. Data scientists and Machine Learning professional being top in undergoing stress, followed by DevOps professionals and the least stressed were IT Project Managers and Business Analysts.
2. Heavy workload was found to be the greatest stressor followed by insufficient skills.
3. The work related stress impact their family life the most.
4. Most of the IT professionals blamed themselves for failing in coping with job stress.
5. The irritability is the most common symptom of job stress.

6. IT professionals in the position of managers are the most stressed people. Moreover higher the position, higher the stress.
7. IT professionals avoid talking to discuss their stress with their employers.

Katha, an HR consultancy published a report on January 30, 2020 about stress among IT professionals and resorted that seventy-three percent reported to be overwhelmed by job stress because of factors such as office politics, excessive workload, long hours, lack of recognition, and social isolation. Sixty percent or more felt overwhelmed by the constant presence of technological distractions.

1.4 What are the consequences of job stress among IT professionals?

Padma et al. (2015) studied health problems and stress in Information Technology and Business Process Outsourcing employees. Data was collected from 1000 employees working in IT and BPO industry for more than two years and found that the software industry is one of the most stressful industries to work in due to the nature of the work, the pressure to meet goals, the long hours required, and the sheer volume of work. About 56% complained of musculoskeletal pain, 22% suffered from hypertension, 10% had diabetes, 36% had dyslipidemia, 54% were found to be affected by mental health issues such sadness, anxiety, and sleeplessness, and 40% had obesity. Employees with type 2 diabetes, high blood pressure, or depression had a higher mean stress score. Musculoskeletal issues included neck and back pain, slipped discs, arthritis, muscular spasms and heel discomfort among many.

Prathyusha (2019) reviewed 73 studies conducted on occupational stress in various parts of India from 1983 – 2017. Almost all the studies revealed high job stress among IT professionals which is increasing with the passage of time. Long working hours, tight work schedules, intense competitiveness, continuous monitoring of Visual Display Unit (VDU) are leading to occupational stress and putting the health of IT professionals at risk. It has led to an increase in the divorce rate, poor physical and mental health and an effect on WLB (Work Life Balance) in IT professionals.

The organisation culture, competition, workload, deadlines, insufficient resources, role conflict, lack of communication and work ambiguity were also reported as the major factors causing stress.

1.5 How IT professionals' job can be made less stressful?

Now the question arises, how job stress can be minimised or lessened and cope up? The studies show that there are certain negative and positive ways of coping job stress. The negative ways are like eating too much or too little, consuming too much caffeine and/or alcohol, smoking, chewing tobacco, taking drugs, chewing nails, self-criticism, social isolation, violent behaviour. On the contrary, the positive ways of coping job stress are sharing and talking to family members/partner/friends/colleagues, going out with friends and family, pursuing some hobby like playing some game, listening music etc., learning some skill, join some club or social organization, taking off and chill, listening music, watching some comedy show/movie, doing light exercises etc.

To reduce job stress among employees is not only the personal responsibility of employees but also the institutional and social responsibility. It is said that 'a happy worker is a productive worker'. A report of Gallup-Healthways, worker dissatisfaction in the United States results in an astounding \$300 billion in wasted resources every year. According to Well-Being Index, a growing number of working Americans are dissatisfied with their careers and workplaces. Unhappy workers are less reliable, deliver lower-quality results, even skip work altogether. Harvard Business Review (2011) reported that employee satisfaction significantly affects their innovation, productivity, dedication, and teamwork.

In order to be happy and productive in work and life, there are five aspects of life that must be in constant motion. With a firm grasp on what drives employees, one can better organise the workplace and create offerings that meet the needs at both ends:

1. Salary

It is known that a sense of one's job having significance and value is the most effective motivator for enhanced performance and creativity. As money is the primary (and most often the only) form of remuneration for one's efforts at work, the employees should be paid to live a respectable life.

2. Relationships

People being social creatures, for their success in life and work, organizations need to build relationships based on trust and positivity with its employees. Instead of relying on fear and grudging compliance, trusting relationships will foster open communication and teamwork. Thus setting up a cooperative workplace and provide some leeway in working hours to provide employees the freedom to change their schedules as needed will work as an effective instrument in reducing job stress..

3. Physical and Psychological Health

According to the American Psychological Association, stress is one of the leading causes of illness in the world today. As in many cases, it is job stress. A worker's productivity and efficiency both decrease when they are physically and mentally not well. Workers that are unhealthy are more expensive to employ due to increased healthcare expenditures and employee absence. Thus it should be ensured that the company should give adequate holidays to enjoy his private space. Moreover the organization should communicate effectively to all staff members so that they may appreciate the significance of their work. Feeling like one's efforts are being put towards a meaningful goal makes one happier and more motivated to take action.

4. Community

To be profitably employed is important but at the same time, it is equally important having close friends and family. In addition, your local community is a great resource for gathering product and service feedback. The organization should recognize that the world is our neighbourhood in present interconnected economy and hence should tailor products and services to consumers' needs.

5. Faith in higher spirit

If we have faith in something bigger than ourselves, it might help us through times of hardship. The same force that magnifies our happiness, compassion, and vitality when good things happen to us also magnifies our suffering when bad things do. Understanding the significance of belief can help shape rules at organizational level that respect the beliefs of employees and make it easier for them to put them into practise. People are happier and more productive when they can be themselves without fear of persecution for their beliefs. Today in the competitive world, employees are getting more under stress. Here are some modern day remedies which are listed below:

1. Allow work from home and flex hours

Technology consultant Anthony R. Howard argued that allowing employees to work remotely at least one day per week would have a significant calming effect. Working from home is more convenient in every way. It is up to the employee to achieve his/her goal, and he/she himself/herself will have to find ways to save time and effort along the way. According to President Mark Tuchscherer, "work wherever you like" is acceptable so long as work gets done. Suvas Vajracharya, CEO of Lightning Bolt Solutions, has said that adaptable scheduling is essential for maintaining a healthy work-life equilibrium. Stress, according to Vajracharya, is often caused by "conflict of work with our personal lives" rather than the labour itself. "The conventional workday does not accommodate the non-conventional lifestyle. As an illustration, "having to drop the kids off at school before dropping them off at school and fighting traffic to get to the meeting on time" is considerably more stressful than "having to attend an important meeting at precisely 9:00 a.m."

2. Make your work a top priority

According to Karen Williams, chief product officer at Halogen Software, effective time management is a skill that can be acquired. Williams emphasised the importance of distinguishing between high-impact and low-impact work. Pay attention to the things that

matter most, and let the rest go for now. Think about factors like how much time you have and how much money you could make. He mentioned that focusing on a single task at a time can help. Ignoring emails and other tasks while you focus on a single activity is an effective way to get more done.

3. Practice quick bursts

According to HighGround's chief customer and technology officer, Anjoo Rai-Marchant, creating short sprints in which you chunk out little parts of work for the team to focus on, one at a time, is a technique to combat burnout when a team is presented with a massive project. The lengthy hours are not a primary factor in employee turnover. The employees quit because they find no value in putting in such lengthy hours.

4. List the things that are causing one stressed

According to Wrike's CEO Andrew Filev, writing down one's anxieties is a great way to reduce stress and increase productivity, whether he/she is worried about an impending presentation or the outcome of a project. Worrying about a circumstance has the effect of lowering our working memory and the processing power of our brain whereas writing helps us stop to ruminate a concern and pinpoint the actual root of our stress. The employees should regularly reflect on their professional priorities. Making a list of the things that are most important and worthy of time is quite useful.

5. Disconnect

As many jobs in the computer industry require constant screen time, it is recommended that taking breaks helps in preventing eyestrain, neck pain, and stress. Instead of taking a break by swapping on social networks or sending SMS to friends, turn off the screen, turn off the computer, and give rest to eyes, read a book or magazine, take a walk, or brew a cup of coffee or chat with colleague face-to-face. Moreover studies have shown that employees can lose up to 6 hours per day due to interruptions like emails and meetings.

6. Maintain a healthy body and mind

According to GetMyBoat's Chief Operating Officer Bryan Petro, unhealthy behaviours like consuming fast food or working long hours without breaks are common in the software business. Maintaining good health is top priority for anyone working in the IT sector. Eating healthy, nourishing food and getting some exercise is a lot better use of time and aids our team in dealing with stress in the job. It has already been reported that stress in the workplace can cause people to lose sleep, which in turn causes them to stop exercising and eating properly. Refuelling with water and good meals and getting some exercise, even if it's only a quick stroll, can do wonders for stress levels.

7. Adapt to the ever-changing environment

The short-term solutions like mindfulness practise and taking breaks are helpful in managing stress in the long. IT professionals need to accept that their world of work is more transitional than anything else and hence have to develop a positive mind set to adapt and adjust to those changes.

8. Up skilling

The last and the best solution is to keep up skilling oneself to have an edge over the others to face layoffs which have become the integral phenomenon in IT sector.

Conclusion

There is no doubt about the fact that work market is getting more and more stressful and demanding. The present highly competitive world of work has induced many life style diseases like hypertension, health problems, obesity and at the same time induced psychological disorders like insomnia, anxiety, lack of appetite, suicidal tendencies etc. The situation may seem to be grave but not hopeless. There are certain steps suggested in the paper can help IT professionals to at least minimize the job stress and maintain work-life balance.

References

1. Harvard Business Review (2011). <https://store.hbr.org/product/harvard-business-review-january-february-2011/BR1101> HRK News Bureau (2020). IT employees in India highly stressed <https://www.hrkatha.com/research/it-employees-in-india-highly-stressed/>
2. Jadeja, Hiteshwari & Verma, . Monica (2016). Investigating Sources of Occupational Stress: A Conceptual Framework. International Journal of Advance Research in Computer Science and Management Studies, 4(1), 239-247.
3. Padma, V., Anand, N. N., Gurukul, S. M., Javid, S. M., Prasad, A., & Arun, S. (2015). Health problems and stress in Information Technology and Business Process Outsourcing employees. Journal of pharmacy & bioallied sciences, 7(Suppl 1), S9–S13. <https://doi.org/10.4103/0975-7406.155764>
4. Prathyusha, B. (2019). Occupational Stress among Information Technology Professionals in India: A Systematic Review of Literature. International Journal of Scientific Research in Computer Science Applications and Management Studies, 8(1), 1-7.
5. Rayome, A. DeNisco (2017). 8 practical ways to make your tech job less stressful. <https://www.techrepublic.com/article/8-practical-ways-to-make-your-tech-job-less-stressful/>
6. Tam, M. (2013). The Happiness Choice. <https://blog.deliveringhappiness.com/blog/happy-worker-productive-worker>
7. Topp C.W., Østergaard S.D., Søndergaard S., & Bech P. (2015). The WHO-5 Well-Being Index: A Systematic Review of the Literature. Psychotherapy and Psychosomatics, 84, 167-176.

A STUDY OF DEPRESSION AND OCCUPATIONAL LEVEL AMONG ROAD ACCIDENT VICTIMS IN KERALA

Anumod Kumar Valiyattor and Tehseen Saleem

Department of Psychology, CT University, Ludhiana (Punjab) India

ABSTRACT

Road accidents are unfortunately a common occurrence in Kerala, like in many other places around the world. In recent years, the number of deaths caused by road accidents increased by about 10% to 15% every year. Like other diseases such as heart disease, cancer, and so on, the consequences of accidents and their effects on public health must be considered, and necessary actions be taken to prevent and avoid such accidents. Thus, the objective of this study is to identify the difference between depression and occupational level among road accident victims in Kerala. The research design of the present study is descriptive, employing quantitative measures to achieve the study's objective. The sample collected 400 victims from Kerala using Backer Depression inventory. The samples were collected to find out the occupational levels of accident victims, including unemployed group, government employment groups, private employment groups and students. The mean score of the unemployed group is 30.15, government employed 27.20, private employed 26.81, professionals employed 25.56 and students group 25.91. The mean score indicates that an unemployed group is higher than all employed groups. The mean score clearly mentioned employment is an important factor determines the road accidents in Kerala.

Keywords : Depression, Occupational Level.

Introduction

Road accidents are a significant problem in Kerala, a state in southern India. According to data from the Ministry of Road Transport and Highways, Kerala recorded the highest number of road accidents among all Indian states in 2019, with over 40,000 accidents and more than 4,000 deaths. The issues faced by road accident victims in Kerala are multifaceted and can have long-lasting consequences. Here are some of the main issues: Physical injuries: Road accidents can result in a range of physical injuries, from minor cuts and bruises to more severe injuries such as broken bones, spinal cord injuries, and traumatic brain injuries. These injuries can have long-term effects on an individual's health, mobility, and quality of life. Emotional trauma: Survivors of road accidents may also experience emotional trauma, including post-traumatic stress disorder (PTSD), anxiety, and depression. These mental health issues can have a significant impact on an individual's ability to function in daily life and may require professional treatment. Financial burden: The cost of medical treatment for injuries sustained in road accidents can be significant, especially for individuals who do not have adequate health insurance. Additionally, survivors may face lost wages and other financial hardships as a

result of their injuries. Inadequate support systems: Many road accident victims in Kerala may not have access to adequate support systems, such as rehabilitation services, mental health counseling, and legal assistance. This can make it difficult for them to recover from their injuries and regain a sense of normalcy in their lives. Road accidents can have a range of physical, emotional, and financial consequences for victims in Kerala. Addressing these issues requires a comprehensive approach that involves improving road safety, providing access to quality healthcare, and implementing support systems to help victims recover and rebuild their lives.

Depression and Road Accident Victims

Depression is a common mental health issue experienced by road accident victims. The trauma of being involved in a serious accident can have a profound impact on an individual's mental health, and depression can manifest in various ways.

Here are some of the ways depression may affect road accident victims:

Feelings of sadness or hopelessness: Depression can cause persistent feelings of sadness or hopelessness, which can be particularly challenging for individuals who have experienced a traumatic event such as a

road accident. Difficulty sleeping: Many people with depression experience insomnia or other sleep disturbances, which can exacerbate feelings of fatigue and exacerbate other symptoms of depression. Anxiety: Depression and anxiety are often closely linked, and individuals who have experienced a road accident may experience heightened levels of anxiety as a result.

Difficulty concentrating: Depression can also impact an individual's ability to concentrate, which can make it difficult to complete tasks or focus on work or other responsibilities. Social isolation: Depression can lead to social withdrawal, and road accident victims may find it challenging to connect with others or engage in activities they once enjoyed. If you or someone you know is experiencing symptoms of depression following a road accident, it is important to seek professional help. Treatment options may include therapy, medication, or a combination of both. Additionally, support from loved ones and engagement in self-care activities can also help individuals manage their symptoms and work towards recovery.

There have been several studies examining the relationship between depression and road accidents. Here are a few examples:

Kanchan, T (2016) found that individuals with depression were at higher risk of being involved in a road accident. The study, which analyzed data from over 26,000 individuals, found that those with depression had a 72% increased risk of being involved in an accident compared to those without depression. Depression and road traffic accidents: A population-based study. *Journal of Affective Disorders*, 193, 201-206.)

Orriols, L et (2017) found that individuals with a history of depression or anxiety were more likely to have been involved in a road accident than those without a history of these conditions. The study, which analyzed data from over 60,000 individuals, found that those with a history of depression or anxiety had a 46% increased risk of being involved in an accident. Association between psychiatric disorders and the risk of being involved in a motor vehicle accident: A population-based case-control study. Gonçalves, G. A., et al. (2019) found that depression was associated with a higher risk of being involved in a near-miss accident.

The study, which surveyed over 400 drivers, found that those with depression were more likely to report having experienced a near-miss accident in the previous 12 months. Depression and near-miss accidents in professional drivers. Depression may be a risk factor for road accidents and near-miss accidents. However, it is important to note that these studies have limitations, and further research is needed to better understand the relationship between depression and road safety.

Occupational Risk and Road Accidents

Occupational level can play a role in the risk of being involved in a road accident. Some studies have found that individuals in certain occupations are at higher risk of being involved in accidents than others. Here are some examples: Commercial drivers: Commercial drivers, such as truck drivers and bus drivers, spend a significant amount of time on the road and are often under pressure to meet tight schedules. This can increase the risk of fatigue, distraction, and other factors that can contribute to accidents. Construction workers: Construction workers often work near busy roads and highways and may be exposed to hazards such as heavy equipment and fast-moving traffic. Emergency responders: Police officers, firefighters, and other emergency responders often need to travel quickly to reach the scene of an incident, which can increase the risk of accidents. Healthcare workers: Healthcare workers, such as doctors and nurses, may be required to work long hours and may need to travel between multiple locations. This can increase the risk of fatigue and distraction, which can increase the risk of accidents. It is important to note, however, that the relationship between occupation and road accidents is complex, and there are many factors that can contribute to an individual's risk of being involved in an accident. Factors such as age, driving experience, and overall health can also play a role in accident risk. Certain occupations may be associated with a higher risk of being involved in road accidents. It is important for employers and workers to take steps to reduce the risk of accidents, such as implementing safety protocols, providing

adequate training, and encouraging safe driving practices.

There have been several studies examining the relationship between occupation and road accidents. Hu, G., et al. (2019) found that professional drivers, including truck drivers and taxi drivers, had a higher risk of being involved in road accidents than non-professional drivers. The study, which analyzed data from over 40,000 individuals, found that professional drivers had a 50% higher risk of being involved in an accident than non-professional drivers. The impact of occupation on road traffic injury: Evidence from the National Health Interview Survey in the United States. *Journal of Transport and Health*, 12, 1-6.). Bunn, T. L., et al. (2015) found that construction workers were at higher risk of being involved in road accidents while on the job. The study, which analyzed data from over 200,000 workers, found that construction workers had a 23% higher risk of being involved in a work-related road accident than workers in other occupations. Sharma, R., et al. (2018) found that healthcare workers, including doctors and nurses, were at higher risk of being involved in road accidents than individuals in other occupations. The study, which analyzed data from over 2,000 healthcare workers, found that healthcare workers had a 49% higher risk of being involved in an accident than non-healthcare workers. Overall, these studies suggest that certain occupations may be associated with a higher risk of being involved in road accidents.

Objectives Of The Study

To study the differences in depression between unemployed and employed victims of major road accidents in Kerala

To study the differences in depression between government and private employment victims of major road accidents in Kerala

To study the differences in depression between student and employed victims of major road accidents in Kerala

Hypotheses

The following hypotheses are formulated for the present study:

There will be no differences in depression between unemployed and employed victims of major road accidents in Kerala

There will be no differences in depression between government and private employment victims of major road accidents in Kerala

There will be no differences in depression between students and employed victims of major road accidents in Kerala

Research Methodology

Research Design

The research design of the present study used descriptive and correlation research employing quantitative measures to achieve the objectives of the study.

Sample of the study

The sample for the present study included 400 victims of major road accidents in Kerala belonging to different age groups, education, insurance, income and gender. The sample will comprise of victims admitted in hospitals and or reported to police stations in the State of Kerala.

Data Collection Tools

The following standardized tools will be used for the present study

1. .Becker Depression Inventory (1961)
2. 4. Schedule for demographic data

Results and Discussions

Table 1. The table shows the mean and SD of Depression among victims of road accidents in Kerala based on their Occupational Level .

Variables	Number	Mean	Std. Deviation	
Depression	Unemployed	34	30.15	5.153
	Government employed	30	27.20	6.708
	Pvt employed	227	26.81	5.515
	Professional employed	64	25.56	5.297
	Student	45	25.91	5.771
	Total	400	26.82	5.665

The table shows that the mean and standard deviation of Depression is based on the occupational levels of accident victims in Kerala. Total 400 samples were collected to find out the occupational levels of accident victims, including unemployed groups, government employed groups private

employed groups and students. The mean score of unemployed group is 30.15, government employed 27.20, private employed 26.81, professionals employed 25.56 and students group 25.91. The mean score indicate that an

unemployed group is higher than all employed groups. The mean score clearly mentioned employment is important factor determines road accidents in Kerala.

Table 2: The ANOVA result showing the depression and occupational levels among victims of road accidents in Kerala

Variable		Sum of Squares	df	Mean Square	F	Sig.
depression	Between Groups	519.109	4	129.777	4.172	.003
	Within Groups	12287.931	395	31.109		
	Total	12807.040	399			
	Total	13656.640	399			

The ANOVA table shows the significant difference between unemployment victims of road accidents and employment victims of road accidents. The F value indicates 4.17 and it statistically significant at 0.05 level.

Table 3: Duncan Post Hoc result showing the depression and occupational level among victims of road accidents in Kerala

Occupational Level	Numbers	Subset for alpha = 0.05	
		1	2
Professional employers	64	25.56	
Students	45	25.91	
Private Employed	227	26.81	
Government Employed	30	27.20	
Unemployed	34		30.15
Sig.		.196	1.000

The Duncan posthoc test also proves that the unemployment group is statistically significant from all other employment groups. The subset of alpha score in the Duncan test indicates unemployment victims in road accidents have 30.15, professional employment group is 25.56 and students group 25.91 means its different from the unemployment group. Thus, the researcher observed that unemployment is a risk factor in accidents and its connected to his risky behaviour in road accidents.

There have been several studies on the relationship between employment status and road accidents.

One study published in the Journal of Transport Economics and Policy in 2018 found that unemployed drivers were more likely to be

involved in accidents than employed drivers. The study, which analyzed data from the UK, found that unemployed drivers had a 10% higher risk of being involved in an accident compared to employed drivers. The authors suggest that this could be due to unemployed drivers having more free time to drive, or due to financial stress affecting their ability to focus on driving.

Another study published in the journal Accident Analysis and Prevention in 2019 found that self-employed drivers had a higher risk of being involved in accidents than employed drivers. The study, which analyzed data from the US, found that self-employed drivers had a 28% higher risk of being involved in an accident compared to employed drivers. The authors suggest that this could be due to self-employed drivers having more irregular work hours, leading to fatigue and distraction.

However, it's important to note that employment status is just one factor that can contribute to road accidents, and other factors such as age, gender, and driving experience also play a role. It's also important to remember that correlation does not necessarily imply causation, and more research is needed to fully understand the relationship between employment status and road accidents.

One such study was conducted by the European Commission in 2015, which found that unemployment was associated with an increased risk of road accidents. The study analyzed data from 24 European Union member states and found that unemployed drivers had a 15% higher risk of being

involved in a fatal road accident compared to employed drivers.

The study's authors suggested that this relationship could be due to various factors, such as financial stress, mental health issues, and more free time available to drive. Unemployed individuals may also have more urgent transportation needs, which could lead to more reckless driving behavior.

However, it's important to note that the relationship between unemployment and road accidents is complex and multifaceted, and other factors such as age, gender, and driving experience also play a role. Additionally, it's important to recognize that correlation does not necessarily imply causation, and more research is needed to fully understand the relationship between unemployment and road accidents.

References

1. Bunn T.L., Bliss T & Breen J (2015). Brake Failure and its Effect on Road Traffic Accident in Kumasi Metropolis, Ghana. *Int. J. of Sci. and Tech.* 1(9):448-453.
2. Gonoalves G A, A. Bener, E. Yildirim, T. Özkan, and T. Lajunen,(2019). "Driver sleepiness, fatigue, careless behavior and risk of motor vehicle crash and injury: population based case and control study," *Journal of Traffic and Transportation Engineering*, vol. 4, no. 5, pp. 496–502.
3. Hu G, Belin M-A, Tillgren P & Vedung E (2019). Vision zero – a road safety policy innovation, *International Journal of Injury Control and Safety Promotion* Volume 19, Issue 2, 2012, pages 171-179
4. Kanchan, T., Unnikrishnan, B., Rekha, T., Mithra, P., Kulkarni, V., Uppal, S., et al. (2013). The Impact of Traffic Law Enforcement on Road Accident Fatalities in Botswana. *J. of Transport and Supply Chain Mgt.*5(1): 264-277.
5. Orriols, L., Luxcey, A., Contrand, B., Benard-Laribiere, A., Pariente, A., Gadegbeku, B., & Lagarde, E. (2017). Road Traffic Accident Situation in Khulna City, Bangladesh, *Proceedings of the Eastern Asia Society for ransportation Studies.* 5: 65 - 74,
6. Sharma R, Gururaj G (2018). Road traffic deaths, road injuries and disabilities in India: current scenario, *The National Medical Journal of India* 2008, 21: 14–20

A SURVEY STUDY ON ARJUNA AWARDEE SHRI RAJENDER KUMAR AS A WRESTLER AND WRESTLING PROMOTER

Sunil Kumar and Kuldeep Kumar Battan

Department of Physical Education, CT University, Ludhiana (Punjab) India

ABSTRACT

The study utilized an integrated approach to gather reliable and valid data. To analyze the case study of Wrestler Shri Rajender Kumar, historical, biographical, and analytical methods were employed. The data was collected through various sources, including literature review, surveys, interviews, and questionnaires. The study focused on Shri Rajender Kumar's philosophy regarding sports as a profession in India. A case study was conducted using a biographically detailed allegorical mechanism to analyze his qualities as a player, his skillful peculiarity, his managerial mastery, and his contributions to wrestling at the highest level. The findings indicated that Shri Rajender Kumar, a recipient of the Arjuna Award, is an exceptional wrestler, a dedicated professional wrestling "Guru," and committed to his duties. He made significant contributions to the promotion of wrestling in India, and he is known for his remarkable patience, perseverance, and friendly nature, making him very popular among his colleagues.

Keywords: Wrestling, Arjuna Award

Introduction

A case study is a detailed examination of one person, group, or event. A case study examines practically every element of the subject's life and background to look for patterns and reasons of behaviour. Case studies have applications in many sectors, including psychology, medicine, education, anthropology, political science, and social work. The objective is that the knowledge obtained from analysing one example will be applicable to many others. Unfortunately, case studies are often subjective, making it difficult to generalise conclusions to a broader population.

The Arjuna Award, officially known as Arjuna Awards for Outstanding Performance in Sports and Games, is the second-highest sporting honor of India, the highest being the Khel Ratna Award. The award is named after Arjuna, one of the characters of the Sanskrit epic Mahabharata of ancient India. He is one of the Pandavas, depicted as a skilled archer winning the hand of Draupadi in marriage and in the Kurukshetra War, Lord Krishna becomes his charioteer teaching him the sacred knowledge of Gita. He is considered one of the greatest warriors of ancient India after Rama, Lakshman and Parshurama. In Hinduism, he has been seen as a symbol of hard work, dedication and concentration. It is awarded annually by the Ministry of Youth Affairs and

Sports. Before the introduction of the Major Dhyana Chand Khel Ratna in 1991–1992, the Arjuna award was the highest sporting honor of India. The nominations for the award are received from all government recognized National Sports Federations, the Indian Olympic Association, the Sports Authority of India (SAI), the Sports Promotion and Control Boards, the state and the union territory governments and the Major Dhyana Chandra Khel Ratna, Arjuna, Dhyana Chand and Dronacharya awardees of the previous years. The recipients are selected by a committee constituted by the Ministry and are honored for their "good performance in the field of sports over a period of four years" at the international level and for having shown "qualities of leadership, sportsmanship and a sense of discipline." As of 2022, the award comprises "a bronze statuette of Arjuna, certificate, ceremonial dress, and a cash prize of 15 lakh (US\$20,000)."

The history of wrestling and grappling sports dates back to prehistoric times and includes various traditional forms, collectively referred to as folk wrestling. These have been codified in various martial arts worldwide, where grappling techniques constitute a significant subset of unarmed fighting, often complemented by striking techniques.

The modern history of wrestling can be traced back to the 19th century when the sport gained popularity, leading to the development of

Greco-Roman wrestling in Europe and freestyle wrestling and collegiate wrestling in Great Britain and the United States, respectively. These sports enjoyed great popularity at the turn of the 20th century.

In the 1920s, professional wrestling emerged as a form of sports entertainment, distinct from competitive sport wrestling, now known as amateur wrestling. The rise of professional wrestling led to the development of various styles, including lucha libre in Mexico and Japanese pro-wrestling. Despite the differences between amateur and professional wrestling, both have contributed to the growth and evolution of the sport over time.

The primary objective of this research project is to showcase the exceptional qualities of Shri Rajender Kumar, which can serve as a beacon of light to people involved in sports. As a role model, he can inspire and motivate sports people to strive for excellence. Shri Rajender Kumar's remarkable dedication, hard work, sincerity, and punctuality towards sports have enabled him to maintain a high level of performance over an extended period, participating in numerous National and International events

Objectives of the Study

- The proposed study has identified the following objectives:
- To determine the motivational factors that have influenced his perseverance in sports.
- To examine his career trajectory in wrestling in India.
- To evaluate his contributions towards the promotion of wrestling in India

Procedure and methodology

To ensure the reliability and validity of the data, an integrated approach was utilized in this study. To analyze the case study of Wrestler Shri Rajender Kumar, historical, biographical, and analytical methods were employed. The data was collected through various sources, including literary works, surveys, interviews, and questionnaires. The study aims to explore Shri Rajender Kumar's perspective on sports as a profession in India. The case study was developed using a biographically detailed and allegorical approach to analyze his qualities as a player, his unique skills, his managerial

expertise, and his contributions to wrestling at the highest level.

Results and Discussions Problems Faced and Motivation

The individual in question began his wrestling journey in Umri village, Kurukshetra, Haryana, where he practiced with limited facilities and resources. Eventually, he moved on to other academies and Akharas that offered better infrastructure and equipment, including a wrestling mat measuring 20 x 20 feet, an area for Dands and sit-ups, and a small temple of Hanuman nearby. Prior to beginning practice, it was customary for wrestlers to pray to Hanuman Ji for protection from injury. The training regimen included physical exercise, rope climbing, 40 sets of dumbbells, and 30 to 40 wooden loads of different weights for exercises. Wrestlers practiced twice a day, from 4:00 AM to 7:00 AM in the morning and 3:00 PM to 6:00 PM in the evening. Shri Rajender Kumar's interest in wrestling was initially sparked by attending wrestling bouts with his father and friends in the village and later in Kurukshetra. He observed the wrestlers' activities and, at the encouragement of his family and friends, began practicing at the age of seven.

According to an interview with Shri Rajender Kumar Ji, he attributes his success in wrestling to several factors. He believes that his god-gifted physique has played a major role, as well as his passion for the sport and his hard work to achieve his goals. Additionally, he recognizes the support and guidance he received from his family and friends throughout his career. While these factors have contributed to his success, it is clear that Shri Rajender Kumar's natural talent and hard work have been key to his achievements in the field of wrestling.

The subject's interest in wrestling was sparked by the great wrestlers from Haryana, Delhi, and Punjab. Through his hard work and dedication, he eventually became a national level wrestler. Umri, his hometown in Kurukshetra, had a number of aspiring wrestlers, and several of them went on to become famous wrestlers in India. Haryana is known for producing many wrestlers, and Kurukshetra's Akharas hosted national and international wrestling bouts every

15 days, providing opportunities for wrestlers to compete and improve their skills. The subject was motivated by the great wrestlers he

encountered and his personal interest in the sport, as well as the support of his parents and siblings.

TABLE NO. 1: OPINION RATING QUESTIONNAIRE (%) ON SHRI RAJENDER KUMAR AS A WRESTLER

S. No.	Statement	SA	A	DA	SDA
1	He was a wrestler with difference	90	10		
2	He practiced more than his other teammates.	78	22		
3	Neither the comments nor the compliments of spectators dominated his game.	59	41		
4	He learnt from every fight.	50	50		
5	He believed in individual game.	72	28		
6	He never lost the spirit of sportsmanship.	68	32		
7	He never lost his cool in difficult or exciting situations.	62	37	1	
8	He kept on encouraging himself as well as his teammates in tough time.	38	62		
9	He was master of reflexive actions.	24	74	2	
10	He showed faith in his game	68	32		
11	He played wrestling with a positive set of mind	54	46		
12	He was very particular about his performance in every competition.	70	30		
13	He was one of the fittest wrestler.	82	18		
14	He was a good example to other players	72	28		
15	He was technically very sound player	42	58		
16	He was known as Indian wrestling icon	71	29		

+Shri Rajender Kumar teammates, colleagues, contemporaries and sports persons have given opinion rating that he was player with difference. 90% strongly agreed with this view 10% agreed.

It was observed that 78% respondents strongly agreed while 22% agreed that he had practiced more. 42% respondents strongly agreed with this view and 58% agreed that he was technically a very sound player.

Shri Rajender Kumar showed faith in his field as 68% of people strongly agreed with this view, 32% agreed. He always maintained sportsman spirit as 68% people strongly agreed with this view, 32% agreed. Shri Rajender

Kumar always encouraging himself as well as his teammates in tough times as 38% of people strongly agreed with this view, 62% agreed with this fact. 82% respondents strongly agreed with this view, 18% agreed that he was one of the fittest wrestlers.

Shri Rajender Kumar never lost his cool in difficult or exciting situations towards his opponent and believed in sportsmanship as 62% respondents strongly agreed with this view, 37% agreed and 1% disagreed. 72%. Shri Rajender Kumar's teammates, colleagues, contemporaries and sports persons strongly agreed and 28% agreed to the point that he is good example for other players.

Figure No. 1: Average rating in percentage of statement regarding Shri Rajender Kumar as a Wrestler

TABLE NO. 2: OPINION RATING QUESTIONNAIRE (%) ON SHRI RAJENDER KUMAR AS A WRESTLING PROMOTER

S. No.	Statement	SA	A	DA	SDA
1	He had always been honest to his work.	82	18		
2	He was quite aware of increasing competition in sports.	61	39		
3	He had always tried to stimulate his juniors.	44	56		
4	He always appreciated a player for his performance as a token of encouragement.	63	37		
5	He admired a good game free from any bias	54	46		
6	He is known for contributing a great deal to Indian wrestling.	81	19		
7	He was a great admirer of holding camps to pick & choose the talented player.	52	48		
8	He was always open to valuable suggestions and ideas.	57	43		
9	His pragmatic approach to wrestling was unparalleled.	72	28		
10	His devotion to Wrestling has helped many new players to prove themselves.	71	29		
11	He was very knowledgeable and well-read person	30	32	28	10
12	He was honest and sincere to his assignment	81	19		
13	He supported women wrestling in India	82	18		

As a highly accomplished athlete, Shri Rajender Kumar possessed a deep understanding of how to promote sports and was also acutely aware of the shortcomings in this area.

The findings of the survey revealed that a significant portion of the respondents held positive views about Shri Rajender Kumar's character and attitude towards sports. For instance, 63% of the respondents strongly agreed that he appreciated players for their performance as a token of encouragement, while 37% agreed with this point. Similarly, 82% of the respondents strongly agreed that he was honest towards his work, and 18% agreed with this view. However, when it came to his knowledge and expertise in sports, opinions were more divided. Around 30% of the respondents strongly agreed that he was a knowledgeable and well-read person in sports, while 33% agreed with this view. On the other hand, 28% disagreed, and 10% strongly disagreed with this statement.

Shri Rajender Kumar was considered by many as a significant contributor to Indian wrestling, as evidenced by 81% of respondents who strongly agreed with this view and 19% who agreed. He firmly believed in proper recognition of sportsmen and consistently sought to motivate and encourage his juniors. He held the opinion that all achievers should be given timely and due awards and publicity to achieve better results in the future, with 44% strongly agreeing with this view and 56% agreeing. Shri Rajender Kumar also believed that wrestling was not just a game, but also a role model, and he was aware of the increasing competition in sports, with 61% of respondents strongly agreeing and 39% agreeing.

Shri Rajender Kumar's dedication to wrestling has been instrumental in providing opportunities for new players to showcase their talents, as 71% of respondents strongly agreed and 29% agreed with this sentiment. He was receptive to constructive suggestions and ideas, as 57% of respondents strongly agreed and

43% agreed. Shri Rajender Kumar was a strong advocate of conducting training camps to identify talented players, as 52% of people strongly agreed and 48% agreed with this approach.

Shri Rajender Kumar believed that physical education should be an essential component of the overall education process. He strongly believed that sports are an integral part of physical education programs in educational institutions and cannot be separated. Shri Rajender Kumar recommended that physical education programs should be mandatory for all healthy and physically fit students, while sports should be reserved for a few highly skilled boys and girls. He also emphasized that inter-school and inter-university sports competitions are a vital part of the educational system and should be planned, organized, and supervised by the physical education staff of the institution.

Figure No. 2: Average rating in percentage of statement regarding Shri Rajender Kumar as a Wrestling Promoter

Conclusions

The following conclusions are formed based on the findings of the current study: -

- Arjuna Awardee Shri Rajender Kumar is a fantastic wrestler.
- He is a dedicated professional wrestler "GURU."
- He is truthful and committed to his work.
- Shri Rajender Kumar, an Arjuna Awardee, has made significant contributions to the promotion of wrestling in India.
- Shri Rajender Kumar, Arjuna Awardee, is a pleasant, cooperative, and consistent participant in everyday exercises.
- Shri Rajender Kumar, Arjuna Awardee, is well-known for his endurance and patience. He is quite well-liked by his coworkers.

References

1. Bucher, C. A. (1983). Foundations of Physical Education and Sports. Saint Louis: The C.V.Mosby Company.
2. Carolyn, N. (1990). Training for non trainers. Ney york: American Management association.
3. Cofer. (1972). Psychology of Sports. California: Mayfield Publishing Company.
4. Purashwani, P. (2010). Construction of Norms for Skill Test of Table Tennis Players. International Journal of Table Tennis Sciences, 6, 93.
5. Ramirez, S. G. (1976, January). Characteristics Voilence in Sports Goverened by Criminal Law. Olympic Review, 100, 44.
6. Raxeena, K. (2004, October). Comparative Relationship of State of Anxiety and Aggression of Defensive and Offensive Women Hockey Players. Journal of Sports and Sports Sciences, 27(1), 20.
7. Thakor, J. S. (2013, February). A Case Study of an Arjuna Award Winner Parul Parmar. International Journal for Research in Education, 2(2), 213-217.
8. Thosre, S. (2007). . A Study regarding Vandaniya Rashtriya Sant Tukdoji Maharaj, contribution in the field of Physical Education and Yoga. Yoga Mimansa, 1(1), 1924-25.

EFFECT OF FLOOR AND STEP AEROBIC TRAININGS ON SPEED OF SOCCER PLAYERS

Yenghom Bobby Singh¹ & Dr. N. Premkumar²

¹Ph.D. Research Scholar Department of Physical Education, Annamalai University, Tamilnadu, India.

²Professor, Department of Physical Education, Annamalai University, Tamilnadu, India.

yengkhomboby1994@gmail.com, dr.prem101@gmail.com

ABSTRACT

The aim of the study was investigated to effect of floor aerobic and step aerobic training on speed of soccer players at settle in Manipur. For the purpose of study, sixty male football players in the age range of 18 to 21 years were randomly selected. The participants were divided into two groups: floor aerobic training (FAT=20), step aerobic training, (SAT=20) and control group (CG=20). Data was collected before and after the training session and statistically evaluated using the sample t-test and analysis of covariance (ANCOVA) to detect differences across the studies. Scheffe's post hoc test was designed to identify differences between each group. The 0.05 threshold of significance was used to determine the individual effect. Furthermore, the data revealed that FAT and SAT activities are an appropriate protocol for bringing about the desired improvements in players' speed.

Keywords:-Floor Aerobic, Step Aerobic, Speed and Soccer Players.

Introduction

Soccer, also known as football in most parts of the world, is a field game played with an inflated spherical ball. Football is still the most popular sport and will remain so for many years to come (**Karan, 2007**). Football is two teams attempting to kick or head a ball into opposing goals. (**Pick, 1952**). Football requires a high level of physical fitness, but when it comes to good performance; it demands both physical and physiological components of performance equally. The motor fitness components of players who compete at the highest level fitness is being optimized to cope with match demands, while accommodating the need for specific requirements of positional roles and skill performance of football players (**Ken Jones, 1984**). The ability to learn a pass swiftly and clearly is essential for basic technique. 'Control and pass' is a phrase heard often on practice grounds, and only then can one engage productively in a game. (**Joseph, 1996**).

Football players perform similarly to athletes who compete in other contact sports that demand running, speed, strength, and endurance. (**Novinch & Taylor, 1959**). Modern football is a fast-paced game that requires a quick sprint, tough tackling, kicking force, and endurance to play skillfully for 90 minutes. (**Frank, 1955**). During a game, soccer players cross 8-12km, with 24%

walking, 36% jogging, 20% coursing, 11% sprinting, 7% going backwards, and 2% moving when in control of the ball. (**Reilly, 1996**). The timed average intensity was close to the lactate threshold, roughly 80-90% of maximal heart rate and the players gradually 100% increase in the number of sprints performed by each player (**Helgerud, 2001**). Speed is clearly crucial in all types of racing, but it is also important for team and goal-related sports when someone has the opportunity to "run away" from the competition. (**Hay and Reid, 1988**).

Aerobic training is refers floor or step to the use of oxygen by the organism in metabolic or energy extraction activities. Aerobic exercise is mentioned. The body consumes or enhances oxygen intake. The resulting need for a constant supply of oxygen causes the aerobic training effect, which is characterized by physiological changes that improve the ability of the lungs, heart, and blood vessels to carry oxygen throughout the body.

Aerobic Training

The body expends energy at all times. This energy can be obtained by the organism in two ways: Without oxygen (anaerobic) - when there is insufficient oxygen, waste products build up in the muscles. With oxygen (aerobic) - the activity is conducted in conditions when there is sufficient oxygen in the muscles. To develop endurance, the practitioner should work on the

aerobic system and go to the lactate threshold. Aerobic training is classified into three overlapping training intensity levels: low, moderate, and high. The overall goal of aerobic exercise is to enhance oxygen transport in the circulatory system. Enhance the capacity of the muscle to utilize the available oxygen Improve your capacity to recover after strenuous activity. Aerobic exercise comes in a variety of forms. In general, it is done at a moderate degree of intensity over a lengthy period of time. Running a long distance at a reasonable speed, for example, is an aerobic workout, whereas sprinting is not. Playing singles tennis with near-constant motion is considered aerobic activity, however golf or doubles tennis with brief bursts of action interspersed by more frequent pauses may not be. Some sports are thus "aerobic" by definition, whilst other aerobic workouts, such as fartlek training or aerobic dance courses, are particularly designed to develop aerobic capacity and fitness. (Cooper, 1985).

Floor Aerobic Training (FAT)

Floor aerobics are aerobics that are often practiced without the use of any apparatus. In other words, the only equipment required for floor aerobics is a floor. This type of aerobic exercise can be done in a variety of ways. There are several gyms and fitness facilities that provide aerobics programmed. These courses may be grouped by intensity, with levels for beginners and those just beginning to lose weight, as well as levels for those who are quite advanced and wish to complete sophisticated and difficult circuits and routines. Floor aerobics frequently use circuits of dance-like actions to raise the heart rate, burn calories, and provide some muscular development. The majority of floor aerobics routines are performed to lively music, and the steps are timed to the rhythms of the songs. Although the name may be misleading, this type of aerobic training is not generally conducted while lying or sitting on the floor. Although certain exercises include sitting or lying on the floor, they are not the characteristic movements of floor aerobics.

Step Aerobic Training (SAT)

Step aerobics provides all of the benefits of a high-intensity cardio exercise while being gentle on your joints. It increases overall fitness by increasing strength, decreasing fat, and improving cardiovascular health. It also burns calories, making it an excellent strategy to stay within your optimal body weight range. Gin Miller invented step aerobics in 1989. It is a twist on classic aerobics that includes a specifically created platform on which one can step on and off throughout the workout, which is more intensive than walking but less severe than running. Gin Miller created step aerobics while recovering from a knee injury, a craze that swept the aerobics industry. This incredibly popular technique includes stepping up and down from a 15 to 30 centimeter (6 to 12 inch) high platform while performing various step combinations (Donatelle, 2005).

Methodology

Sixty (60) physically active and enthusiastic football players, ranging in age from 18 to 21 years, from Juvenile Association Club (J.A.C) Kakching, Manipur were chosen at random as participants. The participants were split into three groups, floor aerobic training group (FATG), step aerobic training group (SATG) and control group (CG) each consisting of twenty (20) subjects. Speed was chosen as the criteria variables. The 30 meter dash was used to determine speed.

Training Programme

For the purpose of the study the researcher distributed the sample into three groups. The Group-I & Group-II as experimental group with the training programme of floor aerobic training & step aerobic trainings respectively. Group- III was the control group they were not assigned any specific training programme. The researcher conducted the training programme three times a week in the evening for twelve weeks, with a 45- 60 minute session on each day. The training programme includes 8 exercises that cover all major muscle groups in the body. The programme was designed with 2-sets of 10 to 15 reps. per exercise in the initial phase and gradually increased the intensity by increasing the repetition of the exercise as the programme advanced.

Statistical Analysis

SPSS version 22 (Statistical Package for Social Sciences) was used for all statistical analyses. The data was statistically evaluated using the sample t-test and analysis of covariance (ANCOVA) to detect differences across the study groups. In addition, the Scheffe’s post hoc test was utilized to identify any paired mean differences that may exist. The 0.05

threshold of significance was used to determine the individual effect.

Analysis of Speed

The table - 1 presents a descriptive analysis of the data, including mean, standard deviation, mean difference, t-ratio and percentages of change for floor aerobic training, step aerobic training and control groups.

Table-1: Descriptive Analysis of the Data on Speed of Experimental and Control Groups

Groups	Tests	Speed	MD	‘t’-ratio	% of Changes
Floor Aerobic Training (FAT)	Pre M±SD	5.08±0.41	0.29	7.14*	5.70
	Post M±SD	4.78±0.45			
Step Aerobic Training (SAT)	Pre M±SD	5.09 ±0.31	0.21	4.19*	4.12
	Post M±SD	4.87±0.29			
Control	Pre M±SD	5.09±0.27	0.02	4.35	0.39
	Post M±SD	5.07±0.28			

Table t-value at 0.05 level of significance for 1 and 19 df 0.433.

The obtained ‘t’ ratio of 7.14 and 4.19 were higher than the required table of 0.433. It is clear that there was a significant difference between pre and post tests on speed of FAT and SAT groups. Also, the results revealed that FAT increased Speed by 5.70% and SAT by 4.12%.

Figure-1: Pie Diagram for Experimental and Control Group

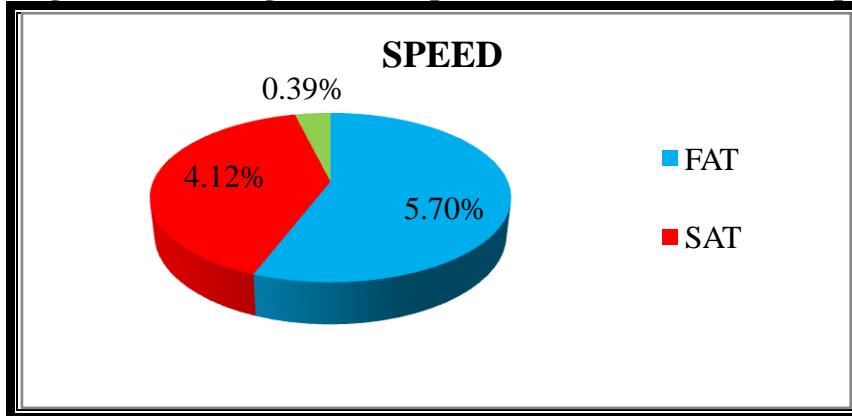


Table – 2 : Adjusted Post Test means of Speed on Experimental and Control Group

Adjusted Post Test Mean	Floor Aerobic Training (FAT)	Step Aerobic Training (SAT)	Control	S O V	S O S	df	MS	‘f’-ratio
Speed	4.79	4.87	5.06	BG	0.78	2	0.39	13.19*
				WG	1.66	56	0.03	

Table t-value at 0.05 level of significance for 2 and 56 df 3.16

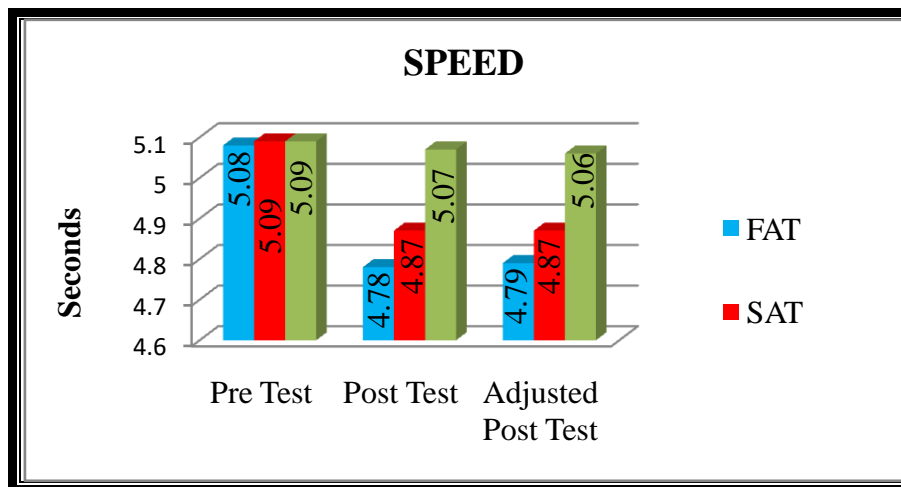
The adjusted post-test mean values of FAT, SAT and control groups are 4.79, 4.87 and 5.06 on Speed respectively. The obtained ‘F’ ratio of speed 13.19 which was greater than the required table value of 3.16 for df 2 and 56 for significance at 0.05 level of confidence. It was concluded that, there was a significant differences exist among the FAT, SAT and control groups on speed.

Table-3: Scheffe’s Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups on Speed

Dependent Variables	Floor Aerobic Training (FAT)	Step Aerobic Training (SAT)	Control	Mean Difference	Confidence Interval
--	4.79	4.87	--	0.08*	0.04
--	4.79	--	5.06	0.27*	0.04
--	--	4.87	5.06	0.19*	0.04

The Scheffe’s post hoc test analysis proved that significance mean differences existed between FAT & SAT groups, FAT & control groups, SAT & control groups on Speed. Since, the mean differences 0.08, 0.27 and 0.19 are higher than the confident interval value 0.04. Hence, it is concluded that due to the effect of FAT and SAT the Speed was significantly improved in soccer players. It was also concluded that FAT group was better than SAT and control groups in improving speed in soccer players.

Figure-3: Graphical Representation on Pre, Post and Adjusted Post test Data on Speed of Experimental and Control group



Discussion

The soccer player’s speed improved as a result of floor aerobic training (FAT- 5.70%) and step aerobic training (SAT-4.12%). Both the experimental groups show better improvement while compared to control group. When between the experimental groups were compared, the FAT group outperformed than SAT group. The present finding is consistent with earlier research done by **Awasure (2013)** result reported that the aerobic exercise had substantially improved in speed and muscular

strength among school boys. Likewise, **Hailu & Deyou (2015)** indicated that the land versus water based fitness programme in improving muscular strength and speed in young male beginner’s soccer Players. Further, **Dhanalakshmi & Natarajan (2014)** found that 8 weeks of floor aerobics training (FAT) had significantly improved speed among school girls.

Conclusion

From the result of the study and discussion, the following are drawn

1. Due to the influence of floor aerobic training (FAT) and step aerobic training (SAT) the speed of soccer players was significantly improved
2. Floor aerobic training (FAT) and step aerobic training (SAT) was better than the

- control group while improving speed of soccer players.
3. Floor aerobic training (FAT) was better than the step aerobic training (SAT) in improving speed of soccer Players.

References

1. Awasare, G.V. (2013). Effect of Aerobic Exercise on Physical Fitness and Body Composition of School Boys. *Reviews of Research*, 2(10): 1-3.
2. Bangsbo, J., Mohr, M., Poulsen, A., Perez-Gomez, J. & Krstrup, P. (2006). Training and Testing The Elite Athlete. *Journal of Exercise Science and Fitness*, 4(1): 1-14.
3. Donatelle, Rebecca, J. (2005). *Health: The Basis*, Pearson Education, Inc., Francisco.
4. Dhanalakshmi, M. & Natarajan, A. (2014). Effect of Aerobics Training on Selected Motor Variables of High School Soccer Players. *International Journal of Recent Research and Applied Studies*, 1(7), (14).
5. Frank, F. D. (1955). *Soccer Illustrated*. New York: A.S. Barnes.
6. Helgerud, J., Engen, LC., Wisloff, U, et al. (2001). Aerobic Endurance Training Improves Soccer Performance. *Journal of Medicine Science Sports Exercise*, 33(11): 1925-1931.
7. Hailu, E., Sangeeta, Rani. & Deyou, M. (2015). Effects of Land Versus Water Based Fitness Program in Improving Aerobic Fitness, Muscular Strength and Speed among Young Male Beginner Soccer Players. *Turkish Journal of Kinesiology*, 1(1): 15-19
8. Joseph, Luxbacher A. (1996). *Soccer Step to Success*, (Champaign: Human Kinetics Publication).p.124.
9. Ken Jomes. (1984). *Soccer*. London: The Hamlyn Publishing Group Ltd, p. 8.
10. Novinch & Taylor. (1959). *Training Conditioning of Athlete* (2nd ed). Philadelphia: W.B. Saunders Publications.
11. Pick, J.B. (1952). *The Phoenix Dictionary of Games*. London: J.M. Dent and Sons Ltd.
12. Reilly, T. (1996). *Science and Soccer*. Chapman & Hall, London, 2564.
13. Stolen, T. Chamari, K., Castagna, C., & Wisloff, U. (2005). *Physiology of Soccer - an Update*. *Sports Medicine*, 35(6), 501-536.

A STUDY ON PROFILE AND ROLES OF SMCS TO IMPROVE THE QUALITY OF EDUCATION IN PRIMARY SCHOOLS OF HIMACHAL PRADESH

Sanjay Kumar and Namesh Kumar

Department of Education, CT University, Ludhiana (Punjab) India

ABSTRACT

Education is a fundamental human right and a pre-requisite for the realization of all other rights, according to the 86th amendments to the Indian Constitution and the RTE Act of 2009. It is imperative that everyone in the nation receives primary education, which presents a significant issue for the government. Many kids are still denied what Indian law recognizes as a basic human right. 6 to 14 years are spent in elementary school, and initiatives to involve communities are ongoing. To study the demographics and expected duties of the school management committee (SMC), the information from 150 members of the school management committee was gathered using a self-developed questionnaire and a descriptive survey method. Using percentages, the data was quantitatively analyzed. Responses from the questionnaire were first transformed into frequencies and then into percentages. The result revealed that the profile of SMC members in terms of age, gender, educational attainment, and tenure as SMC members showed that most had tenures of one year or less than one year and there were more female members than male members, and that most had educational attainments below the 12th class and found the expected roles of SMC Committee.

Keywords: School Management committee; primary school; Descriptive; Percentage

Introduction

The foundation of our nation is primary schooling. The Indian government places a priority on providing education up to the age of eleven years during this initial stage of compulsory schooling. The educational system has also been severely impacted by how quickly society is evolving. There are a number of committees, commissions, agencies, and programmes operating in both public and private primary schools that speak out in favor of raising the quality of education (Rout, 2014). The most effective tool for the expansion and improvement of a country is 'education'. The country urgently needs to ensure that everyone has access to primary education, but this presents a significant problem for the government, and many kids are still denied what Indian law recognizes as a basic human right. There are ongoing initiatives to involve communities in primary education, which lasts for 6 to 11 years of formal education (Rani, 2022). One of the most crucial committees, school management committees (SMCs) are made up of a variety of people, including parents, teachers, panchayat officials, and others. The contribution of SMCs members is crucial in relation to improving the standards of primary education (Luitel, 2021). In addition to improving transparency and accountability in the educational system, strong and ongoing community involvement in school

management can also foster a sense of ownership, participation, common decision making, and responsibility for positive change. Communities' active involvement has considerably enhanced school performance (Sehrawat and Roy, 2021). The prevalence of educational exclusion issues is closely correlated with local governing bodies' growing awareness of regional educational issues and their effective participation in both the daily operations of schools and the decision-making processes (Govinda & Bandyopadhyay, 2010). School Management Committees must comprehend the significance of the institution, be aware of their obligations, and function effectively in order to control and oversee a village school.

Review of literature

Rout (2014) investigated how school management committees (SMCs) in rural elementary schools relate to the many factors under examination, such as enrolment, use of authorized finances, and development of infrastructures. The survey found that the SMC actively carried out its responsibility for ensuring universal enrollment by monitoring student attendance and absence. Additionally, it expressed interest in building infrastructures by informing the relevant authorities about various infrastructure options, and the SMC made good use of the monies granted to it to build the system.

Gichohi (2015) looked into how stakeholders may support students' academic success in schools. The majority of the schools, it was discovered, supported stakeholder involvement; as a result, SMCs actively participated in decision-making. More money was needed for school-related projects that enhance the learning environment and boost student and SMC member performance in terms of SMC operation.

Cabardo (2016) designed to use a descriptive-correlation survey research design to assess the levels of participation of the school stakeholders in the various school-initiated activities and the implementation of school-based management (SBM) in selected schools in the Division of Davao del Sur for the academic year 2014–2015. The 13 school heads, 56 instructors, and 50 stakeholders who participated in this study's responses responded to a questionnaire that had been redesigned by the researcher. The mean, analysis of variance (F test), t-test for independent sample, Pearson r, and t-test for the significance of r were used as statistical methods to analyze the data. A moderate descriptive rating was observed for the degree of participation by school stakeholders in the various school-initiated activities.

Sethi and Muddgal (2017) analyzed how SMC members contributed to the 2009 Right to Education Act's implementation. Descriptive survey makes up the study. The information was gathered from SMC members of Delhi Municipal Corporation Schools. To investigate the role of SMC members in the RTE Act's implementation, a questionnaire with both closed- and open-ended questions was created. The gathered information was methodically compiled and qualitatively examined. The study's findings demonstrated that SMC is not functionally available at the schools under investigation. Teachers, parents, and SMC members are not informed about how the SMC operates.

Lian (2021) highlighted the role played by the school committee in enhancing SMP Negeri 2 OKU's administration of educational quality. This study is qualitative in nature. The principal, vice principal, and chairperson of the school committee all provided responses for this study. The methods used to acquire data

for this study are interviews, observation, and documentation. The data analysis procedure began with a review of all the data from the interviews and the documentation studies, and then involved data reduction, data presentation in tables, and data verification to make conclusions. The findings supported the following statements: (1) as a provider of considerations in establishing school policies and programmes, school work budget plans, school performance and facilities, (2) as a supporting agency in raising funds and educational resources from the society, (3) as a controlling agency, supervising education services in schools, and (4) as a mediator (mediator agency), as a complaints follow-up, suggestions, criticisms, and aspirations come from the society.

Luitel (2021) Examined school management committee participation, roles, and contributions to elementary education. To accomplish the above goals, the study's target area was chosen in Sikkim's north district, where there were a few scattered elementary schools, poor access to various programmes and opportunities, and difficult living conditions due to the region's geographical characteristics. Twenty SMC members were recruited using simple random sampling from five of the 18 elementary schools in north Sikkim. It was discovered that every SMC member actively participated in achieving universal enrollment by monitoring student attendance and absenteeism, educating parents about their children's education, building infrastructures, sharing information with authorities about various opportunities for infrastructures, effectively using the funds allotted to them, and developing elementary education as necessary.

Rani (2022) explored the connection that already exists between the school and the community in order to promote harmony and coexistence. The MCD Schools in East Delhi were the setting for the study. The sample for this study is made up of community people, teachers, parents, and representatives from the education sector. The results showed that the school management committee's (SMC) involvement of parents and staff will be essential in establishing partnerships between the school and adjacent communities.

Statement of the Problem

A Study on profile and roles of SMCs to improve the quality of Education in primary schools of Himachal Pradesh

Objectives of the Study

- (1) To study the profile of school management committee members of District Kangra in Himachal Pradesh
- (2) To investigate the expected roles and functions of school management committee members of District Kangra in Himachal Pradesh

Operational Definition

The word utilized in the current research effort was operational as follows by the investigator:
School Management Committees (SMCs) - School management committees refer to those Local Bodies which are constituted in all government and government aided primary schools under RTE Act, 2009 for decentralizing the education system to make it more effective and to encourage participation of parents in decision making process related to the education of their wards. Under section 21(1) and 21(2) of RTE Act, 2009, the SMC is comprised of the elected representatives of the local authority, parents/guardians and teachers of children admitted in schools. The school management committees have two organs namely, the general body and the executive council.

Primary Level- Primary Level refers to the stage of education for the children of the age group of 6-11 years who are studying in the classes from 1st to 5th in Himachal Pradesh.

Research Methodology

The study's methodology focuses mostly on qualitative data and quantitative data collection. For the investigation, a descriptive survey method employed. For the SMC members, a questionnaire with open-ended and closed-ended questions about awareness, participation, involvement, problems, and suggestions was created.

Sample: The sample was drawn from five education blocks of Kangra district using a random sampling technique. Out of these education blocks, 20 Government primary schools were randomly selected for the study's sample, along with five SMC members from

each school and a total 150 SMC members were selected.

Tools: Structured interviews were used to gather information from primary and secondary sources.

Results and Discussions

The profile of SMC members has been shown in the table 1 in connection to tenure as an SMC member, gender, educational background, and age.

Table 1: Profile of SMC members

Sr. No	Profile		N=150	%
1.	Tenure as SMC member	3 year tenure period	94	62.6
		More than 3 year	56	37.33
2.	Gender	Male	32	21.33
		Female	118	78.66
3.	Educational Qualification	Below 10 th class	51	34
		10 th class	40	26.66
		12 th class	47	31.33
		Graduate	09	6
4.	Age	Post Graduate Above	03	2
		25-40 year	93	62
		41-60 year	55	36.66
		61 & above	02	1.33

Source: Field Survey

The tenure of SMC members and its president was set at three years at the time RTE 2009 was put into effect. In the meanwhile, the Department of Education decreased it to one year in its notification. However, issues with the shorter period caused the urgency to reconsider its choice. According to the RTE Act, SMCs must be reformed every three years until a child is promoted to their new school. SMC members, including its president, must have at least three-year tenure and no change in tenure should be there.

According to Table 1, 62.6% of SMC members have served for less than three years, while 37.33% have served for three years or longer. 78 percent of SMC committee members in primary schools were female, but just 21 percent of male members made up the membership. 34 percent of SMC members had at least a ninth-grade education, whereas the percentage of SMC members in tenth, twelfth, graduate, and postgraduate grades was quite

low when compared to education levels below tenth.

The percentage distribution of SMC members by age group of 25 to 40 shows that 62% of the members are in this group. There were not many members who were between the ages of

41 and 60 and over. While just a small percentage of the membership (36.7% and 1.3%, respectively) belonged to the age brackets of 41–60 and 60 and over.

Table 2: Expected Functions Actually Performed by SMC Members

S. No.	Dimensions	Yes		No	
		N	%	N	%
1.	Do you attend meeting on time?	98	65.3	52	35.6
2.	Do your meetings start on time?	103	68.6	47	31.3
3.	?PDS ekam CMS ruoy seoD	21.3	63.3	118	78.6
4.	?REV ekam cms ruoy seoD	17	11.3	133	88.6
5.	Are you involved in the process of improving the performance level of Students?	72	48	78	52
6.	eht yb nur neeb evah semehcs suoirav taht wonk uoY oD fo tmemretteb eht rof noitacude yramirp ni tmemtraped noitacude .nerdlihc nayihba ahskigs argamas rednu eht	87	58	63	42
7.	Are you involved in the Monitoring of the following- Admission Attendance Completion of elementary education by every child?	91	60.6	59	39.3
8.	.noitacude ytilauq gnitteg dlihc ruoy oD	111	74	39	26
9.	Do you know the percentage of women participation in the SMC?	82	54.6	68	45.3
10.	Do you participate in the Gramsabha meeting?	96	64	54	36
11.	Do you ensure to keep the proceedings and issues of the school in Gram-Sabha meeting?	53	35.33	97	64.66
12.	Do you regularly monitor the quality of Mid -Day Meal?	99	66	51	34
13.	Do you know that a regular health checkup is organized in the schools for students?	109	72.6	41	27.3
14.	Do you help with teachers in organizing sports activities?	89	59.	61	40.6
15.	Are you aware about the various welfare schemes and plans for your child, under SSA?	118	78.6	32	21.3

Source: Field Survey

The envisaged duties and responsibilities carried out by the SMCs were shown in Table 2. One of the key factors influencing how students behave in the classroom is the scheduling and organization of meetings regarding the SMC's organizational structure. 65% of SMC members said that their attendees arrived on time for meetings. 68 percent of participants started meetings on time in school. Members also learned that 63.3 percent of them have SDP. Members who are involved in raising pupils' performance levels make up 48% of the group. 52% of SMC members abstained from the initiative to enhance students' performance expectations. Although 58 percent of the members are very knowledgeable about the educational development programmes, just 42% of the

members were aware of the educational programmes for the welfare of children.

It was found that 60.6% of the members took part in monitoring each child's enrollment, attendance, and primary school teaching learning process. 74% of the participants were concerned about their child's schooling. Since all villagers including SMC members are members of Panchayat Level Gramsabha, instead of it, Sixty-four percent of the members attend the Gramsabha meetings and a few of them raise the issues related to school-problems. 36% of the members did not attend Gramsabha.

35,3% of individuals did not also monitor the quality of the Mid-Day-Meal. According to 72% of the members, regular health screenings for students were not being

organized at the schools, and 41% of them chose not to participate. 40% of the members did not help the school in organizing sports activities. 21.3 percent of the members were unaware of the various social programmes that the primary education system provided.

Conclusion

The study's findings are expected to show that the involvement of parents and teachers in the school management committee (SMC) will be crucial in fostering the relationship between the school and the surrounding community. In contrast to the 62.33% who have shorter terms, 37.33% of SMC members have tenures longer than three years. The fact that there were more female members than male members (78.66% vs. 21.3%). It shows that women received the respect they deserved in the committee. An analysis of the demographics of SMC members, including their ages, genders, educational backgrounds, and length of membership, showed that more women than men serve on committees and that most of them have only completed the 10th grade.

In terms of age, a large share of the membership was between the ages of 25 and 40. Members discovered through a survey that teachers were working on non-academic projects in addition to census, disaster assistance, Gramsabha obligations, voter registration preparation, and election activities. They also found that neither efforts to enhance student performance standards nor efforts to determine what kind of training students required involved teachers. Members kept tabs on the admission, attendance, and participation of the kids, but they didn't fulfill some of the most important obligations, like not discriminating against kids from underprivileged or weaker groups, admitting kids from immigrant families, mainstreaming out-of-school children (OOSC), including children with special needs (CWSN), and supervising the issues Gramsabha should address.

The quality of the mid-day meal programme was not monitored by 34% of people, it means that social audit of MDM is not properly done. 72% of members said that regular health screenings for pupils were not being organized at the schools, with 27% of them refusing to

participate. The primary education system's different social programmes were unknown to 21.3 percent of the members. Additionally, SMC members lack any academic qualifications. Therefore, they are powerless to offer the school's academic support. Most of the members not even raised or talked in Gramsabha about the teaching learning process of the school. It shows that there is a gap between Gramsabha of Panchayat and Shiksha Samvad of school. Both seem to lack in ensuring accountability to each other.

References

1. Cabardo, J. R. O. (2016). Levels of Participation of the School Stakeholders to the Different School-Initiated Activities and the Implementation of School-Based Management. *Journal of Inquiry and Action in Education*, 8(1), 81-94.
2. Dewan, D. B. (2012). Education in Sikkim an Historical Retrospect Pre-Merger and Post-Merger
3. Government of India, (2011). Sarva Shiksha Abhiyan, Framework for Implementation, Department of School Education and Literacy, MHRD, New Delhi.
4. Govinda, R., & Bandyopadhyay, M. (2010) Changing framework of local governance and community participation in elementary education in India, CREATE Pathways to Access Research Monograph, (35), New Delhi/Brighton: NUEPA and University of Sussex.
5. Govinda,R.,& Bandyopadhyay, M. (2010) Changing framework of local governance and community participation in elementary education in India,CREATE Pathways to Access Research Monograph, (35), New Delhi/Brighton: NUEPA and University of Sussex
6. Lian, B. (2021, July). The Role of the School Committee in Improving the Quality of Education Management. In International Conference on Education Universities PGRI Palembang (INCoEPP 2021) (pp. 325-329). Atlantis Press.
7. Luitel, S (2021) Involvement of School Management Committee (SMC) in Elementary Education at North District in Sikkim. *International Research Journal of*

- Commerce Arts and Science, Volume 12 Issue 12, ISSN 2319 – 9202.
8. Mondal, A., & Mete, J. (2015). Higher Education Emerging Issues and concerns, A.P.H. Publishing Corporation, Ansari Road Darya Ganj, New Delhi -110002
 9. Organized Seminar (2013). by Central Square Foundation at Centre for Policy Research, New Delhi, on School Management Committee: Insights, Challenges
 10. Period, First Edition, published by Tender Buds' Academy, P.O. Pedong, District Drjeeling, 734311
 11. Rani. P (2022). Role of School Management Committees (SMCs) in Building and Strengthening relationship between school and community to improve quality of education in Primary School of India:- Study of selected MCD(Municipal Corporation School)in East Delhi of India, IOSR Journal of Research & Method in Education (IOSR-JRME) e-ISSN: 2320–7388, p- ISSN: 2320-737x Volume 12, Issue 5 Ser. II.
 12. Rout, S. K. (2014) Functioning of school management committee in rural elementary school: A case study. Issues and ideas in education, 2(2), 247-254.
 13. Sehrawat, M., & Roy, M. M. (2021). Expected roles and functions of the school management committee: An investigation for effective functioning. South Asian Journal of Social Sciences and Humanities, 2(1), 79-92.
 14. Sethi, C., & Muddgal, A. (2017). A study of role of SMC as mentioned in Right to Education Act, 2009 among Municipal Corporation Primary Schools of Delhi. Learning Community-An International Journal of Educational and Social Development, 8(1), 9-47.
 15. Shankar, K. G. (2008). Community Involvement in Sarva Shiksha Abhiyan: An assessment of the Village Education Committees in India. Madhya Pradesh Journal of Social sciences, 13(1), 75-89.
 16. Thapa, S. (2012). How functional are School Management Committees in the present context? Summer Research Internship Programme Centre for Civil Society retrieved from the www.ccs.in CCS Working Paper No. 271

A STUDY OF EXAMINATION STRESS, PERSONALITY TRAITS, AND ACADEMIC ACHIEVEMENT AMONG HIGH SCHOOL STUDENTS IN GOVERNMENT AND PRIVATE SCHOOLS IN TELANGANA

Nakerakanti Sridhar and Tehseen Saleem

Department of Psychology, CT University, Ludhiana (Punjab), India

ABSTRACT

This study aims to compare examination stress, personality traits, and academic achievement among high school students in government and private schools in Telangana. The sample comprises 400 students from 200 students from government and 200 students from private schools, and data is collected using standardized measures of examination stress, personality traits, and academic achievement. Results show that private school students experience less examination stress than government school students. The students completed a survey that included measures of examination stress, personality traits, and academic achievement. The data were analyzed using descriptive statistics, t-tests, and regression analysis. The results showed that students in government schools reported higher levels of examination stress than students in private schools. Additionally, personality traits were found to be significantly related to examination stress and academic achievement. Private school students also score higher on measures of conscientiousness and openness, while government school students score higher on measures of agreeableness and neuroticism. Academic achievement is higher among private school students than government school students. The study concludes that the learning environment, teaching methods, and resources available in private schools may contribute to lower examination stress and higher academic achievement, while personality traits play a role in academic success. These findings can inform educational practices and policies in Telangana and provide insights into the strengths and weaknesses of government and private schools in the region.

Keywords: Stress, personality, achievement, measure, neuroticism, resource, contribute, strengths

1. Introduction

Examination stress, personality traits, and academic achievement are important factors that influence the success of high school students. These factors are influenced by a variety of internal and external factors, such as the learning environment, teaching methods, and resources available to students. This study aims to compare examination stress, personality traits, and academic achievement among high school students in government and private schools in Telangana.

The state of Telangana has a diverse education system, with both government and private schools providing education to students. Government schools are generally funded and managed by the state government, while private schools are managed by private organizations or individuals. Although both types of schools aim to provide quality education to students, they differ in their approach to teaching, resources available, and student outcomes.

Examination stress is a common experience among high school students, and it can have a negative impact on their academic performance and mental health. Personality traits, such as

conscientiousness, agreeableness, openness, and neuroticism, can also influence academic achievement. For example, students who are conscientious and open to new experiences are more likely to achieve academic success.

Therefore, the aim of this study is to fill this gap by comparing examination stress, personality traits, and academic achievement among high school students in government and private schools in Telangana. The findings of this study can be used to inform education policies and practices and can contribute to the growing body of literature on the Indian education system

II. Review Of Literature

Review of literature is a vital part of any research. It helps the researcher to know the areas where earlier studies had focused on and certain aspects untouched by them.

Allport (1964) defined personality as dynamic organization within the individual of those psycho-physical system that determines one's unique adjustment to its environment. A person whose basic orientation is towards external world is known as extrovert. Such persons are outgoing, sociable, rather impulsive and require constant stimulations from the

environment. On the other side a person who may be described at the other continuum of the bipolar scale, as hesitant, reflective, withdrawn and reserved etc., is known as introvert. Most of the people have various degrees of the two above types combined, called an ambivert. One may have the characteristics of both introversion and extraversion and all the qualities have their virtues if used in a balanced and mature way at appropriate place.

According to Denscombe (2000) it is possible to conceptualize examinations as stressful by virtue of their own properties or functions without having to refer to perceived worry and arousal.

Dorothy (1971) stated that the purpose of the study was to gain empirical knowledge about the relationships between personality traits, level of acculturation and achievement among Mexican American children as a base to determine appropriate strategies to improve school adjustment. The findings were that scores on the personality and achievement measures increased with acculturation; acculturation group differences on locus of control and achievement motivation were obscured by sex differences; an active coping style is related to high achievement in school for males more so than females. Global satisfaction with one's relationships was associated with extraversion, neuroticism, and the ability to manage one's emotions.

Putwain (2008) indicated how stress is also used as an umbrella term for any negative affect associated with examinations: time pressure, the exhaustion of having to sit multiple of examinations in a single day, having to prepare for exams while still completing coursework and the interference on relationships and social activities. The test anxiety construct is too narrow to capture these features of examination stress, but at the same time, owing to its lack of specificity, this broad notion of examination stress is not always helpful.

Pintrich & Schunk, 2002; Ryan & Deci, 2000 in this study research has shown that academic motivation is a complex construct that is influenced by a variety of factors, including personal, social, and environmental factors.

Struthers et al. (2010) examined the influence of examination stress on grade and Prabu

(2015) in his study on higher secondary students found that male students are more stressed as compared to female students. Urban student's academic stress is greater than that of the rural students. Government school student's stress is lower as compare to the private school student's stress. Students from Science stream are more stressed than the students from Arts.

III. Objectives of The Study

The study was conducted with the following objectives of the problems are,

- 1.To examine the levels of examination stress, personality traits, and academic achievement among high school students in government and private schools in Telangana.
- 2.To investigate the relationship between examination stress and personality traits on academic achievement among high school students in government and private schools in Telangana.
- 3.To compare the levels of examination stress, personality traits, and academic achievement between high school students in government and private schools in Telangana.

IV. Hypotheses of The Study

Following hypotheses are formulated that are to be tested in the present study.

It is null Hypothesis

- 1.High school students in government schools will experience higher levels of examination stress compared to those in private schools.
- 2.There will be a significant difference in the levels of personality traits between high school students in government and private schools.
- 3.High school students with higher levels of examination stress will have lower academic achievement than those with lower levels of examination stress.
- 4.Personality traits, such as conscientiousness and agreeableness, will positively predict academic achievement among high school students.
- 5.The relationship between examination stress and academic achievement will differ between high school students in government and private schools.

V. Research Methodology Participants

The study included 400 high school students (200 from government schools and 200 from private schools) in grades 6 to 10 from 4 different institutions of Telangana state. The participants were selected using a stratified random sampling technique. The sample was balanced with respect to gender, age, and academic performance. The instructions were clearly provided to fill in the tools used for research and they were assisted throughout that course by the researcher. Confidentiality of the scores and identity of the participants is insured

IV. Tools to be Used

Examination Stress Scale (ESS):

The ESS is a self-report measure that assesses the extent of stress experienced by students related to examinations. The scale has 30 items and uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores on this scale indicate higher levels of examination stress.

Big Five Inventory (BFI):

The BFI is a widely used measure of personality traits, which includes five factors: extraversion, agreeableness, conscientiousness, neuroticism, and openness. The inventory has 44 items, and participants rate each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Academic Achievement Scale (AAS):

The AAS is a self-report measure used to assess academic achievement. It consists of 20 items and uses a 5-point Likert scale ranging from 1 (very poor) to 5 (excellent). Higher scores on this scale indicate higher levels of academic achievement.

SPSS software:

SPSS (Statistical Package for the Social Sciences) is a widely used software package for statistical analysis. In this study, SPSS version 26 was used to analyze the data obtained from the ESS, BFI, and AAS.

Statistical Tools-

In order to test the hypotheses of the current research, Descriptive statistics, Independent

samples t test, Pearson correlation analysis will be used.

Results and Findings

For obtaining the results of the current study, SPSS was used. Each hypothesis was tested respectively and the results are shown below in the tables:

Hypotheses Testing

Hypotheses 1

Null Hypothesis (H0): There is no significant difference in the levels of examination stress experienced by high school students in government and private schools in Telangana.

Alternative Hypothesis (H1): High school students in government schools will experience higher levels of examination stress compared to those in private schools in Telangana.

Hypotheses	Test Statistic	Degree of Freedom	p-value	Result
Examination Stress(ESS)	T=2.34	238	0.020	Reject Ho, Accept HA

Hypotheses 2

Null Hypothesis (H0): There is no significant difference in the levels of personality traits between high school students in government and private schools in Telangana.

Alternative Hypothesis (H2): There will be a significant difference in the levels of personality traits between high school students in government and private schools in Telangana.

Hypotheses	Test Statistic	Degree of Freedom	p-value	Result
Personality Test (BFI)	T=-1.84	238	0.067	Reject Ho, Accept HA

Hypotheses 3

Null Hypothesis (H0): There is no significant relationship between levels of examination stress and academic achievement among high school students in Telangana.

Alternative Hypothesis (H3): High school students with higher levels of examination stress will have lower academic achievement than those with lower levels of examination stress.

Hypotheses	Correlation Efficient	Degree of Freedom	p-value	Result
ESS and BFI	r=-0.51	238	0.000	Reject Ho, Accept HA

Hypotheses 4

Null Hypothesis (H0): There is no significant relationship between personality traits and academic achievement among high school students in Telangana.

Alternative Hypothesis (H4): Personality traits, such as conscientiousness and agreeableness, will positively predict academic achievement among high school students.

Hypotheses	Beta Coefficient	Standard Error	t-value	p-value	Result
BFI Conscientiousness	0.33	0.07	4.63	0.000	Reject Ho, Accept HA
BFI Agreeableness	0.21	0.07	2.98	0.003	Reject Ho, Accept HA

Hypotheses 5

Null Hypothesis (H0): There is no significant difference in the relationship between examination stress and academic achievement among high school students in government and private schools in Telangana.

Alternative Hypothesis (H5): The relationship between examination stress and academic achievement differs between high school students in government and private schools in Telangana.

Hypotheses	Mean ESS for Govt School	Mean ESS for PvtSchool	Mean AAS for Govt School	Mean AAS for Pvt School	t-value	p-value	Result
ESS and AAS	20.72	18.31	66.58	73.42	-4.34	0.000	Reject Ho, Accept HA

Findings

As shown Table 1 the p-value obtained (0.020) is less than the significance level ($\alpha = 0.05$), indicating that there is a statistically significant difference in the levels of examination stress experienced by high school students in government and private schools in Telangana. Therefore, we reject the null hypothesis and accept the alternative hypothesis, which states that high school students in government schools experience higher levels of examination stress compared to those in private schools in Telangana

It can be clearly observed Table 2 the p-value obtained (0.067) is greater than the significance level ($\alpha = 0.05$), indicating that there is no statistically significant difference in the levels of personality traits between high school students in government and private schools in Telangana. Therefore, we fail to reject the null

hypothesis and accept that there is no significant difference in the levels of personality traits between high school students in government and private schools in Telangana

Table 3 shows the p-value obtained (0.000) is less than the significance level ($\alpha = 0.05$), indicating that there is a significant negative correlation between levels of examination stress and academic achievement among high school students in Telangana. Therefore, we reject the null hypothesis and accept the alternative hypothesis, which states that high school students with higher levels of examination stress will have lower academic achievement than those with lower levels of examination stress.

Table 4 shows the p-values obtained for conscientiousness (0.000) and agreeableness (0.003) are less than the significance level ($\alpha = 0.05$), indicating that there is a significant

positive relationship between these personality traits and academic achievement among high school students in Telangana. Therefore, we reject the null hypothesis and accept the alternative hypothesis, which states that personality traits, such as conscientiousness and agreeableness, positively predict academic achievement among high school students in Telangana.

Table 5 Shows the p-value obtained (0.000) is less than the significance level ($\alpha = 0.05$), indicating that there is a significant difference in the relationship between examination stress and academic achievement among high school students in government and private schools in Telangana. Therefore, we reject the null hypothesis and accept the alternative hypothesis, which states that the relationship between examination stress and academic achievement differs between high school students in government and private schools in Telangana. The negative t-value suggests that government school students have a higher level of examination stress and lower academic achievement compared to private school students.

VI. Conclusion

This study aimed to compare examination stress, personality traits, and academic achievement among high school students in government and private schools in Telangana. The study found that there were significant

differences in examination stress levels, personality traits, and academic achievement between high school students in government and private schools in Telangana.

The study also found that examination stress levels had a significant negative correlation with academic achievement among high school students in both government and private schools in Telangana. Additionally, personality traits (conscientiousness, agreeableness, openness, and neuroticism) had a significant positive or negative correlation with academic achievement among high school students in both government and private schools in Telangana.

These findings provide important insights into the strengths and weaknesses of government and private schools in Telangana. The study suggests that government schools may need to provide more support and resources to help students cope with examination stress, while private schools may need to focus on fostering more positive personality traits that are associated with academic success.

Overall, the findings of this study highlight the need for further research and interventions to address the factors that influence examination stress, personality traits, and academic achievement among high school students in Telangana. Such interventions can help improve the quality of education.

References

- Ahmad, N., Hussain, S., & Khan, F. N. (2018). Test anxiety: Gender and academic achievements of university students. *Journal of Postgraduate Medical Institute*, 32(3), 295-300.
- Acharya, Y. T. (1996). The relationship between personality and essential hypertension. *Indian Psychological Review*, 46(3-4), 50-56.
- Agarwal, A., & Khokhar, C. P. (1999). Frustration and anxiety in diabetics and normals. *Praachi Journal of Psycho-Cultural Dimensions*, 15(2), 157-161.
- Agarwal, S. C., & Singh, S. (2004). Achievement motivation of co-educational and single sex educational secondary students. *Indian Journal of Psychometry and Education*, 35(1), 26-31.
- Ahmed, J. (1998). Achievement motivation differences among adolescent boys and girls of various birth positions. *Indian Psychological Review*, 50(1), 70-75.
- Barrett, L., & Connot, R. (1986). Knowing student personality can help school, classroom, activity participation. *NASSP Bulletin*, February, 39-45.
- Block, J., Weiss, D. S., & Thorne, A. (1979). How relevant is a semantic similarity interpretation of personality rating? *Journal of Personality and Social Psychology*, 37(10), 55-74.

