HYBRID CLASSIFICATION METHOD FOR CARDIOVASCULAR DISEASE PREDICTION

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ABSTRACT

DM (Data mining) is a technique which is utilized to extract the information from the unstructured data. The existing information is considered to implement PA (Prediction Analysis) technique for predicting the upcoming possibilities. This research work aims to predict the heart disease. The CAD (coronary artery disease) is predicted in diverse stages in which the data is pre-processed, features are extracted and the data is classified. This work introduced a hybrid approach which integrates the RF (Random Forest) ensemble algorithm with LR (Logistic Regression). RF ensemble algorithm was implemented to extract the attributes and the heart disease is categorized through LR. A number of parameters are taken in account to evaluate the introduced approach. The analysis depicts that the introduced approach yielded the accuracy up to 95% for forecasting the cardiovascular disease.

***Keywords**: Heart Disease Prediction, MLP, Decision Tree, Naïve Bayes, Random Forest ensemble method, Logistic Regression.*

1. Introduction

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 [1].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. There are several factors that can contribute to cardiopathy for example dynamically changing lifestyles, smoking, eatery habits, physical exertion, over weightness, diabetes, and biochemical issues such as blood pressure or glycaemia, while typical signs of CVDs (Cardiovascular Disorders) may include pain in the arms and chest. 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 frame work to help physicians making accurate and effectual decisions during diagnosis. The physician attempts to differentiate a heart defect by analyzing 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 [2]. Nevertheless, those methods are neither suitable in terms of money nor in terms of time, and can result in man-made errors. At the other side, machine-learning algorithms enable the diagnosis of cardiovascular diseases which substantially scales back processing time and generate highly accurate prediction results. Different types of machine learning methods are adopted in various studies to help in the detection and prediction of cardiovascular diseases.

1.1 Cardiovascular Disease Prediction and Detection

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 statin use can mitigate the risk of emerging CVD and encourage extraordinary measures of cardiovascular diseases [3]. 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. *Figure 1* exhibits the general framework of cardiovascular disease detection and prediction.

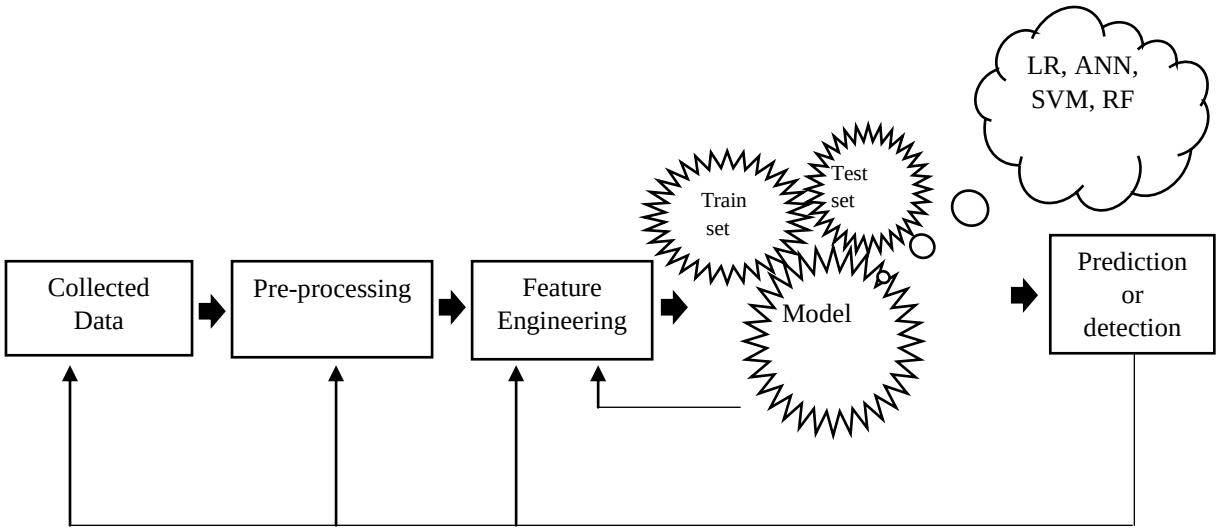

Figure 1: CVD (cardiovascular disease) Detection and Prediction Framework [5]

All stages in illustrated in figure 1 are discussed below:

i. Data set collected: Firstly, the data is retrieved from the source and studied, which examines the values leading the mechanism, parameters and characteristics and ultimate measures from the arrangement [4]. 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. These datasets contain 270 samples and the samples consist of 13 features. All features during the patient's medical examination are collected and divided into three groups: objective data (factual information) [5], examination data (results of the medical examination), subjective data (information provided by the patient).

ii. Data Pre-processing: The next stage in this practice is the pre-processing of the data. In this stage, hierarchical features are coded, missing values and outliers are detected and removed from the data. Data pre-processing start with visualization of the rough data by means of descriptive statistics tables, skewness, and other details for example min, max, percentile values, and mean. This involves identifying and removing missing values, as well as converting hierarchical values (gender, present smoker, and diabetes columns) to integers. Missing values in cigsPerDay, totChol, BMI, glucose, heart rate are replaced with the mean values of every column.In addition, missing values of BPMeds that are hierarchical and learning (ordinal with range 1–4) are eliminated from the dataset. After this stage, feature engineering is implemented on the data to be used in model construction [6].

iii. Feature Engineering: The feature engineering phase, also known as data transformation, involves both choosing the appropriate features or characteristics and altering the data points as a whole. After this step, a variety of classification models are constructed through different machine learning algorithms. This part of the work is not only concerned with selecting relevant features from a set of features but also extracts features hidden within the properties, which account for greater than 95% of the variation in the data. A filter-based feature selection approach is usually applied on the dataset. This approach makes use of statistical measures to score correlations or dependencies between input variables, which can further be filtered to pick the most important attributes. In particular, it considers the mutual information feature selection, feature extraction or selection method by adopting the Select K Best feature selection approach [7].It calculates between two variables and gauges the decrease in vagueness for single variable in the specified the identified value of the other variable.

iv. Classification Model Development: The last step uses a variety of machine learning algorithms to construct a model. The commonly used algorithms include K-Nearest Neighbor (KNN), Support Vector Machine (SVM), Decision Tree (CART), Logistic Regression (LR), Naive **B**ayes (NB), and Random Forest (RF). After feature selection, the dataset is alienated into training and test sets (80:20), which are trained by the above algorithms. The performance of the model is then evaluated on the basis of universal performance measures such as the Area under the Curve (AUC),Cross-Validation Accuracy and the Receiver Operating Characteristics (ROC) [8]. In other words, the performance of the algorithm on the data is examined separately in terms of different metrics.

1.2 Machine Learning Techniques for CVD Detection and Prediction

Machine learning (ML) is a part of artificial intelligence (AI) that is growingly being used in the domain of cardiovascular medicine. Machine learning (ML) allows software applications to become more accurate in predicting outcomes without having to be explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values. The theoretical structure of machine learning is contingent on model that obtain input data (eg, images or text) and predict outcomes (eg, favorable, unfavorable, or neutral) by combining mathematical optimization and statistical analysis. ML corresponds to the use of computer algorithms that have the ability to learn to perform specified tasks from example data without requiring explicit automatic instructions, i.e., data-based CVD diagnostics [9].This area of AI uses sophisticated statistical methods to derive predictive or discriminatory patterns from training data in order to predict results with highest accuracy on original data. The widely utilized machine learning algorithms for cardiovascular disease detection are discussed below:

b. Support Vector Machine (SVM): It is a supervised ML (Machine Learning) algorithm in which the data is partitioned into two or more classes to recognize the optimal linear or non-linear boundary. First of all, the selection of kernel function is done as this function is utilized to segregate the data. The extensive kernels are available in the form of linear function or the Gaussian function. A set of models is trained and the settings are kept to select the rest of the metrics of the SVM (Support Vector Machine) algorithm for the model having lower error. This algorithm is to susceptible to non-discriminating dimensions. Thus, a technique of reducing the dimension is exploited on the input variables to make the training easy and for attaining a superior generalization as for LR (Linear Regression). Its major limitation is the memory cost of this algorithm becomes higher while processing a huge amount of data [11]. This algorithm is effective for recognizing the non-linearity and sparsity in the input data. SVM (Support Vector Machine) is a significant method and various works makes its implementation to acquire highest efficacy.

c. Random Forest (RF): In this method, DTs (decision trees) are integrated and its training is done with various random samples. Every DT is a kind of a set of rules on the basis of the input attributes values. All the components of the training set are classified in an exact manner after the optimization of values. DT is a form of nonlinear model and provides higher variance. The deep formulation of Decision Tree leads to cause irregularities in the training dataset and issues related to overfitting. Thus, the RF (Random Forest) algorithm is employed to train different samples so that such issues are tackled. This results in diminishing the variance due to which the generalization error becomes lower. Hence, the SVM becomes an effective method. The mode or mean is selected to acquire the final forecasting. Two metrics namely total DTs and the depth level for every DT are taken into consideration for these techniques [12]. Moreover, the maximization of discriminatory power on training dataset is the result of increasing the DT in depth. For this, the generalization power is often lost. The Random Forest algorithm assists in converting the issue into a set of hierarchical queries illustrated with DTs. But, this algorithm has lower resistance against noise.

d. Artificial Neural Network (ANN): This algorithm is planned on the basis of structure

and interactions of bio-inspired NNs (neural networks). The internal nodes are employed to insert input data in distinct layers hierarchically. A corresponding weight, whose estimation and adjustment is done in training phase, is comprised in every input line. ANN (Artificial Neural Network) is executed till the recognition of weights that provide promising model performance. The value is acquired using nonlinear function in every node to the contribution from arriving connections. Weight optimization makes the algorithm more adaptable to complex boundaries due to the involvement of higher non-linear combinations of features this kind of algorithm. In addition, the association among layers in this algorithm is taken in account for constructing diverse networks with regard to the application [13]. The presented theory has some limitation to decide the amount of layers or nodes in each layer, which is occurred according to every issue and the amount of training data, and the tendency for these models to be adaptable to the training set. The reason is that the number of weights of algorithm is different from the training samples. ANN (Artificial Neural Network) performed successfully in the presence of huge volume of data.

e. Naïve Bayes: Naïve Bayes is commonly used in the domain of medical data mining and has proved its suitability for different features of clinical data. NB Classification is the technique of the occurrence of significant features of one class dissimilar to the existence of another attribute. NB characterizes each class with a probabilistic summary and searches the most predictable class. It has been validated that NB classifier gives a very good performance in some domains, and poorly on others. NB performance is affected in domains that include non-significantly correlated and unrelated features. The NB classification function is defined in the following way [14]:

$$classify(f_1, \ldots . f_n) = argmaxp(C = c) \prod_{i=0}^{n} p(F_i = f_i \mid C = c)$$

2. Literature Review

2.1 Detection and Prediction of Cardiovascular Diseases using Machine Learning

Victor Chang, et.al (2022) suggested a python-based application for medical research due to its reliability and efficiency for tracking and establishing diverse kinds of health monitoring applications [15]. This application had different stages in which the databases were gathered, LR (logistic regression) was performed and the attributes of dataset were computed. RF (random forest) algorithm was constructed for recognizing the HDs (heart diseases) at superior accuracy. The results depicted that the suggested algorithm yielded the accuracy around 83% for diagnosing the heart diseases.

Javid Iqbal, et.al (2020) introduced an OLM (Ordinary Learning Method) in order to detect the HD (heart disease) on the basis of the clinical data [16]. Cleveland dataset was employed to test the introduced method with respect to fourteen features. The introduced method offered the accuracy of 98.46% as compared to the existing methods. The outcomes demonstrated that the introduced method performed more effectively in contrast to others while detecting the CVDs (cardiovascular diseases).

Anjan Nikhil Repaka, et.al (2019) projected NB (Navies Bayesian) for developing SHDP (Smart Heart Disease Prediction) so that the risk factors related to HD (heart disease) were predicted [17]. Several features such as age, BP (blood pressure), cholesterol, sex, etc., were extracted from the clinical profiles to forecast the probability of HD in patients. The projected algorithm predicted the coronary diseases. This algorithm was executed in distinct phases in which dataset was gathered, the diseases were classified and predicted with NB and the data was transmitted securely via AES (Advanced Encryption Standard). The results indicated that the projected algorithm was useful to predict the risk factors related to coronary disorders and attained an accuracy of 89.77%.

Lanxin Miao, et.al (2020) presented an ML (machine learning) approach for constructing a future CVD (cardiovascular disease) predictive model to predict coronary diseases occurred due to T2D (Type-2 Diabetes) [18]. The SVM (Support Vector Machine) and KNN (K-Nearest Neighbours) models were assisted in the formulation of the presented approach. This approach was trained and tested on Framingham dataset. The presented approach had generated the optimal outcomes. The

results achieved on large datasets revealed that the presented approach offered the accuracy of 96.5% and a recall rate up to 89.8% using SVM technique and 92.9% recall using KNN.

P. Deepika, et.al (2020) designed a PSO (Particle Swarm Optimization) technique to enhance the predictive accuracy with the help of J48 DT (decision tree) [19]. WEKA tool was employed to implement the designed approach. The designed approach was quantified on the Cleveland dataset having different features. The designed approach provided accuracy of 83.61% and the time consumed to develop the predictive model was computed 0.02 seconds. The experimental results exhibited the effectiveness of the designed technique.

In the table 1, the analysis of Detection and Prediction of Cardiovascular Diseases using Machine Learning are compared in terms of Techniques, Findings and Limitations.

Table 1:Analysis of Detection and Prediction of Cardiovascular Diseases using Machine Learning

Author	Year	Technique Used	Findings	Limitations
Victor Chang, et.al	2022	Random forest	The results depicted that the suggested algorithm yielded the accuracy around 83% for diagnosing the heart diseases.	The suggested approach was unable to predict heart diseases accurately.
Javid Iqbal, et.al	2020	Ordinary Learning Method	The introduced method offered the accuracy of 98.46% as compared to the existing methods.	The accuracy to classify the disease was alleviated due to large number of features.
Anjan Nikhil Repaka, et.al	2019	Navies Bayesian	The results indicated that the projected algorithm was useful to predict the risk factors related to coronary disorders and attained an accuracy of 89.77%.	This algorithm had higher delays while preventing the coronary diseases.
Lanxin Miao, et.al	2020	Support vector machine (SVM) and K nearest neighbours (KNN)	The results achieved on large datasets revealed that the presented approach offered the accuracy of 96.5% and a recall rate up to 89.8% using SVM technique and 92.9% recall using KNN.	This approach was not suitable for the current datasets.
P. Deepika, et.al	2020	J48 decision tree and Particle Swarm Optimization (PSO)	The designed approach provided accuracy of 83.61% and the time consumed to develop the predictive model was computed 0.02 seconds.	The designed approach was ineffective of detecting some kinds of coronary diseases.

2.2 Detection and Prediction of Cardiovascular Diseases using Deep Learning

Yuanyuan Pan, et.al (2020) investigated an EDCNN (Enhanced Deep learning assisted Convolutional Neural Network) for assisting and enhancing the process to predict cardiovascular diseases [20]. A deeper framework was deployed to cover MLP (multi-layer perceptron) model with regularization learning techniques. When the attributes were diminished, the efficacy of the classification algorithms was affected concerning processing time, and accuracy. IoMT (Internet of Medical Things) platform was applied to deploy the investigated system for DSS (Decision Support System) that was useful for physicians in diagnosing the information about the heart of patients. The testing outcomes revealed that the investigated system was capable of evaluating the risk level of coronary diseases in effective manner and this system acquired the precision of 99.1%.

Simanta Shekhar Sarmah, et.al (2020) recommended a patient monitoring system for heart patients for which IoT (Internet of Things) based DLMNN (Deep Learning Modified Neural Network) model was implemented for diagnosing and curing the HD (heart disease) [21]. At first, in order to validate the heart patient of a particular hospital, SC (substitution cipher) was integrated with SHA-512. After that, the wearable IoT sensor device, fixed to the body of a patient, was assisted in transmitting the sensor data to the cloud. The PDH-AES

method was exploited to encrypt the sensor data and forward it to the cloud. The decryption was performed on the encrypted data. The recommended system was employed to classify the disease. The recommended system was applicable for diagnosing the coronary diseases in comparison with the traditional techniques. Moreover, this system secured the data at 95.87% efficacy and consumed lower time.

Mohammad Ayoub Khan, et.al (2020) constructed an IoT (Internet of Things) model for computing the heart disease in more accurate manner in which MDCNN (Modified Deep Convolutional Neural Network) was utilized [22].The smart watch and heart monitor device attached to the patient was utilized for monitoring the BP (blood pressure) and ECG (electrocardiogram). The sensor data was classified as healthy and unhealthy using the constructed model. A comparative analysis was conducted on the constructed model against the conventional algorithms to evaluate the efficiency. The results indicated the supremacy of the constructed model over the others while predicting the heart disorders. The accuracy obtained from the constructed model was calculated 98.2%.

Zhe Wang, et.al (2020) established a FRDLS (feature rearrangement based deep learning system) with the objective of predicting death rate due to heart failure [23]. The imbalance issue was handled and the good feature representation was obtained to enhance the efficacy to predict the cardiovascular diseases. A real-world Heart Failure data generated by the EHR system of Shanghai Shuguang Hospital was applied to conduct the experiments. The established system predicted the heart failure mortality quickly and accurately in case of imbalance situation.

As illustrated in table 2, Analysis of Detection and Prediction of Cardiovascular Diseases using Deep Learning are reviewed in terms of technique used, findings and limitations.

Table 2: Analysis of Detection and Prediction of Cardiovascular Diseases using Deep Learning

Author	Year	Technique Used	Findings	Limitations
Yuanyuan Pan, et.al	2020	Enhanced Deep learning assisted Convolutional Neural Network (EDCNN)	The testing outcomes revealed that the investigated system was capable of evaluating the risk level of coronary diseases in effective manner and this system acquired the precision of 99.1%.	The accuracy of this system was found lower in case of huge-sized dataset.
Simanta Shekhar Sarmah, et.al	2020	Deep Learning Modified Neural Network (DLMNN)	The recommended system was applicable for diagnosing the coronary diseases in comparison with the traditional techniques. Moreover, this system secured the data at 95.87% efficacy and consumed lower time.	The recommended system was not performed well to recognize some specific category of heart disease.
Mohammad Ayoub Khan, et.al	2020	Modified Deep Convolutional Neural Network (MDCNN)	The results indicated the supremacy of the constructed model over the others while predicting the heart disorders. The accuracy obtained from the constructed model was calculated 98.2%.	This model provided poor performance in the presence of fully wearable devices.
Zhe Wang, et.al	2020	A feature rearrangement based deep learning system	The established system predicted the heart failure mortality quickly and accurately in case of imbalance situation.	This system was based on 2 hyper parameters that consumed much time for the adjustment.

2.3 Detection and Prediction of Cardiovascular Diseases using Hybrid Techniques

M. Kavitha, et.al (2021) suggested a new ML (machine learning) technique for predicting the heart disease [24]. Three ML algorithms namely RF (Random Forest), DT (Decision Tree) and Hybrid of RF and DT algorithms were implemented. The results of experiments demonstrated that the suggested technique

attained the accuracy of 88.7% with the hybrid algorithm. Additionally, an interface was presented for acquiring the input metric of user in the prediction of the heart disease.

Liaqat Ali, et.al (2019) devised a hybrid system known as χ 2 –DNN (χ 2 –Deep Neural Network) and its quantification was done by comparing it with other techniques to predict the heart disease [25]. The accuracy of the devised system was calculated 93.33%. The outcomes derived from the devised system were found more accurate in comparison with other techniques. The findings exhibited that the devised system was helpful for doctors to predict the heart disease in accurate manner.

Gamal G. N. Geweid, et.al (2019) introduced a hybrid technique of dual SVM (Support Vector Machine) and nonparametric algorithm for locating HFD (heart failure disease) in ECG (electrocardiogram) signals due to which the process to recognize and diagnose the HFD became more reliable and accurate at initial phase [26]. The HFD was detected using the attributes after the comparison of outputs of the introduced technique with SVM (Support Vector Machine). The experimental outcomes revealed the efficiency of the introduced technique for predicting the HFD at 94.97% accuracy in contrast to other techniques.

Sanchayita Dhar, et.al (2018) intended an effective method to predict the CVDs (cardiovascular diseases) with the help of ML (machine learning) techniques [27]. A hybrid of RF (Random Forest) and simple KMC (k-means clustering) was put forward with the objective of predicting heart disease. Two ML (machine learning) models named J48 DT (decision tree) and NB (Naive Bayes) were employed to evaluate the dataset and compare the results. The outcomes validated that the intended method was robust and its accuracy to classify the disease was counted 100%.

Wenqi Li, et.al (2021) projected a CRMPTN (combined reinforcement multitask progressive time-series network) algorithm for predicting the grade of coronary disease. Initially, A3C (asynchronous advantage actor-critic) was executed to pre-train the DRL (deep reinforcement learning) [28]. The RNN (recurrent neural network) algorithm was optimized using this data to parameterize the stochastic policy. Subsequently, the status of the cardiac disease was predicted. For this, soft parameter sharing module, hard parameter sharing module and progressive time-series networks were adopted. The experimental outcomes exhibited that the projected algorithm generated satisfactory results and performed well in comparison with other techniques.

As illustrated in table 3, the Analysis of Detection and Prediction of Cardiovascular Diseases using Hybrid Techniques are reviewed in terms of techniques used, findings and limitations.

Table 3: Analysis of Detection and Prediction of Cardiovascular Diseases using Hybrid Techniques

Author	Year	Technique Used	Findings	Limitations
M. Kavitha, et.al	2021	Hybrid of random forest and decision tree	The results of experiments demonstrated that the suggested technique attained the accuracy of 88.7% with the hybrid algorithm.	This technique attained lower accuracy while recognizing the level of coronary disease.
Liaqat Ali, et.al	2019	χ 2 –DNN	The accuracy of the devised system was calculated 93.33%. The devised system generated more accurate outcomes in comparison with other techniques.	This system had more time complexity.
Gamal G. N. Geweid, et.al	2019	A hybrid approach of dual SVM and nonparametric algorithm	The experimental outcomes revealed the efficiency of the introduced technique for predicting the HFD at 94.97% accuracy in contrast to other techniques.	This technique was unable to analyze the useful features for classifying chronic disease in biomedical signals.

Sanchayita Dhar, et.al	2018	A hybrid approach	The outcomes validated that the intended method was robust and its accuracy to classify the disease was 100%.	The inconsistencies were occurred in data and missing values, noisy data and outliers were also present in this technique.
Wenqi Li, et.al	2021	A combined reinforcement multitask progressive time-series networks (CRMPTN) model	The experimental outcomes exhibited that the projected algorithm generated satisfactory results and perform well in comparison with other techniques.	This algorithm was not effective for detecting other kinds of diseases.

3 Research Methodology

The human heart is one of the critical muscular organs. The major function of this organ is to pump blood through the blood vessels of the circulatory system. The life duration of an individual heavily relies on the heart condition. Any condition affecting the heart infects other parts of the human body. Info is extracted from massive datasets by means of DM using computer vision. DM mechanisms and approaches are used by many communities. The healthcare sector uses DM techniques to predict various ailments. The WHO has declared that cardiovascular disorders have infected many people. Extensive information about subjects suffering from heart disease is entered manually through healthcare organizations. Physicians only take to the ER.
Doctors only need electronic records. The DM approach is just transformed into physical ledgers through data mining techniques. Patients' cardiovascular disorders happen due to various risk factors.
Stages in the prediction of cardiac diseases are as follows:
A. Data Acquisition: This stage is concerned with collecting data from different healthcare institutes to conduct the tests.
B. Data pre-processing: This phase involves pre-processing of the data so as to deploy the machine learning methods with respect to thoroughness for the analysis of critical data. Originally, a mathematical cleaner filter is applied to label incorrect values in the data. Large or small amounts of mathematical data are filtered by setting these values to a certain default value. Therefore, a filter is used to mark and identify useless values and swap them with the mean value of the data distributed. De-noised data is used to improve the efficacy of the training architecture after the selection of features and to abolish irrelevant features from the dataset.
C. Feature selection: This step is performed to identify the disease for which a subset with highly optimal characteristics is used. In this process, the differentiated attributes belonging to the available classes are picked up. There are 2 steps in this process. The primary step uses the feature estimation method to calculate the features of the dataset based on the output class. The next step focuses on choosing groups of operative sets through the search technique to cater the challenge of data classification. The RF ensemble algorithm helps selecting the characteristics. In this algorithm, 100 is deemed as the estimator value. This method aims to form a tree like configuration of the most applicable features. In addition, this algorithm chooses influential features that are used to predict heart disease.
D. Classification: The picked attributes are mapped to the training system for the classification of the inputted features so as to predict the disease. The process is thought as a multi-class issue and entails classifying medical data into four separate classes. The type of heart disease is characterized with a single class. The data is classified by deploying LR classifier framework. The features extracted are fed as input into this classifier. Probability based logistic regression classification algorithm is used to calculate the probability. Keeping this possibility in mind, the data has been classified into some specific classes. The study bifurcates people into two categories: those with coronary artery disease and those living healthful life. The results show whether a person is likely to have a heart disorder. This classification architecture has the potential to predict the likelihood about the incidence of an episode that requires robust

data for a logistic function. Compared to different regression analyses, the LR ensemble approach uses many predictive variables, like numerical, and categorical, among others.
The theory of LR is formulated as:

$$h_\theta(x) = g(\theta^T x)$$

Here, the function $g$refers to the sigmoid function in the form:

$$g(z) = \frac{1}{1+e^{-z}}$$

The sigmoid function consists of specific traits to deliver the values in the range 0 to 1. For logistic regression, the CF is illustrated as:

$$J(\theta) = \frac{1}{m}\sum_{i=1}^{m}[-y^{(i)}\log\left(h_e(x^{(i)})\right) - (1-y^{(i)})\log(1-h_e(x^{(i)}))]$$

In ML, the minima of this cost function is analysed using a built-in function represented as$fmin_bfgs^2$. This function helps determine the most optimal parameter θ for the cost function of LR which is used to create a stable dataset carrying$x$ and y as values. This architecture recognizes the individual that has the probability of the incidence of the CD disorder.