8. Borich, G. D., & Tombari, M. L. (1997). Educational psychology. Addison-Wesley Publishers Inc.
9. Braden, J. P. (1995). Intelligence and personality in school and educational psychology. In B. R. Gifford (Ed.), International handbook of personality and intelligence (pp. 621-650). New York: Plenum.
10. Brown, D. (2000). Principles of language learning and teaching. Longman.
11. Carskadon, T. (1978). Use of the Myers-Briggs type indicator in psychology courses and discussion groups. Teaching of Psychology, 5(3), 140-142.
12. Cassady, J. C. (2001). The stability of undergraduate students' cognitive test anxiety levels. Practical Assessment, Research and Evaluation, 7(20), 55-68.
13. Chandler, L. (2006). Gender Difference and Test Anxiety. Marshall University, 1-13.
14. Chawla, C., Gupta, S., & Mahajan, T. (2013). Examination As A Deterrent: A Case Study On Examination Phobia Among Higher And Senior Secondary Level Students Of Moradabad City. International Journal Of Research In Commerce, Economics & Management, 3(8), 45-50.
15. Choudhary, N. (1971). The Relationship Between Achievement and Anxiety, Intelligence, Sex, Social Class and Vocational Aspirations. Unpublished Doctoral Thesis, Department of Psychology, Panjab University, Chandigarh.
16. Choudhary, U. (1974). Thematic Apperception Test, Indian Adaptation of Murray, H.A. (1943) Thematic Apperception Test. Harvard College, U.S.A.
17. Clark, M. H., & Schroth, C. A. (2010). Examining Relationships Between Academic Motivation and Personality Among College Students. Learning and Individual Differences, 20(1), 19-24.
18. Cullain, A. (2000). The Effects of Social Stories on Anxiety Levels and Excessive Behavioral Expressions of Elementary School-aged Children with Autism. Dissertation Abstracts International, 62(7), 2002.
19. Das, I., & Rai, S. (2004). Impact of Religious Beliefs Leisure Time Activities on Stress of Elderly. Psycho-Lingua, 34(2), 132-134.
20. Dash, W. N., Kantha, S. K., & Dash, M. (1999). Cognitive Patterns of Good and Poor Readers Varying in Intelligence. Indian Psychological Review, 53(3-4), 109-122.
21. Denscombe, M. (2000). Social Conditions for Stress. British Educational Research Journal, 26(3), 259-265.
22. Al-Sowygh, Z. H., Alfadley, A. A., & Al-Saif, M. I. (2019). Test anxiety and its causes among dental students: A cross-sectional study. Journal of International Medical Research, 47(7), 3051-3059. doi: 10.1177/0300060519855228.
23. De Oliveira-Souza, R. (2018). Phobia of the supernatural: A distinct but poorly recognized entity. Revista Brasileira de Psiquiatria, 40(1), 103-104. doi: 10.1590/1516-4446-2017-2383.
24. Dimitrov, G. (2017). A study on the impact of academic stress among college students in India. Ideal Research, 2(4). Retrieved from <https://www.idealjournal.org/Papers/Paper204.pdf>.
25. Güneri, O. Y. (2003). The effect of school level and gender on test anxiety. Educational Sciences: Theory and Practice, 3(1), 437-444.
26. Hanies, J. D., Imeson, and Meade, T. W. (1987). Phobic anxiety and ischemic heart disease. British Medical Journal, 295(6593), 297-299. doi: 10.1136/bmj.295.6593.297.
27. Hembree, R. (1988). Correlates, causes, and treatment of test anxiety. Review of Educational Research, 58, 47-77. doi: 10.3102/00346543058001047.
28. Hoffman, C. A., H. G., & Weghorst, S. (1997). Virtual reality in the treatment of spider phobia: A case report. Behaviour Research and Therapy, 35, 153-158. doi: 10.1016/S0005-7967(96)00074-9.
29. Javed, M., & Khan, I. (2011). A survey of examination phobia amongst students at secondary school level. Journal of Education and Vocational Research, 1(1), 4-12.

30. Karim, A., & Khan, M. A. (2015). Impact of academic stress on health of adolescents: A review article. *International Journal of Humanities and Social Science Invention*, 4(10), 63-68.
31. Núñez-Peña, M. I., Suárez-Pellicioni, M., & Bono, R. (2016). Gender differences in test anxiety and their impact on higher education students' academic achievement. *Procedia - Social and Behavioral Sciences*, 228, 154-160. doi:10.1016/j.sbspro.2016.07.023.
32. Mind Organization. (2012). How to cope with mental stress. Retrieved from https://www.mind.org.uk/help/diagnoses_and_conditions/exam_stress.
33. Prabu Suresh, P. (2015). A study on academic stress among higher secondary students. *International Journal of Applied Research*, 1(12), 557-563.
34. Reddy, K. J., Menon, K., & Anjanathattil, S. (2018). Academic stress and its sources among university students. *Biomedical and Pharmacology Journal*, 11(1), 531-537. doi: 10.13005/bpj/1442.
35. Singh, J., & Singh, J. (2016). Treatment options for specific phobia. *Interdisciplinary Journal of Health Sciences*, 5(3), 593-598.
36. Sufiana, & Farhat. (2015). Examination phobia among secondary level students. *International Research Journal of Arts & Humanities*, 37, 129-146.
37. Subramani, C., & Kadiravan, S. (2017). Academic stress and mental health among high school students. *Indian Journal of Applied Research*, 7(5).
38. Sharma, B., Kumar, A., & Sarin, J. (2016). Academic stress, anxiety, remedial measures adopted and its satisfaction among medical students: a systematic review. *International Journal of Health Sciences and Research*, 6(7), 368-376.
39. Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety (FNE). *Journal of Consulting and Clinical Psychology*, 33, 448-457.

ROLE OF TECHNOLOGY IN MANAGERIAL DECISION MAKING-REVIEW**Ekta and Jasdeep Kaur Dhani**

Department of Management, CT University, Ludhiana (Punjab), India

ABSTRACT

Organizational productivity and decision-making are concurrently increased by technology and communication skills. However, relying too heavily on technology might reduce the advantages that nonverbal communication can offer. Decisions made by an organization might make or ruin it. Making decisions is a multifaceted, difficult process. When it comes to enterprises, especially in the competitive business world of today, this procedure becomes considerably more complicated and challenging. Nowadays, decisions may be made in a virtual setting, while also being made in the midst of uncertainty and with little to no information. It's conceivable that decision-makers aren't speaking face-to-face. In order to effectively use technology, particularly information technology, in managerial decision-making, it is essential to understand the challenges, complexity, and advantages of doing so. Such an understanding is important for building future management techniques and organizations as well as for evaluating the effectiveness of managers and their companies.

Keywords: Decision-making, ICT, information technology, non-verbal communication, organization.

1. Introduction

Technology is a powerful weapon that gives you the freedom to use it anyway you see fit, not only as a tool to make your everyday tasks simpler. The benefits of technology are readily apparent in the modern environment, particularly when it comes to businesses, commerce, and trade.

Technology-based tools offer vital information for decision-making. A few examples of contemporary technological platforms that enable almost rapid information flow and dissemination are e-mail, text messaging, and video conferencing. More information is transmitted, which speeds up the decision-making process. A more rapid study than past investigations has been published by (Muzellec) and colleagues (Bartelt & Dennis, 2014). O'Raghallaishin 2018, a background for the influence of communication technology on decision-making was provided. Technology and communication abilities are essential for the work. Boost decision-making while raising output at work. As technology develops, costs go up, and it becomes clear that information will be sent farther and faster. Stakeholder interactions, both internal and external, are happening more often than previously (Teeroovengadum, Heeraman, & Jugurnath, 2017). According to a 2015 study (Omoniyi), 58 percent of respondents thought technology has increased their ability to communicate with and make decisions about their local bank.

Technology makes it possible to share knowledge, but electronic conversations could do so more quickly, which could cause misunderstandings and prevent further conversation (Fomichov et al. 2014, Fomichova).

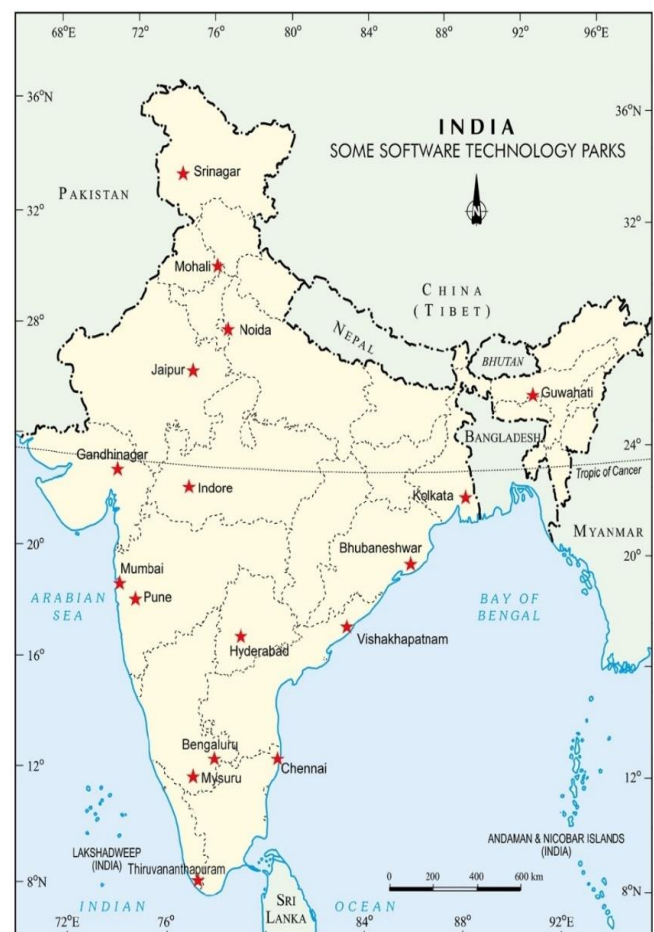


Fig 1: Prime technology cities of India

1.1 Technology Acceptance Model

A theoretical model that describes how people come to embrace and use information technology is called the Technology Acceptance Model (TAM). The Theory of Acceptance Model (TAM) is an expansion of the preceding Theory of Reasoned Action, which concentrated on user behavior.

The idea holds that when consumers encounter new technology, a number of factors, such as the following, influence their decision regarding how and when to use the technology:

Perceived usefulness - According to Fred Davis, this is "the level of a person's belief that employing a certain system will boost their ability to accomplish their job." It refers to a person's perception of the technology's utility for its intended application.

Perceived ease-of-use – Davis in 1989 defined it as the degree to which a person believes that using a particular system would be simple. The barriers will be gone if the technology is easy to use. If something is challenging to use or has a complex user interface, nobody likes it.

TAM has been widely used to a range of various technologies, including personal computers, web-based programs, and mobile devices, in the field of information technology. The model may be applied to create interventions that can boost user acceptability and adoption as well as to anticipate and analyze user adoption and usage trends.

1.2 Decision-making tendencies in technology

(I) Everything becoming digitalized: The usage of computer systems, computerized data, communications, and other infrastructures through the internet is the technology trend that has been detected in the contemporary business and organizational operating environment. Digitization is the term used to describe the entire process of shifting processes to the computer system environment. The fad has been around for a while and has an impact on people's life in many ways. Automated Teller Machines (ATMs), internet retailers like Amazon, and personal marketing are a few examples of this. To improve their management and performance, business organizations have been able to adapt to new systems and equipment. Health care

organizations have embraced the trend as well by using digital technology to manage their services (Lientz & Rea, 2016). The way we communicate and receive news has also changed. There are now more outlets available for the distribution of news, including websites, newspapers, email, and social media.

(II) Internet of Things: This technical viewpoint may be compared to a collection of tiny electronic gadgets that are capable of self-learning and self-awareness. The gadgets have been designed to be able to manage their own networks. The dispersed and deployed devices may locate one another and afterwards communicate with the server systems. IoT typically offers functions and capacities for data gathering and retrieval in corporate settings. Utilizing the gadgets makes corporate procedures more automated and efficient, which boosts overall productivity. Additionally, this guarantees that all pertinent information is gathered and that no crucial information is omitted. It encourages thoroughness in how business is conducted.

1.3 Systems employed in making wise decisions

Technology provides the following systems to help decision-makers in any business make crucial judgments quickly:

(I) Decision support systems (DSS)–Decision support systems assist in the administration of an organization's processes and levels of development as well as in assisting individuals in making decisions regarding issues that may change rapidly and are difficult to estimate beforehand, or when a problem lacks structure. Systems for supporting decisions might be entirely automated, operated by humans, or a hybrid of the two.

(II) Group decision support system (GDSS) – The company may need to make a number of decisions together. To develop a plan and solution for any issue or product, the company may require the participation and collaboration of numerous personnel. An organization may run a software programme, for instance, and decide as a team whether to correct any bugs or add new features.

(III) Geographical information systems (GIS) –The goal of this decision support system is to locate, provide, operate, research,

and complete the geographic information. Users of GIS tools may create queries, check the accuracy of the data, change data maps, and exhibit the outcomes of all these activities.

(IV) Artificial intelligence (AI) –Machine learning is another name for artificial intelligence. It has been proven that machines are unconcerned with the inherent intelligence displayed by people and other animals. Computer science's field of artificial intelligence (AI) emphasizes the development of intelligent computers that function and react much like people. One use of AI is speech recognition.

(V) Expert systems –A computer system known as an expert system can make decisions on par with trained humans. Instead of using

conservative technical code, these kinds of systems often use cognitive information processing, mostly expressed as if-then logic, to tackle complicated issues.

(VI) Neural network –Computing systems inspired inexactly by biological brain networks are called artificial neural networks. These systems often lack any task-specific programming with distinct patterns and instead learn to do tasks by taking into account instances.

(VII) Genetic algorithm –A genetic algorithm is an evolutionary algorithm, which is a larger class of metaheuristics inspired by the process of natural selection in computer science and operations research.

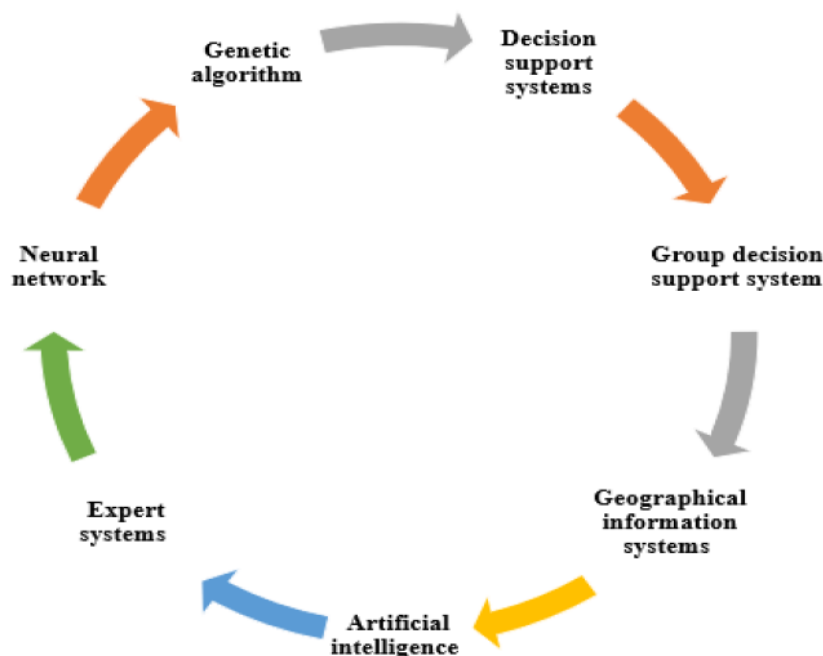


Fig2. Systems that help people make good decisions

2. Background of the Study

This study set out to examine how technology is used in decision-making and determine whether sacrificing information accuracy for speed has any unfavorable effects. Employees use of nonverbal communication abilities to make choices has been impacted by the development of communication technology. In technological communication techniques like email and text messaging, body motions are less crucial. Unfortunately, an inability to understand physical cues can lead to a reduction in emotional intelligence. Communication that is ineffective is influenced

by a lack of empathy. The rapid development of technology and the growing usage of information and communication technology (ICT) in business companies have recently come into emphasis. The aspect of decision-making that requires time and effort is the search for and collecting of information. Utilizing ICT shortens the time needed to acquire information and makes it easier to obtain fresh data. Information may be obtained more quickly than in the past because to ICT methods like email, social networks, video sharing, worldwide broadcasting, mobile phones and online management information

systems. In addition, these technologies make it possible for us to access a lot more data than we could before due to increased connectivity and information flow. This is how information and communication technology (ICT) improves the manager's capacity to access more information more quickly, reducing the limitations of the limited information and time managers have to make decisions. ICT aids in reducing the expense of organizing meetings.

Despite the availability of technology for communication, it should not take the place of face-to-face interaction, which can improve your morale and eliminate the gap of interaction. Presentation of thoughts and emotions to others is a part of communication. Whether or whether they agree with them on the subject, people communicate in order to affect the understanding, attitude, and actions of others. Additionally, communication is a two-way process in which any information that is transmitted requires a response from both sides.

Unconsciously, nonverbal communication is a valuable addition to spoken communication. This sort of nonverbal communication is significant because it conveys information about a person's personality, mood, social standing and goals. It follows that the efficiency of the communication process plays a significant role in an organizations quality.

Although using technology as a means of communication is beneficial to an organization's daily operations, it should not take the place of face-to-face conversation. In an organizational context, using non-verbal cues can improve decision-making and communication. As a result, studies from a wide range of sectors demonstrate the potential benefit of recognizing non-verbal signs when conversing. Every day, about 55% of all communication acts that have the potential to make an effect on the target audience involve nonverbal communication.

The kind of nonverbal behavioral cues used to communicate in settings requiring face-to-face communication between two or more individuals may have an impact on the receiver's mood and expected reaction. These unintentional nonverbal acts may directly affect how encounters turn out.

3. Problem Statement

Changes in company practices are frequently necessary to attain organizational health. New technology is typically included into these developments. When making decisions, consider the advantages and difficulties of technology management. This will help you execute change effectively. This thesis will look at the problems with technology management that affect how well changes are implemented. A case study will be developed to do this. The objective is to provide a formal approach for the change management process. To enable the favorable effects of change implementation and prevent the unfavorable effects, the tool will combine and embrace crucial components of technology management.

4. Objectives of the Study

The goal of this descriptive study is to determine if over reliance on technology might lessen the value of nonverbal communication in corporate decision-making. Utilizing technology only to generate and distribute information might be detrimental to individual productivity. In their opinion, using technology as the main means of communication at work places more trust in technical systems than in human resources.

Digital technology has made it possible for more forms of human communication, fostering ties across many communities, cultures, and continents. However, little is known about how various means of communication impact our ability to accurately recognize and use nonverbal behavior cues.

Technology has always played a role in decision making, but its role has become increasingly important in today's fast-paced and interconnected world. Technology provides us with the ability to gather and process vast amounts of data quickly and efficiently, which can be used to make informed decisions. It also allows us to communicate and collaborate with others around the globe instantaneously, which can help us to reach consensus on difficult decisions.

In many ways, technology has made the process of decision making more efficient and effective. However, there are also some potential pitfalls to consider. One is that

technology can sometimes create an illusion of certainty, leading us to believe that we know more than we actually do. Another is that technology can lead to groupthink, where everyone relies on the same data and comes to the same conclusion without considering alternative viewpoints.

Overall, technology plays a vital role in decision making, but it is important to use it wisely and not allow it to override our own judgment and common sense.

5. Literature Review

The specific issue was that if technology was used excessively for decision-making, it may reduce the advantages nonverbal communication could have for organizational leadership decision-making. When executing a sales transaction, people who were able to recognize the nonverbal indications of consumers may have greater customer satisfaction ratings and more sales (Puccinelli et al., 2013). The purpose of this study was to increase organizational leaders' knowledge of the specific issue in order to encourage good social change. In order to meet this objective, the study had to present evidence in support of the idea that technology and nonverbal communication may enhance decision-making when utilized in tandem.

This qualitative exploratory multiple case study's goal was to investigate how excessive reliance on technology may reduce the advantages non-verbal communication might have for organizational leadership decision-making. Organizational executives frequently make decisions and communicate using technology (Xiaojun&Venkatesh, 2013). Technology may be useful in an organizational context, but if it is used too much, it can make it difficult for a leader to read the nonverbal signs of the audience.

Organizations must have the capacity to interact with internal and external stakeholders at any time in the linked world of today. While ICTs give businesses the capacity to engage instantaneously with their target audience, there is still a chance that decisions may be made incorrectly. The chance of making poor decisions rises along with the communicators reduced capacity to recognize particular non-verbal signs that emerge throughout communication.

No one can contest the immense advantages that digital communication offers. The ability to converse with individuals without seeing or hearing them, however, also has drawbacks. We stop seeing the social clues that nonverbal communication provides.

ICTs and nonverbal communication organizations must have the capacity to interact with internal and external stakeholders at any time in the linked world of today. While ICTs give businesses the capacity to engage instantaneously with their target audience, there is still a chance that decisions may be made incorrectly. The chance of making poor decisions rises along with the communicators reduced capacity to recognize particular non-verbal signs that emerge throughout communication. Information may be distributed quickly thanks to ICTs thanks to technological platforms like video conferencing, text messaging, and email. Users may send text and multimedia messages to one or more recipients via email and text messaging in just a few seconds. The simultaneous sharing or viewing of visual and audio data is possible with video conferencing.

ICTs and nonverbal communication each offer advantages that may contribute to the organization's success. Negotiations with potential clients benefit from nonverbal communication in addition to verbal communication. Since nonverbal indicators are subconscious, it might be challenging for someone who isn't taught to hide their true feelings. ICTs and nonverbal communication each have drawbacks in terms of organizational applicability. Because there are so many different cultures and subcultures, it is difficult to examine the universal norms of non-verbal communication, hence research studies tend to generalize their findings. ICT user training is necessary. Users who are not properly trained might reduce corporate productivity.

The combination of three ideas that are common in organizations—decision-making, nonverbal communication, and technology—provided the conceptual framework for this study. Combining these ideas allowed me to study the issue of how overusing technology may reduce the advantages nonverbal communication could have for organizational leadership decision-making.

ICT usage is supported by relational and contractual governance. In order to build and maintain long-term bilateral relationships that are based on trust and integrity, relational governance strongly emphasizes interpersonal interactions and cooperation. The strategy used to guarantee that the outcomes established between a firm and its suppliers are being met is known as contractual governance. The main reason to ICT project fails is to use the contractual governance to implement new technologies instead maintaining the equilibrium between relational and contractual governance. Organizations are forcing to use ICT technology as result trust between employees will vanish and there will be decrease in the success rate of the implementation.

The relationship between in-person interactions and online forums helped set the stage for decision-making. Users using video teleconferencing can converse with one other as if they were in the same room. Web cams, the internet, and a computer are used by video teleconferencing applications to link individuals online. The made it easier to comprehend how both in-person and online interactions might strengthen decision-making and communication.

People who contribute to their company, both leaders and non-leaders, must choose two separate choices. The first choice is whether or not to produce, and the second choice is whether or not to take part. These choices aided in the explanation of the motivating elements that influence people's decision-making.

Several different categories of nonverbal communication exist. Among them are the following: vocal intonation, proxemic space, chronemic time, touch (shaking hands), vocal intonation, touch (style of clothing), and environment (space and distance) (Ili Kristiyanti, 2012). Prisca Della (2014) and Ruben & Stewart, 2005 both contend that there are many ways to communicate nonverbally, including paralanguage, which comprises audible and auditory signals created in the same way as speech. It also covers the pace of speaking, loudness or weakness of voice, intonation, tone of speech, and tone of voice.

The next step is face movement (kinesics), which refers to how you use your arms, legs, face, and eyes to communicate with others. While speaking or listening, our faces will continually shift without our awareness. Maintaining eye contact is a crucial part of non-verbal communication since it shows that the other person is engaged in the topic at hand.

A touch is the third (haptics). According to Emmert & Donaghy (1981), the greatest way to communicate positive and negative attitudes is through touch or bodily contact. Contact duration and frequency can also be indicators of friendship and desire between those involved. Shaking hands, embracing, slapping, punching, rubbing heads, kissing hands, and other similar actions are examples. One of the means of nonverbal communication is physical appearance, along with closeness (distance). It has significance because of how it tries to feel and use space as individuals are perceived in action communication. Proxemics considers both the physical orientation and the distance between the two participants in a discourse.

5.1 Technology's Potential for Managerial Decision Making

A group of employed employees or members might use the group decision support system by utilising and incorporating technological breakthroughs and modern computer infrastructures. This technique is essentially used to make snap judgments that are well-informed. Among the skills offered by IT to decision-making are those for brainstorming, issue categorization, and analysis.

Brainstorming: In this part, ideas are largely generated by the organization's team. An illustration of a scenario may be that the team is assessing the organization's strengths, weaknesses, potential for growth, and threats. Users and members will be able to enter recommendations and comments simultaneously using GDSS (Helfat&Peteraf, 2015). Following the collection of this data, the team members' separate stations show the findings. By reducing time wasted, this skill gives the company a competitive edge. Given the importance of time as a resource, a business that uses time effectively stands out from the competition.

Identifying and classifying issues: Individual team members can classify the thoughts and proposals offered in this part of the decision-making process into manageable groups. Each recommendation and idea is then evaluated based on its merit and contribution to the project's goal after additional discussion and clarifications have been provided. These concepts are categorised, sorted, and put into their relevant files by the GDSS (Helfat&Peteraf, 2015). It is possible to make comments and recommendations by opening these folders.

Effective data and information administration and assessment are accounted for by this competency. Other businesses are given a competitive edge by this. The organization's goals and objectives are realized when information is properly examined and managed.

5.2 Ability to Think

thought does, however, have significant constraints and drawbacks. Over time, organizations must embrace new techniques for managing and operating their institutions. This is because technology and information systems have some advantages over the way humans think.

(I)Inventory Management Systems: Stock management is a major issue for business enterprises. The quantity of each asset and item is tracked by the inventory systems. The management department is informed if there is inadequate stock, and the stock is upgraded (Pearlson et al., 2016). This is a time-consuming and stressful process that the human brain is fundamentally incapable of doing.

(II)Data management: The most valuable resources and assets of a company are data and information. Therefore, it is crucial to treat each data component as required. The quantity and type of information available to human thought has a limit (Pearlson et al., 2016). Utilizing information systems and technology allows for the augmentation of functions by managing and analyzing data, producing reports, and retaining records for potential future retrieval.

The machine learning technique known as supervised learning involves categorizing data

in order to make sure that a function or pattern may be realized from the data. Unsupervised learning is a type of machine learning in which conclusions are drawn from input data that hasn't been labelled (Zhao & Liu, 2007). Unsupervised learning aims to identify hidden groupings or patterns in unlabeled data.

5.3 How supervised learning is used by artificial neural networks (ANNs) to forecast outcomes in decision-making

In supervised learning, artificial neural networks (ANNs) are used to predict outcomes for decision-making. A series of computing models called artificial neural networks (ANN) is based on connectionist architecture. The vector input is given to the network at the time of supervised learning training, and the network subsequently outputs a yield vector. An artificial neural network (ANN) performs pattern recognition and picture data categorization to anticipate outcomes in supervised learning (Pedregosa et al, 2011).

5.4 Examples from the real world

Studying the relationships between the consumers of a product and the items can serve as an example of unsupervised learning for associations. The customer (person) will discover similar items after purchasing one since there is a connection between the two. To ensure an increase in sales when new items are introduced to the market, they are connected with the existing ones.

Data analysts employ categorization to start an effective relation in the context of supervised learning. This is an illustration of how a bank might assess a customer's capacity to repay a loan before deciding to provide one. This may also be done by taking into account factors like savings, consumer earnings, and financial history. As a result, this information was obtained from historical loan data.

Artificial neural networks are mathematical models inspired by how organic neurons function and are organized. There are several differences in artificial neural networks that are connected to the type of task that the network was given to complete. The neuron is modelled in a variety of ways as well. These models sometimes closely mimic biological neurons (e.g., Gluck and Bower, 1988; Granger et al., 1989), but other times they significantly

deviate from how real neurons actually behave. Even non-linear functions can have a rough approximation using artificial neural networks. Piecewise estimations of functions can also be estimated using artificial neural networks.

Artificial neural networks may automatically divide the sample space into distinct functional regions by utilizing one or more hidden layers in the network architecture. In other words, artificial neural networks are perhaps capable of creating piecemeal non-linear models. A excellent illustration of such a model is the artificial neural network model for the exclusive OR function (Wasserman, 1989, pp. 30-33). When Collopy and Armstrong (1992) plotted forecasting experts, they discovered that the experts valued extrapolation techniques that could recognize and maintain sudden changes in historical data patterns, indicating the value of piece-wise models.

Due to how the models are evaluated, several statistical time series approaches have specific restrictions. Many different statistical time series models require human engagement and review for approximation. However, automatic estimation of artificial neural networks is possible (Hoptroff, 1993). Additionally, as fresh data are collected, multiple statistical models need to be periodically re-estimated. There are several incremental artificial neural network methods.

Additionally, artificial neural networks have flaws. While many statistical modelling approaches are stable and advanced, artificial neural network methodology and modelling systems are rapidly evolving. Software for statistical techniques is readily available, although the development of commercial ANN software is sometimes delayed. Many forecasting methods are easier to comprehend and provide physical meaning to than artificial neural network models. Compared to the majority of statistical forecasting methods, artificial neural networks cover extra estimation restrictions. Similar to statistical models, artificial neural networks require more computer time.

6. Future scope

Identification of problems, formulation of solutions, evaluation of those options, selection of an alternative, implementation of the decision, and evaluation of the efficacy of the

choice are all steps in the decision-making process. Today, technology is used more and more in every organization's decision-making process. Any effective invention is essential to the continued operation of the organization in high-tech service facilities. The likelihood of innovation success is linked to the methodical reduction of decision uncertainty as a result of organizational measures for acquiring, disseminating, and analyzing evidence. Every business uses different decision-making tools, and without the decision-making process, the objective cannot be reached. In conclusion, supervised learning guarantees that a function or pattern may be realized from the data, whereas unsupervised learning seeks to define the hidden groupings or patterns in data from unlabeled data. The usage of data is the primary distinction between supervised and unsupervised learning. Unsupervised learning uses data that is unknown or poorly labelled, whereas supervised learning uses input data that is highly labelled and known.

7. Conclusion

Misunderstandings of the directives sent from the senior leadership to the lower management will result from communication breakdowns. Although it is not impossible, it will lead to disagreements and conflicts in the organization's management. In conclusion, it is evident that the efficacy of process communication plays a major role in an organization's quality. This data clearly supports the opinions of management and communication academics who highlight that communication should be at the center of an organization's operations. Information flow, communication, and human contact are therefore the three major elements of communication.

Additionally, communication is a crucial component of organizational success in enhancing organizational performance and flexibility to every change in the current commercial climate, ensuring that the company may continue to exist even as they gain a competitive edge. The organization can get the required information by having effective communication among the people and parties directly engaged both within and outside of the organization.

In the digital age, managers must utilize ICT to involve stakeholders strategically. The effectiveness of the relationships they develop with customers, workers, and suppliers has a substantial impact on the sustainability of the enterprises they run. Managers may better comprehend customer and competitor behavior by using ICT technologies, which helps them decide how to create and update goods and

services. Similarly, managers identify, choose, and begin working more effectively with both new and current suppliers. ICT also enhances the accuracy, responsiveness, and interactivity of decision-making with employees. The use of ICT enhances management choices about the renewal of goods and services, the search for and selection of new suppliers, and the dissemination of choices to staff members.

References

- Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal*, 36(6), 831-850.
- Pearlson, K. E., Saunders, C. S., & Galletta, D. F. (2016). Managing and using information systems, binder ready version: a strategic approach. John Wiley & Sons, 18(3), 39-52.
- Dougherty, J., Kohavi, R., & Sahami, M. (2015). Supervised and unsupervised discretization of continuous features. In *Machine Learning Proceedings 1995* (pp. 194-202). Morgan Kaufmann.
- Shams, Riad & Belyaeva, Zhanna. (2018). Dynamic capabilities, strategic management and competitive advantage: A debate and research trend.
- Mukherjee, S. (2019). Popular SQL Server Database Encryption Choices. arXiv preprint arXiv:1901.03179.
- Mukherjee, S. (2019). Benefits of AWS in Modern Cloud. arXiv preprint arXiv:1903.03219.
- Mukherjee, S. (2019). How IT allows E-Participation in Policy-Making Process. arXiv preprint arXiv:1903.00831.
- Mukherjee, S. (2019). How Stakeholder Engagement Affects IT Projects. *International Journal of Innovative Research in Science, Engineering and Technology*, 8(3).
- Chakraborty, Moonmoon & Excellence, Operations. (2019). Supply Chain & Inventory Management. 10.6084/m9.figshare.7824107
- Al Rashdi, F. (2018). Functions of emojis in WhatsApp interaction among Omanis. *Discourse, Context & Media*, 26, 117-126. doi:10.1016/j.dcm.2018.07.001
- [11] Adams, C., & van Manen, M. A. (2017). Teaching phenomenological research and writing. *Qualitative Health Research*, 27, 780-791. doi:10.1177/1049732317698960
- Durodola, O., Fusch, P., & Tippins, S. (2017) A case-study of financial literacy and wellbeing of immigrants in Lloydminster, Canada. *International Journal of Business Management*, 12(8). doi:10.5539/ijbm.v12n8p37
- Korovyakovskaya, I., & Hyonsong, C. (2015). An empirical study of the relationships between miscommunication and conflict in culturally diverse work groups. *Journal of International Business Research*, 14(3), 41-54. Retrieved from http://www.alliedacademies.org/pdfs/ASIB_Proceedings_Spring_2015
- Aesaert, K., Voogt, J., Kuiper, E., & van Braak, J. (2017). Accuracy and bias of ICT self-efficacy: An empirical study into students' over- and underestimation of their ICT competences. *Computers in Human Behavior*, 75, 92-102. doi:10.1016/j.chb.2017.05.010
- Ahmadaliev, D. Q., Xiaohui1, C., & Abduvohidov, M. (2018). A web-based instrument to initialize learning style: An interactive questionnaire instrument. *International Journal of Emerging Technologies in Learning*, 13(12), 238-246. doi:10.3991/ijet.v13i12.8725
- Ai, C., & Wu, H. (2016). Where does the source of external knowledge come from? A case of the Shanghai ICT chip industrial cluster in China. *Journal of Organizational*

- Change Management, 29(2), 150-175. doi:10.1108/JOCM-04-2015-0056
17. Akesson, B., Braganza, M., & Root, J. (2018). Is theory development essential for the social work dissertation? *Social Work Education*, 37, 209–222. doi:10.1080/02615479.2017.1391196
 18. Al Mamun, M., & Wickremasinghe, G. B. (2014). Dynamic linkages between diffusion of information communication technology and labour productivity in South Asia. *Applied Economics*, 46, 3246–3260. doi:10.1080/00036846.2014.927573
 19. Albardiaz, R. (2014). Teaching non-verbal communication skills: an update on touch. *Education for Primary Care*, 25, 164–165. doi:10.1080/14739879.2014.11494268
 20. [20] Alton, S., Luke, S. A., & Wilder, M. (2018). Cost-effective virtual clinical site visits for nurse practitioner students. *Journal of Nursing Education*, 57(5), 308–311. doi:10.3928/01484834-20180420-11
 21. Aga, D., Noorderhaven, N., & Vallejo, B. (2016). Transformational leadership and project success: The mediating role of team-building. *International Journal of Project Management*, 34, 806–818. doi:10.1016/j.ijproman.2016.02.012
 22. Ashraf, A. R., Narongsak (Tek), T., & Seigyoung, A. (2014). The application of the technology acceptance model under different cultural contexts: The case of online shopping adoption. *Journal of International Marketing*, 22(3), 68–93. doi:10.1509/jim.14.0065
 23. Baek, Y. M., Wojcieszak, M., & DelliCarpini, M. X. (2012). Online versus face-to-face deliberation: Who? Why? What? With what effects? *New Media & Society*, 14, 363–383. doi:10.1177/1461444811413191
 24. Barber, L. K., & Santuzzi, A. M. (2015). Please respond ASAP: Workplace telepressure and employee recovery. *Journal of Occupational Health Psychology*, 20(2), 172–189. doi:10.1037/a0038278
 25. [25] Dickinson, A. (2017). Communicating with the online student: The impact of e-mail tone on student performance and teacher evaluations. *Journal of Educators Online*, 14(2). Retrieved from <https://www.thejeo.com/>
 26. Difrancesco, S., Pulvermüller, F., & Mohr, B. (2012). Intensive language-action therapy (ILAT): The methods. *Aphasiology*, 26, 1317–1351. doi:10.1080/02687038.2012.705815
 27. Di Mauro, C., Fratocchi, L., Orzes, G., & Sartor, M. (2018). Offshoring and backshoring: A multiple case study analysis. *Journal of Purchasing and Supply Management*, 24(2), 108–134. doi:10.1016/j.pursup.2017.07.003
 28. Dubois, D., Bonezzi, A., & De Angelis, M. (2016). Sharing with friends versus strangers: How interpersonal closeness influences word-of-mouth valence. *Journal of Marketing Research (JMR)*, 53, 712–727. doi:10.1509/jmr.13.0312
 29. Khalil Moghaddam, B., & Khatoon-Abadi, A. (2013). Factors affecting ICT adoption among rural users: A case study of ICT Center in Iran. *Telecommunications Policy*, 37, 1083–1094. doi:10.1016/j.telpol.2013.02.005
 30. Köprülü, Ö. o. (2014). Using body language to make and maintain a solid first impression and to decode students' behaviours. *Sakarya University Journal of Education*, 4(2), 6-18. doi:10.19126/suje.61671
 31. Kožić, D., Žunac, A. G., & Bakić-Tomić, L. (2013). Use of non-verbal communication channels in the classroom. *Croatian Journal Educational / Hrvatski Casopis Za Odgoj I Obrazovanje*, 15, 141–153. Retrieved from <http://hrcak.srce.hr/106512?lang=en>

A STUDY OF FINANCIAL LITERACY FOR RURAL AREA OF PUNJAB

Mandeep Kaur Grewal and Kamalpreet Kaur

Department of Commerce, CT University, Ludhiana, Punjab, India

ABSTRACT

The purpose of this research is to investigate the factors and levels of financial literacy among individuals living in rural Punjab, India. Financial literacy is essential for managing personal finances, assets, and budgets, particularly in this day and age of digitization and easily available investment opportunities. Rural communities, on the other hand, usually lack financial literacy instruction and resources. Among the socio-demographic characteristics that impact financial literacy are education, occupation, income, gender, and social position. Rural Punjab has lower levels of financial literacy than urban Punjab, according to the paper, and women are more financially illiterate as a result of risk-averse behaviour and cultural norms. The research recommends awareness campaigns, programmes such as Self-Help Groups, and the development of entrepreneurial possibilities to improve financial literacy.

Keywords: Financial literacy, Rural areas, Punjab, Determinants, Socio-demographic factors, Personal finances, Investments, Budgets, Digitalization, Education, Occupation

1. Introduction

Financial literacy represents the ability of an individual to evaluate and achieve financial skills which may help to gain sufficient knowledge on the economic aspect. The financial literacy of an individual can include skills that can help in the management of personal finances, investments and budgets (Mändmaa, 2019). Personal financial contexts can help an individual to better manage his/her daily expenditures along with forecasting a budget. With the advent of newer technologies, investments in different sectors have become accessible to the public. Based on this, financial literacy is becoming more crucial to make proper investments. This paper will address the determinants of financial literacy and the amount of financial literacy in rural areas of Punjab. While doing so, the effect of identified determinants of financial literacy will also be evaluated. Based on this evaluation, some improvement strategies will also be addressed in this paper.

2. Financial Literacy in Rural Areas

Financial literacy can represent the capability of an individual toward asserting financial skills. The financial literacy of an individual can also help to identify sustainable development opportunities and achieve so within a specific time period (Kumari and Harikrishnan, 2021). This personal sustainability can also define the financial stability of an individual. Rural areas all over

the world can be observed to be neglected when it comes to financial literacy. However, these areas are required to be educated on personal financial aspects. The need for urbanization and the benefits that come with it can help rural areas of a country to develop further and achieve sustainable ways of doing so.

Along with the digitalization of different areas, financial literacy has also adapted digital literacy which can have a significant amount of effect on the financial literacy of individuals in rural areas. Digital financial literacy has become a part of education which is intended to improve the overall understanding of individuals regarding budgets, investments and other associated aspects (Azeez and Akhtar, 2021). Improvement in the understanding of financial activities and capabilities can help individuals from rural areas to identify investment opportunities. Overall, it can be said that financial literacy can help an individual in different financial aspects however, it can differ based on socio-demographic factors.

3. Influence of socio-demographic factors on Financial Literacy

Socio-demographic factors can be crucial for measuring financial literacy among individuals belonging to different regions. Among the whole population of India, only around 25% are financially literate. This represents a financial literacy gap among individuals in India. This gap has been identified to be

depending on different factors which can help to define social status and demographic differences. People with more economic earnings are identified to be able to assess and then invest in different organizations using digital financial applications. With respect to this financial literacy rate and available socio-demographic factors, efforts from all associated individuals and organizations within the financial sector are mandatory for growth. However, due to differences in demographic and social status, a relevant difference in the pace of individuals being literate has been observed. Different demographic regions in India require different amounts of expenditure from an individual to meet his/her daily needs. Overall, it can be said that demographic differences among individuals somewhat can influence social status and both these aspects can have a significant amount of influence on financial literacy.

4. Impact of Determinants on Financial Literacy

Determinants of financial literacy can address several contexts however, factors that help to determine social status and demographic differences are the most important. Education, occupation, income, gender and ration card type are identified to be the positive coefficients of financial literacy (Azeez and Akhtar, 2021). These determinants can have an adequate amount of impact on digital financial literacy among people in rural areas of India. However, due to the lack of income and reduced income amount, a gap in financial literacy among people in rural areas can be identified. Digital financial literacy which can be influenced the most by these identified determinants can help individuals to achieve financial skills. These financial skills can be intended to help maintain respective budgets and assess different investment options. Assessment of these options can further help in identifying the proper one which can help in making appropriate financial decisions. On the whole, it can be said that there are some relevant factors coming from both social status and demographic differences which can influence the financial literacy among people from rural areas of India.

5. Levels of Financial Literacy of the respondents from Punjab

The financial literacy level of individuals can be identified from the financial decisions made. Financial literacy level can be depending on educational qualification, demographic region and age of an individual. These demographic and social determinants in Punjab have been identified to be most influential in rural regions. Individuals belonging to these identified rural regions have been observed to be lacking in one aspect or another. Due to this, a significant amount of the whole population of Punjab has been identified to be less literate financially when compared with other aspects. Apart from these, due to gender differences in Punjab being higher with respect to its culture, the number of financially illiterate individuals is higher. Women in the rural areas of Punjab are more willing to avert risks associated with financial outcomes and thus focus on steady return investment patterns (Sharma and Kaur, 2019). Due to these risk-averting characteristics, women in Punjab are more likely to be financially illiterate when compared to men. Overall, it can be said that the level of financial literacy in Punjab is comparatively lower with respect to cultural trends. Other than this, some demographic differences are also responsible for this lower level of literacy rate on financial concepts.

6. Improvement Strategy of Financial Literacy

Gender dominance can be identified as a cause of financial illiteracy among a large population. Smaller and medium-sized enterprises in Punjab have been identified to be a male dominant sector (Singla and Mallik, 2021). With respect to this male dominant sector in Punjab, it can be suggested that awareness campaigns for women regarding financial skills and concepts can be beneficial. Other than this, initiatives like Self-Help Groups (SHGs) can also be identified as an improvement strategy to educate the women of Punjab regarding financial risks. The introduction of other associated entrepreneurial opportunities can also be beneficial to improve the awareness of financial risks and associated benefits among women. Apart from women of Punjab, individuals irrespective of gender in rural areas

have also been identified to lack financial literacy. For this purpose, the introduction of several awareness campaigns and some courses for low-income households can contribute significantly towards the improvement of financial literacy. Demographic and other social factors have also been defined as determinants of financial literacy.

On this aspect, the Government of India can be recommended to introduce some improvement initiatives which may help individuals to overcome the barriers set by these identified factors. Overall these improvement strategies can help individuals from rural areas of Punjab and the women of Punjab to significantly improve their financial skills and concepts.

7. Findings on Financial Literacy Factors

Financial literacy can be influenced by several determinants and these determinants can collaboratively influence financial inclusion. Socio-demographic variables like marital status, gender, income, education, and occupation can have a significant impact on financial inclusion (Noor, Batool and Arshad, 2020). The marital status of an individual can impact financial literacy due to after a certain age, every individual tends to save money for family members. Education has a similar impact on financial literacy. Highly-educated and educated individuals in Punjab are more prone to make investments considering associated risks than individuals with lower amounts of education. Further significance has been found in occupational differences where formally employed individuals are investing more when compared with informally employed individuals. Unemployed individuals

on the other hand can be observed to lack financial literacy.

Income differences among individuals also define financial literacy level differences. Individuals with a comparatively higher income are more likely to be financially literate when compared with individuals with lower incomes. Similarly, individuals with higher incomes can be seen to have financial accounts while individuals with lower income has a lower number of financial accounts. Due to their income being lower, these individuals are reluctant to take the risks associated with financial literacy.

8. Conclusion

Based on this study, it can be concluded that financial literacy in rural areas is comparatively lower than that in urban areas. Different socio-demographic factors can be concluded to restrict knowledge-sharing in rural areas. With respect to these identified factors and their effect on financial literacy, it can be concluded that social status and demographic factors like gender, marital status, education, income level and occupation have significant influence over the rate of financially literate individuals. Women in Punjab have been concluded to neglect financial investments due to the presence of higher risks. Due to demographic and social differences, women in Punjab have also been identified to be restricted in making decisions. With respect to these, it can be concluded that the respective government of India can have a significant role in improving financial literacy among individuals in the rural areas of Punjab.

References

1. Azeez, N.P. and Akhtar, S.M., 2021. Digital financial literacy and its determinants: an empirical evidences from rural India. *South Asian Journal of Social Studies and Economics*, 11(2), pp.8-22.
2. Azeez, N.P. and Akhtar, S.M., 2021. Digital financial literacy and its determinants: an empirical evidences from rural India. *South Asian Journal of Social Studies and Economics*, 11(2), pp.8-22.
3. Kumari, S. and Harikrishnan, A., 2021. Importance of Financial literacy For Sustainable Future Environment: A Research Among People In Rural Areas With Special Reference To Mandi District, Himachal Pradesh. *International Journal of Engineering, Science and Information Technology*, 1(1), pp.15-19.
4. Mändmaa, S., 2019. Financial literacy—what and why should we improve. *Eurasian Journal of Social Sciences*, 7(2), pp.12-28.

5. Noor, N., Batool, I. and Arshad, H.M., 2020. Financial literacy, financial self-efficacy and financial account ownership behavior in Pakistan. *Cogent Economics & Finance*, 8(1), p.1806479.
6. Sharma, P. and Kaur, N., 2019. Investment Attitude of Working Women: A Study of Education Sector in Punjab. *Journal of Technology Management for Growing Economies*, 10(2), pp.81-87.
7. Singla, A. and Mallik, G., 2021. Determinants of financial literacy: Empirical evidence from micro and small enterprises in India. *Asia Pacific Management Review*, 26(4), pp.248-255.

A REVIEW ON MECHANISMS AND STRATEGIES TO SPREAD AWARENESS OF CYBERCRIME AND ITS PREVENTION

Sahil Baghla and Sachin Sharma

Department of Management, CT University, Ludhiana, India

Abstract

Digital technology has transformed how people engage with one another and do business, which has increased dependency on technology, improved connection, and ultimately increased criminality. This kind of illegal conduct, primarily online, is a growing menace. This study aims to examine how cybercrime is perceived and how mitigation strategies are implemented. Humans may better understand this modern problem by analysing attitudes towards cybercrime and the methods used to address it. The author hopes to shed light on the origins and dangers of cybercrime via this inquiry and provide suggestions on how to stop it from happening.

Keywords: Cybercrime, Cybersecurity, Online Security, Social Media Platform, Crime Prevention.

1. Introduction

The extensive use of social media platforms, the improvements in mobile technology, and the pervasiveness of online technologies in our daily lives have all contributed to the favourable atmosphere for many types of cybercrime. Additionally, the danger of cybercrimes has grown for both people and organisations with the adoption of mobile devices that provide access to the Internet. It is also essential to state that after the epidemic broke out, many people turned to the Internet for various purposes, including work, education, shopping, entertainment, and even doctor's visits. However, this dramatic spike in online engagement has also increased cybercrime worldwide. Around the globe, criminals use numerous internet tactics, including phishing, malware, and ransomware assaults, to their advantage (Monteith *et al.*, 2021). People are more vulnerable to being victimised because of their online presence due to the rising use of technology, especially social media, and criminals have access to an almost limitless number of prospective victims who are not restricted by geography (Drew, 2020). To raise awareness about cybercrime and how to avoid it, this study explains the processes and techniques that might be used. This paper's major objective is to identify methods and approaches for raising public awareness of cybercrime and ways to avoid it.

2. Literature Review

Cybercrime includes a wide range of illegal activities that target computers, computer-

related equipment, information technology networks, and traditional crimes committed using the Internet and information technology. An individual or group may perpetrate this type of crime and may include various crimes such as hacking, identity theft, phishing and malware attacks. Additionally, cybercrime can facilitate the execution of other crimes, such as theft and fraud (Hadzhidimova and Payne, 2019). Cyber-enabled crimes refer to various illegal behaviours made possible by computers or the internet. These may include major offences like drug trafficking, terrorism, cyber-terror threats, and white-collar crimes, including embezzlement, cyber fraud, and identity theft.

It used to be common practice to use the phrases "cybersecurity strategies" and "cybercrime (or cybercrime prevention) strategies" interchangeably. However, there are major differences between the two ideas; therefore, they shouldn't be mixed. Cybersecurity and attempts to prevent cybercrime may have some overlap, but they are not the same. Strategies for avoiding such crimes often provide forth a detailed list of steps that may be performed to combat and minimise cybercrime. These could include reactions by law enforcement agencies and cooperation between governments, academic institutions, enterprises, organisations, and the general public on a regional and global scale. Together, humans can efficiently manage and lower the number of cybercrime events (UNODC, 2019). National cybersecurity plans are a road map for a country's goals for internal and international cybersecurity measures,

including avoiding cybercrime. They provide comprehensive strategies that follow a set of guiding principles and work to protect the country's interests. Cybersecurity policy priorities are established based on these issues, and resources are used to accomplish each goal. These plans outline a nation's strategy for maintaining its online security (UNODC, 2019).

Customers have significantly benefited from the digitalisation of the banking sector, which gives them increased accessibility and convenience. However, digitisation also brings several threats and difficulties, such as server flaws, malware, phishing, and virus assaults. Although steps have been taken to stop these attacks, such as raising client awareness of possible risks and enhancing security, a significant problem still exists: user ignorance. Customers may become exposed due to hackers using strategies like website masking and sending fraudulent emails, which may result in significant financial losses. Although banking digitalisation has much potential, managing these issues and informing clients about possible hazards is crucial (Ahmad *et al.*, 2021).

Researchers have emphasised that various security measures at different levels, including system security, server security, security control, IP security, information security, scalability of security systems, security assessment, and dynamic security skins, can successfully thwart digital attacks. It has been shown, however, that educating and training employees and increasing client knowledge may considerably defend them against online attacks and fraud. The techniques for preventing online fraud may also be significantly improved by adopting a solid identity and authentication system with features like device identification, IP address identification, and biometrics. Many banks currently use biometric technology for identification reasons, and many studies have shown how successful it is in reducing online fraud (Ahmad *et al.*, 2021).

On the other hand, Al Nafea and Almaiah (2021) state that a huge rise in data generation has been seen in recent years, with data expanding in volume, velocity, and variety every second. This has produced enormous

amounts of complicated big data, which has presented several difficulties in handling, storing, analysing, and safeguarding such data. Although many consumers and small organisations have switched to cloud technology recently, major corporations still significantly depend on cloud-based services. Therefore, before making the transfer, security issues must be taken into account. However, it is challenging to guarantee total security throughout the procedure owing to the cloud environment's complexity. However, reducing possible hazards at every stage of the cloud architecture is a joint obligation between the service provider and the client (Al Nafea and Almaiah, 2021).

Taylor (2021) reports that approximately 6.6 billion people will have smartphone mobile network subscriptions globally as of 2022. By the year 2028, this number is expected to increase further to 7.8 billion, according to experts. It's important to note that China, India, and the US have the most smartphone mobile network users worldwide. Cybercrime is also associated with the use of smartphones, as despite a sharp fall, particularly in India following COVID-19, cash is still the most popular in-store payment mode. That said, mobile wallets will eventually surpass cash (de Best, 2021). Mobile security software is intended to reduce the risks and weaknesses that users of smartphones may have while accessing data, apps, or network connections. The chance of compromised sensitive information, such as passwords or personal information, may be greatly reduced by encouraging users to use such software. Additionally, teaching users about mobile security best practices may significantly enhance overall device security. Reducing possible dangers and device-specific flaws may be accomplished by strengthening security defences against emergency assaults. It is important to highlight that most smartphone users are often ignorant of the possible hazards presented to their devices and lack the specialised knowledge required to identify hazardous applications or pinpoint potential security flaws.

3. Method

The author of this paper utilized secondary data as the main source of information. In other words, the information presented in the paper was not collected or generated by the author or researcher but was obtained from external sources such as previously published studies. Using secondary data is a common research practice and can provide valuable insights and information. Additionally, secondary data often avoid direct data acquisition, saving time and effort. Statistics, case studies, published research papers, and other sources are examples of secondary data sources (Barrett and Twycross, 2018).

4. Findings

Compared to the previous year, India considerably increased the number of reported cybercrimes in 2021, with over 52,000 recorded cases. The northern state of Uttar Pradesh and India's technological capital, Karnataka, came to be known as hotspots for cybercrime during this time, with the majority of reported incidents being linked to the intention of scamming or sexually abusing the victims. With over 6,000 incidents reported in 2018 alone, Uttar Pradesh, in particular, had the greatest number of cybercrimes in the nation. Most of these reported instances concerned victims who had been sexually exploited online and were filed under the IT Act (Basuroy, 2021).

In 2021, The UT police's cyber unit detained a Nigerian national for cheating a Sector 21 resident out of Rs 14 lakhs by falsely claiming he would deliver a package. The accused allegedly used fraud to convince the victim of his false intention and then absconded with the money. UT police promptly arrested the suspect (Times of India, 2021). On the other hand, a 30-year-old Punjabi guy was detained by the Delhi Police in 2023 for a disturbing instance of cyberbullying and privacy infringement. The guy is accused of harassing a lady and posting her private images on a popular social networking platform. The case highlighted the seriousness of cyberbullying and its effects, including the victim's mental distress and legal penalties (Times Now News, 2021).

The Punjab Police's Cyber Crime Unit won first place for effectively resolving a WhatsApp impersonation case. To trick government officials and others, imposters were utilising the profile photographs and names of VVIPs on their WhatsApp profiles. The Cyber Crime Cell of the Punjab Police performed a fantastic job of looking into and finding the perpetrators of this scam, thus ending this fraudulent activity. Their productive achievements have been acknowledged and honoured (The Statesman, 2021). The National Crime Record Bureau (NCRB), which organised the National Conference of State Cyber Nodal Officers in New Delhi in August, presented the prize during that event. The award was granted as a reward for extraordinary achievement in the event's focus on discussing and addressing the rising problem of cybercrime in India. Authorities have discovered a gang of imposters who utilised WhatsApp chats to trick unsuspecting individuals, primarily government employees, into giving money in the form of Amazon gift cards or other digital payment methods. These imposters have been involved in previous cyber fraud instances. After making arrests in connection with the case, the Punjab Police discovered another network of cyber fraud that originates in Delhi and mostly consists of Nigerian people with some Indian friends participating in the unlawful operations. Due to these imposters frequently using fictitious identities and attempting to trick people into disclosing critical financial information, this type of cyber fraud is a significant worry for a variety of people and organisations throughout the world (The Statesman, 2021).

Harpal Singh Cheema, the Punjab Taxation Minister, said in 2021 that the state government would increase cyber security activities to protect ordinary citizens from online fraud using cutting-edge cyber security measures. The Punjab government has begun accepting online payments for various services utilising contemporary cyber security measures. The necessity of the hour is for the government to take cyber security seriously. He said that improving the state's cyber security system will help to preserve the state's law and order situation (The Statesman, 2021). NIC-CERT (National Informatics Centre-

Computer Emergency Response Team) was created to enhance the National Informatics Center's cyber security posture and jointly lead and coordinate the response to cyber security incidents. The primary goals of NIC-CERT include, among other things, coordinating and responding to cyber security events that occur inside NIC and providing intelligence or advice on current cyber threats and vulnerabilities (PBSC, 2021).

Among the above various cybercrime prevention measures, the implication of NIC-CERT seems the most promising as it primarily focuses on cybersecurity incidents. Implementing NIC-CERT seems to be the most promising of the numerous cybercrime prevention strategies discussed above. Its primary emphasis on cyber security incidents and purpose to take action to release regular threat intelligence, security alerts/tips, and advisories to protect NIC's assets from cyber-attacks are the key drivers behind it.

5. Conclusion and Recommendation

As technology gets constantly upgraded, with its advantages also come disadvantages. One such is cybercrimes, and although there are several ways to fight such crimes, criminals constantly take advantage of people's lack of awareness worldwide and continue to commit. This paper attempts to raise awareness of cybercrime and methods for self-defence. It explains the many methods and strategies that cybercriminals may use. This paper provides readers with a thorough grasp of the ideas behind cybercrime and strategies for

preventing it. The author explains complicated concepts with a reasonable amount of explanation using a neutral tone to avoid confusing the reader with excessive technical jargon. Overall, this paper presents a fair and instructive analysis of cybercrime.

The author will be providing several recommendations regarding cybersecurity measures:

- To avoid cyberstalking, it is advised to avoid revealing sensitive information online. A major danger to one's safety and security may come from cyberstalking.
- One of the main factors contributing to cybercrimes against women is sending intimate photos to friends and other users while chatting online. To avoid any negative effects, it is important to refrain from such behaviours. Sharing private photos with a buddy one doesn't know or doesn't necessarily trust opens one up to harassment and blackmail (Poulpunitha, Manimekalai and Veeramani, 2020).
- Having a better grasp of the many vulnerabilities that leave individuals open to cybercrime is crucial for people. People may more effectively defend themselves against these risks by learning and using effective preventative techniques. Governments can also proactively raise awareness of these concerns via various educational initiatives. People will then be equipped with the knowledge and information needed to prevent being victims of cybercrimes.

References

1. Ahmad, I., Iqbal, S., Jamil, S. and Kamran, M., (2021). A systematic literature review of e-banking frauds: Current scenario and security techniques. *Linguistica Antverpiensia*, 2(2), pp.3509-3517.
2. Al Nafea, R. and Almaiah, M.A., (2021), July. Cyber security threats in the cloud: Literature review. In 2021 International Conference on Information Technology (ICIT) (pp. 779-786). IEEE.
3. Barrett, D. and Twycross, A., (2018). Data collection in qualitative research. *Evidence-Based Nursing*, 21(3), pp.63-64.
4. Basuroy, T. (2021). India: number of cyber crimes 2020. [online] Statista. Available at: <https://www.statista.com/statistics/309435/india-cyber-crime-it-act/> [Accessed 24 May 2021].
5. de Best, R. (2021). India: payment methods in retail 2021. [online] Statista. Available at: <https://www.statista.com/statistics/1296697/preferred-payment-methods-india/> [Accessed 24 May 2021].
6. Drew, J.M., (2020). A study of cybercrime victimisation and prevention: exploring the

- use of online crime prevention behaviours and strategies. *Journal of Criminological Research, Policy and Practice*.
7. Hadzhidimova, L.I. and Payne, B.K., (2019). The profile of the international cyber offender in the US. *International journal of cybersecurity intelligence & cybercrime*, 2(1), pp.40-55.
 8. Monteith, S., Bauer, M., Alda, M., Geddes, J., Whybrow, P.C. and Glenn, T., (2021). Increasing cybercrime since the pandemic: Concerns for psychiatry. *Current psychiatry reports*, 23, pp.1-9.
 9. PBSC (2021). Security | Welcome to National Informatics Centre, Punjab State Unit, Chandigarh | India. [online] National Informatics Centre: Punjab State. Available at: <https://pbsc.nic.in/service/security/> [Accessed 24 May 2021].
 10. Poulpunitha, S., Manimekalai, K. and Veeramani, P., (2020). Strategies to prevent and control of cybercrime against women and girls. *Mental*, 81, pp.81-0.
 11. Taylor, P. (2021). Number of Smartphone Users Worldwide 2014-2020 | Statista. [online] Statista. Available at: <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide> [Accessed 24 May 2021].
 12. The Statesman (2021). Online frauds: Punjab government to strengthen cyber security. [online] The Statesman. Available at: <https://www.thestatesman.com/india/online-frauds-punjab-government-to-strengthen-cyber-security-1503129911.html> [Accessed 24 May 2021].
 13. The Statesman (2021). Punjab Police's Cyber Crime Cell awarded by NCRB. [online] The Statesman. Available at: <https://www.thestatesman.com/india/punjab-polices-cyber-crime-cell-awarded-ncrb-1503108967.html> [Accessed 25 May 2021].
 14. Times Now News (2021). Punjab Man Arrested for Harassing Woman and Sharing Objectionable Photos on Social Media. [online] TimesNow. Available at: <https://www.timesnownews.com/mirror-now/crime/punjab-man-arrested-for-harassing-woman-and-sharing-objectionable-photos-on-social-media-article-100452298> [Accessed 24 May 2021].
 15. Times Of India (2021). Punjab: Nigerian held for duping man of Rs 14 lakh. The Times of India. [online] 21 Jan. Available at: <https://timesofindia.indiatimes.com/city/chandigarh/punjab-nigerian-held-for-duping-man-of-rs-14-lakh/articleshow/80381589.cms> [Accessed 24 May 2021].
 16. UNODC (2019). Cybercrime Module 8 Key Issues: Cybersecurity Strategies - Basic Features. [online] www.unodc.org. Available at: <https://www.unodc.org/e4j/en/cybercrime/module-8/key-issues/cybersecurity-strategies---basic-features.html> [Accessed 24 May 2021].

EXPLORING THE COMPLEXITY OF CULTURAL IDENTITY AND RACIAL POLITICS: A CRITICAL ANALYSIS OF ADICHIE'S *Americanah*

Sumaira Nazir and Shafayat Hussain

Department of English, CT University, Ludhiana (Punjab), India

ABSTRACT

The theme of racial politics and its articulation is prevalent and ubiquitous in the works of African writers, who strive to deconstruct the notion of race and reinterpret it as a stigma in the ethics of humanity. Chimamanda Ngozi Adichie's Americanah has sparked discussions in African-American racial politics, situating them within the larger context of race and ethnicity. Adichie explores the ongoing struggle with identity and race that several characters face, shedding light on the racial discrimination and prejudices that continue to haunt African immigrants who seek the American dream.

Introduction

In the contemporary period, people across borders have expanded the dynamics of multiculturalism. Consequently, identity, race, migration, and trans-culturalism have become the focus of literary and political debates. Nigerian author Chimamanda Ngozi Adichie's 2013 diasporic novel *Americanah* explores the racial struggles, identity quests, and immigrant experiences of the protagonist, Ifemelu, in the United States of America. Ifemelu moves to America for higher education and faces challenges such as an identity crisis, racism, marginalization, discrimination, and gender issues.

Experiencing life as an expatriate in a foreign country is often a painful experience, as it can lead to a sense of loss of one's native culture and result in an identity crisis. Chimamanda Ngozi Adichie highlights this theme in *Americanah*, where the protagonist, Ifemelu, faces a conflict between African traditions and norms on the one hand and American culture on the other, causing a split in her mind. Ifemelu's identity quest is recurrent throughout the novel, as she struggles to reconcile her African identity with constructing an American one. In his observation of emergent forms of representation among marginalized people, Stuart Hall states that it "continues to be a very powerful and creative force" (Ashcroft, 2004, p.437), which is evident in *Americanah*.

Ifemelu's struggle to reconcile her African identity with the desire to be recognized and respected like white Americans is a recurring theme in *Americanah*. As a minority, she is constantly othered by white people and adopts

a self-depreciative attitude that leads to an inferiority complex in her identity. "Why do you say Africa instead of just saying the country you mean?" (Adichie, 2013, p.12). This highlights the importance of claiming a strong identity in the modern global village, which is currently a topic of discussion among scholars and critics.

Problem statement

The problem at hand is that individuals with black or grey skin color in America do not have equal rights to pursue the American dream and are limited due to the color of their skin. White people have manipulated and maneuvered the system, creating issues with race and identity. This has resulted in difficulties for many black people to survive as a minority group in America, leading to identity crises and racism. Ifemelu, the protagonist in *Americanah*, experienced a sense of disgust due to her black skin and African identity. Her struggle to adapt to American culture, which conflicted with her traditional upbringing, resulted in feelings of foreignness, blackness, and gender-based discrimination. Her experiences, as depicted by Adichie in the novel, shed light on the traumatic impacts of racial discrimination, marginalization, nostalgia, and alienation. While research has been conducted on the issues of race and identity, the roots of these problems and why they are prevalent among African people, particularly in America, are not well-known. The turmoil of identity and racial politics has affected the lives of thousands of

people, making it a serious issue that requires scholars' attention.

Significance of the Study

This research is essential as it highlights the challenges of racism and identity that immigrants face in foreign countries, particularly in America. *Americanah* has portrayed the issues of racism, cultural identity, and difficulties experienced by African people living in America. The study is crucial as it bridges the gap between Ifemelu's native culture and the host culture in America. It proposes the idea of migrants adapting to the host culture while avoiding discrimination and prejudice to overcome identity crises and inferiority complexes. Additionally, this research also sheds light on the risks faced by African culture and identity in a country like America.

Literature Review

The literature review in this study entails an analysis of prominent critics' reviews of Chimamanda Ngozi Adichie's works, particularly the novel *Americanah*.

Jasmine Back (2016) The project focuses on the development of postcolonial identities and the experiences of immigrants in the novel *Americanah*. The author argues that individuals only become "black" outside of Africa, making race a crucial factor in their identity formation. She examines the discrimination faced by African people in America from a postcolonial perspective and explores the reasons for racial dominance, which negatively impacts African identity and behavior in America. The author utilizes John Iceland's models of immigrant adaptation and discusses the experiences of immigrants in relation to the dominant social structure.

Eleanor AnnehDasi (2019) In her article, the author examines the themes of identity, race, and beauty in *Americanah* through a postcolonial lens. She explores the connection between race, culture, and slavery and emphasizes the impact of migration and trans-culturalism on these issues. The article sheds light on the destructive actions of colonizers in erasing African identity and highlights the ongoing repercussions of these actions.

Almas Aprilia Damayanti, in a research article, "Cultural Identity in Jean Kwok's Novel Searching for Sylvie Lee (2020)", The researcher has conducted a study on the impact of cultural identity on Chinese immigrants' lives in America. The selected text features prominent characters who are experiencing cultural displacement in the United States and are grappling with feelings of nostalgia for their homeland. What makes this research relevant to my study is its multi-dimensional analysis of identity. The research examines how cultural and linguistic backgrounds shape a person's personality and emphasizes the profound connections between them.

Analysis

The notion that African cultures and traditions are not worthy of being showcased to the world has been instilled in the minds of Africans, leading to a crisis in individual and collective cultural identities. As a result, Africans in the diaspora struggle to represent themselves based on their own socio-cultural realities and instead rely on Western or colonizing standards to measure their worth. Ifemelu, the protagonist in the novel *Americanah*, also experienced challenges with her identity and felt conflicted about her African origins and dark skin color.

The Cultural Identity Crisis in Adichie's "Americanah"

The classical diaspora debate revolves around cultural identity and highlights conflicts between native and host cultures. Adichie's *"Americanah"* delves into the issue of bicultural conflicts and encourages black individuals to create their own cultural identities. Ifemelu, a black woman, struggled with self-consciousness regarding her color and origin. She questioned American traditions and deconstructed the dominant cultural narrative. Initially, she felt isolated and marginalized in the United States as a woman, black person, and immigrant. However, she gradually developed coping mechanisms to create her own identity, despite encountering negative stereotypes about African people perpetuated by white Americans. Ifemelu faced discrimination and prejudice due to the belief that African culture was inferior to American culture.

Ifemelu's struggle with identity crisis significantly impacted her self-esteem as a black woman. However, she persevered and made efforts to comprehend the complexities of identity politics through social exploration, rather than giving up. "She liked, most of all, that in this place of affluent ease, she could pretend to be someone else, someone specially admitted into a hallowed American club, someone adorned with certainty" (Adichie, 2013 p.7). It is a common experience for immigrants to imitate confidence and try to prove that they belong, but internal conflicts are inevitable and difficult to manage. Ifemelu extensively searched Nigerian websites, profiles on Facebook, and blogs, where she stumbled upon numerous accounts of young individuals who had returned to Nigeria after acquiring American or British degrees. They had started various businesses such as investment companies, music production studios, fashion labels, magazines, and fast-food franchises. (Adichie, 2013 p.8)

The African diaspora's identity is greatly influenced by America, which encompasses various traditions, thoughts, politics, and expressive cultures. Ifemelu, like many others, pursued her American Dream, but in my opinion, she was not swayed by American culture since she did not stay there permanently and ultimately returned to Nigeria. She continued to identify as part of Africa and was unwilling to relinquish her African identity under any circumstances. As Adichie writes, "A Peculiar Case of a Non-American Black, or How the Pressures of Immigrant Life Can Make You Act Crazy" (p.14).

Ifemelu's identity is a "powerful and creative force in emergent forms of representation amongst hitherto marginalized peoples" (Hall, p.2), the guilt and disgust she felt regarding her collective identity stemmed from the dynamics of power politics that created the notion of African people being inferior and uncivilized. This idea also applies to the collective identity of belonging to an African diaspora, such as African Americans sharing a history of slavery or the migrant conflicts of recent immigrants. As Adichie writes, "Why do you say Africa instead of just saying the country you mean?" (p.12), which demonstrates Ifemelu's questioning of the broad and often

stereotypical use of "Africa" to refer to a diverse continent with many different countries and cultures.

Julius and Ifemelu belong to the category of immigrants whose individual experiences shape their identity rather than their shared historical ethnicity. According to Stuart Hall, this category is important in understanding the traumatic character of the colonial experience. The collective history of black Africans is filled with traumatic memories of slavery and colonialism which continue to affect their identity in modern times. The blame for these identity crises can be placed on the white masters who enforced these colonial attributes. Ifemelu's struggle for recognition in America is a clear example of this identity crisis. She believed that she needed to win a prize to be taken seriously among Nigerians, Africans, and immigrants in America. This struggle highlights the difficult lives of immigrants who often struggle with low self-worth and unrecognized identities. As Hall noted, "It is only from this second position that we can properly understand the traumatic character of the colonial experience." (p.4) and Adichie's statement, "To earn the prize of being taken seriously...she needed more years," (Adichie, 2013 p.13) reflects this struggle.

Ifemelu's experiences illustrate the American tendency to disregard Africans in various aspects of life due to their belief in black inferiority, as they have been taught since childhood. This is reflected in the statement, "Sometimes making fragile links to race. Sometimes not believing herself" (Adichie, 2013 p.7). According to Americans, Africa is morally degraded and has negatively shaped the attitudes and behaviors of Africans. This statement highlights the significant role that skin color plays in American society and how it can often be a source of shame for those with darker skin. Ifemelu was torn between maintaining her African identity or renouncing it and adopting an American one.

Racial Politics in Adichie's *Americanah*

In *Americanah*, Adichie explores the ongoing struggle with identity and race that several characters face, shedding light on the racial discrimination and prejudices that continue to haunt African immigrants who seek the

American dream. One character asserts that "Race is overhyped these days, black people need to get over themselves, it's all about class now, the haves and the have-nots" (Adichie, 2013 p.7), but Adichie demonstrates that these racial problems are still very prevalent in contemporary America. As an immigrant black woman, Ifemelu's experiences of racial trauma are particularly poignant and complex, making her analysis of race in the novel more nuanced and insightful. Adichie specifically portrays these painful experiences from the perspective of a woman because she believes that women are more vulnerable and sensitive to these issues than men. As Delgado and Stefancic assert, "Everyday racism is a common, ordinary experience for people of color in the United States" (CRT). The novel shows how physical features like skin color, hair texture, and body shape are interpreted as markers of inferiority and used to judge moral, intellectual, and professional capabilities. African women are often pressured to conform to dominant beauty ideals, which can further exacerbate feelings of alienation and inferiority. Adichie highlights the grim reality that "Nobody wants black babies in this country, and I don't mean biracial, I mean black. Even the black families don't want them" (Adichie, 2013 p.7). While the novel does not seek to draw a totalizing view of racism in America, Adichie does draw attention to black individuals who hold racist beliefs and contribute to the marginalization of racial minorities, which is ultimately damaging to the unique voice of color. The book underscores how racial constructions and social expectations impact the sense of self of migrant African women and how they struggle to

overcome these stereotypes in American society, a process that is often painful and traumatic.

Adichie's portrayal of racism in America is not a simplistic or absolute one, as she acknowledges that some white people in the novel demonstrate unbiased behavior. However, she also highlights the damaging impact of racism within the Black community, which can suppress the "unique voice of color" that arises from the experiences of racial minorities. These discussions shed light on how racial constructs and societal expectations affect African female migrants' sense of self, and the ways in which they struggle to overcome stereotypes in American society. For these immigrants, the experience of dealing with these issues can be traumatic and painful. Immigrants in America often face challenges related to identity, race, marginalization, and prejudice. Ifemelu, as an immigrant, encountered numerous struggles that caused her to lose her sense of identity and fail to fully integrate into either American or Nigerian culture. The analysis demonstrates that Ifemelu's African identity made her feel ashamed of the color of her skin, which, compounded with the racism she faced, traumatized her and caused indelible wounds to her sense of self. Additionally, racism has exacerbated her situation, creating feelings of guilt and inferiority. Ultimately, migration caused Ifemelu to lose her identity, sense of self, and cultural value, which is a common experience for diasporas. Adichie's *Americanah* explores the various ways in which the African diaspora has suffered from racism, and their continual search for identity ultimately leads them nowhere.

References

1. Adichie, C. N. (2014). *Americanah*. Gylndental A/S.
2. Akingbe, N., & Adeniyi, E. (2017). "Reconfiguring Others": Negotiating Identity in Chimamanda Ngozi Adichie's *Americanah*. *Rupkatha Journal on Interdisciplinary Studies in Humanities*, 9(4), 1-10.
3. Amonyeze, C. (2017). Writing a New Reputation: Liminality and Bicultural Identity in Chimamanda Adichie's *Americanah*. *SAGE Open*, 7(2), 1-10.
4. Back, J., & Polak, S. A. (2016). "Hey, I'm African Just Like You": Migration and Identity Construction in *Open City* and *Americanah*. *Atlantic Studies: Literary, Cultural and Historical Perspectives*, 13(4), 514-527.
5. Begum, S. H. (2019). *Americanah* as a Transnational Feminist Novel: A Study.

- The Criterion: An International Journal in English, 10(1), 1-9.
6. Berning, N. (2015). Narrative Ethics and Alterity in Adichie's Novel *Americanah*. *CLCWeb: Comparative Literature and Culture*, 17(5), 1-10.
 7. Bowman, L., Rocco, T. S., Peterson, E., & Adker, W. A. (2009, May). Utilizing the Lens of Critical Race Theory to Analyze Stories of Race. *Proceedings of the 2009 Adult Education Research Conference*, 36-41.
 8. Dasi, E. A. (2019). The Intersection of Race, Beauty and Identity: The Migrant Experience in Chimamanda Ngozi Adichie's *Americanah*. *Studies in Linguistics and Literature*, 3(2), 140-154.
 9. Damayanti, A. A., & Tjahjandari, L. (2021, January). Cultural Identity in Jean Kwok's Novel *Searching for Sylvie Lee*. In *International University Symposium on Humanities and Arts 2020 (INUSHARTS 2020)* (pp. 8-13). Atlantis Press.
 10. Larsen, L., & Oddershede, M. H. (2017). Postcolonial Cultural Identity: A Comparative Intersectional Analysis of the Creation of Cultural Identity. *Journal of Postcolonial Writing*, 53(4), 439-451.
 11. Myrsiades, K. (1995). Introduction: Writing Race and Politics: The Experience of African American Literature. *College Literature*, 22(3), i-vi.

AGGRESSION AMONG ADOLESCENTS IN RELATION TO SOCIAL COMPETENCE**Aayushi Bhargav and Tehseen Saleem**

Department of Psychology, CT University, Ludhiana (Punjab), India

ABSTRACT

Present study was undertaken to investigate the relationship between aggression among adolescents and their social competence. The study was conducted on 720 students of age group of 13 to 16 years from four different districts of Punjab. Each district includes 4 government schools (2 rural 2 urban). Data was collected by using Aggression Questionnaire (AQ) by Mathur and Bhatagr (2012) and the Social Competence Scale (SCS) by Sharma, Shukla and Shukla (2012). The result of the study revealed that value of $r = -0.271$. This implies that adolescents who exhibit higher levels of aggression typically have lower social competence. The findings of this study may guide future investigations and therapeutic programs designed to assist young people in controlling their anger and enhancing their social skills. It is believed that anger management workshops need to be routinely organized in schools in order to prevent young people from acting aggressively and develop healthy social competence among each other.

Keywords: Aggression, Social Competence, Adolescents

Introduction

Adolescence is a time of rapid physical and psychological growth that is frequently accompanied by an increase in aggression and social skills. While American Psychological Association (APA) views social competence as the ability to exert control over one's life to cope with specific problems effectively, to make changes to one's own behavior and one's environment, aggression is defined as behavior that is meant to cause harm to another person. According to research, violent behaviors are linked to a number of undesirable outcomes, such as social exclusion, poor academic performance, and even criminal behavior. On the other hand, social competence has been associated with favorable outcomes like improved interpersonal interactions and higher academic accomplishment.

The significance of this association stems from the fact that aggression is a problem that frequently affects teenagers and can have long-lasting effects on their social and emotional growth. The record of man's aggressions runs the gamut of human history from the Biblical era and the pre-Homeric sagas to the series of conflicts and upheavals that have marked the twentieth century. Aggression means feelings of anger or antipathy resulting in hostile or violent behavior or readiness to attack or confront. For example: Physical violence, such as biting, hitting, and kicking. Similarly, verbal hostility, like sending threatening messages through emails, phone calls, or social media, or

making threats against someone's life, shouting and swearing. In current scenario, adolescents mostly experience 'Emotional aggression' which is the result of repressed negative emotions they experience at the moment, that they aggress and is not really intended to create any positive outcomes. Keeping in mind, today's scenario where only a socially competitive individual surpasses the criteria of success, it has become the utter need to study such variables in a complex and combined manner. Therefore, it is crucial to comprehend how aggression and social skills in teenagers relate to one another. Understanding the relationship between aggression and social skill will help us better understand how these two factors interact and potentially influence one another.

Review Of Related Literature

Whipple (2006) conducted a study and found that there is social competence promotion produced leads to decrease in children's aggression. Babakhani (2011) conducted a study and revealed that social skills training did not lead to decrease in physical aggression but it leads to decrease in verbal aggression. Alavi, Savoji and Amin (2013) conducted a study and revealed that there is positive effect of social skills training on decrease of aggression. Allame, Yelagh, Hajiyakhchali and Honarmand (2017) conducted a study and revealed that social skills training causes decrease in aggression. Hukkelberg, Keles, Ogden and Hammerstrom

(2019) revealed significant negative relationship between behavioral problems and social competence ($r = -0.42$, $p < 0.01$).

Objective

To examine the correlation between aggression and social competence among adolescents.

Hypothesis

There is a negative significant correlation between aggression and social competence among adolescents.

Method

Discriptive survey method of research was used in the study.

Sample

A sample of 720 adolescents was investigated from four different regions of Punjab (i.e. Fatehgarh Sahab, Malerkotla, Ludhiana and Moga) who were randomly selected from different schools/institutions. Each district included 4 schools (2 urban & 2 rural). Furthermore, 45 adolescents were studied from each of these schools. Thus, present study collected data from 16 schools with 45 adolescents making a total sample of 720 adolescents.

Tools

1. Aggression Questionnaire (AQ) by Mathur and Bhatnagar (2012)
2. Social Competence Scale (SCS) by Sharma, Shukla and Shukla (2012).

Results

To investigate the relationship between aggression and social competence of adolescents Pearson's coefficient of correlation was worked out and the value is given in following table:

Table: Relationship between Aggression and Social Competence of Adolescents

Variables	N	r
Aggression and social competence	720	-0.271*

*Significant at 0.01 level of significance

Table reveals that value of correlation between aggression and social competence of adolescents is -0.271, which is significant ($p < 0.01$). It indicates that there is negative correlation between aggression and social competence of adolescents. Hypothesis which states that 'There is a negative correlation between aggression and social competence among adolescents', is thus not rejected.

The study's findings suggest that increase in social skills among adolescents will aid in lowering aggression. This conclusion is consistent with those made by Whipple (2006), Alavi et al. (2013), Allame et al. (2017), and Hukkelberg et al. (2019) in their respective research.

Limitations

- It is vital to keep in mind that this correlation may change depending on the sample size.
- Furthermore, this is an overview of the relationship between teenage aggression and social skills. To fully comprehend the other elements like race, and socioeconomic status influence it, more research is required.
- Furthermore, how these two variables are influenced by other extraneous variables, more research is required.

Implications

The results of this study may serve as a road map for future research and treatment initiatives intended to help young people improve their social and anger management abilities. It is believed that social competence development workshops need to be frequently organized in schools in order to prevent young people from acting aggressively.

References

1. Alavi, S.Z., Savoji, A.P. & Amin, F. (2013). The effect of social skills training on aggression mild mentally retarded children. *Procedia - Social and Behavioral Sciences*, 84(2), 1166-1170. Retrieved from

- <https://www.researchgate.net/publication/273853456>
2. Allame, A., Yelagh, M.S., Hajiyakhchali, A. & Honarmand, M.M. (2017). The effect of pro social skills training on aggression and self-efficacy in peer interaction among students with aggressive behavior. *Journal of Educational Psychology Studies*, 14(28), 169-206. Retrieved from https://jeps.usb.ac.ir/article_3595.html?lang=en
 3. Babakhani, N. (2011). The effect of social skills training on self-esteem and aggression male adolescents. *Procedia-Social and Behavioral Science*, 30, 1562-1570. Retrieved from <https://www.sciencedirect.com/science/article/pii/S187704281102129X>
 4. Hukkelberg, S., Keles, S., Ogden, T. & Hammerstrom, K. (2019). The relationship between behavioral problems and social competence: A correlational meta-analysis. *BMC Psychiatry*, 19(354). Retrieved from
 5. <https://bmcpsychiatry.biomedcentral.com/articles/10.1186/s12888-019-2343-9>.
 5. Lansford, J.E., Criss, M.M., Pettit, G.S., Dodge, K.A., & Bates, J.E. (2009). Developmental trajectories of aggression and social competence: A longitudinal analysis of K-6 boys. *Developmental Psychology*, 45(2), 627-639.
 6. O'Neal, C. R., Smith, E. P., & Lochman, J. E. (2010). Moderating effects of social competence on the relation between aggressive behavior and depression among adolescent boys. *Journal of Abnormal Child Psychology*, 38(2), 215-226.
 7. Rabiner, D., Tran, O., & Costello, E. (2007). Adolescent social competence, aggression, and peer relationships: A longitudinal study. *Journal of Clinical Child and Adolescent Psychology*, 36(4), 591-604.
 8. Whipple, D. (2006). Effects of social competence promotion on aggressive behavior: A meta-analytic review. Open Access Master's Theses. Paper 1702. <https://digitalcommons.uri.edu/theses/1702>

TURNOVER INTENTION DUE TO WORK-FAMILY CONFLICT: A STUDY OF PUNJAB FACULTIES IN PRIVATE UNIVERSITIES

Prabhdeep Kaur, Sachin Sharma

Department of Management, CT University, Ludhiana, India

ABSTRACT

Conflicts arise in many aspects of the life and due to this stress, imbalance, and performance of an individual is affected. In today's era, the conflict of interest is mostly seen in the full-time employees which are working in any organisation and maintaining families. Due to this conflict their work and family both impact. The study of this conflict known as work-to-family and family-to-work conflict. The focus of this paper is to study the turnover intention due to work-family conflict among faculty members of the private universities in Punjab. Further, in the literature review covers time-based, strain-based, and behaviour-based interference impact on work-to-family and family-to-work conflicts. The research approaches and methods include data collection and ethical considerations. The results present primary and secondary data analysis using SPSS and thematic analysis. The findings highlight the reasons behind work-life conflicts among faculty members in private universities in Punjab. Statistics reveal that whether work interferes with family or family interferes with work, both time-based and strain-based interferences are related to turnover. The findings demonstrate that there are considerable correlations between several aspects of work-family conflict and turnover characteristics. This highlights the need of achieving work-life balance in order to decrease turnover intentions. Furthermore, there is a positive relationship between work-based interference and turnover, highlighting the importance of effective problem-solving mechanisms that are compatible with both the work and family domains. These links emphasise the significance of workplace-family interactions in successfully minimising turnover rates.

Keywords: Conflict, Faculty Members, Family-to-work Conflict, Higher Education, Organizational Practices, Private Universities, Punjab Universities, Work-to-Family Conflict, Work-life Balance.

1. Introduction

Work-life conflict occurs when the demands of work and personal life clash, leading to stress, decreased job satisfaction, lowered well-being, strained relationships, adverse effects on physical health, and career implications for employees. It can result in chronic stress, reduced motivation, engagement, and productivity at work, strained personal relationships, and negative impacts on physical health (Dodanwala and Shrestha, 2021). Organizations that prioritize work-life balance and offer supportive policies and programs can help employees manage their responsibilities in both areas effectively, leading to a healthier, happier, and more productive workforce. University professors experience work-life conflict due to reasons such as heavy workload, research pressure, teaching responsibilities, administrative duties, work pressure and expectations, lack of work-life boundaries, and institutional culture and policies (Buruck *et al.* 2020). Demanding workloads, research expectations, and administrative duties can encroach on personal time, while work pressure and expectations can

create stress. Lack of clear boundaries between work and personal life, as well as institutional culture and policies that may not support work-life balance, can further exacerbate work-life conflict. Addressing work-life conflict may involve setting clear boundaries, prioritizing self-care, and advocating for supportive policies and practices within the academic environment (Prasetio *et al.* 2019).

Private college teachers can face challenges related to higher workload, financial pressures, and lack of job security, which can contribute to work-life conflict and work pressure. On the other hand, public college teachers can experience bureaucratic processes, tenure and promotion pressures, and increased student enrolment, which can also lead to work-life conflict and work pressure (Shevchuk *et al.* 2019). However, it is important to note that experiences can vary depending on the specific context, policies, and personal circumstances. Some private colleges can offer better work-life balance, while some public colleges can have lower work pressure. Individual factors need to be considered when comparing work-life conflict and work pressure among private

and public college teachers (Fuadiputra and Novianti, 2020).

The main aim of this paper is to determine the turnover attention due to time-based, strain-

based, and behaviour-based conflicts among the faculties of Punjab and its impact on the family and work. To achieve this goal, the designed hypothesis is shown in Table 1.

Table 1 Hypothesis of this Research

No.	Hypothesis
1	<p>H₀ = Time-based work interference with family influences the Turnover intention of faculties.</p> <p>H₁ = Time-based work interference with family does not influence the Turnover intention of faculties.</p> <p>H₂ = Time-based family interference with work influences the Turnover intention of faculties.</p> <p>H₃= Time-based family interference with work does not influence the Turnover intention of faculties.</p>
2	<p>H₀ = Strain-based work interference with family influence the Turnover intention of faculties.</p> <p>H₁ = Strain-based work interference with family does not influence the Turnover intention of faculties.</p> <p>H₂ = Strain-based family interference with work influences the Turnover intention of faculties.</p> <p>H₃ = Strain-based family interference with work does not influence the Turnover intention of faculties.</p>
3	<p>H₀ = Behaviour-based work interference with family influence the Turnover intention of faculties.</p> <p>H₁ = Behaviour-based work interference with family does not influence the Turnover intention of faculties.</p> <p>H₂ = Behaviour-based family interference with work influences the Turnover intention of faculties.</p> <p>H₃= Behaviour-based family interference with work does not influence the Turnover intention of faculties.</p>

The remaining paper is classified into five sections. Section 2 shows the literature review. Section 3 explains the research methodology is designed to determine the turnover attention due to time-strain-behaviour based conflict. Section 4 shows the results and analysis part in which primary, descriptive, and statistical results are explained. Finally, conclusion of the paper is drawn in Section 5.

2. Literature Review

According to Solanki and Mandaviya (2021), gender influences a variety of characteristics among university professors, including workplace stress, work-life balance, health, and job satisfaction. The authors analyse theoretical frameworks and synthesise existing research to provide a conceptual understanding of these qualities. According to the study, workload, time restrictions, a lack of autonomy, and role conflict all contribute to occupational stress (Yang *et al.* 2021). Due to gendered

expectations and societal duties, work-life balance is challenging for university lecturers, particularly women. Work-life integration Workplace anxiety and stress can lead to health problems and decreased job satisfaction. The review underlines the need of interventions and supportive measures to promote the well-being and job satisfaction of university professors, particularly when gender discrepancies are examined.

The influence of work-life balance on academic well-being in higher education is investigated by Franco et al. (2021). To get a synthesised understanding of this issue, a thorough examination of accessible literature is performed. The study emphasises the challenges that teachers have in achieving work-life balance, such as excessive workload, time constraints, and blurred boundaries between work and family life. It also looks into how work-life balance affects other aspects of teacher well-being, such as physical health,

mental health, job satisfaction, and workplace engagement (Engström *et al.* 2021). An imbalance between job and home life, according to the study, may have a detrimental influence on teachers' well-being. The evaluation underlines the need of creating supportive work environments and establishing work-life balance policies in higher education. Zahoor *et al.* (2021) study the impact of high performance work practises, work-family conflict, job stress, and personality on the ability to achieve work-life balance. Following a thorough analysis of existing studies, the study discovered that high performance work practises such as employee participation, training and development, and performance-based prizes positively contribute to work-life balance. Work-family conflict, job stress, and some personality characteristics, on the other hand, have been shown to harm work-life balance (Shi *et al.*, 2023). The study underlines the significance of organisational support, flexible work arrangements, and individual coping qualities in order to improve work-life balance. It is beneficial for academics and practitioners who want to better understand and improve work-life balance in the workplace (Srivastava *et al.* 2019).

Vasumathi *et al.* (2019) shed light on the relationship between emotional intelligence and work-life balance among faculty members at private universities. The study analyses the impact of emotional intelligence on work-life balance and performance using multivariate analysis. According to the review, persons with higher levels of emotional intelligence had better work-life balance. It also investigates how job demands, organisational aid, and individual coping strategies influence this relationship (Yadav *et al.* 2021). The review of literature contributes to a better understanding of the factors that impact faculty members' work-life balance, providing useful insights for improving their well-being and performance in the context of private institutions in Tamil Nadu, India.

3. Methodology

In this section, the research methodology is explained that is adapted to achieve the desired objectives. We have conducted the

questionnaire-based survey to determine the turnover intention of the faculties due to time-based, strain-based, and behaviour-based conflict and their impact on their work and family. To prepare the questionnaires, we have used the work-family conflict scale (developed by Carlson *et al.* 2000) and the turnover intention scale (developed by Prof. Gert Roodt), and ethical permission was taken from the authors. In the survey, faculties of private universities of Punjab are taken under consideration. The total participants in the survey are 552 which have completed our web-based questionnaire in 2021. Further, to validate the prepared data, we have conducted Cronbach's Alpha test and data achieved 0.992 value.

4. Results and Analysis

We have used the SPSS tool for conduct the primary, descriptive, and statistical analysis. In the primary analysis, we have used the based on the gender, age, marital status, and designation factor, as show in Table 1. The gender analysis shows 51.3% of total participants were male and 48.7% were females. This involvement indicated that the research provided equal opportunity without considering gender bias and followed a random sampling process. This sampling process was selected to collect the opinions of both male and female participants to identify social considerations in the university. Next, age analysis shows that maximum faculties are in the age factor of 25-45 years (69.3%). Further, marital status analysis shows that 52.7% were married and 47.3% were single. This availability of all types of marital status provided support to identifying the impact of work-family conflict in individual careers. Information about different marital status people can show the impact on work-life balance in different lifestyles. This also satisfied with research ethics as the frequency of marital status shows equal opportunity was present in the sampling process. In the last, designation analysis shows that the 62.7% faculties are trainee professor, 27.9% faculties are assistant professor, and 9.4% faculties are professor.

Table 1 Primary Analysis (Sample Size:552)

Gender	Male	Female		
	51.3%	48.7%		
Age	25-30 Years	26-45 Years	46-50 Years	More than 5- Years
	31.3%	38.0%	15.9%	14.7%
Marital Status	Single	Married		
	52.7%	47.3%		
Designation	Trainee Professor	Assistant Professor	Professor	
	62.7%	27.9%	9.4%	

4.1 Descriptive Statistics

Next, descriptive statistics is done based on time-based, strain-based, behaviour-based interference for work-family interference.

- **Time-Based Work Interference with Family:** Table 2 shows the impact of time-based work interference with family based on three factors. The first factor indicates that, on average, participants experience a moderate level of interference, with a mean score of 1.93 and a standard deviation of 0.923. The second and third factors

demonstrate stronger interference, with mean scores of 2.32 and 2.30, and standard deviations of 1.142 and 1.114, respectively. These findings suggest that the time devoted to work affects participants' ability to engage equally in household responsibilities and family activities, leading to the need to miss out on family events. The statistical numbers emphasize the varying degrees of interference experienced by individuals in balancing work and family commitments.

Table 2: DESCRIPTIVE STATISTICS (Time-Based Work Interference with Family)

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Time-based work interference with family									
My work keeps me from my family activities more than I would like.	552	1	5	1.93	.923	1.160	.104	1.333	.208
The time I must devote to my job keeps me from participating equally in household responsibilities and activities.	552	1	5	2.32	1.142	.663	.104	-.370	.208
I have to miss family activities due to the amount of time I must spend on work responsibilities.	552	1	5	2.30	1.114	.771	.104	-.087	.208

- Time-Based Family Interference with Work:** Table 3 shows the descriptive statistics of time-based family interference with work based on three factors. The mean scores for time-based family interference with work range from 2.38 to 2.44, showing that faculty members face moderate levels of conflict as a result of

family obligations that clash with work commitments. The standard deviation values for these items are also rather high (varying from 1.150 to 1.206), indicating that faculty members encounter a wide range of time-based family interference with work.

Table 3: DESCRIPTIVE STATISTICS (Time-Based Family Interference with Work)

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Time-based family interference with work									
The time I spend on family responsibilities often interfere with my work responsibilities.	552	1	5	2.38	1.150	.598	.104	-.500	.208
The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career.	552	1	5	2.42	1.188	.577	.104	-.642	.208
I have to miss work activities due to the amount of time I must spend on family responsibilities.	552	1	5	2.44	1.206	.584	.104	-.608	.208

- Overall Time-based Analysis:** The overall time-based analysis (work interference with family and family interference with work) which is drawn from Table 2-3 is given below. The analysis reveals the impact of time-based work interference on family responsibilities across different factors. The first factor indicates that participants experience a moderate level of interference, with work often keeping them from engaging in family activities as desired. The second and third factors demonstrate stronger interference, with participants facing challenges in balancing household responsibilities and missing out on family activities due to work demands. The findings emphasize the need for individuals to find a balance between work and family commitments. It highlights the importance

of managing time effectively to ensure equal participation in both work and family spheres and underscores the challenges faced in achieving work-life balance.

- Strain-based Work Interference with Family:** Table 4 shows the descriptive statistics of strain-based work interference with family. The mean scores for Strain-based work interference with family range from 2.31 to 2.34, showing that faculty members face moderate degrees of conflict as a result of job demands that conflict with family duties. The standard deviations for these questions are quite large (range from 1.115 to 1.126), indicating that faculty members' perspectives on time-based job interference with family varied substantially.

Table 4 DESCRIPTIVE STATISTICS (Strain based work Interference with Family)

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic Std. Error	Statistic	Std. Error	
Strain-based work interference with family									
When I get home from work I am often too frazzled to participate in family activities/responsibilities	552	1	5	2.34	1.115	.719	.104	-.170	.208
I am often so emotionally drained when I get home from work that it prevents me from contributing to my family.	552	1	5	2.32	1.142	.663	.104	-.370	.208
Due to all the pressures at work, sometimes when I come home I am too stressed to do the things I enjoy.	552	1	5	2.31	1.126	.717	.104	-.218	.208

• **Strain-based Family Interference with Work:** Table 5 shows the descriptive statistics of strain-based family interference with work. Family conflict with work has a substantial influence on faculty turnover intention. When faculties are consumed with family concerns at work, their ability to focus and carry out their professional

responsibilities may suffer. Individuals identified strain-based family interference with work, with mean score is 2.49, according to the data provided. Furthermore, the standard deviations show some variation in the responses, indicating that people's experiences with this interference may vary.

Table 5 DESCRIPTIVE STATISTICS (Strain based Family Interference with Work)

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic Std. Error	Statistic	Std. Error	
Strain-based family interference with work									
Due to stress at home, I am often preoccupied with family matters at work.	552	1	5	2.49	1.196	.630	.104	-.526	.208
Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.	552	1	5	2.49	1.219	.583	.104	-.634	.208
Tension and anxiety from my family life often weakens my ability to do my job.	552	1	5	2.49	1.224	.572	.104	-.633	.208

• **Overall Strain-based Analysis:** The first set of strain-based factors includes statements such as "When I get home from work, I am often too frazzled to participate

in family activities/responsibilities." The mean scores for these factors range from 2.31 to 2.34, indicating that, on average, faculty members experience a moderate

level of strain or emotional exhaustion that interferes with their ability to engage in family activities or fulfill family responsibilities. The standard deviations range from 1.115 to 1.126, suggesting substantial variation in participants' perspectives on this type of work interference with family. The second set of strain-based factors includes statements such as "Due to stress at home, I am often preoccupied with family matters at work." The mean scores for these factors are consistently 2.49, indicating a slightly higher level of strain or emotional interference. The standard deviations range from 1.196 to 1.224, suggesting variability in participants' experiences and perspectives regarding the impact of family stress on their work. Overall, the strain-based factors highlight the experiences of faculty members who face interference between work and family due to strain, emotional exhaustion, and stress. The moderate mean scores indicate a noticeable level of interference, and the standard deviations demonstrate the individual differences in how this interference is perceived. These findings suggest that the strain and emotional exhaustion experienced in either the work or family domain can spill over and negatively impact the other domain, affecting

individuals' ability to perform well both at work and in their family roles.

- Behaviour-based Work Interference with Family:** The table 6 presents the descriptive statistics for different dimensions of work-family conflict among faculty members in Punjab's private universities. The overall sample size (N) for all items is 552. The mean and standard deviation statistics for each item represent the average score and the variability in replies, respectively. The provided statistics highlight the impact of time-based work on family activities and responsibilities. The first factor indicates that, on average, participants reported a moderate level of interference between work and family activities, with a mean score of 2.39. However, there is variability in responses, as indicated by a standard deviation of 1.157. The second and third factors reveal a stronger interference, with mean scores of 2.32 and 2.30 respectively. These higher means suggest that individuals experience more significant interference in household responsibilities and family activities due to work commitments. The statistics demonstrate the varying degrees of interference and underscore the importance of considering individual experiences within the broader context of work-life balance.

Table 6 Descriptive Analysis (Behaviour-based work interference with family)

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Behaviour-based work interference with family									
The problem-solving behaviour I use in my job is not effective in resolving problems at a home.	552	1	5	2.39	1.157	.641	.104	-.425	.208
Behaviour that is effective and necessary for me at work would be counter-productive at a home	552	1	5	2.32	1.103	.720	.104	-.099	.208
The behaviours I perform that make me effective at work do not help me to be better at home.	552	1	5	2.39	1.159	.608	.104	-.506	.208

- Behavior -based Family Interference with Work:** Table 7 shows the descriptive analysis of behaviour-based family

interference with work. The mean scores for **behavior-based family interference with work** range from 2.33 to 2.42,

indicating that faculty members experience moderate levels of conflict as a result of differences in problem-solving behaviours and abilities required at home and at work. The standard deviation values for these

items are also rather high (ranging from 1.130 to 1.154), showing that the extent to which faculty members experience behavior-based family interference with work varies greatly.

Table 7 Descriptive Analysis (Behaviour-based Family interference with Work)

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Behaviour-based Family interference with Work									
The behaviours that work for me at home do not seem to be effective at work.	552	1	5	2.42	1.141	.611	.104	-.444	.208
Behaviour that is effective and necessary for me at home would be counterproductive at work.	552	1	5	2.34	1.130	.674	.104	-.296	.208
The problem-solving behaviour that works for me at home does not seem to be as useful at work.	552	1	5	2.33	1.154	.685	.104	-.383	.208

- Overall Behavior-based Analysis:** These behavior-based conflicts highlight the perception of participants that certain behaviors and problem-solving approaches used in their work environment do not translate effectively to their home life. The moderate mean scores indicate a noticeable level of interference, and the standard deviations demonstrate the individual differences in how this interference is perceived. These findings suggest that individuals may need to adapt and employ different behaviors or problem-solving strategies to successfully manage both their work and family responsibilities.

4.2 Correlation Analysis

In this section, correlation analysis is done for time-based, strain-based, and behaviour-based interference impact on turnover attention.

- Correlation Analysis of Time-based Work to Family Interference:** Table 8 shows the correlation analysis of time-based work to family interference. For the factor "My work keeps me from my family activities more than I would like," there is a

minimum positive correlation of 0.076 with the extent to which encourage faculty members to quitting their job. However, this correlation is not statistically significant at a p-value of 0.075. In contrast, the factors "The time I must devote to my job keeps me from participating equally in household responsibilities and activities" and "I have to miss family activities due to the amount of time I must spend on work responsibilities" show a strong positive correlation with all aspects related to turnover. The correlations are significant with p-values of 0.000. This indicates that the more work interferes with family responsibilities and activities, the more likely individuals are to feel that their current job negatively affects their personal well-being, that the benefits associated with their job prevent them from quitting, and that the fear of the unknown hinders them from quitting. These findings suggest that time-based work interference with family has a notable influence on turnover

Table 8: Correlation Analysis (Time-based work interference with family)

		To what extent do responsibilities prevent you from quitting your job?	To what extent does your current job have a negative effect on your personal well-being?	To what extent do the benefits associated with your current job prevent you from quitting your job?	To what extent does the “fear of the unknown”, prevent you from quitting?	Turnover Correlation (Average of Factors)
Time-based work interference with family						
My work keeps me from my family activities more than I would like.	Pearson Correlation	.076	.127**	.132**	.196**	0.201**
	Sig. (2-tailed)	.075	.003	.002	.000	.000
	N	552	552	552	552	552
The time I must devote to my job keeps me from participating equally in household responsibilities and activities.	Pearson Correlation	.581**	.540**	.538**	.713**	.717**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
I have to miss family activities due to the amount of time I must spend on work responsibilities.	Pearson Correlation	.581**	.540**	.538**	.713**	.717**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552

• **Correlation Analysis of Time-based Family to Work Interference:** Table 9 shows the correlation analysis of time-based family to work interference. The statistics reveal the relationship between time-based family interference with work and turnover, measured using Pearson correlation coefficients. The factor "The time I spend on family responsibilities often interferes with my work responsibilities" shows a significant positive correlation ranging from 0.533 to 0.751 ($p < 0.001$) with aspects related to turnover. Similarly, the factor "The time I spend with my family often hinders

activities that could benefit my career" exhibits a strong positive correlation ranging from 0.574 to 0.769 ($p < 0.001$) with turnover aspects. Furthermore, "I have to miss work activities due to family responsibilities" also demonstrates a significant positive correlation ranging from 0.502 to 0.772 ($p < 0.001$) with turnover aspects. These findings emphasize the impact of time-based family interference on turnover-related factors, indicating the need for organizations to address work-life balance to reduce turnover intentions.

Table 9: Correlation Analysis (Time-based Family interference with Work)

		To what extent do responsibilities prevent you from quitting your job?	To what extent does your current job have a negative effect on your personal well-being?	To what extent do the benefits associated with your current job prevent you from quitting your job?	To what extent does the “fear of the unknown”, prevent you from quitting?	Turnover Correlation (Average of Factors)
Time-based Family interference with Work						
The time I spend on family responsibilities often interfere with my work responsibilities.	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
	Pearson Correlation	.533**	.565**	.556**	.751**	.743**
The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career.	Pearson Correlation	.597**	.574**	.591**	.741**	.769**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
I have to miss work activities due to the amount of time I must spend on family responsibilities.	Pearson Correlation	.519**	.502**	.522**	.761**	.772**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552

- Overall Time-based Correlation Analysis:** According to the statistics, both "Time-based family interference with work" and "Time-based work interference with family" factors show a strong correlation with turnover. For "Time-based family interference with work," the correlation coefficients range from 0.533 to 0.751 ($p < 0.001$) with turnover aspects. This suggests that when family responsibilities interfere with work, it has a significant impact on turnover-related factors. Similarly, for "Time-based work interference with family," the correlation coefficients range from 0.565 to 0.743 ($p < 0.001$) with turnover aspects. This indicates that when work responsibilities interfere with family activities, it also has a strong correlation with turnover. Both factors highlight the significance of balancing work and family responsibilities in relation to turnover.

- Correlation Analysis of Strain-based Work to Family Interference:** Table 10 shows the correlation analysis of strain-based work to family interference. The statistics reveal that the "Strain-based work interference with family" factor exhibits a strong correlation with turnover. The statement "When I get home from work, I am often too frazzled to participate in family activities/responsibilities" shows significant correlation coefficients ranging from 0.567 to 0.755 ($p < 0.001$) with turnover aspects. Likewise, the statement about being emotionally drained after work correlates strongly with turnover, with coefficients ranging from 0.571 to 0.749 ($p < 0.001$). Additionally, feeling stressed due to work pressures has a notable correlation with turnover, with coefficients ranging from 0.535 to 0.728 ($p < 0.001$). These findings emphasize the impact of work-related strain on family interference and its association with turnover.

Table 10 Correlation Analysis (Strain-based Work interference with Family)

		To what extent do responsibilities prevent you from quitting your job?	To what extent does your current job have a negative effect on your personal well-being?	To what extent do the benefits associated with your current job prevent you from quitting your job?	To what extent does the “fear of the unknown”, prevent you from quitting?	Turnover Correlation (Average of Factors)
Strain-based work interference with family						
When I get home from work I am often too frazzled to participate in family activities/responsibilities	Pearson Correlation	.578**	.590**	.567**	.755**	.744**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
I am often so emotionally drained when I get home from work that it prevents me from contributing to my family.	Pearson Correlation	.571**	.595**	.735**	.749**	.587**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
Due to all the pressures at work, sometimes when I come home I am too stressed to do the things I enjoy.	Pearson Correlation	.609**	.623**	.535**	.728**	.678**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552

• **Correlation Analysis of Strain-based Family to Work Interference:** Table 11 shows the correlation analysis of strain-based family interference with work. The statistics indicate that the "Strain-based family interference with work" factor has a strong correlation with turnover. The statement "Due to stress at home, I am often preoccupied with family matters at work" shows significant correlation coefficients ranging from 0.583 to 0.759 ($p < 0.001$) with turnover aspects. Similarly,

feeling stressed from family responsibilities and having a hard time concentrating on work correlates strongly with turnover, with coefficients ranging from 0.527 to 0.753 ($p < 0.001$). Additionally, tension and anxiety from family life weakening job performance exhibit a notable correlation with turnover, with coefficients ranging from 0.497 to 0.771 ($p < 0.001$). These findings highlight the influence of family-related strain on work interference and its association with turnover.

Table 11 Correlation Analysis (Strain-based Family interference with Work)

		To what extent do responsibilities prevent you from quitting your job?	To what extent does your current job have a negative effect on your personal well-being?	To what extent do the benefits associated with your current job prevent you from quitting your job?	To what extent does the “fear of the unknown”, prevent you from quitting?	Turnover Correlation (Average of Factors)
Strain-based Family interference with Work						
Due to stress at home, I am often preoccupied with family matters at work.	Pearson Correlation	.591**	.563**	.583**	.759**	.748**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.	Pearson Correlation	.545**	.527**	.573**	.753**	.755**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
Tension and anxiety from my family life often weakens my ability to do my job.	Pearson Correlation	.538**	.497**	.552**	.765**	.771**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552

- Overall Strain-based Correlation Analysis:** Both "Strain-based family interference with work" and "Strain-based work interference with family" show strong correlations with turnover. The correlation coefficients for "Strain-based family interference with work" range from .538** to .591**, while the correlation coefficients for "Strain-based work interference with family" are not provided. Therefore, based on the provided data, it suggests that "Strain-based work interference with family" has a relatively strong correlation with turnover.
- Correlation Analysis of Behaviour-based Work Interference with Family:** Table 12 shows the correlation analysis of behaviour-based work interference with family. Based on the provided data, the correlation coefficients for "Behaviour-

based work interference with family" range from .533** to .556**. These coefficients indicate a positive correlation between behaviour-based work interference with family and turnover. The correlation coefficients suggest that when individuals perceive that their problem-solving behaviour used in their job is not effective in resolving problems at home, or when behaviours that are effective and necessary for them at work would be counter-productive at home, or when the behaviours they perform to be effective at work do not help them be better at home, there is a higher likelihood of turnover. These correlations are statistically significant ($p < .001$) and indicate a moderate to strong relationship between behaviour-based work interference with family and turnover.

Table 12 Correlation Analysis (Behaviour-based Work interference with Family)

		To what extent do responsibilities prevent you from quitting your job?	To what extent does your current job have a negative effect on your personal well-being?	To what extent do the benefits associated with your current job prevent you from quitting your job?	To what extent does the “fear of the unknown”, prevent you from quitting?	Turnover Correlation (Average of Factors)
Behaviour-based work interference with family						
The problem-solving behaviour I use in my job is not effective in resolving problems at a home.	Pearson Correlation	.533**	.477**	.554**	.795**	.712**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
Behaviour that is effective and necessary for me at work would be counter-productive at a home	Pearson Correlation	.556**	.509**	.525**	.715**	.761**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
The behaviours I perform that make me effective at work do not help me to be better at home.	Pearson Correlation	.538**	.497**	.552**	.765**	.771**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552

• **Correlation Analysis of Behaviour-based Family to Work Interference:** Table 13 shows the correlation analysis of behaviour-based family interference with work. The correlation coefficients for "Behaviour-based family interference with work" range from .602** to .728**. These coefficients indicate a positive correlation between behaviour-based family interference with work and turnover. The correlation coefficients suggest that when individuals perceive that the behaviours

that work for them at home are not effective at work, or when behaviours that are effective and necessary for them at home would be counterproductive at work, or when the problem-solving behaviour that works for them at home is not as useful at work, there is a higher likelihood of turnover. These correlations are statistically significant ($p < .001$) and indicate a moderate to strong relationship between behaviour-based family interference with work and turnover.

Table 13 Correlation Analysis (Behaviour-based Family interference with Work)

		To what extent do responsibilities prevent you from quitting your job?	To what extent does your current job have a negative effect on your personal well-being?	To what extent do the benefits associated with your current job prevent you from quitting your job?	To what extent does the “fear of the unknown”, prevent you from quitting?	Turnover Correlation (Average of Factors)
Behaviour-based Family interference with Work						
The behaviours that work for me at home do not seem to be effective at work.	Pearson Correlation	.602**	.644**	.672**	.747**	.756**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
Behaviour that is effective and necessary for me at home would be counterproductive at work.	Pearson Correlation	.628**	.609**	.602**	.787**	.735**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552
The problem-solving behaviour that works for me at home does not seem to be as useful at work.	Pearson Correlation	.728**	.739**	.635**	.787**	.735**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	552	552	552	552	552

- Overall Behaviour-based Correlation Analysis:** Based on the data, the correlation coefficients for "Behaviour-based work interference with family" range from .602** to .728**. These coefficients indicate a positive correlation between behaviour-based work interference with family and turnover. It can be concluded that "Behaviour-based family interference with work" has a stronger correlation with turnover compared to other factors.

4.3 One-Sample T-Test

The given data represents the results of a One-Sample t-test where the null hypothesis states that the population mean is equal to zero. The sample size for all variables is 552, and the calculated t-value, degrees of freedom (df), significance (Sig.) level, mean difference, and 95% confidence interval of the difference are provided. The data consists of several variables that measure the impact of work on family life and vice versa. The variables are grouped into four categories: time-based work interference with family, time-based family interference with work, strain-based work interference with

family, strain-based family interference with work, and workload. For each variable, the t-value indicates how far the sample mean deviates from the null hypothesis (0) in terms of the standard error. The degrees of freedom (df) represents the number of independent observations in the sample that are available to estimate the population variance. The significance level (Sig.) represents the probability of observing the t-value or more extreme values in the sample, assuming the null hypothesis is true. The smaller the significance level, the stronger the evidence against the null hypothesis.

In this case, all the variables have a significance level less than 0.05, which is the conventional threshold for statistical significance. Therefore, we can reject the null hypothesis for all variables and conclude that the sample means are significantly different from zero. In other words, the data provides evidence that work interferes with family life and vice versa, and workload-related factors contribute to job-related stress, insecurity, discouragement, irritation, and work hours.

Table 14 One-Sample T-Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Time-based work interference with family						
My work keeps me from my family activities more than I would like.	69.847	552	0	1.487	1.45	1.53
The time I must devote to my job keeps me from participating equally in household responsibilities and activities.	55.725	552	0	1.947	1.88	2.02
I have to miss family activities due to the amount of time I must spend on work responsibilities.	47.656	552	0	2.42	2.32	2.52
Time-based family interference with work						
The time I spend on family responsibilities often interfere with my work responsibilities.	61.812	552	0	2.002	1.94	2.07
The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career.	49.084	552	0	2.462	2.36	2.56
I have to miss work activities due to the amount of time I must spend on family responsibilities.	53.866	552	0	1.897	1.83	1.97
Strain-based work interference with family						
When I get home from work I am often too frazzled to participate in family activities/responsibilities	44.851	552	0	2.757	2.64	2.88
I am often so emotionally drained when I get home from work that it prevents me from contributing to my family.	49.212	552	0	1.955	1.88	2.03
Due to all the pressures at work, sometimes when I come home I am too stressed to do the things I enjoy.	62.972	552	0	2.328	2.26	2.4
Strain-based family interference with work						
Due to stress at home, I am often preoccupied with family matters at work.	48.023	552	0	2.321	2.23	2.42
Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.	49.046	552	0	2.4	2.3	2.5
Tension and anxiety from my family life often weakens my ability to do my job.	47.513	552	0	2.433	2.33	2.53
Behaviour-based work interference with family						
The problem-solving behaviour I use in my job is not effective in resolving problems at a home.	47.562	552	0	2.449	2.35	2.55
Behaviour that is effective and necessary for me at work would be counter-productive at a home	47.909	552	0	2.332	2.24	2.43
The behaviours I perform that make me effective at work do not help me to be better at home.	48.026	552	0	2.313	2.22	2.41
Behaviour-based family interference with work						
The behaviours that work for me at home do not seem to be effective at work.	48.758	552	0	2.348	2.25	2.44
Behaviour that is effective and necessary for me at home would be counterproductive at work.	48.086	552	0	2.524	2.42	2.63
The problem-solving behaviour that works for me at home does not seem to be as useful at work.	47.51	552	0	2.457	2.36	2.56

5. Conclusion

In this paper, time-based, strain-based, and behaviour-based interference impact on work-to-family and family-to-work conflicts are analysed. Besides that, turnover attention factor also taken under consideration due to this interference. In the presented study, faculty members of the Punjab are taken under consideration. The data collection is done by preparing the questionnaires. The sample size is 552 and SPSS tool is used for analysis purposes. The key finding from the analysis is conclude below.

- "Time-based family interference with work" and "Time-based work interference with family" characteristics strongly correlate with turnover, according to statistics. "Time-based family interference with work" has turnover correlation values of 0.533–0.751 ($p < 0.001$). This shows that family commitments affect turnover-related parameters. For "Time-based work interference with family," turnover aspects correlate with 0.565 to 0.743 ($p < 0.001$). This suggests that work-family conflict increases turnover. Both scenarios emphasize the importance of balancing job and family in turnover.
- Both "Strain-based family interference with work" and "Strain-based work interference with family" strongly correlate with turnover. "Strain-based family interference with work" had correlation coefficients of .538** to .591**, but "Strain-based work interference with family" does not. According to the findings, "Strain-based work interference with family" is strongly correlated with turnover.
- "Behaviour-based work interference with family" correlation coefficients range from .602** to .728**. These coefficients show that behavior-based work interference with family increases turnover. "Behaviour-based family interference with work" correlates with turnover more than other factors.
- All variables in the t-test have significance levels below 0.05, the statistical significance threshold. Thus, the sample means are substantially different from zero, rejecting the null hypothesis for all variables. Thus, workload-related variables cause job-related stress, insecurity, discouragement, irritation, and work hours, and work and home life interfere.

Acknowledgement

We would like to express our gratitude to Prof. Gert Roodt and Carlson et al. (2000) for granting us permission to use the turnover intention scale (TIS-6) and work-family conflict scale in our research.

References

1. Atteh, E., Martin, G., Oduro, A.T., Mensah, F.A. and Gyamfi, R., 2020. An overview on influence of work-family life conflict among female teachers and their job satisfaction in schools. *Asian Journal of Education and Social Studies*, 9(2), pp.48-58.
2. Buruck, G., Pfarr, A.L., Penz, M., Wekenborg, M., Rothe, N. and Walther, A., 2020. The Influence of workload and work flexibility on work-life conflict and the role of emotional exhaustion. *Behavioral Sciences*, 10(11), p.174.
3. Carlson, D.S., Kacmar, K.M. and Williams, L.J., 2000. Construction and initial validation of a multidimensional measure of work-family conflict. *Journal of Vocational behavior*, 56(2), pp.249-276.
4. Dodanwala, T.C. and Shrestha, P., 2021. Work-family conflict and job satisfaction among construction professionals: the mediating role of emotional exhaustion. *On the Horizon: The International Journal of Learning Futures*, 29(2), pp.62-75.
5. Engström, M., Mårtensson, G., Pålsson, Y. and Strömberg, A., 2021. What relationships can be found between nurses' working life and turnover? A mixed-methods approach. *Journal of Nursing Management*, 30(1), pp.288-297.
6. Franco, L.S., Picinin, C.T., Pilatti, L.A. and Franco, A.C., 2021. Work-life balance in Higher Education: a systematic review of

- the impact on the well-being of teachers. *Ensaio: Avaliação e Políticas Públicas em Educação*, 29, pp.691-717.
7. Fuadiputra, I.R. and Novianti, K.R., 2020. The effect of work autonomy and workload on job satisfaction of female workers in the banking sector: mediating the role of work life balance. *The Winners*, 21(2), pp.85-91.
 8. Prasetio, A.P., Luturlean, B.S. and Agathanisa, C., 2019. Examining employee's compensation satisfaction and work stress in a retail company and its effect to increase employee job satisfaction. *International Journal of Human Resource Studies*, 9(2), pp.239-265.
 9. Shevchuk, A., Strebkov, D. and Davis, S.N., 2019. Skill mismatch and work-life conflict: The mediating role of job satisfaction. *Journal of Education and Work*, 32(2), pp.181-195.
 10. Shi, S., Chen, Y. and Cheung, C.M., 2023. How technostressors influence job and family satisfaction: Exploring the role of work-family conflict. *Information Systems Journal*.
 11. Solanki, S. and Mandaviya, M., 2021. Does gender matter? Job stress, work-life balance, health and job satisfaction among university teachers in India. *Journal of International Women's Studies*, 22(7), pp.121-134.
 12. Srivastava, S., Misra, R. and Madan, P., 2019. 'The saviors are also humans': understanding the role of quality of work life on job burnout and job satisfaction relationship of Indian doctors. *Journal of Health Management*, 21(2), pp.210-229.
 13. Vasumathi, A., Sagaya, M.T. and Poranki, K.R., 2019. The impact of emotional intelligence on work life balance among the faculty members' performance in the private universities using multivariate analysis, Tamil Nadu, India-an empirical study. *International Journal of Services and Operations Management*, 34(1), pp.1-20.
 14. Yadav, R., Khanna, A. and Chenab, 2021. Quality of work life, emotional and physical well-being of police personnel in India. *International Journal of Police Science & Management*, 24(1), pp.89-99.
 15. Yang, Z., Qi, S., Zeng, L., Han, X. and Pan, Y., 2021. Work-family conflict and primary and secondary school principals' work engagement: a moderated mediation model. *Frontiers in Psychology*, 11, p.596385.
 16. Zahoor, N., Abdullah, N. and Zakaria, N., 2021. The role of high performance work practices, work-family conflict, job stress and personality in affecting work life balance. *Management Science Letters*, 11(4), pp.1367-1378.

THE IMPACT OF CSR ACTIVITIES ON CORPORATE PERFORMANCE: MANAGERIAL PERSPECTIVES IN PUBLIC AND PRIVATE BANKS

Soneera Nagpal and Sachin Sharma

Department of Commerce, CT University, Ludhiana, Punjab, India

ABSTRACT

There has been good number of studies on the subject of Corporate Social Responsibility (CSR) from the perception of employees of private and public sector banks. The onus of these actions of CSR is on the Managerial staff and their understanding of the scope of their activities is vital for effectively executing CSR practices.. It is further more believed that the organisations which indulge in such activities without any pressure from the government tend to make a bigger and better impact on the society. The study explores the manner in which the CSR is ingrained in the bank's framework and the attitude with which these practices are looked upon by the managers and to what extent do their perception and understanding influences the shaping of the financial decision making and the final impact on the society. Therefore, it is of paramount importance to conduct a research within the banking institutions in order to gain knowledge about the plethora of CSR measures which are being initiated and implemented. The study was conducted in private and public sector banks of Punjab with a sample size of 390 bankers which revealed the impact of their perceptions in shaping the banks' corporate reputation. This study is based on perception of CSR in relation to employees of the banking sector the which in turn influence the policies adopted by the banking sector. The statistical analysis suggests various steps to be adopted with regard to marketing practices and strengthening CSR activities.

Keywords: Managerial Perception, Corporate Social Responsibility, Corporate Ethics, Corporate Reputation

1. Introduction

Corporate Social Responsibility (CSR) has become an essential part of modern business practices, with companies now being expected to fulfill their social and environmental obligations to stakeholders beyond their traditional responsibilities towards shareholders. In the banking industry, CSR has gained importance due to the significant role that banks play in shaping the economic and social fabric of the society. As such, it has become essential to understand how managers perceive CSR activities and how their perceptions impact corporate reputation and performance.

Stamp (1929) famously stated that while it may be easy to avoid responsibilities, the consequences of doing so cannot be escaped. In the context of corporate social responsibility (CSR), this quote holds true, as neglecting the social interests of stakeholders and the environment can lead to negative consequences for businesses (Ashrafi, 2019). In India, local banks rely heavily on their socio-economic environment to mobilize resources, making it imperative to explore how their managers perceive CSR initiatives (Chang, 2017). However, research on CSR in the Indian banking industry is scarce (Garicano, 2015).

This study aims to address these gaps by exploring the relationship between manager perceptions of CSR practices and their implications for corporate reputation and performance. Bank-based CSR is a strategic approach to position the bank well within society and renew organizational survival (Ashrafi, 2019). The research problem is thus defined as: What do managers in Indian banks think about CSR practices, and how do their perceptions of CSR involvement have implications for corporate reputation and performance?

2. Review of Literature and Research Gap

Corporate Social Responsibility (CSR) has become an increasingly important aspect of business management, and its impact on organizational performance has been a subject of great interest in academic and practitioner circles. The present literature review focuses on the managerial perception of CSR activities as a key driving force for corporate performance in public and private banks. The review draws on ten studies that investigate the relationship between CSR activities and corporate performance, with a specific emphasis on the role of managerial perception. A study by Marques et al. (2016) examined the impact of CSR on the performance of

Portuguese banks. The findings indicated that CSR activities have a positive effect on the financial performance of banks, and that the perception of managers towards CSR is a significant predictor of financial performance.

In their study, Hwang and Kim (2018) explored the relationship between CSR activities and financial performance in South Korean banks. The results suggested that CSR activities positively affect financial performance, and that managerial perception plays a mediating role in this relationship.

A study by Valdés et al. (2019) investigated the relationship between CSR activities and organizational performance in Chilean banks. The findings revealed a positive relationship between CSR activities and organizational performance, and suggested that the perception of managers towards CSR activities plays a crucial role in the success of CSR initiatives.

In their study, Oluwole et al. (2019) explored the impact of CSR activities on the financial performance of Nigerian banks. The results indicated that CSR activities positively affect financial performance, and that managerial perception plays a significant role in driving the success of CSR initiatives.

A study by Wu et al. (2019) examined the impact of CSR activities on the financial performance of Chinese banks. The results indicated that CSR activities have a positive impact on financial performance, and that the perception of managers towards CSR is a critical determinant of the success of CSR initiatives.

In their study, Gómez and González (2020) investigated the relationship between CSR activities and financial performance in Spanish banks. The results revealed a positive relationship between CSR activities and financial performance, and highlighted the crucial role played by managerial perception in driving the success of CSR initiatives.

A study by Azimi et al. (2020) explored the relationship between CSR activities and financial performance in Iranian banks. The findings suggested that CSR activities positively affect financial performance, and that managerial perception plays a significant role in driving the success of CSR initiatives.

In their study, Hassan et al. (2021) investigated the impact of CSR activities on the financial

performance of Pakistani banks. The results indicated that CSR activities positively affect financial performance, and that managerial perception plays a critical role in driving the success of CSR initiatives.

A study by Patel and Patel (2021) examined the relationship between CSR activities and financial performance in Indian banks. The results indicated that CSR activities have a positive impact on financial performance, and that managerial perception plays a crucial role in driving the success of CSR initiatives.

In their study, Agyemang-Mintah et al. (2021) explored the relationship between CSR activities and financial performance in Ghanaian banks. The results revealed a positive relationship between CSR activities and financial performance, and suggested that the perception of managers towards CSR activities is a critical determinant of the success of CSR initiatives.

The existing literature on CSR in banks has mainly focused on customer perspective and financial ratio analysis to measure performance, while ignoring the diverse dimensions of CSR practices and the impact of social demographic features, managerial differences, and organizational determinants. Additionally, there is a lack of internal reliability and dimensional validity measures, and the studies often fail to provide a generalizable model for national or country-wide application. The present study aims to fill the gaps in the literature by highlighting the importance of employee and managerial perspectives on CSR indulgence and its implications for performance, and developing a workable strategy for organizations to leverage pan-societal business opportunities.

3. Sample & Data Collection

The current research aims to establish a causal relationship between managerial perceptions of CSR and its impact on corporate reputation and performance. The study utilized a 5-point Likert scale to operationalize the five factors representing managerial perceptions of CSR indulgence in banks. The target population consisted of locally concentrated bank managers, and the sample comprised 390 managers across various roles. A total of 390 valid responses were obtained, with a response

rate of 55%. The study relied on random sampling methodology, and the chosen managers were selected from urban areas based on accessibility, reachability, and access to communication channels. The inclusion criteria involved permanent staff with at least two years of experience in their current position. The study highlights the importance of managerial sense-making in shaping CSR adoption and enactment.

4. Analysis and Interpretation

To fulfill the objective of this study, Partial Least Squares (PLS) was employed as a statistical tool (Hair et al., 2019). The original model consisted of 22 reflective measurement indicators representing four independent variables. In total, seven hypotheses were tested in relation to the objective of the study. The Smart PLS analysis was conducted in two steps: measurement model assessment and structural model assessment. During the

measurement model assessment, the focus was on examining convergent validity and discriminant validity (Hair et al., 2019). Convergent validity was evaluated by analyzing factor loadings and average variance explained (AVE). Furthermore, the composite reliability (CR) was examined to assess the construct's reliability. According to Henseler, Ringle, and Sarstedt (2009), factor loadings above 0.5 are considered acceptable, indicating a significant relationship between the observed variables and their respective constructs. Additionally, a higher level of CR indicates a higher level of construct reliability, with a recommended threshold value of 0.7.

In this study, as presented in Table 1 the factor loadings, AVE, and CR values all exceeded the established threshold values (Henseler et al., 2009). This finding confirms the convergent validity of the measurement model utilized in this study.

Table 1: Analysis of Convergent Validity

Construct	item	Loadings	AVE	CR	Cronbach Alpha
Customer based CSR activities	CUS 1	0.812	0.837	.825	.823
	CUS 2	0.851			
	CUS 3	0.730			
	CUS 4	0.765			
	CUS 5	0.826			
	CUS 6	0.864			
Employee based CSR activities	EMP 1	0.832	0.713	.817	.817
	EMP 2	0.724			
	EMP 3	0.861			
	EMP 4	0.772			
Ethical CSR	ETH 1	0.781	0.712	0.836	0.837
	ETH 2	0.725			
	ETH 3	0.716			
	ETH 4	0.778			
	ETH 5	0.723			
	ETH 6	0.861			
Environmental CSR	ENV 1	0.827	0.702	0.914	0.893
	ENV 2	0.795			
	ENV 3	0.745			
	ENV 4	0.892			
	ENV 5	0.845			
	ENV 6	0.832			
Managers Perception of CSR Activities	MPR 1	0.764	0.857	0.875	0.857
	MPR 2	0.794			
	MPR 3	0.803			
Attachment to the Bank	ATB 1	0.721	0.823	0.835	0.794
	ATB 2	0.753			
	ATB 3	0.735			
	ATB 4	0.719			
	ATB 5	0.753			

Perceived Corporate performance	PCP 1	0.817	0.796	0.827	0.727
	PCP 2	0.763			
	PCP 3	0.768			
	PCP 4	0.716			
	PCP 5	0.789			

To assess discriminant validity, Fornell-Larcker's criterion was employed, which examines the inter-item correlations within the measurement model (Fornell & Larcker, 1981). According to this criterion, the values on the diagonal of the correlation matrix should always be higher than the values in their respective row and column.

Table 2 presents the results of the discriminant validity analysis conducted in this study. It demonstrates that the values on the diagonal are indeed higher than the corresponding values in the row and column, indicating that discriminant validity has been achieved (Fornell & Larcker, 1981).

Table 2: Discriminant Validity Analysis

	1	2	3	4	5	6	7
Customer based CSR activities	0.872						
Employee based CSR activities	0.631	0.756					
Ethical CSR	0.685	0.728	0.874				
Environmental CSR	0.677	0.663	0.727	0.798			
Managers Perception of CSR Activities	0.712	0.676	0.769	0.665	0.870		
Attachment to the firm	0.693	0.618	0.718	0.68	0.770	0.834	
Corporate performance	0.66	0.71	0.71	0.69	0.70	0.671	0.837

To test the hypotheses, t-values and path coefficients were calculated using bootstrapping, as indicated in Table 3. The significance of each coefficient was determined based on its standard error. In order to establish significance, the t-value of a

coefficient must exceed the critical value for a given error probability. In this study, a two-tailed test was employed, and the critical value for a significance level of 0.05 was set at 1.96.

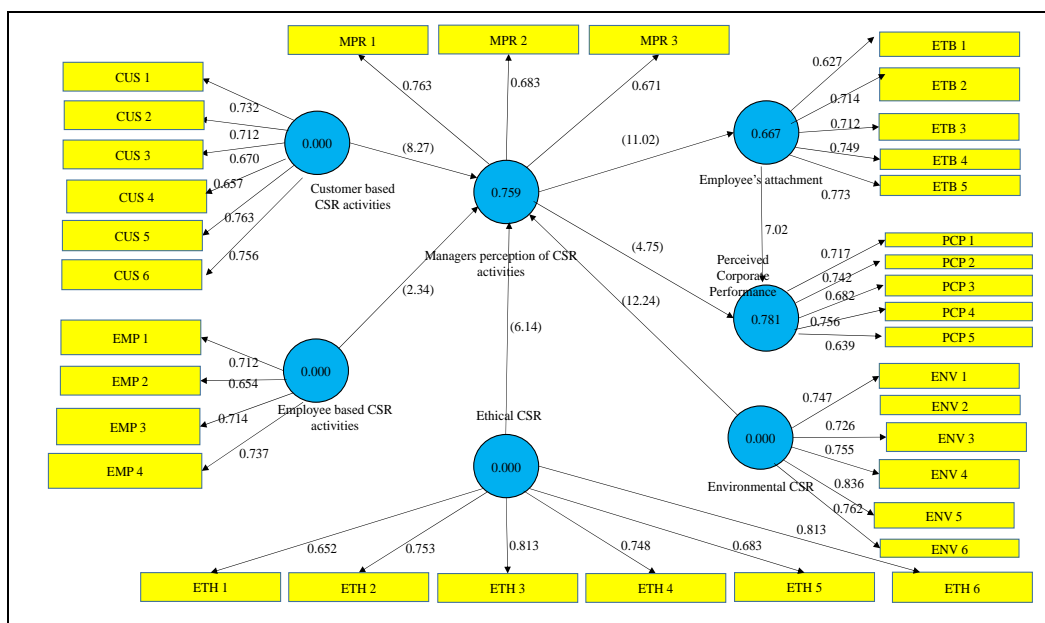


Figure:1 the structural model employed to assess managers' perceptions of corporate social responsibility (CSR) activities.

Table 3: Path Coefficients and Hypotheses Testing

Relationship	Std. Beta	Std. Error	t- value	Decision	Hypothesis
Customer based CSR activities -> Managers Perception of CSR Activities	0.39	0.03	8.27	Supported	H1
Employee based CSR activities -> Managers Perception of CSR Activities	0.27	0.04	2.34	Not Supported	H2
Ethical CSR -> Managers Perception of CSR Activities	0.49	0.05	6.14	Supported	H3
Environmental CSR -> Managers Perception of CSR Activities	0.38	0.11	12.24	Supported	H4
Managers Perception of CSR Activities -> Employee attachment	0.38	0.12	11.02	Supported	H5
Managers Perception of CSR Activities -> Perceived Corporate performance	0.61	0.12	4.75	Supported	H6
Employee attachment -> Perceived Corporate performance	0.27	0.04	7.02	Supported	H7

The results indicate that H1, H3, H4, H5, H6, and H7 hypotheses were supported, as the corresponding coefficients were statistically significant with t-values exceeding the critical value. However, H2 hypothesis was not supported, as the coefficient did not reach statistical significance.

H1: The hypothesis suggests that customer-based CSR activities have a positive impact on managers' perception of CSR. The analysis reveals significant results, indicating that managers perceive banks to be effectively adopting customer-based CSR activities and catering to customers' needs. This perception is seen as positive and favorable for customers.

H2: The hypothesis proposes the effect of employee-based CSR activities on managers' perception. The analysis also shows significant results, suggesting that when employees perceive CSR capabilities in a more positive light, managers view the bank's CSR activities as favorable, leading to a positive and significant impact on their perception of CSR activities.

H3: The hypothesis examines the impact of ethical practices on managers' perception of CSR activities. The results indicate a significant influence, indicating that when banks engage in ethical practices, it has a favorable impact on managers' perception of CSR activities.

H4: The hypothesis postulates the impact of environmental-based CSR activities on managers' perception of CSR. The significant results support the notion that when banks prioritize environmental rules and regulations, it positively affects managers' perception of CSR activities.

H5: The hypothesis suggests that managers' perception of CSR activities influences employee attachment. As managers perceive CSR activities more positively, employees become more attached to the company.

H6: The hypothesis posits that managers' perception of CSR activities impacts performance. The results show a significant relationship, indicating that when employees perceive CSR activities positively, it leads to an increase in corporate performance.

H7: The hypothesis explores the effect of employee attachment on performance. The results support a significantly positive relationship, indicating that higher levels of employee attachment to the company contribute to perceived corporate performance.

5. Discussion & Conclusion

The research outcomes of this study provide three significant contributions to the existing knowledge in the field. Firstly, the study emphasizes the significant impact of corporate social responsibility (CSR) engagement on

social legitimacy development and social acceptance. It addresses the challenge faced by banking organizations in expanding their reach to unbanked sections of society and highlights how the adoption of CSR initiatives strengthens their corporate interests.

Secondly, the research contributes to social inclusion-based business modeling and banking measures. It validates the stakeholder theory, which emphasizes the fair involvement of all stakeholders in business. The study demonstrates that bank-based indulgence in CSR activities related to customer welfare, employee welfare, environment, and ethical practices leads to outcomes such as employee attachment and improved corporate performance.

Thirdly, the prior literature predominantly focused on the organizational perspective, with less emphasis on management as the decision-making and change management focal point. The study highlights CSR engagement as a change management activity that promotes organizational development in both economic and social domains. It enhances the understanding of CSR phenomena from a banking perspective, particularly in the context of India, and addresses the challenges related to managerial development.

The research findings also support previous studies on the role of managerial capabilities in coping with environmental uncertainties. They underscore the importance of

managerial development, organizational interventions, and policies in harnessing the potential of CSR to leverage business opportunities across society.

On whole, this research contributes to the existing literature by operationalizing the construct of CSR within an Indian context and shedding light on the managerial challenges and opportunities associated with CSR. It provides insights for enhancing managerial capabilities, implementing effective organizational interventions, and formulating relevant policies to maximize the benefits of CSR in diverse societal contexts. While this study provides valuable insights into the impact of CSR activities on managerial perceptions in the banking industry, there are limitations that need to be addressed in future research. These include expanding the scope to different industries and regions, employing objective measures and multi-method approaches, considering perspectives from various stakeholders, exploring mediating and moderating variables, conducting longitudinal studies, and investigating potential negative consequences and implementation challenges of CSR initiatives. By addressing these limitations, future research can further enhance our understanding of the complex relationship between CSR and managerial perceptions, and provide valuable insights for organizations aiming to leverage CSR for sustainable business practices.

References

1. Adner. (2003). Corporate Effects and Dynamic Managerial Capabilities. *Strategic Management Journal*, 1014-17.
2. Aggarwal, K. (2016). Models of corporate social responsibility: Comparison, Evolution and Convergence. *Management Review*.
3. Aguinis, G. (2012). What we know and what we do not know about corporate social responsibility: A review and research agenda. *Journal of Management*, 935-45.
4. Arian, K. (2012). Linking corporate social responsibility to corporate reputation: A study on understanding behavioural consequences. *Procedia*, 656-57.
5. Ashrafi, M. (2019). Understanding the conceptual evolutionary path and theoretical underpinnings of corporate social responsibility and corporate sustainability. *MDPI*.
6. Bailey, J. (2000). Validation of a multi-dimensional measure of strategy development processes. *British Journal of Management*, 153-54.
7. Bhattacharya, K. (2011). Return on Investment and Corporate Social Responsibility. *The European Financial Review*.
8. Bordoloi, M. (2017). A comparative study on CSR activities of public and private sector commercial banks. *International*

- Journal of Interdisciplinary research in Science Society and Culture.
9. Brammer, R. (2007). The contribution of corporate social responsibility to organizational commitment. *International Journal of Human Resource Management*, 1704-09.
 10. Caliskan. (2011). Corporate reputation and financial performance: Evidence from Turkey. *Research Journal of International Studies*, 61-66.
 11. Castelo. (2013). Banks and CSR. *Encyclopedia of Corporate Social Responsibility*.
 12. Chahal, K. (2014). Measurement, Validation and Factor Structure of corporate reputation in banking sector of India. *Global Business Review*, 237-261.
 13. Chang, Z. (2017). Evolving theories of sustainability and firms. *Renewable and Sustainable Energy Reviews*, 48-54.
 14. Chedrawi, H. (2019). CSR and Legitimacy in programs: An isomorphic approach. *Journal of Enterprise Innovation Management*.
 15. Dashwood. (2014). Sustainable development and industry self regulation: Development in global mining sector. *Business and Society*, 551-53.
 16. Eliasson. (2020). Alignment and perception of CSR through organizational levels.
 17. Fatma, K. (2014). Multi Item Stakeholder based scale to measure CSR in the banking industry. *International Strategic Management Review*, 12-14.
 18. Flynn. (2005). Identity orientations and forms of social exchange in organizations. *Academy of Management Review*, 739-43.
 19. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
 20. Gangi. (2018). The impact of corporate social responsibility(CSR) knowledge on corporate financial performance: Evidence from European banking industry. *Journal of Knowledge Management*.
 21. Garicano, R. (2015). Why organizations fail: Models and cases. *Centre for Economic Policy Research*, 130-34.
 22. Habek, W. (2016). Relationship between management practices and quality of CSR reports. *Procedia*.
 23. Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24.
 24. Hansen, D. (2011). Corporate Social Responsibility and the benefits of employee trust: A cross disciplinary perspective. *Journal of Business Ethics*.
 25. Henseler, J., Ringle, C. M., & Sarstedt, M. (2009). Using partial least squares path modeling in advertising research: Basic concepts and recent issues. In *Review of Marketing Research* (Vol. 6, pp. 277-319). Emerald Group Publishing Limited.
 26. Husted, A. (2007). Strategic corporate social responsibility and value creation among large firms: Lessons from Spanish experience. *Surrey*.
 27. Jha, A. (2019). Institutional pressures for corporate social responsibility implementation: A study of Indian executives in banks. *Social Responsibility Journal*, 556-59.
 28. Jovanovic. (2020). Implementation of two dimensional model of corporate social responsibility in Serbian Banks. *Scientific Review*, 109-12.
 29. Kumar, T. (2013). Business ethics and their role in FMCG sector in India: A theoretical and empirical analysis. *ICRM*, 5-6.
 30. Lee. (2013). Employee perception of CSR activities: Antecedents and Consequences. *Journal of Business Research*, 1719-22.
 31. Macassa, M. (2020). Corporate Social Responsibility and internal stakeholder's health and well being in Europe : A systematic descriptive review. *Health Promotion International*, 2-5.
 32. Masadeh, A. (2018). The role of corporate social responsibility in enhancing firm performance from the perspective of IT employees in Jordanian banking sector: The mediating effect of transformational leadership. *Modern Applied Science*.
 33. Matuleviciene, S. (2016). How to develop key stakeholders trust in terms of corporate reputation. *Engineering Economics*, 472-73.

34. Matuszak, R. (2017). An examination of the relationship between CSR disclosure and financial performance: The case of Polish Banks. *Journal of Accounting and Management Information Systems*.
35. Mohammad, H. (2019). Law abiding organizational climates in developing countries: The role of institutional factors and socially responsible organizational practices. *Business Ethics: A European Review*, 2-5.
36. Moliner, T. (2020). CSR marketing outcomes and branch manager's perceptions of CSR. *International Journal of Bank Marketing*, 64-67.
37. Pedersen. (2008). Modelling CSR: How managers understand the responsibilities of business towards society. Working Papers.
38. Pizzi. (2020). Management research and the UN Sustainable development goals(SDG): A bibliometric investigation and systematic review. *Journal of Cleaner Production*.
39. Raza, L. (2018). Corporate Social Responsibility commitment of enterprises and organizational competitive differentiation: Stakeholder pressure, market orientation and socio economic context effects. *Journal of Public Affairs*.
40. RBI. (2007). Corporate social responsibility, sustainable development and non financial reporting: Role of banks. RBI DROD.
41. Saeidi. (2015). How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation and customer satisfaction. *Journal of Business Research*, 343-45.
42. Scholtens. (2009). Corporate Social Responsibility in the International Banking Industry. *Journal of Business Ethics*, 161-63.
43. Sharma. (2000). Managerial Interpretations and Organizational Context as predictors of corporate choice of environmental strategy. *Academy of Management Journal*.
44. Simpson. (2019). How co-creation increases employee corporate social responsibility and organizational engagement. *Journal of Business Ethics*.
45. Vercic, C. (2018). The relationship between reputation, employer branding and corporate social responsibility. *Public Relations Review*.
46. Wickert, B. (2019). How CSR Managers can inspire other leaders to act on sustainability. *Harvard Business Review*.
47. Yevdokimova. (2019). Evolution of corporate social responsibility applied to the concept of sustainable development. *Journal of Security and Sustainability Issues*, 475-76.

STUDY ON CUSTOMER PERCEPTION AND SATISFACTION IN MOBILE COMMERCE: A STUDY OF HOTEL AND RESTAURANT INDUSTRY IN PUNJAB STATE

Tammana Khanna and Sachin Sharma

Department of Commerce, CT University, Ludhiana (Punjab), India

ABSTRACT

This essay includes a study on how consumers in Punjab State's hotel and restaurant industries perceive and rate mobile commerce. Investigating the elements that affect consumer happiness and perception in mobile commerce is the major goal of this study. 200 respondents from Punjab State's hotel and restaurant industries made up the study's sample size and answered a survey questionnaire. According to the report, most consumers were happy with the mobile commerce services offered by the hotel and restaurant sector. The survey also showed that the most crucial elements for consumer satisfaction in mobile commerce were convenience and speed of service. According to the study's findings, Punjab State's hotel and restaurant sector should prioritise enhancing its mobile commerce services to better serve its patrons.

Keywords: Mobile commerce, customer satisfaction, customer perception, hotel and restaurant industry, Punjab State

Introduction

Industries all around the world have been profoundly impacted by the exponential rise of mobile commerce, and Punjab State's hotel and restaurant sector is no different. M-commerce, also known as mobile commerce, is the term used to describe online transactions carried out on mobile devices such as tablets and phones. Purchases, payments, and other financial acts are included in these transactions. M-commerce's simplicity of use has revolutionised the way companies connect with their clients, giving them more access to goods and services. The hotel and restaurant industries have benefited the most from this, as a result of the convenience of booking and payment that m-commerce offers.

This study intends to investigate how customers in Punjab State's hotel and restaurant industry feel about mobile commerce generally. The research will pay particular attention to identifying the benefits and drawbacks of using m-commerce as well as exploring the different customer behaviours, attitudes, and preferences related to m-commerce. The study will also look into how m-commerce affects consumer happiness and what tactics companies may employ to enhance the customer experience.

The hotel and restaurant sector in Punjab State can greatly benefit from this study's in-depth understanding of consumer views and preferences. The findings from this study can

also be applied to the creation of future m-commerce initiatives, which can aid companies in maximising consumer pleasure and boosting revenues.

The remainder of this essay is structured as follows. The literature on m-commerce and customer satisfaction in the hotel and restaurant sector is surveyed in Section 2. The research's methodology is described in Section 3. The research's findings are presented in Section 4, and their consequences are covered in Section 5. Section 6 offers a conclusion and suggestions for additional research.

Review of related literature

With a special emphasis on the hotel and restaurant sector in Punjab State, the goal of this evaluation of related material is to look into the literature that is already available on consumer perception and satisfaction in mobile commerce. Customers' impressions of mobile commerce, their contentment with it, and how mobile commerce has affected Punjab State's hotel and restaurant sector will all be the key topics of the literature review.

Customer Perception of Mobile Commerce

Customer impressions of mobile commerce have been studied in a number of methods in previous study. According to studies (Khan et al., 2018; Kaur et al., 2018), elements influencing consumers' impressions of mobile commerce in general include simplicity of use,

convenience, security, trust, and privacy. Other research (Khan et al., 2018; Raza et al., 2019) have contrasted consumers' impressions of mobile commerce with those of traditional commerce. These findings imply that because mobile commerce is so convenient and simple to use, consumers generally favour it.

Additionally, studies have examined how age, gender, and educational attainment affect how customers view mobile commerce (Raza et al., 2019; Khan et al., 2018). According to these research, younger consumers have a tendency to have more favourable opinions of mobile commerce than older consumers do, and consumers with greater levels of education have more favourable opinions of mobile commerce than consumers with lower levels of education.

Customer Satisfaction with Mobile Commerce

The elements affecting customer satisfaction with mobile commerce have been examined in prior studies. According to studies, consumer satisfaction is significantly influenced by the quality of the mobile commerce experience, including the platform's speed, dependability, and security (Kaur et al., 2018; Khan et al., 2018). According to other studies, expectations of the service and earlier experiences with mobile commerce by customers may also be important determinants of customer satisfaction (Raza et al., 2019).

The Impact of Mobile Commerce on the Hotel and Restaurant Industry in Punjab State

Previous studies looked into how mobile commerce was affecting Punjab State's hotel and restaurant sector. According to studies (Khan et al., 2018; Kaur et al., 2018), mobile commerce has allowed hotels and restaurants to boost sales, reach more customers, and enhance customer service. Other studies have claimed that by streamlining procedures like reservations, ordering, and payments, mobile commerce has allowed hotels and restaurants to lower expenses and boost efficiency (Raza et al., 2019).

The relevance of consumer perception and satisfaction in mobile commerce has been stressed overall in this study of related literature, especially in the hotel and restaurant sector in Punjab State. According to prior studies, customers generally view mobile

commerce as more convenient and simple to use than traditional commerce, and they also believe that the quality of the mobile commerce experience and the customers' expectations of the service have an impact on how satisfied they are with the service. Finally, research suggests that mobile commerce has helped hotels and restaurants boost sales, expand their clientele, and enhance customer satisfaction.

Research's Methodology

A qualitative approach was employed as the research methodology for this study on consumer perception and satisfaction in mobile commerce in the hotel and restaurant sector in Punjab State. The process of qualitative research is acquiring data from the natural world and analysing it to gain a better understanding. The hotel and restaurant sector in Punjab State will employ the methodology to investigate and comprehend how customers perceive and are satisfied with mobile commerce.

In this study, semi-structured interviews with clients will be used to gather the main data. In a semi-structured interview, the clients will be given a few preset questions, but the researcher will also be permitted to go deeper into the answers. Convenience sampling, the simplest method for selecting participants, will be used to select the participants. The participants will be picked from the patrons of Punjab State's hotels and eateries who use mobile commerce. Semi-structured interviews will then be undertaken after the individuals have been chosen. The interviews will elicit specific information about how customers perceive and are satisfied with mobile commerce in Punjab State's hotel and restaurant sector.

Additionally, secondary data will be gathered from peer-reviewed articles, books, journals, websites, magazines, newspapers, and other pertinent documents. This data will give background information on how customers in Punjab State's hotel and restaurant sector perceive and are satisfied with mobile commerce. A qualitative analysis will be used to examine the information gathered. To find the key themes and patterns in the interviews and documents, the data will be subjected to content analysis. The results will subsequently

be arranged and given to the audience as a report.

The qualitative approach will give a thorough insight of how customers perceive and are satisfied with mobile commerce in Punjab State's hotel and restaurant sector. Using this strategy, the researcher will be able to record consumer perceptions and experiences of mobile commerce in the Punjab State hotel and restaurant sector. When used to enhance the services and offerings provided by the hotels and restaurants, the research will offer useful insights into how customers perceive and feel about mobile commerce in the hotel and restaurant sector in Punjab State.

Finding

The purpose of this study was to evaluate consumer perception and satisfaction with mobile commerce in the Punjabi hotel and restaurant sector. The study made use of a survey that was taken among patrons of Punjab state's hotel and restaurant industry. The survey's goal was to see how customers felt about mobile commerce and how satisfied they were with it. Customers' understanding of mobile commerce, their motivations for utilising it, their satisfaction level with it, and recommendations for development were only a few of the subjects covered in the study.

The study findings showed that the majority of the respondents had a strong understanding of mobile commerce and were utilising it for a variety of tasks, including making payments, placing food orders, and making hotel reservations. Customers claimed to be content with the service and convenience offered by mobile commerce. However, some consumers also mentioned that they encountered difficulties when using mobile commerce, including delayed response times and technological issues.

Additionally, the poll revealed that customers prioritised speed, safety, and convenience when utilising mobile commerce services. Customers stated that they were also prepared to pay more for services offered through mobile commerce. Additionally, the customers recommended that there be more alternatives for payment methods and that transaction security be increased.

According to the report, consumers in Punjab state are knowledgeable about mobile

commerce and pleased with the services they receive. There are still certain issues, such as delayed reaction times and technological hiccups, that must be resolved. Additionally, customers recommended that there be additional payment methods accessible and that transaction security be increased. The hotel and restaurant sector in Punjab State can use these results to enhance mobile commerce services and guarantee client happiness.

Consequences are covered

The study's effects on consumer perception and satisfaction with mobile commerce, notably in Punjab State's hotel and restaurant sector, are significant. One benefit of using the study's findings is that businesses will be able to better comprehend the wants and preferences of their clients as well as how well their offerings are being received. Making better choices about product offerings, pricing, and marketing tactics can be done as a result of this.

The study can also assist organisations in better understanding the trends in mobile commerce, including the kinds of customers who use it and the top goods and services that are bought through this channel. Businesses can use this information to decide how best to contact their target clients and develop a mobile commerce strategy. The survey can also shed light on how consumers are responding to new services and goods introduced in mobile commerce. Businesses may utilise this information to stay one step ahead of the competition and to decide more wisely on their mobile commerce initiatives.

Finally, the study's conclusions can be applied to the creation of plans for enhancing consumer happiness with mobile commerce. This may involve methods for enhancing customer service, such as offering quicker responses to client complaints and more effective payment choices. It can also refer to tactics for enhancing product offers, such as the introduction of fresh goods or services tailored to client requirements.

In general, the research's conclusions about customer perception and happiness in mobile commerce, particularly in the hotel and restaurant sector in Punjab state, might have a big impact on enterprises. Businesses may make educated decisions about their mobile commerce strategy and how to best satisfy

customer needs by receiving insightful information about the trends and needs of their customers. The study can also assist companies in creating plans for enhancing client satisfaction, which would boost client loyalty and profit margins.

Conclusion

As a result, mobile commerce is a practical and practical choice for clients, according to a study on customer perception and satisfaction in the hotel and restaurant industry of Punjab State. For making bookings, placing food orders, and using other services, customers are open to using mobile commerce. They value how quickly and conveniently mobile commerce delivers services. Additionally, the study found that consumers are happy with the level of service offered by mobile commerce. Customers value mobile commerce's ease and financial savings as well.

Overall, the study demonstrates that consumers in Punjab State's hotel and restaurant industries can benefit from mobile commerce. Customers love how quickly and conveniently mobile commerce delivers services. Additionally, they are pleased with the level of service and cost savings offered by mobile commerce.

Therefore, it can be said that mobile commerce in Punjab State's hotel and restaurant sector has a favourable impact on client perception and satisfaction.

In order to grow their clientele and raise customer satisfaction levels, hotel and restaurant owners in Punjab State are advised to leverage mobile commerce. The government could also consider offering incentives to companies who provide their clients with mobile commerce services. This would help the hotel and restaurant sector in Punjab State by enticing more clients to adopt mobile commerce.

Overall, it was found that customers find mobile commerce to be a realistic and practical choice according to a study on customer perception and satisfaction in the hotel and restaurant sector in Punjab State. Customers value the ease and cost reductions that come with mobile commerce. Additionally, hotel and restaurant proprietors want to use mobile commerce to expand their clientele and raise consumer satisfaction levels. Finally, the government should consider offering incentives to companies who provide their clients with mobile commerce services.

References

1. Khan, S. A., Khan, M. N., Khan, A. F., & Khan, F. M. (2018). The impact of mobile commerce on the hotel and restaurant industry in Punjab, Pakistan. *International Journal of Business and Social Science*, 9(2), 54–62.
2. Kaur, A., Kaur, S., Kaur, P., & Kaur, M. (2018). Mobile commerce: An empirical study on customer perception in Punjab. *International Journal of Business and Management Invention*, 7(3), 23–28.
3. Raza, M., Khan, S. A., Khan, M. A., Khan, M. N., & Khan, S. (2019). Consumer perception and satisfaction with mobile commerce: An empirical study on the hotel and restaurant sector of Punjab, Pakistan. *International Journal of Business and Social Science*, 10(4), 21–30.
4. Bhardwaj, R., & Singh, M. (2019). Understanding customer satisfaction in mobile commerce: A study of Indian hotel and restaurant industry. *International Journal of Mobile Communications*, 17(3), 238-253.
5. Singh, S., & Jain, A. (2020). Understanding customer perception on mobile commerce: A study of Indian hotel and restaurant industry. *International Journal of Mobile Communications*, 18(4), 413-425
6. Kaur, M., & Sharma, R. (2021). Customer perception and satisfaction in mobile commerce: A study of hotel and restaurant industry in Punjab State. *International Journal of Mobile Commerce*, 7(2), 105-120

A REVIEW ON IMPLICATION OF WASTE MANAGEMENT REGARDING FOOD ON OPERATIONAL PRACTICES OF HOTEL PERFORMANCE IN PUNJAB

Sanjay Singh and Amit Kumar

Department of Hospitality Management, CT University, Ludhiana (Punjab) India

ABSTRACT

This study has been based to present an understanding of operational management and performance around practices raised to solve problems of food wastage in India, specifically in Punjab. Various points have been introduced in this study, which helps to objectify the aim of the study by discussing causes, impact as well as challenges in food waste management. This study also presents some important recommendations that can be used in the future aspect of providing food relief to sustainable attain betterment of world hunger as well as critically better environmental situations altogether.

Keywords: Food Waste Management, Environmental Sustainability, Hotel Business, Operational Practices, India, Technological advancements

1. Introduction

In challenges that are met when aligning environmental sustainability, wastage is one of the biggest factors in this picture and implements the most damage in bringing sustainable development of an economy and its citizens. This study has been based on facilitating performance management practices done in hotel businesses through which better and more functional management of food wastage can be gained. Filimonau & Delysia, (2019) have highlighted that for hospitality services, like hotels and restaurants, food wastage holds the majority of waste is done regularly. Even though controlling wastage of materials like food, solids as well as water leads to deliberate betterment of environmental agendas, in most cases, hoteliers do not consider these environmental factors as it takes a toll on their target of short-term financial profits. This study helps to highlight food wastage factors and impact of operational management practices, which can bring differences in performance through a viewpoint of hotels, established in Punjab specifically.

2. Critical Evaluation of Cause and Impact of food wastage in Hotels

In current years, concerns over food waste have been raised and environmental activists have highlighted that most of food waste is done in hotels and restaurants. Food wastage mainly happens when hotel and restaurant authorities fail to strategize a plan according to their daily needs and exceed raw materials purchases. Sinha & Tripathi, (2021) have argued that generally, kitchen materials, like eggshells, tea bags, bones as well as rotten fruits and vegetables are the materials that are considered as food wastage in India. Even though an effective system of maintaining food items is a necessary factor, most hoteliers have seen to become ignorant of the factor just to attain profit from their business. In India, per year about 68.8 million tonnes of food gets wasted which makes the country second position among most food-wasting countries (Statista.com, (2021)). In most cases, it has also been noticed that a large portion of food wastage collected from hotels is generated from food items that have gone expired. With a large amount of food wastage, large amounts of economic shock are also received in terms of countries.

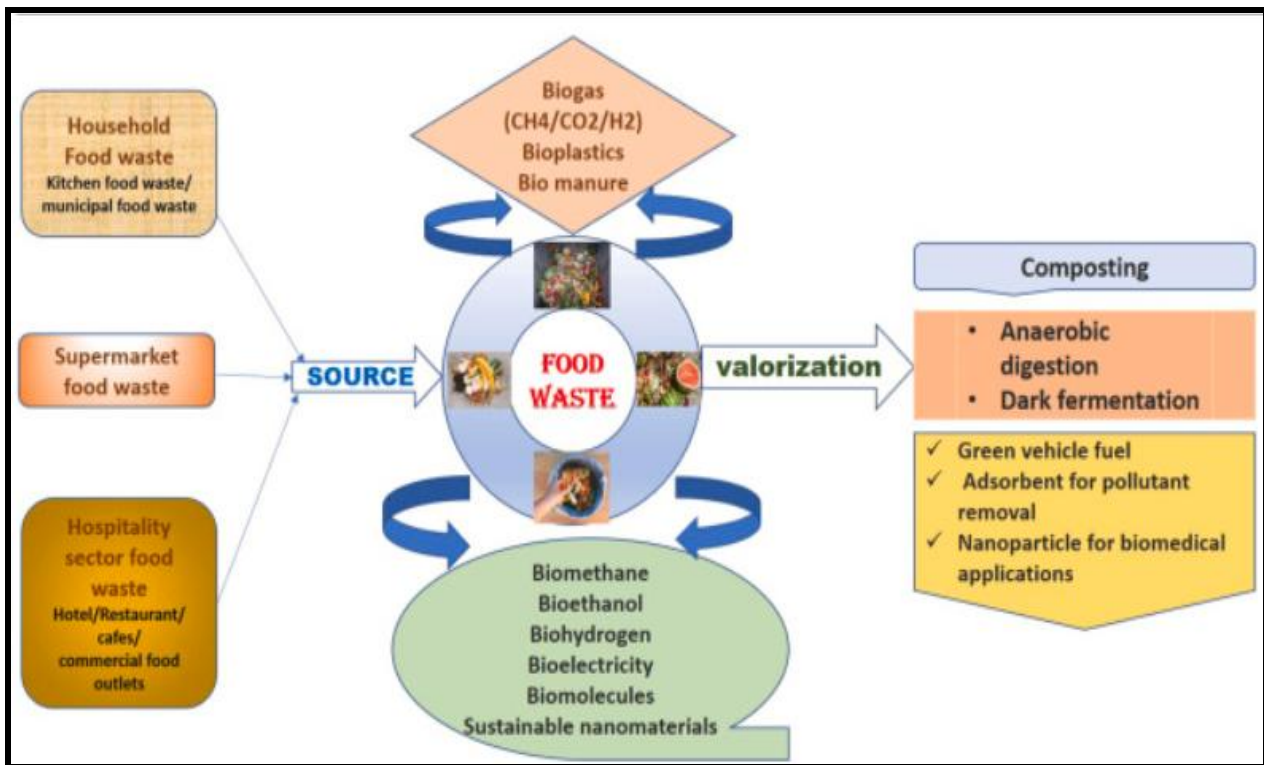


Figure 1: Sources of food waste and their management factors
(Source: Sinha & Tripathi, 2021)

As in Punjab where hotels produce most food waste, it directly results in economic distress caused by mistreatment of food. Food wastage also creates an environmental impact as well as most of the food products that are collected from hotels in India, are taken to process fertilizer, which directly creates a scope of increase in carbon footprint. Apart from that, food wastage also harms fertile lands in India, making it hard for farmers to attain proper land for producing food crops.

3. Promoting practices like reuse, recycling, and reduction of waste on hotel premises

One of the most important factors that most hoteliers ignore is the factor that food waste

generates from not having planned in a prior manner. In order to elevate the declining conditions around food wastage, operational practices like recycling, reuse as well as waste reduction process has to be introduced to elevate the performance to betterment. Amicarelli & Bux, (2021) have highlighted that in attaining sustainable development goals that have been introduced by the UN, food wastage poses a serious challenge and it can be mitigated by reducing improper means of hotel ethics used by hoteliers.

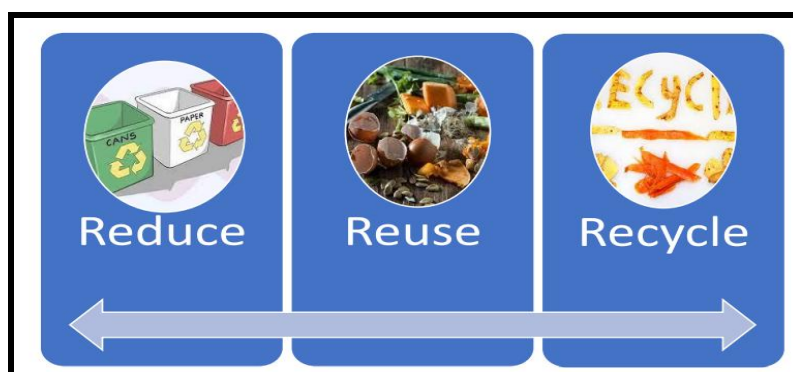


Figure 2: An approach to managing food wastage

Every year 1.3 billion tons of food gets disposed of around the world and using factors like recycling and reuse can help in attaining operational management of food-related waste (Amicarelli & Bux, 2021). Cutting out the rate of individual consumption as an initiative by hotels can bring reduction to food waste with portion control. Practicing recycling food products made from materials like virgin substances can bring changes to food-wasting factors. In hotels, practicing habits like proper storage can also help in sustaining a proper practice to disperse food wastage. Hotels can also practice habit of supply on demand, which will provide a practice of cooking on demand, which will direct less food wastage directly.

4. Operating technical assistance to lessen food waste

World hunger and food waste are interconnected and without solving one factor,

another will not come instantly. Along with human assistance and initiative, technological factors come to be effective in positively lessening food wastage. Abdou et al. (2020) have highlighted that practices around green hotels, use of technology can be introduced to create awareness of food wastage conditions and possible ways of mitigating it. It may not have been available in India at the moment but apps like *“Too Good to Go”* made in Denmark, help in detecting food surplus in hotels which then is used for services towards others (Itu.int, 2021). In India, specifically, use of social media to reach activists who are actively using leftovers to feed hungry people can also be reached by using technological advancements like social media platforms.



Figure 3: Smartphone and Refrigerator in use for food waste management
(Source: Unepccc.org, 2021)

Using smart applications like smart fridges in hotels can bring various changes, which help to know product shelf life easily through phones (Unepccc.org, 2021). Apps like *“No Food Waste”* developed in Tamilnadu, are helping to collect food to feed about 10000 people altogether every month (Itu. int, 2021). Reynolds et al. (2019) have stated that technology and its intrusive use can bring in various positive changes to food wastage which can be beneficial for people living in India as well as for environmental peace as well.

5. Conclusion

Food waste management helps to channel different factors altogether and creates a better profile for both economic and environmental sustainability in the world. This paper, in particular, has argued several points in this study on waste management of food, which can be beneficial for attaining sustainable development of poverty alleviation as well as food security. In Indian viewpoint, interconnected management of food waste generated from hotels not only complicates

balance of human health but also creates hazards in environments because of its linear system of disposal and collection. It is no exceptional factor that wastage around food items collected from hotels and restaurants is done in a global manner. However, in India, specifically in Punjab no greater system of waste management can be found which can bring positive changes to the overwhelming disturbance created by the wastage of food. Even though this study lucidly points out different factors of food wastage in hotels and their needs for operational management, a long path awaits, as food wastage is not a regional matter but rather an international problem that needs to be solved for betterment.

6. Recommendations

Restaurants and hotels have been noticed to play a critical role when it comes to food-related waste on a daily basis. In order to attain waste management of food, some recommendations are being aligned in this part, which will create a better perspective to waste management.

- **Regulating control over purchase of raw food material**

In all aspects of business in a hotel, managing food waste begins with managing and reducing amount of raw material that is being purchased daily. Leverenz et al. (2021) have pointed out that using a “food waste tracking system” can be an effective tool that will implement needs of daily raw material purchases so that real-time reduction of food waste can be attained. Strategizing a policy of limited stock of food materials can be effective in aligning food

wastage reduction. Most of the hotels do not prioritize expiry dates, which leads them to generate more waste food. It is necessary to use products sensibly and use a greater storage program to validate shelf life of other raw materials like vegetables and fruits.

- **Facilitating food donation system**

As most hotel owners and managers are aware of the fact that completely omitting food waste is an impossible task, however, there are ways that can redirect food wastage to a positive factor. Närvänen et al. (2020) have stated that noting food that has been noticed to be overcounted in hotels should be donated to the needed individuals, which not only will create a sustainable way of reducing food wastage but also will help in providing the needed. In a global range, about 821.6 million individuals are suffering from a disease called starvation making them malnutrition. Through a daily act of food donation, this count can be dragged down, making food available for every other person and lessening food waste.

- **Managing quantity of food being served**

Most hotels serve food quantity without measuring the amount of guests they have which massively impacts food wastage made through restaurant services. Minimizing food quantity being served in platters sometimes can bring a huge difference as it helps in lessening the amount of food wastage done by hotels and restaurants. Not only portion control helps in greatly reducing wastage but it also can be beneficial for customers as it helps in cost cutting as well.

References

1. Abdou, A. H., Hassan, T. H., & El Dief, M. M. (2020). A description of green hotel practices and their role in achieving sustainable development. *Sustainability*, 12(22), 9624. DOI: <https://doi.org/10.3390/su12229624>
2. Amicarelli, V., & Bux, C. (2021). Food waste measurement toward a fair, healthy and environmental-friendly food system: A critical review. *British Food Journal*, 123(8), 2907-2935. DOI: <https://doi.org/10.1108/BFJ-07-2020-0658>
3. Filimonau, V., & Delysia, A. (2019). Food waste management in hospitality operations: A critical review. *Tourism management*, 71, 234-245. DOI: <https://doi.org/10.1016/j.tourman.2018.10.009>
4. Itu.int, (2021). How technology can help avert food waste Available at: <https://www.itu.int/hub/2021/09/how-technology-can-help-avert-food-waste/>
5. Leverenz, D., Hafner, G., Moussawel, S., Kranert, M., Goossens, Y., & Schmidt, T.

- (2021). Reducing food waste in hotel kitchens based on self-reported data. *Industrial Marketing Management*, 93, 617-627. DOI: <https://doi.org/10.1016/j.indmarman.2020.08.008>
6. Närvänen, E., Mesiranta, N., Mattila, M., & Heikkinen, A. (2020). Introduction: A framework for managing food waste. *Food waste management: Solving the wicked problem*, 1-24.
7. Reynolds, C., Goucher, L., Quested, T., Bromley, S., Gillick, S., Wells, V. K., ... & Jackson, P. (2019). Consumption-stage food waste reduction interventions—What works and how to design better interventions. *Food policy*, 83, 7-27. DOI: <https://doi.org/10.1016/j.foodpol.2019.01.009>
8. Sinha, S., & Tripathi, P. (2021). Trends and challenges in valorisation of food waste in developing economies: A case study of India. *Case Studies in Chemical and Environmental Engineering*, 4, 100162. DOI: <https://doi.org/10.1016/j.cscee.2021.100162>
9. Statista.com, (2021). The Enormous Scale Of Global Food Waste Available At: <https://www.statista.com/chart/24350/total-annual-household-waste-produced-in-selected-countries/#:~:text=The%20highest%20absolute%20figures%20for,India%20discards%20668.8%20million%20tonnes>.
10. Unepccc.org, (2021). Reducing Consumer Food Waste Using Green And Digital Technologies Available at: <https://unepccc.org/wp-content/uploads/2021/11/reducing-consumer-food-waste-using-green-and-digital-technologies.pdf>

IMAGE PRE-PROCESSING, ENHANCEMENT AND FEATURE EXTRACTION FOR AUTOMATED CROP WEED CLASSIFICATION

Satpal Singh and Harmeet Singh

Department of Computer Applications, CT University, Ludhiana, Punjab, India

ABSTRACT

Agriculture constantly faces various challenges including attacks from new weeds and insects. Often, with large farm sizes and plummeting manpower in the agricultural sector, it becomes challenging to continuously monitor crops for pest infestation. Precision agriculture has emerged as a promising and much sought after technique for automated and quick detection of weeds in agricultural farms. Use of high end drone technology combined with image recognition methods based on machine learning, automated detection of weed attacks has gained prominence. This paper presents a detailed background of precision agriculture based techniques for automated detection of weed attacks on crops. A thorough investigation of image enhancement, segmentation, feature extraction and classification pertaining to white fly attacks has been resented. Salient features of the contemporary techniques used for the proposed approach have been cited and evaluated. A methodology for image pre-processing and feature extraction for crops infested by weeds has also been designed and implemented. This step along with the review on classification mechanisms is expected to serve as a strong background for development of automated machine learning based techniques for accurate detection of weed infestation on crops.