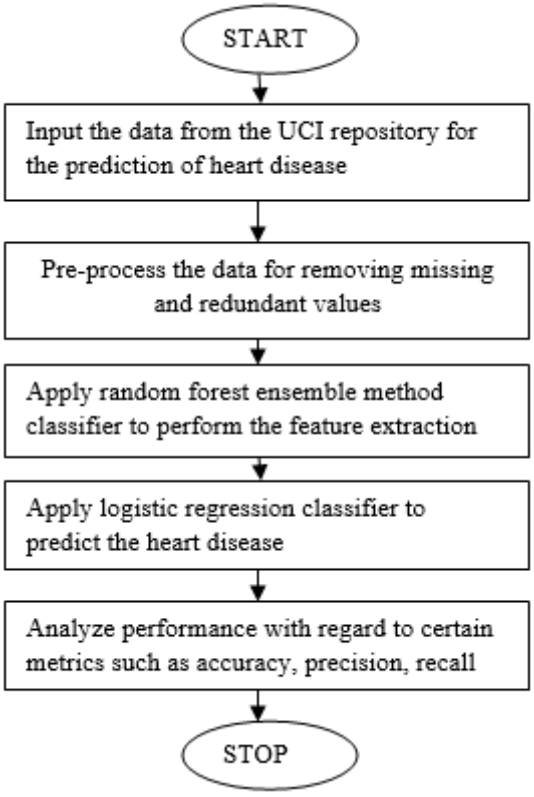

***Figure 2*: Proposed Methodology**

As shown in figure 2, the proposed technique has various phases which include pre-processing, feature extraction, classification and performance analysis. The features are extracted using random forest and classification is done using logistic regression. The performance is analysed in terms of accuracy, precision and recall.

4 Result and Discussion

The Cleveland dataset is a commonly used cardiovascular disease prediction dataset. This dataset consists of 76 features, but only 14 are used in the experiment. These features include age, gender, blood pressure etc and other predictable characteristics.
This research implements various algorithms and makes them compare for cardiovascular disease prediction. A comparative analysis is performed on DT, NB, MLP, and ensemble framework. The ensemble framework consists of RF, NB and Bayesian confidence models. This work uses accuracy, precision and recall as performance measures of different classifiers. The performance of classifiers are shown in table 1,2 and 3
As illustrated in table 4, the accuracy of various models is compared for the prediction

Table 4: Accuracy based analysis

Models	Accuracy
Decision Tree	75.41 percent
Naïve Bayes	83.61 percent
Multilayer Perceptron	83.61 percent
Ensemble Method	85.25 percent
Proposed Method	95.08 percent

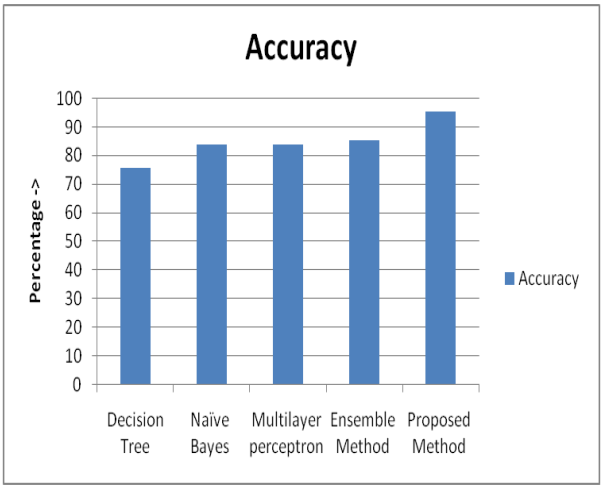

Figure 3: Accuracy based Analysis

Figure 3 demonstrates the use of accuracy as a performance measure to compare the performance of different classification architectures. In the results, the proposed

architecture achieves 95% accuracy which is the best among all the employed CVD classification architectures.

As shown in table 5, the precision values of various classifiers are compared.

Table 5: Precision based Analysis

Models	Precision
Decision Tree	75 percent
Naïve Bayes	84 percent
Multilayer Perceptron	85 percent
Ensemble Method	86 percent
Proposed Method	95 percent

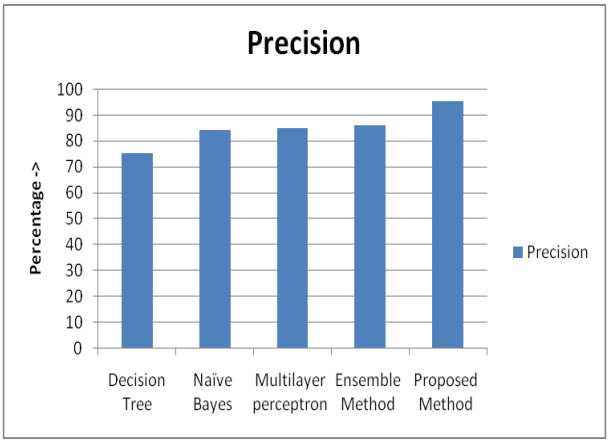

Figure 4: Precision based Analysis

Figure 4 demonstrates the use of precision as a performance measure to compare the performance of different classification architectures. In the results, the proposed architecture achieves 95% precision which is the best among all the employed CVD classification architectures.

As shown in table 6, the recall values of various classifiers are compared

TABLE 6: Recall based Analysis

Models	Recall
Decision Tree	75 percent
Naïve Bayes	84 percent
Multilayer Perceptron	85 percent
Ensemble Method	86 percent
Proposed Method	95 percent

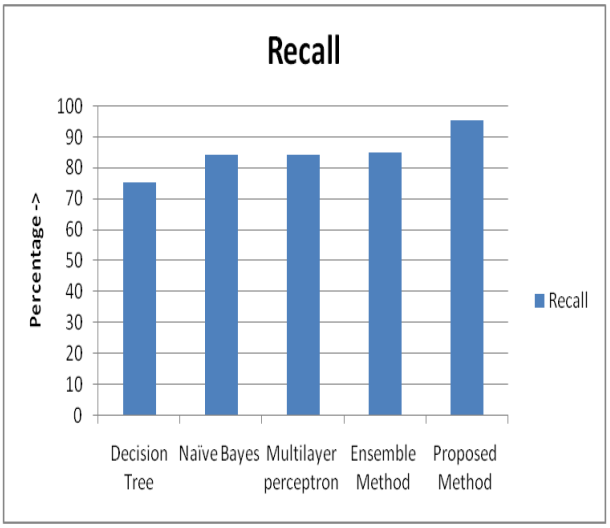

Figure 5: Recall based Analysis

Figure 5 demonstrates the use of recall as a performance measure to compare the performance of different classification architectures. In the results, the proposed architecture achieves 95% recall rate which is the best among all the employed CVD classification architectures.

5 Conclusion

This work concluded that the forecasting of heart disease is a difficult task due to the availability of several features. Diverse methods namely DT (Decision Tree), NB (Naïve Bayes), MLP (Multilayer Perceptron) and ensemble classification algorithm are evaluated to predict the heart disease. This work introduces a novel approach in which RF algorithm is incorporated with LR so that the cardiovascular disease can be predicted. RF (Random Forest) ensemble algorithm is useful to extract the features and the disease is classified using LR (Logistic Regression) algorithm. The introduced approach offers the precision, recall and accuracy up to 95%.

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HYBRID CLASSIFICATION APPROACH WITH TEXTURAL FEATURE ANALYSIS FOR PLANT DISEASE DETECTION

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ABSTRACT

The significant task in image processing is to detect the diseases in plants as the data utilized for input is complex in nature. The infected plants are diagnosed in diverse phases. For this purpose, various algorithms are available. The prior work presented SVM (Support Vector Machine) algorithm in order to detect the disorder. This research work introduces a voting classification system for enhancing the diverse metrics such as accuracy, precision and recall obtained from the earlier work. The MATLAB is applied to deploy the introduced and traditional technique. Some parameters are considered to analyze the results. The results of analysis revealed that the introduced approach outperforms the traditional approach concerning accuracy, precision and recall.

Keywords: *Plant Disease, GLCM, K-mean, SVM, Voting Classifier*

1. Introduction

In agricultural crops, leaves act significantly for offering information related to the amount and nature of horticultural yield. The productivity of food is affected due to various factors including climate changes, occurrence of weed and soil infertility. Another factor that has a great impact on the productivity of food is the occurrence of disease in plant and leaf due to which progress of various agricultural products are affected. If these infections or bacteria are not detected in plants consequently, the utilization of pesticide or fungicide is done inadequately. Thus, plant diseases are taken into consideration by the scientific community, with a focus on the biological attributes of diseases. Precision farming makes the implementation of the most advanced technology in order to optimize the decision-making. The experts and biological review often conduct the visual assessments using the plant diagnosis at the time of their necessity [1]. But this technique consumes much time and it is not cost effective. The detection of diseases in plant is required with the help of advanced and intelligent methods for dealing with these issues. A number of studies utilize the traditional ML algorithms for carrying out the agricultural operations. But, Deep Learning methods as a subset of Machine Learning (ML) are exploited to detect, recognize and classify the objects efficiently in recent times. Thus, agricultural research takes the direction towards the Deep Learning-based solutions. The promising outcomes are acquired using the Deep Learning (DL) methods for executing the agricultural operations such as to differentiate the crop or weed, harvest the fruit and identify the plant. Likewise, other imperative agricultural issues related to identify the disease in plant is also considered in recent studies. Several conventional DL models are implemented for classifying the diseases occurred on plant for which popular Deep Learning (DL) architectures are deployed. Furthermore, modified versions of DL algorithms are also put forward by the researchers for enhancing the performance while categorizing the disease in numerous plant species.

Convolutional Networks belong to the family of Neural Networks. CNNs have proved their efficacy in the fields of image recognition and classification. ConNets have been successfully applied for recognizing faces, objects, and traffic signs in addition to strengthening vision in robots and automatic vehicles. In the last decade, CNN based plant disease classification has obtained remarkable outcomes. The continuing attainment of eye-catching results has increased the popularity of multi-layered supervised network among researchers. The main objective of Convolution in case of a ConvNet is the extraction of features from the input image. Convolution makes use of small filters to preserve the spatial relationship between pixels by learning the features of an image [2]. Figure 1 shows the general DL

based process for the recognition of plant diseases.

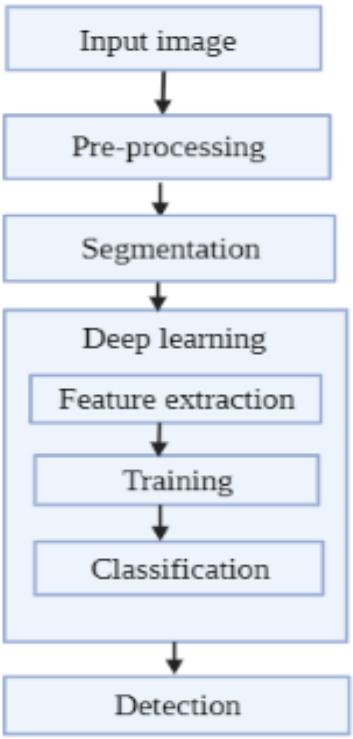


Figure 1. Deep Learning based Plant Disease Recognition

All steps mentioned in the figure have been explained below:

a. Image Acquisition: This task is concerned with the acquirement of different plant imagery from different datasets. One such dataset is 'The Plant Village Dataset'. It is an open-access repository containing 54,323 images in total. Multiple classes are selected per species. The images are generally captured in controlled environmental conditions. This might lead to model's bias. A test dataset comprising a number of images can be obtained from Google as well to access this. These images comprise supplementary plant anatomy, in-field background data and variable disease stages.

b. Pre-Processing: Image pre-processing plays a vital role in deciding the performance of a model. It is quite challenging to differentiate viral, bacterial, and fungal disorders, and generally, an overlap of symptoms appears. These signs can be any quantifiable variation in color, shape, or function which occurs as the plant reacts to the pathogen. This criticality might be overcome by using RGB images. It generates clear, de-noised images which may take more time than the greyscale image to train. However, generally are more appropriate for plant disease recognition frameworks. The reliability of a model may be sensitive to smaller datasets or unvaried data [3].

c. Segmentation: Segmentation is the process of separating a leaf from its background. It is also possible to apply technique this approach in conditions where the classification model needs the knowledge of scene. For instance, this approach can be used to understand the level of pathogen harm around the diseased tissue, contrasted with only the diseased tissue. Segmentation is an old concept. This approach has been implemented for classifying disease since the 1990s. This approach provided good results even at this early stage. The work carried out in the past were also helpful in identifying the limitations. These works show that the technique could not improve the image quality. Thus, it is important to carefully collect data, and performing its pre-processing. Combining this with particular imagery has huge research potential.

d. Feature Extraction: Generally, color, contour, texture, and shape of plant leaves are used for classifying plants. The grayscale image is transformed into a binary image by binarization, and then contour is extracted. The features of the contour line are used to extract features. The machine learning based classification of these features provides recognition rate of 90% [4]. It is quite challenging to perform classification based on just features as similarity in the shape of the leaf outlines occur generally.

$$G_{rau} = 0.299 \times I_r + 0.587 + 0.114 \times I \ldots(1)$$

Apart from this, it is possible to apply brightness or shape transformation with cumulative histogram operations.

e. Classification by CNN: The plant disease detection based on CNN is divided into three stages. All of these stages have been explained below [4]:

Stage 1-Trialling of Image size: first stage is concerned with investigating the effect of image size the model performance. Overall, the testing of 5 images sized ranging from 150 x 150 to 255 x 255 is performed. Initially, the pre-trained weights namely Resnet34 are downloaded. All the layers excluding final two layers are frozen as a default of transfer

learning. The novel weights are comprised in these layers and considered suitable to accomplish the task of classifying the plant disease. These layers are facilitated to be disease separately trained in freezing without any back propagation of gradients. Similar to this way, the final layers are trained using one-cycle policy. The completion of this process leads to release the remaining layers. The fine-tuning procedure is completed with the generation and analysis of plot that displayed the learning rate and loss. An appropriate learning is chosen from this and the model is executed. The recreation of model is carried out to the additional four image sizes using the results. There is not any change in every trial such as the learning rate.

Stage-2 Optimization: The ResNet34 model is optimized by the most appropriate image size. The performance of the model is further optimized by adding more augmentation settings. After this, the last two layers are separated and trained at the default learning rate. When this is completed, fine tuning is performed in which many trials are run to test a sequence of learning rates and number of epochs.

Stage-3 Visualizations: A number of visualizations are generated on the basis of validation and test datasets for understanding purpose. Moreover, the model is devised for creating a web application. This is carried out by storing the completed essential files in a GitHub repository and the model is transferred as a pickle file. The model is deployed by connecting the repository to the united platform called Render. This task is completed by using the 'Render Examples' GitHub repository as a guide.

2. Literature Survey

Punam Bedi, et.al (2021) suggested a new hybrid model in which CAE (Convolutional Autoencoder) network was integrated with CNN (Convolutional Neural Network) in order to detect the diseases on plant automatically [7]. The Bacterial Spot disease which affected the peach plants was detected using this model considering their leaf images. Though, this model was capable of detecting any plant disease. PlantVillage dataset was applied to conduct the experiments. The suggested model yielded accuracy up to 99.35% in training phase and 98.38% in testing phase. Moreover, the suggested model utilized least number of metrics in comparison with other methods.

Xulang Guan, et.al (2021) introduced a novel approach to detect the disease occurred on plants in which 4 CNN (Convolutional Neural Network) algorithms such as Inception, Resnet, Inception Resnet and Densenet were integrated and implemented [8]. A stacking technique was presented to process the outcomes of these algorithms. A publicly available dataset containing 36258 images was executed in the experimentation. The accuracy acquired from the presented technique was calculated 87% which was found higher in contrast to individual model. This accuracy rate demonstrated the appropriateness of the introduced approach via staking technique. This approach was further expanded for the practical cultivation conditions as an enhanced warning tool.

Melike Sardogan, et.al (2018) projected an approach on the basis of CNN (Convolutional Neural Network) model and LVQ (Learning Vector Quantization) algorithm with the objective of detecting and classifying the diseases on tomato plant leaf[9]. The attributes were extracted and classified by modeling CNN algorithm. An analysis was performed on the plant leaf disease on the basis of color information. This model deployed filters on 3 channels on the basis of RGB components. The output feature vector of convolution part was employed in LVQ algorithm to train the network. The projected approach was quantified on dataset in which 500 images of tomato leaves having 4 symptoms were comprised. The experimental outcomes revealed the effectiveness of the projected approach for recognizing 4 diverse kinds of diseases.

Hilman F. Pardede, et.al (2018) developed an unsupervised feature learning algorithm in which the CAE (Convolutional Autoencoder) was exploited to detect the diseases of plant [10]. First of all, the manual attributes were not required in this algorithm due to its potential of generating the discriminative attributes. This algorithm had not assigned labels to data. After that, the SVM (Support Vector Machine) algorithms made the deployed of output of the

autoencoder as inputs to detect the diseases of plant automatically. In the end, the results exhibited the supremacy of the developed algorithm over the traditional algorithm.

Hui Fuang Ng, et.al (2021) designed a mobile application so that the plant disease was detected and classified with the help of DL model of detecting the object [11]. Faster R-CNN (Region based Convolutional Neural Network) detector was implemented with Inception-v2 for providing robustness and efficiency for detecting the diseased plants. The experimental results indicated that the designed application offered accuracy up to 97.9%. This application assisted the farmers having no knowledge in detecting and controlling the diseases in plants at initial phase. This resulted in alleviating the losses and preventing the further spread of the disease.

N Radha, et.al (2021) presented a model in order to monitor the plant and detect the plant disease at initial phase [12]. The automatic methods employed to detect the plant diseases were effective for detecting the signs of disease in advance. This model was evaluated using a dataset in which images related to affected and normal leaves were included. CNN (Convolutional Neural Network) model was adopted for training the model so that the plant diseases were detected. The presented model was able to attain the accuracy of 85% for detecting the diseases of plants and negligible loss was found in the process when the data was trained.

Husnul Ajra, et.al (2020) investigated a method to detect and prevent the diseases occurred on plants leaf in the farming sector in which image processing and 2 CNN (Convolutional Neural Network) models namely AlexNet and ResNet-50 were deployed [13]. At first, Kaggle dataset was implemented to simulate this method with the purpose of recognizing the symptoms of affected leaf. Thereafter, the attributes were extracted and classified from the images while detecting leaf diseases. The outcomes of experiment depicted that the investigated method was efficient and the initial model offered the accuracy 97% and ResNet-50 offered 96.5% accuracy for detecting the plant diseases.

3. Research Methodology

This research work is focused on recognizing the diseases in plants. The entire cycle to detect the infection contains different functions that are discussed as:

1. Pre-processing: - The image is pre-processed in this function with the objective of diagnosing the diseases from leaves of plants. The images are captured to be fed in input. A consistent data source is considered to collect these images. A public dataset called Plant Village is generated in which all the collected are comprised. The Plant Village is a website that is helpful for deriving the information about the plant and its disease's kind. The images taken from wheat are involved in the dataset. This dataset consists of 3 portions in which images normal leaves, leaves suffered from early blight and the images of late blight disease, are inserted. This process also focuses on transforming the input images into gray scale.

2. Segmentation: - The second function aims to split a digitized image into distinct portions. The process to segment an image is adopted to identify the objects and retrieve the information from the images. The images are easily analyzed in this stage. The technique of segmenting an image is put forward to locate the RoI (region of interest) and bounding line of images. Every pixel is marked with a label. Every pixel having similar label leads to strengthen several features. This work adopts KMC (K-means clustering) for segmenting the pictures of plant leaves. Moreover, the samples are gathered into various clusters according to the distance using this algorithm. Two points having least distance amid them are assisted in offering compressed and independent cluster as a closing target. The 3 is taken as the optimal value for the input [9] is taken. The value of k is considered to segment an image. After that, this phase selects the essential portion from the part of input leaf which suffers from infection.

3. Feature Extraction: - The prior stage offers the output in the form of RoI his function is carried for retrieving the attributes from the required region. This process is effective to extract a set of values known as attribute. The further processing is done on the basis of

attributes having information regarding the images. A number of elements namely color, texture, morphology and color coherence vector help in detecting the infections in plants. Several methods are adopted for extracting the attributes from the images. A diseases diagnosis system is constructed on the basis of these features. GLCM, color co-occurrence method, spatial gray-level dependency matrix, and histogram-based algorithm are useful approaches for extracting the attributes. The texture features are classified via GLCM (gray-level co-occurrence matrix).

4. Classification: - The final stage is carried out for generating a classification algorithm in order to diagnose the infected plants. There are 2 sections of entire dataset. The amount of data in the training section is higher in contrast to the testing section. This work projects KNN (K-Nearest Neighbor) algorithm to classify the data. The unknown samples have association with the known ones or the similarity functions are employed to represent this algorithm. The projected algorithm is trained and tested at the same time. This algorithm is efficient for investigating K nearest centers and allocating the square of the greater part to the unknown instance. The majority voting and its k neighbors are considered to classify the data. Moreover, an efficient and robust ML (machine learning) algorithm called RF (Random Forest) is implemented in which a variety of tree predictors are involved. This algorithm is capable of proving optimal outcomes and handling the large volume of data. The construction of RF is done on the basis of integrating various DT (decision trees) to yield the results at superior accuracy. Every DT contains a set of rules in accordance with the input features values. The optimization of these attributes is done to classify all the components. This algorithm faces an issue related to overlapping of RTs (random trees). A random subset of attributes comprised in the dataset assists in making the results more promising. The voting algorithm is fed with the output generated through RF (Random Forest) and KNN (K-Nearest Neighbor). The introduced algorithm is adaptable to cast its vote to either of the both algorithms and achieve the final predictive outcomes.

4. Result and Discussion

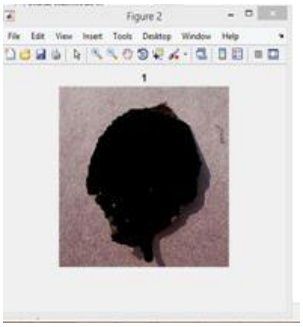
This work considers Plant Village website to gather a dataset. A set of images wheat is taken in this dataset so that diverse kinds of infections of plants are diagnosed. The execution of every stage is discussed as:

1.Input Database: - The collection of data is done from the plant village dataset. The sample images are represented as:

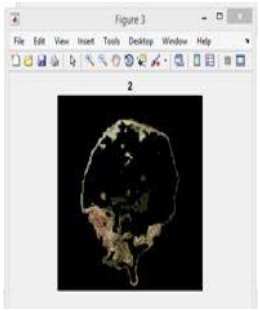
Figure 2. Sample Images

The above figure depicts the representation of the sample images utilized to accomplish the further processing.

2. Segmentation: - The K-Means algorithm is adopted for segmenting the images into specific portions. The images whose segmentation is done are presented below:



a. Segment 1



b. Segment 2

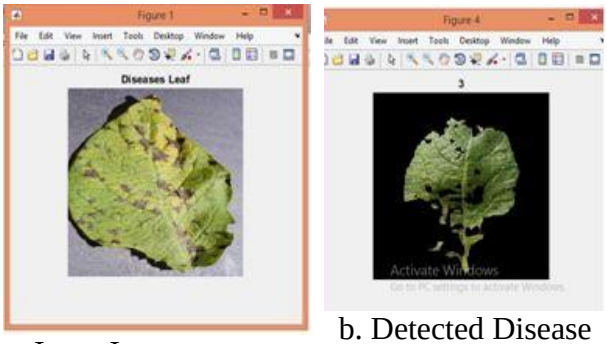
c. Segment 3

Figure 3.Region Based Segmentation

Figure 3 depicts the implementation of the technique of k-mean to segment the images based on region. the experiments take 3 for the k value. Thus, the number of formed segments is three. The a, b, and c illustrate the 3 segments respectively.

3. Feature Extraction: - This stage is executed to extract the features. The GLCM (gray-level co-occurrence matrix) algorithm is adopted to retrieve 13 features to classify the images.

4. Classification: - The final stage emphasized on predicting the disease. The given figure defines the classified disease image.



a. Input Image b. Detected Disease

Figure 4. Disease Classified image

Figure 4 represents that the image a is utilized for the input and image b is used to illustrate the detected image which contains infection.

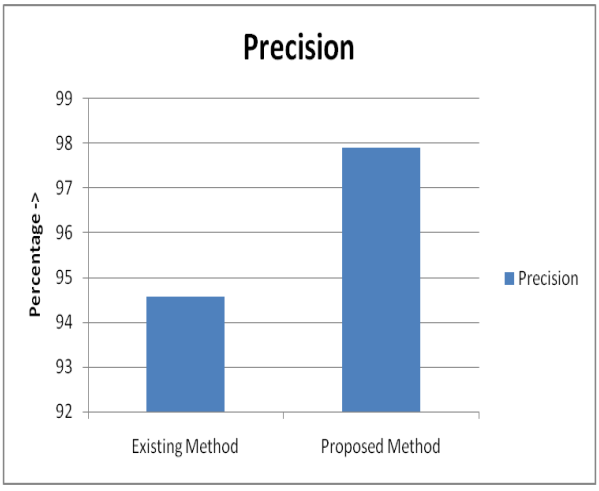


Figure 5. Precision Comparison

Figure 5 depicted that the introduced system performed more effectively in comparison with the existing system with regard to the precision.

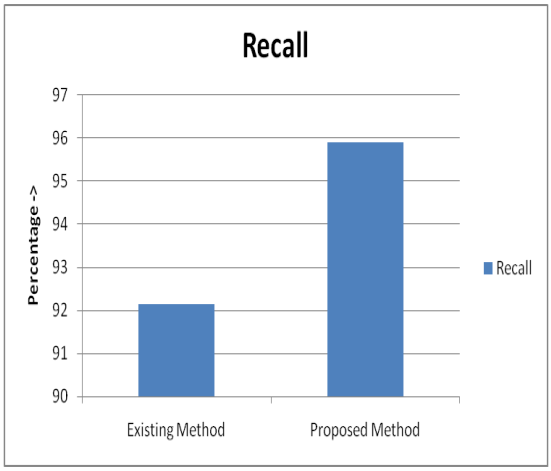


Figure 6. Recall Comparison

Figure 6 exhibits that the introduced system is better in contrast to the existing one with regard to recall value.

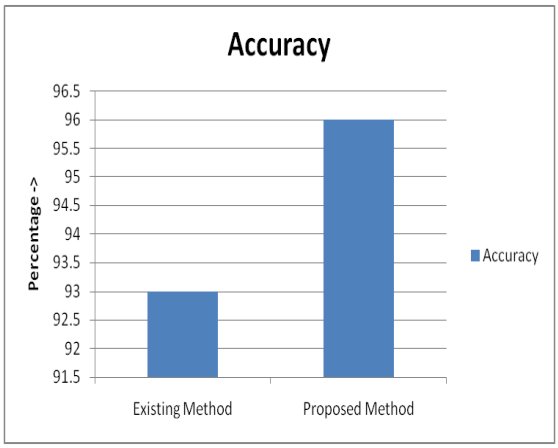


Figure 7. Accuracy Comparison

Figure 7 indicates that the introduced system outperformed the existing system concerning accuracy value.

Conclusion

This work concludes that the introduced approach is applicable for detecting the diseases in plants. This approach detects the infected plants in diverse phases. The K-Means is adopted to segment the plant image. The law textural technique is exploited to extract the attributes. The disease is predicted using RF (Random Forest) and DT (Decision Tree) algorithms. A comparative analysis is conducted on the introduced approach against the SVM (Support Vector Machine) to diagnose the disease of plant. The introduced approach performed more effectively as compared to the traditional technique with regard to accuracy, precision, and recall to detect the infected plants.

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CONSUMER PREFERENCE WITH REFERENCE TO FMCG SECTOR IN HARYANA

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ABSTRACT

This paper aims to investigate consumers' preference towards Indian and foreign brands and factors influence their behavior. The author analyzed data collected from 530 respondents with a structured questionnaire and used Cronbach's Coefficient Alpha for checking the reliability of the questionnaire. Results indicate that from the study suggest that consumers of FMCG products used Indian as well as foreign brands. Respondents gave more preference to Indian brands for hair oil, skin care, perfumes, room freshener and biscuits. Respondents gave more preference to foreign brands of products like shampoo, toothpaste, toilet cleaner, laundry care, dish wash, chocolates. Consumers influenced by factors for both brands. Quality is the most influenced factor when consumer purchase any product of Indian and foreign brand. Price is the second most factor which influence consumers. While personal selling and public relation is the least influencing factor for consumers for selecting a brand. Attractive packaging and advertising creates a favorable impression in customers' minds which influences their buying behavior. The responses of customers are quite mixed in the Haryana state.

***Keywords**: Brands, price, quality, preference, factors, consumer*

Introduction

Fast-Moving Consumer Goods (FMCG)

Fast-moving consumer goods (FMCG), also called consumer packaged goods (CPG), refer to merchandise that are highly in-demand, traded quickly, and affordable. It is generally sold at low profit margin but they are quick to leave the shelves of a store or supermarket because consumers use them on a regular basis which increases the cumulative profit (Mirza and Gupta, 2020). It includes a wide range of products like toothpaste, soaps, shampoo, conditioner, face wash, face cream, tea, soft drinks, stationery, over the counter medicines, laundry products, less expensive consumer electronic goods. Some FMCG are highly perishable such as packaged food, dairy products, fruits, vegetables and baked goods etc. (Ghosal, 2016). Fast-moving consumer goods (FMCG) sector is India's fourth largest sector with Household and personal care is the leading segment which captures 50% of the overall market. Healthcare with 31% and Food and Beverages with 19% come next in terms of market share (Srivastava, 2020)

Brand and Branding:

Brand is an identifying symbol, mark, logo, name, word and sentence that companies use to make a distinction for their product from others. It includes intangible elements related to its specific promise, positioning and personality as well as tangible elements related to its logos, colors, sounds and graphics. A combination of one or more of those elements can be utilized to create a brand identity (Kenton; 2020). A brand is essential for one's own unique story. Brand is some total of consumer's expectations, memories, stories and relationships that account for a decision making to choose one product or service over another. If consumer is neither ready to pay premium, or make a selection nor spreads the word, then there is no brand value exist. Brand is the image that people have in their mind (Biedermann, 2011).

Kotler and Keller (2015) define branding as endowing products and services with the power of a brand .Lisa Buyer (2011) defines Branding as it is more than a name and symbol. It is created and influenced by people, visuals, culture, style, perception, words, messages, PR, opinions, news media and especially social media.

India's Top FMCG Companies

Hindustan Unilever Ltd.

In 1933, Hindustan Unilever was established. It is a well-known manufacturer of consumer goods and one of India's biggest marketing firms. More than 400 brands are represented in the company's portfolio, and its products are offered in more than 150 countries. Personal Care, Home Care, and Refreshment are the company's three business divisions. With revenues reaching $60 billion yearly across

150 countries, the corporation currently ranks among the biggest consumer products companies in the world.

India Tobacco Company Ltd.

ITC has been among India's top FMCG stocks for a number of years. Leading FMCG company in India is ITC (Indian Tobacco Company). In 1910, the corporation was incorporated in India. Although ITC's primary product line is cigarettes, it also sells items in other areas. Aashirwad Atta, Bingo Chips, Fiama, Savlon, Vivel, Classmate Stationery, Sunfeast Yippee!, and others are some of its other well-liked brands.

Nestle

In terms of 5-year returns, Nestle is also among the best FMCG stocks in India. Over time, Nestle India has experienced exponential growth. It is a well-known brand in the FMCG industry and provides a variety of goods, such as food, coffee, tea, and water. The business of the corporation is broken down into four divisions: Beverages, which includes water and carbonated soft beverages; Chocolate and Confectionery; Nutrition, Health & Wellness; which includes newborn nutrition products; and Petcare.

Dabur

Dabur began as a maker of healthcare supplies in Kolkata in 1884. Pharmaceuticals, Ayurvedic goods, cosmetics, and food items are all produced and marketed by Dabur India. With a 5.5% market share, it is one of the biggest FMCG companies in India.

Godrej Consumer Products

In the FMCG industry, Godrej Consumer Products is a pioneer. Products offered by the company include soaps, detergents, food items, medical supplies, cosmetics, and household appliances. Godrej Consumer Products has a significant market share in India and is growing its business in other developing nations including South America and Africa.

In nutshell we can say that the FMCG market is expanding quickly. The nature of supply and demand in the sector is currently changing. Consumers are now more picky and willing to pay more money on high-quality goods than low-quality ones. The FMCG market has expanded as a result of the rising demand for branded goods.

There are some examples of FMCG brands and their ownership in India.

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Indian Companies And Brands		**Foreign Companies And Brands**	
Indian Company	**Brand Name**	**Foreign Company**	**Brand Name**
ITC Limited	Classmate stationery, Aashirvaad atta, Sunfeast Yippee, Bingo	Procter and Gamble Company	Arial, Tide, Gillette, Pantene
Dabur India Limited	Dabur Chyawanprash, Dabur Amla Hair Oil, Real Juices, Dabur Honey and Dabur Lal Dant Manjan	Nestle India Limited	Nescafe, Maggi, Milky bar, Kit Kat Nestle Fresh ‘n’ Natural Dahi
Emami Limited	Chyawanprash, Zandu Balm and Fair and Handsome cream for men	Hindustan Uniliver Limited	Surf excel, Rin, Sunsilk, Lakme
Marico Limited	Parachute coconut oil, Saffola Edible Oils,Livon and Set Wet	Colgate-Palmolive (India) Ltd.	Colgate, Palmolive
Patanjali Ayurved Limited	Patanjali Kesh Kanti, Patanjali DantKanti, Patanjali Basmati Rice	Coca Cola India Pvt. Ltd.	Coca Cola, Fanta, Maaza, Sprite, Thums up, Kinley

Source: secondary data

All the marketing activities of today go around the habits, tastes, preferences, perception and attitudes of consumers. All efforts are being made by industries to provide maximum satisfaction to maximum consumers (Gera, 2014). So there is a need to understand about consumer behavior and preference.

Consumer purchase behavior refers to mental and emotional process during searching, purchasing and post purchase of any product and service. It blends the elements from sociology, socio -psychology, psychology, anthropology and economic (Kundi J et al., 2008). It includes the study what they buy, when they buy it, where they buy it, how often they buy it and how often they use it (Thirumoorthi and Boobalan, 2019).

Objectives of the Study

1. To study FMCG companies in India.
2. To Study the preference of consumer towards FMCG brands.
3. To study the factors affecting towards Indian and foreign brands.

Research Methodology

The present study was undertaken to study the brand preference towards FMCG products. The data required for the study was collected from the selected respondents of Haryana. The nature of data used in the present study is primary which has been collected by using a structured questionnaire. Secondary data also used for the study. The total sample selected was 530. Data has been collected on the basis on stratified and snow ball sampling technique, data is analyzed by the help of Percentile, Mean and Standard Deviation and presented by tables and figures. Preliminary discussions were held with the FMCG consumers and the marketers about the consumption of FMCG products as well as about the brands available and preferred in the study area to gather information on the products to be selected for the study. Based on the discussions, the most commonly available and used products in the study area were selected.

Data Analysis And Interpretation:

Reliability of data:

Cronbach's Coefficient Alpha:

It is the measure of internal consistency .The study focuses on the reliability of a questionnaire. If its value more than .7 then it shows the questionnaire is reliable.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.903	.903	20

Results show that the Cronbach's alpha value for 20 items is shown to be .903. It can be observed that .903 is Cronbach's Alpha score for the variables in the questionnaire. Therefore, it can be said that the data of the questionnaire is satisfactory as the value is more than 0.5. It can also be said that items in the question are appropriate and reliable as Cronbach's Alpha value is high. The cutoff value of 0.7 is usually used in social science researches.

Demographic Characteristics of Respondents

Demographic Variable	Number of respondents	Percentage
Gender		
Female	318	60
Male	212	40
Age		
Below 20 years	159	30
20-30 years	192	36.23
30-40 years	119	22.45
40-50 years	46	8.68
50 years & above	14	2.64
Education		
Up to 10+2	269	50.75
Graduate	187	35.28
Post graduate	64	12.08
Professional degree	5	0.94
Doctorate	5	0.94
Marital status		
Married	298	56.12
Unmarried	230	43.40
Other	2	0.38
Occupation		
Agriculture	27	5.09
Govt. Employee	8	1.51
Private job	112	21.13
Student	225	42.45
Other	158	29.82
Family size		
Joint	198	37.3
Nuclear	332	62.7
Income per year		
Below - 2,00,000	216	40.75
2,00,000-4,00,000	134	25.28
4,00,000-6,00,000	113	21.32
Above 6,00,000	67	12.65

Source: Primary Data

Gender: The above table shows that 318 respondents forming 60%of the total were female and 212 respondents forming 40% the total respondents were male.

Age: Aged below 20 years, 159 respondents forming 30% the total respondents and aged between 20 to 30 years, 192 respondents forming 36.23% the total respondents, aged between 30-40 years, 119 respondents forming 22.45 % the total respondents, aged between 40-50 years, 46 respondents forming 8.68% the total respondents and the rest of the 14 respondents forming 2.64 % the total respondents were aged above 50 years.

Education: 269 respondents forming 50.75 % of the total respondents were educated Up to 10+2 level, 187 respondents forming 35.28% of the total respondents were educated graduate level, 64 respondents forming 12.08 % of the total respondents were educated post graduate level, 5 respondents forming .94% of the total respondents were educated Professional degree level and rest of the 5 respondents forming .94 % of the total respondents were doctorate

Marital status: 298 respondents forming 56.23% the total respondents were married and 229 respondents forming 43.21% the total respondents were unmarried and 3 respondents forming .57% the total respondents were others

Occupation: 27 respondents forming 5.09 % of the total respondents were Agriculturist, 8 respondents forming 1.51% of the total respondents were Govt. Employee, 112 respondents forming 21.13% of the total respondents were Private employee, 225 respondents forming 42.45% of the total respondents were Student carrying their own business and rest of the 158 respondents forming 29.82% of the total respondents was others like housewives, labour, professionals etc.

Family size: 198 respondents forming 37.3% of the total respondents were from joint family, 332 respondents forming 62.7% of the total respondents were from nuclear family

Income per year: 216 respondents forming 40.75% of the total respondents had a gross annual income of up to Rs.200, 000 and 134 respondents forming 25.28%of the total respondents had a gross annual income of Rs. 2, 00,000 – Rs. 4,00,000 and 113 respondents forming 21.32% of the total respondents had a gross annual income of Rs 4,00,000- Rs 6,00,000 and rest of the 67 respondents forming 12.65% of the total respondents were earning more than Rs.6,00,000 annually.

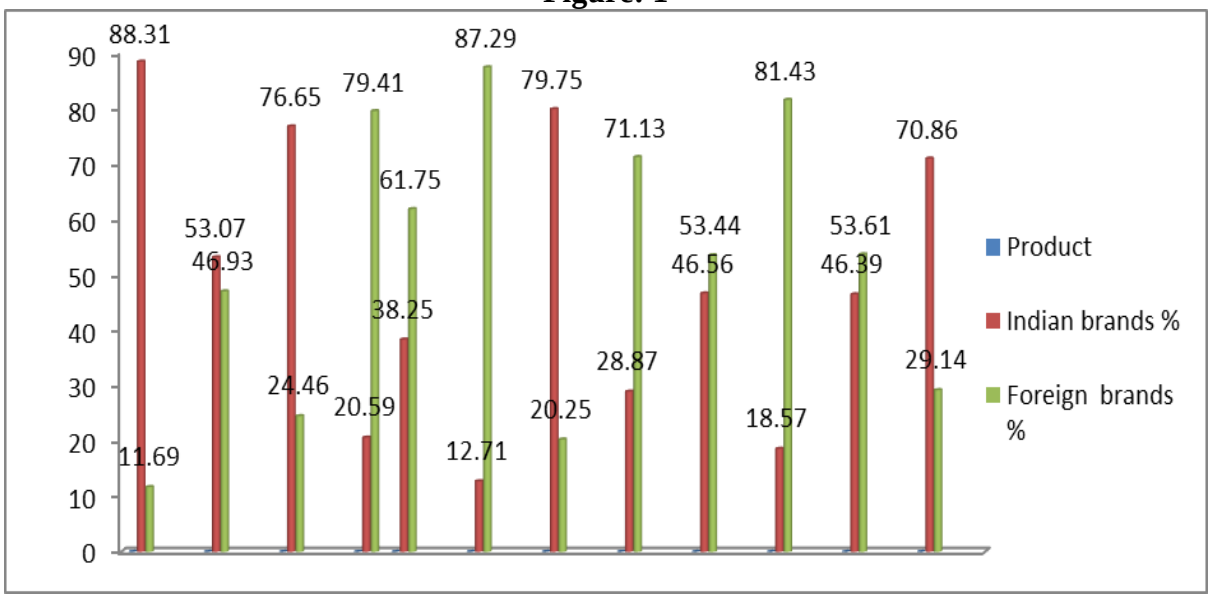
Table: 1
Product and brand wise preference of the Respondents:

Product	Indian brands	Indian brands %	Foreign brands	Foreign brands %
Hair oil	574	88.31	76	11.69
Skin care	372	53.07	329	46.93
Perfumes	522	76.65	159	24.46
Shampoo	146	20.59	563	79.41
Toothpaste	280	38.25	452	61.75
Toilet cleaner	82	12.71	563	87.29
Room freshener	508	79.75	129	20.25
Laundry care	218	28.87	537	71.13
Dish wash	325	46.56	373	53.44
Chocolates	172	18.57	754	81.43
Soft drinks	456	46.39	527	53.61
Biscuits	569	70.86	234	29.14

(Source: primary data)

Table 2 represents the distribution of preference of FMCG Indian and foreign brands used by the respondents. For hair oil respondents used 88.31% Indian brands and only 11.69% foreign brands. For skin care 53.07% Indian and 46.93% foreign brands are used. Respondents gave more preference to Indian brands for hair oil, skin care, perfumes, room freshener and biscuits and other product followed by foreign brands more.

Figure: 1



Factors affecting while purchasing Indian and foreign brands

Here, an attempt has been made to identify the most influencing factors of intention to purchase FMCG brands. Here, the researcher identified ten important factors for analysis. They are listed below

1. Price 2. Quality 3. Brand image 4. Labeling 5. Packaging 6. Advertising 7. Offer 8. Publicity 9. Personal selling 10. Public relation

(a) Factors affecting while purchasing Indian brands

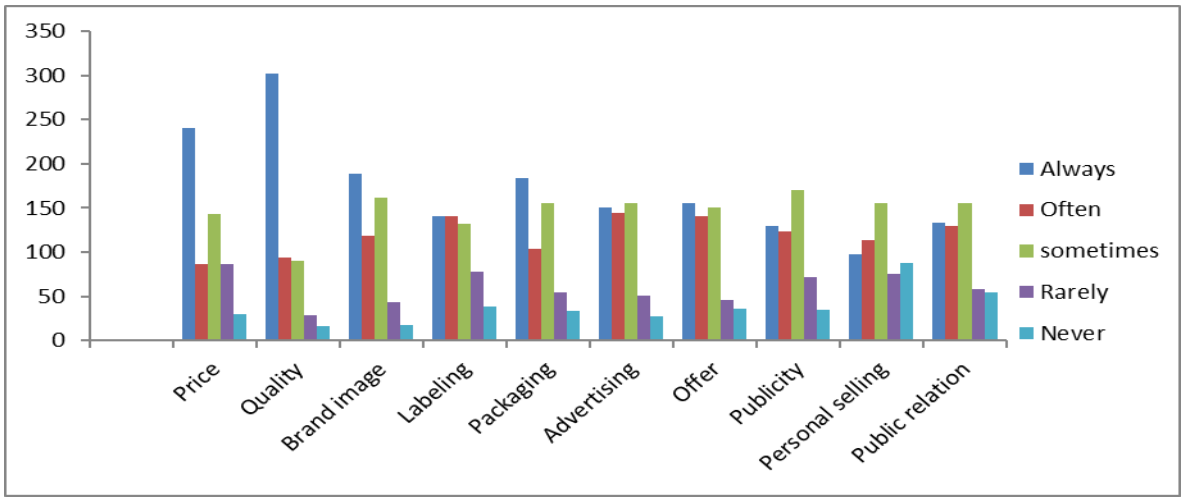
Table 2

Factor	Always	Often	sometimes	Rarely	Never	Mean	Std. Deviation	Rank
Price	240	87	143	87	30	3.9	1.205	2
Quality	302	94	90	28	16	4.2	1.088	1
Brand image	189	118	162	43	18	3.79	1.118	3
Labeling	141	141	132	78	38	3.51	1.229	7
Packaging	184	104	155	54	33	3.66	1.224	4
Advertising	151	145	156	51	27	3.65	1.14	5
Offer	156	141	151	46	36	3.63	1.185	6
Publicity	129	124	170	72	35	3.45	1.185	8
Personal selling	97	113	156	76	88	3.1	1.321	10
Public relation	133	130	155	58	54	3.43	1.257	9

Source: primary data

Table 2 represents the factors affecting the preference towards Indian brands. Based on the mean value, it was cleared that the respondent gave more preference to quality with (Mean=4.20), then price with (Mean=3.9) respectively. On the other side respondents gave least preference to Personal selling with (Mean3.10) and Public relation with (Mean 3.43). Proportion of all factors affecting respondent preference towards Indian brands is shown in Figure 13.

Figure: 2



(b) Factors affecting while purchasing foreign brands.

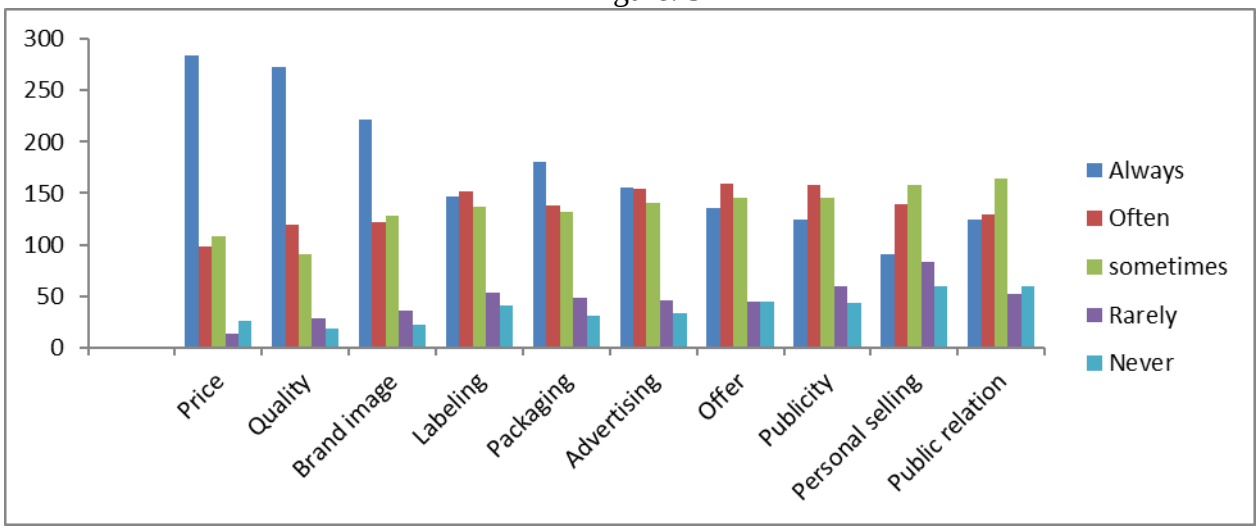
Table 3

Factor	Always	Often	sometimes	Rarely	Never	Mean	Rank	Std. Deviation
Price	284	98	108	14	26	4.13	1	1.128
Quality	273	119	91	28	19	4.13	2	1.098
Brand image	222	122	128	36	22	3.92	3	1.141
Labeling	147	152	137	53	41	3.59	6	1.210
Packaging	181	138	132	48	31	3.74	4	1.188
Advertising	155	154	141	46	34	3.66	5	1.171
Offer	136	159	145	45	45	3.56	7	1.201
Publicity	124	158	145	60	43	3.49	8	1.197
Personal selling	91	139	158	83	59	3.23	10	1.226
Public relation	125	130	164	52	59	3.40	9	1.256

Source: primary data

Table 4 represents the factors affecting the preference towards foreign brands. Based on the mean value, it was cleared that the respondent gave more preference to quality with (Mean=4.13), then price with (Mean=4.13) respectively. On the other side respondents gave least preference to Personal selling with (Mean=3.23) and Public relation with (Mean=3.40). Proportion of all factors affecting respondent preference towards foreign brands is shown in Figure 14.

Figure: 3



Conclusion

The findings from the study suggest that consumers of FMCG products used Indian as well as foreign brands. Respondents gave more preference to Indian brands for hair oil, skin care, perfumes, room freshener and biscuits. Respondents gave more preference to foreign brands of products like shampoo, toothpaste, toilet cleaner, laundry care, dish wash, chocolates. Consumers influenced by factors for both brands. Quality is the most influenced factor when consumer purchase any product of Indian and foreign brand. Price is the second most factor which influence consumers. While personal selling and public relation is the least influencing factor for consumers for selecting a brand. Attractive packaging and advertising creates a favorable impression in customers' minds which influences their buying behavior. The responses of customers are quite mixed in the Haryana state.

Limitation of Study

Only 530 respondents were selected for sampling. There are many other factors which affect brand preferences of consumers but due to time constraints, unable to completely compare how other factors influence brand preferences.

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PSYCHOLOGICAL WELL-BEING OF COLLEGE TEACHERS IN RELATION TO SELF-EFFICACY AND PROFESSIONAL DEVELOPMENT

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ABSTRACT

The purpose of conducting this study was to find out the Psychological well-being of college teachers in relation to self-efficacy and professional development. 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), Teacher Self Efficacy Scale developed by Shweta Sharma (2017) and Professional Development scale by Butia (2014). Mean, SD and t-test were used to compare the psychological well-being, self efficacy 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 self efficacy and professional development of the College Teachers whereas the decrease in the Psychological Wellbeing of college teachers tends to decrease the self efficacy and professional development of college teachers.

Keyword: *Psychological well being, Self-efficacy, Professional development, College teachers*

1. Introduction

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 and an effective development of the personalities of the learner's .

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). On the other hand, low self-efficacy is related to more symptoms of stress, depression and anxiety. (Faure & Loxton, 2003; Kashdan & Roberts, 2004; Shnek, Irvine, Stewart, & Abbey, 2001).

Self-efficacy is a general determinant of a teacher's success and contributes to general well-being. With the growing population of teachers who actively seek advanced degrees or professional continuing education opportunities, there is a need to examine how this continuing education affects self-efficacy.

The professional development practices for experienced teachers are generally viewed as part of the continuum of learning of teachers throughout their careers. Within the framework of professional development, teachers change, improve in the professional field, as well as change, improve, and complement their pedagogical competences and behaviour, and change as a person.

1.1 Psychological well-being

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.

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 functuality 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, happy, 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.

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

1.2 Self-efficacy

Self-efficacy means the ability of a person to carry out action according to his own ways. It also means to set one's expectations according to one's ability to perform various tasks. Self-efficacy is a positive feeling one has about his/her ability to perform at various levels of the tasks. If a person shows more self -confidence and self-belief, it proves that the person possesses more self-efficacy. If people conclude negatively about their efforts to reach their goals, they lack self -efficacy. On the other hand, if they feel positive about the outcomes and efforts to reach their goals, their performance will be increased and higher self-efficacy is exhibited.

The concept of self-efficacy lies at the centre of psychologist **Albert Bandura's** social cognitive theory (1986) emphasizes the role of observational learning, social experience, and reciprocal determinism in the development of personality. According to Bandura, a person's attitudes, abilities, and cognitive skills comprise what is known as the self-system. This system plays a major role in how we perceive situations and how we behave in response to different situations. Self-efficacy plays an essential part in this self-system. Self-efficacy is a concept, introduced by Albert Bandura. Although someone may believe that how some future event turns out is under their control, they may or may not believe that they are capable of behaving in a way that will produce the desired result.

1.3 Professional development

Professional development may be used in reference to a wide variety of specialized training, formal education, or advanced professional learning intended to help administrators, teachers, and other educators improve their professional knowledge, competence, skill, and effectiveness. Professional development as a way to generate changes in teaching practices and improve student achievement (Lawless & Pellegrino,

2007).It refers to instructors developing and improving their skills to better meet the needs of their students. It is the set of tools, resources, and training sessions for educators to improve their teaching quality and effectiveness. Professional development covers a variety of topics and addresses a number of issues present in a particular school or district. The activities in which teachers participate will vary depending on personal preference, personal interests, and professional history (Day, 1999).

Researches in the area of Professional development revealed that teachers were satisfied with the professional development activities that they attended (Michael Bosley 2004) and valued professional development experiences for improvement of teaching strategies (**Nugent,2007) resulting in development of positive** attitudes (Parua, 2012 ; Henning and Mitchell, 2002).