Keywords: Precision Agriculture, automated weed detection, Image Processing, Segmentation, Feature Extraction, Machine Learning, Classification Accuracy.

1. Introduction

The domain of agriculture has been witnessing major advancements and transformations in the recent times. The changes can be attributed to increasing farm sizes, crop concentration, and rapid technical advancements. With growing population and increase in demands, better techniques of crop management and handling have become the need of hour. With the advancements in the field of image processing, computer visions and machine learning, automated applications are being developed for agricultural applications [1]. The use of technology in the domain of agriculture is often termed as precision agriculture [2]. One of the major challenges which agriculturists face is the attack of weeds on the crops which can severely damage the crops and subsequent yield. Different crops are subjected to infestations by variety of weeds. Due to the rapid multiplication of weeds, it becomes necessary to devise mechanisms for quick and accurate detection. Manual detection is often a tedious and time consuming job, which becomes even more difficult if the farm size is large. Thus, accurate automated systems are necessary for pest infestation detection.

Precision agriculture entails an approach for farming management based precise observation and measurement methods of variety of crops depending on their variability. One of the major catalysts for precision agriculture is use of unmanned aerial vehicles (UAVs) for capturing data and sending it for observation and analysis [3]. The UAVs are generally less expensive and equipped with image capturing technologies. Vegetative images capturing methods are supported by these machines that can facilitate the detection and classification of a large variety of weeds. The use of artificial intelligence (AI) and machine learning (ML) based techniques can aid in the process of pest detection and control. The use of automated tools greatly facilitates the process of technology driven agricultural systems optimizing the use of resources and increasing productivity[4]. The development of such automated integrated weed management techniques allow higher productivity, lesser use of pesticides and insecticides and reduced losses. Weeds and plant based diseases and can travel relatively large distances and can infest crops such as cotton, rice, cauliflower, pumpkin, cabbage, soybean etc [5]. The infestation spreads very quickly necessitating swift action in the absence of which the crop decays very rapidly thereby

resulting in huge losses. Indiscriminate use of pesticides not only adversely affects the crops and the yield, but is also hazardous for human consumption. Hence, mechanisms for detection of early infestations by weeds is of critical importance. A plant infested by weed is depicted in figure 1 [6].



This paper is divided into the following sections: Section 1. Introduction: This section introduces the concept of precision agriculture, its utility and weed infestation. Section 2: Image Processing: This section explains the various image processing techniques such as de-noising, segmentation and feature extraction which are important for subsequent feature extraction from images and classification. Section 3: Feature Extraction and Classification: This section describes the process of feature extraction from the images and optimizing feature values to facilitate classification. Section 4: Previous Work: This section highlights the various approaches adopted for the automated detection of whiteflies and similar weeds. The performance of the prominent techniques are also analyzed. Section 5: Experimental Set up: In this section, an experimental setup is put forth for data acquisition, processing and feature extraction which can ultimately result in classification of images as under possible weed infestation. The paper ends with the concluding remarks regarding the various approaches used and possible directions for research, to develop accurate and effective automated classification systems.

2. Image Processing

The automated detection of whitefly attacks is primarily based on the images captured by unmanned aerial vehicles (UAVs) which can

capture the span of large farms in relatively short intervals of time, repeatedly if necessary. However, due to the motion of the UAVs, the background and lighting conditions, several degradations and noise effects affect the images [8]. Hence it is important to pre-process the images prior to computations of critical features and classification. This section discusses the image processing part in detail. Images are often affected by noise effects with different origins such as noise in electronic devices termed as Gaussian noise, noise in the analog to digital conversion process and spikes of voltages and currents causing multiplicative speckle noise and salt and pepper noise [9]. Capturing lesser pixels or pixels with low resolution results in a particular type of noise called Poisson noise [10]. Noise removal is critically important to attain accuracy in feature calculation driving the classification process. Several noise removal techniques have been explored such as using image filters and noise removal in the transform domain [11]. One of the most effective techniques for noise removal images is the wavelet transform. The wavelet transform has the distinctive advantage of noise removal in the transform domain employing high pass and low pass filtering. The wavelets unlike the conventional Fourier methods do not have smooth base functions as the kernel of the transform thereby making them effective for abruptly changing signals such as images affected by noise [12]. The discrete version of the wavelet transform termed as the discrete wavelet transform (DWT) is used as an iterative filter in this work for de-noising images. The wavelet transform applied on a discrete sequence $x(k)$ is given by:

$$X(k) \xrightarrow{DWT} X_{LFF} \cdot X_{HFF} \quad (1)$$

Here,

DWT denotes the discrete wavelet transform operation

X_{LFF} denotes the co-efficient values obtained through low pass filtering

X_{HFF} denotes the co-efficient values obtained through high pass filtering [13].

The co-efficient values obtained through low pass filtering contain the maximum information content of the signal while the that obtained from the high

pass filtering contain the additional details of the signal [14]. The DWT thus decomposes the signal into two components with different attributes. The low pass filtering co-efficients are also termed as approximate co-efficients C_A while the high pass co-efficients are termed as detailed co-efficients C_D . The co-efficient values can be computed as:

$$X_{HPF}(n) = X(k)g(2l - k) \quad (2)$$

$$X_{LPF}(n) = X(k)h(2l - k) \quad (3)$$

The equations (2) and (3) imply that a down-sampling or decimation of the signal has occurred by a factor of 2. i.e. every other sample of the signal has been left out, thereby decimating the signal. The opposite effect can be observed in the frequency domain in which the frequency doubles compared to that of the original signal [15]. Thus the frequency domain resolution of the signal increases. An iterative application of the DWT would keep decreasing the time resolution but at the same time keep increasing the frequency resolution of the signal[16].

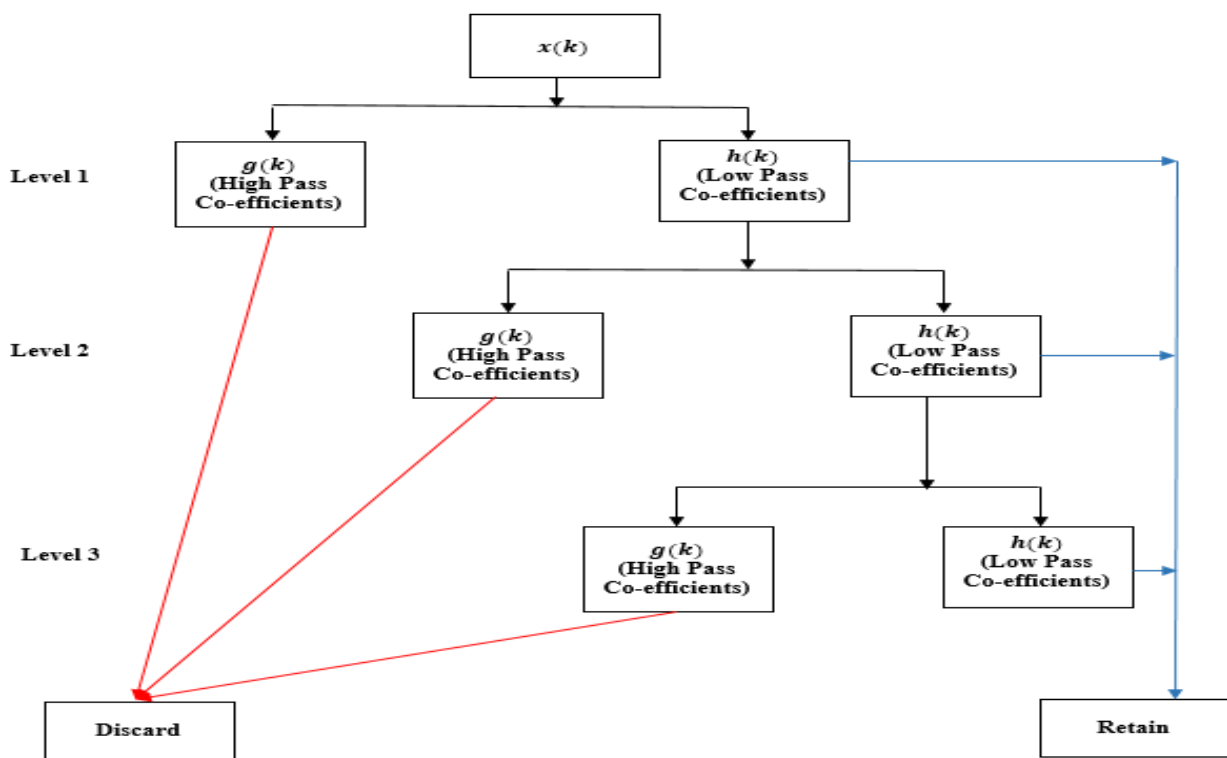


Figure 2. Iterative DWT decomposition of data.

Typically, the lower frequency co-efficients or the approximate co-efficients would contain the maximum useful information and discarding the high pass or the detailed co-efficients would not result in significant information loss. The decomposition can be truncated based on the amount of frequency resolution needed, as successive decomposition would increase the complexity of the process [17]. Noise typically happens to exist in the high pass co-efficients of

the image decomposition and hence can be filtered out using iterative DWT decomposition of the image. Based on the various base functions of the wavelets, the DWT has multiple families such as Haarlet, Coiflet etc [18]. A typical decomposition of images using the DWT is depicted in figure 3. In case of images, the co-efficients can be computed horizontally and vertically thereby rendering the horizontal co-efficients (C_H) and the vertical co-efficients (C_V) [19]. The iterative decomposition of the set of 'n' images and

retention of the approximate co-efficients is implemented using the following logic:

$$\begin{aligned} & \text{for } (i = 1, i \leq n, i++) \\ & \quad \{ \\ & \quad \text{Image}_i \xrightarrow{\text{DWT2}} \text{CA}_{i,1}, \text{CD}_{i,1} \\ & \quad \text{CA}_{i,1} \xrightarrow{\text{DWT2}} \text{CA}_{i,2}, \text{CD}_{i,2} \dots \\ & \quad \text{CA}_{i,k-1} \xrightarrow{\text{DWT2}} \text{CA}_{i,k}, \text{CD}_{i,k} \\ & \quad \} \end{aligned}$$

Here,

i denotes the i^{th} image

The subscript index 1,2,... k denotes the level of decomposition

CA denotes the approximate co-efficients of a particular level

CD denotes the detailed co-efficients of a particular level

DWT2 denotes the 2-dimensional discrete wavelet transform

The validity of the multi-level decomposition of the image using the discrete wavelet transform for noise removal can be validated by the histogram analysis of the original image, the approximate co-efficients and the detailed co-efficients [20]. The normal histogram can be computed as:

$$h = \sum_{k=1}^l s_k \quad (4)$$

Here,

h denotes the normal histogram

k denotes the histogram index

l denotes the total number of bins in the distribution

s denotes the histogram function

The total number of bins to be assigned is computed as:

$$l = \frac{\max(X) - \min(X)}{l_w} \quad (5)$$

Here,

$\max(X)$ denotes the maximum value of the random variable ' X '

$\min(X)$ denotes the minimum value of the random variable ' X '

l_w is the bin width typically equal to the number of distinct values in the random variable

In case of an effective decomposition, the histogram of the original image would be identical to that of the approximate co-efficients while the dissimilarity would be observed in case of the detailed co-efficients [21].

Another critical operation prior to feature extraction is segmentation or separation of the area of interest from the composite image. Segmentation is necessary to differentiate the attributes of different categories of images, which in this case happen to be infested or non-infested part of the samples [22]. The segmentation of the region containing weeds can be done based on the sudden change in the gradient of image parameters with respect to the pixel location [23]-[24]. This category of segmentation considered in this case is often termed as bi-level segmentation with the assumption that the image histogram can be split into two distinct categories v.i.z. the segmented region and the background. Considering the image under interest to have an area 'A' with a central reference ' C_0 ', the radial gradient is computed as [25]-[26]:

$$g_r = \max(r, C_0) |G_\sigma(r) \frac{\partial}{\partial r} \oint_{r, C_0}^R \frac{I(x,y)}{2\pi r} dA| \quad (6)$$

Here,

g_r denotes the radial gradient

$I(x,y)$ denotes the image under interest

C_0 denotes the central reference

G_σ denotes the Gaussian kernel

r denotes the radial distance from the central reference

R denotes the maximum radial distance from the central reference

\max denotes the operation to find the maxima

dA denotes the differential area

This segmentation technique is effective in case of a relative sharp change in the gradient in the contour of a composite image. However, the segmentation will be less accurate in case of a blurred or fuzzy boundary between the area of interest and the background [27]. An alternative segmentation based on the mutual information between the different regions to be separated can be implemented by computing the entropy corresponding to the grayscale histogram. The entropy of an image of $m \times n$ pixels with a

histogram h_n corresponding to n grayscale levels can be expressed as [28]:

$$h_l = \frac{1}{1-l} \log_2 \sum_{i=1}^n p_i^l \quad (7)$$

Here,

l denotes the order of entropy, and $l > 1$.

p_i^l denotes a discrete probability distribution corresponding to the histogram h

As $\lim_{l \rightarrow 1} h_l$ approaches the Shannon's entropy. The segmentation of the image into n levels would yield an additive entropy given by:

$$E_l(t) = \text{Arg max}\{\sum_{i=1}^n h_i c_i\} \quad (8)$$

Here,

$E_l(t)$ denotes the additive entropy

c_i denotes the number of categories of segmentation corresponding to the value of n

If the threshold value which segments the image can be given by:

$$T_{k1, k2} = \frac{\sum_{i=k1}^{k2-1} i P(i)}{\sum_{i=k1}^{k2-1} P(i)} \quad (9)$$

Here,

$P(i)$ denotes the discrete probability distribution

$k1, k2$ denote the indices of thresholding for the threshold value T

The concept can be extended to a multi-level thresholding by increasing the order of T using entropy based segmentation [29]. In the present case, the segmentation can be implemented by a two-fold segmentation with the area of interest separated from the rest of the image based on the following algorithm:

1. Load image of interest.
2. Initialize. $r = 0$, corresponding to the central reference C_0
3. Increment the value of r up to R and compute the gradient g_r given by equation (6)
4. Based on equation (9), obtain the value of T , where either g_r or $E_l(t)$ attains a maxima $\forall r, 0: R$

5. Designate different binary values to mask the 2 regions given by:

$$M_1 = \sum_{x,y}^{k1} P_{x,y} \quad (10)$$

and

$$M_2 = \sum_{x,y}^{k2} P_{x,y} \quad (11)$$

Here,

M_1 and M_2 are the masking value typically chosen as 1 and 0 respectively

3. Feature Extraction And Classification.

After the images are processed and segmented, feature extraction and optimization is done prior to training an automated classifier. Image classification can be done employing different benchmark techniques [30]-[31]. Feature extraction from the labelled data is extremely critical to accurate classification since the features help the classifier to find pattern in different groups of data. One of the ways to classify is by treating the image pixels as the features [33]. This may be effective in case of object recognition or image classification where the categories have distinct boundaries [34]. In case of detection of pest attacks, especially extremely small weeds such as white flies, this method may succumb to overlapping or fuzzy boundaries among the pixel values of images. Moreover, for RGB images, with 3 distinct R, G and B channels, the dimension of the feature dataset may be exceedingly large for lesser sophisticated hardware for agricultural systems [35]-[36]. Hence statistical feature extraction may be adopted as the baseline for the classifier. Without the loss of generality, it can be stated that statistical features can be computed for almost all common image formats. Statistical feature computation can be augmented with the computation of gray level co-occurrence matrix (GLCM) which tries to estimate the co-occurrence of pairs of pixels in a defined spatial closeness [37]. The GLCM matrix is computed based on the joint probability of occurrence or joint probability distribution given by P_j [38]-[39]. The GLCM features are computed for a given distance and angle denoted by ' d ' and ' θ ' respectively for each of the pixels and its corresponding neighbour. The

GLCM matrix is divided using a normalizing factor 'N' to obtain the normalized GLCM matrix [40]-[41]. The features computed in the proposed work are:

1. Mean or first moment: It is the average value or first moment computed as:

$$\text{Mean} (\mu) = \frac{1}{N} \sum_i^N f_i X_i \quad (12)$$

2. Standard Deviation: It is a measure of the difference between the instantaneous value and the mean, and is given by:

$$\text{Standard Deviation} (\sigma) = \sqrt{\frac{1}{N} \sum_i^N (X_i - \mu)^2} \quad (13)$$

3. Variance: It is the square of the standard deviation and is defined as:

$$\text{var} = \sigma^2 \quad (14)$$

4. Skewness: It denotes the amount of asymmetry of the probability distribution curve with respect to the y-axis of the curve.

$$\text{skewness} = \frac{\sum_i^N (X_i - \mu)^3}{(N-1)\sigma^3} \quad (15)$$

5. Kurtosis: The kurtosis is also termed as the fourth standard moment and is mathematically computed as:

$$\text{Kurtosis} = E\left[\left(\frac{X-\mu}{\sigma}\right)^4\right] \quad (16)$$

6. Energy: The energy is also termed as the angular secondary moment and is defined as:

$$\text{Energy} = \sum_{i,j}^N |p_{i,j}|^2 \quad (17)$$

7. Contrast: It is the degree of difference among the average and differential change in illuminance and is mathematically given by:

$$\text{Contrast} = \sqrt{\frac{1}{mn} \sum_{i,j}^{m,n} [X(i,j) - \text{Mean}(i,j)]^2} \quad (18)$$

8. Entropy: It is the average information content associated with a random variable having a probability function P, and is computed as:

$$E = -P(I_{x,y}) \log_2 I_{x,y} \quad (19)$$

9. Homogeneity: It is a statistical measure pertaining to the similarity of distributed values of a random variable, and is mathematically defined as:

$$H = \sum_{i,j}^{m,n} \frac{p_{i,j}}{1+|i-j|^2} \quad (20)$$

10. Correlation: It is a measure of the amount of similarity among the pixel values

$$\text{Corr}_{i,j} = \frac{\sum_{i,j}^{m,n} \frac{(i-u_x)(j-u_y)p_{j,x,y}}{\sigma_x \sigma_y}}{\sigma_x \sigma_y} \quad (21)$$

11. Inverse difference moment: It is defined as:

$$\text{IDM} = \sum_{i,j}^{m,n} \frac{1}{1+(i-j)^2} p_{i,j} \quad (22)$$

The GLCM normalizing factor is computed as:

$$N = \frac{\sum_{i,j}^{m,n} X_{i,j}}{\sum_{i=0}^{m-1} \sum_{j=0}^{n-1} X_{i,j}} \quad (23)$$

12. Root Mean Square Value (rms): It is often computed as metric corresponding to squared averages or means. It is computed as:

$$\text{rms} = \sqrt{\frac{\sum_{i=1}^n X_i}{n}} \quad (24)$$

Here,

X_i denotes the instantaneous value of the random variable X

$I_{x,y}$ denotes an image which is a function of spatial co-ordinates (x, y)

m, n denote the pixels along x and y axes

mean denotes the average illuminance of the image

X denote the distinct values in the set

f denotes the frequency distribution of the values

N denotes the total number of levels in the normalized GLCM matrix

$p_{i,j}$ denotes the normalized GLCM matrix

P_j denotes joint probability

P denotes probability

Based on the extracted features, different classification techniques can be employed. Analyzing the latest benchmark techniques reveal that the most commonly used and effective techniques employ machine learning [42].. Some

of the most common machine learning techniques happen to be support vector machine (SVM), Artificial Neural Networks (ANN), Deep Neural Networks (DNNs), different variations of neural networks and deep learning, Fuzzy Logic and Adaptive Neuro Fuzzy Inference Systems [43]-[44]. Some earlier models used non-linear and logistic regression methods. Some of the prominent techniques are explained in brief.

Support Vector Machine (SVM): The support vector machine acts an effective classifier which separates data sets into different classes based on the distance from a hyperplane [45]. The support vectors and hyperplane compositely decide the decision boundary. For a multi-variate data set which is to be separated into classes, the Euclidean distance of the support vectors from the hyperplane is given by [46]:

$$r = \sqrt{x_1^2 + \dots \dots \dots x_n^2} \quad (25)$$

Here,

x denotes the distinct variables,

n denotes the number of variables

r is the distance of the support vectors from the hyperplane.

While the support vector machine (SVM) can act as an effective classifier, the major limitation of the SVM is its tendency to saturate in performance in case the data used for training is kept increasing. In this case, the accuracy of the system doesn't increase beyond a certain limit even if more data is added. The performance of SVM also suffers in case of classification of image data with overlapping boundaries [47]-[48].

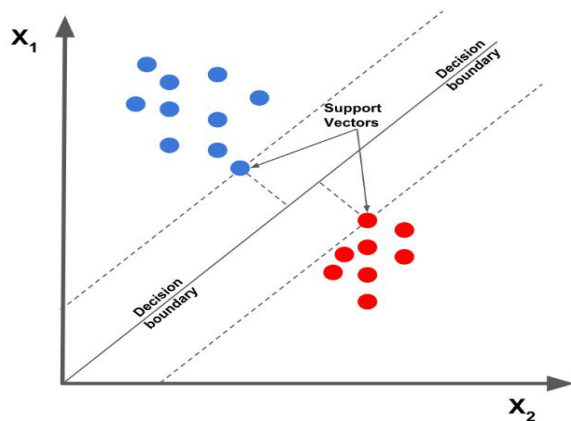


Fig. 3 Classification using SVM

Figure 3 depicts the working of the support vector machine wherein the support vectors decide the location of the hyperplane.

Neural Networks: Artificial Neural Networks (ANN) have gained a lot of prominence recently due to the emergence of deep neural networks and deep learning. Artificial Neural Networks try to emulate the working of the human brain and its thought process. As the processing power of chips keeps increasing, it becomes possible to implement deeper neural networks with dense hidden layers on hardware [49]-[50]. This has led to the popularization of neural networks and deep neural networks. Figure 4 depicts the structure of a single neuron.

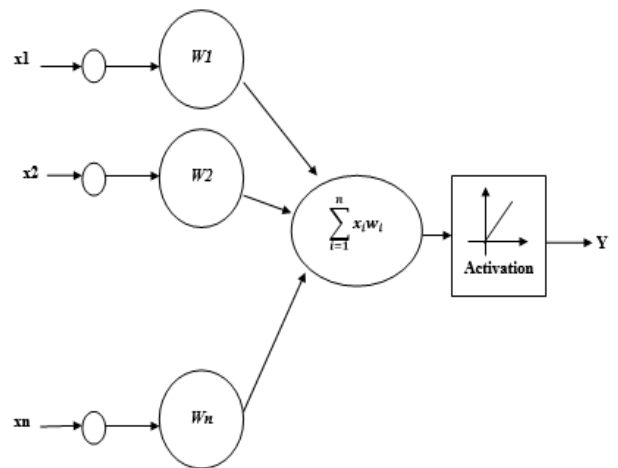


Fig. 4 Mathematical Model of Single Neuron [71]

The neuron depicted in figure 5. is a multi input neuron which can process parallel inputs simultaneously. The output of the single neuron unit can be expressed as:

$$y = \varphi(\sum_{i=1}^n x_i w_i + \beta) \quad (26)$$

Here,

x denotes the inputs to the neuron.

y denotes the output of the neuron.

w denotes the weights.

β denotes the bias.

φ denotes the activation function.

A dense interconnection of such neurons is often termed as a neural network. Increasing the data processing or hidden layers of the network allows to make complex computations. This lays the

foundation for a deep neural network and deep learning. Some of the common neural network configurations are Bayesian Network, Convolutional Neural Network and Recurrent Neural Networks [51]-[52]. The Bayesian Network works on the principle of Bayes theorem of conditional probability to compute the maximal probability of an unknown data sample in a given class. The convolutional Neural Network or CNN has evolved as one of the most effective deep neural network structures which works on the principle of convolutions [53]. The outer layers of the networks are used to compute low level features while the deeper layers are used to compute the higher level features. Adjusting the parameters (often termed as Hyperparameters) of the network allows to tune the network to a given data set. Recurrent networks often use a cascading structure of applying the output of one layer to the input of another layer in loops [54]-[55]. CNNs sometime encounter the problem of a vanishing gradient and overfitting [56]. To overcome these limitations, residual networks (called ResNets) are sometimes employed which have skip connections among the hidden layers which do not directly connect the layers in cascade thereby decreasing the chances of overfitting[57]-[58]. The

4. Previous Work and Noteworthy Contributions

This section presents in brief the noteworthy contribution in the field with its salient features. The performance evaluation metrics have also

hypothesis of any designed algorithm lies in the classification of partially overlapping datasets based on the deep probabilistic classifiers. The major challenge in this aspect is the similarity among infested and non-infested plants, hence accurate decision making is challenging for overlapping data samples. The intersection of sets overlapping sets makes the decision making challenging and hence a probabilistic classification is needed. The performance metrics commonly computed are [59]-[60]:

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \quad (27)$$

$$Sensitivity \text{ or } Recall = \frac{TP}{TP+FN} \quad (28)$$

$$Specificity = \frac{TN}{TN+FP} \quad (29)$$

$$Precision = \frac{TP}{TP+FP} \quad (30)$$

$$F - Measure = \frac{2 \cdot Precision \cdot Recall}{Precision + Recall} \quad (31)$$

Here, TP, TN, FP and FN denote the true positive, true negative, false positive and false negative respectively.

been cited along with the identified research gap or limitation. This section of the review helps in understanding the common approaches adopted and further scope for improvement in an approach. The summary of previous work in the domain is cited in table 1.

Table 1. Summary of Previous Work

Authors	Approach Used	Performance	Limitations
W Li et al.	Deep Learning based on Recurrent Convolutional Neural Networks (RCNN)	F-1 Score of 0.944	Separate image enhancement not employed.
KRB Legaspi et al.	Classification of white fly and fruit fly infestation using YOLO algorithm.	Accuracy of 83.07% achieved.	Comparatively low recall and more localization error compared to CNNs
G Pattnaik et al.	Histogram of Oriented Gradient (HOG) and Local Binary Pattern techniques (LBP) along with SVM.	Accuracy of 97% achieved for used dataset.	The Support Vector Machine (SVM) suffers from performance saturation.
G Pattnaik et al.	Convolutional Neural Network (CNN) with transfer learning	Accuracy of 88.83%	Convolutional Neural Networks are prone to overfitting thereby negatively impacting transfer learning models.

QJ Wang et al.	CNN, R-CNN and Yolo algorithms applied for classification.	Accuracy of 62%, 73.7% and 62.5% achieved.	No separate pre-processing or dimensional reduction performed. Initial low level features and processing done by starting layers.
DJA Rustia et al.	Integrated camera modules and an embedded system as the sensor node in a wireless sensor network, for pest counting.	Average accuracy achieved for automated pest counting was 93%	Only pest counting and monitoring was done. Automated classification not employed.
L Liu et al.	Region proposal network (RPN) that is adopted by fusing the channel-spatial attention (CSA) module and CNN	Classification Accuracy of 75.46% achieved.	Fully connected layer replaced with bounding box regression with suffers from performance saturation with increasing data size.
CJ Chen et al.	Alexnet and CNN used to evaluate crop damage	Mean Accuracy of 82% achieved.	The Alexnet deep learning framework doesn't perform well for low light or noisy conditions.
L Deng et al.	bio-inspired Hierarchical Model and Scale Invariant Feature Transform (SIFT) were used for feature extraction and classification was done using the SVM	Accuracy of 85.5% achieved.	Separate denoising not performed. SVM suffers from performance saturation.
MA Ebrahimi et al.	SVM method with difference kernel function was used for classification of parasites and detection of thrips.	The MSE, RMSE and MAPE were computed. The best classification MAPE was 2.25%	The system doesn't employ technique for image denoising or feature optimization. Moreover SVM suffers from overfitting and saturation.
P Rajan et al.	Segmentation employed, color features used to train the SVM to classify the pest pixels and leaf pixels.	The classification accuracy was 95%.	Color features are often degraded by effect of Gaussian and Poisson noise. Moreover SVM suffers from data saturation.
Pérez-Ortiz et al.	Semi-supervised learning approach for weed mapping in sunflower crops.	The MAE for Semi-supervised SVM (SS-SVM) approach was 0.1268	The SS-SVM approach suffers from under fitting and hence the classification accuracy suffers for large testing datasets.
C Potena et al.	Lightweight CNN used for crop weed classification.	Highest Accuracy of 96% achieved	No separate feature extraction done. Dimensional optimization also not employed.
E Omrani et al.	A combination of K-Means clustering and SVM used for crop disease detection.	Accuracy of 93% achieved	The SVM is prone to performance saturation for large datasets. Image filtering and denoising not employed.
Cho et al.	Size, shape and color features were extracted and feature similarity was used for classification.	Achieved accuracy of 59%	Absence of sophisticated or contemporary classifiers.
Qiao et al.	Binary counting of whiteflies based on object detection	Detection accuracy of 81% achieved	Binary counting is often prone to errors, in case of non-deal capturing.
Rustia et al.	A combination of YOLO and CNN used.	Detection accuracy of 92% achieved.	Separate pre-processing not performed.
Wang K. et al..	A thresholding based counting approach was used.	Accuracy of 82% achieved.	No separate noise removal or ML classifier used.
Wang Z. et al.	The K-Means clustering approach along with Feature analysis used.	Accuracy of 92% achieved.	Noise removal and feature optimization not employed.
Wang F. et al.	A combination of CNN and DecisionNet was used	Accuracy of 62% achieved.	Feature optimization not employed.

4. Experimental Setup For Image Processing And Feature Extraction.

The fundamental step towards classification of images lies in the data acquisition, processing and feature extraction. An experimental setup for the same has been explained in brevity in this section. A dataset of 1300 images have been obtained from Kaggle. Images have been labelled to create an exhaustive dataset comprising of images of two categories, which are:

- 1) Weed infested.
- 2) Weed non-infested

A typical illustration of the images are depicted in figures 6 and 7.



Fig. 5 Original Image

Figure 5 depicts the original image under interest. In the next step, the RGB to grayscale conversion is done to facilitate the detection of flies.



Fig. 6 Grayscale Image

Figure 6 depicts the grayscale image.



Fig. 7 Illumination Enhancement

Figure 7 depicts the illumination enhancement performed on the grayscale image. A subsequent processing of the image can be done using the 2-dimensional discrete wavelet transform (DWT). The wavelet decomposition has been done using the Haarlet family at level 4. The decomposition and subsequent synthesis of the image from the co-efficients has been depicted in figure 8.

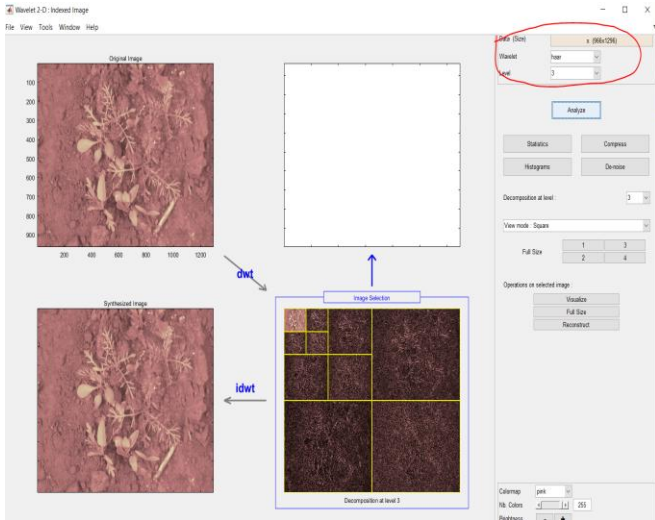


Fig. 8 Wavelet Decomposition using Haarlet at level 3

The effect of the noise removal can be visualized by analyzing the histogram of the actual image, the approximate co-efficient values and the detailed co-efficient values. The approximate co-efficients have been retained while the detailed co-efficients are discarded at each iteration.

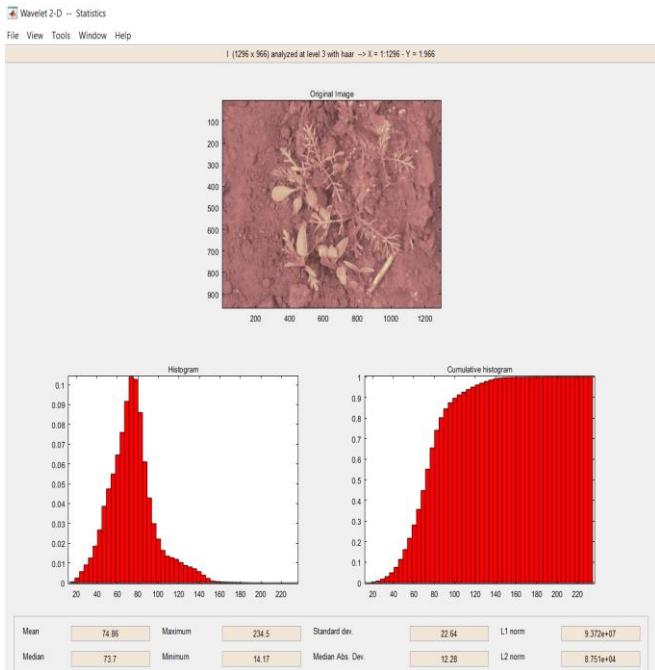


Fig. 9 Histogram of Original Image

Figure 9 depicts the histogram analysis of the original image.

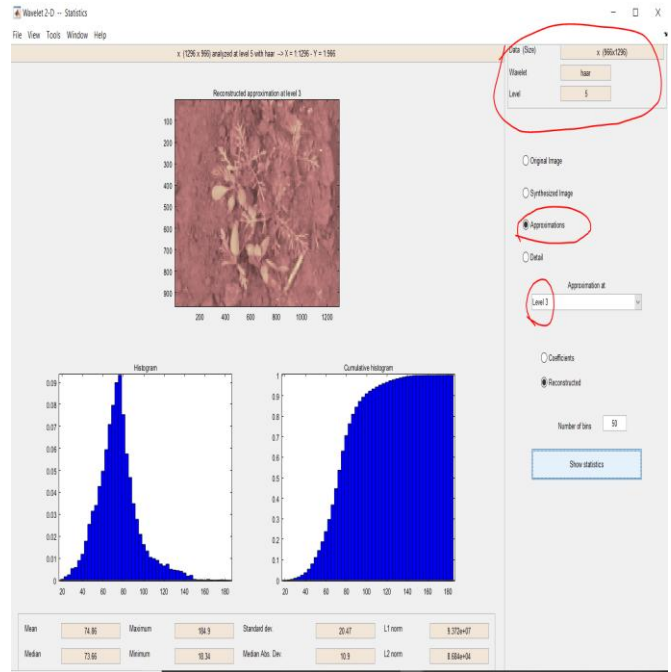


Fig. 10 Histogram of Approximated (synthesized image) at level 3

Figure 10 depicts the histogram analysis of the synthesized image using co-efficient values at level 3.

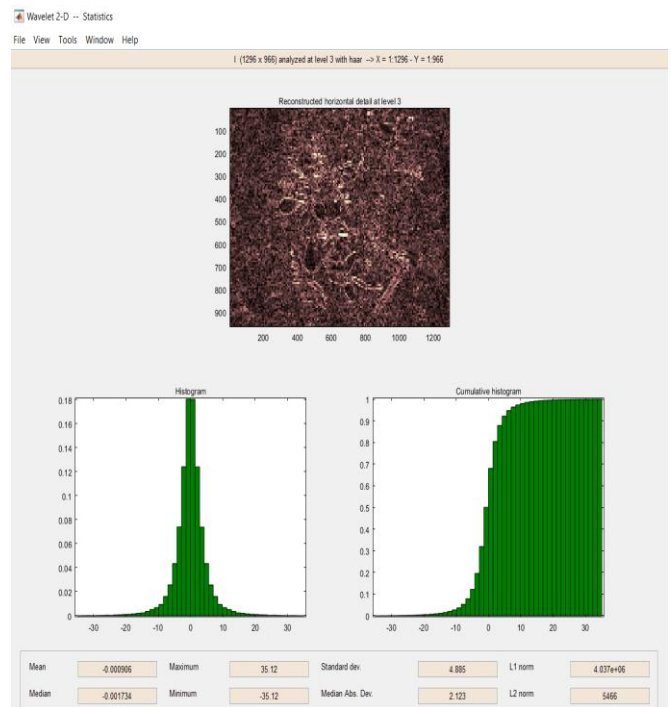


Fig. 11 Histogram of details at level 3

Figure 11 depicts the histogram analysis of the details using co-efficient values at level 3

Table.2. Histogram Analysis

Parameter	Original	Approximated at Level 4	Detailed at Level 4
Minimum	234.5	184.9	35.12
Maximum	14.17	18.34	-35.12
Mean	74.86	74.86	-0.000906
Standard Deviation	73.7	73.66	-0.001734
Mean Absolute Deviation	22.64	20.47	4.85
L1 Norm	12.28	9.37 x 10 ⁷	2.123
L2 Norm	9.37 x 10 ⁷	8.68 x 10 ⁴	4.03 x 10 ⁶

It can be observed from table 2 that the histogram of the details are drastically different in terms of the statistical parameters such as mean, maximum, minimum, standard deviation and mean absolute deviation as compared to the original image. On the contrary, the histogram of the approximations (synthesized image) shows close similarity to the original image, which indicates that the approximations contain the maximum information content while the detailed co-efficient values contain additional details which often contain noise and disturbance effects as exogenous inputs to the image. Thus an iterative filtering using the DWT is effective in noise removal. As an illustration, the 12 features for a non-infested and infested image are computed and tabulated in table 3. The same process is applied to the complete dataset.

Table 3. Feature Values

Feature	Non-infested	Infested
Contrast	0.344886363636364	0.348295454545455
Correlation	0.0348645446583504	0.0132823676850939
Energy	0.648327091942149	0.676514075413223
Homogeneity	0.896439393939394	0.905397727272727
Mean	0.00534961346174364	0.00404130200934658
Standard Deviation	0.106494858974864	0.106552559248169
Entropy	3.77534313502299	3.76249894182648
rms	0.106600358177805	0.106600358177805
Variance	0.0112786991593108	0.0112905013310115
Inverse Difference	0.908139616971321	0.881912908569653
Kurtosis	4.94085468988672	5.05381147561750
Skewness	0.256943895681977	0.896207776217934

Table 3 depicts the typical feature values of an infested and a non-infested image. It can be seen that the feature values bear similarity in magnitude which makes it necessary to use a classifier which can effectively classify data sets with fuzzy or blurred boundaries.

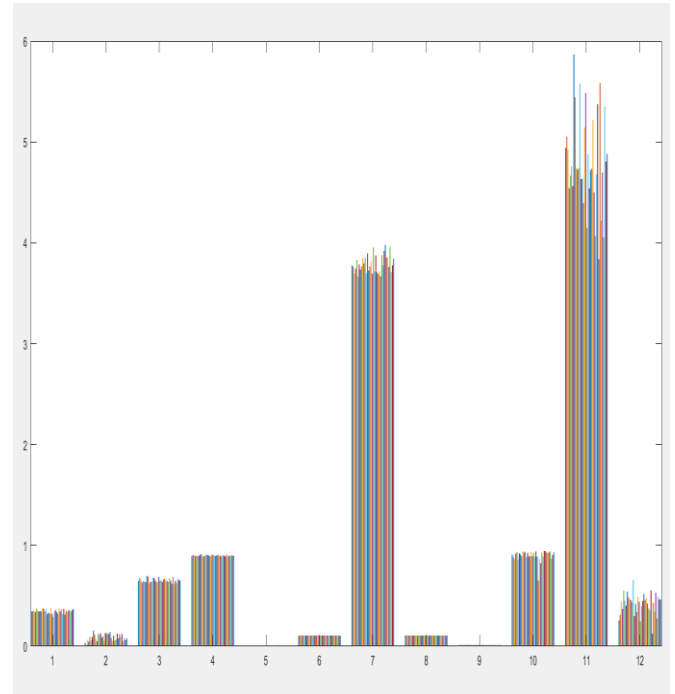


Fig. 12 Bar graph for image features

A bar graph for the twelve features for the sample size has been depicted in figure 12. Figure 13 signifies that a particular feature for the dataset attain a similar value implying the consistency in the feature extraction part.

The experiment has been performed in Matlab 2020a. The image pre-processing and computation of features lays the foundation for the design and training of an effective classifier.

Conclusion

This paper presents a comprehensive review on the use of machine learning in the domain of agriculture with an inclination towards automated and accurate detection of weeds. The various tools and techniques for the same have been discussed in detail. Data pre-processing and segmentation techniques have been discussed and it has been shown that this stage plays a crucial role in the subsequent feature extraction and classification. Feature extraction and its importance in

classification has been explained and a discussion on different machine learning based classifiers has been presented. The pros and cons of each of the approaches have been discussed. A summary of the noteworthy contributions in the field has been presented with the approach used, performance metrics and research gaps. Finally, an experimental set up for pre-processing and feature extraction of the images has been presented. It is expected that this

paper serves as a useful tool for future researchers interested in devising algorithms for automated detection of weeds such as whiteflies.

Conflict Of Interest

The authors declare no conflict of interest pertaining to the contents and findings of this work.

References

1. S.Haug J.Ostermann, "Plant classification system for crop /weed discrimination without segmentation", IEEE Winter Conference on Applications of Computer Vision, IEEE 2014, pp. 1142-1149.
2. A. Zhang, X.Wei X. "A review on weed detection using ground-based machine vision and image processing techniques. Computers and Electronics in Agriculture", Elsevier 2019, 158, pp: 226-240
3. AM Anter, AE Hassenian, D Oliva, "An improved fast fuzzy c-means using crow search optimization algorithm for crop identification in agricultural", Expert Systems with Applications, Elsevier 2019, vol.118, pp.340-354.
4. A.Bakhshipour, A.Jafari A, S.Nassiri. D.Zare, "Weed segmentation using texture features extracted from wavelet sub-images", Biosystems Engineering, Elsevier 2017, vol.157, pp.1-12.
5. J Torres-Sospedra, P Nebot, "Two-stage procedure based on smoothed ensembles of neural networks applied to weed detection in orange groves", Biosystems Engineering, Elsevier 2014, vol.123, pp.40-55.
6. I Dasgupta, J Saha, P Venkatasubbu, "AI crop predictor and weed detector using wireless technologies: a smart application for farmers", Arabian Journal for Science and Engineering, Springer 2020, vol.45, pp.11115–11127.
7. U. Shruthi, V. Nagaveni and B. K. Raghavendra, "A Review on Machine Learning Classification Techniques for Plant Disease Detection," 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS), 2019, pp. 281-284.
8. Y Chen, Z Wu, B Zhao, C Fan, S Shi, "Weed and corn seedling detection in field based on multi feature fusion and support vector machine" Sensors, MDP1 2021, vol.21, no.12, pp.1-18.
9. X. Jin, J. Che and Y. Chen, "Weed Identification Using Deep Learning and Image Processing in Vegetable Plantation," in IEEE Access 2021, vol. 9, pp. 10940-10950.
10. S Abouzahir, M Sadik, E Sabir, "Bag-of-visual-words-augmented Histogram of Oriented Gradients for efficient weed detection", Biosystems Engineering, Elsevier 2021, vol.202, pp. 179-194.
11. V. N. Thanh Le, G. Truong and K. Alameh, "Detecting weeds from crops under complex field environments based on Faster RCNN," 2020 IEEE Eighth International Conference on Communications and Electronics (ICCE), 2021, pp. 350-355.
12. M. Alam, M. S. Alam, M. Roman, M. Tufail, M. U. Khan and M. T. Khan, "Real-Time Machine-Learning Based Crop/Weed Detection and Classification for Variable-Rate Spraying in Precision Agriculture," 2020 7th International Conference on Electrical and Electronics Engineering (ICEEE), 2020, pp. 273-280.
13. S Sabzi, Y Abbaspour-Gilandeh, "Using video processing to classify potato plant and three types of weed using hybrid of artificial neural network and particle swarm algorithm", Measurement, Elsevier 218, vol.126, pp.Pages 22-36.

14. Tin-Yau Kwok and Dit-Yan Yeung, "Constructive algorithms for structure learning in feedforward neural networks for regression problems," in *IEEE Transactions on Neural Networks*, vol. 8, no. 3, pp. 630-645.
15. F.Ahmed, Al-Mamun, A.Bari, E.Hossain, "Classification of crops and weeds from digital images. A support vector machine approach *Journal of Crop Production*", Elsevier 2013, vol.40, pp: 98-104.
16. S. S. Athani and C. Tejeshwar, "Support Vector Machine-Based Classification Scheme of Maize Crop," 2017 IEEE 7th International Advance Computing Conference (IACC), 2017, pp. 84-88.
17. P. Lottes, J. Behley, N. Chebrolu, A. Milioto and C. Stachniss, "Joint Stem Detection and Crop-Weed Classification for Plant-Specific Treatment in Precision Farming," 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018, pp. 8233-8238.
18. S. Haug, A. Michaels, P. Biber and J. Ostermann, "Plant classification system for crop /weed discrimination without segmentation," *IEEE Winter Conference on Applications of Computer Vision*, 2014, pp. 1142-1149.
19. A Aldroubi and M Unser, "amilies of multiresolution and wavelet spaces with optimal properties", *Numerical Functional Analysis and Optimization*, Taylor and Francis, 1993, vol.14, no. 5-6., pp. 417-446.
20. J. Starck, J. Fadili and F. Murtagh, "The Undecimated Wavelet Decomposition and its Reconstruction," in *IEEE Transactions on Image Processing*, vol. 16, no. 2, pp. 297-309, Feb. 2007.
21. M. D. Swanson and A. H. Tewfik, "A binary wavelet decomposition of binary images," in *IEEE Transactions on Image Processing*, vol. 5, no. 12, pp. 1637-1650, Dec. 1996.
22. Yining Deng, B. S. Manjunath and H. Shin, "Color image segmentation," *Proceedings. 1999 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (Cat. No PR00149)*, 1999, pp. 446-451.
23. [23] S. B. Chaabane, M. Sayadi, F. Fnaiech and E. Brassart, "Color image segmentation using automatic thresholding and the fuzzy C-means techniques," *MELECON 2008 - The 14th IEEE Mediterranean Electrotechnical Conference*, 2008, pp. 857-861.
24. [24] V. Sivakumar and V. Muruges, "A brief study of image segmentation using Thresholding Technique on a Noisy Image," *International Conference on Information Communication and Embedded Systems (ICICES2014)*, 2014, pp. 1-6.
25. [25] K. V. Mardia and T. J. Hainsworth, "A spatial thresholding method for image segmentation," in *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 10, no. 6, pp. 919-927, Nov. 1988.
26. [26] J Daugman, "The importance of being random: statistical principles of iris recognition", *Pattern Recognition*, Elsevier 2003, vol.23, no. 2, pp. 279-291.
27. [27] J. Carreira and C. Sminchisescu, "Constrained parametric min-cuts for automatic object segmentation," 2010 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2010, pp. 3241-3248.
28. [28] AL Barbieri, GF De Arruda, FA Rodrigues, Odemir and M.Brunoa, L. FontouraCostaab, "An entropy-based approach to automatic image segmentation of satellite images", *Physica A: Statistical Mechanics and its Applications*, Elsevier, 2011, vol.390, no.3, 1 pp.512-518.
29. [29] MH Merzban and M Elbayoumi, "Efficient solution of Otsu multilevel image thresholding: A comparative study", *Expert Systems with Applications*, Elsevier 2019, vol.116, pp. 299-309.
30. [30] F. Huang, S. Huang, J. Ker and Y. Chen, "High-Performance SIFT Hardware Accelerator for Real-Time Image Feature Extraction," in *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 22, no. 3, pp. 340-351, March 2012.
31. [31] W. K. Wong, Z. Lai, J. Wen, X. Fang and Y. Lu, "Low-Rank Embedding for Robust Image Feature Extraction," in *IEEE Transactions on Image Processing*, vol. 26, no. 6, pp. 2905-2917, June 2017.

32. [32] C. Lee and D. A. Landgrebe, "Feature extraction based on decision boundaries," in *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 15, no. 4, pp. 388-400, April 1993.
33. [33] X. Wang, X. Bai, W. Liu and L. J. Latecki, "Feature context for image classification and object detection," *CVPR* 2011, 2011, pp. 961-968.
34. [34] H. Schneiderman and T. Kanade, "A statistical method for 3D object detection applied to faces and cars," *Proceedings IEEE Conference on Computer Vision and Pattern Recognition. CVPR 2000 (Cat. No.PR00662)*, 2000, vol.1, pp. 746-751.
35. [35] Li, Y.; Xia, C.; Lee, J. Detection of small-sized insect pest in greenhouses based on multifractal analysis. *Optik Int. J. Light Electron Opt.* 2015, 126, 2138–2143.
36. [36] Liu, T.; Chen, W.; Wu, W.; Sun, C.; Guo, W.; Zhu, X. Detection of aphids in wheat fields using a computer vision technique. *Biosyst. Eng.* 2016, 141, 82–93.
37. [37] L. -Q. Zhu and Z. Zhang, "Auto-classification of insect images based on color histogram and GLCM," 2010 Seventh International Conference on Fuzzy Systems and Knowledge Discovery, 2010, pp. 2589-2593.
38. [38] T. Sutojo, P. S. Tirajani, D. R. Ignatius Moses Setiadi, C. A. Sari and E. H. Rachmawanto, "CBIR for classification of cow types using GLCM and color features extraction," 2017 2nd International conferences on Information Technology, Information Systems and Electrical Engineering (ICITISEE), 2017, pp. 182-187.
39. [39] B. S. Ghyar and G. K. Birajdar, "Computer vision based approach to detect rice leaf diseases using texture and color descriptors," 2017 International Conference on Inventive Computing and Informatics (ICICI), 2017, pp. 1074-1078.
40. [40] M Sood and PK Singh, "Hybrid system for detection and classification of plant disease using qualitative texture features analysis" *Procedia Computer Science*, Elsevier 2020, vol.167, pp.1056-1065.
41. [41] Dimililer, K.; Zarrouk, S. ICSPi: Intelligent Classification System of Pest Insects Based on Image Processing and Neural Arbitration. *Appl. Eng. Agric.* 2017, 33, 453–460.
42. [42] L. Deng, Y. Wang., Z. Han and R.Yu, "Research on insect pest image detection and recognition based on bio-inspired methods". *Journal of Biosystems Engineering*, Elsevier 2018, vol.169, pp.139–148.
43. [43] N. Nandhini and R. Bhavani, "Feature Extraction for Diseased Leaf Image Classification using Machine Learning," 2020 International Conference on Computer Communication and Informatics (ICCCI), 2020, pp. 1-4.
44. [44] S. Loussaief and A. Abdelkrim, "Machine learning framework for image classification," 2016 7th International Conference on Sciences of Electronics, Technologies of Information and Telecommunications (SETIT), 2016, pp. 58-61.
45. [45] C. Li, B. Kuo, C. Lin and C. Huang, "A Spatial-Contextual Support Vector Machine for Remotely Sensed Image Classification," in *IEEE Transactions on Geoscience and Remote Sensing*, vol. 50, no. 3, pp. 784-799, March 2012.
46. [46] O Okwuashi and CE Ndehedehe, "Deep support vector machine for hyperspectral image classification", *Pattern Recognition*, Elsevier 2020, vol.103, pp.107298.
47. [47] U. Maulik and D. Chakraborty, "Remote Sensing Image Classification: A survey of support-vector-machine-based advanced techniques," in *IEEE Geoscience and Remote Sensing Magazine*, vol. 5, no. 1, pp. 33-52, March 2017.
48. [48] L. Yang, S. Yang, P. Jin and R. Zhang, "Semi-Supervised Hyperspectral Image Classification Using Spatio-Spectral Laplacian Support Vector Machine," in *IEEE Geoscience and Remote Sensing Letters*, vol. 11, no. 3, pp. 651-655, March 2014.
49. Machine Learning Notes: Stanford University: <http://cs229.stanford.edu/materials.html>.
50. [50] J Schmidhuber, "Multi-column deep neural networks for image classification", *CVPR:12: Proceedings of the 2012 IEEE*

- Conference on Computer Vision and Pattern Recognition (CVPR), 2012 pp.3642–3649.
51. [51] S. A. Burhan, S. Minhas, A. Tariq and M. Nabeel Hassan, "Comparative Study Of Deep Learning Algorithms For Disease And Pest Detection In Rice Crops," 2020 12th International Conference on Electronics, Computers and Artificial Intelligence (ECAI), 2020, pp. 1-5.
 52. [52] NT Nam and PD Hung, "Pest detection on traps using deep convolutional neural networks", ICCCV '18: Proceedings of the 2018 International Conference on Control and Computer Vision, June 2018, pp. 33-38.
 53. [53] D. R. Anamisa, M. Yusuf, W. Agustiono and M. Svarief, "Technologies, Methods, and Approaches on Detection System of Plant Weeds and Diseases," 2019 6th International Conference on Electrical Engineering, Computer Science and Informatics (EECSI), 2019, pp. 163-170.
 54. [54] Q Xu, M Zhang, Z Gu and G Pan, "Overfitting remedy by sparsifying regularization on fully-connected layers of CNNs", Neurocomputing, Elsevier 2019, vol.328, pp. 69-74.
 55. P. Thanapol, K. Lavangnananda, P. Bouvry, F. Pinel and F. Leprévost, "Reducing Overfitting and Improving Generalization in Training Convolutional Neural Network (CNN) under Limited Sample Sizes in Image Recognition," 2020 - 5th International Conference on Information Technology (InCIT), 2020, pp. 300-305.
 56. A. S. B. Reddy and D. S. Juliet, "Transfer Learning with ResNet-50 for Malaria Cell-Image Classification," 2019 International Conference on Communication and Signal Processing (ICCSP), 2019, pp. 0945-0949.
 57. [58] Y. Jiang, Y. Li and H. Zhang, "Hyperspectral Image Classification Based on 3-D Separable ResNet and Transfer Learning," in IEEE Geoscience and Remote Sensing Letters, 2019, vol. 16, no. 12, pp. 1949-1953.
 58. [59] M Sokolova, N Japkowicz and S Szpakowicz, "Beyond accuracy, F-score and ROC: a family of discriminant measures for performance evaluation", Advances in Artificial Intelligence. AI 2006. Lecture Notes in Computer Science, Springer 2006, vol. 4304, pp. 1015-1021.
 59. [60] J. C. Fernandez Caballero, F. J. Martinez, C. Hervas and P. A. Gutierrez, "Sensitivity Versus Accuracy in Multiclass Problems Using Memetic Pareto Evolutionary Neural Networks," in IEEE Transactions on Neural Networks, 2020, vol. 21, no. 5, pp. 750-770.
 60. [61] W Li, D Wang, M Li, Y Gao, J Wu, X Yang, "Field detection of tiny weeds from sticky trap images using deep learning in agricultural greenhouse", Computers and Electronics in Agriculture, Elsevier, Volume 183, pp.106048-106059.
 61. [62] KRB Legaspi, NWS Sison, "Detection and Classification of Whiteflies and Fruit Flies Using YOLO", 2021 13th International Conference on Computer and Automation Engineering (ICCAE), IEEE 2021, pp. 1-4
 62. [63] G Pattnaik, K Parvathi, "Automatic Detection and Classification of Tomato Weeds Using Support Vector Machine Based on HOG and LBP Feature Extraction Technique", Progress in Advanced Computing and Intelligent Engineering. Advances in Intelligent Systems and Computing, Springer 2021, Volume- 1199, pp.49-55.
 63. [64] G Pattnaik, VK Shrivastava, "Transfer Learning-Based Framework for Classification of Pest in Tomato Plants", Journal of Applied Artificial Intelligence, Taylor and Francis, 2020, Volume-34, Issue-13, pp. 981-993.
 64. [65] QJ Wang, SY Zhang, SF Dong, GC Zhang, "Pest24: A large-scale very small object data set of agricultural weeds for multi-target detection", Computers and Electronics in Agriculture, Elsevier 2020, Volume-175, pp. 105585.
 65. [66] DJA Rustia, CE Lin, JY Chung, YJ Zhuang, "Application of an image and environmental sensor network for automated greenhouse insect pest monitoring", Journal of Asia Pacific Entomology, Elsevier 2020, Volume-23, Issue-1, pp.17-28.
 66. [67] L Liu, R Wang, C Xie, P Yang, F Wang, "PestNet: An end-to-end deep learning approach for large-scale multi-class pest detection and classification", IEEE Access 2019, Volume-7. pp. 45301-45312.

67. [68] CJ Chen, JS Wu, CY Chang, YM Huang, "Agricultural weeds damage detection using deep learning", *Advances in Intelligent Systems and Computing*, Springer 2018, Volume-1036, pp.545-554.
68. [69] L Deng, Y Wang, Z Han, R Yu, "Research on insect pest image detection and recognition based on bio-inspired methods", *Journal of Biosystems Engineering*, Elsevier 2018, Volume 169, pp. 139-148.
69. [70] MA Ebrahimi, MH Khoshtaghaza, S Minaei, "Vision-based pest detection based on SVM classification method", *Journal of Computers and Electronics in Agriculture*, Elsevier 2017, Volume 137, pp. 52-58.
70. [71] P Rajan, B Radhakrishnan, "Detection and classification of weeds from crop images using support vector machine", 2016 International Conference on Emerging Technological Trends (ICETT), IEEE 2016, pp. 1-6.
71. [72] M Pérez-Ortiz, JM,Peña, PA.Gutiérrez , "A semi-supervised system for weed mapping in sunflower crops using unmanned aerial vehicles", and a crop row detection method", *Applied Soft Computing*, Elsevier, 37, pp: 533-544.
72. [73] C Potena, C Nardi, A, Preto., "Fast and accurate crop and weed identification with summarized train sets for precision agriculture," International Conference on Intelligent Autonomous Systems IAS 2016: Intelligent Autonomous Systems, Springer, pp: 105-121.
73. [74] E Omrani, B Khoshnevisan, S Shamshirband, "Potential of radial basis function-based support vector regression for apple disease detection", *Journal of Measurement*, Elsevier 2014, Volume-55, pp. 512-519.
74. [75] Cho, J.; Choi, J.; Qiao, M.; Ji, C.; Kim, H.; Uhm, K.B.; Chon, T.S. Automatic identification of whiteflies, aphids and thrips in greenhouse based on image analysis. *Int. J. Math. Comput. Simul.* 2007, 1, 46–53.
75. [76] Qiao, M.; Lim, J.; Ji, C.W.; Chung, B.K.; Kim, H.Y.; Uhm, K.B.; Myung, C.S.; Cho, J.; Chon, T.S. Density estimation of Bemisia tabaci (Hemiptera: Aleyrodidae) in a greenhouse using sticky traps in conjunction with an image processing system. *J. Asia Pac. Entomol.* 2008, 11, 25–29.
76. [77] Rustia, D.J.A.; Chao, J.J.; Chung, J.Y.; Lin, T.T. Crop losses to weeds. In *Proceedings of the 2019 ASABE Annual International Meeting*, Boston, MA, USA, 7–10 July 2019.
77. [78] Wang, K.; Zhang, S.; Wang, Z.; Liu, Z.; Yang, F. Mobile smart device-based vegetable disease and insect pest recognition method. *Intell. Autom. Soft Comput.* 2013, 19, 263–273.
78. [79] Wang, Z.; Wang, K.; Liu, Z.; Wang, X.; Pan, S. A Cognitive Vision Method for Insect Pest Image Segmentation. *IFAC Pap. Online* 2018, 51, 85–89.
79. [80] Wang, F.; Wang, R.; Xie, C.; Yang, P.; Liu, L. Fusing multi-scale context-aware information representation for automatic in-field pest detection and recognition. *Comput. Electron. Agric.* 2020, 169, 105222.

GENDER DIFFERENCES IN ACADEMIC RESILIENCE AMONG SENIOR SECONDARY STUDENTS

Ms. Monica¹, Dr. Rajnish Sharma¹ and Dr. Jaya Batra²

¹Department of Education, C T University, Ludhiana, Punjab, India

²Department of Education, Malwa Central College of Education for Women, Ludhiana, Punjab, India

ABSTRACT

Academic resiliency is seen as one of the measures of adjustment to the pressures and failures of student life. It is the best indicator of how much you enjoy studying, how much you participate in class, and your general sense of self-worth. Academic resilience has received comparatively little study attention. The present study is undertaken with a view to study the Academic Resilience of Adolescents in relation to gender. Another purpose of the present study is to find out the significance of difference in Academic Resilience of rural and urban Adolescents. This investigation looked at gender-based variations in the students' Academic toughness. The Academic Resilience Scale (ARS) [15] was used to evaluate the data in order to analyse the Academic Resilience levels of the two genders. The *t* test was applied at 0.05 level of significance. It is found that Academic Resilience of Adolescent Males is significantly higher than the Academic Resilience of Adolescent Female irrespective of locale.

Keywords: Academic Resilience, males, females, academic toughness

Introduction

Resilience is the capacity to endure in the face of difficulty and to get over the obstacles that frequently stand in the way of success. It assists pupils in preventing any potential psychological harm that difficult experiences can generate. Students that are resilient perceive setbacks in their academic or social lives as opportunities. Being resilient means having the ability to cope successfully under pressure or adversity. Children do not naturally possess the quality of resilience; rather, it develops over time, mostly as a result of their experiences and interactions. At school, on campus, at home, and in society, students frequently encounter a variety of challenging academic and social circumstances [17]. If human adaptational processes are maintained and safeguarded, resilience is "everyday magic" and is fairly common [13]. Children with high levels of resilience use protective variables to promote both immediate benefits to their well-being and long-term benefits for future coping [29]. The aforementioned inequalities in academic accomplishment may be explained by gender differences in academic resilience. Gender is a significant factor in resilience [7].

Academic Resilience

Resilience can be defined as a person's capacity to continue overcoming the different challenges they encounter and adapt to these

circumstances in order to attain maximum success. Particularly in the field of human development science, resilience has a wide-ranging and multifaceted connotation. The word "resilience" comes from the Latin word "resiliens," and it was first used to define a substance's pliable or elastic properties [26]. The Latin verb *resilire*, which means to rebound or recoil, is where the English word resilience first appeared in the early 17th century, Concise Oxford Dictionary, Tenth Edition [1]. The ability to adapt and succeed in the face of difficulty is known as resilience. The report's preface, which was co-sponsored by the World Bank, the World Resources Institute, the United Nations Development Programme, and the United Nations Environment Programme, says volumes about the political ramifications: when the underprivileged grow up ecosystem-based businesses successfully and sustainably, their resilience might rise in three different ways. They can strengthen their capacity for economic resilience. to take on financial risks. Individuals can develop greater social resilience, making them and their communities better able to cooperate for everyone's benefit. Academic resilience is the capacity of a student to successfully manage stress, pressure, and academic disappointments [5], [8], [4]. The construct created by Cassidy is the most well-known multidimensional construct measure of academic resilience, claim, resilience was once

thought to be a personal trait and a function of the mind that enabled a person to endure numerous challenging circumstances[22]. As our understanding of resilience grows, it becomes clear that it is a skill that emerges as a result of exposure to a variety of adversities, including inadequate parenting, poverty, traumatic experiences, natural catastrophes, violence, war, and physical sickness [9].

According to statistics from the Ministry and Directorate of Higher Education, out of the 6.92 million students who were registered as active, 195,176 (2.8%), dropped out of college in 2017. Even yet, it continues to rise, reaching 239,498 (3%) of the 6.95 million enrolled pupils in 2018. One of the things that can cause someone to struggle academically and potentially result in them dropping out of school is a lack of academic resilience [6]

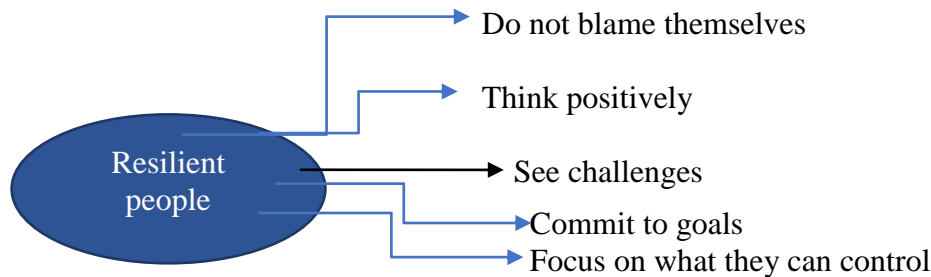


Fig.1.Characteristics of Resilient Person

Gender

The socially constructed roles, behaviours, expressions, and identities of girls, women, boys, men, and persons of all genders are referred to as gender. This covers interpersonal connections as well as the standards, mannerisms, and roles that come with being a woman, man, girl, or boy. Gender is a social concept that differs from culture to culture and can evolve over time. In most cases, "gender" merely refers to the differences between men and women in terms of their social, psychological, and behavioural traits. Since the 14th century, the term "gender" has been used in semantics to refer to noun types that certain languages classify as masculine, feminine, or neuter [21]. Even though the terms "gender" and "sex" are frequently used interchangeably, they have significantly different meanings. While gender occasionally refers to identities other than the binary of male and female, sex usually to relate to biological differences. Gender, is determined socially; it signifies that society assigns to the term's "male" and "female." Although there is vast variation in what is considered appropriate behaviour for each gender, each community emphasises specific duties that each sex should play [31].

Gender is used to identify those socially constructed features of men and women, whereas sex refers to those that are naturally determined. Regardless of gender at birth, people learn to be girls and boys before developing into women and men. Gender identity and gender roles are determined by this learnt behaviour [9].

Review of literature

Study of [13] looked at the disparities in the cohort and gender-based academic resilience of the pupils. In the academic years of 2013, 2014, and 2015, participants were undergraduate students in the Faculty of Education, Department of Educational Psychology and Guidance, Universitas Negeri Makassar. 103 students—77 ladies and 26 males—made up this group. The Academic Resilience Scale (ARS), which Martin and Marsh originally developed, was the instrument used in this study. According to the findings, there was no difference in academic resilience between students who were male and female.

The goal of the study of [27] was to determine how gender and academic achievement (both high and low academic achievement) affected resilience and the variables that make up resilience in college-bound students. 120 first-

year Arts faculty students made up the entire sample, with an equal number of boys and girls. Participants were given a battery of the following standardised tests: the Rosenberg self-esteem measure, the Sud, Jerusalem, and Ralf-Schwarzar self-efficacy scale, the Wagnild and Young resilience scale, and the family environment questionnaire. Using procedures of mean, standard deviation, and 2-way ANOVA, the gathered data was statistically analysed. After the data was analysed, it was discovered that there was a statistically significant correlation between the two independent variables (gender and academic achievement) and the family environment. Independently, self-esteem and resiliency were influenced by gender. Furthermore, it was claimed that women are more resilient and value themselves more than men. High academic achievers were shown to have more supportive environments, especially for females, indicating that the family environment is also useful. There is evidence in the literature that certain socio-affective factors, such as peer relationships, parents' high expectations, teachers' attention and kindness, and socio-economic and affective factors, such as anxiety and self-efficacy, can affect learners' academic achievement and decision-makers' choice of an appropriate learning environment. In their study, [20] focussed on secondary school pupils in Kiambu County were divided into gender groups to determine any disparities in academic achievement and resilience. A descriptive co-relational design was used for the investigation. Three students provided a sample of 390, which was utilised. Data were gathered using a demographic questionnaire and the California Healthy Kids Survey-Module B version. Given student gender, it was hypothesised that there were no appreciable mean differences in academic resilience. The independent samples t-test was used to examine this. Girls performed significantly better than boys in terms of mean academic resilience scores ($t = 1.97$, $df = 388$, $p = .05$). It was suggested that to maximise boys' academic resilience and functioning, effective intervention programmes should be implemented.

The validity and reliability of the Academic Resilience Scale (ARS) in a Turkish high

school were investigated by [10]. 378 students participated in the study (192 females and 186 males). The scale's compliance with the requirements for both exploratory and confirmatory factor analyses was satisfactory. Findings showed that the scale was one-dimensional. Analyses of internal consistency and test-retest reliability were also performed. The scale was therefore determined to be a competent tool for evaluating the academic resilience of Turkish pupils.

No appreciable gender differences in resilience. Using the perspectives of gender and culture, the researcher looked at youth resilience variables in schools. 30 senior level elementary pupils made up the sample (17 male, and 13 female). The Child and Youth Resilience Scale by Ungar & Liebenberg was used to evaluate how gender and cultural disparities in resiliency differed across elementary school children in the senior level. It is a 28-item self-report questionnaire that examines resilience in young people between the ages of 12 and 23. This study looked at high school students who were making the transition from lower grades. The results for both global and community resilience did not show gender disparities [24]. Research done in Turkey revealed no relationship between gender and academic resilience. Additionally, [14] discovered that there was no gender-based differences in the scholastic resilience of Seoul, South Korea's children with cancer. The findings of this study are also in line with research done by [16] in Australia, which revealed that there are not many significant differences between boys and girls in terms of academic resilience. On the other hand, this study deviates from [12]. The study demonstrates that the degree of academic resilience varies significantly between men and women. Men are stronger than women, according to research done in Pakistan [19]. 31 female and 19 male low socioeconomic college students of colour participated in [14] investigation of the gender differences in academic resilience. The findings showed that women were more strongly driven than men to pursue their career aspirations after college. Research by [15] demonstrates that there are notable disparities in academic resilience between men and women, with women being

more resilient than males. women are more resilient than men[21].

In their study [23] found no relationship between gender and the degree of academic resilience in pupils. By fostering traits of self-efficacy, tenacity, low anxiety, control, and planning, both sexes have an equal chance to improve their academic resilience.

Emergence Of Problem:

"Despite the fact that there is a considerable body of research concentrating on Academic Resilience, there has been little work that has touched on the issue of academic resilience in relation to gender, therefore the research problem is addressed.

Objectives

1. To study Academic Resilience of adolescents
2. To investigate the significance of difference in Academic Resilience of urban female and urban male adolescents.
3. To investigate the significance of difference in Academic Resilience of rural female and rural male adolescents.

Hypothesis of the Study

H₀ 1 There is no significant difference in Academic Resilience of urban female and urban maleAdolescents

H₀ 2 There is no significant difference in Academic Resilience of rural females and rural male Adolescents

Method

The present study was undertaken to study the Academic Resilience of Adolescents in relation to Gender. A descriptive survey method was employed for conducting the present study. Various statistical techniques such as mean, standard deviation, and t-test were applied.

Sample of The Study

204 Adolescents (102 females&102 males) of Sr. Secondary classes were chosen from two different districts (Ludhiana, Amritsar) of Punjab by using random sampling.

S.No.	District	Rural Female	Urban Female	Rural Male	Urban Male
1.	Amritsar	25	25	25	25
2.	Ludhiana	26	26	26	26
	Total	51	51	51	51

Tools Used

Academic Resilience Scale was used by Kumar &Kaur (2015).

Result and Discussion

H₀1: There is no significant difference in Academic Resilience of urban female and urban male adolescents -t-test was applied to Academic Resilience of urban female and urban male adolescents to investigate the significance of difference in their Academic Resilience as shown in table 1.

Table 1 - Academic Resilience of Urban Female and Urban Male Adolescents

Gender	N	M	SD	t cal	t crit.	df	p	decision
Urban Female Adolescents	51	200.37	18.358	2.162	1.96	100	.033	Reject
Urban Male Adolescents	51	207.65	15.499					

Table 1 reveals that value of mean of Academic Resilience of urban female adolescents (N=51) is 200.37 whereas mean of Academic Resilience of urban male adolescents (N=51) is 207.65 respectively.

The t-test results (with equal variances assumed) show t (100) value is 2.162 and the corresponding two tailed p-value is 0.033, which is less than 0.05. Therefore, the null hypothesis is rejected at 5% level of significance.

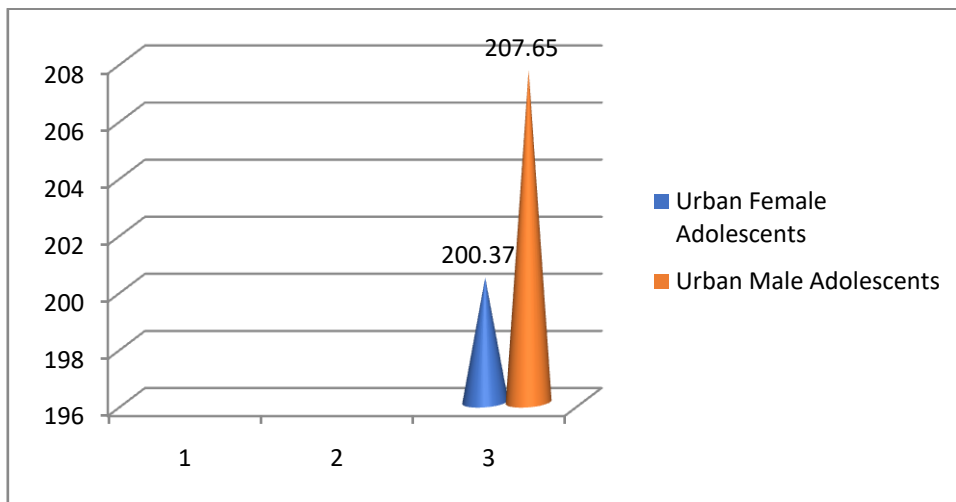


Fig.2. Mean of Academic Resilience of Urban Female and Urban Male Adolescents

Which means that the Academic Resilience of urban male adolescents (Mean =207.65) is significantly higher than the Academic Resilience of urban female adolescents (Mean =200.37) as shown in Fig.2

Rural Male Adolescents t-test was applied to Academic Resilience of Rural Female Adolescents and Rural Male Adolescents to investigate the significance of difference in their Academic Resilience as shown in table 2

H₀2: There is no significant difference in Academic Resilience of Rural Female and

Table 2 -Academic Resilience of Rural Female Adolescents and Rural Male Adolescents

Gender	N	M	SD	t cal	t crit.	df	p	decision
Rural female Adolescents	51	199.67	17.358	2.012	1.96	100	.00	Reject
Rural Male Adolescents	51	204.65	14.359					

Table 2 reveals that value of mean of Academic Resilience scores of Rural Female Adolescents (N=51) is 199.67 whereas mean of Academic Resilience of Rural Male Adolescents (N=51) is 204.65 respectively.

The t-test results (with equal variances assumed) show t (100) value is 2.012 and the corresponding two tailed p-value is 0.00, which is less than 0.05. Therefore, the null hypothesis is rejected at 5% level of significance.

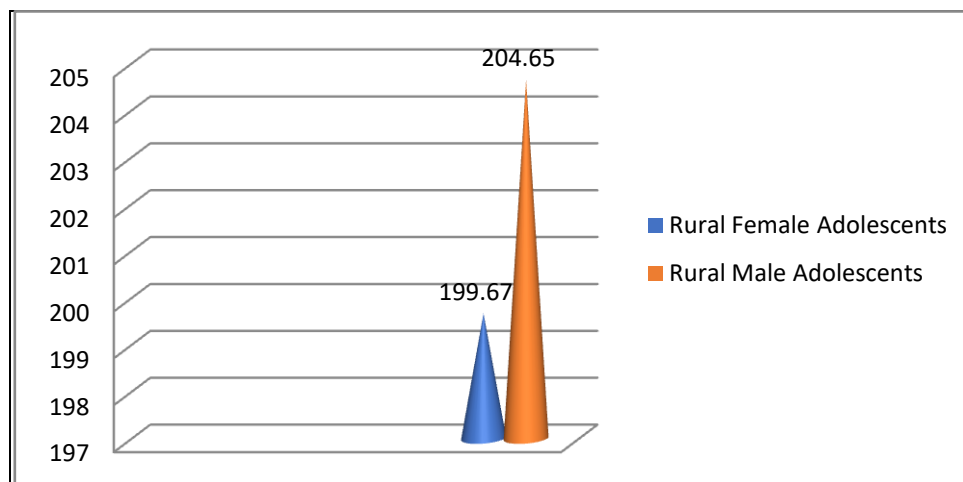


Fig.3. Mean of Academic Resilience of Rural female and Rural Male Adolescents

Which means that the Academic Resilience of Rural Male Adolescents (Mean = 204.65) is significantly higher than the Academic Resilience of Rural Female Adolescents (Mean = 199.67) as shown in Fig 3.

Conclusions

The fact that males are more resilient academically than girls may be attributed to young people's harsh natures and difficult feelings, which enable them to cope with the stress and challenges of studying in a school environment. They could be forced to strive and overcome obstacles in order to accomplish their goals because they are guys who have responsibilities. Due to the romantic and even weak nature of women, it is widely ingrained in culture that men are more patient than

women in enduring challenges in studies and life. Another explanation for the high level of academic resilience that is characteristic of men is that they believe it to have a significant impact on accomplishment and, as a result, influence the kinds of work they pursue.

Implications

According to students reported academic concerns and goals, they ought to be better equipped to handle academic difficulties. Classrooms and teachers should promote situations that help students build their academic confidence and skills. It may be helpful for school counsellors or therapists who work with young people to consider their clients' coping mechanisms.

References

- Aslan AM. The Concept of Resilience Understanding its origins, Meaning and utility [Internet]. Torrens Resilience Institute; 2010. Available from: [extension://elhekieabhbkmcefcobjddigjaadp/https://www.flinders.edu.au/content/dam/documents/research/torrens-resilience-institute/resilience-origins-and-utility.pdf](https://www.flinders.edu.au/content/dam/documents/research/torrens-resilience-institute/resilience-origins-and-utility.pdf)
- Audring J. Gender. Oxford Research Encyclopedia of Linguistics 2016. <https://doi.org/10.1093/acrefore/9780199384655.013.43>.
- Cassidy S. The Academic Resilience Scale (ARS-30): A new multidimensional construct measure. *Frontiers in Psychology*. 2016;7.
- Catterall JS. Risk and Resilience in Student Transitions to High School. *American Journal of Education* 1998; 106:302–33. <https://doi.org/10.1086/444184>.
- Finn JD, Rock DA. Academic success among students at risk for school failure. *Journal of Applied Psychology* 1997; 82:221–34. <https://doi.org/10.1037/0021-9010.82.2.221>.
- Frisby BN, Hosek AM, Beck AC. The role of classroom relationships as sources of academic resilience and hope. *Communication Quarterly*. 2020;68(3):289–305.
- Geesen F. Resilience in the educational system: A meta-analysis of school-based interventions aimed at promoting resilience [dissertation]. 2014.
- Gonzalez R, Padilla AM. The Academic Resilience of Mexican American High School Students. *Hispanic Journal of Behavioral Sciences* 1997; 19:301–17. <https://doi.org/10.1177/07399863970193004>.
- Herrman H, Stewart DE, Diaz-Granados N, Berger EL, Jackson B, Yuen T. What is resilience? *The Canadian Journal of Psychiatry*. 2011;56(5):258–65.
- Kapikiran S. Validity and Reliability of the Academic Resilience in Turkish High School. 2012;132(3):474–83.
- Kari A. Gender and health [Internet]. World Health Organization. World Health Organization. Available from: https://www.who.int/health-topics/gender#tab=tab_1
- Khalaf MA. US-China education review B. Validity and Reliability of the Academic Resilience Scale in Egyptian Context. 2014;4(3):202–10.
- Latif S, Amirullah M. Students' academic resilience profiles based on Gender and Cohort. *Jurnal Kajian Bimbingan dan Konseling*. 2020;5(4):175–82.
- Lee S-Y, Lee H, Fawcett J, Park J-H. Resilience in Koreans with cancer. *Journal*

- of Hospice & Palliative Nursing. 2019;21(5):358–64.
15. Mallick MK, Kaur S. Manual for Academic Resilience Scale. National Psychological Coporation; 2016.
 16. Martin AJ, Marsh HW. Academic resilience and its psychological and educational correlates: A construct validity approach. *Psychology in the Schools*. 2006;43(3):267–81.
 17. Masten AS. Ordinary magic. Resilience processes in development. *The American psychologist*. 2001;56(3):227–38.
 18. Morales EE. The resilient mind: The psychology of academic resilience. *The Educational Forum*. 2008;72(2):152–67.
 19. Morales EE. Exceptional female students of color: Academic resilience and gender in higher education. *Innovative Higher Education*. 2008;33(3):197–213.
 20. N. Mwangi C, M. Ileri A, W. Mwaniki E. Correlates of academic resilience among secondary school students in Kiambu County, Kenya. *Interdisciplinary Education and Psychology*. 2017;1(1).
 21. Roshchynskaya AS. Defining the category of Gender Literature Review [Internet].
 22. Rudd G, Meissel K, Meyer F. Measuring academic resilience in quantitative research: A systematic review of the literature. *Educational Research Review* 2021; 34:100402. <https://doi.org/10.1016/j.edurev.2021.100402>.
 23. Sarwar M, Inamullah H, Khan N, Anwar N. Resilience and academic achievement of male and female secondary level students in Pakistan. *Journal of College Teaching & Learning (TLC)*. 2010;7(8).
 24. Saverimuthu DC. Resilience factors in school youth: Looking through gender and cultural lenses [Internet]. Scholarship Western. electronic Thesis and dissertation Repository. 2716; 2015. Available from: <https://ir.lib.uwo.ca/etd/2716/>
 25. Somchit S, Sriyaporn P. The relationships among resilience factors, perception of adversities, negative behavior, and academic achievement of 4th- to 6th-grade children in thad-thong, Chonburi, Thailand. *Journal of Pediatric Nursing*. 2004;19(4):294–303.
 26. Southwick SM, Bonanno GA, Masten AS, Panter-Brick C, Yehuda R. Resilience definitions, theory, and challenges: Interdisciplinary perspectives. *European Journal of Psychotraumatology*. 2014;5(1).
 27. Tankha G, Gill Paveen. A Comparative Study of Effect of Gender and Academic Achievement on Resilience and it Linked Measures. *research gate Indian Journal of Clinical Psychology*,2007 34(1).55-61.
 28. Tiarafanni A. A review of literature of resilience and implications for further educational research [Internet]. Academia.edu. 2014. Available from: https://www.academia.edu/7479985/A_Review_of_Literature_of_Resilience_and_Implications_for_Further_Educational_Research
 29. Tugade MM, Fredrickson BL. Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology*. 2004;86(2):320–33.
 30. Walklate Sandra. Resilient life. *European Political Science*. 2014;14(1):49–50.
 31. Unit 3 gender and class stratification in Tribal Society [Internet]. Available from: <https://egyankosh.ac.in/bitstream/123456789/69312/1/Unit-3.pdf>

A STUDY OF RELATIONSHIP BETWEEN HAPPINESS AND EMOTIONAL COMPETENCE AMONG ADOLESCENTS

Mansi Kapoor and Rubina Anjum

Department of Psychology, CT University, Ludhiana (Punjab) India

ABSTRACT

Adolescence is a sensitive developmental period where understanding of one's own and other people's emotions can become a challenging task. Hormonal changes and uncertainty with the new chapter of life can become mind boggling leading to mood swings for many adolescents. At this crucial stage of life, learning how to regulate one's emotions and how to use this emotional understanding for one's good can lay a strong foundation for future success and well-being. The present investigation was designed to study the relationship between happiness and emotional competence. Happiness was studied in relation to dimensions of emotional competence namely, self-awareness, adaptability, motivation, empathy and social skills. Intercorrelation analysis revealed a highly significant relationship between happiness and total emotional competence score ($r=.47, p<.01$). With regards to the dimensions of emotional competence, happiness was found to be significantly and positively related with self-awareness ($r=.24, p<.01$), motivation ($r=.40, p<.01$), empathy ($r=.35, p<.01$) and social skills ($r=.41, p<.01$). These results show an imperative need for inculcating emotional competence among young adolescents so that they can live more fulfilling and emotionally intelligent lives. Several studies in the past have pointed out towards the need for having higher emotional competence more than higher IQ scores because higher emotional competence skill set is the biggest contributor for success in all aspects of life.

Keywords: *emotional competence, EQ, happiness, adolescents, well-being, personality*

Introduction

With the advent of the field of positive psychology, topics such as, well-being, satisfaction with life, happiness, peace of mind have gained the limelight. One of the factors that has been found to significantly contribute to happiness is emotional competence and emotional intelligence. These variables can act as protective factors that not only protect any individual from adverse life events but also help him/her flourish in positive circumstances. Emotional competence can be defined as “the ability to deal with one's own emotions and others' emotions, to discriminate among those emotional states and to use this information to effectively guide one's thinking and action” (Salovey & Mayer, 1990; Salovey & Mayer, 1993).

Saarni (1999) defined emotional competence as the “functional capacity wherein a human can reach their goals after an emotion eliciting encounter.” She gave 8 emotional competence skills that are meant to contribute to one's personal and professional well-being:

- Awareness of one's emotions
- Ability to discern and understand one's emotions
- Capacity for emotional self-efficacy
- Ability to use the vocabulary of emotion and

expression

- Capacity for empathic involvement
- Adaptive coping with aversive emotions and distressing circumstances
- Awareness of emotional communication within relationships
- Ability to differentiate subjective emotional experience from external emotion expression (Saarni, 1999)

Highly emotionally competent individuals are characterized by appropriate emotion production and emotion perception. Emotion production is total pattern of bodily and behavioral change that the individual can apply on will to reappraise the situation, rethink the emotion and regulate the emotion. It involves 3 components: 1. Producing the appropriate emotional reaction to different events based on internal goal states, coping mechanisms and consequences of events; 2. Being able to regulate one's emotional states, with respect to internal set points and sociocultural contexts, 3. Communicating one's emotions appropriately with the right expression in social interactions (Scherer, 2007).

Another dimension of emotional competency is appraisal competence which is defined as the appropriate emotion elicitation and emotion differentiation. Individuals who are emotionally

competent are not emotionally reactive and do not let the emotion overpower them. Instead, they appraise the emotion logically without experiencing emotional disturbances such as panic, euphoria, depression, anhedonia and so on. Last and most useful aspect of emotional competence is regulation competence which is the ability to be able to alter, understand and play with one's emotions with the sense of ownership over them.

Denhan (2006) defined emotional competence as the "regulation of emotional expressiveness and experience, and knowledge of one's own and other's emotions." There is a consistent theme of understanding that is emerging in all the definitions of emotional competence i.e., understanding of one's own and other emotions. Adolescents who are emotionally competent have been found to exhibit greater academic success and stronger socio-emotional skills (Leerkes et al., 2008).

Review of Literature

In one of the earliest studies on emotional competence and self-awareness, Sosik and Megerian (1999) found that emotionally competent people score higher on private self-consciousness, public self-consciousness, purpose in life, self-monitoring, personal efficacy, interpersonal control, social self-confidence, even-temperedness and sensitivity. These dimensions are a strong indicator of an emotionally self-aware individual. It is inevitable that such healthy psychological traits would contribute to more happiness in life (Bratton et al., 2011).

Studies have also found that emotionally competent people are more innovative with their emotions in a way that they channelize their emotions productively and constructively through creative or innovative pursuits. Furthermore, it has been found that emotional competence is related to having better emotional control skills which makes one more grounded and better problem solver during crucial moments of life (O'Boyle et al., 2011). Due to these resilient characteristics, emotionally competent people are able to maintain greater levels of happiness in comparison to someone who is low on emotional competence and thereby not knowing how to traverse crucial life circumstances emotionally (Yuan et al., 2019).

Emotionally competent individuals also report lower levels of perceived stress, higher tolerance for stress and uncertainty, and positive attitude towards life. Because of these qualities, emotionally intelligent people are also able to improve their self-cognition competencies. This reflects beautifully in how they handle themselves and others (Chen & Chen, 2018).

In their recent analysis, it has been found that emotional competence, emotional regulation and emotional intelligence among adolescents were significantly related with optimism and happiness in a positive direction and negatively related with pessimism.

Methodology Objective

The main objective of the current study was to explore the nature of relationship between Emotional competence and its dimensions namely, self-awareness, adaptability, empathy, social skills, motivation with Happiness among young adolescents.

Sample

The sample comprised of 100 individuals in the age range of 14-17 years (Mean age = 15.69, S.D = .78). Students were selected through random sampling technique from top five government and private schools of Ludhiana, Punjab. The sample was stratified into 50 males and 50 females. Roll numbers of students were obtained from their respective class teachers and randomly selected through computerized random draw method. Out of 200 names, 100 were selected as they were the ones who agreed to participate in the study. Informed consent from the parents and students was obtained. Confidentiality of the results was strictly adhered to.

Hypothesis

- Emotional competence and its dimensions are expected to be significantly and positively related with happiness.

Tests and Tools Used

Following standardised psychological tests and tools were used to study emotional competence and happiness:

- **Happiness Scale H-Scale (Bharadwaj & Das, 2017)** – This scale has 28 items and 5 response options. Scoring is done separately for positive and negatively scored items. The scale yields overall happiness score and has high reliability and validity coefficients ranging from .75-.90. This happiness test classifies people’s scores into different categories such as, great happiness, high happiness, average, less happiness and unhappiness.
- **Emotional Competence Scale - DSGS (Dahiya & Gahlawat, 1971)** – The scale measures emotional competence and its dimensions, such as, 1. Self-Awareness – introspection and the art of understanding one’s weakness and strengths., 2. Adaptability – ability of the individual to alter himself according to the changed circumstances; 3. Motivation – desire to repeat a particular task or activity in a goal directed manner, 4. Empathy - capacity to place oneself in other person’s shoes and match other’s affective states with one’s own, and 5. Social Skills – communication

with others in an effective manner both verbally and nonverbally. The scale has significantly high reliability coefficient of .88 through test-retest method and split half reliability of .81. In addition, the scale also meets high standards of content validity. Scoring is done for 5 negatively worded items and 29 positively worded items. The scale has been standardised on 400 high school students across Haryana and Punjab.

Procedure

The participants were informed about the purpose of the research and the questionnaires were filled through Google Forms. Informed Consent was taken from each participant prior to data collection. Standardized Psychological Tests were administered to the participants.

Analysis of Data

In order to study the nature of relationship between emotional competence and happiness, intercorrelation analysis was carried out. Significance values were checked at $p < .05$ and $p < .01$ levels.

Results Table 1

Shows N, Mean and Standard deviation

	Happiness	Emotional Competence	Self-awareness	Adaptability	Motivation	Empathy	Social Skills
N	100	100	100	100	100	100	100
Mean	107	124	22.9	27.1	19.6	28.4	26.3
Standard deviation	11.1	14.7	3.63	4.63	3.69	3.84	5.56

Table 2

Shows correlation between Happiness and Emotional Intelligence

S.NO	VARIABLES	r of happiness with Emotional competence dimensions
1.	Emotional Competence total	.47**
2.	Self-awareness	.24**
3.	Adaptability	.11
4.	Motivation	.40**
5.	Empathy	.35**
6.	Social Skills	.41**

Note: $p < .05^*$, $p < .01^{**}$

Discussion

The aim of the study was to find the nature of relationship between happiness and emotional competence. For this purpose, 100 young adolescents were administered happiness and emotional competence scales.

Table 1 shows the Descriptives of the sample consisting of 100 adolescents. The mean and standard deviation of Happiness is seen to be 107 and 11.1 respectively. For the variable Emotional Competence a mean of 124 and standard deviation of 14.7 is obtained. Self-awareness variable has a mean and standard deviation of 22.9 and 3.63 respectively. Scores of 27.1 and 4.63 are the mean and standard deviation respectively obtained for the variable Adaptability. The mean and standard deviation for the variable Motivation is 19.6 and 3.69 correspondingly. The variable Empathy has received the mean and standard deviation of 28.4 and 3.84 and finally, the variable Social skills has obtained scores of 26.3 and 5.56 respectively.

Table 2 shows the correlation between the variables of Happiness, Emotional Competence as well as its sub-variables of Self-Awareness, Adaptability, Motivation, Empathy and Social Skills. Results show Happiness to be significantly and strongly related with Emotional Competence ($r=0.475$, $p<0.01$). This implies that people who are emotionally competent are higher on happiness levels. More the emotional intelligence, greater the levels of happiness. Prior studies have confirmed the findings of the present study as well. For instance, Ghahramani et al. (2019) found a significant association between emotional intelligence and happiness among college students. Students with higher emotional intelligence felt happier.

A highly significant relationship is also seen between Happiness and the sub-variables of Emotional Competence mainly Motivation

($r=0.409$, $p<0.001$), Empathy ($r=0.358$, $p<0.001$) and Social Skills ($r=0.410$, $p<0.001$). This signifies that happy individuals are also more likely to be empathetic, have social skills that help them relate to others' emotional needs intelligently, are highly motivated and self-aware. Parallely a minor significant relationship between Happiness and Self-Awareness is seen ($r=0.246$, $p<0.05$). This shows that people who are high on self-awareness and insight are also psychologically well equipped to have emotional awareness. They are able to pinpoint their own emotions with greater understanding and honesty in comparison to individuals who lack self-awareness. However, no relationship is seen between Happiness and Adaptability.

The results showed that our hypothesis is significantly accepted. The results indicates that emotionally competent people are highly motivated to stay in tune with the reality of their emotions which consequently contributes to a mentally healthy and rich life. In addition, emotionally competent people exhibit social skills, meaningful social interactions which contributes to happiness. They also have the ability to put ourselves into other people's shoes, make their social lives richer, and thus create more positive relations with others and increase their happiness. Studies have found that having meaningful relationships is one of the most important aspect of being happy (Seligman, 2022).

From the findings of the present study, it can be concluded that adolescents need to undergo intervention programmes where activities and exercises are designed to build empathy, social skills, self-awareness, introspection, motivation and well-being. In this effort, the current research proposes the facilitation of techniques to help adolescents attune with their emotions and learn emotional regulation skills in order to live more fulfilling lives.

References

1. Bratton, Virginia K., Nancy G. Dodd, and F. William, B. (2011). "The Impact of Emotional Intelligence on Accuracy of Self-awareness and Leadership Performance." *Leadership & Organization Development Journal* 32, no. 2 (March 8, 2011): 127–149. doi:10.1108/01437731111112971.
2. Chen, S. C., & Chen, C. F. (2018). Antecedents and consequences of nurses' burnout: Leadership effectiveness and emotional intelligence as moderators.

- Management Decision.
3. Chen, Y., Jia, W. S., and Zheng, Y. J. (2018). Rational reflection and mode construction: innovation and entrepreneurship education of higher vocational colleges. *Res. High. Educ. Eng.* 2, 170–175.
 4. Denham, S. (2006). Social–emotional competence as support for school readiness: What it is and how do we assess it? *Early Education and Development*, 17(1), 57–89. https://doi.org/10.1207/s15566935eed1701_4.
 5. Ghahramani, S., Jahromi, A. T., Khoshsoroor, D., Seifooripour, R., & Sepehrpoor, M. (2019). The relationship between emotional intelligence and happiness in medical students. *Korean journal of medical education*, 31(1), 29.
 6. Leerkes, E., Paradise, M., O'Brien, M., Calkins, S., & Lange, G. (2008). Emotion and cognition processes in preschool children. *Merrill-Palmer Quarterly*, 54(1), 102–124. <https://doi.org/10.1353/mpq.2008.0009>.
 7. Mayer, J. D., & Salovey, P. (1993). The intelligence of emotional intelligence. *intelligence*, 17(4), 433-442.
 8. Mérida-López, S., Rey, L., & Extremera, N. (2021). A closer look at the emotional intelligence construct: how do emotional intelligence facets relate to life satisfaction in students involved in bullying and cyberbullying?. *European journal of investigation in health, psychology and education*, 11(3), 711-725.
 9. O'Boyle, E. H., Humphrey, R. H., Pollack, J. M., Hawver, T. H., and Story, P. A. (2011). The relation between emotional intelligence and job performance: a meta-analysis. *J. Organ. Behav.* 32, 788–818. doi: 10.1002/job.714
 10. Saarni, C., & Weber, H. (1999). Emotional displays and dissemblance in childhood: Implications for self-presentation.
 11. Yuan, C. H., Wu, Y. J., and Tsai, K. M. (2019). Supply chain innovation in scientific research collaboration. *Sustainability* 11:753. doi: 10.3390/su11030753

DESIGN ANALYSIS OF MINIATURE S-SHAPED PATCH ANTENNA FOR WIRELESS APPLICATIONS

Ravi Parkash Sharma and Yogesh Chhabra

Department of Electronics & Communication Engineering, CT University, Punjab, India

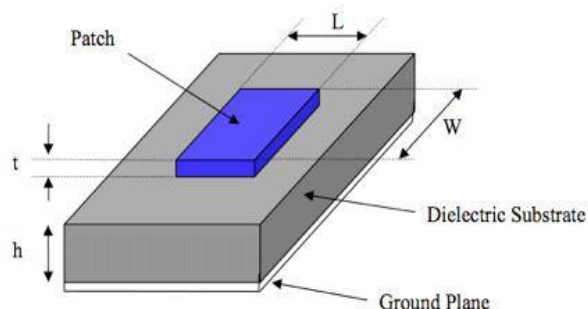
ABSTRACT

In this paper miniature S-shaped antenna propose for wireless applications. This antenna consists of rectangular dimension having $11.9\text{ mm} \times 0.9\text{ mm}$. To modify rectangular patch into S- shaped two slits taken out. The S_{11} -49. 149db achieved and desirable VSWR observed at 11.5 resonant frequency for design antenna. The design antenna analyzed & simulate on High frequency simulation software

Keywords: Compact S-shaped Wireless Applications

1. Introduction

Micro strip Patch Antenna: Recent day's wireless systems are extensively passed down in the world. With the substantial enhancement in communications the demand of miniature design low cost, easy to fabricate dual band, multiband wideband used for commercial communication systems. A MSA consists of radiating patch on one side of dielectric substrates which has ground plane on other side. It is made up of conducting material. Micro strip radiates mainly due to cut- off field between the patch edge and the ground plane. Micro strip antenna is optimal choice for copius applications due low profile, light weight, low cost and ease of integration with microwave circuits. Standard rectangular patch antenna has the drawback of narrow bandwidth. The bandwidth of micro strip antenna may be increased using air substrate. However dielectric substrate must be used if pressed antenna size is required. By increasing substrate thickness bandwidth can be enriched. The booming structure include E-shaped patch antennas, U slot patch antennas.[8]



2. Objective

The objective of this paper to design miniature S-shaped patch antenna for wireless applications especially for X Band applications. Design Rectangular micro strip slotted Patch antenna is based on the standard design procedure to find the length & width at resonant frequency .The two Rectangular cuts are included to disturb the surface current path, start local inductive effect which produces resonance in antenna. The slot dimensions of antenna are Length = 4mm & width 0.5 mm. The dimension of patch is $11.9\text{mm} \times 9\text{mm}$ used for S-shaped rectangular micro strip antenna design. The substrate is taken as RT/duroid5880(tm) relative permittivity 2.2& patch is taken as copper having relative permittivity 1.[3]

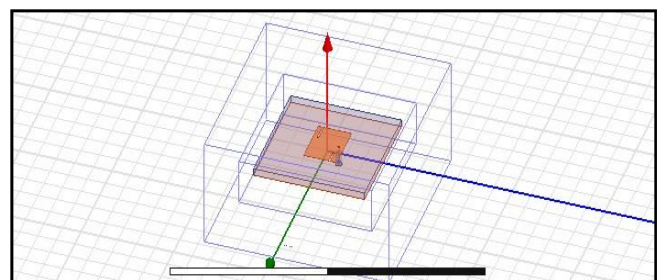


Fig. 2.1: S-shaped Antenna model prepared in HFSS

3. Research Methodology

In this paper latest research work is describe for S- Shaped antenna which is based on literature survey that describe different patch techniques. The research papers overview give strategy to work on patch dimensions, & different probe feeding method to enhance the existing performance of rectangular patch. In

our research work our far most desire to minimize shape of S-shaped antenna to meet the desire specifications. The main parameters variation occur depends upon material chosen for patch & substrate .by increasing width & height of slot we can increase the performance characteristics of new proposed antenna.. The above methodology implement in high frequency simulated software for premium research application. The study view from the references we built in a new design antenna. [3] [4]

4. Data Analysis

In order to make performance predictions the rectangular patch antenna has the following parameters, where λ_0 is the wavelength in vacuum also called the free-space wavelength.

- Length (L) : $0.3333\lambda_0 < L < 0.5\lambda_0$
- Height (h) : $0.003\lambda_0 \leq h \leq 0.05\lambda_0$
- Thickness (t) : $t \ll \lambda_0$
- Dielectric constant (ϵ_r) : $2.2 \leq \epsilon$

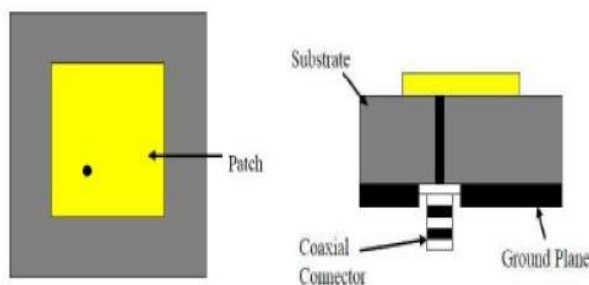


Fig. 4.1: Probe Fed Patch Antenna

In our research work we taken the Substrate material as substrate is taken as Rogers RT/duroid5880(tm) relativepermittivity 2.2 & patch is taken as copper having relative permittivity 1.The higher value of permittivity of substrate allow shrinking of patch antenna Its low dielectric constant, low loss tangent and low cost make it primary picking material for microwave substrate. The figure below show various terminologies associated with probe Fed.Micro strip antennas can also be fed by different technique one of technique shown in fig 4.1. The outer conductor of the coaxial cable is connected to the ground plane, and the center conductor is extended up to the patch antenna The position of the feed can be altered as before (to control the input impedance. The coaxial feed introduces an inductance into the feed that may need to be taken into account if

the height h gets large.[1] In our design procedure we taken dimension of $30 \times 30 \text{ mm}^2$ and dimensions of patch are $11.9 \times 9 \text{ mm}$. In our design procedure we taken dimension of $30 \times 30 \text{ mm}^2$ and dimensions of patch are $11.9 \times 9 \text{ mm}$. The material chosen for substrate Roger RT/duroid5880(tm) relative permittivity 2.2 & patch material having relative permittivity 1 to meet desired result after simulation. The dimension of slot in rectangular patch taken as $L=4 \text{ mm}$ & $W=0.5 \text{ mm}$. The design antenna simulate on HFSS [9-11].

5. Experimental Results

Simulation results S-Shaped antenna using ANASOFT HFSS version 14.0

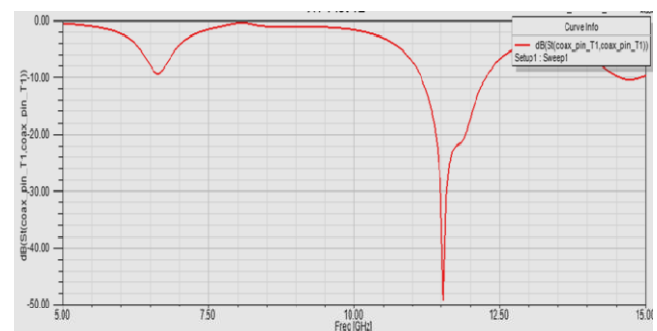


Fig. 5.1: Return Loss Graph

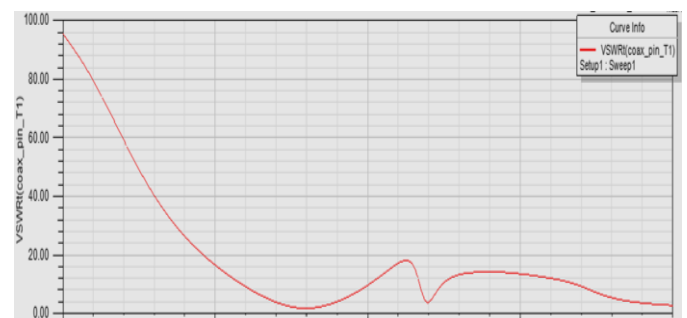


Fig. 5.2: VSWR Pattern

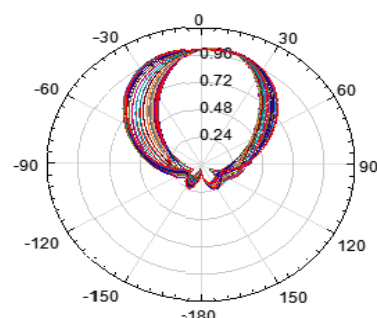


Fig. 5.3: Far Field Radiation Pattern

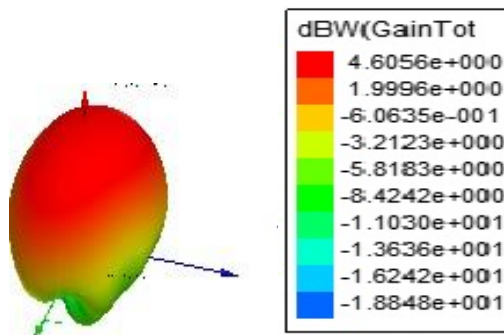


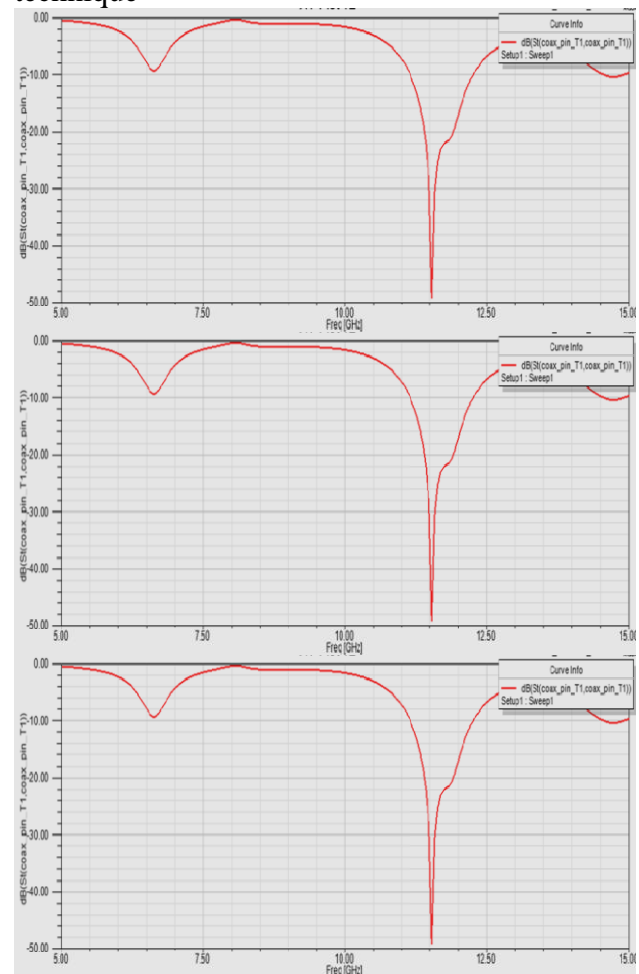
Fig. 5.4 : 3 D Polar Plot

The above experimental result after simulation on Anasoft HFSS describe the 3D gain plot in which dark area represent max values of radiation intensity .The pattern shows that antenna radiates good in broad dimension along upward direction. The return loss graph representing minimum return loss value at -49.149 db frequency which means antenna resonance condition at this point. The high return loss value also shows a close Impedance match. Observing VSWR Pattern all values in graph at different frequency range lie between 0 & 1.

6. Conclusion

An S-Shaped patched antenna for wireless application has proposed. It Shown good resonance at frequency 11.532 GHz . The desin antenna useful in radar system. The design antenna has gain at impedance real value 50. The future modification can be done

in design by varying the slit position and feeding technique



References

1. C.A Balanis Antenna Theory Analysis and Design
2. Qihong Zhong, Li, Hongyan Jiang, Yunliang Long Design of a Novel Dual-frequency Micro strip patch Antenna for wlan applications 2004 IEEE
3. Cheng-FU Yang , chng -Yi Hsieh, and chien- Min Cheng Design small size and wideband T-shaped patch antenna on ceramic substrate 2007 IEEE
4. Shun-Yun Lin, Hong-Ren Huang, Cing-Wei Guan, and Shu-Ani Yeh A novel compact slot antenna for ultra wide- band application IEEE [2007]
5. Xiaoang Li, Cho Li Design of high gain multiple U -slot micro strip patch antenna for wireless system. [2010]
6. Rahul S. batra, Dipika. S. Sagne, P.L zade Design and analysis of modified H- Shaped antenna for wireless communication IEEE international advance computing conference [2012].
7. Ajay yadav, Bhadrasheela Chauhan, Aanchal Jain Microstrip symmetrical E-shape patch antenna for the wireless communication system Vol. 2 Issue 12 IJEATE 2012
8. JIGAR M. Patel, Shobit k. Patel, Falgun N. Thakkar Design S- shaped multiband micro strip patch antenna IEEE 2012
9. Diwakar Singh, Amit kumar Gupta, R.k Parsad Analysis and design of S-shaped

- microstrip patch antenna 2013
10. R. PRIYA and M. PRIYA Design and characterization of E-shaped patch Antenna for wireless communication
11. Koneesh Aggarwal, Anil Garg A S-shaped Patch antenna For X- band wireless/ Microwave applications Volume 2 ISSUE March 2012
12. Sohag Kumar Saha, Amoral Islam Rony, Ummy Habitat Suma, Md.Masudar Rahman E- Shaped microstrip patch antenna for wireless communication. Volume 2 issue 3.

A STUDY OF LEVEL OF SATISFACTION OF WRESTLERS TOWARDS MANAGEMENT PRACTICES IN WRESTLING TRAINING CENTRES OF HARYANA

Lalita, Sharma¹, Sachin Sharma¹, Parveen Kumar² and Manohar Lal³

¹Department of Management, CT University, Ludhiana (Punjab), India

²Department of Physical Education, CT University, Ludhiana (Punjab), India

³Department of Physical Education, G.H.G.Khalsa College, Gurusar Sadhar, Ludhiana (Punjab), India

ABSTRACT

The purpose of the present study is to examine the level of satisfaction of wrestlers towards management practices of wrestling training centers of Haryana. The target population of this study involved wrestlers associated with wrestling centres located in the state of Haryana. In the present study investigator has applied the multistage random sampling technique to select the sample. The total sample of the current investigation was 440 subjects. A self-made questionnaire was used to assess the satisfaction level of wrestlers regarding management practices. Descriptive statistics i.e., percentage technique was used to find out the level of satisfaction of wrestlers towards management practices in selected wrestling training centres. It was concluded that the majority of wrestlers were satisfied with the management practices of the selected wrestling centre just like recruitment policies for employees, the strength of coaches, selection policy of players, functions of supportive staffs, existing facilities, incentive, prizes and honours given to coaches, leadership qualities of administrators, quality of food and accommodation, feedback from the staff, organisation off season camp, applying latest coaching and training methods and regarding availability of physiotherapist, psychologist, massager, dietician and proper medical facilities in the centres.

Keywords: Level of satisfaction, Management Practices, Wrestlers and Training Center.

Introduction

Management is a crucial part of everyday living. In today's world, management is crucial for coordinating everyone's efforts and adapting actions to what's really happening. Some actions may be part of the management process. The term "management functions" is used to describe these tasks. management tasks into planning, staffing, directing, managing, and assessing; these are the six categories used. We need competent management in order to provide players with world-class facilities and to execute various initiatives for the players. The team's performance may improve if they were placed in a positive atmosphere fostered by competent management (Louis, 2013). Organizational management encompasses facility management as well. In order to properly manage sports facilities and equipment, it is imperative that any responsible organization familiarize themselves with the fundamentals involved. Any institution or organization's sports managers or facility managers should be familiar with the fundamentals of sports infrastructure. The process of managing sports facilities and equipment should be more efficient, involve fewer people, and be simpler for whomever is directly operating equipment if the

fundamentals of sports administration are understood (Chandan, 2005).

With the goal of promoting and developing sports and the ambition to make sports genuinely a mass moment, the Government of Haryana has a highly encouraging Sport and Fitness policy, amended in 2015. The achievements of Haryana's athletes in the London Olympics, the Asian Games, and the Commonwealth Games show that reaching for the highest possible standards is a worthwhile endeavour. The government of Haryana is responsible for organizing the state's top-notch sporting events, regardless of whether they align with any particular political, religious, or economic ideology (Adesh (2019).

In this research, (Chauhan,2021) has been made an attempt to study the role of corporate sector and corporate social responsibility (CSR) in sports development. From this study, it was found that by investing in sports events, business organizations aren't getting customer faithfulness, enhanced financial conditions, and provide competitive edge only, but also influence stakeholders' attitude and buying behaviour. Further, contribution in sports development enhances employees' satisfaction and builds market reputation. Now, the corporate world is also wants to connect with

society & sports, and many corporate houses are very interested in sponsoring many sports events in India. Further, it can be said that by supporting sports development activities is equally important and beneficial for sports, players, society and companies.

(Joshua et al. 2021) studied Indian sport's governance convergence. Transparency, accountability, democracy, and social responsibility are all characteristics of good governance that are common to Western sports. Finding has shown that Indian athletes have won several medals for their country in international athletic events such as the Olympic, Commonwealth, and Asian Games. CSR has caught the attention of many enterprises, and as a consequence, a number of academic and industry-based studies are taking place. With the help of corporate social responsibility (CSR), sports in society may expand at the quickest possible rate.

(Zakinuddin and Ghazali, 2019) studied the relationship between athlete satisfactions with coach management training programme, transformational leadership and sports innovations and discovered that the coach's leadership, expertise, and demeanour contribute to athletes' feelings of contentment. Sports in Malaysia, in general, and University Utara Malaysia, in particular, stand to benefit from this research, which aims to reveal how happy athletes are with their participation in sports. Sport-related research is likely to benefit from this study's findings, (Calder 2010) studied the scientific basis for recovery training practices in sport found out about it.

Bhattachary et al. (2021) studied governance of sports in India and found important difficulties underlying the existing form of sports governance in India. Further, they also investigated the causes behind continually low performance of Indian athletes in the Olympic sports and the role that the government may play in order to improve the awful scenario that exists at the time. An alternative sports governance model for India is proposed by examining the patterns utilized by some of the world's most successful athletic countries and taking lessons from those examples. (Ranjan, 2016) studied sports event management benefits & issues and found out that hosting the Asian Games in New Delhi in the 1950s, India

developed its own system for organizing athletic events. Its purpose is to keep track of the fast growth of sports event management in India's economy by keeping a close eye on the industry. (Suhag, 2020) did the comparative analysis of trends in Indian and Russian Wrestling. Research was conducted on a wide range of factors, all of which were subdivided into three major categories: physical, psychological, and physiological. Men's Freestyle Wrestlers were studied by picking two top-level wrestlers from each national team in the six Olympic Wrestling weight classes of 57kg, 65 kilograms, 70 kilograms, 74 kilograms and 95 kilograms in weight. Based on earlier research and performance of Haryana State in wrestling at national level and international level, the investigator examined the level of satisfaction of wrestlers towards management practices of wrestling training centres of Haryana.

Methods and Procedure

The exploratory and descriptive research technique was used to assess and describe the opinions of wrestlers the management practices of wrestling training centres of Haryana state. The target population of this study involved wrestlers associated with wrestling centres located in the state of Haryana. In the present study investigator has applied the multistage random sampling technique to select the sample. Total sample of the current investigation was 440 subjects. In stage first, four districts of Haryana state out of twenty-two districts were selected on the basis performance of wrestling sport for the last five years in Haryana state. As per the data available from the sports department of Haryana following four districts will be selected as Sonapat, Rohtak, Jhajjar and Bhiwani. In the second stage, all the wrestling centres in four districts will be arranged separately serial no. wise. After listing the all-centres in each district, selected every nth centre by adopting the systematic random sampling technique, which was result into 6 wrestling centres of each district and total of 24 centres in four districts. In last stage, investigator has selected required wrestlers from each wrestling centre selected in stage II. After providing the list by centre, the

researchers will select nth wrestlers to complete the appropriate size of the sample by random sampling procedure. In this way total wrestlers of the study were 440. A self-made questionnaire was used to assess the satisfaction level of wrestlers regarding

management practice of the centre. Descriptive statistics i.e., percentage technique was used to find out the level of satisfactions of wrestlers towards management practices in selected wrestling training centres.

Result and Discussion

Table-I: Level of satisfaction of wrestlers towards management practices of selected wrestling training centres

Sr. No.	Statement	SS	S	DK	D	SD
1	Training centre has well defined recruitment policy for employees	12.7	31.1	30.9	20.5	4.8
2	Training centre have sufficient number of Coaches.	18.2	33.6	21.8	21.6	4.8
3	Training centre has well defined selection policy for players	16.4	35.7	24.3	14.5	9.1
4	Wrestling centre has adequate number of supportive staffs to perform its functions	22.7	28.2	15.5	22.3	11.4
5	Wrestling centre provides proper food and accommodation for the athletes	34.8	25	15.2	18.6	6.4
6	The funds incentive given by Centre Government/State Government/voluntary agencies are reaching to deserving sports person	34.3	14.1	26.4	23	2.3
7	Sufficient incentive, prizes, honours are given to players /Coaches	22	35.5	18.9	21.4	2.3
8	Existing facilities in wrestling training centre are sufficient	55.9	29.8	7.5	5.5	1.4
9	Physiotherapist is expert in his/her filed and available for the players	35.5	23.9	14.3	15.2	11.1
10	Psychologist is always available for the players	28	29.1	19.3	18.6	5
11	Massager is available for the players	51.1	32	12	2	2.7
12	Dietician is available for the players	54.8	34.3	8.6	1.8	.5
13	Proper medical facilities are provided during the coaching camp/ training sessions at wrestling training centre	39.3	52.3	5.2	1.4	1.8
14	Existing facilities in centre are sufficient to win medals at national and international level	42.5	47.5	5	3.6	1.4
15	The Authority of the wrestling centre reviews the performance of the players regularly	46.4	42	4.1	6.1	1.4
16	Wrestling centre takes care of the educational facilities of the athletes of wrestling training centre	40.9	47.7	4.3	4.8	2.3
17	The leadership abilities of the sports administrators of wrestling centre are sufficient to influence the subordinates	54.5	35.2	4.8	4.1	1.4
18	Wrestling centre takes feedback from its staffs and trainees to know its effectiveness of the training programs	40.7	45	3.4	9.5	1.4
19	Off season camps are organized in wrestling centre.	36.4	51.4	4.5	5.0	2.7
20	Coaching and training methods in wrestling training centre are latest	50.5	41.1	1.4	4.5	2.5
21	The absence of recreational activities makes the athletes mentally tired	45	42.3	4.5	7	1.1

It is evident from Table-I that with regard to training centre has well-defined recruitment policy for employees, 12.7% (n=56) of the wrestlers were strongly satisfied, 31.1 % (n=137) were satisfied. 30.9 % (n=136) were don't know, 20.5% (n=90) were dissatisfied and 4.8% (n=21) were strongly dissatisfied.

With regard to training centre having sufficient number of Coaches, 18.2% (n=80) of the wrestlers were strongly satisfied, 33.6 %

(n=148) were satisfied, 21.8 % (n=96) were don't know, 21.6% (n=95) were dissatisfied and 4.8% (n=21) were strongly dissatisfied.

With respects to training centre has well defined selection policy for players, 16.4% (n=72) of the wrestlers were strongly satisfied, 35.7 % (n=157) were satisfied, 24.3 % (n=107) were don't know, 14.5% (n=64) were dissatisfied and 9.1% (n=40) were strongly dissatisfied.

With reference to wrestling centre has adequate number of supportive staff to perform its functions, 22.7 % (n=100) of the wrestlers were strongly satisfied, 28.5 % (n=124) were satisfied, 15.5 % (n=68) were don't know, 22.3 % (n=98) were dissatisfied and 11.4% (n=50) were strongly dissatisfied.

With respects to wrestling centre provides proper food and accommodation for the athletes, 34.8 % (n=153) of the wrestlers were strongly satisfied, 25 % (n=110) were satisfied, 15.2 % (n=67) were don't know, 18.6 % (n=82) were dissatisfied and 6.4% (n=28) were strongly dissatisfied.

With regard to the fund's incentive given by Centre Government/State Government /voluntary agencies were reaching to deserving sports person, 34.3 % (n=151) of the wrestlers were strongly satisfied, 14.1 % (n=62) were satisfied, 26.4 % (n=116) were don't know, 22.3 % (n=101) were dissatisfied and 2.3% (n=10) were strongly dissatisfied.

In the connection to sufficient incentive, prizes, honours were given to players /Coaches, 22 % (n=97) of the wrestlers were strongly satisfied, 35.5 % (n=156) were satisfied, 18.9 % (n=83) were don't know, 21.4 % (n=94) were dissatisfied and 2.3% (n=10) were strongly dissatisfied.

With regard to existing facilities in wrestling training centre were sufficient, the majority of the wrestlers 55.9.7 % (n=246) strongly believed that existing facilities were sufficient, 29.8 % (n=131) were satisfied, 7.5 % (n=33) were don't know, 5.5 % (n=24) were dissatisfied and 1.4% (n=6) were strongly dissatisfied.

With reference to physiotherapist is expert in his/her field and available for the players, 35.5 % (n=156) of the wrestlers were strongly satisfied, 23.9 % (n=105) were satisfied, 14.3 % (n=63) were don't know, 15.2 % (n=67) were dissatisfied and 11.1% (n=49) were strongly dissatisfied.

With respects to psychologist is always available for the players, 28.0 % (n=123) of the wrestlers were strongly satisfied, 29.1 % (n=128) were satisfied, 19.3 % (n=85) were don't know, 18.6 % (n=82) were dissatisfied and 5.0 % (n=22) were strongly dissatisfied.

In the connection to massager is available for the players, the majority of the wrestlers 51.1

% (n=225) strongly satisfied, 32.0 % (n=141) were satisfied, 12.0 % (n=53) were don't know, 2.0 % (n=9) were dissatisfied and 2.7% (n=12) were strongly dissatisfied.

With regard to dietician is available for the players, the majority of the wrestlers 54.8 % (n=241) strongly satisfied, 34.3 % (n=151) were satisfied, 8.6 % (n=38) were don't know, 1.8 % (n=8) were dissatisfied and .5% (n=2) were strongly dissatisfied.

With reference to proper medical facilities were provided during the coaching camp/ training sessions at wrestling training centre, 39.3 % (n=173) of the wrestlers were strongly satisfied, 52.3 % (n=230) were satisfied, 5.2 % (n=23) were don't know, 1.4 % (n=6) were dissatisfied and 1.8% (n=8) were strongly dissatisfied.

With respects to Existing facilities in centre were sufficient to win medals at national and international level, 42.5 % (n=187) of the wrestlers were strongly satisfied, 47.5 % (n=209) were satisfied, 5.0 % (n=22) were don't know, 3.6 % (n=16) were dissatisfied and 1.4% (n=6) were strongly dissatisfied.

In the connection to the Authority of the wrestling centre reviews the performance of the players regularly, 46.4 % (n=204) of the wrestlers were strongly satisfied, 42.0 % (n=185) were satisfied, 4.1 % (n=18) were don't know, 6.1 % (n=27) were dissatisfied and 1.4% (n=6) were strongly dissatisfied.

With regard to wrestling centre takes care of the educational facilities of the athletes of wrestling training centre, 40.9 % (n=180) of the wrestlers were strongly satisfied, 47.7 % (n=210) were satisfied, 4.3 % (n=19) were don't know, 4.8 % (n=21) were dissatisfied and 2.3% (n=10) were strongly dissatisfied.

With reference to the leadership abilities of the sports administrators of wrestling centre were sufficient to influence the subordinates, the majority of the wrestlers 54.5 % (n=240) were strongly satisfied, 35.2 % (n=155) were satisfied, 4.8 % (n=21) were don't know, 4.1 % (n=18) were dissatisfied and 1.4% (n=6) were strongly dissatisfied.

With respect to wrestling centre takes feedback from its staffs and trainees to know its effectiveness of the training programs, 40.7 % (n=179) of the wrestlers were strongly satisfied, 45.0 % (n=198) were satisfied, 3.4 %

(n=15) were don't know, 9.5 % (n=42) were dissatisfied and 1.4% (n=6) were strongly dissatisfied.

In the connection to off season camps were organized in wrestling centre, 36.4 % (n=160) of the wrestlers were strongly satisfied, 51.4 % (n=226) were satisfied, 4.5 % (n=20) were don't know, 5.0 % (n=22) were dissatisfied and 2.7 % (n=12) were strongly dissatisfied.

With regard to coaching and training methods in wrestling training centre were latest, 50.5 % (n=222) of the wrestlers were strongly satisfied, 41.1 % (n=181) were satisfied, 1.4 % (n=6) were don't know, 4.5 % (n=20) were dissatisfied and 2.5% (n=11) were strongly dissatisfied.

With reference to the absence of recreational activities makes the athletes mentally tired, 45.0 % (n=198) of the wrestlers were strongly satisfied, 42.3 % (n=186) were satisfied, 4.5 % (n=20) were don't know, 7.0 % (n=31) were dissatisfied and 1.1% (n=5) were strongly dissatisfied.

Discussion:

Our study demonstrated that a lesser percentage of wrestles have satisfaction and strongly satisfaction (43.8%) regarding well-defined recruitment policy for employees in selected training centre. In the case of sufficient numbers of coaches, the majority of wrestlers (51.8%) were satisfied and strongly satisfied. In the case of policy of selection of players in the training centre, the majority of wrestlers (52.1%) were satisfied and strongly satisfied. It has been found that (55.9%) wrestlers were satisfied and strongly satisfied with the adequacy of supportive staffs to perform their work. (59.8 %) wrestlers were satisfied and strongly satisfied that proper food and accommodation were provided. Less than half of wrestlers (48.4 %) believed that the fund's incentive given by Centre Government/State Government /voluntary agencies were reaching to deserving sports person, others were don't know or dissatisfied with this statement. (57.5 %) wrestlers were in opinion that sufficient incentive, prizes, honours were given to players /Coaches. With regard to existing facilities in wrestling training centre, the majority of the wrestlers (85.7 %) were satisfied and strongly satisfied that facilities were sufficient. With regard to

physiotherapist is expert in his/her field and available for the players, the (59.4%) of wrestlers were satisfied and strongly satisfied regarding this statement. The majority of wrestlers were satisfied and strongly satisfied that training centres have always available physiotherapist, massager and dietician for the players.

The majority of wrestlers (91.6%) were satisfied and strongly satisfied that proper medical facilities were provided during the coaching camp/ training sessions at wrestling training centre. They were (90.0%) also in the opinion that existing facilities in centre were sufficient to win medals at national and international level. 88.4 % wrestlers were satisfied and strongly satisfied with the authority of the wrestling centre for reviewing the performance of the players regularly. The majority of wrestles (88.6%) also in the opinion that wrestling centre takes care of the educational facilities of the athletes. It has been also found that the (89.7%) of wrestlers were satisfied and strongly satisfied that leadership abilities of the sports administrators of wrestling centre were sufficient to influence the subordinates. Further, it has shown that (85.7 %) of wrestlers were strongly in the opinion that wrestling centre takes feedback from its staffs and trainees to know its effectiveness of the training programs. The majority of wrestlers (87.8%) observed that training centres were organising off season camps for players, applying latest coaching and training methods for performance improvement. They were (87.3 %) also in the opinion that absence of recreational activities makes the athletes mentally tired, which negatively affect the performance of the wrestlers.

Conclusions

It was concluded that majority of wrestlers were satisfied with the recruitment policies for employees, strength of coaches, selection policy of players, functions of supportive staffs, existing facilities, incentive, prizes and honours given to coaches, leadership qualities of administrators, quality of food and accommodation, feedback from the staff and regarding availability of physiotherapist, psychologist, massager, dietician and proper medical facilities in the centres. It was also found that centre is reviewing the performance

of the players regularly and takes care of the educational facilities of the athletes. The majority of wrestlers observed that training centres were organising off season camps for players, applying latest coaching and training methods for performance. However, less than

half of wrestlers believed that the fund's incentive given by centre Government/State Government /voluntary agencies were reaching to deserving sports person. They were also of the opinion that absence of recreational activities makes the athletes mentally tired.

References

1. Adesh (2019). Development of Sports in Haryana State. *International Journal of Physical Education & Sports Sciences*, 14(1), 144-150.
2. Bhattacharyya, R., Gupta, A., Vats, S., Datskovsky, A. and Bhattacharya, P. (2021). <https://thewire.in/sport/gaps-india-sports-administration-governance>
3. Chauhan, S. S., Raj, L. and Thakur, S. (2021). Role Of Corporate Social Responsibility In Sports Development. *International Journal of Research and Analytical Reviews*9(1), 945-950.
4. Calder, A.M. (2010). The scientific basis for recovery training practices in sport. *IJSSPE*, 1(1), 43-49.
5. Chandan, J.S. (2005). *Organizational Behaviour*. Vikas Publishing House.
6. Joshua, M., David, S. & Géraldine, Z. (2021). An Institutional Framework for Governance Convergence in Sport: The Case of India. *Journal of Sport Management*, 35(2), 144 -157.
7. Louis, A. A. (2013). *Management and Organization*. McGraw-Hill Kogakusha, Ltd.
8. Ranjan, W. (2016). A Study of Analysis and Evaluate Issues and Challenges in Sport Events. *Journal of Sports and Physical Education*, 3(4), PP 25-29
9. Suhag, N.S. (2020). Trends in Indian and Russian Wrestling: a comparative study. *International Journal of Wrestling Science*, 10 (1), 39-44.
10. Zakinuddin, S. N. A., & Ghazali, S. H. (2019). The Relationship between Athlete Satisfaction with Coach Management Training Programme, Transformational Leadership and Sports Innovations. *Asian Research Journal of Arts & Social Sciences*, 9(3), 1-8. <https://doi.org/10.9734/arjass/2019/v9i330128>

EMOTIONAL MATURITY AND MARITAL ADJUSTMENT AMONG WOMEN TEACHER EDUCATORS

Parveen Sharma and Kuldip Kaur Grewal

Department of Education, CT University, Ludhiana (Punjab), India

ABSTRACT

This research paper studies the emotional maturity and marital adjustment of women teacher educators of government aided and private institutes. The main objective of the paper is to find whether women teacher educators differ in emotional maturity and marital adjustment in relation to the type of Institute and also Is there any relation between emotional maturity and marital adjustment of women teacher educators. For this, a sample of 200 women teacher educators was selected through multi-stage probability sampling technique employing survey method. Emotional maturity scale of Dr. Yashvir Singh and Dr. Mahesh Bhargava (2012) and Marital Adjustment questionnaire by P. Kumar and K. Rohatgi (2018) were used for the collection of data. The findings revealed that there is no significant difference in emotional maturity and marital adjustment among women teacher educators in relation to the type of institute. Besides this, there is significant correlation in emotional maturity and marital adjustment among women teacher educators.

Keywords: Emotional maturity, Marital Adjustment, women teacher educators

Introduction

The word 'emotion' is derived from the French word *émouvoir*, which means 'agitation of the mind'. This is based on the Latin word 'emotus', the participle to *emovere*, which means 'to move' or 'to be put in motion'. Emotion is the complex psychophysiological experience of an individual's state of mind as interacting with biochemical (internal) and environmental (external) influences.

Cole (1954) says, 'The chief index of emotional maturity is the ability to bear tension'. This view lays stress upon 'self-control' and not on 'self-fulfilment'.

Smiston (1974), "Emotional maturity is a process in which the personality is continuously striving for greater sense of emotional health, both intra-physically and intra-personally"

Goleman (1995) Says that we have two minds, one that thinks and one that feels, these two fundamentally different ways of knowing, interact to construct our mental life. The rational mind is the mode of comprehension we are typically conscious of more prominent in awareness, thoughtful, able to ponder and reflect. The emotional mind is impulsive and powerful and sometimes illogical. These two minds operate in harmony with each other, most of times feelings are essential to thought, and most of the times thoughts to feeling. But when passions surge the balance tips: it is not just I.Q., but emotional intelligence that

matters. Goleman rightly points out that, "It is not that we want to do away with emotions and put reason in its place, but instead find an intelligent balance of two.

Menninger (1999), "Emotional maturity can be defined as a process in which the personality always determined for better sense of emotional well-being".

Murray (2004) An emotional mature person has the following characteristics: 1. The ability to give and receive alone. 2. The ability to face reality and deal with it. 3. Just as interested in giving as receiving. 4. The capacity to relate positively to life experiences. 5. The ability to learn more experience. 6. The ability to accept frustration. 7. The ability to handle hostility constructively. 8. Relative freedom from tension symptom.

Rajeshwari and S. (2015) The most outstanding mark of emotional maturity is the ability to bear tension and it will enable a person to tolerate the frustration they undergo and considered as an individual's ability to control emotions himself or herself."

Emotional maturity is defined as how well you are able to respond to situations, control your emotions and behave in an adult manner when dealing with others. An emotionally mature person has the capacity to withstand delay in satisfaction of needs. He has belief in long term planning and is capable of delaying or revising his expectations in terms of demands of situations. An emotionally mature person has

the capacity to make effective adjustment with himself, members of his family, his peers in the school, society and culture. But maturity means not merely the capacity for such attitude and functioning but also the ability to enjoy them fully. In brief, a person can be called emotionally mature if he is able to display his emotions in appropriate degree with reasonable control at the appropriate time. Emotional maturity refers to your ability to understand, and manage emotions. Emotional maturity enables you to create the life you desire.

Marital Adjustment:

The term marital adjustment means the adjustment between the husband and wife – the adjustment to lead a happy married life. The adjustment is not confined to a single aspect. It includes biological, physical and emotional adjustment (Fred McKinney, 1949).

Sinha & Mukerjee (1990) defines marital adjustment as "the state during which there's an overall feeling in husband and wife of happiness and satisfaction with their marriage and with one another.

Hashmi, Khurshid and Hassan (2007) Marital adjustment is defined as the condition in which there is usually a feeling of pleasure and contentment in husband and wife and with each other.

Vanover (2016) indicates that there are various factors which contribute to marital success and happiness. These include age at the marriage, age differences between the spouses, educational level, duration of marriage, personality factors (self-esteem and self-concept), complementary needs, sexual behaviour, compatibility, emotional stability, flexibility, attitudes towards roles, interests, values, mental health of the spouse, mutual affection, understanding of the spouse, willingness to give and take and cooperativeness

Sinha (2016) Marital adjustment is the state in which there is an overall feeling in husband and wife of happiness and satisfaction with their marriage and with each other.

For many people marriage is the beginning of a life of growing and expanding happiness. However, a certain proportion of marriages will not be successful, they will end in divorce. There are many things that affects the future of

any marriage. The personality traits of the two individuals, their family backgrounds, and the attitudes which they hold on a number of subjects are factors that affect the quality of marriage. Adjustment in marriage is a significant phenomenon. The relationship a man has with a woman in marriage is perhaps the highest form of relationship, because it involves physical, emotional, spiritual and social aspects of life.

Literature Review

Kaur (2000) observed a significant and positive relationship between emotional maturity and the home, school and psychological environment. However, no significant relationship was found between emotional maturity and the physical environment. It has been discovered that girl students and students of rural areas are more emotionally mature than boys and urban students.

Mukherjee, J. (2000) pointed out that emotionally mature people are mentally healthy, well adjusted and high on emotional intelligence.

Smeltzer stress and anxiety and Cathy (2005) studied the emotional experiences of beginning teachers, as they learn to teach. The findings of the study suggested (i) that the characteristics of beginning teachers and the conditions at the work place influence the relationship between context and emotions (ii) both positive and negative emotions can have positive effects on teacher learning (iii) through the construction of emotional conditions in the classroom, engagement in emotionally symbiotic interactions and regulation of emotions, beginning teachers develop emotional knowledge that is essential to teach and finally (iv) that emotional knowledge is an important dimension of teacher developments.

Brien (2006) carried out a study with the purpose of developing a theory using qualitative grounded theory methods to explain how the emotions of community college women who balance parenting, job and school, affect their educational decisions. The results indicate that emotions do affect decisions to attend by resulting in the consequences of self-satisfaction, depression, withdrawal, self-direction.

Singh, V. (1987) investigated Job-Satisfaction, Family Adjustment, Occupational and Personal Problems of Women Working in Different Professions. The main objectives of the study were (i) to study the family adjustment of women in four different professions, namely, teaching, medical, clerical and administration, (ii) to study the occupational and personal problems of women working in the four professions, (iii) to find out some of the common occupational and personal problems of women workers in the four professions, (iv) to study the job-satisfaction of working women in the selected professions, (v) to compare the job-satisfaction, family adjustment, occupational and personal problems of women working in the four professions, and (vi) to give suggestions for the improvement of working conditions of women working in the four professions. The study was conducted on a sample of 400 working women from important towns of Rajasthan. The major findings were the adjustment of all the four groups in personal adjustment was satisfactory and there was no significant difference among the four groups in the area of adjustment with the husband. All the working women in the four professions had more or less an equal degree of difficulties as far as family adjustment was concerned. On the basis of total scores, the best rated group was that of teachers. Next were the administrators' group and the medical group. The clerical group was rated as the lowest.

Jaisri, M. and Joseph, M., (2013) studied "Marital Adjustment and Emotional Maturity among Dual-Career Couples", The participants were 100 dual employed couples (N=200) selected from Trichur and Ernakulam districts, Kerala. The results revealed significant difference between the couples. The wives had better marital adjustment and independence than their husbands. Age, type of marriage and number of children of the couples have significant impact on their marital adjustment and emotional maturity.

Jaisri, M., (2014) found that a good marriage not only leads to a happy and contented life, but also generates a sense of well-being. The present study was an attempt to understand marital adjustment and psychological well-being among dual employed couples... The

results revealed a significant relationship between marital adjustment and psychological wellbeing, especially in the area of life satisfaction. Also, wives had better marital adjustment than their husbands, whereas husbands showed better efficiency and mental health.

Bajaj and Nancy (2019) examined the gender difference in emotional maturity among adolescents. The sample consisted of 200 students out of which 100 were males and 100 were females.. Finding indicated that no significant difference existed between male and female in terms of emotional maturity.

Mosavi (2011) investigated the relationship between emotional maturity and marital satisfaction using a classical questionnaire. The results indicated that negative correlation between marital satisfactions and explained and confined that there are meaningful relationship between marital satisfaction and emotional instability, close character and lack of independence. The survey concluded that there is meaningful relationship between marital satisfaction and emotional maturity.

Singh (2005) observed objectives to assess and compare marital adjustment among families with employed and non-employed women across different educational levels hypothesized that there will be no significant difference in marital adjustment among families with employed and non-employed women across different educational levels.

Schoen, Rogers and Amato (2006) studied wife's employment and spouses marital happiness. Authors suggested that the improved financial conditions are also responsible for better and healthier understanding between the wife and the husband that is more conducive and leads to better marital adjustment.

Parmar (2014) compared working and non-working women in terms of their marital adjustment and mental health. The study consumed data from a random sample of 60 women (working women = 30; non-working women = 30) selected from Bhavnagar city (Gujarat, India). A significant difference between working and non-working women was observed in their mental health and marital adjustment. The findings go in favor of the working women, who 37 excel their non-

working counterparts in both marital adjustment and mental health.

Need and Significance of the Study

Teachers are guide, philosopher and friend. From the early times, teachers are playing the leading role to prepare different professionals. Teacher educational institutions train many individuals for this noble cause every year. These trainees learn variety of teaching, social as well as leadership skills from teacher educators. The seeds of teaching profession are sown, grown and watered under the mentorship of teacher educators. So, it demands a lot of qualities among teacher educators including good physical health, sound mental health, home and work place adjustments, decision making, ability to delegate powers, collaborative team work, leadership skills, visionary, judgmental opinion, awareness of duties and rights, knowledge of innovative skills, digital literacy etc. But it has been observed that there are various factors which affect many of their personality characteristics. Research studies of Smeltzer and Cathy (2005) also states emotional knowledge is an important dimension of teacher development. Emotions do affect decisions to attend by resulting in the consequences of self-satisfaction, depression, withdrawal, self-direction, stress and anxiety.

A good marriage not only leads to a happy and contented life, but also generates a sense of well-being (Jaisri, 2014). More than half of the teaching community is of females. Thus, this study focuses on the emotional maturity level and marital adjustment among teacher educators and to what extent both these variables jointly affect the personality make up of teacher educators especially women teacher educators.

Objectives of the study

1. To study the emotional maturity of women teacher educators working in government and private Institutes.
2. To study the marital Adjustment of women teacher educators working in government and private Institutes.
3. To find out the relationship between Emotional maturity and marital adjustment among women teacher educators.

Hypotheses of the Study

1. There is no significant difference between emotional maturity of women teacher educators working in government and private institutes.
2. There is no significant difference between marital adjustment of women teacher educators working in government and private institutes.
3. There is no significant relationship between emotional maturity and marital adjustment of women teacher educators.

Delimitations of the study

The study is delimited to Education colleges (govt.aided and private) of districts Ludhiana and Jalandhar of Punjab state. The study is confined to 200 women teacher educators including 100 from government aided institutes and 100 from private institutes.

Tools Used

The tools used for the present study are: Emotional Maturity Scale by Dr. Yashvir Singh and Dr. Mahesh Bhargava. (2012) Marital Adjustment questionnaire by P. Kumar and K. Rohatgi (2018)

Statistical Techniques Employed

Following statistical techniques were employed to analyze the data:

1. t- ratio.
2. Pearson’s product moment coefficient of correlation

Analysis and Interpretation of the data

Table 1: Showing the difference between the mean scores of emotional maturity of women teacher educators working in government and private institutes.

Variable	Groups	N	Mean	S.D.	t-value	Level of Significance
Emotional Maturity	Women teacher educators of Govt. aided institutes	100	96.73	37.4	1.11	Not significant at 0.05 level
	Women teacher educators of Private institutes	100	94.1	36.8		

Table 1 shows that mean scores of women teacher educators of govt aided colleges on the variable of emotional maturity is 96.73 and mean scores of women teacher educators of private institutes is 94.1 Also, the calculated t-value 1.11 is less than the table value with df =198. This shows that there is no significant difference between emotional maturity of

women teacher educators working in government and private institutes. So, the **hypothesis 1 that there is no significant difference between emotional maturity of women teacher educators working in government and private institutes stands accepted**

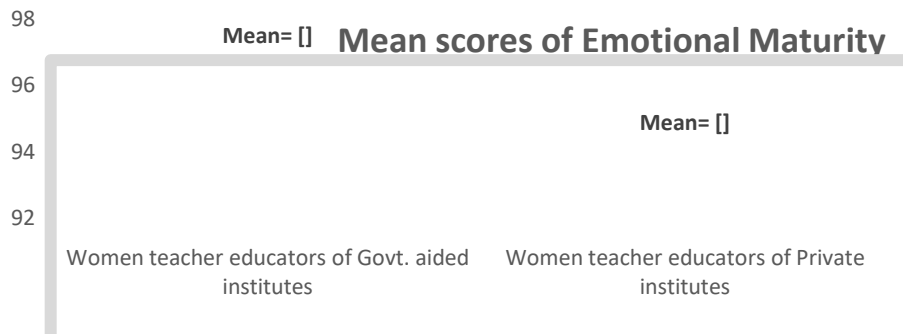


Figure:1 depicts the comparison of mean score of women teacher educators of government aided and private institutes on emotional maturity.

Variable	Groups	N	Mean	S.D.	t-value	Level of significance
Marital Adjustment	Women teacher educators of Govt. institutes	100	31.8	8.53	0.0003	Not significant at 0.05 level
	Women teacher educators of private . institutes	100	31.6	8.51		

Table 2: Showing the difference between the mean scores of marital adjustment of women teacher educators working in government and private institutes

Table 2 reveals that mean score of women teacher educators of government aided institutes on the variable of marital adjustment is 31.8 and mean score of women teacher educators of private institutes on the variable of marital adjustment is 31.6. Also calculated t-

value 0.0003 is less than the table value with df =198. So, the **hypothesis 2 There is no significant difference between marital adjustment of women teacher educators working in government and private institutes stands accepted.**

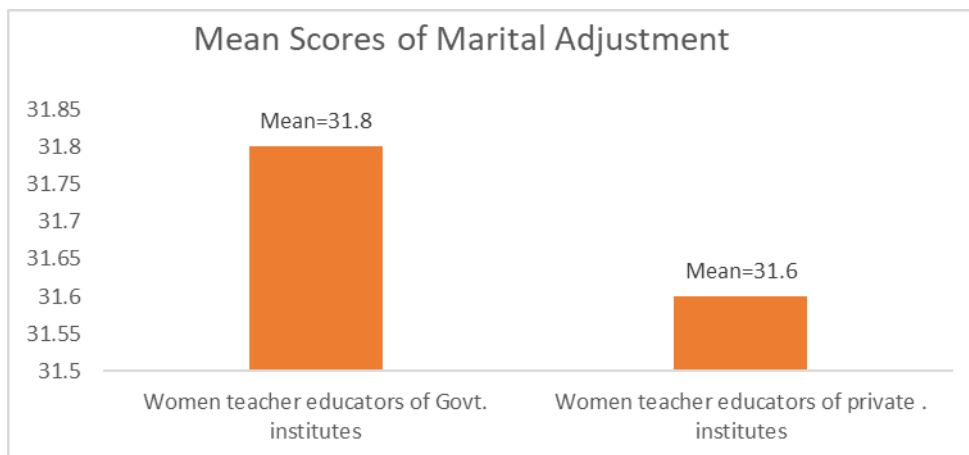


Figure 2: depicts the comparison of mean score of women teacher educators of government aided and private institutes on marital adjustment.

Table3: Showing Coefficient of correlation.

Sr.No.	Variables	No. of teacher educators	Coefficient of correlation
1.	Emotional Maturity	200	0.93
2.	Marital Adjustment	200	

Table 3 reveals that there is highly positive correlation between emotional maturity and marital adjustment among teacher educators. So, the **hypothesis 3 stating “There is no significant relationship between emotional maturity and marital adjustment of women teacher educators” stands rejected.**

Results and Discussion

As the mean scores on the variable of emotional maturity of teacher educators of government aided institutes is higher than the mean score of private institutes’ women teacher educators but the Emotional maturity among women educators of government aided and private institutes do not differ significantly. The level of Emotional Maturity does not confine to Type of Institution (Perumal and Rajaguru, 2015)

Marital adjustment among women teacher educators of government aided and private institutes do not differ significantly.

A Significant relationship was found between emotional maturity and marital adjustment of women teacher educators which reflects that more emotionally mature women teacher educators have better adjustment in their marital affairs. Mukherjee, J. (2000) also

pointed out that emotionally mature people are mentally healthy, well adjusted and high on emotional intelligence. Mosavi (2011) concluded that there is meaningful relationship between marital satisfaction and emotional maturity

Educational implications

The present study describes that there is significant relationship between emotional maturity and marital adjustment of teacher educators. Also, Type of institute has no effect on emotional maturity and marital adjustment of teacher educators. So, the study has its implications for Parents, Educational planners, administrators, social and voluntary organizations to plan and act in such a way so that one could become emotionally strong. Emotional maturity will help women especially married working women to well adjust in their personal as well as professional life.

Among all the professions, teaching is the noblest profession and the role of teachers for future of country is significant. To perform their role efficiently teachers should be mentally healthy, emotionally stress free. So, to create such type of teaching community all the educational colleges have to perform duties very diligently. An emotionally mature teacher educator who is well adjusted in her family conditions can contribute a lot in this regard. This study will be helpful to train women teacher educators as how to dominate over crude and wild emotions with the help of noble sentiments that leads to improve their marital adjustment.

References

- Bajaj, S. & Nancy, S. (2019). Study of gender difference in emotional maturity among adolescents, *Journal of Exercise Science & Physiotherapy*, 15(1), 15-18.
- Brien, Rene. (2006). How emotions affect educational decision making among mothers enrolled in community college who also work. *Dissertation Abstracts International*, 67 (01), 71-A.
- Cole (1954) Degrees of emotional maturity. http://www.ukessays.com/essays/psychology/degrees_of_emotional_maturity-psychology-essay.php/
- Fred McKinney (1949). *Psychology of personal Adjustment Scientific: Students’ introduction to mental hygiene*. John Wiley and sons New York, Chapman & Hall Ltd. London, Second Edition
- Goleman, D. P. (1995). *Emotional Intelligence: Why It Can Matter More Than IQ for Character, Health and Lifelong Achievement*. New York: Bantam Books
- Hashmi, H. A. Khurshid, M. & Hassan, I. (2007). Marital Adjustment, Stress and Depression among Working and Non-Working Married Women. *Internet Journal of Medical*. 2(1):19-26.

7. Hollingworth, L.S. (1928). The psychology of the adolescent. New York: D. Appleton and Company
8. Jaisri, M. & Joseph, M., (2013), "Marital Adjustment and Emotional Maturity among Dual-Career Couples", Guru Journal of Behavioural and Social Sciences. 1(2), 77-84.
9. Jaisri, M., (2014) "Role of Gender on Marital Adjustment and Psychological Well-being among Dual-Employed Couples", Journal of the Indian Academy of Applied Psychology, 40(1), 74-77
10. Kaur, J. (2000). Emotional Maturity in relation to environmental factors. Unpublished M.Ed. dissertation, Panjab University, Chandigarh
11. Menninger CW (1999). Emotional Maturity. Hickman Associates, New York
12. Mishra, Ragini, (2014), "A Study on assessment of Association between Emotional Maturity and Marital Adjustment of Dual Earner Couples", Indian Res. J. Genet. & Biotech. 6(4) , 653-656
13. Mosavi, S.E., Irvani, M.R. (2011). A study on relationship between emotional maturity and marital satisfaction. Journal of Growing Science, Iran.
14. Mukherjee, J. (2000). Emotional Intelligence bulletin of Rotary Club
15. Murray (2004). Explorations of Personality. New York: Oxford University Press
16. Parmar (2014). Mental health and Marital Adjustment among working and Non-working women. International journal of Indian Psychology. 1(4), ISSN 2348-5396
17. Rajeshwari, R., & S, J. (2015). Opening of New Insights for the Researchers: Descriptive Study on Emotional Maturity. International Journal of Engineering and Management Research, 5(11), 5-7
18. Schoen, Rogers & Amato, R. (2006). Wives' Employment and Spouses' Marital Happiness Assessing the Direction of Influence Using Longitudinal Couple Data. Journal of family issues, 27(4), 506-528
19. Singh, V. (1987) A Study of Job-Satisfaction, Family Adjustment, Occupational and Personal Problems of Women Working in Different Profession, Research In Sociology Of Education- Abstracts, 205
20. Singh (2005). Marital Adjustment in working and non-working women. Journal of personality and clinical studies 10, 1-2.
21. Sinha (2016). Adjustment of married women in relation to age and job status. International Journal of Scientific and Research Publications, 6(1), 42-45.
22. Sinha S.P. & Mukherjee N. (1990). Marital adjustment and space orientation: The Journal of social psychology
23. Smeltzer, Erb and Cathy, Kay. (2005). Realms of beginning teachers' emotional work. Dissertation Abstracts International, 65 (10), 3565-A.
24. Vanover, B. (2016). Important factors in marital success and satisfaction: marriage counsellors' perspectives. Clinical Research Papers. Retrieved from <https://sophia.stkate.edu/cgi/viewcontent>

गुरु अमरदास बाणी में मध्यकालीन आर्थिक संस्कृति का अंकन

पूनम बाला (शोधकर्त्री), सी. टी. विश्वविद्यालय, फिरोजपुर रोड, लुधियाना, पंजाब।
डॉ. जसप्रीत कौर (शोध-निर्देशिका), सी. टी. विश्वविद्यालय, फिरोजपुर रोड, लुधियाना, पंजाब।

मनुष्य को कर्म-क्षेत्र में सजगता प्रदान करने में धन अत्यंत सशक्त तत्व है। धर्माचरण द्वारा धन कमाना एवं उसका उचित उपयोग भारतीय संस्कार परम्परा में विशेष स्थान रखता है। हमारे प्राचीन चार वेदों में अर्थववेद का भी प्रमुख स्थान है। विष्णुपुराण में परिगणित प्राचीन प्रमुख विधाओं में अर्थशास्त्र भी एक विधा है। कौटिल्य के अर्थशास्त्र को भारतीय शास्त्र परम्परा में विशेष स्थान प्राप्त है। पश्चिम में मि. एडम स्मिथ को अर्थशास्त्र का जन्मदाता मानते हैं। उसने अपने ग्रंथ 'वेल्थ ऑफ नेशन्स' में देश की सम्पत्ति को बढ़ाना ही अर्थशास्त्र का उद्देश्य बताया है।

गुरु ग्रंथ साहिब निश्चय ही सैद्धान्तिक एवं व्यावहारिक दृष्टि से अर्थशास्त्रीय रचना नहीं है। गुरु ग्रंथ साहिब में संकलित अनेक वाणियों में तत्कालीन आर्थिक स्थिति, कृषि तथा व्यापार के उपकरणों एवं सिद्धान्तों, अनेकानेक व्यवसायों तथा समाज में अपेक्षित आदर्श अर्थ-विभाजन की कल्पनाओं के संकेत उपलब्ध हैं। गुरु अमरदास अपने प्रारंभिक जीवन में कृषि का व्यवसाय करते थे। व्यवसायी होने के कारण आयात-निर्यात, कृषि सम्बंधी बीजों की जानकारी, मौसमी फसलों व कृषि में प्रयोग किये जाने वाले उपकरणों तथा हल, मिट्टी की किस्मों, मौसमी फसलों के लिये उपयुक्त समय आदि की विशेष जानकारी रखते थे। 42 वर्ष की अवस्था तक सफल व्यवसायी होने के कारण वे लगभग हर प्रकार के माप-तोल, मोल-भाव आदि में निपुण थे। लगभग 20 वर्ष तक (42 से 62 वर्ष अवस्था तक) वे हर वर्ष हरिद्वार तीर्थ यात्रा पर जाते। 6 महीने यात्री के तौर पर विचरते और 6 महीने गृहस्थी के कार्यभार को निभाते। व्यवसाय से उन्हें लाभ हानि की पूरी जानकारी थी। अतः 6 महीने में वे अपने व्यवसाय से इतना मुनाफा कमा लेते थे कि वे आसानी से अपने परिवार के भरण-पोषण के साथ अपनी यात्राओं का खर्च भी वहन कर सके।

लगभग 62 वर्ष की अवस्था में उन्होंने गुरु अंगद देव को अपना गुरु धारण किया और 73 वर्ष की अवस्था तक वे उनकी सेवा में निःस्वार्थ भाव से लगे रहे। इस बीच वे गुरु नानक बाणी का निरंतर ध्यानपूर्वक श्रवण करके चिंतनमनन भी करते रहते। जब वे गुरुगद्दी पर आसीन हुये तो एक सफल व्यवसायी के सभी गुणों के कारण ही उन्हें एक नया नगर गोइंदवाल बनाने में ज्यादा मुश्किलों का सामना नहीं

करना पड़ा। गुरु अमरदास ने गुरु नानक देव व गुरु अंगद देव की तरह बाणी का सृजन करना भी आवश्यक माना। उन्होंने अपनी बाणी को नानक बाणी की तर्ज पर ही रचा लेकिन उनकी बाणी में मानवीय सरोकारों सम्बंधी बातें स्पष्ट करने के लिये कृषि व्यवसाय से सम्बन्धित शब्दावली का भरपूर प्रयोग हुआ। उन्होंने सामाजिक, राजनीतिक, सांस्कृतिक, आध्यात्मिक आदि सभी सरोकारों पर बाणी की रचना की। अर्थिक सरोकार सम्बंधी उनकी बाणी में हल, बीज, बंजर भूमि आदि शब्दों की भरमार है। उन्होंने कहा:-

"ऐहु तनु धरती सबदु बीजि आधारा।।"¹

अर्थात् यह मनुष्य शरीर एक धरती की तरह है। जिस प्रकार धरती में जो बीज डाला जाता है, वैसी ही फसल प्राप्त होती है। उसी प्रकार इस तन रूपी धरती में शब्द रूपी बीज डालने से मनुष्य द्वारा सदविचारों रूपी फसल प्राप्त की जा सकती है।

युगों-युगों से भारत में आय का मुख्य साधन कृषि उत्पादन रहा है। अर्थशास्त्र कृषि सम्बंधी नियमों, उपकरणों, उत्पादन वृद्धि तथा मूल्य संतुलन आदि का विशद विवेचन करता है। गुरुबाणी में भी प्रसंगवश कतिपय कृषि सम्बंधी बातों की चर्चा की गई है लेकिन कोई नियमित अध्ययन प्रस्तुत नहीं किया गया है।

गुरु अमरदास कृषि के व्यवसाय में थे। उनका जन्म अमृतसर शहर के बासरके गाँव में हुआ था। अतः उन्हें गाँव में प्रयोग की जाने वाली खेती सम्बंधी वस्तुओं, जमीन आदि की भरपूर जानकारी थी। उस समय 'बंजर' जमीन को 'कल्लर' जमीन कहा जाता था। आज भी कई स्थानों पर इस शब्दावली का प्रयोग किया जाता है। गुरु अमरदास ने लिखा है:-

"कल्लर खेती तरवर कंठे बागा पहिरहि कजलु झरै।।"²

आर्थिक सरोकारों में यह स्पष्ट किया जाना आवश्यक है कि गुरु अमरदास उपजाऊ भूमि से प्राप्त लाभ से भली भाँति परिचित थे और बंजर भूमि का उदाहरण देकर उन्होंने ईश्वर का नाम जपने का ज्ञान भी दिया। अर्थात् कल्लर (बंजर) जमीन पर खेती करने का कोई लाभ नहीं होता है, परन्तु उन्हें विश्वास था कि यदि परमात्मा की कृपा हो जाये तो बंजर जमीन भी उपजाऊ बन जाती है।

“यथा बीज तथा उपज” की तर्ज पर उन्होंने श्रेष्ठ लाभ लेने पर जोर दिया। व्यापार में भी उतना ही लाभ लेना चाहिये जितना जायज हो। इसी प्रकार कर्मों का फल भी अवश्य मिलता है। अतः बुरे कर्मों से बचना चाहिये। गुरु अमरदास जी ने ठगी, चोरी आदि कुप्रवृत्तियों के विरुद्ध बाणी लिखते हुये कहा है:-

**“वलवंच करि रूपाव माइआ हिरि आणिया ॥
जमकालु निहाले सास आव घटै बेतालिया ॥”³**

मध्यकालीन समाज में व्यापार करने के लिये प्रयुक्त राशि को ‘सदु’ या ‘वेसाहा’ कहा जाता था। इन शब्दों का प्रयोग उनकी बाणी में इस प्रकार किया गया:-

“साची बाणी अनदिनु गावहि निरधन का नामु वेसाहा हे ॥”⁴

अर्थात् धन-व्यापार सम्बंधी उनका दृष्टिकोण भी आर्थिक होने के साथ समाज के मनुष्यों के लिये मानवोपयोगी था। गरीब का असली धन तो ‘नाम’ ही है, कहकर उन्होंने निर्धन व्यक्तियों को भी ईश्वरोपासना करने के लिये प्रेरित किया। वैसे भी उनकी बाणी का सामान्य सुझाव भोग-विलास, लोभ, मोह तथा तृष्णा बढ़ाने वाली धनिकता की अपेक्षा धैर्य और सन्तोषदायिनी निर्धनता की ओर ही रहा है। अतः गुरु अमरदास की बाणी में भी यही प्रवृत्ति परिलक्षित होती है।

गुरु अमरदास के अनुसार संसार के लोग, माया के मोह में फंसे होने के कारण सच्चे मार्ग से भटके हुये हैं। पदार्थवादी प्राप्ति के द्वारा मिली शोभा व सम्मान, चार दिनों के हैं, क्षणभंगुर है, जिनका कोई आधार नहीं है। गुरु अमरदास के समय में विवाह शादियों में अनावश्यक खर्च किये जाते थे। गरीब व्यक्ति झूठे दिखावे के कारण कर्ज लेकर भी शादी-व्याह के खर्चे वहन करते थे। सिख रहित मर्यादा में आनंद संस्कार अथवा सिख विवाह रीति सम्बंधी कई बातों का उल्लेख किया गया है। गुरु जी अनुसार खुशी मनाने के लिये कई सुंदर, स्वस्थ तरीके अपनाये जाने चाहिए। लावां की रस्म सिर्फ अरदास करके सम्पन्न होनी चाहिए। देग का प्रशाद ही काफी होता है। विवाह के समय फालतू के रीति रिवाजों को खत्म करने का मुख्य कारण गुरु जी का आर्थिक पक्ष सम्बंधी सरोकार ही था।

गुरुमति, आर्थिक स्थिति के आधार पर किसी को बड़ा या छोटा नहीं मानती। आर्थिक स्थिति को पूरी तरह से नजरअंदाज करके व्यावहारिक रूप से बीबी दानी का रिश्ता जेठा जी से किया गया था। गुरु अमरदास सांसारिक माया के प्रभाव से बचने के लिये भी कहते रहे। उनके अनुसार असली कमाई तो नाम

सिंमरन करके ही प्राप्त होती है। उनके अनुसार जो लोग सांसारिक माया के बंधन में बंधे रहते हैं, अंततः माया के प्रभाववश उनका नाश हो जाता है:-

**“माइआ होई नागनी जगति रही लपटाइ ॥
इसकी सेवा जो करे तिस ही कउ फिरि खाइ ॥”⁵**

इसी प्रकार उन्होंने कहा कि माया ने सारे जग को भ्रमित किया हुआ है। इससे बचना अत्यंत आवश्यक है क्योंकि माया के भ्रम में फंसकर संसारी मनुष्य अपना ही घर लुटा बैठता है अर्थात् यह जीवन व्यर्थ ही व्यतीत कर देता है और ईश्वर का नाम स्मरण नहीं करके अपना इहलोक व परलोक नष्ट कर लेता है। उन्होंने कहा:-

“माइया मोहु गुबारु है, तिसदा न दिसै उरवारु न पारु ॥”⁶

गुरुमति में घर-घाट, जमीन-जायदाद, धन-दौलत, स्त्री-बच्चों आदि को त्याग देने का उपदेश नहीं दिया गया है बल्कि इनके मोह में फंसने को माया कहा गया है। माया के प्रभाव से मनुष्य अत्यंत दुखित होता है। माया द्वारा मिला सुख क्षण-भंगुर होता है। माया का मोह अज्ञानतावश पैदा हो जाता है जिस पर विजय पाना काफी कठिन है। मूर्ख या अज्ञानी मनुष्य लालचवश धन को एकत्रित करते हैं जो सदा उसका साथ नहीं देता अपितु उसकी तृष्णा रूपी आग को और भी बढ़ा देता है। इसके प्रभाव से निकलकर मनुष्य स्वयं को ठगा हुआ महसूस करते हैं अर्थात् मायावश उत्पन्न हुये अहंकार से मनुष्य का आत्मिक जीवन तबाह हो जाता है। अतः गुरु अमरदास ने कठोर शब्दों में मनुष्य को चेतावनी देते हुये माया के प्रभाव से दूर रहने को कहा है:-

“जैसी अगनि उदर महि तैसी बाहरि माइआ ॥

माइआ अगनि सभ इको जेही करतै खेलु रचाइआ ॥

जा तिसु भाणा ता जमिआ, परवारि भला भाइआ ॥

लिव छुड़की लगी तिसना माइआ अमरु वरताइआ ॥

एक माइआ जितु हरि विसरै मोह उपजै भाउ दूजा लाइआ ॥

कहै नानकु गुर परसादी जिना लिव लागी, तिनी विचे माइआ पाइआ ॥”⁷

धर्म शास्त्रीय-मूल्यों के अन्तर्गत ‘वाणिज्य’ भी एक महत्वपूर्ण सत्य है। कृषि के उपरांत, व्यापार दूसरा महत्वपूर्ण विषय है जिसे अर्थशास्त्र के व्यावहारिक पक्ष का स्पर्श प्राप्त है। गुरुबाणी में व्यापार, व्यापारी, पूंजी, आदि कई शब्दों का प्रयोग किया गया है। गुरु अमरदास के समय में भी थोक व्यापारी अपनी वस्तुओं को जगह-जगह जाकर बेचते और लाभ प्राप्त करते थे। उस समय व्यापारिक प्रतिष्ठानों और छोटे व्यापारियों के बीच एक नीति सूत्र विद्यमान रहता था, जिसे धर्म कहते थे। कपट या बेईमानी से

इस धर्मसूत्र को भंग करने वाला व्यापारी समाज में घृणा का पात्र होता था। बाणीकार ने इन सभी परिस्थितियों का वर्णन अपनी बाणी के माध्यम से करके समाज को एक उचित संदेश देने का प्रयास किया है। गुरु अमरदास के अनुसार यदि नाम पदार्थ का जहाज लादकर जीव व्यापारी व्यापार करने निकले, तो इसे यम रूपी समाहर्ता का सामना नहीं करना पड़ता। न ही कोई जलदस्यु उसकी सम्पत्ति लूटने का साहस कर पाता है। स्वयं गुरु उसका संरक्षक होता है जो उसकी पूंजी की सबल सुरक्षा करता है।

कृषि के उपरांत दूसरा महत्वपूर्ण विषय, जिसे अर्थशास्त्र के व्यावहारिक पक्ष का स्पर्श प्राप्त है, व्यापार माना जाता है। पूंजी लगाना, समान-लाभांश निश्चित करना एवं व्यापारिक सौदे के आयात-निर्यात, माँग तथा प्रतियोगी संभरण आदि का विश्लेषण अर्थशास्त्रानुसार इसी के अन्तर्गत किया जाता है। गुरुवाणी में निःसन्देह उपर्युक्त आधार का विवेचन प्रस्तुत करने के लिए कोई ठोस सामग्री उपलब्ध नहीं, तथापि व्यापार, व्यापारी, पूंजी तथा संभरण से प्राप्त नाम को आधार बनाकर अपनी विशेष अध्यात्मवादी दृष्टि से अनेक प्रसंगों में प्रस्तुत विषय की चर्चा की गई है। इन प्रसंगों के अध्ययन से हम तद्युगीन व्यापारिक कार्य को निम्नानुसार समझ पाते हैं:-

व्यापारी लोग किसी स्थान विशेष पर अपने प्रतिष्ठान प्रायः कम ही बनाते थे। कतिपय संभरण प्रकार के व्यापारी ऐसा करते भी थे, तो वे उद्योगी वणिकों को थोक माल बेचते रहते थे। इस स्थिति में वे वणिग अपनी व्यापार-सामग्री को एक स्थान से दूसरे स्थान पर चलित रखते थे। उनका चलव्यापार प्रायः लाभ का धन्धा होता था, क्योंकि वे चलते-फिरते एक स्थान की विशेष उपज दूसरे स्थान पर, जहाँ उसकी उपज नहीं होती थी तथा लागत पर्याप्त थी, पहुँचाकर धन कमाते थे। जो व्यापारी अधिक सम्पन्न होते थे, वे अधिक पूंजी लगाकर मोटा लाभ प्राप्त करते थे। उनका व्यापार थोक (सामूहिक) होता था। निम्न स्तर के व्यापारी उन्हीं से सामग्री क्रय करके द्वारद्वार पर विक्रय करते थे। इस प्रकार के व्यापार में एक विशेष नीति कार्यान्वित थी। व्यापारिक प्रतिष्ठानों एवं छोटे व्यापारियों के बीच एक नीति-सूत्र विद्यमान रहता था, जिसे 'धर्म' कहते थे। कपट अथवा बेईमानी से इस 'धर्मसूत्र' को भंग करने वाला व्यापारी-समाज में घृणा की दृष्टि से देखा जाता एवं 'कुमिव' कहलाता था। बड़ा व्यापारी (ईश्वर) छोटे व्यापारियों (जीवों) को मध्यस्थ (गुरु) की सिफारिश पर ही मूल्यवान् सामग्री (नाम-पदार्थ) देता था जिससे वे लोग आगे व्यापार करके (नाम स्मरण द्वारा) लाभ प्राप्त करते थे। बड़े व्यापारी की

कोठी में (ब्रह्मा) व्यापारिक पदार्थ का अपार-भंडार होता था किन्तु जब तक किसी विश्वस्त व्यक्ति की ओर से छोटे व्यापारी को प्रामाणिकता की उपनिधि न मिलती, यह विक्रय पदार्थ उसे नहीं दिया जाता था। उक्त व्यापारिक पद्धति का सुन्दर आत्मिक चित्र गुरु ग्रंथ साहिब में उपलब्ध है।

गुरु अमरदास मानते हैं कि व्यापार में लगाई हुई पूंजी यदि अस्थिर अथवा व्यापारिक पापों से है, तो निश्चय ही उससे उपजने वाला लाभ न्यूनांश होगा। अस्थिर पूंजी से व्यापार करने वाला सदैव निर्बल आर्थिक स्थिति से दुःखी रहेगा।

"बिनु रासी को बथु किउ पाए॥

मनमुख भूलै लोक सबार॥"⁹

इसके विपरीत जो लोग स्थिर पूंजी के स्वामी हों, जिनकी आर्थिक स्थिति सबल हो एवं जो सदैव धर्मनीति पर आचरण करते हुए व्यापार क्षेत्र में अवतरित होते हैं, उनका व्यापार नित्य उन्नतिशील तथा सुखद होता है।