Guskey (2003) concluded that professional development, which aids in deepening a teacher's understanding of the content and how students learn the specific content, are critical components of successful professional development. A change in classroom practices is related to professional development activities which include opportunities for active learning (Birman et al., 2000).

Causton-Theoharis and Theoharis (2008) documented how student learning improved after policies, procedures, curriculum, and instruction were shifted to support all learners. The noted challenge for teacher professional development is to provide the opportunity for teachers to deepen their understanding of the learning process and continuously develop instructional approaches that support learning.

2. Literature review

2.1 Studies related to Psychological Well Being

Sisask and colleagues' (2014) study reported that teachers with high wellbeing are more likely to assist children with mental health challenges. Similarly, a number of other studies conclude that the preconditions for teachers to improve the mental health of their students will be achieved by providing them with a good school environment, valuing the subjective psychological wellbeing of the teachers, and providing adequate training to fulfil their gatekeeper role (Roffey, 2012; Salter-Jones, 2012; Tyson, Roberts & Kane, 2009). These suggestions are in line with a whole school approach to mental health promotion (Sisask et al., 2014).

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 Self-efficacy

Loreman, and Sharma (2014) conducted research to determine in changes in teaching efficacy, attitudes and concerns related to inclusive education. The research was conducted on a sample of 2361 in-service

teachers residing Hong Kong. The research findings indicated that self-efficacy, acceptance and concern were significant factors towards positive improvements in teaching and learning.

Poulou, Reddy and Dudek (2018) conducted research to determine relationship of teacher self-efficacy and classroom practices. The data was collected from 58 Greek teachers. The main objective of the research was to examine teacher' perceptions of self-efficacy and actual instructional and behavior management practices using the Classroom strategies assessment. The findings of the study revealed significant differences between teachers' self-reported self-efficacy and self-efficacy rating by observers.

Alexander, S. (2020)conducted research to ascertain teacher's self-efficacy beliefs about motivating students studying in elementary schools run by an NGO in various districts of Punjab. The data was collected through a multistage sampling technique from 400 teachers working in schools for ethnic and poor communities in 8 districts of Punjab. This result shows significant relationship among teacher's perception of self-efficacy to motivate students, capacity for self-motivation, and professional commitment for effective teaching. A strong positive correlation was found among teacher's self-efficacy beliefs to apply effective teaching strategies to enhance motivation among students. Therefore, school management must focus on the intrinsic motivation of teachers so that they can self-motivate themselves for effective teaching.

2.3 Studies related to Professional development

Macheng (2016) conducted research on junior secondary schools of Botswana. The research was conducted on fourteen (14) participants. The data was gathered by using survey questionnaires and interviews. The purpose of the research was to understand the importance of continuous professional development as a critical phenomenon to deal with the gaps in training of teachers from time and changes. The findings of the study indicated that lack of structures or programs in junior secondary schools facilitate teacher professional development and growth.

Kaur &Bhullar (2019) investigated the study is to develop an understanding of relationship between professional development and job satisfaction of teacher educators. A sample of 120 teacher educators from colleges of education with 50 teacher educators working in government and government aided colleges and 70 teacher educators working in private college was drawn from 12 randomly selected colleges of education of Punjab state. A significant positive relationship was found between professional development and job satisfaction of teacher educators working in both government and private sectors.

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. 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). On the other hand, low self-efficacy is related to more symptoms of stress, depression and anxiety. (Faure &Loxton, 2003; Kashdan& Roberts, 2004; Shnek, Irvine, Stewart, & Abbey, 2001).

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 self-efficacy of college teachers with respect to streams of study.
2. To investigate the significance of relationship between psychological well-being and professional development of college teachers with respect to streams of study.

5. Hypothesis

1. There exists no significant relationship between psychological well-being and self-efficacy of college teachers with respect to streams of study.
2. There exists no significant relationship between psychological well-being and professional development of college teachers with respect to streams of study.

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. Teacher Self Efficacy Scale developed by Shweta Sharma (2017).
3. Professional Development scale by Butia (2014).

Statistical Techniques

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

7. Result and discussion

Hypothesis 1

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

Correlation Analysis of Psychological Wellbeing and Self Efficacy with respect to Stream 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	0.74	.000	Sig at .05 level
	Self Efficacy		190.85	11.50			
Science Stream College Teachers	Psychological Wellbeing	300	173.07	22.26	0.87	.000	Sig at .05 level
	Self Efficacy		191.34	11.18			

Interpretation: The correlation analysis of Psychological Wellbeing and Self Efficacy of college teachers with respect to stream of study depicts a significant positive relationship between Psychological Wellbeing and Self Efficacy. For the Humanities stream of College Teachers, the 'r' value for the Correlation Analysis of Psychological Wellbeing with Self Efficacy is positive 0.74 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 Self Efficacy is positive 0.87 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 Self Efficacy of college teachers with respect to stream of study.

Hypothesis 2

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

Correlation Analysis of Psychological Wellbeing and professional development with respect to Stream 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	0.84	.000	Sig at .05 level
	Professional Development		216.79	24.19			
Science Stream College Teachers	Psychological Wellbeing	300	173.07	22.26	0.85	.000	Sig at .05 level
	Professional Development		217.01	23.11			

Interpretation: The correlation analysis of Psychological Wellbeing and Professional Development of college teachers with respect to stream of study depicts a significant positive relationship between Psychological Wellbeing and Professional Development with respect to stream of study. For the Humanities stream of College Teachers, the 'r' value for the Correlation Analysis of Psychological Wellbeing with Professional Development is positive 0.84 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 Professional Development is positive 0.85 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 Professional Development of college teachers with respect to stream of study.

Conclusion

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. It is essential that teachers have a balance between their life and work and therefore need to possess higher psychological well-being. 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.

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EXPLORING THE ATTITUDES OF INVESTORS TOWARD FINANCIAL INSTRUMENT INVESTMENT: AN EMPIRICAL ANALYSIS OF PUNJAB

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ABSTRACT

The research aims to understand how investors perceive investing in financial instruments in Punjab, India. It aims to examine the level of financial literacy among investors, raise awareness about investors' perception, explore the relationship between demographic and non-demographic factors and investment choices, and identify factors that influence investors' perception. The research is significant as it addresses issues such as terrorism, corruption, and police brutality that impact investments in Punjab and aims to provide insights for mitigating these issues and improving the well-being of affected individuals. This study uses a positivist philosophy and quantitative methods with surveys for data collection. Primary, Descriptive and inferential statistics are used for analysis. The design is descriptive and deductive, drawing on existing theories and research to formulate hypotheses. The statistics reveal that the variables have diverse ranges and distributions, with skewness and kurtosis values within acceptable ranges. They represent various aspects of investors in Punjab, India, providing insights for further analysis. In conclusion, the descriptive statistics highlight the characteristics and trends of surveyed investors in Punjab, India, providing valuable insights for further research and analysis in the field of investment behavior.

Keywords: *Empirical Analysis, Financial Instrument, Investors, Investment, Perception, Punjab.*

1. Introduction

In Punjab, a state located in northern India, there is a growing economy with diverse industries and a significant number of investors. Over time, there has been an increasing trend of individuals and institutions in Punjab investing their savings and funds into various financial instruments such as stocks, bonds, mutual funds, and other investment vehicles. Therefore, it is crucial to understand the perception of investors towards financial investment in Punjab, which serves as the motivation behind conducting an empirical analysis.

By conducting an empirical analysis of investors' perception towards financial investment in Punjab, researchers aim to gain insights into the factors that influence investment decisions and patterns in the region. This analysis involves examining the perceptions, preferences, and behaviors of investors, identifying the drivers and barriers to financial investment, assessing the level of risk tolerance, understanding the investment strategies adopted, and exploring the impact of demographic and non-demographic factors on investment decisions. Such knowledge can provide valuable inputs for policymakers, financial institutions, and investors themselves to make informed decisions, develop tailored investment products and services, and promote financial literacy and awareness among the population.

Financial investment plays a critical role in the economic development of Punjab and any region. It facilitates capital formation, mobilizes savings, channels funds into productive investments, creates employment opportunities, and fosters economic growth. Furthermore, financial investment provides individuals and institutions with avenues to generate income, build wealth, and achieve their financial goals. Therefore, understanding the perception of investors towards financial investment in Punjab is crucial in order to better understand the investment landscape, highlight the challenges and opportunities, and guide stakeholders in formulating effective strategies to promote a conducive investment environment, attract investments, and ensure sustainable economic growth in the region.

The main contribution of this study is to analyze the awareness level and factors are taken under consideration by various investors for investment in Punjab. To achieve this goal, we have conducted the primary research by preparing the questionaries and taking interviews of investors of Punjab. The sample size is taken under consideration is 600 and SPSS software is used for data analysis purposes. Further, primary, descriptive, and various statistical tests such as correlation coefficient, Cronbach's Alpha, regression, chi-

square, ANOVA, are performed in this study. The research finding of this study is summarized as follows.

- The study shows the results of a survey conducted on 600 respondents in Punjab, India. The survey collected data on various demographic and non-demographic factors, as well as the behavior and preferences of investors. The primary analysis shows the distribution of respondents based on gender, age, and profession. The gender distribution of the respondents is shown, with 52.2% male and 47.8% female respondents. The age distribution of the respondents is shown, with the highest frequency in the age group of 40-50 years (34.2%), followed by 30-40 years (33.2%) and 50-60 years (32.7%). Further, the profession distribution of the respondents is shown, with an equal distribution of 33.3% each for employees, professionals, and business class.
- The descriptive statistics show the mean, standard deviation, skewness, and kurtosis values for various factors related to investors' behavior and preferences. The skewness and kurtosis values indicate that the variables have normal distributions, with most of them falling within the range of -2 to +2 for skewness and -3 to +3 for kurtosis. The study analyzed a total of 600 valid responses.
- The statistical tests used in the study, such as Cronbach's Alpha, Regression, ANOVA, and Correlation, produced significant results. The study's variables have excellent internal consistency, which suggests reliability. According to regression analysis, investors' perspective and degree of awareness were significantly influenced by their level of financial literacy, investment behavior, and demographic and non-demographic characteristics. The results of the ANOVA revealed a substantial difference between the groups that the predictors represented. The results of the correlation test showed how important both demographic and non-demographic factors are.

The rest of the paper structure is as follows. Literature review is illustrated in Section 2. Section 3 defines the problem statement in which objectives, hypothesis, and scope of the study is defined. Section 4 gives a detailed description of research methodology is designed for conduct research. Section 5 shows the analysis and interpretation part in which primary, descriptive, and various statistical tests are performed to validate the investor perception towards investment in Punjab. Finally, conclusion and recommendation are defined in Section 6.

2. Literature Review

Financial instruments in Punjab encompass a variety of options, such as stocks, exchange-traded funds (ETFs), bonds, certificates of deposit (CDs), mutual funds, loans, and derivatives contracts (Polzin et al., 2019). These instruments are classified into cash instruments and derivative instruments, each serving a different purpose (Charfeddine et al., 2020).

Cash instruments are often utilized by state governments in Punjab to regulate fiscal deficits and receive subsidized tariffs, with a fiscal deficit of 61% reported in 2018-19 (Mitra, Balasubramanya & Brouwer, 2022). On the other hand, derivative instruments are used to improve the structure of underlying assets and influence investment decisions, providing opportunities for investors to manage risk and speculate on price movements (Kaur & Kaur, 2020; Bragg, 2018).

Financial instruments offer several beneficial aspects. They often come with relaxed terms compared to other financial products, making them more accessible to a wider group of people (Zauro et al., 2020). Financial instruments can also overcome inefficiencies in the financial market and provide financing to those with limited access to financial resources, leading to increased support for financial recipients (Peñasco et al., 2021).

Stocks and ETFs in Punjab provide opportunities for investors to hold and trade securities, offering potential for higher returns and diversification (Sharma & Kaur, 2019). Bonds and CDs offer fixed income investments, while mutual funds provide professional management and diversification. Derivatives contracts allow investors to hedge against risk or speculate on future price movements, and loans can be used for various

purposes (Mitra, Balasubramanya & Brouwer, 2022).

3. Problem Statement

The problem statement in Punjab regarding financial instruments pertains to optimizing the utilization of these instruments to achieve favorable financial outcomes for investors, state governments, and recipients. This involves addressing challenges such as fiscal deficits, limited access to financial resources, market inefficiencies, and informed investment decision-making. Punjab has faced fiscal deficits, necessitating effective management of cash instruments like bonds and CDs. Ensuring inclusive access to financial resources, addressing market inefficiencies, and facilitating informed investment decisions are critical challenges that need to be tackled to optimize the use of financial instruments in Punjab.

3.1 Objectives of the Study

In this section, the objective of the study is defined, as follows.

- To examine the financial literacy level among the investors.
- To study the awareness level of investors' perception regarding financial instruments".
- To examine the relationship between demographic, non-demographic factors and choice of financial instruments.
- To identify the factors that affects the perception of investors regarding financial instruments.

3.2 Hypothesis of the Study

This section shows the hypothesis are taken under consideration for conduct research. We have designed total five null/alternative hypothesis as follows.

Table 1: Hypothesis of the Study

Hypothesis	Null Hypothesis	Alternative Hypothesis
H_1	There is no significant level of financial literacy among the investors	There is a significant level of financial literacy among the investors
H_2	There is no significant relationship between the awareness level and investors' perception regarding financial instruments	There is no significant relationship between the awareness level and investors' perception regarding financial instruments
H_3	There is no significant relationship between the awareness level and investors' perception regarding financial instruments	There is a significant relationship between the awareness level and investors' perception regarding financial instruments
H_4	There is no relationship between demographic, non-demographic factors and choice of financial instrument	There is a relationship between demographic and non-demographic factors and the choice of financial instrument
H_5	Various factors do not affect the perception of investors	Various factors affect the perception of investors

3.3 Scope of the Study

In this study, the data is collected from the investors of the Punjab. The data is collected while considering investor perception, awareness level, and various demographic/non-demographic factors. Further, in this study, 600 investors of the Punjab are interviewed across the state of the Punjab.

4. Research Methodology

In this section, research methodology is explained which is designed for conduct research to achieve the desired objectives. To achieve this goal, following research methodology is adapted.

- **Type of Research**: In this paper, we have done the descriptive research in which we have collected the primary data of the investors of Punjab through survey method. To conduct survey, questionaries are prepared according to the desired objectives and google form is prepared.
- **Sample Method**: The sampling method is surveyed in this study is stratified random sampling method.
- **Sample Unit**: Sample unit defines the respondents are chosen for fill the questionaries. In this research, the

respondents are classified into three classes according to their profession such as employees, business persons, and other professionals.

- **Sample Size**: In this research, according to the Cochran formula, we have done the survey of 600 investors of the Punjab.
- **Data Collection**: Primary data collection method is used for collect data through the structured questionaries.

4.1 Limitation of the Study

In this section, the limitation of the study is explained.

- The study is conducted only for Punjab state.
- The sample size is restricted to 600 due to resources in terms of time and place.
- The study is conducted for check awareness level of investors and various factors of investment in Punjab.

5. Analysis and Interpretation

In this section, analysis and interpretation is explained for the primary questionaries are prepared for investors perception towards investment in Punjab. We have employed the Statistical Package for Social Sciences (SPSS) software for data analysis. Further, we have conducted primary, descriptive, and various statistical tests for accept/reject the designed hypothesis.

5.1 Primary Analysis

In this section, we have done the primary analysis of the investors based on the gender factor, age factor, and profession.

Table 2 shows that primary analysis based on the gender factor. The survey has been effectively considered taking respondents 600 here, the total female respondents are 287 and the total male respondents are 313.

Table 2 Primary Analysis based on Gender Factor

Gender	Frequency	Percent	Cumulative Percent
Male	313	52.2	52.2
Female	287	47.8	100
Total	600	100	

Table 3 shows that the primary analysis based on the age factor. It can be analysed that for the age group of 30-40, nearly 199 however, the age group of 40-50 is 205 have transformed the rates of frequency, and the 50-60 is 196.

Table 3 Primary Analysis based on Age Factor

Age Factor	Frequency	Percent	Cumulative Percent
30-40	199	33.2	33.2
40-50	205	34.2	67.3
50-60	196	32.7	100
Total	600	100	

Table 4 shows the primary analysis based on the profession factor. it has been noticed that the professions have been eventually segmented that can be included the 200 respondents' workers, 200 respondents' business, and 200 respondents professionals' class with analysed total respondents of 600.

Table 4 Primary Analysis based on Profession Factor

Profession Factor	Frequency	Percent	Cumulative Percent
Employees	200	33.3	33.3
Professional	200	33.3	66.7
Business class	200	33.3	100
Total	600	100	

5.2 Descriptive Test

Table 5 (a-b) shows the descriptive test is conducted for check various factors of investment of the investors.

The table 5(a) presents statistical data related to different factors related to investment and investor behavior. The data includes mean, standard deviation, skewness, and kurtosis for various factors, with a sample size of 600. The factors analyzed include demographic and non-demographic factors, various factors, behavior of investors, investment pattern, investment avenues, selecting an investment, reviewing investment portfolio, risk tolerance, diversified investment portfolio, and individual stocks/mutual funds. The data provides insights into the characteristics and distribution of these factors, which can be useful for understanding investment patterns and making informed investment decisions.

Table 5 (a) Descriptive Test

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Demographic and Non-Demographic Factor	600	1.25	0.434	1.147	0.1	-0.686	0.199
Various Factors	600	1.24	0.424	1.253	0.1	-0.431	0.199
Behavior of Investors	600	1.74	1.12	1.629	0.1	1.78	0.199
Investment Pattern	600	1.25	0.571	3.291	0.1	14.668	0.199
Investment Avenues	600	1.75	1.097	1.658	0.1	1.996	0.199
Selecting an Investment	600	2.02	0.814	-0.04	0.1	-1.489	0.199
Review Your Investment Portfolio	600	2	0.83	-0.003	0.1	-1.55	0.199
Risk Tolerance	600	2.07	0.812	-0.129	0.1	-1.473	0.199
Diversified Investment Portfolio	600	1.96	0.825	0.071	0.1	-1.529	0.199
Individual Stocks/ Mutual Funds	600	2.02	0.844	-0.041	0.1	-1.596	0.199

Table 5(b) presents descriptive statistics for various investment-related factors, including the decision to invest in a particular company, preferred investment time horizon, investing in socially responsible companies, income typically invested, confusing investment products, level of investment experience, investment strategy, control over investment portfolio, and fear of investment. The statistics include mean, standard deviation, skewness, and kurtosis, with a sample size of 600. The data provides insights into the characteristics and distribution of these factors, which can be useful for understanding investor preferences, behavior, and concerns related to investment decisions.

Table 5(b) Descriptive Test

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Decision to Invest in a Particular Company	600	2.02	0.834	-0.028	0.1	-1.563	0.199
Preferred Investment Time Horizon	600	2.04	0.843	-0.069	0.1	-1.589	0.199
Invest in Socially Responsible Companies	600	1.98	0.811	0.043	0.1	-1.477	0.199
Income do you typically Invest	600	2	0.816	-0.009	0.1	-1.499	0.199
Confusing Investment Product	600	1.95	0.821	0.096	0.1	-1.509	0.199

Level of Investment Experience	600	1.49	0.5	0.053	0.1	-2.004	0.199
Investment Strategy	600	1.93	0.793	0.125	0.1	-1.401	0.199
Control over your Investment Portfolio	600	2	0.834	0.009	0.1	-1.564	0.199
Fear of Investment	600	1.97	0.831	0.062	0.1	-1.549	0.199

5.3 Statistical Test

In this section, we have explained and analyzed the various statistical tests are performed to validate the desired objectives of this paper.

- **Correlation Coefficient Test:** The correlation coefficient is determined using Eq. (1).

$$r = (\Sigma(Xi - \bar{X})(Yi - \bar{Y})) / \sqrt{(\Sigma(Xi - \bar{X})^2)}\ \sqrt{(\Sigma(Yi - \bar{Y})^2)} \quad \text{----------(1)}$$

The correlation tests between financial literacy and various factors of investors were conducted and the results are presented in Tables 6 to 12. In Table 6, financial literacy showed a weak negative correlation with investors' perception and awareness level ($r = -.111$, $p < 0.01$) and a moderate negative correlation with demographic and non-demographic factors ($r = -.248$, $p < 0.001$), various factors ($r = -.140$, $p < 0.001$), and behavior of investors ($r = -.095$, $p < 0.05$). However, no significant correlation was found between financial literacy and investment pattern or investment avenues (Slaton *et al.* 2022).

Table 6 Correlation Test between Financial Literacy vs. other Factors of Investors

		Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues
Financial literacy	Pearson Correlation	1	-.111**	-.248**	-.140**	-.095*	-0.01	-.098*
	Sig. (2-tailed)		0.007	0	0.001	0.02	0.81	0.016
	N	600	600	600	600	600	600	600

In Table 7, investors' perception and awareness level showed weak negative correlations with financial literacy ($r = -.111$, $p < 0.01$) but strong positive correlations with demographic and non-demographic factors ($r = .785$, $p < 0.001$), various factors ($r = .642$, $p < 0.001$), behavior of investors ($r = .766$, $p < 0.001$), investment pattern ($r = .669$, $p < 0.001$), and investment avenues ($r = .747$, $p < 0.001$).

Table 7 Correlation Test between Investors Perception and Awareness Level vs. Other Factors of Investors

	Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues	Financial literacy
Investors perception and awareness level	Pearson Correlation	-.111**	1	.785**	.642**	.766**	.669**	.747**
	Sig. (2-tailed)	0.007		0	0	0	0	0
	N	600	600	600	600	600	600	600

Table 8 showed that demographic and non-demographic factors had strong positive correlations with financial literacy (r = .785, p < 0.001), various factors (r = .593, p < 0.001), behavior of investors (r = .800, p < 0.001), investment pattern (r = .594, p < 0.001), and investment avenues (r = .768, p < 0.001), but weak positive correlation with investors' perception and awareness level (r = .785, p < 0.001).

Table 8 Correlation Test between Demographic and Non-Demographic Factor vs. other Factors of Investors

	Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues	Financial literacy
Demographic and non demographic factor	Pearson Correlation	-.248**	.785**	1	.593**	.800**	.594**	.768**
	Sig. (2-tailed)	0	0		0	0	0	0
	N	600	600	600	600	600	600	600

In Table 9, various factors showed moderate positive correlations with financial literacy (r = -.140, p < 0.001), demographic and non-demographic factors (r = .593, p < 0.001), behavior of investors (r = .673, p < 0.001), investment pattern (r = .624, p < 0.001), and investment avenues (r = .632, p < 0.001), but strong positive correlation with investors' perception and awareness level (r = .642, p < 0.001).

Table 9 Correlation Test between Various Factors vs. other Factors of Investors

	Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues	Financial literacy
Various factors	Pearson Correlation	-.140**	.642**	.593**	1	.673**	.624**	.632**
	Sig. (2-tailed)	0.001	0	0		0	0	0
	N	600	600	600	600	600	600	600

Table 10 revealed that behavior of investors had weak negative correlation with financial literacy (r = -.095, p < 0.05), but strong positive correlations with investors' perception and awareness level (r = .766, p < 0.001), demographic and non-demographic factors (r = .800, p < 0.001), various factors (r = .673, p < 0.001), investment pattern (r = .687, p < 0.001), and investment avenues (r = .888, p < 0.001).

Table 10 Correlation Test between Behavior of Investors vs. other Factors of Investors

	Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues	Financial literacy
Behavior of investors	Pearson Correlation	-.095*	.766**	.800**	.673**	1	.687**	.888**
	Sig. (2-tailed)	0.02	0	0	0		0	0
	N	600	600	600	600	600	600	600

In Table 11, investment pattern showed no significant correlation with financial literacy, but had strong positive correlations with investors' perception and awareness level ($r = .747$, $p < 0.001$), demographic and non-demographic factors ($r = .768$, $p < 0.001$), various factors ($r = .624$, $p < 0.001$), behavior of investors ($r = .687$, $p < 0.001$), and investment avenues ($r = .639$, $p < 0.001$).

Table 11 Correlation Test between Investment Pattern vs. other Factors of Investors

	Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues	Financial literacy
Investment pattern	Pearson Correlation	-0.01	.669**	.594**	.624**	.687**	1	.639**
	Sig. (2-tailed)	0.81	0	0	0	0		0
	N	600	600	600	600	600	600	600

Finally, in Table 12, investment avenues had weak negative correlation with financial literacy ($r = -.098$, $p < 0.05$), but strong positive correlations with investors' perception and awareness level ($r = .747$, $p < 0.001$), demographic and non-demographic factors ($r = .768$, $p < 0.001$), various factors ($r = .632$, $p < 0.001$), behavior of investors ($r = .888$, $p < 0.001$), and investment pattern ($r = .639$, $p < 0.001$).

Table 12 Correlation Test between Investment Avenues vs. other Factors of Investors

	Financial literacy	Investors perception and awareness level	Demographic and non demographic factor	Various factors	Behavior of investors	Investment pattern	Investment avenues	Financial literacy
Investment avenues	Pearson Correlation	-.098*	.747**	.768**	.632**	.888**	.639**	1
	Sig. (2-tailed)	0.016	0	0	0	0	0	
	N	600	600	600	600	600	600	600

To summarize, the correlation tests revealed that financial literacy had weak negative correlations with investors' perception and awareness level, demographic and non-demographic factors, various factors, and behavior of investors (Schimmack, 2021). However, no significant correlation was found between financial literacy and investment pattern or investment avenues. On the other hand, investors' perception and awareness level, demographic and non-demographic factors, various factors, behavior of investors, investment pattern, and investment avenues showed strong positive correlations with each other, indicating a significant relationship.

- **Cronbach's Alpha:** Cronbach's alpha is a statistical measure used to assess the internal consistency or reliability of a scale or questionnaire. It indicates the extent to which items in a scale or questionnaire are correlated with each other, and thus, provides an estimate of the overall reliability or consistency of the scale. The formula for calculating Cronbach's alpha is as follows:

$$\alpha = (k / (k-1)) * (1 - (\Sigma(si^2) / s^2)) \text{ ------(2)}$$

Where: α is Cronbach's alpha, k is the number of items in the scale, si^2 is the variance of the scores of the individual items, s^2 is the variance of the total scores of all items Cronbach's alpha ranges from 0 to 1, with higher values indicating higher internal consistency or reliability of the scale. A common rule of thumb is that a Cronbach's alpha value of 0.7 or higher is considered acceptable, although the threshold may vary depending on the field of research or the purpose of the scale (Schrepp, 2020).