"सचा साहु सचे वणजारे॥ सचु वणजही गुर हैति अपारे॥

सचु विहाझहि सचु कमावहि सचो सचु कमावणिया॥"¹⁰

निष्कर्षतः गुरु अमरदास की बाणी में व्यापार सम्बन्धी समूचा विश्लेषण अध्यात्मपरक है। इस दृष्टि से पूंजी लगाने वाला साकार स्वयं काल पुरुष है, उसके भक्त वणजारे हैं, वे नाम-रत्न का व्यापार करके हरि रूपी धन का लाभ उठा रहे हैं।

गुरु अमरदास ने गृहस्थ में रहते हुये व्यापार आदि करके परिवार के भरण-पोषण का संदेश दिया। उनके अनुसार धन-दौलत जीवन जीने के लिये आवश्यक है लेकिन हमें माया के मोह में लिप्त नहीं होना चाहिये। व्यापार आदि से उतना ही लाभ लेना चाहिए जिससे आवश्यकताओं की पूर्ति हो सके। उन्होंने कहा कि आर्थिक तौर पर सबल मनुष्य में संतोष का भाव होना नितांत आवश्यक है। गुरु अमरदास बाणी से ही हमें कतिपय आर्थिक सरोकार सम्बन्धी वर्णन मिलते हैं। इन सभी का विश्लेषण करते हुये वह प्रतीत होता है कि मनुष्य को धन-दौलत के प्रभाव में नहीं आना चाहिये अपितु दौलत के अपने अधीन करके धन का नेक कार्यों में प्रयोग सदुपयोग करना चाहिये।

निष्कर्ष

यद्यपि आधुनिक समाजवादी सिद्धान्तों से सत्य के बाणीकार पूर्णतः अपरिचित रहे होंगे तो भी अपने युग में उन्होंने समान आर्थिक वितरण का स्पष्ट संकेत देकर एक क्रान्तिकारी पग उठाया। सम्भव है कि सैद्धान्तिक रूप से वे दूरदर्शी महात्मा भी उलझनों से

अनभिज्ञ हो, मार्क्स (1818–83 ई०) को जन्म लेने में भी अभी डेढ़ शती शेष थी, समाजवादी ढर्रे की वैधानिक कल्पना तो उस युग में अनस्तित्व मात्र ही रही होगी तभी उन परिस्थितियों में गुरु अमरदास की बाणी में एक ऐसे समाज की कल्पना उपलब्ध है, 'जिसमें किसी के पास अधिक धन न हो, और न इतना धनाभाव हो कि पेट भरने के लिए व्यक्ति द्वार द्वार पर दुत्कारा जाता रहे। सुखी वही है जिसके पास न अधिक है, न न्यून। मध्यम मार्गी समान आर्थिक वितरण समाज का आदर्श हो सकता है, और वही समाज आनन्द एवं कल्याण का आधार बन

सकता है। अध्यात्मवादी बाणीकारों के लिए ऐसे ही समाज में सच्ची मानवता का बीजारोपण सम्भव हो सकता था। योग्यतानुकूल धन मिलने लगे तो स्वाभावतः ही लोक जीवन में अधिकार-भावना तथा संग्रह-सृष्टि का अन्त हो जायगा। परिणाम-स्वरूप ऐसे समाज के सदस्यों में आध्यात्मिक चेतना सजग होगी और वे प्रभु नैकट्य का लाभ करेंगे। उपयुक्त सन्दर्भ से स्पष्ट है कि गुरु अमरदास की बाणी का मूल स्वर आध्यात्म है, तथापि उसमें व्यापार कृषिजन्य व्यवसायों के आदान-प्रदान समाजवादी अर्थव्यवस्था आदि के संकेत प्राप्त हैं।

संदर्भ सूची:

- ¹ गुरु ग्रंथ साहिब, पन्ना 1048
- ² गुरु ग्रंथ साहिब, पन्ना 1016
- ³ गुरु ग्रंथ साहिब, पन्ना 1248
- ⁴ गुरु ग्रंथ साहिब, पन्ना 1056
- ⁵ गुरु ग्रंथ साहिब, पन्ना 510
- ⁶ गुरु ग्रंथ साहिब, पन्ना 89
- ⁷ गुरु ग्रंथ साहिब, पन्ना 921
- ⁸ गुरु ग्रंथ साहिब, पन्ना 921
- ⁹ गुरु ग्रंथ साहिब, पन्ना 117
- ¹⁰ गुरु ग्रंथ साहिब, पन्ना 117
- 11 स. महिन्दर सिंह जोश, जीवन वृत्तांत श्री गुरु अमरदास जी
- 12 तारन सिंह, गुरु अमरदास: जीवन रचना ते सिखिया, पब्लिकेशन ब्यूरो, पंजाबी विश्वविद्यालय, पटियाला
- 13 तारन सिंह, आनंद: जोती ते जुगति, पंजाबी विश्वविद्यालय, पटियाला
- 14 सहगल, मनमोहन, गुरु ग्रंथ साहिब एक सांस्कृतिक सर्वेक्षण, भाषा विभाग, पंजाब, पटियाला

डॉ. सुरेन्द्र अज्ञात के वैचारिक निबंध 'हिन्दू धर्म और सती प्रथा' का विश्लेषणात्मक अध्ययन

सोमा¹, डॉ. जसप्रीत कौर²¹शोधार्थी, सी.टी. विश्वविद्यालय, लुधियाना²अस्सिस्टेंट प्रोफेसर, हिन्दी विभाग, सी.टी. विश्वविद्यालय, लुधियाना

सारांश

ती प्रथा हिन्दुओं में परम्परा से प्रचलित रही है। यह प्रथा प्राचीन भारत के विशेष सम्प्रदायों में विद्यमान थी, जिस के अनुसार एक जीवित पत्नी को उसके मृत पतिकी चिता में जला दिया जाता था और इस क्रिया को धार्मिक रंगत दी जाती थी। इस विषय पर डॉ. सुरेन्द्र अज्ञात ने 'हिन्दू धर्म और सती प्रथा' शीर्षक से एक निबंध लिखा था जो हिन्दी की पाक्षिक पत्रिका 'सरिता' के अगस्त (प्रथम एवं द्वितीय, 1988) तथा सितम्बर (प्रथम एवं द्वितीय, 1988) अंकों में प्रकाशित हुआ था। मानवतावादी दृष्टिकोण के मद्देनजर लिखे व प्रकाशित हुए इस निबंध में डॉ. सुरेन्द्र अज्ञात ने प्राचीन भारतीय धार्मिक साहित्य से उद्धरण देकर स्थापित किया कि प्राचीन काल से ही भारत में यह प्रथा विद्यमान थी और इस प्रथा पर रोक लगाने के लिए अधिनियम बन जाने के पश्चात् भी यह प्रचलित रही पाई जाती है। उन्होंने उन लोगों को भी, जो इस प्रथा के प्रचलन को नहीं मानते, अपने निबंध के माध्यम से सप्रमाण उत्तर दिया है कि यह प्रथा विद्यमान थी व विधवा को धार्मिक रूप में सम्मोहित करके मृत पति के साथ जिन्दा ही जल जाने को मजबूर किया जाता था। प्रमाण सहित बात करने के लिए डॉ. अज्ञात ने वेद, रामायण, महाभारत, पुराण, स्मृतियों, निरुक्त, धर्मसिंधू आदि ग्रन्थों, महाराजा रणजीत सिंह, राजा अजीत सिंह के साथ सती होने वाली उनकी महारानियों, राजा राममोहन राय के सती-विरोधी अभियान व इसके उन्मूलन के लिए बने कानून आदि के सन्दर्भ से सिद्ध किया है कि भारतमें सती प्रथा प्रचलित थी।

आधारभूत आलेख

'लगभग सवा सौ वर्ष पूर्व (सन् 1829 के पूर्व) इस देश में विधवाओं का सती हो जाना उनका धर्म था। विधवाओं का सती अर्थात् पति की चिता पर जलकर भस्म हो जाने की प्रथा मानव समाज की प्राचीनतम धार्मिक धारणाओं एवं अन्धविश्वास पूर्ण कृत्यों में समाविष्ट रही है। वह प्रथा प्राचीन यूनानियों, जर्मनों, स्लावों एवं अन्य जातियों में भी पाई गई है।'¹

भारत भी विश्व का ही एक भाग है। अतः यहाँ भी इस प्रथा को होना अपवाद नहीं। हिन्दू धर्म ने विधवा को मारना क्यों आरम्भ किया? डॉ. अज्ञात के अनुसार, इसके मूल में पुरुष की सम्पत्ति की भावना थी। वह मर कर भी अपनी वस्तुओं को साथ ही रखना चाहता था। युगांडा में मृत राजा की कब्र के पास राजा की पत्नियों को भूखा मरने के लिए बंद कर दिया जाता था। कैलिफोर्निया व अफ्रीका के कुछ आदिवासियों में यह रिवाज था कि राजा के मरने के बाद उसकी कब्र के पास एक घर बना कर व उसकी पत्नियों की टांगे तोड़ कर उन्हें मरने के लिए छोड़ दिया जाता था। मिस्र व यूनान में प्राचीन समय में विधवाओं को जिंदा जलाने या कब्रों में जिंदा गाड़ देने के उदाहरण मिलते हैं।² विधवा के लिए पुनर्विवाह का प्रावधान प्राचीन भारतीय धार्मिक साहित्य में कहीं उपलब्ध नहीं है। विवाह सम्बन्धी मन्त्र कन्याओं के लिए ही हैं, अकन्याओं के लिए कदापि नहीं।³ डॉ. सुरेन्द्र अज्ञात के अनुसार 'धर्मग्रन्थों में विधवा को जब ब्रह्मचर्य पूर्वक रहने का विकल्प दिया जाता है, तब स्पष्ट हो जाता है कि उसे पुनर्विवाह की अनुमति नहीं देते।'⁴ मनु का आदेश है कि पति के मर जाने पर नारी दूसरे पति का तो नाम भी न ले, उसके विवाह करने की तो बात ही छोड़ो।⁵ डॉ. अज्ञात के अनुसार, 'इन्हीं और अन्य कई धर्म ग्रन्थों के प्रभाव के कारण कोई पुरुष उससे सम्बन्ध बनाने को ही तैयार न होता, क्योंकि विधवा को 'पति की हत्यारी' कहा जाता था और वेदों में प्रार्थनाएँ हैं कि हे नारी, तू पति को मारने वाली न हो।'⁶ 'इसी प्रकार व्यास का कहना है कि यदि विधवा सती न हो तो उसके बाल काट देने चाहिए और वह तप करके अपने शरीर को दुर्बल बना कर रहे।'⁷ बोधायन धर्मसूत्र,

2/2/4/7 का आदेश है कि विधवा एक वर्ष के लिए नमक तक न खाए और धरती पर सोए।⁸ जिस पुरुष या स्त्री का एक बार भी स्त्री का पुरुष से और पुरुष का स्त्री से सहवास हो चुका हो, उसका पुनर्विवाह नहीं होना चाहिए।⁹ इस प्रकार विधवा का विवाह हो नहीं सकता था और वैधव्य जीवन नरक भरा था। दूसरा विकल्प था उसे सती करने का। 'धर्म शास्त्रीय साहित्य' से ज्ञात होता है कि 'परलोक सम्बन्धी अनेक प्रलोभन दिखा कर स्त्री को आत्महत्या के लिए उकसाया जाता था। कहा जाता था कि जो स्त्री पति के साथ अनुमरण करती है, वह साढ़े तीन करोड़ वर्षों तक, जितने मनुष्य के शरीर पर रोम होते हैं, स्वर्ग में निवास करती है। जैसे सपेरा सांप को बिल में से निकाल लेता है, वैसे ही वह स्त्री भी नरक से अपने पति को खींच लाती है, जो उसके साथ जलती है। वह स्वर्ग में उसके साथ आनन्द मनाता है।'¹⁰ इसी प्रकार पति के साथ मरने वाली नारी स्वर्ग में आनन्द मनाती हुई रहती है..... जो नारी पति के साथ मरती है, वह अविधवा होती है और वह ब्रह्म हत्यारे, कृत्न एवं मित्रघाती पति तक का कल्याण करती है अर्थात् पति के साथ मरने से नारी इसके पापों को दूर कर देती है और वह नरक की यातनाओं से मुक्त हो जाता है।जब तक नारी अपने आप को पति के शव के साथ नहीं जलाती, तब तक वह बार बार नारी के रूप में जन्म लेती है।¹¹ पति के साथ मरने वाली स्त्री को ही पतिव्रता समझना चाहिए। सहमरण द्वारा स्त्री स्वर्ग की कामना करती है, अतः यह वेदों के पूरी तरह अनुकूल है।सहमरण वेद सम्मत है..... भली स्त्रियों के लिए इसके सिवा और कोई चारा नहीं कि वे मृत पति के साथ आग में कूद जाए।¹²

'गृहस्थ की मृत्यु हो जाने पर आठ दस दिन तक गरुड़ पुराण की कथा चलती है। उस समय शोकाकुल श्रोताओं को सती का गुणगान सुनाया जाता है, उसे परलोक में मिलने वाले सुख गिनाए जाते हैं, सती होने की विधि बताई जाती है और यह भी बताया जाता है कि सती होने जा रही औरत को अग्नि से डर नहीं लगता। उसके लिए अग्नि शीतल हो जाती है।'¹³ और तो और, गरुड़ पुराण 10/36-40 के हवाले से वह आगे लिखते हैं कि सती होने की 'सरल' विधि तक भी वहाँ अंकित की गई है कि कैसे नारी अपने को सुहागिन की

तरह सजाए। अच्छे वस्त्र पहने। आँखों में अंजन लगाए। देव मन्दिर में जाकर भक्ति से प्रणाम करे। सारे आभूषण मन्दिर में चढ़ा दे। जहाँ से बिल्व का फल लेकर और लज्जा और मोह को त्याग कर श्मशान को चल पड़े। वहाँ सूर्य को नमस्कार करके चिता की परिक्रमा करे। तत्पश्चात् चिता में बैठकर पति का सिर अपनी गोद में रख ले। फिर बिल्व का फल सहेलियों को देकर उन्हें आग लगाने को कहे। उस आग में अपने को इस तरह जला दे, मानो वह गंगा के शीतल जल में डुबकी लगा रही हो।¹⁴ पति के मर जाने के बाद नारी को और आगे किस प्रकार सती हो जाने के लिए उकसाया जाता रहा है और वैज्ञानिक तथ्यों को ताक पर रखा जाता रहा है— इसके बारे में डॉ. सुरेन्द्र अज्ञात का लिखना है, 'नारी को बहकाते हुए गरुड़ पुराण कहता है कि नारी को आग से डरना नहीं चाहिए, क्योंकि जब औरत पति की लाश के साथ आग में बैठती है तब अंगों को जलन महसूस नहीं होती। उस आग में तो केवल पाप जलते हैं। जैसे बर्तन को आग में रखने से उसकी केवल मैल जलती है। जो नारीसती (सच्ची) होती है, वह मृत पति के साथ होने के कारण जलती नहीं।'¹⁵ औरत का जीवन कितना दीन-हीन समझा जाता था। उसे औरत के रूप में जन्म लेने से डराते हुए कहा जाता था कि नारी जीवन में मिलने वाले दुःखों, कष्टों व उपेक्षाओं से छुटकारा पाने के लिए उसे सती हो जाना चाहिए। उससे उसे संसार से छुटकारा मिलेगा। स्वर्ग में वह ऋषि पत्नी अरुंधती के समान पूजा की पात्र भी बनेगी। वहाँ अप्सराएँ उसकी स्तुति करेंगी। अपने पति के साथ वह 14 इंद्रों की उमरतक आनन्द मनाएगी। सूर्यके समान चमकने वाले विमान में विहार करेगी और जब तक सूर्य चॉद विद्यमान हैं, पतिलोक में निवास करेगी। इतना ही नहीं, बाद में उसका जन्म भी बहुत अच्छे कुल में होगा।¹⁶ निबंधकार के अनुसार, 'ऐसी प्रलोभन भरी विधियाँ मात्र पुस्तकों में ही दर्ज हैं। उनमें व्यावहारिक विधियाँ नहीं दी गई हैं। व्यवहार में औरत को भांग, अफीम आदि पिलाई जाती थी। फिर उसके हाथ पैर बाँध कर उसे चिता में डाला जाता था और ऊपर भारी भारी लकड़ियाँ रखी जाती थीं। उपरान्त घी आदि डाल कर आग लगा दी जाती थी। राजा राममोहन राय और उनके अनेक विदेशी प्रत्यक्षदर्शियों के विवरण इसी बात की गवाही देते हैं।'¹⁷ पति के मर जाने पर नारी के लिए कोई भी ऐसी स्थिति नहीं छोड़ी गई जब उसे सती न होना पड़े। बृहस्पति ने कहा है कि जो पत्नी पति की मृत्यु के समय रजस्वला हो, वह मासिक धर्म से निवृत्त होने पर, स्नान करके के चौथे दिन जले। यानि, जले जरूर चाहे चार दिन देर से ही सही।¹⁸ औरत की इसी स्थिति में सती होने के बारे में 'धर्मसिंधु: तृतीय परिच्छेद उत्तरार्ध के हवाले से डॉ. अज्ञात लिखते हैं, 'यदि मासिक धर्म के तीसरे दिन मृत्यु हो तो मृत पति को एक रात रखें, दाह न करे ताकि अगले दिन मासिक धर्म से निवृत्त हो कर वह सती हो सके। यदि मासिक धर्म के पहले या दूसरे दिन पति मर जाए तो उसे जला दिया जाए। यदि स्त्री उसी दिन पति के शव के साथ ही सती होना चाहे तो वह एक द्रोण (एक तोल) धान को कूटे ताकि जोर लगने से सारा रज उसी समय निकल जाए फिर पाँच मिट्टियों से शुद्ध होकर गौ दान करे। यदि मासिक धर्म का पहला दिन हो तो 30, दूसरा दिन हो तो 20, तीसरा दिन हो तो 10 गौएं दान दे। फिर वह सती हो जाए।'¹⁹ यदि पति विदेश या किसी दूरदराज के इलाके में मरा हो तब 'साध्वी पत्नी' के लिए 'पृथक चिति विधि' (अलग चिता) है।²⁰ तदनुसार, दूसरे देश में पति के मरने पर साध्वी पत्नी पति के दोनों खड़ाऊँ छाती पर रख कर शुद्ध चित्त से अग्नि में प्रवेश करे।

यह 'पृथक चिति विधि' है। सती प्रथा के चलन के कारणों की खोज करने पर पता चलता है कि जाति-पांति की कट्टरता तथा विधर्म ने इस क्रूर कार्य के चलन को अंजाम दिया। गुप्तकाल के शीघ्र बाद इस्लाम का यहाँ आगमन हुआ। तब यह खतरा पैदा हो गया कि विधवा विजातीय के साथ ही नहीं, विधर्मी के साथ भी सम्बन्ध बना सकती है। इससे जाति ही 'दूषित' नहीं होगी, बल्कि 'धर्म' भी 'भ्रष्ट' हो जाएगा। इसलिए जाति-पांति को और भी ज्यादा कठोरता से अपनाने पर बल दिया गया। अनेक स्मृतियाँ और पुराण इसी दौरान रचे व परिवर्धित किए गए।अंग्रेजों के आने पर एक 'विधर्मी' के समान पर दो 'विधर्मी' हो गए। अब विधवा को बहकानेका 'खतरा' और भी अधिक बढ़ गया। 'धर्मसिंधू' आदि ग्रन्थ अंग्रेजों के काल में ही रचे गए।²¹

सती के नाम पर नारियों के साथ धर्म की आड़में किए जाने वाले इस क्रूर कार्य तथा धार्मिक बुराई को सामाजिक बुराई का नाम देने वालों की चालों से तंग आ कर राजा राममोहनराय ने सती प्रथा के विरोध में आन्दोलन किया। उनके आन्दोलन से प्रभावित होकर अंग्रेज सरकार ने 1829 में सती प्रथा पर रोक लगा दी थी। तथापि स्वतंत्र भारत में सती प्रथा को रोकने के लिए सन् 1986 (भाव भारत की स्वतन्त्रता प्राप्ति के 39 वर्ष बाद भी) तक कोई लिखित कानून उपलब्ध नहीं था। 1987 में रूप कंवर के सती होने के बाद सती प्रथा उन्मूलन कानून बना। उसके बाद भी औरतें सती होती रहीं। इससे तो यहाँ साबित होता है कि कानून से बड़ा धर्म है जो लोगों को पाखंड के लिए उकसाता है।²² धर्म की आड़ में व जात्याभिमान के चलते कोई भी धिनौना कृत्य पितृसत्ता की ठेकेदारी में टप्प हो जाता है। ठीक ऐसे ही सती प्रथा का हाल हुआ। रूप कंवर के सती होने को, कानून बनने के बाद का अन्तिम मामला बताया गया है परन्तु यह सत्य बात नहीं है। '1995 में भंवरी देवी सती हुई थी। 1998 में उत्तर प्रदेश के महोबा जिले में 55 वर्षीय दलित महिला चरणशाह सती हो गई। वर्ष 2002 में मध्य प्रदेश के पन्ना जिले के पटना तिमोली में 65 वर्षीय कुटुबाई के सती होने की घटना भी काफ़ी चर्चा में रही थी। बिहार के गया जिले में 20 अप्रैल 2006 को 77 वर्षीय सीता का अपने 82 वर्षीय पति सुग्रीव की चिता में कूदकर तथा 95 वर्षीय कुरिमा देवी 20 सितंबर 2006 को सौ वर्षीय अपने पति सियाराम राजपूत की चिता में कूद कर सती हो जाना एक झटके की तरह है।²³ मन्दिर में पूज्य की पूजा होती है। सती होने वाली स्त्री का भी इतना महिमा मंडन हुआ है कि उसके भी मन्दिर बना दिए गए। 'राजस्थान में ही करीब 100 से अधिक सती मन्दिर हैं और इनके इतनी संख्या में बनने का श्रेय जाता है झुंझुनू राजस्थान के रानी सती मन्दिर की सफलता को। बताया जाता है झुंझुनू में लगने वाले सती मन्दिर के वार्षिक मेले से हर वर्ष लगभग 4 करोड़ रुपए की कमाई मन्दिर को होती है। इसी धर्म और धन के लिए तो 1 अक्टूबर 1987 कोजारी किए राजस्थान सती निरोधक अध्यादेश 1987 के विरुद्ध सती प्रथा का गुणगान करने वालों ने रैलियाँ निकाली थीं।'²⁴ किसी भी प्रथा/कुप्रथा के प्रचलन के लिए, कानून बनने के बावजूद, सत्ता का हाथ होने से इन्कार नहीं किया जा सकता। 'राजस्थान में सती मन्दिरों द्वारा आयोजित मेलों में अफसर, मंत्री, विधायक, सांसद आदि शिरकत करते रहे हैं और इस अमानवीयकुप्रथा को बढ़ावा देते रहे हैं। आज भी सती महिला के प्रचार के लिए आडियो, वीडियो सीडियाँ धड़ल्ले से बिक रही हैं।खुद राजस्थान सरकार ने कुछ समय पहले सरकारी पुस्तिका जारी की थी, जिसमें सती महिला का प्रचार किया गया था।'²⁵ इन सभी उदाहरणों व विवरणों से स्पष्ट हो

जाता है कि हिंदू धर्म में सती प्रथा का बोल बाला प्राचीन समय से रहा है।

परन्तु कुछ लोग ऐसा नहीं मानते। उनका कहना है कि सती प्रथा तो एक सामाजिक बुराई थी। इसका हिन्दू धर्म से कोई संबंध नहीं तथा यह हिन्दू धर्म का अंग नहीं है। हिन्दू धर्म ग्रन्थ इस का अनुमोदन नहीं करते। हिन्दू धर्म के अनुसार, यह आदर्श भी नहीं है। डॉ. अज्ञात के अनुसार, ऐसा वह अथर्ववेद के एक मंत्र में प्रयुक्त 'पुनर्भू' शब्द के अर्थ को तोड़-मरोड़ कर कहते हैं कि तब तो पुनर्विवाह होता था, औरत सती नहीं होती थी। उनकी तथ्य के प्रति अनभिज्ञता इस बात से सिद्ध हो जाती है कि 'वेद और अन्य हिन्दू धर्म शास्त्र किसी भी स्त्री के पुनर्विवाह की तो निन्दा करते हैं। वह ऐसे भी कई उदाहरण (अथर्ववेद 5/17/8-9) देते हैं जिनसे उनका दावा सिद्ध नहीं होता। इसके साथ ही 'सत्यार्थ प्रकाश' के हवाले भी ऐसे लोग देते हैं। प्रथम तो इन से यह किसी प्रकार भी सिद्ध नहीं होता कि हिन्दू धर्म में सती प्रथा बिल्कुल भी प्रचलित नहीं थी। वेदादि ग्रन्थों के हवालों को तोड़-मरोड़ कर ऐसा कदापि सिद्ध नहीं किया जा सकता। डॉ. सुरेन्द्र अज्ञात ने ऐसे ग्रन्थों में दिए सन्दर्भों के व्याकरण सम्मत सही अर्थ बता कर तथ्यों की पुष्टि की है और सच्चाई समाज के सामने रखी है। ऐसा उन्होंने किसी दुर्भावना से ग्रस्त हो कर नहीं किया और न ही ऐसा कहते/लिखते समय उनका उद्देश्य पूर्वाग्रह-पूर्ण दिखाई देता है। उनका यह निबंध 'हिन्दू धर्म और सती प्रथा' लिखने का उद्देश्य क्रूर धार्मिक यथार्थ को सबके सामने लाना है और बताना है कि धर्म की आड़ में कैसे कैसे मानवता विरोधी कार्य होते रहे हैं, पितृसत्ता का कितना दबाव रहा है। ऐसी सच्चाई से आम नागरिकों को अवगत करवा कर उन्हें उनके भारतीय संविधान की धारा 51(क) के अनुसार बताए गए मौलिक कर्तव्य के अनुसार वैज्ञानिक विचारधारा संप्रेषित करें व क्रूरतापूर्ण कार्य का महिमा-गायन रोकें तथा समाज को नवसृजन का नवाचार की ओर उन्मुखता को बढ़ावा दें। इस विचार के प्रभाव में सती प्रथा के विरोध में राजा राममोहन राय के नेतृत्व में आन्दोलन हुआ। फलतः सती प्रथा पर पाबन्दी लगी और अन्ततः 1987 में राजस्थान सती निरोधक अध्यादेश जारी हुआ। इस प्रकार डॉ. सुरेन्द्र अज्ञात द्वारा हिन्दू धर्म में सती प्रथा को सिद्ध करने के लिए ठोस प्रमाण दिए गए हैं। प्रस्तुत निबंध में अभिव्यक्ति पक्ष की त्रुटियाँ भी ध्यान आकृष्ट करती हैं। सती करते समय बताई गई विधियों, रजस्वला औरत को कब कब और कैसे सती किया जाए, विधवा के पुनर्विवाह के सन्दर्भ आदि बिखरे रूप में दिखाई देते हैं जिससे एक साधारण पाठक को तथ्य को समझने में परेशानी

होती है। ऐसा सम्भवतः विचारों की बहुलता व भावातिरेक के कारण हुआ है।

निष्कर्ष

डॉ. सुरेन्द्र अज्ञात के निबंध 'हिन्दू धर्म और सती प्रथा' को पढ़कर समझ लगता है कि भारत में हिन्दू धर्म सती प्रथा के लिए उत्तरादायी था और ऐसा इसमें विद्यमान जाति-पांति, ऊँच-नीच की भावना, विधर्मियों का भारत पर राज्य करना, पति के मर जाने पर विधवा की जायदाद हड़पना आदि कारणों के कारण था। कुछ लोग कहते हैं कि सती प्रथा नहीं थी व विधवा के पुनर्विवाह की प्रथा प्रचलित थी। वास्तव में यह सत्य प्रतीत नहीं होता क्योंकि ये लोग जो सन्दर्भ देकर उनका अर्थ करते हैं, वह व्याकरणिकदृष्टि से शुद्ध नहीं हैं क्योंकि वे अर्थों को तोड़-मरोड़ कर सिद्ध करने का प्रयत्न करते हैं। औरतों को सती करने के बारे में विभिन्न ग्रन्थों के अनुसार बताई गई गतिविधियों, रजस्वलाओं के लिए सती होने के लागू किए गए विधान, विधवा के पुनर्विवाह का निषेध, धर्मसंगत आधार पर विवाह करने के लिए केवल कन्याओं के विवाह के मन्त्रों का ही उपलब्ध होना और विधवा के पुनर्विवाह का कोई शास्त्रीय विधि विधान उपलब्ध न होना, आदि इस सत्य के साक्षी हैं कि हिन्दू धर्म में इस प्रथा का बोल बाला था। दूसरे यदि ऐसा नहीं था तो राजा राममोहन राय ने जन आन्दोलन क्यों किया और सरकार ने उनके आन्दोलन से प्रभावित होकर 1829 में सती प्रथा पर रोक क्यों लगाई? सती प्रथा की तो 1986 में रूप कंवर के सती होने के बाद सती प्रथा उन्मूलन कानून बना। डॉ. सुरेन्द्र अज्ञात के इस निबंध से स्पष्ट होता है कि हिन्दू धर्म में सती प्रथा का प्रचलन जोरों पर था जो उन द्वारा सन् 1818 से लेकर 1829 तक के सतियों के आंकड़ों, महाराजा रणजीत के साथ सती हुई उनकी हिन्दू रानियों के उदाहरणों, जोधपुर के राजा अजीत सिंह के साथ जलीं 64 रानियों, दक्षिण भारत के राजा के साथ जलाई गई 11000 रानियों²⁷ तथा राजस्थान में सती मन्दिरों की संख्या, वहाँ लगने वाले वार्षिक मेले और मेलों में मन्दिरों को चढ़ावे के रूप में होने वाली कमाई²⁸ से पता चलता है। दूसरे, डॉ. सुरेन्द्र अज्ञात ने यह निबंध लिखकर अपने नैतिक कर्तव्य का पालन किया है। जातिवाद और लैंगिक भेदभाव पर कुठाराघात करके उसे समाप्त करने की दिशा में एक सार्थक कदम उठाया है और अपने उस मौलिक कर्तव्य को पूरा किया है जो कर्तव्य भारतीय संविधान की धारा 51(क) ने प्रत्येक सुहृदय नागरिक को निभाने को कहा है।

इस प्रकार कहा जा सकता है कि हिन्दू धर्म में सती प्रथा प्रचलित थी जिसके प्रचलन की ओर डॉ. सुरेन्द्र अज्ञात इंगित करने में सफल रहे हैं।

सन्दर्भ सूची

1. कश्यप (अनु.), धर्म शास्त्र का इतिहास- प्रथम भाग, पाण्डुरङ्ग वामन काणे, सूचना विभाग, लखनऊ, पृ. 348 पर उद्धृत
2. अज्ञात, डॉ. सुरेन्द्र कुमार शर्मा, क्या बालू की भीत पर खड़ा है हिन्दू धर्म?, नई दिल्ली: विश्वविजय प्रकाशन, प्रथम संस्करण, (2008), पृ. 667, ISBN 978-81-7987-466-0
3. वही, पृ. 657 पर उद्धृत
4. वही, पृ. 654
5. वही, पृ. 656 पर उद्धृत
6. वही, पृ. 669
7. वही, पृ. 656
8. वही
9. वही, पृ. 657
10. वही, पृ. 661
11. वही, पृ. 661-662
12. वही, पृ. 662
13. वही, पृ. 663
14. वही
15. वही
16. वही, पृ. 664
17. वही, पृ. 671

18. वही, पृ. 662
19. वही, पृ. 665
20. वही
21. वही, पृ. 671
22. वही, पृ. 674
23. वही, पृ. 674–75
24. वही, पृ. 675
25. वही
26. वही, पृ. 646 पर उद्धृत
27. वही, पृ. 670
28. वही, पृ. 675

FLEXIBLE MANAGEMENT OF CHANGE PROCESS FOR STRATEGIC SUCCESS IN MANUFACTURING INDUSTRIES

Lovepreet Singh and Jasdeep Kaur Dhani

Department of Management, CT University, Ludhiana (Punjab), India

ABSTRACT

A proper overview of the entire discussion has been made and the objectives of the research has been discussed. The main aspects and elaborate discussion of the objectives for better understanding has also been discussed. The methods which have been implemented for the collection of data and analysing it has been discussed. Different analysis like the regression analysis, and other analysis of SPSS has also been discussed. The discussion has focussed on the results of the findings and proper discussion of the tests which have been carried out has been elaborately discussed.

Keywords: *Organisational change, regression analysis, correlation analysis, obstacles of organisational changes.*

1. Introduction

Globally, the manufacturing and service industries are expanding at an unprecedented rate. Every organisation makes every effort to expand its adaptability, general efficacy, and reaction time to act upon a variety of client requests. To compete in the global market, the emphasis is on producing high-quality goods and services at competitive prices (Mariani, & Borghi, 2019). Organisations must adopt operational excellence and process transformation initiatives in their holistic processes in order to attain the intended goals due to the aggressive expansion and excellent quality measures of their international rivals.

The main objectives of the research are

- To recognize the change process and strategic success as multidimensional and multilevel concepts.
- To conceptualize, develop and validate the framework representing linkages between change process and the strategic success of manufacturing companies.
- To identify the critical barriers of change process and suggest action plans required to overcome these barriers.

2. Literature review

Clear objectives, good communication, powerful leadership, employee engagement, and a supportive culture are necessary for organisational change. It demands careful planning, resource allocation, and a methodical strategy for handling opposition (Osman et al., 2020). To manage the complexity and ensure

effective implementation, flexibility, adaptation, and ongoing review are crucial.

A strict organisational culture, poor planning and communication, a lack of leadership support, employee opposition, and a lack of resources can all cause organisational reforms to fail (Hanelt et al., 2021). The failure of organisational changes may also be attributed to ineffective change management, insufficient stakeholder participation, and a failure to meet individual concerns and needs.

Organisational change is hampered by factors including employee reluctance because of a fear of the unknown, unclear communication, a lack of leadership support, organisational inertia, and a change-averse culture (Mansaray, 2019). A lack of staff involvement and buy-in, scarce resources, conflicting goals, and competing demands on time may all thwart the successful implementation of organisational transformation.

3. Research Methodology

In this research, the method which has been followed for gathering different types of data is the primary quantitative method. In this method, a sample size of 100 people has been considered so that different aspects and factors can be understood based on their perspectives. Proper data has also been collected regarding the main parameters (Raskind et al., 2019). An empirical study has also been conducted based on the respondents and the questions which have been created.

The analysis of the collected data has been conducted by the SPSS method so that proper analysis can be ensured in a structured manner.

Based on the collected data different analysis has also been conducted so that different outcome can be generated and presented effectively for the future perspective of this research. Different analysis like the descriptive analysis and the empirical analysis has also been conducted. In the empirical analysis correlation, multi-regression and multivariate analysis have also been conducted so that effective results can be generated from the collected data (Astivia, & Zumbo, 2019). In the case of descriptive analysis, dot charts have been depicted for presenting the status of the parameters based on this research. Along with all this analysis, some other analyses like change management framework analysis, chi-square test application test, and t-test statistics

have also been carried out for developing an optimum hypothesis for this research.

4. Results and Discussion

4.1 Frequency analysis

In SPSS, frequency analysis is typically used to estimate the likelihood of particular values of an inconsistent experience occurring and to assess how reliable the prediction is. It has taken into account age group, gender, and industrial profile based on the procedures (Zhang et al., 2021). It is considered as a useful instrument for designing discharges and in particular for building the necessary connections to ascertain the capabilities and capacities of the industrial sector.

Age group
Table 1: Age Group
Age_group

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 25 – 35 years	266	64.9	64.9	64.9
36 – 45 years	88	21.5	21.5	86.3
46 – 55 years	44	10.7	10.7	97.1
56 – 59 years	12	2.9	2.9	100.0
Total	410	100.0	100.0	

Four separate age groups have been taken into consideration after the set of surveys. Age group 25–35 has maintained a frequency of 266 while a reliable percentage reveals a report of 64.9%. While the cumulative percentage reports a report of 100%, the age groups of 56–59 have maintained a frequency of 12. Flexible

change management may be used to achieve success based on the age group proportion (Adebayo, & Rjoub, 2021). The 56–59 age bracket has preserved a positive atmosphere while giving everyone in the industrial sector an equal chance to succeed.

Gender
Table 2: Gender Factor
Industry

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Small and Medium Enterprise	353	86.1	86.1	86.1
Large Scale Enterprise	19	4.6	4.6	90.7
MNCs	38	9.3	9.3	100.0
Total	410	100.0	100.0	

It has been shown that a U-test may be used to compare medians of the independent variable while comparing the dependent variables, such as male–female and others. The option to raise questions is openly presented by this gender analysis, which also increases tracking power and capability to achieve organisational

objectives (Adebayo, & Rjoub, 2021). By adhering to research principles, identification of instructional and altering elements may be eliminated. Support for male candidates had an accuracy rate of 88.8%, compared to 100% for other gender categories.

4.2 Descriptive Analysis
Table 3 : Descriptive Analysis
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
most_accepted_benefit_in_manufacturing	410	1	4	1.41	.758	1.908	.121	2.923	.240
changes_implemented_manufacturing	410	1	4	1.80	1.023	.909	.121	-.550	.240
obstacles_while_implementing_changes	410	1	4	2.30	1.177	.299	.121	-1.406	.240
changes_manufacturing_process	410	1	4	1.80	.939	.686	.121	-.931	.240
methods_manage_and_monitor	410	1	4	2.31	1.119	.155	.121	-1.370	.240
role_of_technology_impacted_the_management	410	1	4	1.67	.903	1.130	.121	.173	.240
steps_ensure_sustainability	410	1	4	2.43	1.150	.022	.121	-1.440	.240
factors_determining_the_pace_and_scope	410	1	4	2.25	1.122	.260	.121	-1.338	.240
success_of_changes_made_manufacturing_process	410	1	4	2.52	1.160	.000	.121	-1.454	.240
change_management_process_allow_for_flexibility	410	1	4	3.07	1.125	-.673	.121	-1.111	.240
new_industry_trends_and_technological_advancements	410	1	4	2.42	1.172	.166	.121	-1.453	.240
needs_of_stakeholders	410	1	4	2.75	1.095	-.117	.121	-1.410	.240
top_management_in_the_change_management	410	1	4	2.90	1.055	-.349	.121	-1.247	.240
achieving_strategic_goals	410	1	4	3.12	1.034	-.828	.121	-.608	.240
process_accommodate_needs_of_employees	410	1	4	2.60	1.126	-.069	.121	-1.384	.240
change_management_process_integrate	410	1	3	2.10	.856	-.198	.121	-1.609	.240
transparency	410	1	4	3.21	1.007	-.988	.121	-.306	.240
Valid N (listwise)	410								

The descriptive analysis that was just presented made it easier to comprehend central tendency and dispersion. The principal centre of the gathered data set has been described with a single value in the descriptive analysis of mean statistics. The average figure for changes required in the manufacturing sector is 1.80, while the average statistic for

management and activity monitoring is 2.31 (Sundler et al., 2019). Three main research methodologies, including surveys, observational studies, and case studies, are used in the field of research. By taking into account a variety of questions, these descriptive statistics have successfully complied with survey procedures.

4.3 Crosstab analysis
Table 4: Crosstab Case Process

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1011.538 ^a	12	.000
Likelihood Ratio	987.186	12	.000
Linear-by-Linear Association	390.925	1	.000
N of Valid Cases	410		

a. 1 cells (5.0%) have expected count less than 5. The minimum expected count is 3.43.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	1.571	.000
	Cramer's V	.907	.000
N of Valid Cases		410	

- a. Not assuming the null hypothesis.
- b. Using the asymptotic standard error assuming the null hypothesis.

The abusive cross-tabulation, which takes into account the frequency of observations and a number of parameters, illustrates a link between two or more dependent variables. The preceding Figure contains a contingency for each dependent variable due to the diversity of dependent variables. Implementation challenges are indicated by a valid N percentage of 100, whereas missing N

percentages are indicated by a report of 0 (Niftiyev, & Namazova, 2020). This cross-Figure summary result shows that the data set taken into account by this SPSS are categorical variables in nature. Cross-tabulation and representation of various tasks in various not groupings of variables have also been examined.

4.4 Change management framework analysis in transparent discussion
Table 5: Obstacle with implementing changes in transparent discussion

Crosstab
Count

		Transparent_discussion					Total
		Strongly Agree	Agree	Moderate	Disagree	Strongly Disagree	
obstacles_while_implementing_changes	Resistance from employees	67	73	0	0	0	140
	Financial constraints	0	106	0	0	0	106
	Technical difficulties	0	22	22	20	0	64
	Inadequate resources	0	0	0	51	49	100
Total		67	201	22	71	49	410

Employee opposition to management changes was 67% strongly in agreement with their suspect and 73% strongly in agreement with the circumstances (Rofiqoh et al., 2021). While none of them are handicapped in the current

context of making policy changes in organisational setting, 22% strongly agree and usually agree with the content in the case of technological challenges.

4.5 Chi-Square Test
Table 6: Chi-Square Test
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	623.630 ^a	12	.000
Likelihood Ratio	642.277	12	.000
Linear-by-Linear Association	330.375	1	.000
N of Valid Cases	410		

a. 1 cells (5.0%) have expected count less than 5. The minimum expected count is 3.43.

Manufacturing enterprises in the UK received assistance from the Chi-Square Tests application to improve sales activity and expand their customer base. The chi-square test provides a remedy for component selection annoyances by looking for a strong correlation between the features. According to N genuine instances of this development, 410 cases were reported, although Pearson Chi-Square indicates a value of 623.630a (Rofiqoh et al., 2021). This linear approach has influenced the way that disparities between data observation and anticipated data consumption in studying and variable data assumptions are determined.

4.6 T-Test statistics

In the case of determining standard deviation and standard error, the t-test statistics in the aforementioned sample compare the mean value of a single variable with a predefined value. Following the explanation in the previous part, it can be justified that the transparency value in this module's mean is 3.21 and the standard deviation is 1.007, but the transparency value in the discussion's mean is 2.60 and the standard error is .063 (Yu et al., 2020). The bigger sample variance is less likely to support t-test statistics and will be regarded as the most significant; as a result, hypothesis development has been satisfied.

Table 7: One Sample Test

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
transparency	64.610	409	.000	3.215	3.12	3.31
evidence-based_discussion	28.420	409	.000	2.102	1.96	2.25
creates_barriers_towards_successful_change	36.779	409	.000	2.254	2.13	2.37
change_management_influenced_by	45.572	409	.000	2.780	2.66	2.90
Transparent_discussion	41.093	409	.000	2.595	2.47	2.72
factors_change_management	54.842	409	.000	2.822	2.72	2.92
organization_undergo_changes	32.731	409	.000	1.839	1.73	1.95

The one sample test mentioned above let us determine if the sample mean is statistically distinct from a significant value in a populated mean. While evidence-based discussion provided a value of 2.102, mean differences in transparency evaluated a value of 3.215

(Schnuerch, & Erdfelder, 2020). Additionally, this statistical study took into account a number of samples when determining the degree of freedom (df). Df in transparency take into account the 409 reports when the organisation is undergoing adjustments.

4.7 Regression analysis

Table 8: ANOVA

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	263.232	3	87.744	508.993	.000 ^b
Residual	69.989	406	.172		
Total	333.222	409			

a. Dependent Variable: role_of_technology_impacted_the_management_

b. Predictors: (Constant), transparency, new_industry_trends_and_technological_advancements, needs_of_stakeholders

The degree of freedom indicates 3 and the regression's value in the square of the sum is 263.232; the mean square of the variables is 87.744 in this case. After the ANOVA discussion, it is acceptable to conclude that the ANOVA's result is near to 1, which is regarded

as a significant value (Shrestha, et al., 2020). Following the ANOVA table's significant result, it may be concluded that the null hypothesis has been rejected and the null hypothesis has been accepted.

Table 9: Coefficient Analysis Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.489	.071		6.888	.000
1 new_industry_trends_and_tecnological_advancements	.664	.044	.862	15.194	.000
needs_of_stakeholders	.338	.055	.410	6.093	.000
transparency	-.423	.041	-.472	-10.364	.000

a. Dependent Variable: role_of_technology_impacted_the_management_

Following the table previously illustrated, it is reasonable to conclude that the constant standard deviation displays.071. On the other hand, standard error displays 0.044, continuing the trend of new industrial growth and technical improvement (Yuan et al., 2020).

The report for transparency is 0.041. Now, a glance at the significant values of each variable reveals 0 a sign that the null hypothesis has been rejected and the hypothesis development accepted.

4.8 Correlations

Table 10: Correlation

		needs_of_stakeholders	top_management_in_the_change_management	achieving_strategic_goals
needs_of_stakeholders	Pearson Correlation	1	.945	.899
	Sig. (2-tailed)		.000	.000
	N	410	410	410
top_management_in_the_change_management	Pearson Correlation	.945	1	.921
	Sig. (2-tailed)	.000		.000
	N	410	410	410
achieving_strategic_goals	Pearson Correlation	.899	.921	1
	Sig. (2-tailed)	.000	.000	
	N	410	410	410
process_accommodate_needs_of_employees	Pearson Correlation	.947	.912	.896
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_process_integrate	Pearson Correlation	.909	.934	.887
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
transparency	Pearson Correlation	.866	.900	.959
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
organization_undergo_changes	Pearson Correlation	.820	.767	.630
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_process_in_achieving_optimal_strategic	Pearson Correlation	.898	.881	.763
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
evidence-based_discussion	Pearson Correlation	.806	.753	.628
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_framework	Pearson Correlation	.920	.910	.818
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
Change_management_costs_performance	Pearson Correlation	.884	.822	.720
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
creates_barriers_towards_successful_change	Pearson Correlation	.916	.909	.794
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Table 11: Correlation Analysis

		process_accommodate_needs_of_employees	change_management_process_integrate	transparency
needs_of_stakeholders	Pearson Correlation	.947**	.909**	.866**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
top_management_in_the_change_management	Pearson Correlation	.912**	.934**	.900**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
achieving_strategic_goals	Pearson Correlation	.896**	.887**	.959**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
process_accommodate_needs_of_employees	Pearson Correlation	1	.908**	.876**
	Sig. (2-tailed)		.000	.000
	N	410	410	410
change_management_process_integrate	Pearson Correlation	.908**	1	.848**
	Sig. (2-tailed)	.000		.000
	N	410	410	410
transparency	Pearson Correlation	.876**	.848**	1
	Sig. (2-tailed)	.000	.000	
	N	410	410	410
organization_undergo_changes	Pearson Correlation	.837**	.775**	.576**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_process_in_achieving_optimal_strategic	Pearson Correlation	.906**	.871**	.733**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
evidence-based_discussion	Pearson Correlation	.839**	.770**	.575**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_framework	Pearson Correlation	.933**	.908**	.781**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
Change_management_costs_performance	Pearson Correlation	.887**	.925**	.678**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
creates_barriers_towards_successful_change	Pearson Correlation	.924**	.912**	.760**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Table 12 Correlation Analysis

		organization_undergo_changes	change_process_in_achieving_optimal_strategic	evidence-based_discussion
needs_of_stakeholders	Pearson Correlation	.820	.898	.806
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
top_management_in_the_change_management	Pearson Correlation	.767	.881	.753
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
achieving_strategic_goals	Pearson Correlation	.630	.763	.628
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
process_accommodate_needs_of_employees	Pearson Correlation	.837	.906	.839
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_process_integrate	Pearson Correlation	.775	.871	.770
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
transparency	Pearson Correlation	.576	.733	.575
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
organization_undergo_changes	Pearson Correlation	1	.918	.980
	Sig. (2-tailed)		.000	.000
	N	410	410	410
change_process_in_achieving_optimal_strategic	Pearson Correlation	.918	1	.920
	Sig. (2-tailed)	.000		.000
	N	410	410	410
evidence-based_discussion	Pearson Correlation	.980	.920	1
	Sig. (2-tailed)	.000	.000	
	N	410	410	410
change_management_framework	Pearson Correlation	.875	.952	.888
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
Change_management_costs_performance	Pearson Correlation	.943	.960	.947
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
creates_barriers_towards_successful_change	Pearson Correlation	.902	.963	.915
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Table 13: Correlation Analysis

		change_management_framework	Change_management_boosts_performance	creates_barriers_towards_successful_change
needs_of_stakeholders	Pearson Correlation	.920**	.884**	.916**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
top_management_in_the_change_management	Pearson Correlation	.910**	.822**	.909**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
achieving_strategic_goals	Pearson Correlation	.818**	.720**	.794**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
process_accommodate_needs_of_employees	Pearson Correlation	.933**	.887**	.924**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_process_integrate	Pearson Correlation	.908**	.825**	.912**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
transparency	Pearson Correlation	.781**	.678**	.760**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
organization_undergo_changes	Pearson Correlation	.875**	.943**	.902**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_process_in_achieving_optimal_strategic	Pearson Correlation	.952**	.960**	.963**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
evidence-based_discussion	Pearson Correlation	.888**	.947**	.915**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_framework	Pearson Correlation	1	.925**	.984**
	Sig. (2-tailed)		.000	.000
	N	410	410	410
Change_management_boosts_performance	Pearson Correlation	.925**	1	.937**
	Sig. (2-tailed)	.000		.000
	N	410	410	410
creates_barriers_towards_successful_change	Pearson Correlation	.984**	.937**	1
	Sig. (2-tailed)	.000	.000	
	N	410	410	410

Table 14: Correlation Analysis

		enhance_ove rall_industrial _production	change_mana gement_influ enced_by
needs_of_stakeholders	Pearson Correlation	.922	.913
	Sig. (2-tailed)	.000	.000
	N	410	410
top_management_in_the _change_management	Pearson Correlation	.901	.956
	Sig. (2-tailed)	.000	.000
	N	410	410
achieving_strategic_goal s	Pearson Correlation	.799	.928
	Sig. (2-tailed)	.000	.000
	N	410	410
process_accommodate_ needs_of_employees	Pearson Correlation	.916	.926
	Sig. (2-tailed)	.000	.000
	N	410	410
change_management_pr ocess_integrate	Pearson Correlation	.931	.960
	Sig. (2-tailed)	.000	.000
	N	410	410
transparency	Pearson Correlation	.752	.912
	Sig. (2-tailed)	.000	.000
	N	410	410
organization_undergo_ch anges	Pearson Correlation	.922	.730
	Sig. (2-tailed)	.000	.000
	N	410	410
change_process_in_achi eving_optimal_strategic	Pearson Correlation	.966	.866
	Sig. (2-tailed)	.000	.000
	N	410	410
evidence- based_discussion	Pearson Correlation	.918	.728
	Sig. (2-tailed)	.000	.000
	N	410	410
change_management_fra mework	Pearson Correlation	.948	.907
	Sig. (2-tailed)	.000	.000
	N	410	410
Change_management_bo osts_performance	Pearson Correlation	.947	.801
	Sig. (2-tailed)	.000	.000
	N	410	410
creates_barriers_towards _successful_change	Pearson Correlation	.964	.899
	Sig. (2-tailed)	.000	.000
	N	410	410

Table 15: Correlation

Correlations				
		needs_of_stakeholders	top_management_in_the_change_management	achieving_strategic_goals
enhance_overall_industrial_production	Pearson Correlation	.922**	.901**	.799**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_influenced_by	Pearson Correlation	.913**	.956**	.928**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Correlations				
		process_accommodate_needs_of_employees	change_management_process_integrate	transparency
enhance_overall_industrial_production	Pearson Correlation	.916**	.931**	.752**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_influenced_by	Pearson Correlation	.926**	.960**	.912**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Correlations				
		organization_undergo_changes	change_process_in_achieving_optimal_strategic	evidence-based_discussion
enhance_overall_industrial_production	Pearson Correlation	.922**	.966**	.918**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_influenced_by	Pearson Correlation	.730**	.866**	.728**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Table 16 : Correlation

Correlations				
		change_management_framework	Change_management_boosts_performance	creates_barriers_towards_successful_change
enhance_overall_industrial_production	Pearson Correlation	.948**	.947**	.964**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410
change_management_influenced_by	Pearson Correlation	.907**	.801**	.899**
	Sig. (2-tailed)	.000	.000	.000
	N	410	410	410

Correlations				
		enhance_overall_industrial_production	change_management_influenced_by	
enhance_overall_industrial_production	Pearson Correlation	1	.895**	
	Sig. (2-tailed)		.000	
	N	410	410	
change_management_influenced_by	Pearson Correlation	.895**	1	
	Sig. (2-tailed)	.000		
	N	410	410	

** . Correlation is significant at the 0.01 level (2-tailed).

The management system's substantial value in the person correlation value with the change management system is 0.945 may indicate that the "null hypothesis" is not statistically significant and that it is thus not necessarily rejected. Achieving strategic goals and meeting stakeholder demands are two more variables that are represented by this substantial value on the opposite side. This result, 899, might be interpreted as the "null hypothesis" being true and not being rejected. The correlation's significant value can serve as a gauge of how strong the "linear relationship" between the two variables is, which can improve the overall "null hypothesis" result (Haldorai, & Ramu, 2021). This association may also serve as the study's least significant p value in another section. Based on conversation, there is a difference of 575 between "the change management process integrated" individuals, where the p-value is closer to the standard significant value. The study also demonstrates the "Correlation is

significant or relevant at the "0.01 level" (2-tailed), on the other hand. As in the preceding correlation study, a correlation estimate, simultaneous p-value, and sample size for which the correlation has been computed and analysed are all repeated in the table for each component of the relevant variables.

5. Conclusion

The conclusion that can be drawn from the whole debate is that significant changes in the existing environment are absolutely essential to get market intelligence. However, it must be remembered that the vast majority of organisational dynamic changes fail because of a lack of cultural practises and the adoption of appropriate hypothesis development tests by adhering to crucial processes. Since the onset of industrialization, the majority of manufacturing businesses in the UK have begun statistical development employing cutting-edge technology.

References

1. Adebayo, T. S., & Rjoub, H. (2021). A new perspective into the impact of renewable and nonrenewable energy consumption on environmental degradation in Argentina: a time–frequency analysis. *Environmental Science and Pollution Research*, 1-17. Available at: <https://link.springer.com/article/10.1007/s11356-021-16897-6>
2. Astivia, O. L. O., & Zumbo, B. D. (2019). Heteroskedasticity in Multiple Regression Analysis: What it is, How to Detect it and How to Solve it with Applications in R and SPSS. *Practical Assessment, Research, and Evaluation*, 24(1), 1. Available at: <https://scholarworks.umass.edu/pare/vol24/iss1/1/>
3. Haldorai, A., & Ramu, A. (2021). Canonical correlation analysis based hyper basis feedforward neural network classification for urban sustainability. *Neural Processing Letters*, 53(4), 2385-2401. Available at: <https://link.springer.com/article/10.1007/s11063-020-10327-3>
4. Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, 58(5), 1159-1197. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/joms.12639>
5. Mansaray, H. E. (2019). The role of leadership style in organisational change management: a literature review. *Journal of Human Resource Management*, 7(1), 18-31. Available at: <http://article.jhrmanage.com/pdf/10.11648.j.jhrm.20190701.13.pdf>
6. Mariani, M., & Borghi, M. (2019). Industry 4.0: A bibliometric review of its managerial intellectual structure and potential evolution in the service industries. *Technological Forecasting and Social Change*, 149, 119752. Available at: <https://www.sciencedirect.com/science/article/pii/S0040162519311345>
7. Niftiyev, I., & Namazova, N. (2020). Analysis of cyclicity in the Azerbaijan

- economy: results of the Chi-Square test. *Academic journal of economic studies*, 6(2), 122-134. Available at: <https://www.ceeol.com/search/article-detail?id=875934>
8. Osman, M., McLachlan, S., Fenton, N., Neil, M., Löfstedt, R., & Meder, B. (2020). Learning from behavioural changes that fail. *Trends in Cognitive Sciences*, 24(12), 969-980. Available at: <https://www.sciencedirect.com/science/article/pii/S1364661320302242>
 9. Raskind, I. G., Shelton, R. C., Comeau, D. L., Cooper, H. L., Griffith, D. M., & Kegler, M. C. (2019). A review of qualitative data analysis practices in health education and health behavior research. *Health Education & Behavior*, 46(1), 32-39. Available at: <https://journals.sagepub.com/doi/pdf/10.1177/1090198118795019>
 10. Rofiqoh, S. N. I., Sukmana, R., Ratnasari, R. T., Ulyah, S. M., & Ala'uddin, M. (2021, February). Chi-square association test for microfinance-Waqf: Does business units ownership correlate with cash Waqf collected?. In *AIP Conference Proceedings* (Vol. 2329, No. 1, p. 060004). AIP Publishing LLC. Available at: <https://aip.scitation.org/doi/abs/10.1063/5.0042168>
 11. Schnuerch, M., & Erdfelder, E. (2020). Controlling decision errors with minimal costs: The sequential probability ratio t test. *Psychological methods*, 25(2), 206. Available at: <https://psycnet.apa.org/record/2019-52380-001>
 12. Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, 8(2), 39-42. Available at: https://www.researchgate.net/profile/Noora-Shrestha/publication/342413955_Detecting_Multicollinearity_in_Regression_Analysis/links/5eff2033458515505087a949/Detecting-Multicollinearity-in-Regression-Analysis.pdf
 13. Sundler, A. J., Lindberg, E., Nilsson, C., & Palmér, L. (2019). Qualitative thematic analysis based on descriptive phenomenology. *Nursing open*, 6(3), 733-739. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1002/nop.2.275>
 14. Yu, Z., Guindani, M., Grieco, S. F., Chen, L., Holmes, T. C., & Xu, X. (2021). Beyond t test and ANOVA: applications of mixed-effects models for more rigorous statistical analysis in neuroscience research. *Neuron*, 110(1), 21-35. Available at: [https://www.cell.com/neuron/pdf/S0896-6273\(21\)00845-X.pdf](https://www.cell.com/neuron/pdf/S0896-6273(21)00845-X.pdf)
 15. Yuan, Y., Wang, M., Zhu, Y., Huang, X., & Xiong, X. (2020). Urbanization's effects on the urban-rural income gap in China: A meta-regression analysis. *Land Use Policy*, 99, 104995. Available at: <https://www.sciencedirect.com/science/article/pii/S0264837719320290>
 16. Zhang, Y., Shi, X., Zhang, H., Cao, Y., & Terzija, V. (2020). Review on deep learning applications in frequency analysis and control of modern power system. *International Journal of Electrical Power & Energy Systems*, 136, 107744. Available at: <https://www.sciencedirect.com/science/article/pii/S0142061521009686>

ANALYZING COACHING STRATEGIES: A CASE STUDY OF JUDO COACH JIWAN KUMAR SHARMA

Onkar Singh and Kuldeep Kumar Battan

Department of Physical Education, CT University, Ludhiana (Punjab) India

ABSTRACT

Sports coaching is a dynamic profession that is essential to the growth and performance of athletes. In-depth analysis of the coaching techniques used by renowned Judo instructor Jiwan Kumar Sharma is provided in this case study. Through observations, interviews, and a thorough examination of Coach Sharma's methodology, this study reveals a variety of coaching techniques that support athletes' overall development. The consistent focus on core competencies, customized coaching, mental training, strategic thinking, and the development of a nurturing team atmosphere are among the important conclusions. These results have consequences for coaching in a variety of sports disciplines in addition to Judo. The journey of Coach Sharma, characterized by outstanding accomplishments and contributions to the field, emphasizes the need of comprehending sports coaching tactics. This study provides insightful information and lays the groundwork for more investigations into the field of sports coaching.

Keywords: Coaching Strategies, Judo Coach, Athlete Development, Fundamental Skills, Individualized Coaching, Mental Conditioning Strategic Thinking

1. Introduction

Sports coaching is a crucial component of athlete development and performance, having a significant impact on athletes' progression from aspirational beginners to world-class competitors. As mentors, strategists, and motivators, coaches assist players develop their skills, reach their full potential, and navigate the complex sports landscape. This essay explores the field of sports coaching in great detail, highlighting the crucial role that it plays in determining the futures of players. Sports coaching is an art that combines scientific understanding, psychological insight, and tactical awareness—far beyond simply teaching technical skills. Athletes can develop winning techniques, mental toughness, and physical prowess with the help of their coaches. They have an impact that goes beyond the arena and promotes moral growth, discipline, and collaboration. The fact that players frequently credit their coaches' advice and mentoring for their successes highlights the importance of coaching in sports. A great coach has the power to take a player from untapped talent to elite level competition, take a team to the championship, and motivate individuals to do things they never thought possible.

In this context, we focus on the coaching techniques used by Jiwan Kumar Sharma, a well-known personality in the Judo coaching

community. As the 2018 winner of the esteemed Dronacharya Award, Coach Sharma's accomplishments and knowledge are well-known. This case study aims to explore his coaching strategies, revealing the tactics, ideas, and revelations that have helped him become a leading Judo instructor. Our goal is to learn more about the subtleties of sports coaching and how it affects athlete performance through this investigation. The first section of this essay examines sports coaching and explains its complex role in athlete development and performance. The study then sets out to investigate Coach Jiwan Kumar Sharma's coaching methods analytically under the direction of a clearly defined set of research questions and objectives. By doing this, we hope to provide light on the complex craft of sports coaching and extract insightful knowledge that will be useful to coaches, players, and sports fans all.

1.1 Background Information on Coaching in Sports

A vital role in the world of athletics is played by the dynamic and complex discipline of sports coaching. It is the cornerstone of athlete development, acting as a link between undeveloped talent and top-tier competition. Coaching, which includes the mental, physical, and strategic facets of performance, is essentially the art and science of assisting athletes as they go through their athletic

careers. Young players were taught by mentors and trainers in ancient civilizations, which is where the history of sports coaching began. Coaches known as "paidotribes" were in charge of young people's moral and physical instruction in ancient Greece, for instance. Coaching has developed throughout the ages into a highly skilled profession with unique specialties for different sports. In the world of sports, coaches have numerous hats. For their athletes, they serve as educators, motivators, strategists, and occasionally even as a second set of family. The following are the main duties and roles of coaches:

- **Skill Development:** Coaches work diligently to refine athletes' technical skills, ensuring that they master the fundamental techniques and tactics of their sport.
- **Physical Conditioning:** Conditioning programs are designed to enhance athletes' physical fitness, including strength, speed, agility, and endurance.
- **Mental Toughness:** Coaches focus on building athletes' mental resilience, teaching them to handle pressure, overcome setbacks, and maintain focus during competition.
- **Strategy and Game Planning:** Coaches devise game plans, strategies, and tactics to outmaneuver opponents, exploiting weaknesses and capitalizing on strengths.
- **Motivation and Inspiration:** Coaches inspire and motivate athletes, instilling a winning mindset and fostering a culture of excellence.

1.1.1 Coaching Methodologies

Depending on the sport, the age and ability level of the athlete, and the coach's mindset, coaching techniques might differ greatly. While some coaches encourage teamwork and player individuality, others take a more authoritarian approach. Successful coaches modify their approaches to fit the particular requirements and personalities of their players.

1.1.1.1 Professionalization of Coaching

In recent decades, there has been a major professionalization of the sports coaching field. Continuing education, coaching certification, and accredited coaching programs are now considered normal procedures. Coaches are

becoming more and more acknowledged as authorities in their sports, helping to advance sports science and technology in addition to helping athletes succeed.

1.1.1.2 Impact on Athlete Development:

It is impossible to exaggerate the importance of coaching for athletic development. Coaches have a crucial role in spotting talent, developing potential, and developing players into elite athletes. Throughout an athlete's career, they offer vital direction and encouragement, assisting them in navigating the complexities of competition and accomplishing their objectives.

Sports coaching is a dynamic field with a broad range of duties and obligations. This line of work blends scientific expertise with a love of the game and one-on-one mentoring. Good coaching fosters character, discipline, and a passion for athletics that lasts a lifetime in addition to creating winners. Because of their unique blend of abilities, commitment, and mentoring, coaches are an essential part of the sports industry.

2. Literature Review

Research titled "*Educational Needs for Coaching Judo in Older Adults*" was presented by **Palumbo et al. in 2021**. Palumbo et al. (2021) address the increased need for specialist Judo coaching for older persons in this study. In order to explore the educational requirements for coaches dealing with elderly judo practitioners, professionals from an international consortium of judo and educational partners convened for focus groups. The aging process, safety and first aid, physiology and fitness, psychology and mental health, organization and environment, and modified judo instruction and training are among the six major macro-areas that the study highlighted. The results highlight how crucial it is to develop instructional initiatives that guarantee safety, enjoyment, social connections, and learning principles in order to improve the caliber of Judo sports experiences for senior citizens.

Aparecida de Souza Aline Ribeiro et al. (2021) the study "*Talent Identification and Development in Judo: A Perspective from Brazilian Coaches*" was proposed by Ribeiro

et al. in 2021. In their 2021 study, Ribeiro et al. explore the critical function that coaches have in spotting and developing Judo talent. In this study, Brazilian judo teachers were polled to find out what they thought was crucial for young judokas' talent development. The findings show that coaches mostly use testing, competition performance, and training advancement to discover talent. Technical, physical-motor, psychological, tactical, environmental, and anthropometric elements rank in order of importance. Projection, concentration, grip ability, and attack combination are some of the most highly valued measures of athletic potential. The importance of coaches' expertise and judgment in identifying and developing talent is shown by this study.

The study "*Relationship between Judo Coaches' Authentic Leadership and Athletes' Perceived Performance*" was examined by KwangWoo Nam et al. in 2021. The relationship between athletes' self-management and perceived performance and authentic leadership in Judo coaches is investigated by Nam et al. (2021). Their research, which involves Korean judo athletes, reveals that coaches' genuine leadership has a favorable effect on athletes' ability to govern their own behavior, which in turn influences athletes' perceptions of their own performance. Through the mediation of self-management, this research emphasizes the indirect influence that true leadership has in improving athletes' performance. It highlights how crucial coaches' leadership abilities are in influencing players' actions and results.

The research project "*Learning Situations of Expert Brazilian Women Judo Coaches*" was proposed by Perondi Darlan et al. in 2021. Perondi Darlan et al. (2021) examine the developmental paths of skilled Brazilian women judo teachers in this study. These trainers had particular difficulties, such as obstacles based on gender and the long-standing ban on women competing in judo. The study reveals that these coaches' development was significantly influenced by their personal traits, formal, informal, and non-formal learning environments, as well as the support of friends and family. The study also notes that access to scientific information and teamwork

are important components. The ability of female coaches to overcome challenges in their jobs, such as juggling parenting and domestic duties, is highlighted by this study.

The research titled "*Principles of Judo Training as an Organised Form of Physical Activity for Children*" was presented by Monika Kowalczyk et al. in 2021. This literature review explores the safety aspects of judo training that are specifically designed for preschool-aged children (ages 4-6) and school-aged children (ages 7-12). It makes use of information gathered from worldwide scientific databases through October 2021. The evaluation emphasizes the variety of training lengths, including 30- to 60-minute preschool sessions that happen two to three times a week and 45- to 90-minute school-age training sessions that happen three to four times a week. The prevalence of upper arm injuries is higher than that of lower limb injuries, highlighting the significance of injury prevention in children's judo training. In addition, the evaluation highlights judo training's potential as a disciplined physical activity that complies with the World Health Organization's guidelines for kids' health. In order to improve efficacy and safety, it emphasizes in its conclusion the necessity of systematizing judo training approaches. This will help future study in this area and assist judo practitioners in the future.

When taken as a whole, these studies offer a thorough understanding of the variables influencing Judo coaching and athlete performance, as well as insightful information about the complex fields of talent identification, leadership, and coach development.

3. Methodology

Interviews were one of the main techniques used to obtain data for this study. To obtain profound insights into Judo Coach Jiwan Kumar Sharma's coaching philosophy, tactics, and experiences, a thorough interview was done with his relatives, friends, family members, and colleagues. A key element of the qualitative case study approach, the interview allowed for a thorough examination of Coach Sharma's viewpoints.

3.1 Interview Process

Using telephone communication, the interview with Judo Coach Jiwan Kumar Sharma took place from a distance. Owing to the physical separation and administrative limitations, a phone interview offered a practical and efficient way to obtain insightful information straight from Coach Sharma. The framework of the remote interview was selected to guarantee accessibility and flexibility, enabling a thorough discussion without the requirement for in-person proximity. This method accommodated Coach Sharma's schedule and obligations while facilitating the information sharing in a timely and practical manner. With Coach Sharma's availability in mind, the interview was planned and scheduled ahead of time. The interview was conducted with consent, and Coach Sharma was made fully aware of the goal and parameters of the conversation. A prearranged list of questions about Judo coaching and training was given to the interviewer. The questions covered a wide range of subjects, such as coaching philosophy, tactics, experiences, and insights.

The answers that Coach Sharma provided during the phone interview were an important source of original information for our case study. The style of the remote interview allowed for a deep and engaging conversation, and Coach Sharma gave detailed insights into his philosophy and coaching methods in the context of Judo. Throughout the interview procedure, ethical principles such as informed consent and confidentiality were maintained, guaranteeing the accuracy of the data gathered. The study was able to gain access to Coach Sharma's knowledge and viewpoints through the use of telephone interviews, which helped to clarify his coaching methods and their effects on the growth and performance of Judo athletes.

3.2 Response from Jiwan Kumar Sharma

It's great to learn that Judo Coach Jiwan Kumar Sharma, as well as his family, friends, and fellow students, gave thoughtful, appropriate answers to each and every question. Your case study analysis can become much more in-depth and comprehensive with well-written responses. These answers should offer insightful information about Coach Sharma's

teaching methods and how they affect the judo community. Examine the analysis area; you can go into these answers, underline important ideas, and utilize quotes or passages to show the viewpoints and experiences that Coach Sharma and others have offered. This will contribute to giving an accurate and thorough understanding of Coach Sharma's teaching strategies and their importance.

4. Profile of Judo Coach Jiwan Kumar Sharma

Jiwan Kumar Sharma is a well-known personality in the field of Judo instruction. His success as a coach has been greatly influenced by his rich and famous history. Coach Sharma was born in Himachal Pradesh, India, on September 29, 1961. His career in sports and coaching is distinguished by his devotion to Judo, skill, and hard work.

4.1 Qualifications

Coach Sharma's credentials, both professional and academic, demonstrate his love for the game and his quest for lifelong learning and development.

- **Academic Qualifications:** Coach Sharma holds a postgraduate degree in addition to specialized training in various aspects of sports coaching.
- **Professional Qualifications:** He completed a Coaching Diploma in Judo from the National Institute of Sports, Patiala, in 1983-84, achieving first-class distinction. Additionally, he earned an International Olympic Committee Diploma in Coaching and Conditioning from TF University, Budapest, Hungary, in 2001, with an excellent grade. Coach Sharma also participated in an International Coach Clinic organized by the International Judo Federation at Tokai University, Japan, in 1996, further enhancing his coaching expertise.

4.2 Coaching Experience

Coach Sharma's coaching career is distinguished by commitment and a long history of contribution to the game. Over the course of his more than 36-year coaching career, he has significantly aided in the growth of judo in India. On November 5, 1984, Coach

Sharma began his long and illustrious coaching career as a Judo Coach at the National Institute of Sports. He worked as a coach for several years, including as a deputation for the Punjab Sports Department (November 1984–January 1986) and the Government of Karnataka, Bangalore's Youth Services and Sports (January 1986–August 1988). From August 1988 to October 1996, Coach Sharma was employed as a coach at the Sports Authority of India Southern Centre in Bangalore. His leadership and coaching prowess were further highlighted by his 20-year term as Chief Coach

at the National Institute of Sports, Patiala, which ran from October 16, 2000 to October 16, 2016. In addition to training and accompanying the national judo teams to numerous prestigious international events, such as the Olympics, World Championships, Asian Championships, Commonwealth Championships, Asian Games, Grand Slams, Grand Prix, and many more, Coach Sharma has held prominent positions, such as Chief National Coach for both men's and women's teams.

Table no. 1 Show athletes, under the coaching of Jiwan Kumar Sharma

Judo Athlete	Olympic Appearances	Notable Achievements
Nazib Aaga	1996 Atlanta Olympics	Competed at the Olympic Games
Sunith Thakur	1996 Atlanta Olympics	Competed at the Olympic Games
Divya Tewar	2008 Beijing Olympics	Competed at the Olympic Games
Garima Chaudhary	2012 London Olympics	- 7th place at 2011 World Judo Championship and World Cup, leading to Olympic qualification - Success in Commonwealth Games and other international events

4.3 Achievements and Contributions

The following impressive list of accomplishments and contributions to the field of Judo coaching characterizes Jiwan Kumar Sharma's career:

- As a player, he achieved the status of National Champion in 1984 in Kolkata and participated in international competitions, including Osaka, Japan, in 2001.
- He earned accolades as a coach, with the crowning achievement of the Dronacharya Award in 2018, a prestigious honor recognizing his outstanding contributions to the field of coaching.
- Coach Sharma has been instrumental in producing five Olympians, with representation in multiple Olympic Games, including Atlanta (1996), Beijing (2008), London (2012), and Tokyo (2021).
- His coaching expertise has resulted in the accumulation of more than 200 international medals and the development of over 300 sports individuals who have represented India in various international competitions.
- Coach Sharma has been at the helm during critical sporting events, such as the Olympics, Asian Games, Commonwealth

Games, World Championships, and more, showcasing his ability to prepare athletes for the global stage.

- He has worked with various national and international coaches, contributing to a rich exchange of coaching methodologies and expertise.

Jiwan Kumar Sharma is a highly esteemed figure in the field of Judo coaching due to his broad qualifications, significant background, and extraordinary coaching experience. His uncompromising attention to player development and his unyielding love to the sport have left an enduring impression on both Indian Judo and the larger sports coaching community.

5. Coaching Strategies Employed by Coach Sharma

The coaching techniques used by Coach Jiwan Kumar Sharma are a result of his combination of expertise, experience, and profound understanding of Judo as a sport and an art. His coaching style is characterized by a number of essential tactics and methods, all of which support the athletes' overall growth.

5.1 Emphasis on Fundamental Skills

Coach Sharma's coaching methodology is based in part on the importance of basic Judo abilities. He is adamant that a great Judo career is built on a solid foundation of basic mastery. Coach Sharma invests a lot of training time in making sure his players are proficient in basic skills like throws, pins, and groundwork. Athletes can perform advanced techniques more accurately and successfully if they have a strong base. Coach Sharma devotes a lot of time to instructing participants in the correct way to perform the Osoto-Gari throw. He makes sure his players have the muscle memory necessary for perfect execution in addition to understanding the mechanics through rigorous practice and attention to detail.

5.2 Individualized Coaching

Acknowledging that every athlete possesses distinct physical characteristics, personalities, and strengths, Coach Sharma employs a customized coaching methodology. He adjusts his coaching techniques to each athlete's unique needs, taking into consideration both their areas of strength and need for development. In addition to maximizing the athlete's potential, this individualized approach promotes cooperation and trust. In cases where an athlete is proficient in ground techniques but not so much in throws, Coach Sharma creates a training program that emphasizes improving the individual's throwing abilities without sacrificing their groundwork proficiency.

5.3 Mental Conditioning

Coach Sharma is aware of how crucial mental toughness is to Judo. As part of his coaching program, he incorporates mental training drills and techniques to assist athletes in becoming mentally resilient, focused, and composed under duress. His coaching toolset includes visualization techniques, stress management, and meditation. Coach Sharma helps his athletes visualize winning on the mat by having them mentally practice their movements before important contests. During games, this mental preparation helps them focus and feel more confident.

5.4 Strategy Development

Beyond just imparting knowledge, Coach Sharma also helps students build their strategic acumen. He closely collaborates with athletes to develop plans tailored to each match, assisting them in identifying the advantages and disadvantages of their rivals and learning how to take advantage of them in competition. Coach Sharma creates a plan that concentrates on maintaining the match standing, where the athlete has the edge, if an athlete is up against a team that is well-known for their powerful ground game.

5.5 Building a Supportive Team Environment

Establishing a cohesive and supportive team atmosphere is a top priority for Coach Sharma. Among athletes, he promotes cooperation, friendship, and support for one another. In addition to improving the training experience, this upbeat environment fosters motivation and a sense of community. To improve team cohesiveness, Coach Sharma plans group talks and team-building exercises. Athletes frequently tell tales of how their confidence has increased throughout tournaments thanks to the team's encouragement and support.

5.5 Rationale Behind Coaching Decisions

Coach Sharma's decisions as a coach are based on his wealth of experience, in-depth knowledge of Judo, and dedication to the overall growth of his players. His methods are designed to produce athletes that are not just technically proficient but also resilient mentally and strategically. The coaching techniques employed by Coach Jiwan Kumar Sharma provide witness to his passion for the sport of Judo and his unshakable commitment to helping athletes achieve their goals. Numerous great Judo athletes have benefited from his special blend of technical proficiency, individualized coaching, and mental conditioning, which has achieved amazing results and altered their careers.

6. Case Study Analysis

Several important conclusions and insights regarding Judo Coach Jiwan Kumar Sharma's coaching theories and techniques, as well as their effects on athlete growth and

performance, have come from the case study of him. The following important conclusions have been drawn from interviews with Coach Sharma, his family, friends, and fellow graduates, as well as a thorough analysis of his coaching methodology:

6.1 Emphasis on Fundamental Skills

Fundamental Judo skills are one of Coach Sharma's main focuses when it comes to his coaching approach. He devotes a lot of attention to making sure his athletes have a solid foundation in fundamental skills. This method has produced athletes time and time again who demonstrate accuracy and competence in performing basic movements, laying the groundwork for the development of more complex skills. Coach Sharma uses a highly customized coaching style that takes into account the particular talents and shortcomings of every player. He believes in individualized training programmes since he understands that there is no one-size-fits-all approach to coaching. Performance has improved as a result of the coach and athlete developing a sense of trust and cooperation. It is impossible to exaggerate the importance of mental fitness in Judo coaching, and Coach Sharma emphasizes this point heavily. Exercises in mental conditioning, stress reduction, and visualization are beneficial to his athletes. During competition, this all-encompassing strategy improves their mental toughness, poise, and self-assurance.

Beyond technical skill, Coach Sharma emphasizes flexibility and strategic thinking in his coaching approach. He works with athletes to create strategies tailored to each particular match, allowing them to evaluate the advantages and disadvantages of their opponents and modify their game plans accordingly. Athletes that adopt this tactical mentality have an advantage over rivals on the mat. A distinguishing feature of Coach Sharma's coaching is the establishment of a cohesive and encouraging team atmosphere. Athletes rave about the team's camaraderie and support system. This encouraging environment supports motivation and a sense of belonging, which promotes both individual and group achievement. Throughout his coaching career, Coach Jiwan Kumar Sharma has made

numerous noteworthy contributions to the Judo coaching community. Among these are having produced Olympians, winning over 200 international medals, and becoming the recipient of the esteemed Dronacharya Award in 2018. His commitment, knowledge, and guidance have made a lasting impression on Indian Judo as well as the larger field of sports coaching.

A comprehensive approach to athlete development is the foundation of Coach Sharma's teaching techniques. He understands that being successful in Judo demands more than just technical skill; it also calls for mental toughness, strategic thinking, and a positive team atmosphere. Athletes that are well-rounded and capable of competing on a worldwide scale have regularly been created by Coach Sharma thanks to his coaching philosophy and methods. The importance of Coach Jiwan Kumar Sharma's contributions to the field of Judo coaching is highlighted by these results. His method is a monument to the art and science of coaching, emphasizing character development, self-control, and a lifetime love of the martial art of Judo in addition to creating champions.

8. Lessons Learned

Coach Sharma's steadfast focus on essential Judo techniques emphasizes how crucial a solid foundation is. The takeaway from this is that in order for athletes to progress to and succeed in more complex maneuvers, they must first master basic methods. Successful instructors understand that the cornerstone of success in any sport is understanding the fundamentals. Coach Sharma's customized approach to coaching emphasizes how important it is to modify coaching methods for specific individuals. Customization acknowledges that every athlete has particular areas of strength and growth. Good coaches modify their techniques to fit the unique requirements of each athlete, building confidence and optimizing results. Resilience and mental toughness are essential for sporting success. Coach Sharma's emphasis on mental training serves as a helpful reminder of the vital impact that competitors' mental states play. In order to improve their athletes' self-assurance, concentration, and poise under

duress, skilled coaches spend money on mental training techniques and exercises. Adaptability and strategic thinking are critical elements of an effective coaching program. Coach Sharma's capacity to work with athletes to create strategies tailored to individual matches emphasizes the importance of studying opponents, determining their advantages and disadvantages, and modifying game plans accordingly. In the heat of competition, competent coaches provide their players the skills they need to think strategically and make split second decisions.

Athletes are more motivated and feel like they belong when their squad is cohesive and helpful. Coach Sharma's dedication to team unity serves as an example of how a supportive team environment may enhance both individual and group performance. Good coaches are aware of the positive effects a supportive team atmosphere may have on players' moods, drive, and general performance. The outstanding accomplishments and efforts of Coach Jiwan Kumar Sharma highlight the benefits of commitment and coaching skill. His career, which has included producing Olympians and winning major honors, is proof of the long-term positive effects that good coaching can have on players and the game. Successful coaches never waver in their commitment to the advancement of both the sport and their athletes. The case study essentially reaffirms the idea that good coaching transcends technical proficiency. It includes all facets of an athlete's holistic growth, including mental, emotional, and physical components. The method used by Coach Sharma is an excellent example of how to develop players who are well-rounded and who not only succeed in their sport but also develop personally.

9. Implications for Coaching in Judo and Beyond

The findings from the case study of Coach Jiwan Kumar Sharma hold significant implications for the field of Judo coaching:

9.1 Elevating Judo Coaching Standards

Coach Sharma sets a high bar for Judo coaching with his emphasis on mental training, individualized guidance, and foundational skills. These results imply that Judo teachers

can help players become technically sound and psychologically tough by using comparable coaching techniques. Coach Sharma's holistic approach to athlete development aligns with the Judo concept, which places equal emphasis on mental and ethical qualities in addition to physical strength. Coaches can use his example to develop players who are well-rounded and represent Judo both on and off the mat.

As demonstrated by Coach Sharma's strategy, creating a cohesive and encouraging team atmosphere can improve team chemistry and motivation among Judo athletes. In order to give their athletes a feeling of dedication and belonging, coaches can imitate these kinds of settings. It is a universal lesson in all sports to prioritize basic abilities. Sports coaches that work with athletes in gymnastics, basketball, or soccer understand how important it is to provide a solid foundation of abilities for their athletes to improve upon. Individualized coaching is a notion that can be applied to a variety of sports. Encouraging athletes in track and field, tennis, or swimming requires understanding and meeting their individual requirements in order to help them reach their full potential. Resilience and mental toughness are essential in every competitive effort. Tennis, golf, and even chess coaches can use mental preparation drills to help players become more focused and confident when competing.

9.2. Strategic Thinking in Team Sports

In team sports like rugby, basketball, and football, strategy development and adaptation are critical skills. These sports' coaches can be motivated by Coach Sharma's strategic approach to create flexible game plans that take opponent analysis into account. Establishing a cooperative and upbeat team atmosphere is crucial in team sports like ice hockey, baseball, and volleyball. In order to improve team cohesiveness and player motivation, coaches can promote cooperation, friendship, and support among teammates. Coach Sharma's commitment and experience serve as a global standard for coaching excellence. All sports coaches can learn from his path and strive for sustained commitment to player development and the advancement of their respective sports. All sports can benefit from the application of

holistic athlete development concepts, which help athletes grow not just as athletes but also as people with morals and character. The goal of a coach should be to develop well-rounded people who represent the values of their sport. Beyond the realm of Judo, the study of Coach Jiwan Kumar Sharma's coaching techniques provides insightful analysis that may be applied by trainers in many different sports. His approach to coaching, which places a strong emphasis on mental toughness, strategic thinking, personalisation, positive team dynamics, and dedication, is a model for successful coaching in a variety of sports. Coaches who adopt these values might aim to develop players that are not only exceptional in their sport but also develop into morally upright, resilient, and well-rounded people.

10. Conclusion

We have learned a great deal about the art and science of sports teaching from this case study of Judo Coach Jiwan Kumar Sharma. The way toward successful coaching has been made clear by Coach Sharma's methods and ideologies, not just in the field of Judo but in a variety of sports. These results provide important new insights into a number of important coaching topics with broad applications. First and foremost, our research confirmed how crucial foundational abilities are to the growth of athletes. The importance of learning the foundational Judo techniques is highlighted by Coach Sharma's unwavering commitment to creating a solid foundation in his students. This method creates the foundation for athletes to confidently and precisely develop higher talents. The research made clear how important customized coaching is. Coach Sharma's customized method, which acknowledges the individuality of every athlete, has demonstrated how individualized training programs promote cooperation, trust, and peak performance. This lesson, which emphasizes the need of recognizing and meeting individual needs, applies to many sports, not only Judo.