In Table 13, the case processing summary indicates that there were 600 valid cases, accounting for 100% of the total cases. No cases were excluded based on listwise deletion, which involves removing cases with any missing values in any of the variables used in

the procedure. The reliability statistics show that Cronbach's alpha for the scale was calculated to be 0.809, with a total of 10 items included in the analysis. This suggests that the scale has a reasonably high level of internal consistency or reliability, as the alpha value exceeds the commonly accepted threshold of 0.7 (Adeniran, 2019). Therefore, the findings indicate that the scale used in the study is likely to be reliable for measuring the construct of interest.

Table 13 Cronbach's Alpha Test

Case Processing Summary			
		N	%
Cases	Valid	600	100
	Excluded[a]	0	0
	Total	600	100
a. Listwise deletion based on all variables in the procedure.			
Reliability Statistics			
Cronbach's Alpha	N of Items		
0.809	10		

- **Chi-Square Test:** The Chi-Square test is a statistical test used to determine if there is a significant association between two categorical variables in a contingency table (Turhan, 2020). It is based on the difference between the expected and observed frequencies in each cell of the table. The equation for the Chi-Square test statistic is:

$$\chi^2 = \Sigma [(O - E)^2 / E] \text{ --------(3)}$$

Where: χ^2 = Chi-Square test statistic, O = Observed frequency in each cell, E = Expected frequency in each cell (calculated based on the assumption of independence between the variables)

Phi coefficient (φ) and Cramer's V (V) values cannot be exactly 0 in a Chi-Square test. Phi ranges from -1 to 1 for 2x2 tables, with 0 indicating no association, -1 a perfect negative association, and 1 a perfect positive association. Cramer's V, used for larger tables, ranges from 0 to 1, with 0 indicating no association and 1 a perfect association (Kim, 2019). A value of 0.785 would indicate a strong association, suggesting a significant relationship between the variables being analyzed using Chi-Square, with interpretation depending on context.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	370.193[a]	1	.000		
Continuity Correction[b]	365.788	1	.000		
Likelihood Ratio	347.889	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	369.576	1	.000		
N of Valid Cases	600				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 32.21.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.785	.000
	Cramer's V	.785	.000
N of Valid Cases		600	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Figure 1 Chi-Square Test

- **Regression Test:** Regression analysis is a statistical method used to examine the relationship between one dependent variable and one or more independent variables. It seeks to model the relationship between the dependent variable and the independent variables by estimating the coefficients of the independent variables in the regression equation (Hasnain *et al.* 2021). The formula for a simple linear regression equation is as follows:

$$Y = \beta 0 + \beta 1 * X + \varepsilon \text{ --------(4)}$$

Where: Y is the dependent variable, β0 is the intercept or constant term, β1 is the coefficient of the independent variable X, X is the independent variable, ε is the error term or residual

Table 14 Model Summary of the Regression Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.836[a]	0.699	0.697	0.226
a. Predictors: (Constant), Financial literacy , Investment pattern , Various factors , Demographic and non demographic factor				

In Table 14, the model summary provides an overview of the regression model. The R value represents the correlation coefficient, indicating the strength and direction of the relationship between the dependent variable and the independent variables. The R square value indicates the proportion of the variance in the dependent variable that can be explained by the independent variables, with higher values indicating better goodness of fit. The adjusted R square value is a modified version of R square that accounts for the number of predictors in the model (Qasim *et al.* 2021). The standard error of the estimate represents the standard deviation of the residuals, providing a measure of the accuracy of the model in predicting the dependent variable.

Figure 2 depicts the regression test results, which may include scatter plots, regression lines, or other visual representations of the relationship between the dependent and independent variables. Figure 3 displays the goodness of fit table, which may contain additional statistics such as F values, p-values, and degrees of freedom to assess the overall goodness of fit of the model. Figure 4 shows the pseudo R-square value, which is an alternative measure of goodness of fit that varies depending on the specific regression model used.

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	401.604			
Final	109.405	292.199	16	.000

Figure 2 Regression Test

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	132.219	22	.000
Deviance	94.290	22	.000

Figure 3 Goodness of Fit Table

Pseudo R-Square

Cox and Snell	.386
Nagelkerke	.667
McFadden	.565

Figure 4 Pseudo R-Square

The findings from the regression test in the given tables and figures would need to be interpreted in the context of the specific research question or hypothesis being tested, and any relevant conclusions or implications should be drawn based on the results obtained.

- **ANOVA Test:** ANOVA (Analysis of Variance) is a statistical test used to compare means among three or more groups to determine if there are significant differences. It examines whether there is enough evidence to reject the null hypothesis, which states that

there are no differences among the groups (Liu and Wang, 2021). The ANOVA equation calculates the sum of squares, degrees of freedom, mean squares, F-value, and significance level (p-value) to assess the statistical significance of the results.

In Table 15, the ANOVA test results are presented. The "Model" column provides information about the sources of variation, including the regression (explained) and residual (unexplained) sums of squares. The "df" column represents the degrees of freedom for each source of variation, while the "Mean Square" column shows the ratio of the sum of squares to the degrees of freedom (Frossard and Renaud, 2021). The "F" column displays the F-value, which is calculated as the ratio of the mean squares of the regression and residual, and the "Sig." column represents the significance level (p-value) of the F-value.

Table 15 ANOVA Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	70.347	4	17.587	344.829	.000[b]
	Residual	30.346	595	0.051		
	Total	100.693	599			
a. Dependent Variable: Investors perception and awareness level						
b. Predictors: (Constant), Financial literacy , Investment pattern , Various factors , Demographic and non demographic factor						

The findings from Table 15 suggest that the regression model, with predictors such as financial literacy, investment pattern, and demographic/non-demographic factors, has a statistically significant effect on the dependent variable "Investors perception and awareness level" as evidenced by the low p-value ($p < 0.001$). This indicates that there are significant differences among the groups represented by the predictors.

Table 16 presents the results of the correlation test, showing the unstandardized coefficients, standardized coefficients (Beta), t-values, and significance levels (p-values) for each predictor in the regression model. The "B" column displays the unstandardized coefficients, which represent the estimated effect of each predictor on the dependent variable. The "Std. Error" column provides the standard error of the estimate for each coefficient, while the "Beta" column presents the standardized coefficients, which allow for comparison of the relative strength of the predictors (Johnson, 2022). The "t" column displays the t-values, which are calculated as the ratio of the coefficient to its standard error, and the "Sig." column represents the significance level (p-value) of the t-values.

Table 16 Correlation Test in the Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.071	0.049		1.434	0.152
	Demographic and Non-Demographic factor	0.529	0.029	0.56	18.074	0
	Various Factors	0.169	0.03	0.175	5.678	0
	Investment Pattern	0.16	0.022	0.228	7.247	0
	Financial Literacy	0.063	0.027	0.055	2.333	0.02
a. Dependent Variable: Investors perception and awareness level						

The findings from Table 16 indicate that the demographic and non-demographic factors have the highest standardized coefficient (Beta = 0.56), followed by various factors (Beta = 0.175), investment pattern (Beta = 0.228), and financial literacy (Beta = 0.055). These standardized coefficients suggest that demographic and non-demographic factors have the strongest impact on the dependent variable, while financial literacy has a relatively weaker impact. The significance levels (p-values) for all predictors are below 0.05, indicating that all predictors are

statistically significant in their effects on the dependent variable.

6. Conclusion and Recommendation

The study's statistical tests, including Cronbach's Alpha, Regression, ANOVA, and Correlation, revealed important findings. The variables used in the study showed high internal consistency, indicating reliability. Regression analysis indicated that financial literacy, investment pattern, and demographic/non-demographic factors significantly influenced investors' perception and awareness level. ANOVA results showed significant differences among the groups represented by the predictors. Correlation test highlighted the strong impact of demographic and non-demographic factors. Based on these findings, recommendations include enhancing financial literacy, considering demographic and non-demographic factors, monitoring investment patterns, and conducting further research. These insights can guide policymakers, financial institutions, and practitioners in improving investors' decision-making processes.

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A CASE STUDY ON THE BIOGRAPHICAL PROFILE OF SHRI RAJENDER KUMAR- AN ARJUNA AWARDEE

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ABSTRACT

The case study of Wrestler Shri Rajender Kumar was examined using historical, biographical, and analytical methods. The data was collected through various sources including couplet literature, surveys, and interviews. By utilizing these techniques, a case study was created that analyzed his qualities as a player, his skillful characteristics, his managerial expertise, and his contribution to wrestling at the highest level. The study found that Shri Rajender Kumar is a dedicated and sincere athlete who has made significant contributions to the promotion of wrestling in India. He is also known for his friendly and cooperative demeanor, as well as his commitment to daily exercise. Shri Rajender Kumar's remarkable patience and perseverance has earned him a great deal of respect and popularity among his colleagues. Additionally, his impressive achievements at both the national and international levels were presented in the study. Overall, Shri Rajender Kumar's profile as an Arjuna Awardee is a testament to his talent, hard work, and dedication to the sport of wrestling.

Introduction

A case study is a comprehensive examination of a specific case or cases within a real-world setting. This approach is commonly used in various fields, such as medicine, business, and politics, to delve into specific subjects, such as individual patients, firm strategies, or political campaigns. A case study can cover a wide range of topics, including individuals, groups, organizations, events, belief systems, or actions. It is not limited to one observation, as it can include multiple observations of individuals or entities across different time periods within the same study. A study with numerous cases is referred to as cross-case research, while a study with a single case is known as within-case research.

There are many variations of case studies, which can vary based on the number of participants (often a small number), the type of approach (qualitative), the extent of analysis (a comprehensive examination of a phenomenon and its context), and the realism (examining a "real-life" setting). Scholars generally agree that a case study does not necessarily need to involve only one participant (N = 1), but can involve multiple participants within a single case or across several cases.

Established in 1961 to recognize exceptional athletes in India, the award has undergone various changes and updates over the years. In 1977, the award was expanded to include all recognized sports, and in 1995, categories were added for indigenous games and physically handicapped athletes. A lifetime contribution category was introduced in 1995, which led to the creation of the Dhyan Chand Award in 2002. In 2018, the award criteria were revised to include only sports recognized in major multi-sport events, such as the Olympic Games, Paralympic Games, Asian Games, Commonwealth Games, World Championship, World Cup, cricket, indigenous games, and para sports. Additionally, the award is now limited to fifteen recipients per year, though exceptions may be made for outstanding performance in major events, team sports, and across genders. Finally, at least one award must be given to a physically challenged athlete.

While professional wrestling became less serious during the 20th century, amateur wrestling made significant progress during the same period. In the early days of wrestling, there were no weight classes (only heavyweight was recognized in the first Olympic Games), but amateur wrestling later developed weight divisions (for details, see freestyle wrestling). Previously, wrestling matches were continuous and contested until one or two of three falls, with or without a time limit. However, in 1967, international amateur wrestling was limited to three three-minute rounds.

The development of a point system in amateur wrestling proved to be a significant improvement, as it virtually eliminated the possibility of draw matches. The need for this system arose from the limited range of moves in Greco-Roman wrestling, which restricted

holds to above the waist and prohibited the use of legs. This made matches dull once the wrestlers were on the mat, as demonstrated in the 1912 Olympic Games when two Finnish Greco-Roman wrestlers battled for six hours with no decision. In response, American colleges introduced the idea of recording the length of time each wrestler was in control of the contest during a bout. The National Collegiate Athletic Association adopted the collegiate style of wrestling in 1928 as a national sport, leading to the formulation of a set of point awards to keep a running score during a bout. Similar to international freestyle and Greco-Roman bouts, these rules and judging systems include awarding points for reversing control, applying a pinning hold, and putting an opponent in danger of being pinned. The running point score and the difference in control time are used to determine the victor in no-fall bouts. The collegiate style of wrestling gained popularity in high schools and colleges in the United States after World War II.

During the 20th century, a new international wrestling style known as sambo was developed. This form of jacket wrestling was created by Anatoly Kharlampiev and other researchers who studied various traditional wrestling styles. Sambo quickly gained popularity in the Soviet Union, Bulgaria, and Japan, and was eventually recognized on an international level in 1964. In sambo, a wrestler wins by throwing their opponent cleanly on their back, or by causing them to submit once the bout goes to the mat. Similar to judo and Mongolian wrestling, bouts in sambo consist of three three-minute rounds.

The scholar conducting the research believes that to excel in sports, the country requires capable and devoted professionals such as Shri Rajender Kumar as leaders. The aim of this research project was to underscore the qualities of Shri Rajender Kumar, which can guide individuals involved in sports. He is an exemplar whose actions can encourage and drive athletes to strive harder. Shri Rajender Kumar's unwavering commitment, diligence, sincerity, and punctuality towards sports enabled him to sustain his performance at the international level over an extended period as he participated in numerous national and international events.

Objectives of the Study

The proposed study aims to achieve the following objectives:

- To analyze the factors that influenced his personality as a player.
- To examine the impact of his childhood, birthplace, and education on his performance.
- To document the awards and recognitions bestowed upon him at different points in time

Procedure and Methodology

To ensure reliable and accurate data for the research on Wrestler Shri Rajender Kumar, an integrated approach was utilized. This involved utilizing historical, biographical, and analytical methods, as well as data from couplet literature, surveys, and interviews. A case study was conducted using a biographical approach to analyze his performance as a player, taking into account his unique skills, leadership abilities, and contributions to wrestling at the highest level.

Results and Discussions

Family Background

The villages in Kurukshetra district have gained popularity for their wrestling culture due to their fertile soil, pleasant climate and abundant dairy products such as milk, ghee, and curds. This has resulted in the local youth being healthy and active, engaging themselves in physical activities such as wrestling. Shri Rajender Kumar, a well-known wrestler, hails from the village of Umri, located in the Thanesar Tehsil of Kurukshetra district. The background of the subject plays a significant role in shaping his formative years. Shri Rajender Kumar was born on October 25, 1985, the third child of Shri Daya Ram, a farmer, and Smt. Kamlesh, a homemaker. He grew up in a wrestling-oriented community and showed a keen interest in wrestling from an early age. Despite being active and naughty, he did not display a strong inclination towards academic studies as a young boy.

The subject acknowledges that his family had modest means during his early years, but he now considers his socio-economic status to have improved. He credits his family for

providing significant support and encouragement during his early days as a wrestler, as well as after he achieved a certain level of success. However, he did experience financial difficulties in the initial stages of his wrestling career. During his school days, he actively participated in wrestling and other outdoor activities, thanks in part to the influence of his friends, seniors, and coach. According to his friends, the subject possesses a positive, optimistic, and tenacious attitude, with a strong determination to win and persevere through any obstacles.

The subject has embraced sports and wrestling as a profession and a challenge, and has overcome difficult circumstances through hard work, dedication, and support from family and friends. Shri Rajender Kumar's father, Shri Daya Ram, a farmer, played an important role in supporting and motivating him in wrestling. Similarly, his mother, Smt. Kamlesh, despite being uneducated, instilled important values in all her children, including Shri Rajender Kumar, and contributed significantly to his success. She was emotionally and physically strong and had a calm temperament. The family belongs to the Hindu religion and are of the Jat caste.

Educational Background

Umri, located in the Kurukshetra district of Haryana state, is predominantly Hindi and Haryanvi speaking. During the time of Shri Rajender Kumar's childhood, English medium schools were rare in the area, and Hindi was the language of instruction for most students. However, Shri Rajender Kumar was admitted to an English medium private school called Holy Heart Model School until the 5th grade, where he was one of 250 students. The teachers at the school were dedicated and took a great interest in teaching their students, including physical education teachers and senior students with an interest in sports, particularly wrestling. The teachers encouraged Shri Rajender Kumar's interest in wrestling, and were proud of his achievements in the sport. Later, he was enrolled in a Gurukul near KUK University until the 8th grade, after which he returned to his village and completed the 9th and 10th grades there. Finally, he completed his 11th and 12th grades from HissarJat School. After completing his schooling, he pursued higher education (BA) from Kurukshetra University Campus. He is proficient in both Hindi and Haryanvi languages, and still values the teachings he received during his childhood. Through his rich experience, he has acquired extensive knowledge about various subjects.

Details of School and College

- Name of the school: Holy Heart Model School
- Place of school: Near Umri Village
- Medium of Study: English
- Duration in the school: Till 5th Class
- Name of the school: Gurukul
- Place of school: Near KUK Campus
- Medium of Study: Hindi
- Duration in the school: 5th to 8th class
- Name of the school: Village Government School
- Place of school: Umri Village
- Medium of Study: Hindi
- Duration in the school: 9th& 10th class
- Name of the school: HissarJat School
- Place of school: Hissar
- Medium of Study: English
- Duration in the school: 11th and 12th class
- Higher Education – BA (Graduation)
- University - KUK

Table No. 1: Achivements Of Shri Rajender Kumar

S. No.	Championship	Place	Year	Medal	Weight Category
1	Asian Championship	Bishkek	2018	Bronze	55 Kg
2	Asian Championship	New Delhi	2010	Silver	55 Kg
3	Commonwealth Games	New Delhi	2010	Gold	55 Kg
4	Commonwealth Championship	Brakpan	2017	Gold	55 Kg
5	Commonwealth Championship	Melbourne	2011	Gold	55 Kg
6	Commonwealth Championship	Jalandhar	2009	Gold	55 Kg
7	Commonwealth Championship	Johannesburg	2004	Silver	55 Kg
8	South Asian Games	Islamabad	2004	Gold	60 Kg

Conclusions

Based on the findings of the current study, the following conclusions can be drawn:

- Shri Rajender Kumar, who has been awarded the prestigious Arjuna Award, is an exceptional wrestler. He is dedicated and passionate about his profession and is committed to achieving his goals.
- Shri Rajender Kumar is an honest and sincere individual who takes his assignments seriously. He has contributed significantly to the promotion of wrestling in India and has been instrumental in popularizing the sport.
- Shri Rajender Kumar is friendly, cooperative, and disciplined in his daily exercise routine. He is known for his extraordinary patience and perseverance and is highly regarded by his peers in the wrestling community.

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ICT: AN NEW OPPORTUNITY TO ENHANCE EDUCATION SECTOR

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Introduction

Teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and much of it is available to students as well as teachers at the same time As new concepts of learning have evolved, teachers are expected to facilitate learning and make it meaningful to individual learners rather than just to provide knowledge and skills. Recent developments of innovative technologies have provided new possibilities to teaching profession but at the same time have placed more demands on teachers to learn how to use these technologies in their teaching. Through use of multimedia in education the education is more joyful then before.

Hypothesis

ICT help to make teaching learning process more effective. ICT Helps teaching learning process easy.

Research Methodology

Research Methodology is based on the primary and secondary data. Primary data are collected directly by interacting the respondents (teacher& students) , opinion from experts are also consider before final conclusion and most of the secondary data are collected from newspapers, magazine, books and website.

Role of ICT in the Curriculum

One can generally differentiate three distinctive roles for ICT in the curriculum

- Learning about ICT: ICT as a subject of learning in the curriculum, such as computer literacy, computer sciences and informationliteracy.
- Learning with ICT: The use of various computer capabilities such as computation multimedia, internet or World Wide Web (WWW) as a medium to enhance instruction or as a replacement for other media without changing beliefs about the approach to and the methods of teaching andlearning.
- Learning through ICT: Here ICT is integrated so completely as essential tool in a course/curriculum that the teaching and learning of that course/curriculum is no longer possible withoutit.

Impact of ICT on Teacher-Educators And Student Teachers

1. ICT provide gateway to world of information and enables teachers to be updated.
2 It is helpful to professional in the field of educationby usingtechnology
3. It is also effective implementation of certain student - centric methodologiessuch as project -based learning which puts the students in the role ofactiveresearches and technology becomes the appropriate tool.
4. Effective tool for information acquiring - thus studentsareencouraged to look for information from multiple sources and they are now more informed then before.
5. ICT enabled better and swifter communication, presentation of ideas is more effective andrelevant.

What about learning with computers and the Internet?

- Learning with the technology means focusing on how the technology can be the means tolearning ends across the curriculum. It includes:
- Presentation, demonstration, and the manipulation of data using productivitytools
- Use of curriculum-specific applications types such as educational games, drill and practice, simulations, tutorials, virtual laboratories, visualizations and graphical representations of abstract concepts, musical composition, and expertsystems

How can ICT help expand access toeducation?

ICT are potentially powerful tools for extending educational opportunities, both formal and informal, to previously underserved

constituencies-scattered and rural populations, groups traditionally excluded from education due to any reason or person with disabilities as well as all others who for reason of cost or because of time constraints are unable to enroll on campus.

Conclusion

On the basis of above discussion and taking into consideration of hypothesis near about 50 students and 50 teachers in different stream in Nagpur (M.S.) India are interacted and ask question regarding the use of ICT in teaching learning process out of 50 students 32 say ICT helps learning easy, and out of 50 teacher 29 teachers says ICT helps teaching learning process more effective. On the basis of above interaction researcher conclude that with the use of ICT in teaching learning process, the teaching-learning process is easy and effective.

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SELF-EFFICACY AMONG ADOLESCENTS IN RELATION TO SOCIAL COMPETENCE

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ABSTRACT

Present study was undertaken to investigate the relationship between self-efficacy 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 Self-efficacy scale (SES) by Bhatnagar and Mathur (2012) and the Social Competence Scale (SCS) by Sharma, Shukla and Shukla (2012). The result of the study revealed that value of r= 0.474. This implies that adolescents who exhibit higher levels of self-efficacy typically have higher social competence. The findings of this study suggests that Individuals with high self-efficacy look at difficulties as challenges rather than threats, they tend to be more intrinsically interested in the tasks they pursue, which increase the accomplishments and success rate of the teens automatically. Thus, to study the level of social competency among adolescents, self-efficacy is an essential variable to measure.

Keywords: *Self-Efficacy, Social Competence, Adolescents*

Introduction

Life is a journey characterized by several distinct and unique stages beginning with conception and ending at death. Among these stages, the most crucial and critical stage is ‘Adolescence’. In this stage, the complex human mind gets activated and energized by countless and continuous psychosocial, emotional and environmental characteristic features. During the adolescent period the contribution of these factors becomes imminent for the speedy and swift growth of the human potentialities. A comprehensive and holistic growth of all these aspects triggers appropriate and adequate human behaviors. But, due to some biological or natural factors along with situational or man-made factors, there comes a variation in each individual, which naturally elicits differences in social performance of the adolescents in society. The word of “competence” comes from the Latin word "competent", which can be translated as "one who has the right to judge”, respectively," the one who has the right to speak”. Social competence is a set of component skills or procedures applied conditionally. These might include perception of relevant social cues, interpretation of social cues, realistic anticipation of obstacles to personally desired behavior, anticipation of consequences of behavior for self and others, generation of effective solution to interpersonal problems, translation of social decisions into effective social behaviors and the expression of a positive sense of self efficacy. Today, psychologists contend that our sense of self-efficacy can influence whether we actually succeed at a task. Thus, self-efficacy is a personal belief in one's capability to organize and execute courses of action required to attain designated types of performances. For example, a student who feels confident that she/he will be able to learn the information and do well on a test. Self-efficacy can play an important role in health psychology and how people manage their health, nutrition, and illness. Because individuals with high self-efficacy look at difficulties as challenges rather than threats, they tend to be more intrinsically interested in the tasks they pursue. Perceived self-efficacy is concerned with people’s beliefs in their ability to influence events that affect their lives. This core belief is the foundation of human motivation, performance accomplishments, and emotional well-being (Bandura, 1997, 2006). Unless people believe they can produce desired effects by their actions, they have little incentive to undertake activities or to persevere in the face of difficulties. Whatever other factors may serve as guides and motivators; they are rooted in the core belief that one can make a difference by one’s actions.

Review Of Related Literature

Eid (2012) conducted a study and found that the presence of a positive correlation between expectations of self-efficacy and social skills.

Hamed (2012) examined a study and revealed that the strongest relationships were found among the self-efficacy and social competence over time.

Erozkan (2013) administered a study and revealed that there is positive effect of social skills training on increase of self-efficacy.

Hughes, Galbraith and White (2014) examined a study on perceived competence: a common core for self-efficacy and self-concept. Results indicated that the underlying structure of self-efficacy and competency related self-concept is hierarchical. Since distinct competencies were measured in self-concept thus, social competence is reflected and made up of different combinations and levels of self-efficacy.

Mehsin (2017) performed a study on self-efficacy and its relationship with social skills and the quality of decision-making among the students. Results of the study showed a statistically significant positive relationship in social skills, self-efficacy and their impact on decision-making.

Objective

To examine the correlation between self-efficacy and social competence among adolescents.

Hypothesis

There is a positive significant correlation between self-efficacy 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. **Self-efficacy scale (SES) by Bhatnagar and Mathur (2012)** measures the standardized items in eight dimensions: i) Self-regulatory ii) Self-influence iii) Self-confidence iv) Self-evaluation v) Self- achievement vi) Self-esteem vii) Self-cognition viii) Self.
2. **Social Competency scale (SCS) by V.P Sharma, Prabha Shukla and Kiran Shukla (2012)** includes standardized items in five areas: i) Pro-social attitude ii) Social competition iii) Social leadership iv) Social tolerance v) Social maturity.

Results

To investigate the relationship between Self-Efficacy and Social Competence of adolescents Pearson's coefficient of correlation was worked out and the value is given in following table:

Table 1: Relationship between Self-efficacy and Social Competence of Adolescents

Respondents	N	R
Total sample	720	0.474*

***Significant at 0.01level of confidence**

Table 1 represents coefficient of correlation between Self-Efficacy and Social Competence among adolescents. The value of coefficient of correlation came out to be 0.474 which is significant at 0.01 level of confidence. Thus, it can be said that there exists positive correlation between Self-Efficacy and Social Competence among adolescents. Hence, the hypothesis H stating that "there would be a positive significant relationship between Self-Efficacy and Social Competence among adolescents" is accepted.

The study's findings suggest that increase in self-efficacy among adolescents will aid in social competence in them. This conclusion is consistent with those made by Eid (2012), Hamed (2012), Erozkan (2013), Hughes, Galbraith and White (2014), Mehsin (2017) in their respective research.