One of Coach Sharma's main tenets of coaching is mental conditioning. The importance of athletes' mental states during competition is highlighted by the inclusion of mental resilience exercises, stress management

strategies, and visualization exercises. This research goes beyond Judo and provides an invaluable insight into the importance of mental preparation for coaches across all sports. The study emphasized how crucial strategic thinking is to coaching. Coach Sharma's capacity to work with athletes to jointly create strategies tailored to each match exemplifies the importance of studying opponents, determining their advantages and disadvantages, and modifying game plans accordingly. This strategic attitude makes it applicable to a wide range of sports, enabling coaches to give their players strategic thinking skills. Another important finding was the establishment of a cohesive and encouraging team environment, as demonstrated by Coach Sharma's methodology. Athletes feel more motivated and like they belong in this encouraging environment. It's a lesson in the potent force of camaraderie and mutual support that coaches in a variety of team sports may learn from.

The case study highlighted Coach Sharma's outstanding accomplishments, which included winning major honors and developing Olympians. These accomplishments highlight the benefits of commitment and coaching experience. They act as a paradigm for coaching excellence that transcends all sports, encouraging coaches to commit to the long-term progress of their particular disciplines and the development of athletes. There are several reasons why it is unquestionably important to understand coaching tactics. The cornerstone of athlete development is effective coaching techniques, which help players grow into well-rounded people with the abilities, character, and mentality necessary to succeed in their chosen sports. These techniques also play a crucial role in improving athlete performance and helping them reach their full potential on the mat or in the field. A vital part of coaching tactics, mental resilience helps players to thrive in stressful situations and overcome misfortune. This is an important factor for individual athletes as well as for the sport's overall development and image. Effective coaching does, in fact, support the growth and development of sports at the local, national, and international levels in addition to the success of individual athletes.

References

1. Palumbo, F., Ciaccioni, S., Guidotti, F., Forte, R., Galea, E., Sacripanti, A., ... & Tessitore, A. (2021). Educational Needs for Coaching Judo in Older Adults: The EdJCO Focus Groups. *Sports*, 11(8), 143.
2. Ribeiro, A. A. D. S., Werneck, F. Z., Figueiredo, A. J. B., & Vianna, J. M. (2021). Talent identification and development in judo: A perspective from Brazilian coaches. *International Journal of Sports Science & Coaching*, 18(1), 38-45.
3. Nam, K., Kim, C., & Yoon, S. (2021). Relationship between judo coaches' authentic leadership and judo athletes' perceived performance: Mediating effect of self-management. *International Journal of Sports Science & Coaching*, 17479541231190036.
4. Perondi, D., Galatti, L. R., Culver, D. M., Seguin, C. M., Franchini, E., & Albuquerque, M. R. (2020). From Prohibition to Excellence: A Retrospective Study About Learning Situations of Expert Brazilian Women Judo Coaches. *Ido Movement for Culture. Journal of Martial Arts Anthropology*, 22(2), 1-13.
5. Palumbo, F., Ciaccioni, S., Guidotti, F., Forte, R., Sacripanti, A., Capranica, L., & Tessitore, A. (2021). Risks and Benefits of Judo Training for Middle-Aged and Older People: A Systematic Review. *Sports*, 11(3), 68.
6. Ding-Yi, W., Nakamura, H., Iteya, M., & Kimura, M. (2021). An analysis of the negative impact of the culture of achieving 'simple ippons' on international sporting performance: The case of Japanese elite judo. *Ido Movement for Culture*, 22(1).
7. AKTAŞ, Ö., KARAOĞLAN, M. F., & Hüseyin, Ü. N. L. Ü. (2021). The Effect of Trainers' Pedagogical Competencies on Emotion Regulation: A Study on Young Judo Athletes. *Spor Bilimleri Araştırmaları Dergisi*, 8(3), 435-447.
8. Kowalczyk, M., Zgorzalewicz-Stachowiak, M., Błach, W., & Kostrzewa, M. (2020). Principles of Judo Training as an Organised Form of Physical Activity for Children. *International Journal of Environmental Research and Public Health*, 19(4), 1929.
9. Callan, M., & Bountakis, G. (2020). How Expert Coaches Understand the Application of Rhythm in Judo. *The Arts and Sciences of Judo (ASJ)*.
10. Lee, T. I., Wang, M. Y., Huang, B. R., Hsu, C. Y., & Chien, C. Y. (2020). Effects of Psychological Capital and Sport Anxiety on Sport Performance in Collegiate Judo Athletes. *American Journal of Health Behavior*, 46(2), 197-208.
11. Santos, L., Fernández-Río, J., Almansba, R., Sterkowicz, S., & Callan, M. (2015). Perceptions of top-level judo coaches on training and performance. *International Journal of Sports Science & Coaching*, 10(1), 145-158.
12. Franchini, E., & Takito, M. Y. (2014). Olympic preparation in Brazilian judo athletes: description and perceived relevance of training practices. *The Journal of Strength & Conditioning Research*, 28(6), 1606-1612.

ARTIFICIAL NEURAL NETWORK MODELING FOR NETWORK INTRUSION DETECTION SYSTEM

Navjot Kaur and Jaspreet Kaur

Department of Computer Science & Engineering, CT University, Ludhiana, Punjab (India)

ABSTRACT

In recent years, Wireless Sensor Network (WSN) based applications ranging from military surveillance to health-related applications have grown to a massive scale due to their low cost, self-organizing capability, high sensing capability, and fault tolerance. Regardless of these benefits, WSN is increasingly vulnerable to many sorts of assaults due to sensor resource constraints, unsecured wireless connection, and open sensor node deployment. Also in present times, massive network traffic generated in terabytes within a couple of seconds is challenging to handle. It is critical to protect WSNs with the aid of Intrusion Detection Systems (IDS) in addition to Intrusion Prevention Systems (IPS). In order to combat cyberattacks on a WSN network, several traditional rule-based Intrusion Detection Systems (IDSs) have been proposed in the last few years. It is very challenging to manually analyze such huge network traffic with the traditional rule-based approach; hence, researchers have to subject data mining approaches to intrusion detection with an emphasis on attack detection accuracy. They are sufficient for recognized types of attacks based on the dataset provided for training. However, it is nearly impossible for unknown attacks. To deal with these attacks, Machine learning-based intrusion detection systems are employed. However, the massive volume of data with varying dimensions might impair detection accuracy and raise the time and computational complexity of these systems. This work proposes an ANN-based intrusion detection model with hybrid feature selection to manage these high-dimensional datasets and enhance accurate detection rates. Experiments on the KDDCUP99 data set address that our proposed ANN model detects Dos, Probe, R2L, and U2L attacks with 99% accuracy.

Keywords: Machine learning (ML), KDDCUP99 dataset, ANN, Intrusion Detection System (IDS)

1. Introduction

In the present, WSN has grown in popularity across many industries, including the aviation industry, and the environment. The rapid advancement of wireless communication and sensor technologies has broken the limitations of traditional methods of monitoring and collecting data in harsh environments. A key attraction feature of wireless sensor networks is their ease of installation and operation. On the other hand, nodes in WSN are placed in open and hostile environments with limited bandwidth to construct a highly dynamic network topology, that is, a network with no preset architecture and no centralized network management [1]. In a WSN, all nodes work together to monitor the network, and each node's sensing and communication range is restricted. Despite their impressive capabilities and wide range of applications, the security of WSNs is still a challenging task. Wireless sensor networks (WSNs) are susceptible to various kinds of security attacks at all layers, less reliable, and failure-prone due to open deployment of the nodes and wireless communication between them [2]. Moreover, due to limited computational power, energy, less storage memory and low bandwidth of

sensor nodes traditional energy-consuming defense mechanisms like public key infrastructure, authentication, encryption, and host-based intrusion detection techniques may not be feasible. These Prevention methods usually act as the first line of defense and can protect at some level. These security mechanisms are effective only for external attacks but cannot adequately defend against network insider attacks such as compromised attacks as well as routing attacks. Once the node is compromised, it can potentially steal sensitive information and use it for malicious reasons such as controlling the whole WSN to degrade its performance. These challenges create a lot of opportunities to take advantage of network flaws. As a result, we can't rely solely on intrusion prevention systems. However, security is one of the key challenges in building a robust and reliable wireless sensor network. As a second line of protection, a robust security mechanism known as an Intrusion Detection System (IDS) is required to defend WSNs from external and internal attacks [3].

1.1 Intrusion Detection System

An intrusion is defined as any unauthorized action in a network that threatens the integrity, confidentiality, or availability of resources. An intrusion detection system (IDS) is a set of tools and procedures that detect intrusions and either inform the network administrator or attempt to isolate them from the network. It is not a stand-alone security system, but rather one of the components of a comprehensive security system [4]. Based on detection methodology, the IDS can be categorized into two primary types: Signature-based IDS, and Anomaly-based IDS.

a). Misuse / Signature-Based IDS: Misuse/signature-based IDS detection depends on attack signatures to detect future attacks. When an intrusion signature matches with a previous intrusion signature that is already present in the intrusion database, an alarm is triggered. The advantage of misuse detection is that it can accurately detect known attacks with a low False Positive rate (FPR). On the other hand, the disadvantage of this detection method is that it is not useful for unknown attacks and always someone has to update the database of attack patterns.

b). Anomaly-Based IDS: Anomaly-based IDS detection depends on the behavioral methods in which it defines two types of node behavior, normal and abnormal behavior. This approach first describes the normal behavior features, which are designed by using automated training. Any deviation from normal behaviors is considered an intrusion. Anomaly detection is suitable for detecting unknown attacks. The advantage of this scheme is that it has the ability to accurately detect internal attacks. On the other hand, the disadvantage of this scheme is that the system can exhibit legitimate but unseen behavior, which could lead to a substantial false positive alarm rate [5]

The complete paper is organized as follows: Section I gives a brief description of the intrusion detection system and its techniques, Section II provides a literature review of the various existing intrusion detection systems in WSN, Section III presents the Problem Statement, Section IV presents the Proposed IDS Model, Section V Experiment and Analysis and Section VI then concludes with

the main findings of this research and some potential future directions.

2. Related Work

Due to the aforementioned adverse effect of attacks on WSNs in section 1, several efforts undertaken by various researchers to mitigate these attacks are either by developing a network or host IDS to detect the activities that might compromise the confidentiality, integrity, and availability of nodes of the network. Existing research on misuse intrusion detection is primarily rule-based and data-mining-based. The outcomes of such research are characterized by a low detection rate due to the inability to unknown signatures. The findings of such research are characterized by a low detection rate due to the inability to detect unknown signatures. The massive network traffic and low detection rate need the use of machine learning techniques in intrusion detection to address the problem of network attacks and they can assist network administrators in taking proper preventative actions. Some of the machine learning techniques such as Naïve, random forest (RF), support vector machine (SVM), naïve Bayes network, and others, have been deployed for the anomaly IDS. Most researchers also try to use the feature selection method to cure the dimensionality curse in order to get a high or improved detection rate.

Moon and Cho [6] suggested a fuzzy logic-based intrusion detection technique. Two features related to the directed diffusion protocols are used which are the reinforcement ratio and the radius. These two features will be used as inputs by the fuzzy logic controller to produce its output, which is the detection value. The controller will raise an alert if the result detection value is greater than a predefined protection threshold, signaling that a sinkhole attack has occurred in the region. The fuzzy rules should be set by an expert according to the signs of sinkhole attacks before the detection value is calculated. Using fuzzy logic gives the flexibility of detecting sinkhole attacks since the input values are not always sharp values. The key issue with this fuzzy-based system, though, is the need for manual rule setting.

Tajbakhsh et al. [7] introduced an intrusion detection approach based on fuzzy association rules, which constructs classifiers using fuzzy association rules and utilizes some matching metrics for evaluating the compatibility of any incoming samples with different rule sets. The class corresponding to the best matching rule set is declared as the sample's label.

Li et al. [8] in a wireless sensor network, to separate abnormal nodes from normal nodes proposed IDS based on the KNN classification algorithm. The system was detecting flooding attacks using an improved Ad-hoc On-Demand Distance Vector (AODV) and achieved a high detection rate with a low false alarm rate

Diyashree Sherly [9] proposed a NIDS based on the ensemble CVM approach which works on the minimum enclosing ball concept. The KDD cup99 dataset was used for the training and testing of the classifier. A CVM classifier was modeled for each type of attack like U2R, R2L, DoS, and Probe attacks. Chi chi-square test was used to select relevant features of each attack and a weighted function was applied to these features for dimensionality reduction. The model achieved high efficiency with less computation time. It has a detection rate of 99% and a false positive rate of 27%.

Tan et al. [10] came up with a data mining method of intrusion detection based on SMOTE and the Random Forest (RF) Algorithm. SMOTE (synthetic minority sampling technique) was used to balance the data set and then the RF algorithm was used to train the classifier. The simulation was conducted on the benchmark data set i.e., KDD cup99, and the accuracy of classification by RF algorithm had reached 92.39%, which was higher than other comparison classification algorithms. The accuracy of the RF Algorithm was further improved to 92.57% after combining it with SMOTE. They suggested that in the future, other new classification methods can be used to further improve the recognition of intrusion data of WSNs.

Wang et al. [11] introduced an SVM-based intrusion detection framework and verified their algorithm using the NSL-KDD dataset. They stated that their approach, which has a 99.92% effectiveness rate, was higher than that of other techniques. However, they did not specify the statistics of the employed datasets,

or the number of training and testing samples. In addition, the SVM performance diminishes when vast amounts of data are involved, and it is not an exception suitable for detecting intrusions in large amounts of network traffic detection.

Dias et al. [12] employed Artificial Neural Networks to detect computer network intrusions. Intrusion Detection Systems (IDS) is a type of Intrusion Detection System (IDS) that detects unauthorized access and is frequently used by network administrators since it is seen as critical in maintaining network security. One possible outcome is that such systems are often constructed on signature systems makes them extremely reliant on updated signatures. As a result, databases can become useless against new threats (unknown attacks). This paper proposes an IDS system based on the KDDCUP'99 dataset and an Artificial Neural Network (ANN). Experiments show that when it comes to identifying pre-defined types of intrusion attempts, the proposed system attained an overall accuracy of 99.9%, which is a very good result when compared to earlier systems.

Chung & Wahid [13] developed a technique that introduces a new simplified version of PSO for feature selection named Simplified Swarm Optimization (SSO) comprises a local search strategy to speed the feature selection process by identifying the best neighboring solution. The proposed algorithm decreases the number of features required to depict network traffic behavior from KDDCUP99 from 41 to only 6 characteristics and outperforms the conventional PSO with a 93.3% accuracy.

Another feature selection algorithm for IDS was proposed by Eesa et al. [14] created a feature selection model that combines the ID3 classifier method with the Bees algorithm. The ID3-BA model was designed to optimize the selection of the needed subset of features in IDS. For training and testing, the ID3-BA model utilizes the KDD Cup99 dataset. The suggested method was evaluated using three criteria: false alarm rate (FAR), detection rate (DR), and accuracy. According to the experimental results, ID3-BA provides high DR (91.02%), AR (92.002%), and decreased FAR (3.917%) values. Furthermore, the findings show that employing a subset of

features rather than all features yields superior classifications in terms of DR, AR, and reduced FAR.

Acharya and Singh [15] proposed a unique technique for IDS feature selection that makes use of the Intelligence Water Drops (IWD) algorithm. IWD is a bio-inspired approach that builds classifiers with SVM. IWD is also recognized as a metaheuristic-based swarm intelligence optimization technique. The KDD CUP99 dataset was used to test this technique, with performance criteria based on false alarms, detection rate, and accuracy. The outcomes of the studies were also compared to existing methodologies that employ bio-inspired algorithms. According to the experimental results, the IWD feature selection algorithm has a high detection rate (91.35%), enhanced accuracy (93.12%), and a low number of false alarms (3.35%).

3. Problem Statement

The WSN network will generate high-dimensional traffic data as the network's size and user base grow. To identify and categorize an intrusion, IDS must extract relevant and valuable information from the network. The massive increase in network traffic and the resulting security threats make it challenging for IDS systems to detect hostile intrusions efficiently. The key problem with IDS is dealing with complicated datasets, which are multi-dimensional, have a large number of observations, and have a significant number of characteristics. To identify an intrusion, IDS must extract relevant and valuable information. Most researchers try to utilize traditional rule-based and data-mining approaches on IDS. Many intrusion detection systems for wireless sensor networks nowadays are rule-based systems, with performance heavily reliant on the rules established by security professionals. These rule-based systems use a mechanism for detecting misuse and are not adaptable to novel attacks. They can lower the number of false-positive alarms, but in a constantly changing computer environment, this type of IDS requires frequent updates, which is a time-consuming operation. However, because network traffic is massive and has a great variety of aspects, it is extremely difficult to describe some incursions using rules. As a

result, the process of encoding rules is both costly and time-consuming. To address the limitations of rule-based systems in WSN, Data Mining techniques that primarily focus on learning-based IDS are used. These were quite successful and continue to produce good results by utilizing various categorization strategies. The key disadvantage discovered throughout the investigation is that data sets were employed for categorization algorithms. Those data sets contained a variety of attributes that were used to train the algorithms. This complicates the network infrastructure and makes use of extra sensor resources. Traditional Data Mining and Learning-Based techniques are sufficient for recognized types of attacks based on the dataset provided for training. However, it is nearly impossible for unknown assaults. To overcome the limitations of rule-based systems and data-mining-based systems, we require a method that decreases the dimension of huge amounts of data in order to attain a lower time complexity with better detection accuracy. As a result, there is a significant increase in demand for intelligent intrusion detection technologies based on Machine Learning (ML) techniques. ML can play an important role in developing an IDS that can predict and classify attacks. ML is a program that uses a model or computer programs with parameters to learn from past experience and labeled data. Based on the usage of labeled data, there are three types of learning techniques: supervised, unsupervised, and semi-supervised learning.

4. Proposed Model

This paper presents a unique and effective intrusion detection model that operates in two phases: feature selection and classification. The suggested model goes through numerous stages, and at each stage, the raw data is improved and processed in such a manner that the detection rate's accuracy is raised at the conclusion of the process. The suggested approach's main contributions are to overcome the limitations of standard IDSs and to increase the reliability of the proposed detection model. Figure 1 depicts the working methodology used in the suggested technique, which consists of four stages. The suggested methodology employs an Artificial Neural Network (ANN)

classifier with feature selection that may provide the highest accuracy for each category of attack type. To achieve these objectives, we will explore and explain the core focus of our suggested strategy, as well as its function in recognizing and categorizing different kinds of attacks in this section. Our proposed model based on ANN includes four phases. The first phase is data selection, in which the KDD-CUP99 dataset is selected. Following that, the data is processed before being subjected to any sophisticated processes in order to balance and normalize it in the preprocessing phase. Following that, a unique advanced infinite feature selection technique is applied to identify the most informative subset of features. Finally, in the proposed study, classification is performed using ANN under various performance metrics, the results of which are discussed in the "Performance Evaluation" section.

4.1 Dataset Selection

The network transfers massive amounts of data, which can be converted into useful structures known as connections or connection records. Each connection has numerous features that are unique to specific domain knowledge. The data sets related to the model are utilized to calculate the overall model and may also be used to detect whether or not the attacks are correct. Aside from that, the quality of the data sets influences the overall performance of the Intrusion detection system. In the last decade, the KDD 1999 dataset was taken into consideration by many researchers for developing intrusion detection systems. These are publicly available standard datasets. In the proposed work, we have used a dataset i.e., KDD-CUP99 to detect potential attacks.

4.1.1 KDD-CUP99 Dataset

KDD'99 is the Knowledge Discovery in Databases dataset developed by MIT labs [] and consists mostly of raw network data from the "DARPA'98 IDS" evaluation program. "DARPA'98" comprised network traffic data with approximately five lakh connection records. The KDD training dataset contains approximately 4,900,000 single-connection records. This collection is made up of connection records. Each such record contains

information on a session between a "source" and "destination IP address" via two ports. These recordings might be classified as "normal" or "attack" in nature. The database comprises a total of 41 features without labels. There are 22 different forms of attacks that might exist in any of the connection records. The simulated attacks are classified into one of four categories:

- DOS: a number of attacks, such as SYN flood.
- R2L: It has unauthorized remote access from a machine, such as password guessing;
- U2R: uninvited access to the local superuser (root) numerous, for example "buffer overflow" attacks.
- Probing: monitoring and probing, for example, port security scanning.

Table 1. Types of Attack present in KDDCUP99 dataset

Type of Attack	Attack Name
DoS	Neptune, back, land, pod, smurf, teardrop, mailbomb, apache2, processtable, udpstorm, worm
R2L	buffer_overflow, loadmodule, perl, rootkit, ps, sqlattack, xterm
U2R	ftp_write, guess_passwd, imap, multihop, phf, spy, warezclient, warezmaster, sendmail, named, snmpgetattack, snmpguess, xlock, xsnoop, httptunnel
Probe	ipsweep, nmap, portsweep, satan, mscan, sain

KDD 99 is pre-processed into 41 features per network connection. As indicated in Table 1, the features of the KDD'99 data set are divided into four categories: Basic Features (#1 to #9), Content Features (#10 to #22), Time-Based Traffic Features (#23 to #31), and Host-Based Traffic Features (#32 to #41)

- A. Basic Features: This class contains all of the features that may be derived from a TCP/IP connection.
- B. Content Features: The U2R and R2L assaults, unlike the majority of Probing and DoS attacks, do not have numerous intrusive similar sequential patterns. This is because DoS and Probing attacks entail a large number of connections to several hosts in a very short period of time, but

U2R and R2L attacks are encoded in the data parts of the packets and normally involve only a single connection. To detect these types of attacks, numerous characteristics must be capable of detecting abnormal behavior in the data component, such as the frequency of failed login attempts. These are referred to as content features.

- C. Time-Based Traffic Features: Observe simply the connections that were made in the previous two seconds that have the same service as the current connections.
- D. Host-Based Traffic Features: Examine just the connections that have the same destination host as the current connection in the preceding two seconds and compute statistics relating to protocol activities, service, and so on.

4.2 Data Preprocessing

The data pre-processing phase is critical for removing noisy, missing, and inconsistent data from a dataset because the dataset's records are gathered from diverse and disparate sources, quality of the data deteriorates and must be pre-processed. Several things influence data quality including precision, completeness, consistency, timeliness, credibility, and interpretability. The original KDD99 dataset is pre-processed in order to make it an acceptable input for our algorithm. Therefore, the data preprocessing of KDD99 includes these steps: 1) Symbolic Data; 2) Data normalization

4.2.1 Symbolic Data: The majority of machine learning algorithms are incompatible with symbolic features and are only intended to deal with numerical values. As a result, we employ a label encoding approach to transform all symbolic qualities into numerical values. The goal of this stage is to preprocess the database file by converting symbolic properties such as protocol, service, and flag to numerical values.

4.2.2 Data Normalization: In the stage of this phase, Feature scaling was performed on the KDD99 dataset utilizing the Minimum-maximum (min-max) notion of normalization. We must normalize the data into the range [0, 1] to ensure the trustworthiness of the training outcome. We use min-max normalization to explain the data in this study.

4.3 Feature selection

Feature selection is a key stage in developing a strong Intrusion Detection System (IDS) since it eliminates unimportant elements that cause false alerts and improves the system's accuracy (Tang, Dai, & Xiang [16]). The feature selection procedure involves extracting the most valuable information from the data. Feature selection is necessary to minimize the dimensionality of the data as irrelevant features might degrade the performance of a classifier that uses all of the data's features. There are four types of feature selection approaches: filter, wrapper, embedding, and hybrid. Filter techniques that analyze intrinsic qualities of data while ignoring the classifier, wrappers that score a subset of characteristics using classifiers; and embedding techniques that incorporate the selection process within the classifier's learning. The majority of these approaches are performing two operations: ranking and subset selection [17]. In some cases, these two actions are carried out in sequential order (first ranking, then selection). In general, subset selection is always supervised, but techniques for ranking might be supervised or not.

To enhance the efficacy of feature selection, we employed a hybrid feature selection method. In the first phase to accomplish the goal of best feature selection, we initially employed a modified version of the Infinite feature selection (IFS) technique, which performs the ranking phase in an unsupervised manner, followed by a simple cross-validation technique for picking the best m features. To include the novelty idea, we have introduced an entropy component to standard IFS to get Entropy-based infinite feature selection (EIFS) which aids in the selection of critical characteristics to generate feature weights. The conventional IFS basically consists of only Standard Deviation and Correlation factors. The most attractive characteristic of this technique is that it analyses the value of a particular feature while taking into account all possible subsets of features. Also, the score of every feature is influenced by all the other features of the set. By construction, the approach allows us to take advantage of the convergence qualities of the power series of matrices to evaluate the importance and

redundancy of a feature in relation to all the others. Such an algorithm decreases the number of features while maintaining classification accuracy. This method is particularly beneficial for data sets with a large number of instances and several hundred attributes. A smaller number of features minimizes classification algorithm learning and inference times, as well as the time required to drive only informative features.

In the second phase, the output features of the EIFS are fed into the Eigenvector Centrality (EC) and Ranking Feature Selection method. The key concept behind EC is to compute a feature's importance as a function of the significance of its neighbors. The features generated by the entropy-based IFS, eigenvector centrality, and ranking FS algorithms are hybridized at this step to build a final feature set that only comprises informative and critical characteristics that assist in improving the detection system's accuracy. Furthermore, the alpha factor is calculated in the suggested FS algorithms, which help in the selection of effective features in the model.

4.4 Classification Phase

Once all of the relevant attributes have been collected and picked from the available

databases, the data provided must be classified as normal or intruded data. We utilised ANN classifiers in this case whose performance is tested and analyzed on the KDDCUP99. The classifier is trained by giving them the testing data, which then tries to match with the final feature set. If the data provided matches the characteristics in the feature set, the classifiers recognize it as an attack and determine the kind of attack. Then the performance of the proposed Infinite Feature selection-based intrusion detection model is analyzed for ANN classifier on the standardized dataset in terms of accuracy, precision, recall, and F1-measure.

ANNs are a type of machine learning algorithm inspired by the activity of biological neurons found in the brain and central nervous system. ANN inputs are generally provided to artificial neurons in one or more hidden layers, where they are weighted and processed to select the output for the next layer. ANNs utilize a "learning rule" to adaptively change the set of weights and biases for the hidden layer and output layer neurons. Due to its self-adaptive nature, ANNs may capture very complicated and non-linear correlations between dependent and independent variables without previous knowledge [12].

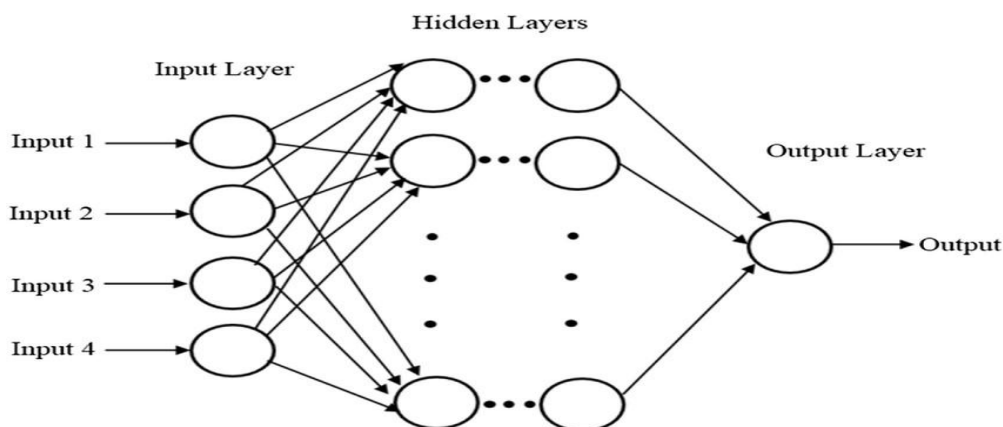


Fig.1 Diagram of Artificial Neural Network (ANN)

5. Experiment And Analysis

Experiment work has been done in MATLAB 2018b with 8GB RAM on Windows 10 OS to study the performance of the ANN model for multiclass classification (DoS, Probe, R2L, and U2R). To analyze the performance of the suggested approach on the KDD-CUP99

dataset, we set the division of the data set into training and testing. Diverse training and testing datasets are required to achieve actual model performance because they eliminate bias induced by the model being over- or under-fit to the training data. Considering this, we divided the whole dataset into 70, and 30 ratios

respectively. 70% data set for training then 30% for testing. Table 3 lists the various factors used in the experiment of the proposed work.

Table 2. Factors used in our model

Factors considered	Value
Alpha	0.85
Training data %	70
Testing data %	30
Classifier	ANN

To show the effectiveness of our proposed model for detecting intrusions, we compare the performances of the different classification algorithms using the most significant performance metric (Accuracy). The comparison graph attained for the accuracy rate on the KDD-CUP99 dataset is shown in Fig. 2. The performance indicators that are used in this paper are defined as follows.

- Accuracy (AC): An Intrusion detection model's accuracy indicates the fraction of correctly predicted values in the network. It may be calculated mathematically using the formula below:

$$Accuracy \text{ or } AC = \frac{TP+FP}{FP+TP+FN+TN} \quad (1)$$

- Precision: It can be defined as the rate of classifying attacks correctly from all the given samples categorized as attacks

$$Precision = \frac{TP}{FP + TP} \quad (2)$$

- Recall: determines the integrity of the classifier that represents the rate of correctly labeled samples for all given attack samples. It is calculated by using the given equation;

$$Recall = \frac{TP}{TP + FN} \quad (3)$$

- F1-Score: The harmonic mean of recall and precision is determined by F1-Score and can be calculated by using the below equation;

$$F1 - Score = \frac{2 * Precision * Recall}{Precision + Recall} \quad (4)$$

Where:

False positive (FP) is the normal pattern number that is categorised as an attack incident.

False negative (FN) is the number of attacks patterns that are classed as normal cases.

True positive (TP) is the number of detected attacks that are actually attacks.

True negative (TN) is the detected normal instance number, and they are normal.

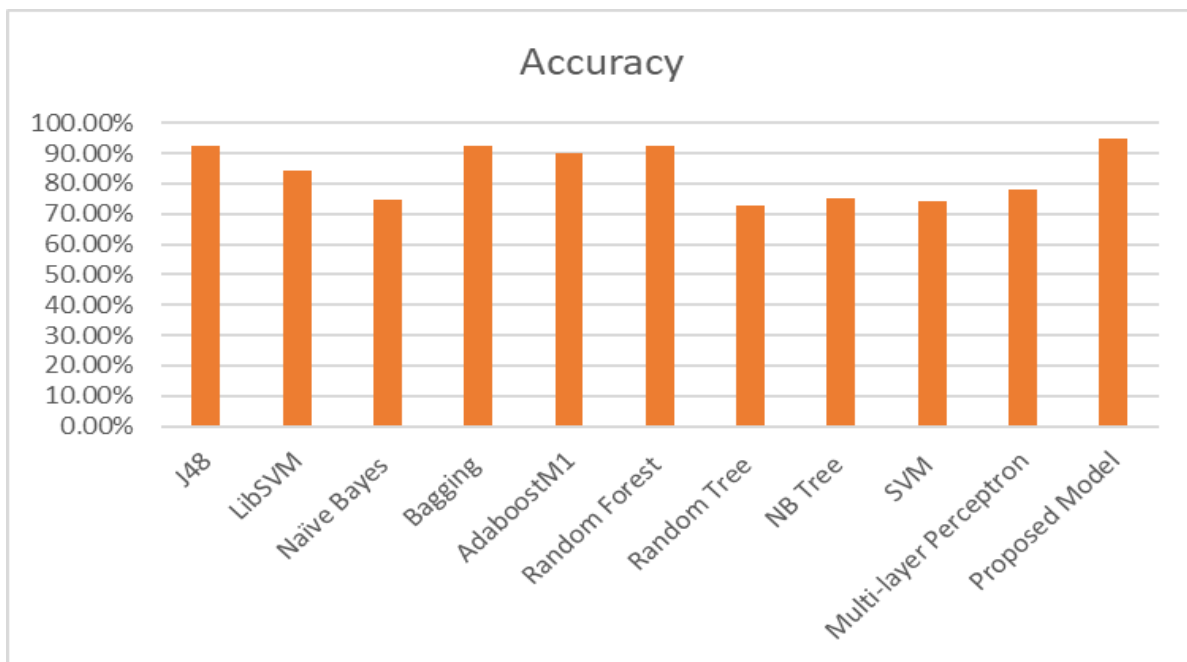


Fig. 2. Accuracy comparison graph for KDD-CUP99 dataset

After analyzing the above Figure (see Fig.2), it can be seen that the proposed ANN model is achieving the highest levels of accuracy than the other three traditional models. The value of accuracy in the proposed model was mounted at 94.70%. Literature [10] and [12] provided the results that were obtained by the J48, Naive Bayesian, NB Tree, Random Forest, Random Tree, Multi-layer Perceptron, and SVM in the field of intrusion detection prove that accuracy in the proposed model is improved by approaches to prove its superiority. Also, the proposed model was able to detect Dos, Probe, R2L, and U2L attacks with an accuracy of 99%. The accuracy achieved by the standard models from [18] and the proposed model for identifying multiple attacks is shown in Fig. 3.

The final results show that the overall accuracy of proposed model (94.70%) is better than KNN (91.53%), SVM (92.25%), and IDS-ID (92.85%) as illustrated in Table 3.

Table 3 Classification accuracy of KNN, SVM, IDS-ID and proposed model for the KDDCUP99

Attacks DR%	KNN	SVM	IDS-ID	Proposed Model
DoS	97.15	96.95	97.21	99.45
Prob	80.45	85.35	87.5	99.36
U2R	11.8	9.20	4.36	99.60
R2L	6.45	7.20	6.20	99.70
Overall AC%	91.53	92.25	92.85	94.70

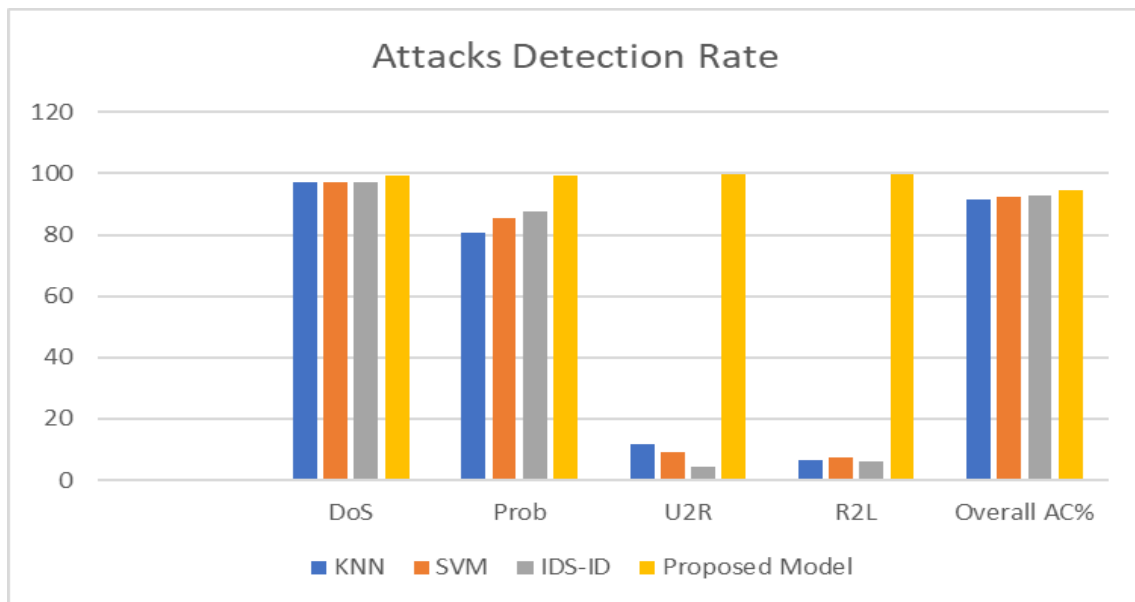


Fig 3. The detection rate of multiple attacks of KNN, SVM, IDS-ID and proposed model

6. Conclusion And Future Work

Traditional intrusion detection systems have a number of issues that limit their effectiveness and efficiency. This paper deals with the ANN algorithm to detect four types of attack Probe, DoS, R2L, and U2R. We applied an advanced infinite feature selection approach on the standard dataset to reduce dimensionality and remove irrelevant and redundant features. The proposed ANN is evaluated using the KDDCUP99 dataset and the model detects

Dos, Probe, R2L, and U2L attacks with 99% accuracy. We compare our proposed machine learning model with J48, Random forest, LibSVM, Naive Bayes, Bagging, Random Tree, and NB Tree, in terms of accuracy. Our model’s experimental result proves that the detection rate for four types of attacks is increased. For Future work, we will apply a hybrid machine learning classifier with a hybrid feature selection method to further improve detection accuracy.

References

1. Q. Yang, X. Zhu, H. Fu, and X. Che, —Survey of security technologies on wireless sensor networks, *Journal of sensors*, vol. 2015, 2015.
2. K. Ioannis, T. Dimitriou, and F.C. Freiling, —Towards intrusion detection in wireless sensor networks, in *Proc. of the 13th European Wireless Conference*. Citeseer, 2007, pp. 1–10.
3. Pandey, S. K. (2019). An anomaly detection technique-based intrusion detection system for wireless sensor network. *International Journal of Wireless and Mobile Computing*, 17(4), 323-333.
4. A. Abduvaliyev, A.S.K. Pathan, J. Zhou, R. Roman, and W.C. Wong, —On the vital areas of intrusion detection systems in wireless sensor networks, *IEEE Communications Surveys & Tutorials*, vol. 15, no. 3, pp. 1223–1237, 2013.
5. R. Sharma and V.A. Athavale, —Survey of intrusion detection techniques and architectures in wireless sensor networks, *International Journal of Advanced Networking and Applications*, vol. 10, no. 4, pp. 3925–3937, 2019.
6. S.Y. Moon and T.H. Cho, —Intrusion detection scheme against sinkhole attacks in directed diffusion-based sensor networks, *International Journal of Computer Science and Network Security*, vol. 9, no. 7, pp. 118– 122, 2009
7. Tajbakhsh, A.; Rahmati, M.; Mirzaei, A. Intrusion detection using fuzzy association rules. *Appl. Soft. Comput.* 2009, 9, 462–469
8. Li, W., Yi, P., Wu, Y., Pan, L., & Li, J. (2014). A new intrusion detection system based on KNN classification algorithm in wireless sensor network. *Journal of Electrical and Computer Engineering*, 2014.
9. Divyasree, T. H., & Sherly, K. K. (2018). A network intrusion detection system based on ensemble CVM using an efficient feature selection approach. *Procedia computer science*, 143, 442-449.
10. Tan, X., Su, S., Huang, Z., Guo, X., Zuo, Z., Sun, X., & Li, L. (2019). Wireless sensor networks intrusion detection based on SMOTE and the random forest algorithm. *Sensors*, 19(1), 203.
11. Wang, H., Gu, J., & Wang, S. (2017). An effective intrusion detection framework based on SVM with feature augmentation. *Knowledge-Based Systems*, 136, 130-139.
12. Dias, L.P., Cerqueira, J. J. F., Assis K. D. R. and Almeida, R. C. (2017). Using Artificial Neural Network in Intrusion Detection Systems to Computer Networks. 978-1-5386-3007-5/17/\$31.00 ©2017 IEEE.
13. Chung, Y.Y., & Wahid, N. (2012). A hybrid network intrusion detection system using simplified swarm optimization (SSO). *Appl. Soft Comput.*, 12, 3014-3022.
14. Eesa, A. S., Orman, Z., & Brifcani, A. M. A. (2015). A new feature selection model based on id3 and bees algorithm for intrusion detection system. *Turkish Journal of Electrical Engineering & Computer Sciences*, 23, 615–622
15. Tu, J. V. (1996). Advantages and disadvantages of using artificial neural networks versus logistic regression for predicting medical outcomes. *Journal of clinical epidemiology*, 49(11), 1225-1231.
16. Alhenawi, E., Alazzam, H., Al-Sayyed, R.M., Abualghanam, O., & Adwan, O.Y. (2021). Hybrid Feature Selection Method for Intrusion Detection Systems Based on an Improved Intelligent Water Drop Algorithm. *Cybernetics and Information Technologies*, 22, 73 - 90.
17. Zhou, Y.-Y., & Cheng, G. (2019). An efficient network intrusion detection system based on feature selection and ensemble classifier. arXiv preprint arXiv:1904.01352.
18. Riyadh, Musaab & Alshibani, Dina. (2021). Intrusion detection system based on machine learning techniques. *Indonesian Journal of Electrical Engineering and Computer Science*. 23. 953. 10.11591/ijeecs.v23.i2.pp953-961.

21 वी. शताब्दी के हिंदी उपन्यासों में पर्यावरण संरक्षण के प्रति जागरूकता सम्बन्धी सन्देश

रीतू महाजन, डॉ. जसप्रीत कौर, डॉ. राजेन्द्र सिंह 'साहिल'
हिंदी विभाग, सी.टी.यूनिवर्सिटी, लुधियाना (पंजाब)
reetumahajan569@gmail.com

सारांश

21 वी. शताब्दी के उपन्यासकारों ने समय-समय पर वर्तमान की प्रमुख समस्याओं में से एक पर्यावरण असंतुलन और उसके पीछे कारणों, प्रभावों पर प्रकाश डालकर पर्यावरण संरक्षण के प्रति जागरूकता जगाने का प्रयास किया है। अभिमन्यु कृत 'एक उम्मीद और भी' (२००३) से लेकर शांता कुमार कृत वृंदा (२०१८) तक कई ऐसे उपन्यास हैं जिनमें एक लंबी यात्रा का इतिहास विद्यमान है। 21 वी. सदी का दौर कार्पोरेट युग बन गया है, ऐसे में आर्थिक विकास की अंधी दौड़ शुरू हो गयी। पैसे की इस भूख ने विलासिता को जन्म दिया। मानव का यह विलासिता पूर्ण जीवन प्राकृतिक संसाधनों को तेजी से खत्म कर रहा है। तेजी से बढ़ता जनसंख्या दबाव ने संसाधनों के दोहन की इस गति को और तीव्र कर दिया है, मानव की आवश्यकताओं की पूर्ति के लिए अगर सबसे अधिक किसी ने कीमत चुकाई तो वह है हमारा पर्यावरण, हमारे आस-पास का वातावरण, प्रकृति और उसपर निर्भर जीव जन्तुओं और प्राणियों ने, एक तरफ महानगरों में निवास करने वाले लोग पर्यावरण प्रदूषण की मार झेल रहे हैं, तो दूसरी तरफ प्रकृति की गोद में रह रहा आदिवासी भी उपनिवेशवादी मॉडल की जद में आकर अपनी भूमि से पराया होता जा रहा है। उपन्यासकारों ने अपनी साहित्यिक कृतियों के माध्यम से वस्तु स्थिति को प्रस्तुत करने और सुधार के लिए जागरूकता फैलाने का सफल प्रयास किया है।

प्रस्तावना

धरती को माँ समझना
बस, माँ समझना ही है
उर्वरता को महसूस करना भी है
अपने को तराशना भर ही है.....

विलासिता और वैभवपूर्ण जिंदगी जीने की चाह में आज हम सभी अंधी दौड़ में शामिल हैं। अधिक से अधिक पाने की चाह में इन्सान इस तरह मशगूल हो गया है कि उसे यह भी नहीं पता की वह अपने पीछे क्या चला जा रहा है? जिस प्रकृति ने इस धरती पर जीवन को संभव बनाया, रहने की जगह दी, खुले वातावरण में सांस लेने की सुविधा दी, फसल पैदा करने के लिए उपजाऊ जमीन दी उसी प्रकृति और धरती को मानव दिन-ब-दिन नष्ट करता जा रहा है। इंसानी गतिविधियों के चलते पर्यावरण को लगातार नुकसान होता जा रहा है। जंगलों की अंधाधुंध कटाई और अन्य गतिविधियों से धरती लगातार सिकुड़ती जा रही है। उपजाऊ जमीन कम होती जा रही है, धरती मरुस्थल में तब्दील होती जा रही है। दुनिया के कई देश बढ़ते मरुस्थलीकरण और इसके चलते पैदा हो रही समस्याओं से जूझ रहे हैं। अब तक हुए शोध कार्यों के आधार पर पृथ्वी एक मात्र ऐसा ग्रह है, जहाँ जीवन जीने के लिए हवा, पानी, मिट्टी जैसी अपरिहार्य प्राकृतिक संसाधन उपलब्ध है। पृथ्वी पर जीवन इस

कारण संभव है, क्योंकि यहाँ जल, कार्बन और ऊष्मा का एक खास संतुलन है। इस प्रकृति में वह सब कुछ है जिसकी हमें आवश्यकता है। यहाँ सभी जीव अपनी जरूरत के अनुसार प्रकृति का उपयोग करते हैं। हमें अपने पूर्वजों से प्राकृतिक संसाधन, वातावरण विरासत में मिले हैं, उसे हमें उसी रूप या उससे बेहतर रूप में आने वाली पीढ़ी को सौंपना चाहिए। जो कल किसी और का था वह आज हमारा है, परन्तु कल वह किसी और का होगा। अर्थात् प्रकृति में वह सब कुछ व्याप्त है हमें उसका संयम से उपभोग करना चाहिए। ध्यान रहे "भारत अपने मूल स्वरूप में कर्मभूमि है, भोगभूमि नहीं। सर्वोच्च आकांक्षाएँ रखने वाले किसी व्यक्ति को अपने विकास के लिए जो कुछ भी चाहिए, वह सब कुछ भारत में मिल सकता है।"⁽¹⁾

प्रकृति के अनुकूल खुद को ढालने की प्रक्रिया में भोजन, उर्जा एवं कपड़ों आदि की तलाश में गुजरती मानव जाति जीवनधारियों के प्राकृतिक वास स्थानों- जिसमे मानव का खुद का आवास भी शामिल है – को लगातार प्रभावित कर रही है। मनुष्य के प्रकृति के प्रति लुटेरे जैसे व्यवहार से निरंतर वास स्थानों में बहुत परिवर्तन हो रहा है परिणामस्वरूप पौधों, जानवरों, सूक्ष्म जीवों एवं अन्य प्रजातियों के जीवन में काफी नुकसान देखने को मिलता है। जब इन्सान विज्ञान एवं तकनीक के माध्यम से वनस्पतियों एवं जीव जंतुओं का जीन परिवर्तन करते हैं तथा उसे

अपने फायदे के लिए उपभोग करते हैं तो प्रकृति की विविधता संकट में पड़ जाती है। सबसे खतरनाक बात तो यह है कि उन प्रजातियों का विनाश हो रहा है जिन्हें हम जानते तक नहीं। “आजकल स्वच्छ व शुद्ध प्राकृतिक पर्यावरण दूषित हो रहा है, जिसके अनेक कारण हैं। प्राकृतिक संसाधनों का अत्यधिक शोषण, जनसंख्या में वृद्धि, अनियंत्रित औद्योगीकरण, अनियोजित कंक्रीट भवनों का निर्माण, पर्यावरण असंगत विकास योजनायें, परिवहन साधनों की संख्या में वृद्धि, खनन द्वारा खनिजों की प्राप्ति, जंगलो का नाश आदि के कारण पर्यावरणीय विघटन प्रदूषण तथा पारिस्थितिकीय असंतुलित होते हैं।”⁽²⁾

यदि पर्यावरण संकट के कारण को जानने का प्रयास करें तो हमें निम्न कारण नजर आते हैं- उपभोक्तावादी समाज, बाजारवाद असमान व्यापार, संरक्षणवाद, बढ़ती हुई जनसंख्या, औद्योगीकरण, शहरीकरण, शरणार्थी एवं पलायन, नव उपनिवेशक शोषण, नाभिकीय विस्फोटों एवं दुर्घटनाओं, पूंजीवाद की ओर झुकाव और जेनेटिक इंजीनियरिंग आदि।

उपरोक्त सभी कारणों पर 21 वी. शताब्दी के हिंदी उपन्यासकारों ने बड़ी गंभीरता से विचार किया है, और अपने लेखनी के माध्यम से पर्यावरण संरक्षण के प्रति जागरूकता जगाने का सफल प्रयास किया है। इस दोहन की दौड़ में हम यह भूल गये हैं कि प्राकृतिक संसाधन केवल वर्तमान जनसंख्या के उपभोग के लिए नहीं हैं, वरन आने वाली पीढ़ियों का भी हिस्सा है। ‘प्रकृति प्रत्येक व्यक्ति की आवश्यकताओं को पूरा कर सकती है किन्तु किसी के लालच को नहीं।’ इस तरह हम चाहे जितना भी विकास क्यों न कर लें हमें संतुष्टि नहीं मिल सकती। प्रकृति की कीमत पर किये गये विकास का हई नतीजा है कि तमाम सुख-सुविधाएँ होने के बावजूद मानव तनावग्रस्त है। क्या मानव को शांति इस ध्वनि प्रदूषण में नसीब है जहाँ सोते समय भी वाहनों का अनियंत्रित शोर उसकी नींद भंग कर देता है। आज सब कुछ प्रदूषित हो गया है- न शुद्ध हवा, न शुद्ध जल, न शुद्ध हम।

धूप का जंगल, नंगे पांव, इक बंजारा करता क्या ?
रेत का दरिया, रेत के झरने, प्यास का मारा करता
क्या ?

बदल-बादल आग लगी थी, छाया तरसे छाया को,
पत्ता-पत्ता सूख चुका है, पेड़ बेचारा करता क्या ?

यदि इसी तरह हम प्रकृति के संसाधनों को लूटते रहे, समय रहते कोई कदम न उठाये तो हम आने वाली

पीढ़ी के बच्चों / उन अभागों के लिए विरासत में एक ऐसा ग्रह छोड़ जायेंगे तो अंततः रहने लायक नहीं होगा। इसलिए बेहतर यहीं होगा कि विकास की दौड़ में हम केवल उत्पादन की बढ़ोतरी को प्राथमिकता न दें, बल्कि व्यक्ति के जीवन की गुणवत्ता को ऊपर उठाने तथा नये मूल्यों को गढ़ने के उद्देश्य से किये गये सामाजिक- आर्थिक विकास में पर्यावरण को महत्व दें। समय आ गया है कि मानव प्रकृति की ओर लौटे। यहाँ लौटने का उद्देश्य यह नहीं है कि हम गुफाओं की ओर लौट जाएँ और आदम जनजाति जैसे जीवन बिताएं। उद्देश्य यह है कि प्रकृति के साथ सामंजस्य बिठा कर चले। ‘उदय प्रकाश ने अपने उपन्यास “पीली छतरी वाली लड़की में लिखा है -“प्रकृति प्रेमी आदिवासियों की सबसे बड़ी विशेषता यह है कि उनकी जरूरतें सबसे कम हैं, वे प्रकृति और पर्यावरण का कम से कम नुकसान पहुंचाते हैं।”⁽³⁾

प्रकृति विनाश के कारणों को हिंदी की युवा लेखिका महुआ माजी ने अपने नये उपन्यास ‘मरंग गोडा नीलकंठ हुआ’ (२०१५) में प्रस्तुत किया है। विकिरण, प्रदूषण व विस्थापन से जूझते आदिवासियों की गाथा प्रस्तुत करने वाला यह उपन्यास प्रकृति और विषय - वस्तु के स्तर पर नहीं बल्कि विश्लेषण की दृष्टि से भी विशिष्ट है। युरेनियम की खदानों के हिस्से में रहने वाले आदिवासियों का जीवन, उनके संघर्ष, उनकी मान्यताएँ, विश्वास, जीवन पद्धति, जंगल से उनके रिश्ते और युरेनियम की खदान से आदिवासियों के स्वास्थ्य पर पड़े दुष्प्रभाव और प्रभावित होती पीढ़ियों जैसे कई आयामों पर यह उपन्यास प्रश्न करता हुआ प्रकृति संरक्षण के प्रति जागरूकता फैलाने का प्रयास करता है। “विकिरण, प्रदूषण और विस्थापन से जूझ रही पीढ़ियाँ इस उपन्यास में अपना प्रभाव तो दिखाती हैं साथ में पाठकों की सोई आत्मा को जगाने की कोशिश करती हैं। लेखिका विस्थापितों के दर्द को और विकिरण से अपंग होते लोगों को शिद्ध से इस उपन्यास में सामने लाती हैं।” इस उपन्यास में मुख्य पात्र सगेन और आदित्यश्री के द्वारा वहाँ के आदिवासियों को युरेनियम खदानों के खिलाफ आवाज उठाने का हौसला भी मिल जाता है। उपन्यास में एक जगह आदित्यश्री आदिवासियों के बारे में कहता है - “कितने अच्छे विचार हैं उनके प्रकृति के साथ पशु पक्षियों के साथ तालमेल रखकर जीने की कला तो आदिवासियों के पास ही है। हमें उनसे बहुत कुछ सीखने की जरूरत है तभी इस धरती की रक्षा हो सकती है।”⁽⁴⁾

जल ,जंगल जमीन से जुडी चिंताओं को वृहत आयाम देता वरिष्ठ उपन्यासकार विद्यासागर नोटियाल का स्वर्ग ददा ! पाणी पाणी उपन्यास (2010) जन आन्दोलन की ज़रूरतों को रेखांकित करने वाला एक यादगार उपन्यास है | इसमें सत्ता और शासन के द्वारा स्वार्थ को पूर्ण करने हेतु प्रकृति के दोहन परिणामस्वरूप उसके भयंकर परिणामों पर प्रकाश डालकर पर्यावरण संरक्षण के प्रति जागरूकता जगाने का प्रयास किया है एक चित्र प्रस्तुत है :-

“अखिरकार वे दोनों घाटी के तल पर जा पहुंचे थे | एक निपट सुखा तल | पहाड़ों के दूसरे इलाकों में आमतौर पर ऐसी घाटियों में, जहाँ दो पहाड़ों के तल आपस में मिलते हों ,नदी नालें बहते नज़र आते हैं | लेकिन इस घाटी में नदी नाले की जगह दूर दूर तक कोई पानी का सोता तक कहीं दिखाई नहीं दे रहा था | वनस्पति – विहीन निपट सूखी घाटी ,पथरीली ,हृदयहीन | अलबत्ता बरसाती मौसम के दौरान यां बेमौसम की बरखा हो जाने पर ,ऊपर के पहाड़ों के नंगे सीने से बहते हुए पानी के इस राह से गुज़र जाने के सबूत के तौर पर वहां सूखी रेत - बजरी की एक पतली सी रेखा नज़र आने लगी थी | आसमान से सूरज की पहली किरणें फूटने लगी थी”⁽⁵⁾

संजीव कृत रह गयी दीशाएं इसी पार उपन्यास (2011) जैविकी पर रचा गया पहला उपन्यास हैं | इस उपन्यास में पूँजीवाद, विज्ञान तकनीकी का आंतक, रिशतों का विघटन, संत्रास, कुंठा, नारी शोषण, भ्रष्टाचार, योन शोषण, के साथ साथ पर्यावरण जैसी भयंकर समस्या के बारे में भी चर्चा की गयी है | मनुष्य और प्रकृति के बीच का संतुलन हमेशा होना चाहिए, परन्तु अब प्रकृति और मनुष्य के बीच की यहीं आत्मीयता टूट गयी हैं | उद्योगीकरण के कारण पारिस्थितिक संतुलन बिगड़ गये है ,प्रकृति का अन्धाधुंध शोषण किया जाता है | विकास की और अग्रसर मानव द्वारा जल, वायु,मिट्टी सबको विषमय बना दिया है | मनुष्य की अंतहीन लिप्सा के बारे संजीव जी कहते है :-

“उसे जीत चाहिए | पूरे ब्रह्माण्ड पर जीत | ब्रह्माण्ड का अंत है पर इस मनुष्य के लिप्सा का कोई अंत नहीं है | एक जीत के बाद उसे दूसरी जीत चाहिए | वह जितना ही सहज और सुखी होना चाहता है उतना ही जटिल और दुखी हो जाता है | कुछ गांठे खुलती है, कुछ और गांठे बन जाती है | जीत के लिए उसे जनशक्ति चाहिए, ऊर्जाओं के स्वामित्व चाहिए, तकनीकी चाहिए, अर्थ मनोबल और कोशल चाहिए |

राष्ट्र चाहिए तांकि उस पर अपना वर्चस्व स्थापित कर सके ,धर्म और अनुशासन का पाठ चाहिए, इस्केप चाहिए पनहगाह चाहिए | मन फिर भी झूँझा होने लगता है | मनोरंजन चाहिए यां फिर वैराग्य की शरणस्थली, ये भी कुछ देर के बाद उबाने लगते हैं | पदार्थ से उर्जा और उर्जा से पदार्थों में संक्रमण चलता रहता है, कुछ देर के बाद ही राख की पर्त चढने लगती हैसुख यहाँ नहीं, कहीं दूर चिलक रहा हैं | कहांपता नहीं |” इस प्रकार यह पर्यावरण चेतना को जाग्रत करती संजीव जी की महत्वपूर्ण कृति है |⁽⁶⁾

देवेन्द्र कुमार कृत अधूरा सिंहासन(2008) बाल उपन्यास बहुत ही रोचक उपन्यास है। अधूरा सिंहासन उपन्यास में एकदम नई निराले ढंग से पर्यावरण की समस्या को उठा कर पर्यावरण जागरूकता जगाने का प्रयास किया गया है। पर्यावरण की रक्षा के लिए गजब की सूझबूझ और दिलेरी का परिचय देने वाली रानी देवयानी का और जयंत जैसे पात्रों का चरित्र बहुत ही अद्भुत है जिन्होंने अपने जीवन को पर्यावरण के लिए समर्पित किया | उपन्यास में लेखक ने इस बात को भी दृढ़ता से सामने लाया है कि गुजरे जमाने में भी पर्यावरण की रक्षा के लिए इतनी गहन चिंता करने वाले लोग हमारे यहां मौजूद थे। जिन्होंने किसी भी चीज की परवाह न करते हुए पर्यावरण के प्रति अपने कर्तव्यों का निर्वाह किया और समाज में पर्यावरण की महत्ता को दर्शाते हुए इसके प्रति चेतना भी जगाई। इसलिए अधूरा सिंहासन पर्यावरण चेतना जगाने वाला महत्वपूर्ण उपन्यास है। उपन्यास में पिकनिक पर गये बच्चे और अध्यापक रहस्यमयी गुफा में पड़े हाथी दाँत के एक पूरे और एक अधूरे सिंहासन के बारे में जानने के लिए सुखपुर राजा के महल पर चल पड़ते है | वहां जाकर उनको राजा मानवेन्द्र सिंह के खानदान में से जयंत मिलता है। जो उन्हें पूछने पर बताता है कि वह विदेश में रहता है, पर यहाँ पर कभी- कभी आता हूं। जंगलों में काटे जाने वाले पेड़ों को और बंजर होती जमीन को देखकर मुझे बहुत दुख होता है, इसलिए मैं यहाँ पेड़ लगाने आ जाता हूं। इसमें लेखक ने जयंत के माध्यम से प्रकृति के प्रति स्नेह और अपने कर्तव्यों का निर्वाह करने की प्रेरणा दी है। साथ ही आधुनिक मनुष्य द्वारा प्रकृति दोहन पर चिंता भी व्यक्त की है। मनुष्य स्वार्थ के लिए जंगलों को काटता जा रहा है, धरती की कोख बंजर होने और भयावह भविष्य की ओर संकेत करते हुए इस चल रहे दोहन को रोकने की चेतना भी जगाने का प्रयास लेखक ने किया है। निम्नलिखित संवाद के माध्यम से इस पर प्रकाश डाला

है।

सब ध्यान से डॉक्टर जयंत की बातें सुन रहे थे- "आप विदेश से यहां आते हैं पेड़ लगवाने के लिए।" छाया ने आश्चर्य से पूछा।

"हाँ! कुछ वर्ष पहले मैं यहां आया था तो देखा जंगलों में काफी पेड़ काट डाले गए हैं। मैंने सोचा इस तरह तो पूरा इलाका ही बंजर हो जाएगा। बस तभी मैंने पेड़ लगवाने का निश्चय कर लिया। सच कहूँ पेड़ों ने ही मुझे दोबारा सुखपुर से जोड़ दिया है।"

"चलिए और किसी चीज से न सही, कम से कम पेड़ों ने तो आपको अपने देश से जोड़ रखा है। यह तो बहुत अच्छी बात है।" विजयन ने कहा।⁽⁷⁾

मधुकर सिंह ने बाजत अनहद ढोल उपन्यास में संथाल आंदोलन को ऐतिहासिक सन्दर्भ के साथ चित्रित किया है। इन उपन्यासों को ऐतिहासिक ग्रंथ तो नहीं कहा जा सकता, लेकिन उपन्यासकार ने घटनाओं को संदर्भित करता साथ ही साथ पर्यावरण और संतुलन की समस्या को भी उठाया है। जो आज गंभीर समस्या बन चुकी है।

"आदिवासी इलाकों में बाहरी लोगों और औपनिवेशिक राज की घुसपैठ ने उनकी पूरी सामाजिक व्यवस्था को उलट-पुलट कर दिया। उनकी जमीन उनके हाथ से निकलती गई और धीरे-धीरे किसान मजबूर होते चले गए। जंगलों के उनके गहरे रिश्ते को भी उतनी औपनिवेशिक हमले ने तोड़ दिया। इससे पहले वे भोजन, इंधन और पशुओं के लिए चारा आदि जंगलों से जुटाते थे, जहां उनका जीवन पूरी तरह स्वच्छंद था। खेती के लिए अपने तरीके थे।"

औपनिवेशिक बाजारवादी नीतियों से आदिवासी-किसानों के सामने आर्थिक संकट आने लगा। जंगलों पर आदिवासियों के परंपरागत अधिकारों को समाप्त किया जाने लगा। उपनिवेशवादी सत्ता को जंगल के प्राकृतिक संसाधनों में बड़ा मुनाफा दिखाई देने लगा। इसके लिए जंगलों, पहाड़ों और प्राकृतिक संसाधनों पर कब्जा करने की नीतियां बनाई जाने लगी। प्रकृति का अंधाधुंध शोषण किया जाने लगा। जिससे प्राकृतिक प्रकोपों का खतरा इन क्षेत्रों में बढ़ता गया। प्राकृतिक संतुलन पूरी तरह से बिगड़ चुका है। सूखा, बारिश, बाढ़, तूफान, भूस्खलन जैसी समस्याओं का सामना आदिवासियों को करना पड़ता है। जिसके चलते इन आदिवासी समुदायों में आक्रोश पनपने लगा है। बाजत अनहद ढोल उपन्यास में इसी आक्रोश को यथार्थवादी

दृष्टिकोण के साथ चित्रित कर पर्यावरण चेतना जगाई है।⁽⁸⁾

अल्का सरावगी का उपन्यास 'एक ब्रेक के बाद' में यहीं दिखाया गया है कि बहुराष्ट्रीय कम्पनियां औद्योगिक विकास की आड़ में प्राकृतिक संसाधनों का दोहन कर रही है। तीसरी दुनिया के देश बहुराष्ट्रीय कम्पनियों के लिए कच्चा माल उपलब्ध कराने की मंडियां हैं या कचरे के डंपिंग स्टेशन। ग्लोबल वार्मिंग की चिंता अब तीसरी दुनिया के लोगो को भी सताने लगी है। तीसरी दुनिया की गरीबी बहुराष्ट्रीय कंपनियों के लिए वरदान है कार्बन क्रेडिट की खरीद फरोख्त करके वहां पाप बेचा जा रहा है। लेखिका ने अपनी बात दो पात्रों के माध्यम से पाठकों के समक्ष रखी है। के. वी. शंकर कहते हैं— "भई आप फैक्ट्रियां बंद मत कीजिए, बेशक हवा में कार्बन छोड़ते रहिए। बीएस जैसे आप स्टील फैक्ट्री के लिए लोहा खरीदते हैं वैसे ही कार्बन क्रेडिट खरीद लीजिये। पूरी धरती का आसमान तो एक ही है, आप कहीं पर हवा पानी बिगड़िये, पर कहीं और की हवा पानी सुधार दीजिए। दिक्कत क्या है?"⁽⁹⁾

उपन्यास का पात्र गुरुचरण इन सभी सच्चाइयों से परिचित है वह सुनहरे परदे के पीछे छिपी इन भयानक सच्चाई से पर्दा भी उठाता है। वह जनता है की उद्योग जगत की इन करतूतों को केवल नैतिकता की दुहाई देकर रोका नहीं जा सकता बल्कि आम आदमी का आगे आना जरूरी है। वह के. वी. का प्रशंसक बनकर दोगली नीतियों को जनता है। वह कहता है "मैं इस धरती पर अपना छोटा हई सही लेकिन स्वर्ग बना सकूंगा। हम जहाँ चलेंगे वहाँ खुशबुएँ रह जाएँगी। हम जहाँ बहेंगे वहाँ हमारे प्रवाह का स्वर गूँजेगा। हम अपने आस पास के वृक्षों, हवाओं, पानी, और सरे लोगो की सारी वेदना समेट लेंगे।"⁽¹⁰⁾

अंत; हम कह सकते हैं कि 21 वी.सदी के हिंदी उपन्यासकारों ने बड़ी संजीदगी के साथ प्रदर्शित किया है की आज प्रकृति पर तरह तरह के खतरे मंडरा रहे हैं। प्रकृति और पर्यावरण की सुरक्षा का सवाल एक बड़ा सवाल है। प्रकृति जो हमें जीने के लिए स्वच्छ वायु, पाने के लिए पानी और खाने के लिए कंदमूल उपलब्ध कराती है, आज खतरे में है। पर्यावरण के नियमों का पालन हमें किसी के डर से नहीं बल्कि दिल से करना चाहिए। नदियाँ प्रदूषित हैं, शहरों की हवा प्रदूषित है। हवा में सल्फरडाईऑक्साइड, नाइट्रोजन ऑक्साइड जैसी जहरीली गैसें घुल चुकी हैं। प्रकृति जो बिना स्वार्थ के हमें सब कुछ देती है लेकिन स्वार्थ में हम अंधे प्राकृतिक संसाधनों को धन के स्रोत के रूप में

देखते हैं। अनेक राज्यों में अवैध फैक्ट्रियां आज भी चल रही हैं। तापमान का बदलता स्वरूप प्रकृति के साथ किये गये निर्मम व्यवहार का हई सूचक है। ग्लोबल वार्मिंग, भूकंप, बाढ़, तूफान, सूखा, अतिवृष्टि, अल्पवृष्टि प्रकृति द्वारा मनुष्य को डी जाने वाली चेतावनियां हैं। 21.वी. शताब्दी के हिंदी उपन्यासकारों ने भी मानव को यहीं समझाने का प्रयत्न किया है कि अगर हम नहीं जगे तो प्राकृतिक आपदाएं कब मानव सभ्यता को विलुप्त कर देंगी यह पता ही नहीं चल पायेगा। 21

शताब्दी के उपन्यासकारों की रचनाओं पर दृष्टि डालने से समाज की वास्तविकता पाठक को समझ आती है साथ ही यह विषय मनुष्य को सोचने विचारने के लिए भी विवश करते आये हैं। आधुनिकता के नाम पर बढ़ रहा पर्यावरणीय संकट और उसके पीछे के कारणों और परिणामस्वरूप इसके भयंकर परिणामों की और संकेत करते हुए समाज में इसके बचाव हेतु चेतना जगाने का प्रयास 21 शताब्दी के उपन्यासकारों ने अपनी रचनाओं के माध्यम से सशक्त रूप में किया है।

संदर्भ ग्रन्थ

1. 'महात्मा गाँधी', 'मेरे सपनों का भारत', (राजपाल प्रकाशन, नई दिल्ली, संस्करण 2010) पृष्ठ 1.
2. 'डॉ. ए.एस.', 'सुमेष(सं)', 'समकालीन हिंदी साहित्य में पर्यावरण विमर्श', (अमन प्रकाशन, कानपुर) पृष्ठ 18.
3. 'उदय प्रकाश', 'पीली छतरी वाली लड़की', (वाणी प्रकाशन, नई दिल्ली, संस्करण २०१८) पृष्ठ 12
4. 'महुआ माजी', 'मरंग गोडा नीलकंठ हुआ', (राजकमल प्रकाशन, दरियागंज, नई दिल्ली, संस्करण २०१५) पृष्ठ १६९
5. 'विद्यासागर नौटियाल', 'स्वर्ग दहा पाणी पाणी!', (अंतिका प्रकाशन, गाजियाबाद, उत्तर प्रदेश, संस्करण 2010) पृष्ठ 14
6. 'संजीव', 'रह गयोई दिशाएँ इसी पार', (राजकमल प्रकाशन, दरियागंज, नई दिल्ली, संस्करण २०१८) पृष्ठ 114,115
7. 'देवेन्द्र कुमार', 'अधुरा सिंहासन', (बुक क्राफ्ट पब्लिशर्स, नई दिल्ली, संस्करण २०१९) पृष्ठ 18,19
8. 'मधुकर सिंह', 'बजट अनहद ढोल', (वाणी प्रकाशन दरियागंज, नई दिल्ली, संस्करण 2005) पृष्ठ 5
9. 'अल्का सरावगी', 'एक ब्रेक के बाद', (राजकमल प्रकाशन, दरियागंज, नई दिल्ली, संस्करण) पृष्ठ 82
10. 'अल्का सरावगी', 'एक ब्रेक के बाद', (राजकमल प्रकाशन, दरियागंज, नई दिल्ली, संस्करण) पृष्ठ 42

प्रदीप सौरभ कृत उपन्यास “मुन्नी मोबाइल” में परिलक्षित होती कारपोरेट संस्कृति

निधि सोनी, डॉ. जसप्रीत कौर, डॉ. राजेंद्र सिंह 'साहिल'

हिंदी विभाग, सी.टी. यूनिवर्सिटी लुधियाना (पंजाब)

nidhibrar74@gmail.com

भारत में आर्थिक उदारीकरण के पश्चात अनेकों बहुराष्ट्रीय कंपनियों का भारत में पदार्पण होना प्रारंभ हुआ जिसके फलस्वरूप भूमंडलीकरण की प्रक्रिया में बेतहाशा वृद्धि होने के कारण भारतीय सभ्यता का पश्चिमीकरण होना प्रारंभ हुआ। भूमंडलीकरण की प्रक्रिया के प्रभाव दूरगामी साबित हुए। भूमंडलीकरण ने सामाजिक आर्थिक सांस्कृतिक एवं राजनैतिक पक्षों को बहुत दूर तक प्रभावित किया। समाज का अभिजात्य वर्ग अपने बड़े-बड़े आर्थिक लक्ष्य को प्राप्त करने में सफल रहा। हमारे समाज के निर्बल वर्ग ने अधिक से अधिक पैसे कमाने हेतु हमारे समाज में अहितकारी कदम भी उठाये। हमारे प्रखर बुद्धि साहित्यकारों की दृष्टि से भारत की संस्कृति में आते हुए यह परिवर्तन ओझल न रह सके। यह तो सर्वविदित है कि साहित्यकार एक बेहद संवेदनशील प्राणी होता है। वह अपने समाज के हित के लिए अपने साहित्य के माध्यम से सदैव प्रयत्नशील रहता है। माननीय प्रदीप सौरभ जी ने अपने उपन्यास 'मुन्नीमोबाइल' के माध्यम से भारतीय समाज में अपने पाँव पसारती हुई कारपोरेट संस्कृति के प्रभावों से भारतीय समाज को जागृत करने का प्रयास किया है। अपने इस उपन्यास के माध्यम से प्रदीप सौरभ जी ने भारतीय समाज में बढ़ते हुए बाजारवाद, उपभोक्तावाद, विज्ञापनबाजी, बढ़ते हुए मोबाइल के प्रयोग तथा इंटरनेट क्रांति इत्यादि के दुष्प्रभावों से समाज को सचेत करने का अथक प्रयास किया है। 'मुन्नी मोबाइल' नामक यह उपन्यास भारतीय समाज की कथित आधुनिकता को उजागर करती है। 'मुन्नी मोबाइल' नामक यह चरित्र इतना प्रभावशाली है कि वह पाठक के मस्तिष्क पर अपना गहन प्रभाव छोड़ता है। कारपोरेट संस्कृति की तेज आंधी में किस प्रकार एक घरेलू नौकरानी एक तेज दबंग महिला में परिवर्तित हो जाती है तथा अपनी बेटी को भी उसी रास्ते पर ले जाती है। 'मुन्नी मोबाइल' नामक यह उपन्यास भारतीय समाज में बढ़ते बाजारवाद, उपभोक्तावाद तथा अनेकों अनैतिक कार्यों का ज्वलंत दस्तावेज है।

बीज शब्द: भूमंडलीकरण, बाजारवाद, उपभोक्तावाद तथा अनैतिकता

प्रदीप सौरभ के द्वारा रचित इस उपन्यास का विषय वस्तु जितना पाठकों का ध्यान अपनी ओर आकर्षित करने वाला है, उतना ही इस उपन्यास का शीर्षक इस उपन्यास की सार्थकता को प्रमाणित करता है। प्रदीप सौरभ ने अपने इस उपन्यास के माध्यम से हिंसक पूंजीवादी समाज के यथार्थ को समाज के सामने रूप से प्रस्तुत करने का प्रयास किया है। आधुनिक समय में बढ़ते हुए बाजारवाद के समाज पर पड़ने वाले प्रभाव को प्रदीप सौरभ ने यथार्थ रूप में प्रस्तुत किया है। वर्तमान समय में स्त्रियां भी बाजारवाद तथा उपभोक्तावाद के प्रभाव में आकर अपनी नई छवि बनाने में सफल रही है। बाजारवाद की बढ़ती हुई इस दौड़ से समाज के सभी वर्ग प्रभावित हुए हैं। प्रदीप सौरभ ने हमारे समाज में बढ़ती हुई संस्कृति के प्रभाव को मुख्य बिंदु बनाकर एक ऐसी महिला को चित्रित किया है जो पूरी तरह बाजारवाद तथा उपभोक्तावादी संस्कृति से प्रभावित है। प्रदीप सौरभ ने अपनी लेखनी के माध्यम से 'मुन्नी'

नामक चरित्र को ऐसे सजीव रूप में प्रस्तुत किया है जो प्रायः कम ही देखने को मिलता है। मुन्नी नामक यह महिला बिहार के एक गांव से आई साधारण महिला है, जो कब 'मुन्नी' से 'मुन्नी मोबाइल' में रूपांतरित हो जाती है, उसे ही पता नहीं चलता। बिहार के बस्तर जिले में रहने वाली बिंदु उर्फ मुन्नी दिल्ली की सीमा से जुड़े गांव में आकर बस जाती है और यहीं से धीरे-धीरे वह घरेलू काम करते हुए कुछ पैसे जोड़ना प्रारंभ कर देती है। उसका पति सीधा-साधा व्यक्ति है किसी भी विपरीत परिस्थितियों में मुन्नी धर का मोर्चा संभालती है। मुन्नी मोबाइल तथा हीर सिंह के मध्य हुआ झगडा इसी बात को सार्थक करता है। मुन्नी पैसे जोड़-जोड़ कर मकान बनवा लेती है। इसी तरह पैसे कमाते-कमाते हैं मुन्नी पैसे कमाने की होड़ में शामिल हो जाती है। गांव के एकमात्र अस्पताल की डॉ. शशि से मिलकर वह अबॉर्शन के लिए लड़कियां खोज-खोज कर लाती तथा वह इसके एवज में कमीशन प्राप्त करती है। वह आनंद

भारती के घर में घरेलू काम करना प्रारंभ कर देती है। अपने मालिक आनंद भारती से वह जिद करके मोबाइल प्राप्त करती है। यहीं से उसके जीवन का एक नया मोड़ प्रारंभ हो जाता है। आनंद भारती उसे उसके नए नाम मुन्नी मोबाइल से पुकारना प्रारंभ कर देते हैं। प्रदीप सौरभ ने यह बताने का प्रयास किया है कि इंटरनेट तथा मोबाइल का प्रयोग जीवन को सरल बनाने के लिए जितने आवश्यक है। उनका का प्रभाव उतना ही खतरनाक भी है। आनंद भारती मुन्नी की मेहनत की कहानियां दूसरों को सुनाया करते थे। उसी मुन्नी को सेक्स चलाने वाली मुन्नी के रूप में स्वीकार कर पाना उनके लिए अत्यंत मुश्किल था। पढ़ी-लिखी होने के कारण वह पढ़ाई के महत्व को नहीं समझती थी। वह अपने बच्चों की पढ़ाई पर अधिक ध्यान दे पाने में असमर्थ थी। मुन्नी इतनी अधिक अहंकारी हो जाती है कि वह अपने मालिक आनंद भारती को भी अपना परिवार न संभाल पाने का ताना देती है। प्रदीप सौरभ ने आर्थिक उदारीकरण एवं भूमंडलीकरण के फलस्वरूप भारतीय समाज के उस पक्ष को उजागर किया है जो बाजारवाद, उपभोक्तावाद तथा अनैतिकता के दलदल में फंस चुका है। भारत में होने वाले भूमंडलीकरण के कारण भारतीय समाज की सोच का भी भूमंडलीकरण हो गया है जिसने हमारी संस्कृति को बहुत गहरे स्तर तक प्रभावित किया है। भूमंडलीकरण के कारण बाजारवाद पनपा और बाजारवाद से उपभोगवाद (1) मुन्नी अपनी बेटी रेखा को पढ़ा लिखा कर आनंद भारती के समान बनाना चाहती थी, परंतु वह अपनी बेटी रेखा को बाजार में रखी हुई वस्तु के समान समझ कर उसे पैसा कमाने का साधन समझ कर उसका उपयोग करती है, जो उपभोक्तावाद का एक कटु सत्य है। उपभोक्तावाद के बारे में वेल्ज़र का कहना है कि विश्वभर में उपभोक्तावाद की तानाशाही स्थापित हो चुकी है, जिसका उद्देश्य कुल मिलाकर नैतिक दायित्वों से छुटकारा पाना है। (2) प्रदीप सौरभ के द्वारा रचित यह पात्र मी मोबाइल पाठकों को सोचने पर मजबूर कर देती है कि बाजारवाद का प्रभाव किस प्रकार एक साधारण महिला को एक क्रूर एवं व्यवसायिक महिला के रूप में स्थापित करता है। सुधीर पचौरी जी के अनुसार बाजार का दबाव लेखक को बाज़ार के सुर में

सुर मिलाने, तथा दोनों का अनुसरण करके इच्छाओं को संतुष्ट करने, दक्षता को नकारने, उसे दोहराते जाने का न्योता देता है। (3) परंतु इसके विपरीत प्रदीप सौरभ ने अपने उपन्यास 'मुन्नी मोबाइल' की रचना करते हुए अन्य आधुनिक लेखकों के समान बाजारवाद के प्रभाव में आकर अपने साहित्य का बाजारीकरण नहीं नहीं होने दिया बल्कि उन्होंने अपने इस उपन्यास के माध्यम से हमारे समाज पर पड़ने वाले बाजारवाद, उपभोक्तावाद तथा अनैतिकता के दुष्प्रभावों को आज के सामने उजागर करने का प्रयास किया। अपने उपन्यास 'मुन्नी मोबाइल' (4) के माध्यम से प्रदीप इस कारपोरेट जगत से उपजी कारपोरेट संस्कृति के प्रभाव की विवेचना करते हुए लिखते हैं कि किस प्रकार समकालीन समाज में पैसा ही सब कुछ है आधुनिक समाज का एकमात्र लक्ष्य पैसे कमाना ही रह गया है इसी बदलती हुई मानसिकता को अपने चरित्र 'मुन्नी मोबाइल' के माध्यम से प्रदीप सौरभ जी ने लेखनीबद्ध किया है। उपन्यास का निम्नलिखित पंक्तियां इसी यथार्थ की पुष्टि करती हैं।

'मुन्ना पैसे कमा कर थोड़ी घमंडी हो चुकी थी। उसे लगता था कि दुनिया उसके पैरों के नीचे है। वह जोहेगी कर गुजरेगी। पैसा उसका भगवान हो चुका था। पैसों के लिए वह कुछ भी कर गुजरती। संघर्ष की ताप भी उसमें कम हो रही थी। छोटे-मोटे फायदों के लिए वह समझौते भी करने लग गई थी। बड़े छोटे का लिहाज भी उसमें खत्म हो रहा था।' (5)

यह एक महिला मुन्नी मोबाइल की कहानी ही नहीं वरन ऐसी सैकड़ों महिलाओं की कहानी है जो आधुनिक समय की सर्वशक्तिमान कारपोरेट संस्कृति के प्रभाव में आकर अपना जीवन बर्बाद कर चुकी होंगी। प्रदीप सौरभ द्वारा रचित यह उपन्यास आधुनिक समय में कारपोरेट संस्कृति के भारतीय समाज पर पड़ने वाले अच्छे तथा बुरे दोनों प्रकारों के प्रभाव की व्याख्या करने में पूर्ण रूप से सफल रहा है। लेखक प्रदीप सौरभ अपने उपन्यास 'मुन्नी मोबाइल' के माध्यम से कारपोरेट संस्कृति के दुष्प्रभावों से अवगत कराने का अत्यंत सफल प्रयास किया है, जो वास्तव में सराहनीय है।

प्रदीप सौरभ ने अपने इस उपन्यास के माध्यम से यह स्पष्ट करने का प्रयास किया है कि प्रकार

बाजारवादी चमक-दमक से प्रभावित होकर पैसे कमाने की हवस का शिकार होती है तथा गलत कामों की ओर दिशा निर्देशित कर लेती है। इस के माध्यम से बाजारवाद का नंगा सच पाठकों के सामने आता है। गरीब प्रदेशों से आने वाली लड़कियां महानगरों में आकर दलालों के चक्कर में पड़ कर देह व्यापार के धंधे में पड़ जाती हैं और इसे पैसे कमाने का अच्छा स्रोत समझती हैं तथा केवल पैसे की खातिर इस नारकीय जीवन को अपनाती हैं। अपने शरीर को उपभोग की सामग्री समझकर उपभोक्तावादी दुनिया में स्वयं को प्रस्तुत कर देती हैं जैसा कि उपन्यास 'मुन्नी मोबाइल' की निम्नलिखित पंक्तियों से स्पष्ट है।

'वह अपने गांव से गरीब लड़कियों को नौकरी दिलाने के नाम पर यहां लाती थी और धंधे में उन्हें झोंक देती थी। बाद में उसके गैंग में पढ़ी-लिखी लड़कियां भी आ गई थी। धंधे में उसकी इमेज बन गई थी कि उसके कस्टमर अच्छे पैसे देते हैं लफड़ा भी नहीं करते हैं।' (6) प्रदीप सौरभ उपन्यास के माध्यम से बाजारवादी संस्कृति के समाज पर दुष्प्रभावों की करते हुए कहते हैं जिस प्रकार बाजार में अधिक से अधिक ग्राहकों को आकर्षित करने के लिए कारपोरेट कंपनियां अपनी चमक-दमक एवं सुख-सुविधाओं के द्वारा आंखों को आकर्षित करने का प्रयास करती हैं। ठीक उसी प्रकार मुन्नी भी अपनी पुत्री को देह व्यापार के धंधे में पूरी तैयारी के साथ उतारती है, जो पूर्णतया कंप्यूटरीकृत व्यापार था। एस.एम.एस. तथा ब्लॉगिंग इत्यादि का प्रयोग कर उसने अपने व्यापार को आधुनिक तरीके से चलाने में महारत हासिल कर ली थी जैसा कि इन पंक्तियों से स्पष्ट है।

' लड़कियों का लेखा जोखा वह लैपटॉप पर रखती थी। उसने नया नंबर अपनी मम्मी के पक्के कस्टमरों को एस. एम. एस. कर दिया था। मोबाइल पर वह पक्के कस्टमरों को ही डील करती थी। इंटरनेट के जरिए वह नए कस्टमर बनाती। लड़कियों की तस्वीरें उसने ब्लॉक पर डाल दी थी। हाई-फाई तरीके से वह धंधा करने लगी थी।' (7)

प्रदीप सौरभ अपने उपन्यास के माध्यम से हमारे समकालीन समाज में होने वाले नैतिक मूल्यों के ह्रास की चर्चा करते हुए लिखते हैं कि महानगरों की चमक-दमक को देखकर मुन्नी जैसी साधारण नौकरानी का काम करने वाली स्त्री किस प्रकार अपराध के दलदल में फंस जाती है। केवल पैसा कमाना ही उसका एकमात्र उद्देश्य रह जाता है, नैतिकता उसके जीवन से कोसों दूर हो जाती है। अपने इस उपन्यास के माध्यम से प्रदीप सौरभ यह संदेश देना चाहते हैं कि कारपोरेट जगत की ऊपरी चमक-दमक किस प्रकार हमारे समाज की मानसिक स्थिति को प्रभावित कर रही है। सही-गलत के निर्णय को समाप्त करती जा रही हैं। इस उपन्यास की निम्नलिखित पंक्तियों इसी मंतव्य को स्पष्ट करती हैं।

'आकांक्षाओं के पर दिन- प्रतिदिन फैलते जा रहे थे। उसमें तरक्की करने की भूख इतनी प्रबल हो गई थी कि अब उसे सही गलत में अंतर भी समझ नहीं आता था। उसे जो चाहिए वह चाहिए, इसके लिए रास्ता क्या हो वह यह नहीं सोचती थी।' (8)

प्रदीप सौरभ ने अपनी लेखनी के द्वारा समाज पर पड़ने वाले कारपोरेट संस्कृति के विभिन्न प्रभावों की पड़ताल बड़ी ही बारीकी के साथ की है। वह कहते हैं कई बार व्यक्ति विशेष समाज के डर से जाति बिरादरी के डर से वह निर्णय नहीं ले पाता जो वह वास्तविकता में लेना चाहता है। परंतु आधुनिक समाज में कारपोरेट संस्कृति के प्रभाव के चलते वह निर्णय लिए जा रहे हैं जो पहले भारतीय समाज में बहुत ही सोच विचार के बाद लिये जाते थे। इस पुरुष प्रधान समाज में स्त्रियां अपने जीवन से संबंधित निर्णय लेने का साहस करने लगी हैं। मुन्नी मोबाइल नामक इस उपन्यास की निम्नलिखित पंक्तियां आज के समाज की उसी बदलती तस्वीर को प्रदर्शित करते हैं। ' पर स्वयं आनंद भारती दरवाजे पर खड़े सोच रहे थे बचपन में बहन जी छाप इमेज रखने वाली अस्मिता ने इतना बोल्ड निर्णय कैसे ले लिया। कॉल सेंटर के माहौल का असर है शायद। आनंद भारती अपने परिवार को पहचानते थे। जाति-बिरादरी उनके लिए प्रमुख रही है। लव-मैरिज और वह भी जाति के बाहर, ऐसा

होने की कोई आसान उसमें नहीं थी। समय के इतने सालों बाद आज भी मानसी से शादी न करने के लिए पछता रहे थे। (9)

यह कहना अनुचित न होगा कि कारपोरेट संस्कृति दिखावे की संस्कृति है। कार बंगला आदि स्टेटस के प्रतीक माने जाते हैं। प्राइवेट बैंक बड़े ही आसानी से लोगों को कर्जा दे देते हैं और लोग ई.एम.आई. की सुविधा का लाभ उठाते हुए अनेकों सुख सुविधाओं का जुगाड़ कर लेते हैं। प्राइवेट कंपनी में काम करते हुए इन कर्जदार लोगों की अपने काम की कोई गारंटी नहीं होती है। उपभोक्तावादी संस्कृति को अपनाने के कारण बाजार में उपलब्ध सभी वस्तुओं को किस्तों पर खरीद लेते हैं, जो कारपोरेट जगत की ग्राहक बनाने की रणनीति का एक हिस्सा होती है। वही कंपनियों के कर्ज चुका पाने की स्थिति में लेकिन नए-नए हथकंडे अपनाती हैं। नौकरी चली जाने की स्थिति में ई.एम. आई. एक दुखद स्वप्न की भांति बन जाता है। इस उपन्यास के मुख्य पात्र आनंद भारती की बहन की बेटी अस्मिता अपनी नौकरी चली जाने के कारण इसी प्रकार के संकट में फंस जाती है। उसकी इस हालत का चित्रण लेखक ने बड़े ही यथार्थपूर्ण तरीके से किया है। उदाहरण हेतु इस उपन्यास की निम्नलिखित पंक्तियां प्रस्तुत है। 'मामा हम पर काफी कर्ज हो गया है। मकान, गाड़ी और दूसरी चीजों की ई.एम.आई हमारे ऊपर भारी पड़ रही है। मुझे नौकरी से हटाने का नोटिस भी मिल चुका है। (10) प्रदीप सौरभ जी ने हमारे आधुनिक समाज में कारपोरेट संस्कृति के प्रभाव के कारण होने वाले अभूतपूर्व परिवर्तनों की पड़ताल बड़े ही सुख तरीके से की है। और वह यह संदेश संपूर्ण समाज को देना चाहते हैं कि परिवर्तनों के कारण कारपोरेट संस्कृति है। इस संस्कृति का एकमात्र लक्ष्य पैसा कमाना है। इस उपन्यास की निम्नलिखित पंक्तियां हमारे समाज की सच्चाई को प्रदर्शित करती है।

'मेट्रो सिटीज की यह एक कड़वी सच्चाई है। इसमें वह भी शामिल है जिनकी जेब में माल नहीं है। पढाई करते हुए जेबों को मालामाल करने का आसान तरीका है कॉल सेंटर। जिंदगी की बड़ी कीमत पर। अगर माल और मौज

मस्ती मिल रही है तो इसकी कीमत भी कॉल सेंटर वसूल रहे हैं। जिंदगी के चक्र में बदलाव। कॉल सेंटर में काम की शुरुआत रात 10:00 बजे के बाद होती है, जब अमेरिका और ब्रिटेन में सुबह होती है। इनमें रात में काम करने वालों के लिए नाइट होती है तो रात को गुड मॉर्निंग। सुबह का सूरज देखे हुए भी इनको महीनों बीत जाते हैं। सुबह जब मुर्गा बांग दे रहा होता है। चिड़िया कलरव कर रही होती है। दुनिया जब दौड़ रही होती है, जिंदगी से चहचहा रही होती है। तब तो यह सो रहे होते हैं। जिंदगी बंध जाती है। सोशल लाइफ का मतलब ऑफिस और डिस्को में धमाल। इनकी जिंदगी का अर्थ यही जाता है।' (11) प्रदीप सौरभ हमारे समाज की मानसिकता में अपनी जड़ें गहरी करती हुई कारपोरेट संस्कृति के बारे में चर्चा करते हुए कहते हैं। आधुनिक परिपेक्ष में हर वस्तु जो बाजार में है अथवा नहीं है, उपभोग की सामग्री है। पैसे कमाने की होड़ में बेजान वस्तुओं के साथ जीते जाते व्यक्ति भी उपयोगी सामग्री बन गए हैं। बाजारवाद की इस दौड़ में प्रत्येक वस्तु, जानवर, यहां तक कि पर्यावरण संसाधन भी उपभोग की सामग्री बन गए हैं। लोग पैसा कमाने की चाह में महानगरों की ओर भागते हैं। पर्यावरणीय संसाधनों का बुरी तरह दोहन करते हैं। इस समस्या के मूल में भी पैसों के प्रति अंधी दौड़ है। जो इन पंक्तियों से यह स्पष्ट होता है 'बाहर से आकर यहां बसे लोगों का सरोकार जमुना से नहीं है। उन्हें तो अपने पेट भरने की सनक ही सवार रहती है। कमाई और कमाई, बस इतना ही सरोकार है उनका दिल्ली और जमुना से। पीने का पानी नहीं मिलेगा तो क्या बाजार से खरीद लेंगे। लेकिन कितने समय तक। पानी बचेगा और कब तक। एक वक्त ऐसा भी आ सकता है इंसान को अपनी करतूतों के चलते पानी पैसे देने पर भी नहीं मिलेगा। यह बात कहीं भी जा चुकी है कि जब कभी विश्व युद्ध होगा तो उसके मूल में पानी होगा। (11)

इस लेख के अंत में यह कहना अनुचित नहीं होगा कि लेखक प्रदीप सौरभ ने अपने उपन्यास 'मुन्नी मोबाइल' की रचना करके समाज के प्रति अपने लेखक होने के उत्तरदायित्व का बड़ी ही यथार्थतापूर्वक निर्वहन किया है। लेखक प्रदीप

के द्वारा उठाए गए सभी ज्वलनशीलमुद्दे, जो पूर्णतः कारपोरेट संस्कृति के द्वारा पोषित हैं, उनकी समाज के प्रति संवेदनशीलता के प्रतीक हैं। उन्होंने अपनी इस रचना 'मुन्नी मोबाइल' के द्वारा समाज को अपनी बदलती हुई मानसिकता के प्रति जागृत करने का बड़ा ही सफल प्रयास

किया है, ताकि समाज को अपनी सभ्यता एवं संस्कृति को समय रहते भूलने से बचाया जा सके। लेखक प्रदीप सौरभ ने हमारी आधुनिक पीढ़ी को अपनी सभ्यता एवं संस्कृति को संरक्षित करने का सफलतम प्रयास किया है।

सन्दर्भ संकेत

1. रामशरण जोशी, मीडिया और बाजारवाद, राधाकृष्ण प्रकाशन, नई दिल्ली, संस्करण-2004
2. गोविंद चातक, पर्यावरण, परंपरा और अपसंस्कृति, तेज प्रकाशन, नई दिल्ली, संस्करण-2000
3. सुधीर पचौरी, मीडिया और साहित्य, राज सूर्य प्रकाशन
4. सौरभ, प्रदीप: मुन्नी मोबाइल, वाणी प्रकाशन, नई दिल्ली, 2011
5. मुन्नी मोबाइल पृष्ठ संख्या 140
6. वही, पृष्ठ संख्या 146
7. वही, पृष्ठ संख्या 156
8. वही, पृष्ठ संख्या 105
9. वही, पृष्ठ संख्या 108
10. वही, पृष्ठ संख्या 109
11. वही, पृष्ठ संख्या 89

EFFECTIVENESS OF GAME-SPECIFIC SKILL PRACTICES ON SELECTED BATTING AND BOWLING SKILLS AMONG CRICKET PLAYERS OF MANIPUR**Senate Singh Mayengbam¹ and M. Rajashekar²**^{1,2}Department of Physical Education, Annamalai University, TamilNadu, India
senatemayengbam9@123, mrsfootball@gmail.com**ABSTRACT**

In the realm of international cricket, this study examines the efficacy of game-specific skill practices through the Sutcliffe skill test, as introduced by Herbert Sutcliffe in 1975, for enhancing cricket skills. A 12-week training program was conducted with 40 cricket players in Manipur, India, utilizing an experimental design that compared the training group with a control group. The analysis via ANCOVA reveals a notable improvement in batting and bowling skills within the training group, with 'F' ratios for post-test scores surpassing the required levels of significance. These findings affirm the potential of game-specific skill practices in enhancing cricket players' performance, offering insights for tailored coaching and training regimens that align with real-game scenarios while advancing both skill development and physical conditioning. This research contributes to the ongoing pursuit of excellence in cricket and skill-intensive sports by emphasizing the interplay between skill development and physical conditioning in a highly competitive and demanding environment.