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SOCIAL MEDIA ADDICTION, SOCIAL NETWORKING ADDICTION, EMOTIONAL COMPETENCEAND HAPPINESS AS PREDICTORS OF AGGRESSION AMONG ADOLESCENTS

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ABSTRACT

Aggression is on the rise due to multifaceted reasons such as, stress, pressure to find one's identity in the world of social media, insecurities, jealousies and unhappiness in general. The upcoming generation is more vulnerable to aggression due to social media exposure. Keeping in mind, the urgent need to have in-depth cure for aggressive tendencies for adolescents, the present study was envisaged. In the study predictors and correlates of aggression are investigated using pearson product moment correlation and stepwise multiple regression analysis (N=100). Aggression was studied in relation to social networking addiction, social media addiction, emotional competence and happiness among young adolescents. The results revealed a significant and positive relationship between aggression and some dimensions of social networking addiction and social media addiction scales. Negative relationship was found between aggression and empathy aspect of emotional competence. The findings have implications for adolescent psychology, personality psychology and developmental psychology. Intervention programmes must be developed that help the youth cope with their addictions and aggressive behaviours.

***Keyword**: aggression, social media, social networking, addiction, happiness, emotional competence*

Introduction

Aggression as the layperson knows of is the act of inflicting harm to another person physically, emotionally or mentally. Over the years, the concept of aggression has evolved from being considered as just a physical act to also being indirectly violent through words and intentions (Guler,Oztay & Ockocak, 2021) . For one to be aggressive, physical violence is not necessary. Even acts of backbiting someone, gossiping, wanting someone's goals to be obstructed or taking revenge are considered to be acts of aggression. Studies have found that males are more physically aggressive while females are more verbally aggressive. Moreover, females are conditioned to believe that aggression is a manly trait (Anderson & Huesmann, 2003).

There are several theories that explain why one gets aggressive. According to the instinct theory, human beings are programmed to be aggressive for their self-defence. Freud believed that aggression stems from a powerful death instinct, also termed as Thanatos in which one desires an end or death of someone. According to evolutionary socio-biologists, we are wired to have aggressive thoughts in order to let our genetic pool become more prevalent and wide spread. Being aggressive served a purpose to our ancestors, so that they could become capable of hunting and surviving (Buss & Perry, 1992).

Frustration aggression hypothesis says that frustration, which is defined as the blockage between you and your goals can be the biggest cause of aggression. However, this is not always the case as sometimes frustration leads to depression instead of aggression. Both affective states have opposite characteristics. Social learning theorists adopt the view that aggression is largely learned through imitation learning, observation and role modelling. If one's parents are aggressive, the child finds it normal to inculcate aggression.

As per Zillman's excitation transfer theory arousal instigated in one situation can be transferred to another situation. Instead of channelizing one's aggressive tendency appropriately, sometimes the individuals can displace anger at the wrong person, object or in the wrong situation. Overall every theory has its own implications and is valid contextually.

Types of aggression

Psychologists have studied the following types of aggression (Yamasaki & Nishida, 2009):

Physical – includes hitting, slapping, punching or acts that cause physical pain or hurt to the victim.

Verbal – includes shouting, swearing, insulting, sarcastic and pinching remarks that cause personal distress and emotional harm to someone.

Relational - damaging another person's reputation through backbiting, manipulating, gossiping and bullying or circulating malicious rumors.

Hostile – emotional and reactive acts with the intention to hurt someone or destroy an object.

Instrumental – it is an act of aggression in order to save oneself from being attacked.

Passive – indirect expressions of coldness, silent treatment, snide remarks, or ghosting.

Review of Literature

Specially, the outbreak of coronavirus also brought huge mental health damage to teens and adolescents who stayed home. In order to overcome boredom proneness, they resorted to social media and social networking sites (Midha & Kanwar, 2021).

Being sensitive and psychologically less immune to illness, they developed series of anxiety related behaviours, depression and addictions. Studies have found that internet and social media overuse was strongly associated with aggression in adolescents. This is because internet provides confidentiality and anonymity which allows aggressive behaviour go unnoticed. Further, while using social media obsessively, the user loses self- awareness which is why controlling one's aggressive and impulsive behaviours becomes a challenge (Dhaka & Naris, 2019). Using social media for stress relief and excitement brings other problems of low emotional intelligence, impulsivity and lack of empathy (Wong et al., 2020). Sensation seeking tendencies on social networking sites can also cause aggressive behaviours.

Studies have also found that in some cases adolescents use social networking and social media addiction as a way of expressing their hidden suppressed anger at home or in relationships with friends or teachers at school. Such children use social media as an emotional outlet for their unhappy and dissatisfied circumstances (Wong, Yanagida, Spiel & Graf, 2021). Aggression is an internalising or externalising behaviour problem that can arise from social networking and social media addiction. It can soon be converted into behavioural disorder if not kept under supervision and check.

Aggression has also been found to have a negative relationship with emotional competence and happiness. People who score higher on aggression are poor at managing their own emotions and are overall unhappy with their lives. Since aggression makes one more predisposed towards negative affect, one's subjective well-being can be significantly reduced under the influence of aggressive temperament (Orkibi & Ronen, 2019). It is a dual pathway, such as, individuals who are high on trait aggression already perceive their life to be lacking of beauty and full of flaws. This perception further makes them aggressive and unhappy in the long run, thereby lowering down their life satisfaction.

Objectives

- The primary objective of the current study was to identify correlates and predictors of aggression among school going adolescents.
- Another objective was to find the relationship of aggression with social media addiction, social networking addiction, happiness and emotional competence.

Hypotheses

Keeping in mind the review of literature, the following hypotheses were proposed withaggression as the predictor:

1. Aggression is expected to be positively related with social media addiction and its dimensions, namely, occupation, mood modification, relapse and conflict.
2. Aggression is expected to be positively related with social networking addiction and its dimensions viz. impulsivity, virtual freedom and negative outcome.
3. Aggression is expected to be negatively related with emotional competence and its dimensions, namely, self-awareness, adaptability, motivation and empathy.
4. Aggression is expected to be negatively related with happiness.

Method

Sample

The current study comprised of 100 high school adolescents from various government and private schools of Ludhiana. Random stratified sampling was done with 50 males and 50 females in the age range of 14-17 years. Informed consent was obtained from the students and their parents before administering the questionnaires to them.

Tools used

Following standardised ***tests and tools*** were used in the study :-

- ***Social Media Addiction Scale (Tutgun-Unal & Deniz, 2015)*** – This 41 item scale has been developed with 775 students having at least one account account on Facebook, Twitter or Instagram. SMAS is a 5-point Likert scale graded with expressions such as "Always," "often," "sometimes," "rarely," and "never." The scale comprises of four dimensions, namely:

(1) ***Occupation*** – it signifies a person's occupation or obsession with social media activities;

(2) ***Mood modification*** – it measures the extent to which the individual uses social media to get relief from stress, negative emotions and anxiety;

(3) ***Relapse*** – it indicates the extent to which the individual goes back to social media addictive habit pattern after trying to restraint himself/herself;

(4) ***Conflict*** - it signifies the extent to which social media addiction causes conflict in the individual's academic, personal, social or work life. Scoring ranges from 41 to 205. The scale shows strong discriminant and convergent validities and strong internal consistency and test-retest reliability coefficients. The scale also yields an overall social media addiction score along with its sub-dimensions.

- ***Social networking addiction scale*** - This is a 32 item test used to measure internet addiction in terms of obsession with uploading or sharing audios, videos, playing games, dating, photo sharing, etc. Many people find their sense of identity and meaning through networking sites (Shahnawaz, Ganguli & Zou, 2013). The scale was developed on 420 school going students in Delhi. It has the following factors: 1. Impulsivity – itis the tendency to act without thought and show diminished impulse control over internet usage. It contains items like "while I study my mind remains online;" and "I can't compromise my time of being online even if my real friends compel me to be with them." 2. Virtual Freedom – It measures the sense of being free to do what a person wants to do on online social networking sites as family pressure and limitations imposed by parents on one's identity reduces. Some of the items measured under this dimension are "Its cool to be online as there are no rules;" and "we can easily express our emotions online." 3. Negative outcomes – third factor measures the consequences that the user has to face in his/her personal and social life due to internet networking addiction. The scale shows good psychometric properties in terms of reliability ranging from.79 to .94 for overall score and dimensions.

- ***Aggression Scale (Mathur & Bhatnagar, 1971)*** – this sale is a 5-point scale with 30 positive statements and 25 negative statements. The test has satisfactory reliability coefficient of .88in males and .81 in females. Concurrent validity coefficient has been .80 in males and .78 in females. Three categories are scored on this scale – high aggression, average and low aggression.

- ***Happiness Scale H-Scale (Bharadwaj & Das, 2017)*** – This scale has 28 items and 5 response options that vary as per the nature of the question. Scoring is done separately for positive and reverse scored items. Overall happiness score is obtained from this scale. The scale has high reliability and validity coefficients ranging from .75-.90. Thescale classifies people's sores as greater 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 understanidng 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 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.

Statistical analysis

Pearson's product moment correlation and stepwise multiple regression analysis was done with aggression as the dependent variable and social media addiction, social networking addiction, happiness and emotional competence as independent variables. Skewness and kurtosis were checked before running their parametric tests. Homoscedasticity of variance was also verified before beginning multiple stepwise regression.

Table 1 showing descriptive statistics and intercorrelation analysis of aggression with allstudy variables

S.No	Variables	r with aggression	Means	S.D
1.	Social media	.14	103.49	28.46
2.	Occupation	.254*	31.09	10.37
3.	Mood modification	.231*	14.67	5.19
4.	Relapse	.062	12.98	5.12
5.	Conflict	.04	44.80	15
6.	Happiness	.13	107.41	11.05
7.	Social networking	.16	95.58	14.21
8.	Impulsivity	.22*	56	12.54
9.	Virtual freedom	-.02	25	4.56
10.	Negative outcome	.15	14.93	2.78
11.	Emotional competence	.16	124.25	14.65
12.	Self-awareness	.05	22.94	3.62
13.	Adaptability	.01	27.06	4.62
14.	Motivation	.131	19.63	3.69
15.	Empathy	-.264*	28.44	3.83
16.	Social skills	.062	26.25	5.56

Table 2: Showing Stepwise Multiple Regression Analysis

Predictors	***B***	***Beta***	***R Square***	***t***	***p***
Social media addiction	.274	.298	.08	2.77	.006
Social networking addiction	.193	.22	.07	2.17	.03

Results

Glance at Table 1 reveals intercorrelation analysis of all study variables. In this investigation, one is specifically interested in the relationship of aggression with other variables. Pearson's product moment correlation values revealed Aggression to be significantly and positively related with Occupation (r=.25, p<.05), Mood modification (r=.23, p<.05), Impulsivity (r=.22, p<=.05) and Empathy (r=-.264, p<.05). Means and S.D are also depicted in table 1. Hypothesis 1, 2 and 3 are partially accepted.

Table 2 showed stepwise multiple regression analysis with aggression being the dependent variable. Social media addiction predicted Aggression among adolescents by 8% ($R^{2=}$.08, t=2.77, p<.006). Second most significant predictor of aggression was social networking addiction which contributed 7% variance

($R^{2=}$.07, t=2.17, p<.03). Overall the regression model contributed to 15% variance in aggression. In other words, social media addiction and social networking addiction predict aggression by 15%. However, other predictors like happiness and emotional competence did not emerge to be significant predictorsof aggression.

Discussion

Glance at Table 1 reveals intercorrelation analysis of all study variables. Pearson's product moment correlation values revealed Aggression to be significantly and positively related with Occupation (r=.25, p<.05), Mood modification (r=.23, p<.05), Impulsivity (r=.22, p<=.05) and Empathy (r=-.264, p<.05). These inter-correlation values shows that aggression is related with obsessive or compulsive preoccupations to use social media. More the aggression, more the thoughts of using social media as an outlet for one's emotional outburst. Mood modification dimension of social media addiction scale was also found to be significantly related with aggression which indicates that people who are prone to higher levels of aggressionuse social media as a means to modify their mood, calm down negative emotions and feel a sense of relief. Positive relationship of aggression with impulsivity also indicates that individuals who lack impulse control, self-regulation and are unable to stop themselves before acting are more aggressive than non-impulsive individuals. Last significant correlation emerged between aggression and empathy. This negative relationship implies that when under the influence of aggressive thoughts, an individual is unable to empathise with others and put himself into other's shoes.

Glance at the stepwise regression analysis table revealed two variables to be significant predictors of aggression. Social media addiction predicted Aggression among adolescents. It contributed to aggression by 8% variancce ($R^{2=}$.08, t=2.77, p<.006). Second most significant contributor of aggression was social networking addiction which contributed 7% variance ($R^{2=}$.07, t=2.17, p<.03). Overall the regression model contributed to 15% variance in aggression. In other words, social media addiction and social networking addiction predict aggression by 15%. However, other predictors like happiness and emotional competence did not emerge to be significant predictors of aggression.

Prior studies are concurrent with the findings of the present study. Agbaria (2021) investigated the mediating role of self-control in the relationship between internet addiction and aggression. It was observed that lack of self-control and negative emotions contributed tothe significant relationship between aggression and internet addition. On the other hand, positive affect and self-regulation acted as protective factors for aggressive behaviours as well as internet addiction. Through this supporting evidence it can be concluded that adolescents need to be guided on how to maintain a positive affect and self-control so that they may stay psychologically immune and less vulnerable to addictions.

One of the most prevalent ways of showing aggression on social media and social networking sites is making insulting and condescending remarks on posts. Other forms of aggression on social media involve acts of deceiving other people through fake accounts, psychologically attacking others through cyberbullying and stealing other's intellectual property or creativity (Mengu & Mengu, 2015). Another study by Guler et al. (2021) aggression increased as more time was being spent on social networking sites. One of the biggest factors in an increase in aggression were stress, depression, anxiety and lack of quality relationship between parent-child at home. These factors contributed to a significantly positive relationship between aggression and social networking.

Donat and Ozdemir (2012) also found out that aggressive behaviours can lead to social media addiction specially in male adolescents. The reasons can be attributed to lack of social skills training, lower life satisfaction, unable to engage one's potential in productive activitiesto name a few.

It can be concluded from the findings of the present study and prior literature that adolescents need intervention programmes in schools and colleges where they are taught to build health coping skills from time to time, made aware of how to enhance their well-being through other productive means instead of simply relying on social networking and social

media sites. The study points out towards an urgent need to incorporate life skills training programmes for adolescents so that they can stay resilient and psychologically well equipped with better ways to deal with anger and negative emotions instead of resorting to social networking sites. Emotional intelligence and emotional competence training is also required to build confidence in adolescents to deal with their emotions independently.

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COMPARATIVE STUDY OF RECTANGULAR PATCH WITH S- SHAPED ANTENNAS USING DIFFERENT FEEDING TECHNIQUES

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ABSTRACT

An antenna element is the most imperative element of communication. In this paper comparative analysis is done between different antenna designs. In first segment of designing rectangular patch design is purposed and it's resonant at 10GHz. For these antennas similar dimensions of 11.9×0.9mm is taken out. In second and third segment of design two slits cut out from substrate sheet. The modified designs resonant at 11.5 GHz Frequency value. The purpose design antenna analyzed and simulate with HFSS (High Frequency Simulation Software).

Keywords: *Compact S-shaped, wireless applications*

I Introduction

Recent days 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 various 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 includes E-shaped patch antennas, U slot patch antennas. [8]

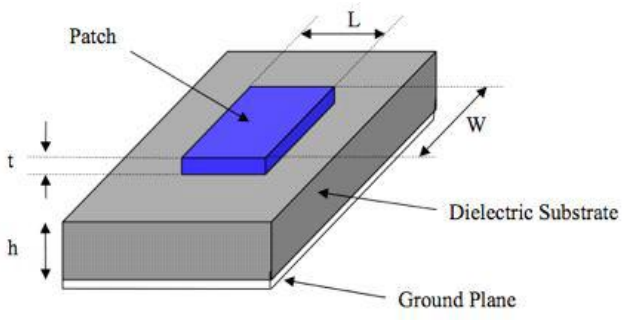


Fig. 1.1: Structure of Rectangular Micro strip Patch Antenna

II Objective

The objective of this paper to design miniature S-shaped patch antenna for wireless applications. Design of 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 11.9mm×0.9mm used for 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]

III Research Methodology

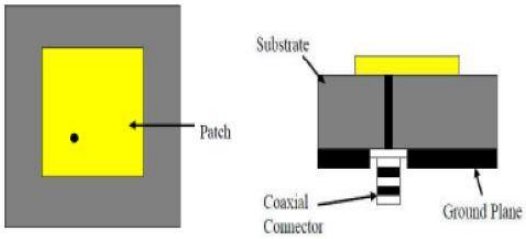
In this paper latest research work is describe for S-Shaped antenna which is based on literature survey that describe different patch techniques. The research papers overview give strategy to work on patch dimensions, & different probe feeding method to enhance the existing performance of rectangular 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 ne 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]

IV Data Analysis

In order to make performance predictions the rectangular patch antenna has the following parameters, where λ0 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) : $t << \lambda_0$
- Dielectric constant (ε_r) : $2.2 \leq \varepsilon$

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 1.2.



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 30×30 mm^2 and dimensions of patch are 11.9×9mm. The material chosen for substrate is FR4 having relative permittivity 4.4 & patch material as copper having relative permittivity 1 to meet desired result after simulation The dimension of slot in rectangular patch taken as L=4mm & W=0.5mm. The design antenna simulate on HFSS [8-9]

V Experimental Results

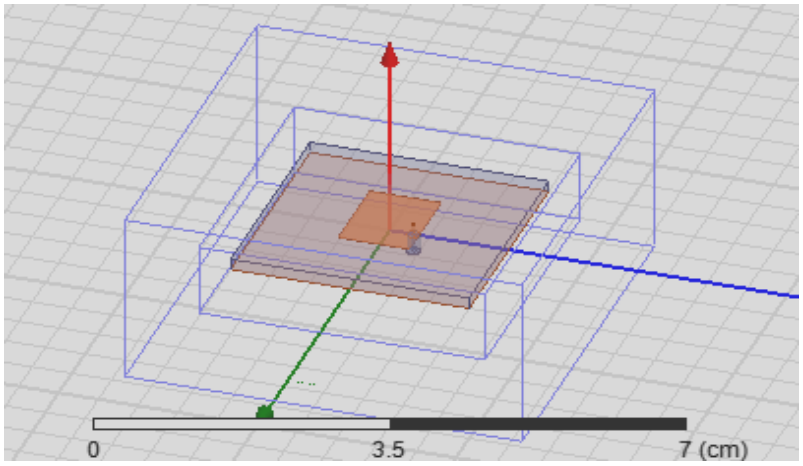


Fig:5.1 Coventional Patch Antenna

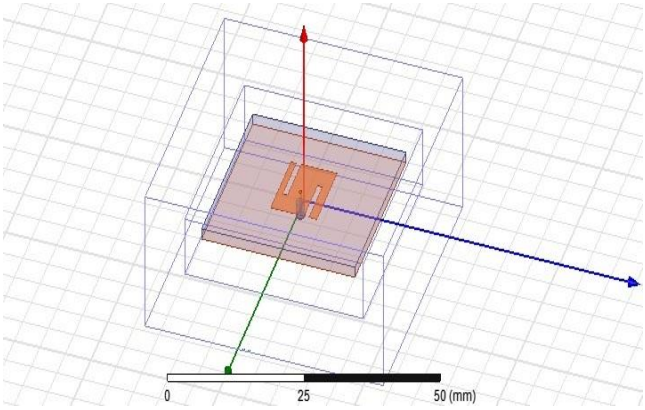


Fig.5.2 Probe Fed S-Shaped Patch Antenna

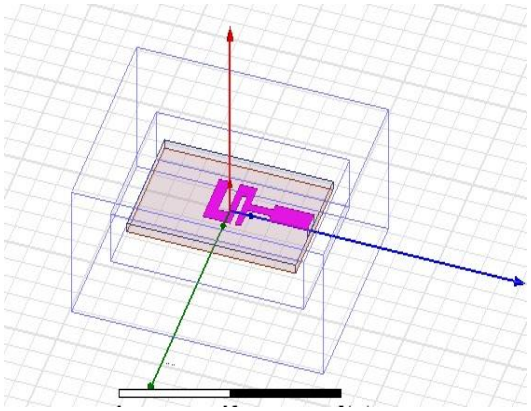


Fig.5.3 Edge Fed S-Shaped Patch Antenna

Table 5.1 : Comparison of Simulated design Antennas

Parameters	Conventional patch Antenna	Edge fed S-shaped Antenna	Probe Fed S--shaped Antenna
ReturnLoss (db)	-26.8 db	-14.7&-10.9	-49 & -9.2
VSWR	1.4	1.6	1.4
Gain (dbi)	7.00	3.19	5.35
Directivity(db)	6.98	4.18	5.35
Radiation efficiency	0.99	0.76	0.98
Frequency operation	Single band	Dual band	Dual band

Conclusion

Keeping in view of design parameters, it is concluded that purposed case-III design is representing good results as compare to other design of antenna. Based on the design and performance evaluation of antennas it is found that the III design i.e. dual band miniature S-shaped is better than other two design cases. It is learned that above design is made optimal by various changes in the dimensions for the C-band and X-band. However, this design may further be optimized by keeping into consideration the gain, directivity and other frequency band applications.

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Agropyron repens: A COMPREHENSIVE REVIEW WITH PHYTOCHEMICAL AND PHARMACOLOGICAL INVESTIGATION

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ABSTRACT

Agropyron repens (Poaceae) is a rhizomatous perennial grass that spreads rapidly. Except for Antarctica, it is present on all continents in the majority of the world's temperate climates and is indigenous to western Asia and Europe. The names couch grass, coutch, dog grass, quack grass, and twitch grass are all used to refer to it. In the form of decoction and infusion, it is commonly used in folk medicine. The plant is documented to possess beneficial effects as anti-inflammatory, hypoglycemic, diuretic, antioxidant, antimicrobial, antiadhesive, hypolipidemic, demulcent, tonic and for the control of symptoms of urinary disease, prostatic disease, rheumatism, and nephrotoxic damage The present review is an attempt to highlight the various ethnobotanical and traditional uses as well as phytochemical and pharmacological reports on Agropyron repens.

Keywords: *Agropyron repens, ethnobotanical uses, phytochemistry, pharmacological activities*

Introduction

Traditional medical systems offer an incredibly large body of source material for the creation of novel medications and natural products, which are now crucial sources of pharmacotherapeutics[1].In India, *Agropyron repens* grass is found in the western Himalayas at altitudes between 2,700 and 3,600 m^2. It is locally called Zamak in Ladakh, Washka in Kashmir, and Jau in Jammu[3]. Through the use of rhizomes or creeping rootstocks, this grass spreads widely[4]. Traditionally it has been used as a cough remedy to relieve bronchial irritation, diuretic, and for the treatment of gout, rheumatism, and skin disorders[5]. The plant is rich in silica, such as magnesium silicate, as well as various carbohydrates, mucilaginous components, pectin, triticin, cyanogenetic glucosides, phenol compounds, flavonoids, soponins, volatile and essential oils, vanillin glucoside, and salicylic acid[6].

Description

Plant Profile

Synonyms: Agropyron firmum J. Presl, Elytrigia repens (L.) , Agropyron repens (L.) P. Beauv., Triticum repens L [7].

Taxonomic classification:

Kingdom: Plantae; **Subkingdom:** Tracheobionta; **Superdivision:** Spermatophyta; **Division:** Magnoliophyta; **Class:** Liliopsida; **Subclass:** Commelinidae; **Order:** Cyperales; **Family:** Poaceae / Gramineae; **Genus:** Elymus L.; **Species:** Elymus repens (L.) [7].

Common names:

Arabic: najim, najeel, **English:** couch grass, coutch, dog grass, quack grass, quick grass, scotch, twitch grass; **French:** chiendent, petit chiendent; **German:** quecke; **Português:** Grama francesa, rizoma; **Spanish**: grama canina; **Italian:** gramigna rizoma [7].

Morphology

Agropyron repens is a rhizomatous perennial grass that has upright culms with a base that is somewhat curled. They range in length from 30 to 120 cm. The rhizomes are lengthy, heavily branching, sharp-pointed, yellowish-white in appearance. In general, stems are upright and 50-120 cm high, thin to fairly stout, dull green or more or less glaucous, with three to five nodes. One to four primary, 0-150 secondary, creeping rhizomes with numerous nodes, a scale leaf, bud, branch, and fine root system at each node. Roots extend to 160 cm[8]. Leaf blades have little auricles at the point where the blade and sheath meet, and they are 14 to 2 inches wide, pointed, and flat. Leaf blades are typically hairless below and have a characteristic small constriction towards the tip. The spikelets are carried flat to the stem and are grouped in two long rows. The florets are small to awnless. Ellipsoidal, light yellow to brown seeds[9].

Distribution

This grass can be found in temperate regions of Asia, North and South America, Australia, and New Zealand. It spreads to yards, lawns, ditches, roadside vegetation, and other moist areas and is found in farmed and natural grassland communities. Quackgrass is now found in every state in US, throughout Canada and in many European countries[10]. In Asia it has been found in countries like China, Korea, Afghanistan, Cyprus, Iran; Iraq, Lebanon, Syria, Turkey, Pakistan and few other countries[11]. In India it is found in the Western Himalayas [2].Some consider it to be the most dangerous perennial weed of the northern temperate zone's cooler areas. It competes aggresively with row crops, fruits, grains and fodder crops[1,2, 13].

Reproduction

Quack grass reproduces by seeds as well as by rhizomes. Freshly collected seed will not germinate at constant temperatures of 5 to 30 degrees Celsius in either sunshine or darkness, but up to 90 percent germination is possible with a daily temperature variation of 15 to 25 degrees Celsius. If there are diurnal temperature changes, the seeds can germinate after shedding and does not require an after-ripening period[14].When buried, seeds can remain viable for up to four years and stay dormant for two to three years[15].When the rhizome apex is removed or the rhizome is cut off from the parent plant, axillary buds on quack grass rhizomes are released from inhibition. Isolated rhizome segments have a polarity that causes the buds at the apical end to become aerial shoots, while those at the base either become rhizomes or go dormant[16].

Chemical composition

The whole plant of *Agropyron repens* has been reported to have Monosaccharides-glucose, D-fructose, rhamnose, pectins and hemicelluloses A and B[17]. The Phenolic compounds reported were P-hydroxybenzoic, Vanilic and P-Coumaric acids[18]. Chlorogenic acid, P-hydroxycinnamic acids[17] P-hydroxycinnamic acid esters: (E) and (Z), P-coumaric acid-16-hydroxyhexadecylester and P-coumaric acid hexadecyl ester (E) and (Z) [19] and bis-(E) - and bis-(Z)-diesters of analogous structure[20].

The flavonoids were examined to be Tricin (Unique compounds) [21], rutin, baicaleine, and hyperoside[17].Anthraquinones reported were emodin (0.06-0.2 mg/kg) chrysophanol (0.05-0.2 mg/kg), physcion (0.08-0.3 mg/kg) [22].

Triticin, high-branched out polysaccharide resembling inulin (3-18%) and free fatty acid particularly palmitic acid were reported. Silicic acid and silicates have also been reported[23]. Oestrogen, androstenone, progesterone and androgens are reported in trace amounts[24]and Lectins, which can be found in the seedlings and leaves of *Agropyron repens* may also be present in the rhizome[25].

The Couch grass is known to contain up to 0.75% ascorbic acid, saponins, the polyacetylated compound agropyrene, slimes and traces of essential oils. The underground part additionally contains up to 40 mg% carotene[17].

The rhizome of *Agropyron repens* has volatile oil agropyrene with a 95% contribution to the total essential oil, and was considered to be active constituent (1-phenyl-2,4-hexadiyne).25% Monoterpens 0.85% Sesquiterpenes are also identified The composition of the steam distillate of *Agropyron repens* rhizomes is given in Table [26].

Composition (%age) of the steam distillate of *Agropyron repens* rhizome.

S.No	Constituents	% composition
1.	α-pinene	0.04
2.	Camphene	0.03
3.	Hexanal	0.07
4.	Myrcene	0.03
5.	heptan-2-one	0.02
6.	Limonene	0.32
7.	Cineole	0.07
8.	γ-terpinene	0.19
9.	p-cymene	1.10
10.	Menthone	1.40
11.	Isomenthone	0.36
12.	Decanal	0.12
13.	Camphor	0.10
14.	non-2-en-1-al	0.30
15.	Linanool	0.36
16.	Bornyl acetate	0.16
17.	Carvone	5.50
18.	trans-anethole	6.80
19.	Pelargonic acid	1.80
20.	Thymol	4.30
21.	Carvacrol	10.80
22.	Myristic acid	1.30
23.	Palmitic acid	23.50
24.	Oleic acid	1.60
25.	Linoleic acid	2.50

Traditional and ethnobotanical use

Couch grass has been used in folk medicine as a diuretic, as a cough medicine to alleviate bronchial irritation. It has been used to treat gout, rheumatic disorders and chronic skin disorders[27]. The juice of rhizome is used for cystitis, nephritis, cirrhous liver; decoction for tonsils and as an adjuvant for cancer and chronic skin disorders. Bark is bitter, astringent, febrifuge, anthelminitic, antispasmodic, expectorant (used in asthma, bronchitis). It has also been used for dysentery as a substitute for Holarrhena antidysenterica. Bark and leaves are used as tonic in debility, especially after childbirth. It is frequently used to treat enuresis and urine incontinence in children as well as to manage the symptoms of rheumatism, prostatic illness, urinary calculi, and infections [28,29].

The Ayurvedic Pharmacopoeia of India indicates the use of stem bark in high fever and giddiness[30]. *Agropyron repens* is also used as to reduce blood cholesterol and in treating nephrolithiasis (kidney stones), diabetes, and liver ailments, among others[31]. *Agropyron repens* is incorporated into Medicinal plants against liver disease and Indian Herbal Medicine as Hepatoprotective and Hepatocurative[32].

Pharmacological activities

Hypolipidemic effects

In normal and streptozotocin-induced diabetic rats, the effects of a lyophilized aqueous extract from couch grass rhizome on plasma cholesterol and triglyceride levels as well as body weight were assessed after a single oral dose of 20 mg/kg and during repeated oral administration at the same dose level once a day for two weeks. After repeated oral dosing, plasma cholesterol levels significantly decreased after just one week. After a single and repeated oral dosing, the therapy significantly reduced plasma cholesterol in diabetic rats. Six hours after a single oral dosage of the extract, a significant drop in cholesterol levels was seen. The plasma cholesterol level considerably dropped four days after the extract was repeatedly administered orally, and it continued to drop for another two weeks. Two weeks following oral therapy, repeated oral administration of the aqueous extract of Agropyron repens rhizome resulted in a considerable reduction in body weight[33].

Antiadhesive activity

By interacting with bacterial outer membrane proteins with an IC25 of 630 g/mL ($p<0.05$), a hydroethanolic (50%V/V) lyophilized extract of couch grass rhizome reduced the adherence of uropathogenic Escherichia coli bacteria to a cell line derived from human urinary bladder cancer[34].

Treatment of urinary tract infections and diuresis

In order to determine the effectiveness and tolerability of a liquid extract of Agropyron repens (Acorus drops) in patients with urinary tract infections or irritable bladders, a post-marketing surveillance was developed. Data from 313 patients with irritable bladder syndrome or urinary tract infections were examined. 50–60 drops were administered to the patients three times daily for an average of 12 days.Changes in urological symptoms over the course of treatment served as the main criterion for efficacy. Between 69% and 91% of the urological symptoms that were initially noted improved throughout treatment [35].

This herb contains a significant amount of the sugar mannitol, which is a common "osmotic diuretic." Vanillin and saponins both have diuretic effects. Because of its diuretic and antibacterial properties, couch grass has been used to clear infections from the urinary tract[36].

Anti-inflammatory activity

When given orally, a hydroethanolic (80% V/V) dry extract of couch grass rhizome decreased carrageenan-induced rat paw oedema by only 14%, compared to 45% by indometacin at 5 mg/kg. Injecting 0.1 ml of a 1% carrageenan suspension into the rat hind paw's plantar area caused the oedema[37].

Hypoglycaemic activity

In normal and streptozotocin (STZ) diabetic rats, the hypoglycaemic impact of an aqueous extract of Agropyron repens (Triticum repens) rhizomes was examined. In STZ diabetic rats, oral administration of the aqueous extract (20 mg/kg) resulted in a significant reduction in blood glucose levels ($p<0.001$); the blood glucose levels returned to normal after daily oral administration of the aqueous extract (20

mg/kg) for two weeks (p< 0.001).Normal rats showed significant blood glucose level reductions following both acute (p 0.001) and chronic (p< 0.001) therapy[38].

Sedative effect

A 10% infusion of couch grass rhizome was given intravenously to mice in doses equal to 10, 15, 20, 40, and 80 mg of crude drug, and orally to mice in doses equal to 40 and 80 mg of crude drug. The measurement of sedative effects used a variety of techniques, such as motility tests. Motility reduced to 95.9 and 36.1%, respectively, in groups getting the infusion orally, and to 73.9, 51.4, 22.8, 18.9, and 2.4%, respectively, in groups receiving it intraperitoneally, compared to the motility of control animals receiving simply water or physiological saline[39].

Other Pharmacological actions

A product called Tritipalm is made up of 60 grains of fresh triticum root and 30 grains of fresh saw palmetto fruit, and each fluid drachm is intended to act as a general nutrient tonic and sedative to irritated and inflamed nose, throat, and bronchial mucous membranes, particularly to stop purulent discharges. It also affects the glandular appendages of the reproductive tract. Nephritis, simple and gonorrheal urethritis, cystitis, vesical irritation, strangulation, dysuria, and atrophy of the mammae, testes, ovaries, uterus, and particularly of the prostate gland are among the conditions in which it is particularly advised. The dosage is one liquid drachm followed by four sips of water each day[40].

In British Columbia and Canada, it was one of the medicinal herbs used to treat endoparasites and gastrointestinal issues in dogs, cats, and pigs[41].

Contraindications and adverse effects:

Couch grass is listed by the Council of Europe as a natural source of food flavoring (category N2). In the United States, it is listed as GRAS (Generally Recognized as Safe). The safety and efficacy of couch grass has not been systematically studied for any indication in available reports. However, traditional use suggests that couch grass is generally well tolerated. Couch grass is accepted in the Indian and Colonial Addendum of the British Pharmacopoeia for use in the Australian, Eastern and North American Colonies, where it is much employed. Excessive and prolonged use of couch grass should be avoided due to its reputed diuretic action, as this may result in hypokalemia (abnormally low potassium levels in the blood). Caution is advised in patients who have edema (swelling) caused by heart or kidney disease. Based on tradition, couch grass should be taken with plenty of fluids to flush out the urinary tract[42].

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EXAMINATION OF THE MANAGEMENT PRACTICES OF SELECTED WRESTLING TRAINING CENTRES OF HARYANA

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ABSTRACT

The aim of this study is to analyze wrestling training centres management practices in Haryana state. The target group of this study includes wrestlers related to wrestling centres in Haryana State. In this study, the investigator used the multi-stage random sampling technique for selecting the sample. The total sample size of this study is 440 individuals. The self-made questionnaires were used to evaluate the management practices of selected training centers. The descriptive statistics, i.e. percentage technique, were used to ascertain the management practices. It was found that the majority of wrestlers agreed that recruitment policies for employees, the strength of coaches, selection of players, distribution of funds incentive, availability of dieticians, care of educational facilities of athletes, leadership qualities of administrators, organising off-season camps and applying the latest coaching and training methods in the centres are up to the mark. However, the majority of wrestlers were not agreed with the selection policy of players, functions of supportive staff, quality of food and accommodation, incentive and prizes given to coaches, availability of physiotherapist, psychologist and massager, existing facilities to win medals at national and international level. It was also found that centre is not reviewing the performance of the players regularly, and not taking regular feedback from its staffs and trainees to know the effectiveness of the training programs. The wrestlers were also of the opinion that the absence of recreational activities not makes the athletes mentally tired.

Keywords: *Management Practices, Wrestlers and Training Center*.

Introduction

Organizational success is highly reliant on the quality of its management. Management is a crucial part of everyday living. The management of wrestling training centers in Haryana has been a key factor in the state's success in producing world-class wrestlers. In today's world, management is crucial for coordinating everyone's efforts and adapting actions to what's really happening. 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).

Performance management is a general term used to monitor the degree to which an organization achieves its goals (McLean, 2017). It is a continuous process in organizations that links the strategic directions of the organization with the performance of employees and the performance of the organization itself (McLean, et al. 2010). As a process, performance management relies on performance measurement to provide important information that an organization uses to improve the effectiveness and efficiency of its processes (Bititci, Carrie, & McDevitt, 1997). Winand et al. (2014:124) defined organizational effectiveness as "the acquisition and effective use of necessary resources through organizational processes to achieve meaningful and targeted goals and to high satisfaction of organizational stakeholders." Due to the different interests and strategic needs of stakeholders, empirical studies have shown that NGOs face a myriad of different dimensions of effectiveness (O'Boyle and Hassan, 2014). Stakeholders such as government, athletes, sponsors, volunteers and coaches may indeed expect different results from a sports organization (O'Boyle and Hassan, 2014). Winand et al. (2010, 2012) identified key outcomes related to elite sport, increasing participation and spreading the values and growth of sport.

Wrestling has a long and rich history in the Indian state of Haryana, and the state has produced some of the finest wrestlers in the country. To promote the development of wrestling in the state, the Haryana government has established several wrestling training centers across the state. These centers provide world-class training facilities and coaching to young wrestlers, with the aim of producing

elite athletes who can represent the country at the highest levels. The management of these training centers is a complex task, involving a range of stakeholders, including coaches, wrestlers, administrators, and government officials. This exploratory study seeks to examine the management practices of these wrestling training centers in Haryana and identify areas for improvement. The study will focus on several key aspects of the management of these centers, including the admission and selection process, the training and coaching methods used, the facilities and resources available to wrestlers, the monitoring and evaluation systems in place, and the impact of these centers on the wrestling community in Haryana. Through a combination of surveys, interviews, and observations, the study aims to provide a comprehensive understanding of the management of wrestling training centers in Haryana and identify best practices and areas for improvement. The findings of this study will be of interest to policymakers, coaches, wrestlers, and other stakeholders involved in the development of wrestling in the state and beyond.

Methods and Procedure

The exploratory and descriptive research technique was used to assess and describe the opinions of wrestlers regarding 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 Sonepat, 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 center 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 the last stage, the investigator has selected the 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 the random sampling procedure. A self-made questionnaire was used to examine the management practice of the centre. Descriptive statistics i.e., percentage technique was used to find out the opinions of wrestlers towards management practices in selected wrestling training centers.

Result and Discussion

Table-I: Responses for wrestlers regarding management practices of selected wrestling training centres of Haryana.

Sr. No.	Statement	Yes	No	Others
1	Training centre has well defined recruitment policy for employees	60.9	34.1	5.0
2	Training centre have sufficient number of Coaches	54.8	40.2	5.0
3	Training centre has well defined selection policy for players	41.4	57.7	.9
4	Teams/players at various levels in wrestling centre are selected on merit basis	52.7	46.1	1.1
5	Wrestling centre has adequate number of supportive staffs to perform its functions	44.8	54.5	.7
6	Wrestling centre provides proper food and accommodation for the athletes	38.4	60.7	.9
7	The funds incentive given by Centre Government/State Government/voluntary agencies are reaching to deserving sports person	54.5	43.0	2.5
8	Sufficient incentive, prizes, honours are given to players /Coaches	32.3	67.0	.7
9	Whether any physiotherapist is available for the players?	43.4	55.5	1.1
10	Psychologist is always available for the players	48.6	50.5	.9
11	Massager is available for the players	32.7	66.4	.9
12	Dietician is available for the players	54.8	44.3	.9

13	Existing facilities in centre are sufficient to win medals at national and international level	39.8	59.3	.9
14	The Authority of the wrestling centre reviews the performance of the players regularly	43.9	55.0	1.1
15	Wrestling centre takes care of the educational facilities of the athletes of wrestling training centre	65.5	33.2	1.4
16	The leadership abilities of the sports administrators of wrestling centre are sufficient to influence the subordinates	52.5	46.1	1.4
17	Wrestling centre takes feedback from its staffs and trainees to know its effectiveness of the training programs	43.2	54.8	2.0
18	Off season camps are organized in wrestling centre.	56.1	42.7	1.1
19	Coaching and training methods in wrestling training centre are latest	53.4	45.5	1.1
20	The absence of recreational activities makes the athletes mentally tired	44.8	54.5	.7

From the analysis, it was observed from the above table-I that with regard to training centre has well defined recruitment policy for employees, majority of the wrestlers 60.9% (n=268) were in the opinion that recruitment policy is well defined, however, 34.1 % (n=150) wrestlers were not in the favour that recruitment policy is well defined and 5.0 % (n=22) of wrestlers don't know or did not respond.

With regard to training centre have sufficient number of Coaches, majority of the wrestlers 54.8% (n=241) were in the opinion that training centre have sufficient number of coaches, however, 40.2 % (n=177) wrestlers were not in the favour that number of coaches were sufficient and 5.0 % (n=22) of wrestlers don't know or did not respond.

With regard to training centre has well defined selection policy for players, majority of the wrestlers 41.4% (n=182) were in the opinion that recruitment policy is well defined, however, 57.7 % (n=254) wrestlers were not in the favour that recruitment policy is not well define and .9 % (n=04) of wrestlers don't know or did not respond.

The majority of the wrestlers 52.7% (n=232) were in the opinion that teams/players at various levels in wrestling centre were selected on merit basis, however, 46.1 % (n=203) wrestlers were not in the favour and 1.1 % (n=05) of wrestlers don't know or did not respond. With regard to wrestling centre has adequate number of supportive staffs to perform its functions, majority of the wrestlers 54.5 % (n=240) were not in in the opinion that centre has adequate number of supportive staffs to perform its functions, however, 44.8% (n=197) wrestlers were in the favour and .7 % (n=03) of wrestlers don't know or did not respond.

The majority of the wrestlers 60.7 % (n=267) were in the opinion that wrestling centre were not providing proper food and accommodation for the athletes, however, 38.4% (n=169) wrestlers were in the favour and .9 % (n=04) of wrestlers don't know or did not respond.

With regard to the fund's incentive given by Centre Government/State Government /voluntary agencies were reaching to deserving sports persons, majority of the wrestlers 54.5% (n=240) were in the opinion that fund's incentive is reaching to deserving sports persons, however, 43.0 % (n=189) wrestlers were not in the favour and 2.5 % (n=11) of wrestlers don't know or did not respond.

The majority of the wrestlers 67.0 % (n=295) were not in the opinion that sufficient incentive, prizes, honours were given to players/coaches, However, 32.3% (n=142) wrestlers were in the favour and .7 % (n=03) of wrestlers don't know or did not respond.

The majority of the wrestlers 55.5 % (n=244) were not in the opinion that physiotherapist is available for them, however 43.4% (n=191), wrestlers were in the favour and 1.1 % (n=05) of wrestlers don't know or did not respond.

The half of the respondent wrestlers 50.5 % (n=222) were not in the favour that Psychologist is always available for the players, however, 48.6% (n=214) wrestlers were in the opinion and .9 % (n=04) of wrestlers don't know or did not respond.

The majority of the wrestlers 66.4 % (n=292) were not in the opinion that massager is available for them, however 32.7% (n=144), wrestlers were in the favour and .9 % (n=04) of wrestlers don't know or did not respond.

The majority of the wrestlers 54.8% (n=241) were of the opinion that dietician is available for the players, however, 44.3 % (n=195) wrestlers were not in the favour and .9 % (n=04) of wrestlers don't know or did not respond. With regard to existing facilities in centre were sufficient to win medals at national and international level, the majority of the wrestlers 59.3 % (n=261) were not of the opinion that existing facilities were sufficient to win medals at any level, however, 39.8% (n=175) wrestlers were in the favour that existing facilities were sufficient to win medals at any level and .9 % (n=04) of wrestlers don't know or did not respond.

With regard to the authority of the wrestling centre reviews the performance of the players regularly, the majority of the wrestlers 55.0% (n=242) were of the opinion that authority is not reviewing the performance of players regularly, however, 43.9 % (n=193) wrestlers were agreed and 1.1 % (n=05) of wrestlers don't know or did not respond.

The majority of the wrestlers 65.5 % (n=288) were in the opinion that wrestling centre takes care of the educational facilities of the athletes of the centre, however, 33.2 % (n=146) wrestlers were not in the favour and 1.4 % (n=06) of wrestlers don't know or did not respond.

The majority of the wrestlers 52.5 % (n=231) were in the opinion that the leadership abilities of the sports administrators of wrestling centre were sufficient to influence the subordinates, however, 46.1 % (n=203) wrestlers were not in the favour and 1.4 % (n=06) of wrestlers don't know or did not respond.

With regard to wrestling centre takes feedback from its staffs and trainees to know its effectiveness of the training programs, the majority of the wrestlers 54.8 % (n=241) were not in the opinion that centre takes feedback from its staffs and trainees, however, 43.2 % (n=190) wrestlers were in the favour and 2.0 % (n=09) of wrestlers don't know or did not respond.

With regard to off season camps were organized in wrestling centre, the majority of the wrestlers 56.1 % (n=247) were in the opinion that off season camps were organised regularly; however, 42.7 % (n=188) wrestlers were not in the favour regarding this and 1.1 % (n=05) of wrestlers don't know or did not respond.

With regard to coaching and training methods in wrestling training centre were latest, the majority of the wrestlers 53.4 % (n=235) were in the opinion that latest coaching and training methods were using in wrestling training centre, however, 45.5 % (n=200) wrestlers were not in the favour and 1.1 % (n=05) of wrestlers don't know or did not respond.

With regard to absence of recreational activities makes the athletes mentally tired, the majority of the wrestlers 54.5 % (n=240) were not of the opinion that without recreational activities athletes becomes mentally tired, however, 44.8 % (n=197) wrestlers were in the favour and .7 % (n=03) of wrestlers don't know or did not respond.

Discussion

The findings demonstrate that a majority of wrestles (60.9%) have the opinion that centres were adopting well-defined recruitment policy for employees. They were also of the opinion (54.8%) that training centres have a sufficient number of Coaches. In the case of the policy of selection of players in training centre, the majority of wrestlers (57.7%) were not in favour. However, majority of the wrestlers (52.7%) were of the opinion that teams/players at various levels in wrestling centre were selected on a merit basis. It has been found that (54.5%) of wrestlers were strongly of the opinion that supportive staffs were not adequate to perform their work. (60.7 %) wrestlers were not in favor that proper food and accommodation being provided in the wrestling centres. The majority of the wrestlers 54.5% were of the opinion that the fund's incentive is reaching to deserving sports persons. However, the majority of the wrestlers 67.0 % were not of the opinion that given incentives, prizes and honours were sufficient for the players /Coaches. The majority of wrestlers (more than 50%) agreed that training centers have always not available physiotherapists, psychologists and massagers. However, dieticians for the players were always available.

(59.3%) of wrestlers were of the opinion that existing facilities in the centre were not sufficient to win medals at the national and

international level. 55.0% wrestlers were of the opinion that authority is not reviewing the performance of players regularly. The majority of wrestles (65.5%) were also of the opinion that wrestling center takes care of the educational facilities of the athletes. It has been also found that the (52.5%) of wrestlers agreed that leadership abilities of the sports administrators of wrestling center were sufficient to influence the subordinates. Further, it has found that (54.8 %) of wrestlers were of the opinion that the wrestling centre is not taking regular feedback from its staffs and trainees to know the effectiveness of the training programs. The majority of wrestlers (more than 50%) agreed that training centers were organizing off-season camps, applying latest coaching and training methods for performance improvement. It has also found that the majority of wrestlers 54.5 % were not of the opinion that without recreational activities athletes become mentally tired.

Conclusion

It was concluded that the majority of wrestlers agreed that recruitment policies for employees, the strength of coaches, selection of players, distribution of funds incentive, availability of dieticians, cwere of educational facilities of athletes, leadership qualities of administrators in the centres were up to the mark. The majority of wrestlers also observed that training centres were organising off-season camps for players and applying the latest coaching and training methods for performance. However, the majority of wrestlers were not agreed with the selection policy of players, functions of supportive staffs, quality of food and accommodation, incentive and prizes given to coaches, availability of physiotherapist, psychologist and massager, existing facilities to win medals at national and international level. It was also found that centre is not reviewing the performance of the players regularly, and not taking regular feedback from its staffs and trainees to know the effectiveness of the training programs. The wrestlers were also of the opinion that the absence of recreational activities not makes the athletes mentally tired.

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COMPARATIVE STUDY OF PROFESSIONAL COMMITMENT OF WOMEN TEACHER EDUCATORS IN RELATION TO AGE AND LOCALE OF THE INSTITUTE

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ABSTRACT

This research study focuses on the comparison of professional commitment of women teacher educators with respect to age and locale of the institute. The main objective of the paper is to compare the professional commitment of women teacher educators of (a)rural and urban educational colleges (b) of below and above 35 years of age. For this, a sample of 250 women teacher educators was selected through random sampling technique from the Punjab State. Professional commitment scale by Dr. Vishal Sood (2012) was used for the collection of data. The findings revealed that there is no significant difference in Professional commitment of women teacher educators in relation to age and locale of the institute.

***Keywords**: Professional commitment, Age, Locale, women teacher educators*

Introduction

A profession is an occupation founded upon specialized educational training and instructions. A profession arises out through the process of professionalization, when any trade or occupation transforms itself through the development of formal qualifications based upon education, training, apprenticeship, research and development etc. Some professions enjoy relatively high salaries, status and social respect, while others don‟t earn high salaries and public prestige. Variations in salaries status and respect do exist even within specific professions. In education, for example, a university professor may earn more in terms of basic salaries, emoluments, allowances and other facilities as compared to a primary school teacher.

Professionalism involves consistently achieving set standards, directly or indirectly in 7 the chosen field of study or job. It refers to the act and practice of behaving responsibly, ethically, sensibly and rationally in fulfilling roles and responsibilities of a specific work. The concept of commitment is widely used as a conscious human behaviour as an agreement or pledge to do something in future. It is a conscious effort of a person's adherence to something to which one is bound by a pledge or duty.

Lee et al. (2000) Professional Commitment is defined as "the psychological connection between an individual and his profession, based on affective reaction of the individual towards this profession".

Skidmore (2007) defined professionally committed teachers as those teachers who are: a) dedicated to developing themselves professionally by seeking advanced degrees and standards- based professional growth opportunities; b) critically reflective in their practice by seeking meaningful feedback and discourse, and engagement in action research; c) advancing the training profession through the creation of professional learning communities and teachers' contributions to leadership positions

McCabe and Sambrook (2008 & 2013) Professional commitment is defined as loyalty, the desire to stay in a profession, and a sense of responsibility toward the profession's particular problems and challenges.

Sharma (2010) in his book mentioned that teachers should have the professional commitment and enthusiasm for accomplishing their responsibilities as well as their duties. Fuhrer, he wrote the following ideals and beliefs for teachers;

Teacher should give priority to his professional commitment and development.

Teacher should be enthusiastic towards his teaching and teaching programmes.

Teacher should have emotional tie with his students. He should provide educational guidance to his students.

Teacher should have positive outlook and sympathetic attitude toward his students.

Teacher should try to understand his students with regard to their abilities, capacities, needs, aims, weakness and their level of aspirations.

Chang et al. (2015) Professional commitment is defined as an attitude that provides a physical, mental and emotional connection to one's work. It is also the harmony between an individual's beliefs and their determination to continue working in their profession.

Jafaragaee (2012) Professional commitment is a person's pledge, promise or resolution toward his/her profession.

Literature Review

Hung and Liu (1999) in their study entitled 'Effects of Stay-Back on Teacher's Professional Commitment' concluded that stay-back is the factor which is most highly and significantly related to commitment. Apart from this, the other factors like marital status, age and tenure were also found to be significantly related to commitment.

Punia (2000) conducted a study on commitment among university teachers. The main objective of the study was to assess the commitment on two dimensions; organizational commitment and job commitment. The analysis of data revealed that teachers of different age groups were not equally committed. Young teachers were more committed towards the profession. He found that university teachers were more committed towards their job as compared to their organization.

Maheshwari (2002) studied the professional commitment among secondary school teachers. The sample of the study comprised of 160 school teachers in Tuticorin Distt. In analysis mean, S.D. and t-values were computed. In his study investigator concluded that the healthy school environment enhances commitment among teachers.

Giffords (2003) in a study entitled "An Examination of Organizational and Professional Commitment among Public, not for Profit and Proprietary Social Service Employees" found that organizational and professional commitment is related to auspice. The study revealed that employees' ages and their position within the organization appears to be related with professional commitment.

Kohli (2005 a) conducted a study to evaluate the Level of Professional Commitment of the Teacher Educators of Punjab State. An instrument was developed by the investigator to find the level of professional commitments. It was found that the professional commitment male teacher educator was moderate. But in case of female teacher educators the profession commitment was found to be highly significant Brown and Sargeant (2007) explored Job Satisfaction, Organizational Commitment, and Religious Commitment of Full-Time University Employees. The study found that workers who were older than age 46 years had higher organizational commitment than younger employees workers holding doctoral degrees had higher levels of religious commitment than individuals with a high school diploma. Further the study revealed that the longer employees stayed at this institution, the higher the levels of organizational commitment.