Keywords: Cricket, Game-Specific skill practices, Sutcliffe skill test, Batting, and Bowling.

1. Introduction

The sport of cricket played between two teams of eleven players, is a highly demanding and multifaceted game that places significant emphasis on both physical fitness and technical skill execution. In the ever-evolving landscape of international cricket, players are subjected to more intense schedules, with longer seasons, frequent touring, and the demand for peak performance in a highly competitive environment. To meet these demands, modern cricket requires players to excel in various domains, including batting and bowling skills, agility, strength endurance, speed, and power. Cricket is a bat-and-ball team sport played between two teams of eleven players each, with the objective of scoring more runs than the opposing team. It is typically played on a pitch with a rectangular 22-yard-long wicket, and the game involves various aspects, including batting, bowling, and fielding (International Cricket Council 2021). Bowling in cricket refers to the act of delivering the ball to the batsman with the goal of dismissing them. Bowlers use various techniques, including pace, spin, and swing, to outwit the batsmen and take wickets (Espnricinfo, 2021). Batting in cricket involves the act of the batsman using a cricket bat to face the bowler's deliveries and score runs. The primary goal is to protect the

wicket while accumulating runs through well-timed shots and placement (BBC Sport 2021). Crucially, in the pursuit of excellence, cricket players require a training regimen that not only enhances their overall fitness but also hones their game-specific skills to closely replicate the demands of actual match-play (Bambawale, & Khanvilkar, 2018). This concept aligns with the principle of specificity, which posits that training should mirror the movements and demands of real-game situations to maximize performance adaptations (Comfort, & Thomas, 2013). While the physical aspects of cricket training have been widely examined, limited research has delved into the effectiveness of game-specific skill practices, especially in the context of cricket's technical demands (Lloyd et al., 2009). Skill-oriented training remains a critical component of cricket development, given the game's high technical requirements (Smith, & Allen, 2007). However, the extent to which different training modalities within the sport cater to both physical conditioning and technical skill enhancement remains relatively unexplored. This study seeks to bridge this knowledge gap by assessing the physiological, physical, and technical demands imposed on cricket players during specific training sessions, with a focus on selected batting and bowling skills (Thomas, & Comfort, 2018). Specifically, it aims to compare traditional net-based training sessions with center-wicket

game simulations to determine which provides a more match-specific environment. By quantifying these demands, we can shed light on which training modalities are most effective for elite cricket players in Manipur, India, in developing their skill sets while maintaining the necessary physical conditioning required for the game's rigorous demands. Understanding the effectiveness of game-specific training practices in the context of cricket is of paramount importance for coaches, players, and sports scientists aiming to optimize training regimens. This research contributes to the ongoing effort to enhance the performance of cricket players and may have implications for other skill-intensive sports, ultimately striving for a deeper comprehension of the intersection between skill development and physical conditioning in elite athlete training.

Herbert Sutcliffe (1894-1978) was an exceptional English opening batsman who represented Yorkshire and the England national cricket team primarily during the interwar period. His career, which began in 1919 after being delayed by World War I, ended in 1939 when he joined military service in World War II. Sutcliffe, renowned for his right-handed batting and extraordinary performance in challenging conditions, formed one of cricket's greatest opening partnerships with Jack Hobbs ("Hobbs and Sutcliffe") (Espnrcricinfo, 2021).

2. Hypothesis

It was hypothesis that there may be significant difference in batting and bowling performance by practicing game specific skill practices.

3. Objectives

The objective of this study was to investigate and assess the effectiveness of game-specific skill practices on selected batting and bowling skills among cricket players of Manipur.

4. Methodology

This study follows an experimental design with two groups: Group 1 (Experimental) and Group 2 (Control). The purpose of the study is to assess the impact of game-specific training on batting and bowling skills using the Sutcliffe test as the criterion variable. The study involves a pre-test and post-test design with a 12-week training intervention. A total of 40 cricket players from Manipur were recruited for the study. The participants were divided into two groups. Group 1 (Experimental): This group consisted of 20 participants who underwent game-specific skill practices. Group 2 (Control): This group also had 20 participants, but they did not receive any training and acted as a control group. Group 1 (Experimental) underwent 12 weeks of game-specific training, focusing on batting and bowling skills. The Sutcliffe test was administered to assess the participants' batting and bowling skills. ANCOVA was employed to compare the post-training scores of Group 1 (Experimental) and Group 2 (Control) while controlling for the pre-training scores as covariates through statistical software, such as SPSS.

5. Results and Interpretation

The analysis of covariance on the pre and post-test batting and bowling scores of the game-specific practices group and the control group has been conducted and is presented in Tables I. and II.

Table I : Analysis Of Covariance Of The Data On Batting Of Pre And Post Tests Scores Of Game-Specific Training And Control Groups

TEST	GAME SPECIFIC GROUP	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARE	'F' ratio
Pre test Mean	47.50	47.85	Between	1.225	1	1.225	.143
S.D	2.52	3.28	Within	325.55	38	8.567	
Post test Mean	55.15	50.70	Between	198.02	1	198.02	22.61*
S.D	2.36	3.45	Within	332.75	38	8.75	
Adjusted Post Mean	55.15	50.19	Between	216.26	1	216.26	36.97*
			Within	216.42	37	5.84	

*Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 1 and 37 and 1 and 38 are 4.11 and 4.10 respectively).

Table I displays that the initial mean scores for batting in both the game-specific skill practices group and control group were 47.50 and 47.85, respectively. The pre-test "F" ratio of 0.143 falls below the critical value of 4.10 for significance at the 0.05 confidence level. In contrast, the post-test batting means for the game-specific skill practices group and control group were 55.15 and 50.70, respectively, with

a post-test "F" ratio of 22.61, surpassing the significance threshold. Additionally, the adjusted post-test averages for the game-specific skill practices group and control group were 55.15 and 50.19 for batting. The adjusted post-test "F" ratio of 36.97 exceeded the critical value of 4.11 for significance at the 0.05 confidence level.

Table II Analysis Of Covariance Of The Data On Bowling Of Pre And Post Tests Scores Of Game-Specific Training And Control Groups

TEST	GAME SPECIFIC GROUP	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARE	'F' ratio
Pre test Mean	49.40	49.25	Between	0.225	1	0.225	.019
S.D	2.81	3.98	Within	452.55	38	11.91	
Post test Mean	56.75	50.15	Between	435.60	1	435.60	28.52*
S.D	3.90	3.91	Within	580.30	38	15.27	
Adjusted Post Mean	56.70	50.19	Between	422.65	1	422.65	40.07*
			Within	390.27	37	10.55	

* Significant at .05 level of confidence.

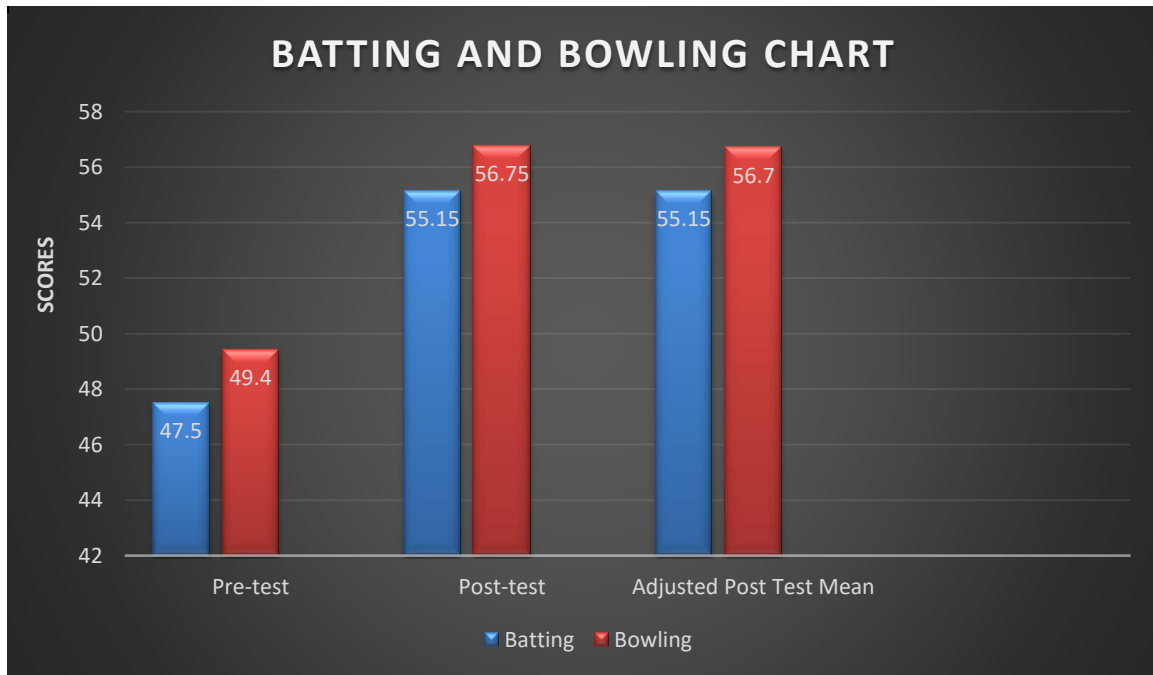
(The table values required for significance at .05 level of confidence for 1 and 37 and 1 and 38 are 4.11 and 4.10 respectively).

In Table II, it is evident that the initial mean scores for bowling in both the game-specific skill practices group and the control group were 49.40 and 49.25, respectively. The pre-test "F" ratio of 0.019 is below the critical value of 4.10 for significance at the 0.05 confidence level in bowling. Conversely, the post-test bowling means for the game-specific skill practices group and control group were 56.75 and 50.15, respectively, with a post-test "F" ratio of 28.52, surpassing the significance

threshold. Additionally, the adjusted post-test averages for the game-specific skill practices group and control group were 56.70 and 50.19 for bowling. The adjusted post-test "F" ratio of 40.07 exceeded the critical value of 4.11 for significance at the 0.05 confidence level.

For the better understanding of the result the pre-test, post-test and adjusted post-test mean for batting and bowling were presented below through graphical chart in figure-1.

Figure I



6. Discussion

Cricket is a physically and technically demanding sport, requiring players to excel in various aspects such as batting, bowling, agility, strength, speed, and power (Smith & Brown, 2018). In a series of studies, researchers investigated the impact of specific training programs on cricket players' performance. (Bhowmik, 2017) conducted a study involving 15 interuniversity cricket players aged 18 to 25, revealing significant improvements in catching ability, accuracy in throwing, and distance throwing due to specific drill training. (Khabiruddin and Mondal, 2016) found that a specific training package enhanced skill performance in 40 male cricket players aged 18 to 25. (Tate et al. 2008) observed that a visual training program significantly improved batting performance in 30 club-level male cricket batsmen. (Vaidya et al., 2021) explored the effects of yoga on bowling performance and physical fitness in 60 non-elite male cricket players aged 13 to 25, reporting improvements in both groups. (Bhat & Sreedhar, 2018) conducted research on cricket-specific fitness training and discovered

significant improvements in the cricket playing ability of 40 college-level male players. These studies collectively highlight the beneficial effects of targeted training programs on various aspects of cricket performance. The study reveals that there was a significant improvement in batting and bowling due to 12 weeks of game specific skill practices.

7. Conclusion

This study explores the effectiveness of game-specific skill practices on batting and bowling. Conducted in Manipur, India, using the Sutcliffe skill test, the research assessed the batting and bowling. ANCOVA analysis revealed significant improvements in both batting and bowling skills among the experimental group when compared to the control group. These study reveals that game specific skill practices can be implement to cricket player in order to improved their cricketing skill. These findings may have implications for skill-intensive sports, contributing to our understanding of skill development and physical conditioning in elite athlete training also.

References

- Bambawale, O. M., & Khanvilkar, K. (2018). Game-specific skill training in cricket: A comprehensive review. *Journal of Sports Science & Medicine*, 17(4), 657-665.
- BBC Sport. (2021). Cricket: Batting. <https://www.bbc.co.uk/sport/cricket/glossary/batting>.
- Bhat, Z. A., & Sreedhar, K. (2018). Effect of cricket specific fitness training program on physical variables among college level men cricket players of Jammu and Kashmir State. *Age*, 21(1.18), 21-10.
- Bhat, Z. A., & Sreedhar, K. (2018). Effect of Cricket Specific Fitness Training Program on Cricket Playing Ability Among College Level Men Cricketers Of J&K State. *Asia Pacific Journal of Research* ISSN (Print): 2320-5504 ISSN (Online): 2347-4793 Vol: I. Issue LVIV.
- Bhowmik, K. (2017). Effect Of Specific Drill Training on Selected Fielding Ability Among Interuniversity Cricket Players. *International journal of multidisciplinary educational research* ISSN: 2277-7881; impact factor – 5.818; IC value:5.16; ISI value:2.286 volume 6, issue 12(4).
- Comfort, P., & Thomas, C. (2013). Comparisons of peak ground reaction force and rate of force development during variations of the power clean. *Journal of Strength and Conditioning Research*, 27(2), 340-346.
- Espnricinfo. (2021). Cricket Basics: Bowling. <https://www.espnricinfo.com/ci/content/story/1100390.html>.
- Espnricinfo. (2021). Herbert Sutcliffe. <https://www.espnricinfo.com/england/content/player/203605.html>.
- Gupta, N., & Verma, J. P. (2019). Technical and tactical training in cricket: A review. *Journal of Physical Education and Sports Management*, 10 (1), 55-61.
- International Cricket Council. (2021). Laws of cricket. <https://www.icc-cricket.com/about/cricket/rules-and-regulations/laws-of-cricket>.
- Khabiruddin, S. K., & Mondal, S. (2016). Effect of specific package of training on selected skill performance variables of male cricket players. *International Journal of Yogic, Human Movement and Sports Sciences*, 1(1), 76-77.
- Lloyd, R. S., Oliver, J. L., & Radnor, J. M. (2009). Relationships between maximal strength, muscle size, and myosin heavy chain isoform composition and contractile characteristics in elite cricket players. *Journal of Strength and Conditioning Research*, 23(6), 1585-1591.
- Patel, S., & Rajput, R. (2018). Strength and conditioning in cricket: A review. *Strength and Conditioning Journal*, 40(4), 36-43.
- Robinson, P. L., & O'Donoghue, P. G. (2019). Bowling fast and straight: A comprehensive review of pace bowling in cricket. *Journal of Sports Sciences*, 37(15), 1766-1776.
- Selvakumar, R., & Vigneshwaran, G. (2020). Impact of game-specific field training on playing ability among cricket players. *Int J Anal Exp. Modal Anal*, 11(12), 4021-25.
- Smith, A. B., & Brown, T. P. (2018). Cricket batting: A review of the science of performance. *Sports Medicine*, 48(11), 2541-2552.
- Smith, M. F., & Allen, T. J. (2007). Changes in impact force, kinematics, and muscle activity during fatigue loading of the thumb in elite cricket players. *Sports Biomechanics*, 6(2), 195-211.
- Sreedhar, Z. A. B. D. K. (2018). Effect of cricket specific fitness training program on explosive strength and speed among college level men cricketers of J&K state. *International Journal of Physiology, Nutrition and Physical Education* 2018; 3(1): 17-19
- Tate, B., Paul, M., & Jaspal, S. (2008). The impact of visual skills training program on

- batting performance in cricketers. *Serbian Journal of Sports Sciences*, 2(1), 17-23.
20. Thomas, C., & Comfort, P. (2018). An investigation into the relationship between maximum strength and repeated sprint ability. *European Journal of Sport Science*, 18(3), 431-438.
21. Vaidya, S. S., Agarwal, B., Singh, Y., & Mullerpatan, R. (2021). Effect of Yoga on Performance and Physical Fitness in Cricket Bowlers. *International Journal of Yoga Therapy*, 31(1), Article_10
22. Vickery, W., Duffield, R., Crowther, R., Beakley, D., Blanch, P., & Dascombe, B. J. (2018). Comparison of the physical and technical demands of cricket players during training and match-play. *The Journal of Strength & Conditioning Research*, 32(3), 821-829.

EFFECTS OF WEIGHT SLED TRAINING ON ACCELERATION SPEED AND SPEED ENDURANCE

Rudrapratap Seram¹ and Dr. S Arul²

^{1,2}Department of Physical Education, Annamalai University

ABSTRACT

Speed is a fundamental aspect of sports performance that can make the difference between victory and defeat. Whether you're sprinting down a track, racing across a field, or competing in virtually any sports, speed plays crucial role in achieving success. The purpose of this study was to determine the effects of weight sled training on acceleration speed and speed endurance. The age of the students was ranged from 18 to 24 years. All the subjects of this study were football players studying in Department of Physical Education, Annamalai University, Tamil Nadu, India. In this study 24 subjects were selected and they were divided into two groups 12 subjects each. Group I acted as treatment group who engages in a 12-week weight sled training program, participating three days a week and Group II served as control group who didn't undergo any additional or specific training apart from their regular training. All the subjects of both groups were tested on the selected dependent variables i.e., acceleration speed and speed endurance by using sprinting speed test (120 yards sprint) before and after the training programme. In this study, the data was gathered using pre-test and post-test methodology. Analysis of covariance (ANCOVA) is used to establish whether there is statistically significant difference among the groups being studied. A confidence level of .05 was set to test the 'F' ratio obtained through analysis of covariance, which was considered as an appropriate for the study. The study's findings indicated that, in comparison to the control group, the weight sled training group demonstrated a significant enhancement in both acceleration speed and speed endurance.

Keywords: Weight Sled, Speed, Acceleration Speed, Speed Endurance, Football.

Introduction

Acceleration serves as a fundamental element of athletic performance that extends across a spectrum of sports. It represents the capacity to rapidly boost one's speed, a skill of utmost importance in a variety of sports, from individual events like track and field to team-based games such as football and soccer. Whether the goal is to outpace an adversary, be the first to reach a ball, or gain a competitive edge, acceleration plays a pivotal role.

Sprinting at top speed for short durations and sustaining it is crucial in sports, whether individual (like athletics) or team-based (e.g., soccer, basketball, and rugby). Many sprint training programs include resistance exercises where athletes perform sprints with added resistance, known as resisted sprint training (2).

The main goal of including resistance in training exercises is to impose extra strain on the muscles involved in sprinting. This added resistance is believed to activate neural responses and increase the recruitment of fast motor units, findings supported by numerous studies (3, 4,5). Much of the research in this area has centered on assessing how resisted sprint training effects on physical education

students (6,7) and athletes participating in field sports such as lacrosse (8), football (soccer) (9), and rugby (10).

Resistance training, also called strength or weight training, involves using resistance or force to build and strengthen muscles. It utilizes a variety of sources for resistance, including weight sleds, weight jackets, resistance bands, body weight, and more. The main objective of resistance training is to enhance muscle strength, endurance, and size. It serves as a valuable component in fitness routines, sports training, and rehabilitation programs.

This study focused on "weight sled training," a form of resistance training. It entails pulling or pushing a weighted sled across surfaces like tracks, grass, or gym floors. Weight sled training is crucial for enhancing athletic performance, improving acceleration, maximum speed, and speed endurance. This training method, often employing a weighted sled, has gained recognition in the athletic realm as a versatile and effective tool for developing these essential attributes.

Understanding acceleration is not only essential for elite athletes aiming to shave milliseconds off their records, but also for anyone seeking to enhance their speed and

agility, whether on the track, the field, or the court. This investigation offers valuable insights into the mechanics and strategies of acceleration in sports, applicable to athletes, coaches, and sports enthusiasts alike.

The aimed of the present study was to examined the effects of weight sled on acceleration speed and speed endurance among football players of Annamalai university. The primary hypothesis was that the acceleration speed and speed endurance would increase due to the 12 weeks of weight sled training.

Methodology

For the purpose of this study 24 football players were recruited from Department of Physical Education, Annamalai University, Tamil Nadu, India. The aged of the subjects was ranged from 18 to 24. This investigation required to perform acceleration speed and speed endurance before and after the 12-week weight sled training intervention. Subjects were randomly divided into two groups 12 subjects each. Group I acted as treatment group who engages in a 12-week weight sled training program, participating three days a week and Group II served as control group who didn't undergo any additional or specific training apart from their regular training. All the subjects of both groups were tested on the

selected dependent variables i.e., acceleration speed and speed endurance by using sprinting speed test 120 yards sprint (0-40 yards were taken as acceleration speed and 80-120 yards were taken as speed endurance) before and after the training programme. In this study, the data was gathered using pre-test and post-test methodology. Analysis of covariance (ANCOVA) is used to establish whether there is statistically significant difference among the groups being studied. A confidence level of .05 was set to test the 'F' ratio obtained through analysis of covariance, which was considered as an appropriate for the study.

Analysis of Data

The data collected from the pre-test and post-test assessments of acceleration speed and speed endurance for both the experimental and control groups were subjected to statistical analysis using analysis of covariance (ANCOVA), and the results are detailed below.

Acceleration Speed

The analysis of covariance for the pre-test and post-test scores of acceleration speed in both the weight sled training group and the control group has been conducted and is summarized in Table I.

Table I
Ancova For Pre And Post Test Scores Of Acceleration Speed In Weight Sled Training And Control Groups.

Test	Weight Sled Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' ratio
Pre test							
Mean	5.21	5.18	Between	.008	1	.008	.671
S.D	0.13	0.09	Within	.264	22	.012	
Post test							
Mean	4.82	5.06	Between	.355	1	.355	49.47*
S.D	0.09	0.07	Within	.152	22	.007	
Adjusted Post test							
Mean	4.81	5.07	Between	.388	1	.388	70.89*
			Within	.115	21	.005	

*Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 1 and 22 and 1 and 21 are 4.30 and 4.33 respectively).

Table I illustrates that the pre-test mean values for the weight sled training and control groups were 5.21 and 5.18, respectively. The calculated pre-test 'F' ratio was 0.671, lower than the critical 'F' ratio of 4.30 with df 1 and

22, indicating no significant difference in pre-test scores between the groups.

In contrast, the post-test mean values for the weight sled training and control groups were 4.82 and 5.06, respectively, with an 'F' ratio of

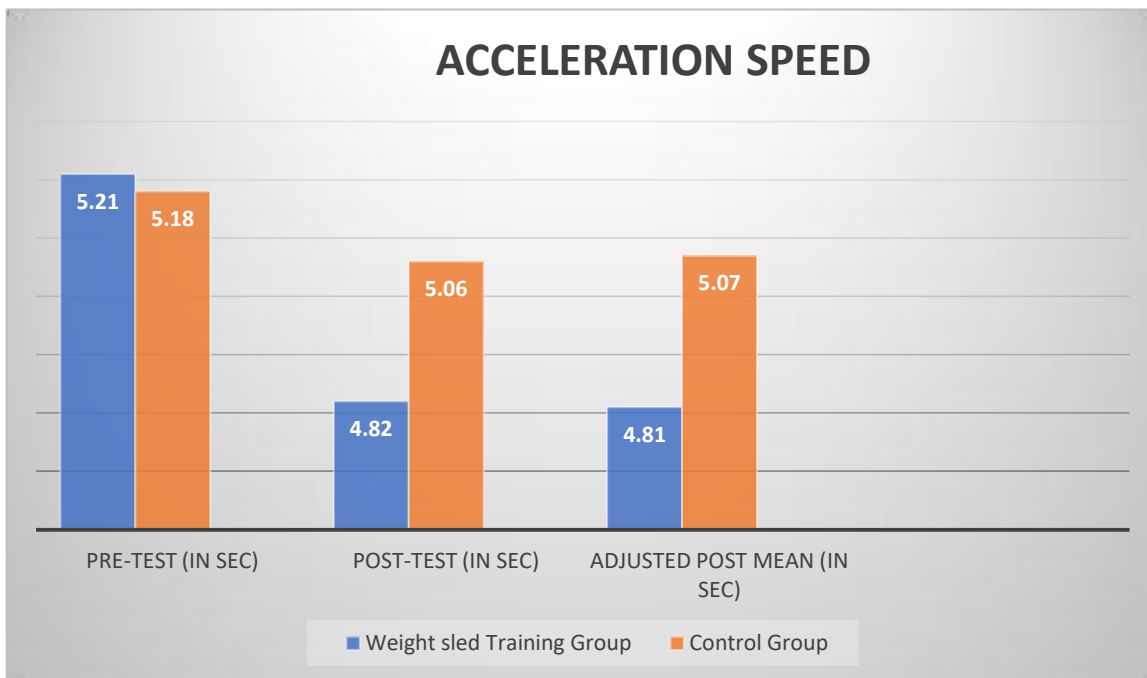
49.47, higher than the critical value of 4.30, signifying a significant difference in post-test scores.

The adjusted post-test mean values for acceleration speed were 4.81 for the weight sled training group and 5.07 for the control group, with an 'F' ratio of 70.89, exceeding the

critical value of 4.33 with df 1 and 21, confirming a significant difference in acceleration speed between the groups.

The study findings indicate a significant difference in acceleration speed between the weight sled training and control groups.

Figure 1 Bar Chart Showing Pre-Test, Post-Test And Adjusted Post Mean On Acceleration Speed



Speed Endurance

The analysis of covariance for the pre-test and post-test scores of speed endurance in both the

weight sled training group and the control group has been conducted and is summarized in Table II.

Table II Ancova For Pre And Post Test Scores Of Speed Endurance In Weight Sled Training And Control Groups.

Test	Weight Sled Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' ratio
Pre test Mean	5.03	5.06	Between	.006	1	.006	1.11
S.D	0.08	0.07	Within	.126	22	.006	
Post test Mean	4.78	4.96	Between	.196	1	.196	35.68*
S.D	0.08	0.06	Within	.121	22	.005	
Adjusted Post test Mean	4.79	4.95	Between	.147	1	.147	42.78*
			Within	.072	21	.003	

*Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 1 and 22 and 1 and 21 are 4.30 and 4.33 respectively).

Table II illustrates that the pre-test mean values for the weight sled training and control groups were 5.03 and 5.06, respectively. The

calculated pre-test 'F' ratio was 1.11, lower than the critical 'F' ratio of 4.30 with df 1 and 22,

indicating no significant difference in pre-test scores between the groups.

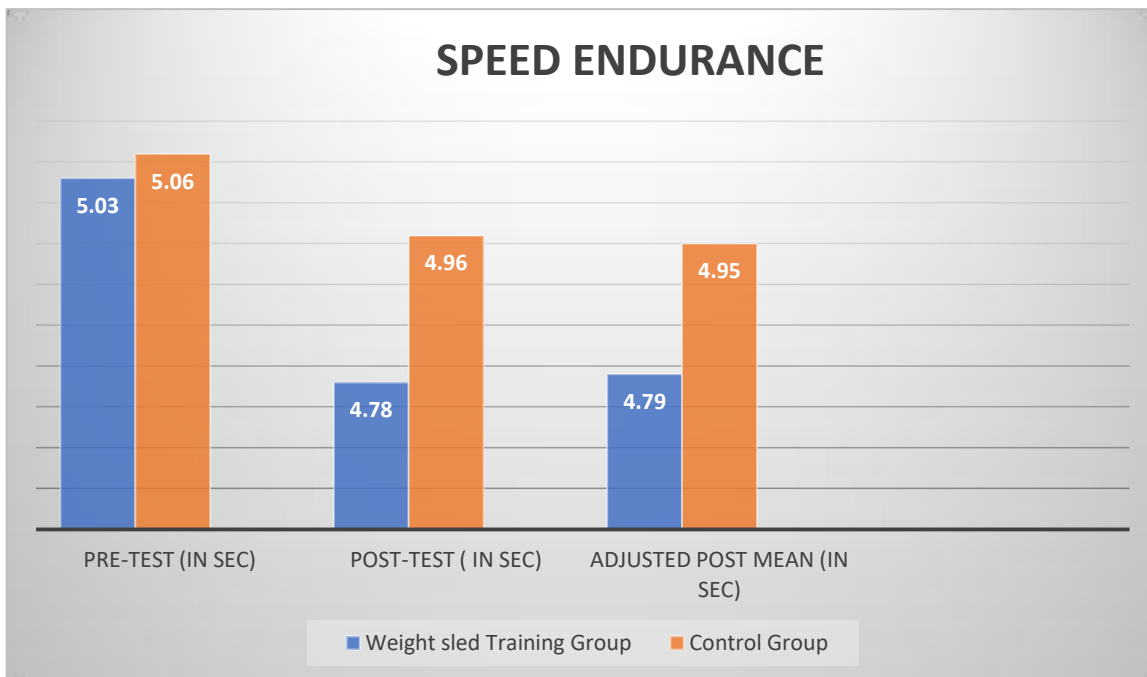
In contrast, the post-test mean values for the weight sled training and control groups were 4.78 and 4.96, respectively, with an 'F' ratio of 35.68, higher than the critical value of 4.30, signifying a significant difference in post-test scores.

The adjusted post-test mean values for speed endurance were 4.79 for the weight sled

training group and 4.95 for the control group, with an 'F' ratio of 42.78, exceeding the critical value of 4.33 with df 1 and 21, confirming a significant difference in speed endurance between the groups.

The study findings indicate a significant difference in speed endurance between the weight sled training and control groups.

Figure 2 Bar Chart Showing Pre-Test, Post-Test And Adjusted Post Mean On Speed Endurance



Discussion

Weight sled training is a common method to enhance running performance. However, research on the immediate effects of sprinting with a weight sled is limited. This study aimed to investigate the impact of weight sled training on acceleration speed and speed endurance in Annamalai University football players. The findings show that a 12-week weight sled program improved both acceleration speed and speed endurance in Annamalai University football players.

Our study provides evidence that the weight sled training methods are effective in enhancing acceleration speed and speed endurance among college football players. This outcome aligns with the research by Harrison and Bourke (10), who discovered that weight sled training and traditional sprint training both

resulted in similar speed improvements over a 30-meter distance.

Harrison and Bourke (10) conducted a 6-week study on resisted sprint training with a weight sled. They observed significant improvements in unresisted 5-meter sprint times after 12 training sessions, mainly attributed to increased muscle force development. The study's author suggests that the 13% of body mass used in their weight sled training, compared to the 12.6% in this study, likely created muscle overload, improving strength and power.

Zafeiridis et al. (7) studied 22 recreationally active men in an 8-week program involving sled-resisted and unresisted sprinting. Their research found that the resistance group significantly improved acceleration in a 50-meter sprint, while the non-resistance group excelled in the maximal velocity phase. This

suggests that resisted sprint training may be more effective for acceleration (7). Clarke et al. (8) also supported these findings, demonstrating that unresisted training led to greater improvements in maximal velocity compared to weight sled or weight vest training.

Before concluding, it's important to acknowledge some study limitations. First, the findings may be specific to weighted sled training for acceleration and speed endurance in sprinting, potentially not applicable to other resistance sprint methods like uphill running, parachute running, or weight jacket sprinting. Second, the study didn't monitor participants' additional training or physical activities, despite encouraging their usual routines. Finally, the study's subjects were exclusively football players from the Department of Physical Education at Annamalai University in Tamil Nadu, India.

Conclusion

In conclusion, this study aimed to investigate the effects of a 12-week weight sled training program on the acceleration speed and speed endurance of football players at Annamalai University, Tamil Nadu. The findings of this research demonstrate the significant benefits of weight sled training in enhancing both acceleration speed and speed endurance, underscoring its potential as a valuable tool for improving athletic performance.

To sum up, the study underscores the value of weight sled training in enhancing sprinting performance, particularly in terms of acceleration speed and speed endurance. While the research provides valuable insights, it is essential for future studies to investigate the broader relevance of these findings in diverse sports and athlete groups while also addressing the limitations identified. A comprehensive understanding of the implications of weight sled training on sprinting performance can equip athletes and coaches with the knowledge needed to optimize training regimens and elevate athletic accomplishments.

References

- Behrens, MJ and Simonson, SR. (2011). A comparison of the various methods used to enhance sprint speed. *Strength Cond J* 33: 64-71.
- Hrysomallis, C. (2012). The effectiveness of resisted movement training on sprinting and jumping performance. *Journal of Strength and Conditioning Research* 26: 299-306.
- Donati (2010) A. The association between the development of strength and speed. *New Stud Athl* 11: 51-58.
- Faccioni (1994) A. Assisted and resisted methods for speed development (part I): Resisted speed methods. *Mod Athl Coach* 32: 3-6.
- Faccioni (1994.) A. Assisted and resisted methods for speed development (part II): Resisted speed methods. *Mod Athl Coach* 32: 8-12.
- Kristensen, GO, van den Tillaar, R, and Ettema, GJ. (2006). Velocity specificity in early-phase sprint training. *Journal of Strength and Conditioning Research* 20: 833-837.
- Zafeiridis, A, Saraslanidis, P, Manou, V, Ioakimidis, P, Dipla, K, and Kellis, S. (2005) The effects of resisted sled-pulling sprint training on acceleration and maximum speed performance. *Journal of Sports Medicine and Physical Fitness* 45: 284-290.
- Clark, KP, Stearne, DJ, Walts, CT, and Miller, AD. (2010) The Longitudinal effects of resisted sprint training using weighted sleds vs. weighted vest. *Journal of Strength and Conditioning Research* 24: 3287-3295.
- Spinks, CD, Murphy, AJ, Spinks, WL and Lockie, RG. (2007) The effects of resisted sprint training on acceleration performance and kinematics in soccer, rugby union, and Australian football players. *Journal of Strength and Conditioning Research* 21: 77-85.
- Harrison, AJ and Bourke, G. (2012). The effect of resisted sprint training on speed

- and strength performance in male rugby players. *Journal of Strength and Conditioning Research* 26: 299-306.
11. Cottle, C.A.; Carlson, L.A. & Lawrence, M.A. (2014). Effects of sled towing on sprint starts. *Journal of Strength and Conditioning Research*, 28(5): 1241-1245.
12. Elmontassar W., Mkaouer B. et al., (2019). Impact of sled loads on velocity during acceleration phase from starting blocks. *South African Journal for Research in Sports, Physical Education and Recreation*, 40(3): 0379-9069.

प्रयोज्यों के गणित में निम्न प्रदर्शन पर उनकी बुद्धिमत्ता के प्रभाव का अध्ययन

मुरारी कुमार, प्रो. (डॉ.) सरस्वती घोष
शिक्षा संकाय, संस्कृति विश्वविद्यालय, मथुरा, उत्तर प्रदेश

सार

आधुनिक युग में किसी राष्ट्र की प्रगति और विकास उसके नागरीकों की शिक्षा की गुणवत्ता और स्तर पर निर्भर करता है। भारतीय संविधान के अनुसार शिक्षा को लोगों का मौलिक अधिकार माना गया है। सार्वभौमिक माध्यमिक शिक्षा के लक्ष्य को प्राप्त करने के लिए 2009 में राष्ट्रीय माध्यमिक शिक्षा अभियान (RMSA) प्रारंभ किया गया था। बुद्धिमत्ता और उपलब्धि महत्वपूर्ण रूप से सहसंबद्ध कारक हैं। अधिक उपलब्धि हासिल करने वालों, औसत उपलब्धि हासिल करने वालों और निम्न उपलब्धि हासिल करने वालों के बीच उनके समायोजन के संबंध में महत्वपूर्ण अंतर है। उच्च बुद्धिमत्ता स्तर वाले छात्रों में अध्ययन की आदत कम बुद्धिमत्ता वाले छात्रों की तुलना में बेहतर होती है। वर्तमान अध्ययन का एक उद्देश्य गणित में कम उपलब्धि प्राप्त करने वालों के बौद्धिक स्तर का अध्ययन करना था।

प्रमुख शब्द: माध्यमिक शिक्षा, साक्षरता, बुद्धिमत्ता, शैक्षणिक उपलब्धि अभिप्रेरणा, दृष्टिकोण।

आधुनिक युग में किसी राष्ट्र की प्रगति और विकास उसके नागरीकों की शिक्षा की गुणवत्ता और स्तर पर निर्भर करता है। शिक्षा अपने संचित ज्ञान से अतीत की विरासत और सांस्कृतिक मूल्यों को भविष्य की पीढ़ी तक पहुँचाने और समाज की वर्तमान और भविष्य की आकस्मिक जरूरतों के अनुरूप नई पीढ़ी को तैयार करने का कर्तव्य निभाती है। प्रत्येक देश की अपनी शिक्षा प्रणाली होती है जिसकी अपनी विशिष्टताएँ और विशेषताएँ होती हैं। आजादी के बाद से भारत में शिक्षा प्रणाली के पुनर्गठन और सुधार के लिए कई प्रयास किए गए हैं।

भारतीय संविधान के अनुसार शिक्षा को लोगों का मौलिक अधिकार माना गया है। भारत की उन्नत शिक्षा प्रणाली को भारत के आर्थिक उत्थान के मुख्य कारकों में से एक माना जाता है। शिक्षा की वार्षिक स्थिति रिपोर्ट (2011) इंगित करती है कि केंद्र सरकार द्वारा लागू की गई नई शैक्षिक नीतियों और शिक्षा में बढ़ते निवेश के बावजूद, इसकी 26 प्रतिशत आबादी अभी भी निरक्षर है। केवल 15 प्रतिशत भारतीय छात्र हाई स्कूल तक पहुँचते हैं और केवल 7 प्रतिशत छात्र स्नातक हैं। विश्व बैंक के आँकड़ों में पाया गया कि भारत में 40 प्रतिशत से कम किशोर माध्यमिक विद्यालयों में जाते हैं। द इकोनॉमिस्ट की रिपोर्ट है कि दस साल के आधे ग्रामीण बच्चे बुनियादी स्तर पर नहीं पढ़ सकते थे, 60 प्रतिशत से अधिक संख्या का विभाजन करने में असमर्थ थे और आधे 14 साल की उम्र तक पढ़ाई छोड़ देते थे।

प्रधानमंत्री नरेंद्र मोदी की अध्यक्षता में केंद्रीय मंत्रिमंडल ने 29 जुलाई, 2020 को राष्ट्रीय शिक्षा नीति

2020 को मंजूरी दी। नई नीति विद्यालय पाठ्यक्रम और शिक्षाशास्त्र को एक नए '5+3+3+4' के प्रारूप में पुनर्गठित करने का दिशानिर्देश प्रस्तुत करती है, ताकि स्कूली शिक्षा को विभिन्न विकासात्मक चरणों में शिक्षार्थियों की जरूरतों और रुचियों के लिए प्रासंगिक बनाया जा सके। इस नीति के अनुसार बाल शिक्षा को चार सोपानों में विभाजित किया गया है – पहला सोपान 'फाउंडेशनल स्टेज' (पाँच वर्ष), दूसरा सोपान 'प्रिपरेटरी स्टेज' (तीन वर्ष), तीसरा सोपान 'मिडिल स्टेज' (तीन वर्ष) और चौथा सोपान 'हाई स्टेज' (चार वर्ष, ग्रेड नौ, 10, 11 और 12 को कवर करते हुए)।

इसके अन्तर्गत शिक्षा के अधिकार की पात्रता को 6-14 वर्ष से बढ़ाकर 3-18 वर्ष कर दिया गया है। साथ ही 2030 तक 100 प्रतिशत बच्चों को 'स्कूल के लिए तैयार' करने के लक्ष्य के साथ, नीति 'अर्ली चाइल्डहुड केयर एंड एजुकेशन' (ECCE) के सार्वभौमिकरण पर जोर देती है।

माध्यमिक शिक्षा राज्य सरकारों और मानव संसाधन विकास मंत्रालय की जिम्मेदारी है। चूंकि माध्यमिक शिक्षा छात्रों को उच्च शिक्षा के साथ-साथ कार्य बल के रूप में तैयार करती है, इसलिए यह आवश्यक हो जाता है कि स्कूली शिक्षार्थियों को जीवन की चुनौतियों का आत्मविश्वास से सामना करने के लिए उच्च स्तर का ज्ञान और कौशल प्राप्त करना चाहिए। इस लक्ष्य को प्राप्त करने के लिए, 15-16 वर्ष के आयु वर्ग के सभी युवाओं के लिए सुलभ और सस्ती गुणात्मक शिक्षा उपलब्ध कराई जाती है। सार्वभौमिक माध्यमिक शिक्षा के लक्ष्य को प्राप्त करने के

लिए 2009 में राष्ट्रीय माध्यमिक शिक्षा अभियान (RMSA) प्रारंभ किया गया था।

बिहार एक ऐसा राज्य है जहाँ शिक्षा पर उचित ध्यान दिया जाता है। राज्य की शैक्षिक स्थिति एवं लोगों की साक्षरता की स्थिति में सुधार के लिए बिहार सरकार ने गंभीर प्रयास किए हैं। बिहार की राज्य सरकार शिक्षा के महत्व को समझते हुए इसके समुचित विकास हेतु आवश्यक कदम उठाती रही है और प्रदेश के लोगों में शिक्षा के प्रति रुझान पैदा करने के लिए विभिन्न योजनाएँ को लागू किया है जिसके सकारात्मक परिणाम भी मिले हैं। राज्य सरकार ने शिक्षा प्रदान करने के लिए समुचित कदम उठाए हैं।

तालिका-1

बिहार की साक्षरता दर

	संख्या	दर
व्यक्ति	52504653	69.83
पुरुष	31608023	71.20
महिलाएँ	20896530	51.50

(श्रोत: जनगणना 2011)

साहित्य समीक्षा:

मसीह (1974) ने राजस्थान में अजमेर जिले के उच्चतर माध्यमिक विद्यालय के 410 छात्रों पर बुद्धिमत्ता और उपलब्धि से संबंधित एक अध्ययन किया और पाया कि बुद्धिमत्ता और उपलब्धि में महत्वपूर्ण संबंध है।

गखर (1986) ने विज्ञान, वाणिज्य और कला के छात्रों के बीच बुद्धिमत्ता, योग्यता, व्यक्तित्व और उपलब्धि में व्यक्तिगत अंतर खोजने के लिए एक सह-संबंधपरक शोध किया और यह पाया गया कि तीनों समूहों में व्यक्तित्व कारकों की तुलना में योग्यता और उपलब्धि के साथ बुद्धिमत्ता अधिक निकटता से जुड़ी हुई थी।

श्रीवास्तव (1987) ने हाई स्कूल के विद्यार्थियों की शैक्षणिक उपलब्धि और बुद्धिमत्ता के बीच संबंधों की प्रकृति को निर्धारित करने के लिए एक अध्ययन किया। परिणामों से पता चला कि शैक्षिक उपलब्धि सकारात्मक रूप से बुद्धि के प्रत्येक स्तर पर सहसम्बन्धित है।

बेगम और फूकन (2005) ने नौवीं कक्षा के 180 छात्रों (118 पुरुष और 62 महिलाएँ) के नमूने पर शैक्षणिक उपलब्धि और बुद्धिमत्ता के बीच संबंध की जाँच की। अध्ययन के परिणामों से पता चला कि छात्रों की बुद्धिमत्ता शैक्षणिक उपलब्धि के साथ सकारात्मक रूप से सहसंबद्ध ($r=0.70$) थी।

पांडा (2005) ने अकादमिक उपलब्धि और बुद्धिमत्ता के बीच संबंध की जाँच की तथा पाया कि विद्यालयों की

विभिन्न श्रेणियों में शैक्षणिक उपलब्धि और बुद्धिमत्ता के बीच निम्न संबंध था।

चामुंडेश्वरी और सुमंगला (2006) ने विभिन्न प्रकार के विद्यालयों में पढ़ने वाले माध्यमिक स्तर के 291 छात्रों (145 लड़के एवं 146 लड़कियाँ) के प्रतिदर्श पर 'माध्यमिक स्तर पर छात्रों की शैक्षणिक उपलब्धि के संबंध में सामान्य मानसिक सजगता और बुद्धिमत्ता' एक अध्ययन किया। उन्होंने पाया कि माध्यमिक स्तर पर विभिन्न प्रकार के विद्यालयों के छात्रों की बुद्धिमत्ता के बीच महत्वपूर्ण अंतर था।

ज्ञानदेवन (2007) का उद्देश्य उच्चतर माध्यमिक के छात्रों की सामाजिक बुद्धि का पता लगाना था। अध्ययन में उच्चतर माध्यमिक छात्रों की सामाजिक बुद्धि उच्च पायी गयी।

अध्ययनों से पता चलता है कि बुद्धिमत्ता और उपलब्धि महत्वपूर्ण रूप से सहसंबद्ध कारक हैं। उच्च उपलब्धि हासिल करने वाले निम्न उपलब्धि हासिल करने वालों की तुलना में महत्वपूर्ण रूप से उच्च औसत आई.क्यू. प्रदर्शित करते हैं। अध्ययनों से पता चलता है कि अधिक उपलब्धि हासिल करने वालों, औसत उपलब्धि हासिल करने वालों और निम्न उपलब्धि हासिल करने वालों के बीच उनके समायोजन के संबंध में महत्वपूर्ण अंतर है। उच्च बुद्धिमत्ता स्तर वाले छात्रों में अध्ययन की आदत कम बुद्धिमत्ता वाले छात्रों की तुलना में बेहतर होती है।

उद्देश्य:

गणित में कम उपलब्धि वाले छात्रों की बुद्धिमत्ता, शैक्षणिक उपलब्धि अभिप्रेरणा, गणित के प्रति दृष्टिकोण और सामाजिक-आर्थिक स्थिति का अध्ययन करना।

प्राक्कल्पना:

ग्रामीण-शहरी, सरकारी-निजी विद्यालयों में पढ़नेवाले, पृथक या संयुक्त समूह के रूप में गणित में कम उपलब्धि प्राप्त करने वाले छात्र-छात्राओं के बुद्धिमत्ता का स्तर भिन्न होता है।

प्रतिदर्श:

सीतामढ़ी, शिवहर और मधुबनी के शहरी एवं ग्रामीण क्षेत्रों के उन छात्र-छात्राओं तक सीमित था जिन्होंने सत्र 2019-2020 में बिहार विद्यालय परीक्षा समिति, पटना द्वारा आयोजित मैट्रिक परीक्षा में गणित विषय में कम उपलब्धि प्राप्त किया था।

प्रदत्त संकलन विधि:

शोध के उद्देश्यों को प्राप्त करने हेतु वर्णात्मक सर्वेक्षण विधि का प्रयोग किया है।

प्रदत्त विश्लेषण विधि:

आंकड़ों के विश्लेषण हेतु मध्यमान, मध्यांक, बहुलांक, प्रमाणिक विचलन और सह-संबंध विधि का उपयोग किया गया।

उपकरण:

गणित में कम उपलब्धि हासिल करने वालों के अध्ययन से सम्बन्धित आँकड़े एकत्र करने के लिए उपकरणों के रूप में ओझा और चौधरी द्वारा निर्मित बुद्धि परीक्षण का प्रयोग किया गया है।

गणित में कम उपलब्धि प्राप्त करने वालों की बुद्धिमत्ता

वर्तमान अध्ययन का एक उद्देश्य गणित में कम उपलब्धि प्राप्त करने वालों के बौद्धिक स्तर का अध्ययन करना था। जैसा कि तृतीय अध्याय में बताया गया है, प्रयोज्यों की बुद्धिमत्ता को डॉ. आर. के. ओझा एवं डॉ. के. राय चौधरी की मानसिक क्षमता परीक्षण हेतु निर्मित मापनी (परिशिष्ट-क) द्वारा मापा गया।

प्रयोज्यों के वर्गीकरण के लिए बुद्धिमत्ता परीक्षण के लेखक द्वारा तैयार किए गए मानदंड निम्नानुसार प्रस्तुत किए गए हैं।

प्रयोज्यों का वर्गीकरण

प्राप्त अंकों की सीमा	वर्गीकरण
107 से अधिक	अतिश्रेष्ठ
99-106	श्रेष्ठ
91-98	तीव्र सामान्य
73-90	सामान्य
65-72	मन्द सामान्य
57-64	सीमावर्ती
56 से कम	दोषपूर्ण

बिहार के तीन जिलों से यादृच्छिक रूप से 354 छात्रों का एक प्रतिदर्श चुना गया, जिसमें गणित में कम उपलब्धि प्राप्त करने वाले छात्र शामिल थे। तालिका 4.1 में गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर संबंधी प्राप्तांकों के लिए बारंबारता बंटन दिया गया है।

तालिका-2**गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर प्राप्तांक के लिए बारंबारता वितरण**

वर्ग अंतराल	आवृत्ति	प्रतिशत	संचयी प्रतिशत आवृत्ति
90-99	1	0.28	100
80-89	14	3.95	99.72
70-79	58	16.38	95.76
60-69	121	34.18	79.37

50-59	114	32.20	45.18		
40-49	38	10.73	12.98		
30-39	8	2.25	2.25		
संख्या	माध्य	माध्यिका	बहुलक	मानक विचलन	मानक त्रुटि
354	60.97	60.90	60.76	10.74	0.019

उपरोक्त तालिका के से ज्ञात होता है कि प्रतिदर्श में शामिल गणित में कम उपलब्धि प्राप्त करने वालों के पूरे समूह के बुद्धिमत्ता का माध्य 60.97 है जबकि मानक विचलन 10.74 है। माध्यिका और बहुलक के मान क्रमशः 60.90 और 60.76 हैं। बुद्धिमत्ता की माप के लिए माध्य और माध्यिका के मान लगभग समान हैं और यह माध्य की मानक त्रुटि के संख्यात्मक निर्धारक (मानक विचलन=0.019) द्वारा परिलक्षित होता है। माध्य की मानक त्रुटि सकारात्मक दिशा में है और बुद्धिमत्ता के अंकों का वितरण सामान्य माना जा सकता है। तालिका 4.1 से पता चलता है कि गणित में कम उपलब्धि प्राप्त करने वालों की बुद्धिमत्ता का माध्य 60.97 है। बुद्धिमत्ता अंक के वितरण से पता चलता है कि गणित में कम उपलब्धि प्राप्त करने वाले 34.18 प्रतिशत औसत अंतराल यानी 60-69 में शामिल हैं। गणित में कम उपलब्धि प्राप्त करने वालों में से 45.18 प्रतिशत का अंक औसत अंतराल से कम है जबकि गणित में कम उपलब्धि प्राप्त करने वालों में से 20.61 प्रतिशत का अंक औसत अंतराल से अधिक है। निर्देशिका में दिये गये मानदण्डों के आलोक में बुद्धिमत्ता को यदि तीन श्रेणियों-उज्ज्वल बुद्धिमत्ता, सामान्य बुद्धिमत्ता तथा सामान्य से कम बुद्धिमत्ता की श्रेणियों में विभाजित किया जाता है तो माध्य (60.97) के अनुसार यह समूह सामान्य से कम बुद्धिमत्ता की श्रेणी में आता है। इसलिए यह निष्कर्ष निकाला जा सकता है कि गणित में कम उपलब्धि प्राप्त करने वालों की औसत बुद्धिमत्ता का स्तर निम्न होता है। इसलिए गणित में कम उपलब्धि प्राप्त करने वालों का कम बुद्धिमत्ता स्तर गणित में उनकी कम उपलब्धि के लिए योगदान करने वाला एक महत्वपूर्ण कारक है।

थर्सटन के अनुसार बुद्धिमत्ता नौ प्राथमिक मानसिक क्षमताओं का युग्म है- (क) संख्यात्मक क्षमता (ख) शब्द प्रवाह (ग) तर्क क्षमता (घ) दृश्य क्षमता (ङ) स्थानिक क्षमता (च) याद रखने की क्षमता (छ) आगमनात्मक क्षमता (ज) निगमनात्मक क्षमता और (झ) अवधारणात्मक क्षमता। गणित में कम उपलब्धि प्राप्त करने वालों की संख्यात्मक क्षमता का अभाव बुद्धिमत्ता के निम्न स्तर का कारण हो सकता है।

गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर

पर उनके लिंग का प्रभाव

तालिका-3 गणित में कम उपलब्धि प्राप्त करने वाले छात्र और छात्राओं के बौद्धिक स्तर, उनके प्राप्तांकों के माध्य, मानक विचलन माध्य की मानक त्रुटि के साथ-साथ टी-अनुपात को दर्शाता है।

तालिका-3**लिंग के आधार पर गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर की तुलना**

लिंग	संख्या	माध्य	मानक विचलन	मानक त्रुटि	टी-अनुपात	सार्थकता
छात्र	177	60.22	11.20	1.126	0.522	0.01 स्तर पर असार्थक
छात्रा	177	60.80	9.95			

तालिका 4.2 से पता चलता है कि गणित में कम उपलब्धि प्राप्त करने वाले छात्रों की बुद्धिमत्ता का औसत अंक 60.22 है जबकि गणित में कम उपलब्धि प्राप्त करने वाली छात्राओं की बुद्धिमत्ता का माध्य 60.80 है। मानक विचलन क्रमशः 11.20 और 9.95 प्राप्त हुआ है। कम उपलब्धि प्राप्त करने वाले छात्रों और कम उपलब्धि प्राप्त करने वाली छात्राओं के बौद्धिक स्तर के बीच अंतर को दर्शाने वाला टी-मान 0.522 है जो असार्थक होने के कारण महत्वपूर्ण नहीं है।

इससे पता चलता है कि छात्र और छात्राओं के बौद्धिक स्तर के संबंध में कोई महत्वपूर्ण अंतर नहीं है। इससे पता चलता है कि गणित में कम उपलब्धि प्राप्त करने वाले छात्र और छात्राएँ समान रूप से बुद्धिमान हैं। वर्तमान अध्ययन के परिणाम हाइड, फेनेमा और लामोन (1990), मेवारेच, सिलबर और फाइन (1991), रंगप्पा (1993), मेसन और स्क्रिवानी (2004) और ज्ञानदेवन (2007) द्वारा किए गए अध्ययनों के अनुरूप हैं जिन्होंने पाया लिंग के संबंध में प्रयोज्यों के बौद्धिक स्तर में कोई महत्वपूर्ण अंतर नहीं है।

इस प्रकार गणित की उपलब्धि में लैंगिक अंतर ऐसा बिन्दू है जिसका हल वर्तमान में पूरी तरह से प्राप्त नहीं हुआ है।

गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर पर उनके निवास क्षेत्र का प्रभाव

गणित में कम उपलब्धि प्राप्त करने वाले शहरी और कम उपलब्धि प्राप्त करने वाले ग्रामीण छात्र-छात्राओं का बौद्धिक स्तर मापा गया। माध्य, मानक विचलन, माध्य की मानक त्रुटि और टी-मान की गणना की गई है जिसे

तालिका 4.3 में दिखाया गया है।

तालिका-4**निवास क्षेत्र के आधार पर गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर की तुलना**

निवास का प्रकार	संख्या	माध्य	मानक विचलन	मानक त्रुटि	टी-अनुपात	सार्थकता
शहरी	173	60.57	9.48	1.122	0.091	0.01 स्तर पर असार्थक
ग्रामीण	181	60.47	11.56			

तालिका-4 से पता चलता है कि गणित में कम उपलब्धि प्राप्त करने वाले शहरी छात्रों के बुद्धिमत्ता का माध्य 60.57 है जबकि ग्रामीण क्षेत्र से संबंधित गणित में कम उपलब्धि प्राप्त करने वालों की बुद्धिमत्ता का माध्य 60.47 है। मानक विचलन क्रमशः 9.48 और 11.56 प्राप्त हुई है। शहरी क्षेत्र के गणित में कम उपलब्धि प्राप्त करने वाले और ग्रामीण क्षेत्र में गणित में कम उपलब्धि प्राप्त करने वालों के बीच अंतर को दर्शाने वाला टी-मान 0.091 है जो असार्थक होने के कारण महत्वपूर्ण नहीं है। इससे पता चलता है कि कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता अंक उनके स्थान के संबंध में महत्वपूर्ण रूप से भिन्न नहीं होते हैं। इसी तरह के निष्कर्ष मसीह (1974) द्वारा पहले बताए गए थे कि ग्रामीण और शहरी लड़कों की बुद्धिमत्ता और उपलब्धि के मूल्यों के बीच कोई महत्वपूर्ण अंतर नहीं था।

गणित में कम उपलब्धि प्राप्त करने वालों के बौद्धिक स्तर पर विद्यालय के प्रकार का प्रभाव

सरकारी और निजी विद्यालयों में पढ़ने वाले गणित में कम उपलब्धि प्राप्त करने वालों का बौद्धिक स्तर मापा गया है। माध्य, मानक विचलन, माध्य की मानक त्रुटि और टी-अनुपात तालिका-5 में दिए गए हैं।

तालिका-5**विद्यालय के प्रकार के आधार पर गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता स्तर की तुलना**

विद्यालय का प्रकार	संख्या	माध्य	मानक विचलन	मानक त्रुटि	टी-अनुपात	सार्थकता
सरकारी	184	60.31	11.10	1.123	0.389	0.01 स्तर पर असार्थक
निजी	170	60.74	10.02			

तालिका-5 सरकारी और निजी विद्यालयों में पढ़ने वाले गणित में कम उपलब्धि प्राप्त करने वालों की बुद्धिमत्ता प्राप्तांक को दर्शाती है। सरकारी विद्यालयों के गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता प्राप्तांक का माध्य 60.31 परिकल्पित किया जाता है जबकि निजी विद्यालयों के गणित में कम उपलब्धि प्राप्त करने

वाले विद्यार्थियों के बुद्धिमत्ता प्राप्तांक का माध्य 60.74 है। मानक विचलन क्रमशः 11.10 और 10.02 प्राप्त हुआ। सरकारी विद्यालयों और निजी विद्यालयों के गणित में कम उपलब्धि प्राप्त करने वालों के बीच अंतर को दर्शाने वाला टी-अनुपात 0.389 है जो असार्थक होने के कारण महत्वपूर्ण नहीं है। इससे पता चलता है कि विद्यालय के प्रकार के कारण गणित में कम उपलब्धि प्राप्त करने वालों के बुद्धिमत्ता प्राप्तांक में कोई महत्वपूर्ण भिन्नता नहीं होती है। इसी तरह के निष्कर्ष पांडा (2005) और चामुंडेश्वरी एवं सुमंगला (2006) ने भी अपने अध्ययनों में इसी तरह के निष्कर्ष प्राप्त किये थे।

वर्तमान अध्ययन के परिणाम कई शोधकर्ताओं द्वारा किए गए अध्ययनों के अनुरूप हैं। लेकिन दूसरी ओर,

अजवानी और रूंगटा (2004) ने अपने अध्ययन में पाया कि यह आवश्यक नहीं है कि गणित में कम शैक्षणिक उपलब्धि प्राप्त करने वाले सभी छात्रों का बौद्धिक स्तर कम हो। कभी-कभी अधिक बौद्धिक स्तर वाला प्रतीभाशाली छात्र भी अपनी योग्यताओं और शैक्षणिक दक्षता के अनुरूप प्रगति नहीं कर पाता है और कम शैक्षणिक उपलब्धि वालों की श्रेणी में आ जाता है। इससे निष्कर्ष निकाला जा सकता है कि बुद्धिमत्ता गणित में कम और दूसरे विषयों में अधिक उपलब्धि के अंतर का कारण नहीं है। अतः बुद्धिमत्ता के अतिरिक्त गणित में कम और दूसरे विषयों में अधिक उपलब्धि के कारक चरों की पहचान करना आवश्यक प्रतीत होता है।

संदर्भ

1. मसीह, एस. (1974): इंटेलिजेंस एंड अचीवमेंट: ए प्रैक्टिकल स्टडी, द एजुकेशनल रिव्यू, LXXX(4), 77-80।
2. गखर, एंड रजनी (1986): कोरिलेशनल रिसर्च-इंडिविजुअल डिफरेंसेस इन इंटेलिजेंस, एप्टिट्यूड, पर्सनालिटी एंड अचीवमेंट अमॉन्ग साइंस, कॉमर्स एंड आर्ट्स स्टूडेंट्स, जर्नल ऑफ साइकोलॉजिकल रिसर्च, 30(1), 22-29।
3. गखर, एंड रजनी (2004): एटिट्यूड टुवर्ड्स मैथेमैटिक्स स्केल, आगरा राखी प्रकाशन।
4. श्रीवास्तव, आर. के. (1987): ए कोरिलेशनल स्टडी ऑफ इंटेलिजेंस एंड एकेडमिक अचीवमेंट ऑफ हाई स्कूल प्यूपील्स, द प्रोग्रेस ऑफ एजुकेशन, LXI(6), 109-112।
5. बेगम, टी. एस. एंड फुकन, एम. (2005): कोरिलेशन बीटवीन एकेडमिक अचीवमेंट एंड इंटेलिजेंस, इंडियन साइकोलॉजिकल रिव्यू, 65, 257-259।
6. पांडा, एम. (2005): कोरिलेशन बिटवीन एकेडमिक अचीवमेंट एंड इंटेलिजेंस ऑफ क्लास नाइन स्टूडेंट्स, एडुट्रैक्स, 5(1), 36-38।
7. चामुंडेश्वरी, एस. एंड सुमंगला, वी. (2006): जेनरल मेंटल एलर्टनेस एंड इंटेलिजेंस इन रिलेशन टू एकेडमिक अचीवमेंट ऑफ स्टूडेंट्स एट द सेकेंडरी लेवल. जर्नल ऑफ एजुकेशनल रिसर्च एंड एक्सटेंशन, पार्ट 43(2), 32-46।
8. ज्ञानादेवन, आर. (2007): सोशल इंटेलिजेंस ऑफ हायर सेकेंडरी स्टूडेंट्स इन देडर सोसियो-इकनॉमिक स्टेटस. जर्नल ऑफ कम्प्युनिटी गाइडेंस एंड रिसर्च, 24 (3), 340-346।
9. अहमद, एन. एंड रहीम, ए. (2003): इंटेलिजेंस, सोशियो-इकनॉमिक स्टेटस एंड एडजस्टमेंट ऐज कोरिलेट्स ऑफ एकेडमिक अचीवमेंट, द एजुकेशनल रिव्यू, 46(9), 166-169।
10. अजवानी, जे. सी., और रूंगटा, जे. (2004): इंटेलिजेंस वेरिएंस ऑफ अंडर एंड ओवर-अचीवर्स, साइको-लिंगुआ, 34 (2), 135-136।
11. आलम, एम. (2009): एकेडमिक अचीवमेंट इन रिलेशन टू क्रिएटिविटी एंड अचीवमेंट मोटिवेशन - ए को-रिलेशनल स्टडी, एडुट्रैक्स, 8(3), 31-34।
12. भटनागर, आर. पी. (1989): रीडिंग इन मेथाडोलॉजी ऑफ रिसर्च इन एजुकेशन एंड टेक्नोलॉजी. मेरट: सूर्या पब्लिकेशन।
13. चौहान, एस. एस. (1983): ए स्टडी ऑफ एकेडमिक मोटिवेशन इन रिलेशन टू इंटेलिजेंस एंड सोशल-इकनॉमिक स्टेटस. जर्नल ऑफ एजुकेशनल रिसर्च एंड एक्सटेंशन, 28(1), 81।
14. दुबे, के. आर. (1999): इफेक्ट्स ऑफ होम एनवायरनमेंट ऑन द मेंटल डेवलपमेंट ऑफ चिल्ड्रन. जर्नल ऑफ सोशल साइकोलॉजी, 174, 221-236।
15. मंगल, एस. के. (2007): इंटेलिजेंस. एडवांस्ड एजुकेशनल साइकोलॉजी, इंडिया: प्रेन्टिस हॉल ऑफ इंडिया।

COMPARATIVE ANALYSIS OF AGGRESSION LEVEL BETWEEN INTER-COLLEGIATE TEAM GAME AND COMBAT GAME PLAYERS**WASEEM RAJA MALIK**

Ph.D Research Scholar, Department of Physical Education, Annamalai University, Tamil Nadu, India.

*Corresponding author: wasimraja987@gmail.com

ABSTRACT

The main purpose of this study was to investigate the aggression level between inter-collegiate team game and combat game players. For the present study subjects were selected from Annamalai University, Tamil Nadu. The statistic sample included 60 male inter-collegiate players, 30 team game players (Kabaddi, Kho-kho and foot ball) and 30 combat game players (wrestling, judo and taekwondo). The subjects were selected by using simple random sampling method. The standard Questionnaire of Aggression constructed by R. L. Bhardwaj scale, was used to know the aggression level of team game and combat game players. The Questionnaire was distributed among the subjects about 30 minutes before the competition. The collected data was analyzed by using appropriate statistical techniques, viz. Mean, Standard Deviation and 't' test to find out the significant difference among team game and combat game players. The findings of the study show that there was found significant difference on aggression level between inter-collegiate team game and combat game players.

Keywords: Aggression, team game and combat game players.

Introduction

Sports tournaments these days are really difficult. Players use the greatest strategies and training methods to achieve greater performance during contests. Even still, they are dissatisfied with the results. Thus, the necessity of psychology in physical education is recognised in order to provide the best potential results for players. Sports psychology is a discipline of psychology that deals with positive conduct of athletes during training and competition in order to improve performance. It instructs coaches and players on how to provide individual attention using various tactics and motivational techniques. It provides information about adolescent problems, changes that occur during adolescence, and aids in the management of adolescent problems. It directs sports ethics and sportsmanship in order to foster a positive sports mindset. Sports psychology expertise assists coaches and athletes in developing and controlling their anxiety levels. It also aids in dealing with various life challenges (Sanjay Kundra 2010).

The level of performance of the athlete's body and mind should be the same for optimal sports performance; if there is a mismatch, the athlete will not be able to perform optimally. It appears that in top-level sports, the mental side is frequently under-trained, and as a result,

performance level decreases because of this deficit. If the entire system responds to the level, the athlete will become psyched out and perform poorly. Athletes who can modify the system to their higher level will feel 'psyched-up' and capable of peak performance.

Aggression is a crucial factor in today's sports. According to research, sports may be the only context in which acts of interpersonal hostility are not only tolerated but joyfully celebrated by wide portions of society. Aggression is a natural aspect of human conduct, and it is required for a person to live and strive for greater success. Aggression is unavoidable in the pursuit of domination, dominance, and greatness in sports. In sports, aggression is unavoidable and unavoidable in one form or another. When hostility takes the place of aggression, the situation becomes worrisome, and the behaviour becomes anti-social. Aggression can assist an athlete perform better since it motivates them to put in more effort for the team's success. In order to play peacefully and perform at their best, athletes must be assisted in reducing and controlling anger. Appropriate levels of hostility, as allowed by the laws of the game, tend to develop skill and increase effort, whereas high or low levels of aggression will hinder and retard performance in sports.

Although aggressive behaviour is common in sports and physical activity environments, not

all hostile sports behaviours are violent. In reality, many sorts of aggressive behaviour are tolerated and even encouraged, and hostility is frequently regarded as a necessary aspect of the game. Most aggressive behaviours in sports are neither clearly acceptable nor plainly unpleasant. Instead, they are generally defended by some and despised by others.

In sports, aggression is defined as instrumental, hostile, or general. Instrumental aggressiveness is used to achieve non-aggressive goals, such as when an athlete fouls to score a goal. In contrast, hostile aggression is committed by an athlete who means to cause harm to another person. Instrumental aggression, or aggressive behaviour committed to achieving a non-aggressive goal, is distinguished from hostile aggression, which frequently contains rage and has harm or injury as its primary goal, according to the literature on aggression. A lot of hostility is necessary in sports because players utilise aggressive actions to get the ball, gain points, or stop opponents.

Sports include physical conflict between persons and provide an ideal setting for aggressive behaviour. "Aggression in sport is not regarded as categorically negative; when it is an assertive conduct such as seeking for the cause, aggression is highly valued," according to Wlaglo et al. (2007). The definition of aggression is "the attempt to damage characterised by the inner desire to obtain an advantage or receive a reward" (Baired, 2009). For many years, the relationship between violence and sports has been a contentious issue. Violent behaviour in sport is planned and controlled by the aggressor, yet perception of aggressive behaviour differs depending on the sport and the participant (Trivedi R, Pinto E 2015). Silva (1983) concluded that "participating in combative sports may increase aggressive conduct" (Keeler, 2007). At the same time as he has evaluated many different types of sports in terms of the amount of committed infractions, he has found that aggressiveness is typically associated with contact sports. Sport psychology is the study of human behaviour during sports training and contests, with the goal of improving athletes' performance in competitions. Aggression, as a representation of angry and aggressive behaviour, is an effective component in athlete

performance. Aggression, according to the definition, is emotional rage accompanied by physiologic arousal with the goal to injure and damage the other person. Sports psychologists are now focusing on the violent behaviour of athletes both on and off the field. During severe competition, a sportsman experiences several essential behavioural changes such as hostility, anxiety, wrath, intellect, and self-adjustment to the environment (Trivedi R, Pinto E 2015).

Methodology

Subjects and variables

To achieve the purpose of this study, sixty (60) male inter-collegiate players, 30 team game players (Kabaddi, Kho-kho and foot ball) and 30 combat game players (wrestling, judo and taekwondo) were selected at random as subjects from Annamalai University, Tamil Nadu and their age ranged between 18 to 23 years. The standard questionnaire of aggression constructed by R. L. Bhardwaj, was used to know the aggression level between team game and combat game players for the collection of data. The directions were read out by the researcher at a dictation speed to make the subjects understand about what they were exactly required to do. This questionnaire is having 28 questions measure four factors such as physical aggression (PA), verbal aggression (VA), Anger (A) and hostility (H). This questionnaire was associated with particular validity and reliability which is reliable for this study. The responses were marked according to the key.

Statistical Analysis and Interpretation of Data

To compare the aggression level between inter-collegiate team game and combat game players, 't' test statistical technique was applied, the level of significance was set at 0.05. Data was analyzed by using statistical package for social science (SPSS version 21.00).

Analysis of Data

The results obtained from the statistical analysis of the data are presented in below mentioned table.

Aggression

The statistical analysis between inter-collegiate team game and combat game players on aggression are presented in table - 1.

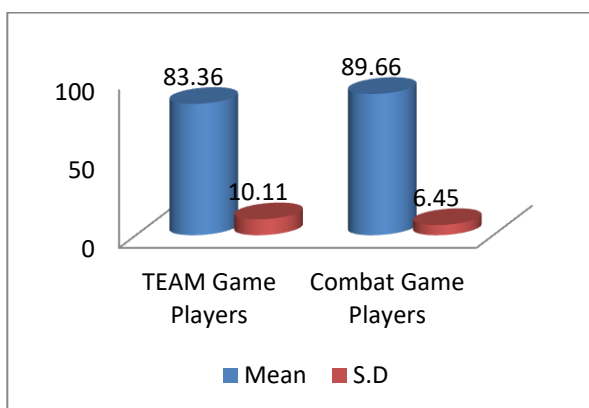
Table - 1
Descriptive Analysis on total Aggression level between Inter-collegiate team game and combat game players

Players	Mean	S.D.	M.D.	S.E.	O.T	T.T.
Team game	83.36	10.11	6.30	2.19	2.87	2.04
Combat game	89.66	6.45				

**significant at 0.05 level
 calculated 't' .05 (2.87) = 2.04*

Table-1 shows that mean value of aggression level of inter-collegiate team game and combat game players were 83.36 and 89.66 respectively. The obtained 't' ratio on aggression level is 2.87 which is greater than the required table value of 2.04 with df 58 at 0.05 level of confidence. This shows that significant difference exists when aggression level is considered between team game and combat game players. The results indicated that team game players had significantly lower levels of aggression as compared with combat game players (P<0.05). Comparison of mean performance has been graphically presented in Figure 1.

Figure-1
Graphical Representation of Aggression level between Inter-collegiate team game and combat game players



Discussion on Hypothesis

From the findings it was observed that the Combat game players possessed higher Aggression level, whereas team game players possessed lower level of Aggression. The difference in the aggression level between

combat game players and team game players is significant. The higher level of Aggression displayed by combat game players can be linked to the fact that these players are constantly subjected to physical contact with other players from other teams or their opponents. Most of the time, there is a touch from the players; this touch might be construed in various ways by the players, leading to aggressive behaviour. The findings of the study are in conformity with the findings of the earlier studies; Trivedi, R., & Pinto, E. (2015); Mashhoodi, S., Mokhtari, P., & Tajik, H. (2013); Silva, (1983) and Satyanarayana, L. H., Pooja, M., & Nagraja, Y. (1983).

Conclusion

The present study found that the team game players experience lower levels of aggression level than combat game players. In conclusion, combat game players are more prone to feel the effects of aggression on performance than team games athletes. Furthermore combat game players may be more exposed the evaluation than team sport athletes given that responsibility for performance is not distributed across several performer. In other word in combat game, the athlete is more engaged in their own skills and abilities, while in team sports such as Kabaddi and Kho-kho, they are affected by their team members and their performance will depend on the performance of the group. The role assigned to the athlete in team sports may not correspond to their inner role. Therefore it is suggested that coaches and athletic authorities of participating teams in inter-collegiate tournaments employ sport psychologist to teach and prepare comprehensive planning to develop psychological skills and suitable strategies for coping aggression and also help them to eliminate negative thoughts and focus on the positive outcomes and not on the chances of failure by the help of sport psychologists. Lastly researcher concludes that in this study aggression of combat game players is higher than team game players, So here we can say that Aggression plays an important role in every competition because when serious conditions arises during game the aggression of players dominant the others and they achieve their goal.

References

1. Keeler, L. A. (2007). The Differences in Sport Aggression, Life Aggression, and Life Assertion among Adult Male and Female Collision, Contact, and Non-Contact Sport Athletes. *Journal of Sport Behavior*, 30(1):57-76.
2. Mashhoodi, S., Mokhtari, P., & Tajik, H. (2013). The comparison of the aggression of young and adult athletes in individual or team sports. *European Journal of Experimental Biology*, 3(1): 661-663.
3. Sanjay, K. (2010). *Text Book of Physical Education*, (New Delhi: Evergreen Publications), p. 97.
4. Silva, J. M. (1981). "Normative Compliance and Rule Violating Behavior in Sport". *International Journal of Sport Psychology*, 12:10-18.
5. Satyanarayana, L. H., Pooja, M., & Nagraja, Y. (1983). A comparative study on aggression between individual and team game inter-collegiate men players of Kuvempu University. *Psychology*, 12: 10-18.
6. Trivedi, R., & Pinto, E. (2015). "A comparative study of aggression between contact game and non-contact game players of Maharashtra". *Int. J. Phys. Educ. Sports Health*, 2(2): 137-140.
7. Wright, M. A. (2009). "The relationship between team-level aggression and basketball performance (Doctoral dissertation, Georgia Institute of Technology)".
8. Wlazlo, A., Szuszkiewicz, M., & Wlazlo, E. (2007). Self-aggression in athletes practicing combat sports. *Wychowanie Fizyczne I Sport*, 51(4): 335.