Sood (2008) conducted a study on Professional Commitment among B.Ed. teacher education of Himachal Pradesh, investigator studied the level of professional commitment of teacher educators serving in secondary teacher training institutions of Himachal Pradesh. Results show that the level of professional commitment of B.Ed. teacher educators in Himachal Pradesh are moderate. Significant differences are found in professional commitment of B.Ed. teacher educators with regard to gender, marital status and teaching experience. However, NET qualified and non-qualified teacher educators are found to have a similar level of commitment towards their profession

Gupta and Kulshreshtha (2008) attempted to see the professional commitment of the primary school teachers and concluded that there is no significant difference in the professional commitment of male and female teachers. Further, they concluded that insignificant difference was found in the professional commitment of public-school teachers and government school teachers

Meimanat (2009) examined the effects of leadership behaviour on the faculty commitment of humanities departments in the University of Mysore, India: regarding factors of age group, educational qualifications and gender. The finding of the study shows significant differences between male and female commitment. Further, the interaction effects between age group and educational qualifications regarding faculty commitment scores were significant.

Kaur and Dhaliwal (2011) investigated the teacher commitment and job satisfaction of teachers at various levels. Major findings of the study were: elementary, secondary and college level teachers have above average level of teacher commitment; elementary, secondary and college teachers did not differ significantly in their commitment; male and female teachers did not differ significantly in their commitment at three levels; rural elementary teachers were more committed towards their job than the urban elementary teachers; and urban college teachers were more committed with their job than rural college teachers.

Malik and Sharma (2013) investigated teaching effectiveness of secondary school teachers in relation to their professional commitment. In this study researchers studied the teaching effectiveness of secondary school teachers in relation to their Professional commitment. This study reveals that gender of teachers does not bear any relationship with their teaching effectiveness and professional commitment. It also reveals that locality of schools does not influence the teaching effectiveness but influence the professional commitment of secondary school teachers. There exists a significant relationship between teaching effectiveness and professional commitment of secondary school teachers. It was also found that professional commitment influences teaching effectiveness of teachers.

Kumar (2013) concluded that there is no significant relationship between role commitment and effectiveness among the college teachers and there is significant difference in the mean score of role commitment of male and female college teachers as well as rural and urban college teachers.

Gajjar (2014) undertook a study entitled "A study of professional work commitment of teacher trainee of B. Ed. College". The findings revealed no significant difference in the professional work commitment of male and female teacher trainees. Professional commitment of Post Graduate teacher trainees was significantly higher than the Graduate teacher trainees. Rural and urban teacher trainees did not differ significantly in their professional commitment. There was found no significant difference in the professional commitment of science and non-science educational background teacher trainees.

Shoaib and Khalid (2017) undertook a study on professional commitment of teacher educators: future of nation builders. The study revealed that aged teacher educators were more committed as compared to young ones. Further, it is concluded that teachers having higher academic and professional qualifications were more committed as compared to less qualified teachers.

Meric and Erdem (2020) conducted a study on Prediction of Professional Commitment of Teachers by the Job Characteristics of Teaching Profession. Results of the study suggest that teachers' perceptions of professional commitment levels are very high. It is found that teachers' general levels of professional commitment do not differ in terms of gender, area and educational level. Further, it is concluded that the general level of professional commitment is found to differ in favour of single teachers and teachers with 1-10 years of service.

Need and Emergence of the problem

The role of teachers in our society is indispensable. Therefore, it becomes important to realise and understand what is it that makes a teacher. What are the factors that leads a teacher into dedicating his/her whole life in improving the lives of their students? What are the factors that make them stay committed to their profession? Only a dedicated teacher will be able to do justice to her job. As the, Adaval (1979) tells us in his book, Quality of Teachers, that the aim of the teacher training should be to inculcate the right type of attitudes in the teachers, so that they may come up to the expectations of the society. Here it is also important to note that not all teachers have had the same upbringing or schooling. Teacher training institutes have to give a remarkable contribution for developing in novice teacher the qualities of commitment. For this, Teacher educators should also possess qualities of commitment and leadership. Many studies have been done to study the professional commitment of teacher educators and what all factors influence it. But a very few studies have done the comparison of the professional commitment of teacher educators

especially women teacher educators in different aspects like age, locality, type of institutes etc.. So, the investigator wants to compare the level of professional commitment of women teacher educators of different age groups as well as working in educational colleges of different locale.

Objectives of the study:

1. To study the professional commitment of women teacher educators working in institutes of rural and urban areas.
2. To study the professional commitment of women teacher educators below and above 35 years age.

Hypotheses of the Study:

1. There is no significant difference between professional commitment of women teacher educators locale wise.
2. There is no significant difference between professional commitment of women teacher educators below and above 35 years

Delimitations of the study:

The study is delimited to Education colleges of Ludhiana and Moga districts of Punjab state. The study is confined to 250 women teacher educators.

Sample: Random sampling technique was employed to select 250 women teacher educators of educational colleges.

Tool used:

Professional commitment scale for teacher educators by Dr. Vishal Sood (2012)

Statistical Techniques Employed :

Following statistical techniques were employed to analyze the data:

(a) Descriptive statistics(Mean, Median, Mode, S.D.)

(b) t-ratio

Analysis and Interpretation of the data:

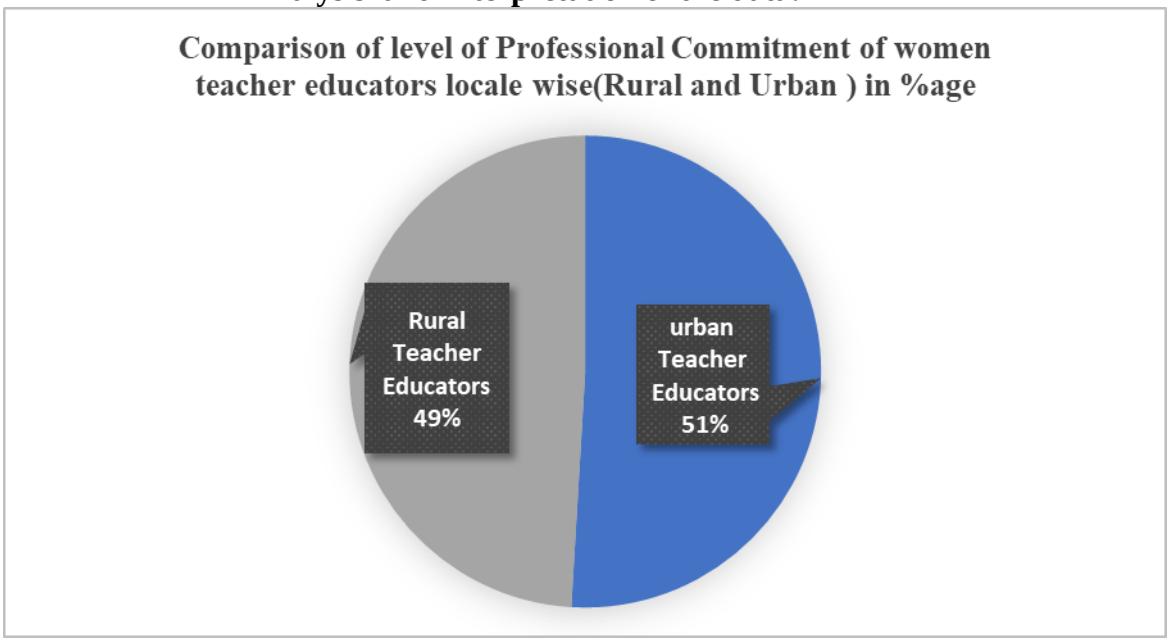

Figure1: Comparison of professional commitment (%) of women teacher educators working in rural and urban areas.

The pie chart in figure 1 depicts that 51% women teacher educators of urban education colleges are professionally committed whereas professional commitment of women teacher educators of rural education college is 49%. It reveals the moderate level of professional commitment among women teacher educators of rural as well as urban educational colleges.

Table 1 : comparison of professional commitment among women teacher educators locale wise

Variable	Locale	N	Mean	S.D.	t-value	Level of significance
Professional Commitment	Rural	125	231.58	40.24	0.25	Not significant at 0.05 and 0.01 level.
	Urban	125	240.48	49.45		

Table 1depicts that mean scores and standard deviation of women teacher educators of Rural educational colleges on the variable of professional commitment is 231.58 and 40.24 respectively whereas mean scores and standard deviation of women teacher educators of urban educational colleges on the variable of professional commitment is 240.48 and 49.45 respectively. Also, Calculated t-value with df=248 is 0.25 which is less than the critical table value. This shows that there is no significant difference between professional commitment of women teacher educators working locale wise. So, the **hypothesis 1 that there is no significant difference between professional commitment of women teacher educators locale wise stands accepted.**

Table 2 : comparison of professional commitment among women teacher educators Age wise

Variable	Age	N	Mean	S.D.	t-value	Level of significance
Professional Commitment	Above 35 years	125	249.8	49.7	0.44	Not significant at 0.05 and 0.01 level
	Below 35 years	125	229.3	46.47		

Table 2depicts that mean scores and standard deviation of women teacher educators of above 35 years age on the variable of professional commitment are 249.8and 49.7 respectively whereas mean scores and standard deviation of women teacher educators of below 35 years age on the variable of professional commitment is 250.7and 46.47 respectively. Also, Calculated t-value with df=248 is 0.44 which is much less than the critical table value. This shows that there is no significant difference between professional commitment of women teacher educators od above and below 35 years age,. So, the **hypothesis 2 that there is no significant difference between professional commitment of women teacher educators age wise stands accepted.**

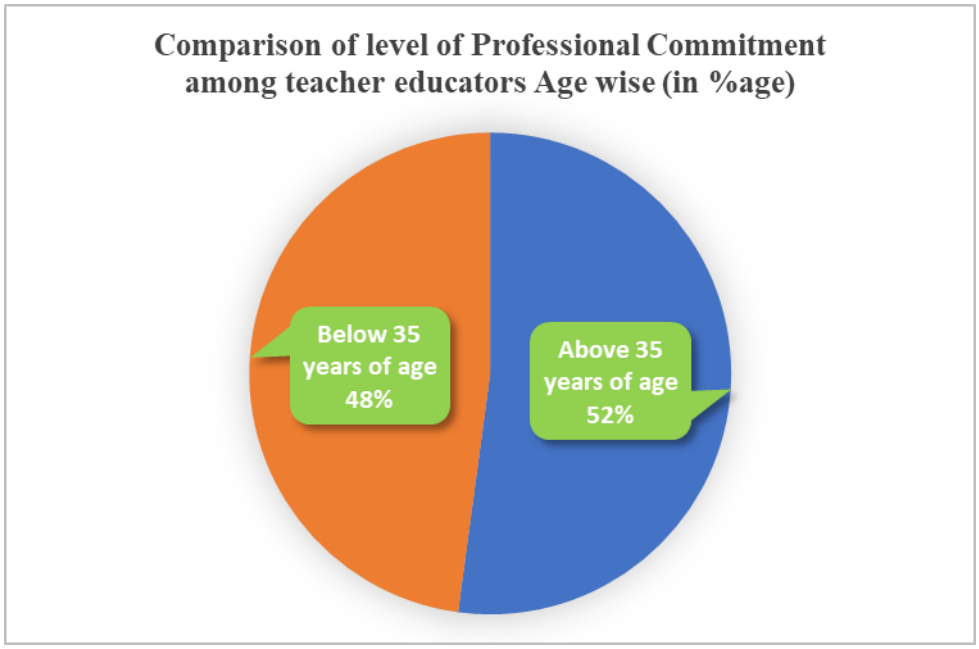

Figure 2: Comparison of professional commitment (%) of women teacher educators working in rural and urban areas.

The pie chart in figure 2 depicts that 48% women teacher educators of above 35 years old have professional commitment whereas 52% women teacher educators of below 35 years age are professionally committed . It reveals the moderate level of professional commitment among women teacher educators of below 35 years age and above average level of professional commitment of above 35 years age.

Results and Discussion:

- As the mean scores on the variable of Professional commitment of teacher educators of institutes situated in urban locale is higher than the rural locale institutes. But this difference is not significant at both 0.05 and 0.01 level of significance. Thus, women teacher educators working in both urban as well as rural Education colleges do not differ significantly on the variable of professional commitment. The studies supporting the results are: -

Kaur and Dhaliwal (2011) college teachers did not differ significantly in their commitmet. It is found that teachers' general levels of professional commitment do not differ in terms of gender, area and educational level. (Meric and Erdem (2020)

- Mean scores of Professional commitment of women teacher educators belonging to the age group of above 35 years old is higher than the below 35 years of age, but this difference is again not significant at both 0.05 and 0.01 level of significance. Thus, women teacher educators belonging to the age group of above 35 and below 35 don't differ significantly on the variable of Professional commitment.

Educational Implications

As per our findings the professional commitment among women teacher educators of rural and urban educational colleges is of moderate level. so, all institutes whether in rural locale or urban locale should take initiatives like conducting workshops, seminars, conferences, research trainings etc. for professional growth of the teachers. This professional growth will eventually contribute towards their eagerness to learn more and stay committed to their profession.

The professional commitment is not much influenced by Age of the women teacher educators concludes that the commitment characterizes as a highly personal way of viewing the self and its relation to the education. So ,the policy maker or authority may consider that instead of just discussing the way to show their commitment that is their practice, needed to strengthen through in service and pre service training programmes and effective guidance mechanisms.

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उच्च शिक्षारत छात्राओं की जागरूकता पर माता–पिता के शैक्षणिक स्तर का प्रभाव : बी.आर.ए. बिहार विश्वविद्यालय, मुजफ्फरपुर, बिहार के संदर्भ में एक अध्ययन

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सार

मानव जनसंख्या में आधा हिस्सा महिलाओं का है। महिलाओं के विकास के बिना मानव विकास की कल्पना संभव नहीं है। महिलाओं के समग्र विकास के प्रभावी कारकों में से एक है 'शिक्षा' के प्रति उनकी जागरूकता। महिलाओं में उच्च शिक्षा के प्रति जागरूकता से संबंधित अध्ययन बिहार प्रांत के मुजफ्फरपुर जिला अंतर्गत भीम राम अम्बेदकर बिहार विश्व विद्यालय, मुजफ्फरपुर के अधीन स्नातकोत्तर कक्षाओं में अध्ययनरत छात्राओं पर किया गया। शिक्षा के प्रति जागरूकता को देखने के लिए महिला जागरूकता मनोवृति मापनी का प्रयोग कर अध्ययन किया गया। इस अध्ययन में प्रयोज्यों के सामाजिक, आर्थिक, राजनैनिक, शैक्षणिक, व्यक्तित्व और मनोवैज्ञानिक कारकों के आधार पर उनकी शिक्षा के प्रति जागरूकता का अध्ययन किया गया और मापनी से प्राप्त प्रदत्त का सांख्यिकीय विश्लेषण कर निष्कर्ष तक पहुँचने का प्रयास किया गया है।

प्रमुख शब्दः *मुजफ्फरपुर, महिला, जागरूकता, माता–पिता, शैक्षणिक स्तर, बिहार।*

मानव जनसंख्या में आधा हिस्सा महिलाओं का है। अतएव, महिलाओं के विकास के बिना मानव विकास की कल्पना संभव नहीं है। साथ ही आधुनिक युग महिला सशक्तिकरण का युग है। सशक्तिकरण का अर्थ है 'सक्षम होना'। और इस दिशा में महिलाओं के समग्र विकास के प्रभावी कारकों में से एक है 'शिक्षा' के प्रति उनकी जागरूकता। इस अध्ययन में महिलाओं की शिक्षा के प्रति जागरूकता पर उनके माता–पिता के शैक्षणिक स्तर के प्रभाव को जाानने का प्रयास किया गया।

छात्राओं के जागरूकता के संदर्भ में मुख्य रूप से बी.आर.ए. बिहार विश्वविद्यालय, मुजफ्फरपुर, बिहार जिसे पूर्व में बिहार विश्वविद्यालय, मुजफ्फरपुर के नाम से जाना जाता था, की स्नातक स्तर की छात्राओं की जागरूकता पर माता–पिता के शैक्षणिक स्तर का प्रभाव हेतु अध्ययन किया गया। छात्राओं में शिक्षा के प्रति जागरुकता और उनके सर्वांगीण विकास को ध्यान में रखकर महंत दर्शन दास महिला महाविद्यालय, मुजफ्फरपुर, रामवृक्ष बेनीपुरी महिला महाविद्यालय, मुजफ्फरपुर और महिला शिल्प कला भवन महाविद्यालय, मुजफ्फरपुर की स्थापना हुई। साथ ही शहर अन्तर्गत लंगट सिंह महाविद्यालय, रामदयालू सिंह महाविद्यालय, नितेश्वर सिंह महाविद्यालय, रामेश्वर सिंह महाविद्यालय, महेश प्रसाद सिंह साईन्स कॉलेज और श्रीकृष्ण चिकित्सा महाविद्यालय, मुजफ्फरपुर आदि महाविद्यालयों की भी स्थापना की गईं जहाँ छात्रों के साथ ही छात्राओं के लिए सह शिक्षा की व्यवस्था थी। महिला महाविद्यालयों के अतिरिक्त इन महाविद्यालयों ने भी अध्ययनरत् छात्राओं की जागरूकता के साथ ही उनके सर्वांगीण विकास में महत्त्वपूर्ण भूमिका निभाई है।

शिक्षा एक दीर्घकालीक और बहुआयामी घटक है। इसलिए इसकी सर्वमान्य परिभाषा संभव नहीं है। अनेक विद्वानों एवं चिन्तकों ने इसे परिभाषित करने का प्रयास किया है। पश्चिमी विचारक रूसों का मानना है कि ''शिक्षा जीवन है। शिक्षा का केन्द्र छात्र–छात्राएँ हैं। इसलिए शिक्षा का ध्येय व्यक्तित्व का विकास करना है।'' यह परिभाषा व्यापक और सार्थक है। पाश्चातय विद्वानों की भांति भारतीय विद्वानों ने भी अपने ढंग से शिक्षा की परिभाषा दी है। महात्मा गांधी के अनुसार, ''शिक्षा से मेरा अभिप्राय बालक तथा प्रौढ़ के शरीर, मन तथा आत्मा में अन्तर्निहित शक्तियों के सर्वांगीण प्रकटीकरण से है।'' उन्होंने शिक्षा का अर्थ मानव के अन्दर गुणों का सर्वांगीण विकास माना है और उन्होंने कहा ''साविद्या या विमुक्तये'', अर्थात 'जो मुक्ति के योगय बनाए वह विद्या, बाकि सब अविद्या'। उन्होंने शिक्षा के अर्थ में नैतिकता को प्राथमिकता दी है। जिससे मानव को मुक्ति मिलती है। विवेकानन्द ने कहा है कि ''मनुष्य की अन्तरचिन्हित पूर्णता को अभिव्यक्त करना ही शिक्षा है।'' उनके कथन से यह ज्ञात होता है कि शिक्षा मानव में नैतिकता को विकसित कर उनमें आध्यात्मिकता की भावना जागृत करती है। जिससे उनका आत्मबल बढ़ता है। फलतः इससे उनके जीवन में 'सत्यम, शिवम, सुन्दरम' का भाव मुखर होता है।

डॉ. राधा कृष्णन के अनुसार, ''शिक्षा का उद्देश्य व्यक्ति और समाज का निर्माण करना होना चाहिए।'' उनके द्वारा शिक्षा के व्यक्तिक एवं सामाजिक उद्धेश्य की ओर संकेत मिलता है। इसके अतिरिक्त यह

शिक्षा, जीवन और मनुष्य, जाति, मन और मानवता की ओर इंगित करता है, साथ ही संबंध की स्थापना में सहायक है।

पाश्चात्य एवं भारतीय विद्वानों द्वारा दी गई शिक्षा की परीभाषा पर दृष्टि डालने से यह स्पष्ट होता है कि इनकी परिभाषाएँ तत्कालीन परिस्थितियों एवं आवश्यकताओं के आधार पर उनके जीवन दर्शन की पूर्ण अभिव्यक्ति है। विशेषकर, महात्मा गांधी और विवेकानन्द की परिभाषा में शिक्षा की व्यापतका समाहित है। उन्होंने शिक्षा को सर्वांगिण प्राथमिकता दी है। शिक्षा समाजिकरण का एक मुख्य घटक है जो जीवन में लोगों के समायोजन के लिए संजिवनी का काम करती है। व्यक्ति और समाज में पूरक संबंध है जहाँ उसकी सारी क्रियाएँ घटित होती है और जहाँ का प्रत्येक प्रौढ़ व्यक्ति शिक्षक की भूमिका निभाता है अर्थात जिससे व्यक्ति आजीवन शिक्षा ग्रहण करता है।

आधुनिक मनोवैज्ञानिकों एवं शिक्षा शास्त्रियों के बीच एक नई विचार धारा विकसीत हो रही है। जिसके अनुसार जीवन के सभी व्यवहार एवं दृष्टीकोण किसी न किसी समय में वयक्ति के व्यक्तित्व से प्रभावित होते हैं। आइजिंक (1947) ने महिलाओं में उच्च शिक्षा के प्रति जागरूकता पर विचार भी इस दृष्टीकोण का अपवाद नहीं है। उक्त व्याख्या से यह स्पष्ट हो चुका है कि महिलाओं का उच्च शिक्षा के प्रति दृष्टिकोण उनके अनेकानेक व्यक्तिगत एवं बाह्य तत्वों से प्रभावित होता है।

परिकल्पना

शिक्षा वयस्क जीवन के प्रति स्त्रियों के विकास के लिए एक आधार के रूप में विशेष रूप से महत्वपूर्ण भूमिका निभाती है। शिक्षा अन्य अधिकारों को सुरक्षित करने के लिए लड़कियों और महिलाओं को सक्षम करने में एक महत्वपूर्ण भूमिका निभाती है। शिक्षा के माध्यम से महिलाएँ अपनी नेतृत्व क्षमता संचार और कौशल को निखारती हैं। साथ ही वित्तीय प्रबंधन, समस्या समाधान, निर्णय लेने की क्षमता को मजबूत करने में शिक्षा महत्वपूर्ण भूमिका निभाती है। शिक्षा के माध्यम से महिलाएँ पेशेवर और व्यक्तिगत जीवन में उत्कृष्टता प्राप्त करने में सक्षम हैं।

महिला शिक्षा के परिणामस्वरूप महिलाएँ सभी प्रकार की सरकारी व गैर सरकारी संस्थाओं में काम करने लगी हैं। अपनी आजीविका के लिए उसमे स्वयं नौकरी करने, वेतन प्राप्त करने की जिज्ञासा क्रमशः बढ़ती गई। स्वयं उपार्जन के कारण उनमें आत्म विष्वास बढ़ा जिससे पुरूशों पर निर्भरता की भावना क्रमशः समाप्त होती चली गई। साथ ही वे परिवार के भरण–पोशण में अग्रणी भूमिका निभाती हैं। महिलाओं के उस प्रगतिशीलता के दो प्रमुख परिणाम हुए। पहला कि उनमें बहुआयामी जागृति आई और दूसरा उनमें अधिक से अधिक अधिकार प्राप्त करने की भावना विकसित हुई है। प्रगतिशील महिलाओं में अधिक से अधिक अधिकार की चाहत रखने लगी हैं। आज भी भारत की जनसंख्या का एक बड़ा हिस्सा न केवल गरीब है अपितु अशिक्षित भी है। यहाँ की जनसंख्या का लगभग 26 प्रतिशत भाग अशिक्षित है। समाज में एक ओर जहाँ उच्च शिक्षा प्राप्त लोग है, वहीं दुसरी ओर अनपढ़ एवं अशिक्षित परिवार भी है। दोनों ही प्रकार के परिवार का आन्तरिक वातावरण एक जैसा होना संभव नहीं है। जिन परिवारों के अधिकांश लोग पढ़े–लिखे हैं उन परिवारों का वातावरण उन्मुक्त एवं कुन्ठामुक्त देखा गया है। किन्तु अनपढ़ परिवार अन्धविश्वास, संकीर्ण विचार और रूढ़िवादिता का शिकार होता है। अशिक्षित परिवारों में आज भी आधुनिक विचारों का समावेश नहीं हो पा रहा है। बालक एवं बालिकाएँ परिवार के अनुरूप ही विचार, परंपरा एवं मान्यताओं को ग्रहण करते हैं। माता–पिता के शैक्षणिक स्तर का छात्राओं के शैक्षिक विकास पर भी निश्चित रूप से प्रभाव पड़ता है। इस पृष्ठभूमि में यह प्राकल्पना स्थापित किया जाता है कि उच्च शिक्षित माता–पिता के छात्राओं में मध्यम एवं निम्न शिक्षित माता–पिता की छात्राओं की अपेक्षा अधिक अनुकूल जागरूकता पायी जायेगी।

विधि

छात्राओं के बीच जागरूकता का अर्थ और उसके शैक्षिक विकास से है। शैक्षिक विकास के साथ ही संपूर्ण रूप से विकास जागरूकता के अंतर्गत आता है। शैक्षिक स्तर का मापन, माता–पिता के शैक्षिक स्तर के प्रभाव का छात्रओं के शैक्षिक विकास के निर्धारक के रूप में सम्मिलित करने के पिछे शैधान्तिक पृष्ठभूमि यह रही है कि शिक्षित माता–पिता अपने बालिकाओं को अद्यतन शैद्धांतिक उपलब्धियों से परिपूर्ण करना चाहते हैं। वर्तमान सामाजिक परिवेश में कभी–कभी इसका विपरित परिणाम भी देखने को मिलता है। उदाहरण स्वरूप, बहुत अधिक शिक्षित एवं प्रबुद्ध परिवार के बच्चे भी विकृत हेा जाते हैं और अनुकूल शैक्षिक उपलब्धि को नहीं प्राप्त कर पाते हैं। प्रयोज्यों के माता–पिता के शैक्षणिक स्तर को जानने के लिए उनसे व्यक्तिगत सूचना–पत्र में निम्न प्रश्न पूछा गया– ''आपके माता–पिता/अभिभावक का शैक्षणिक स्तर क्या है? जो आपको ठीक लगे उसके आगे टिक का चिन्ह् लगाकर उत्तर दें।

(क) स्नातकोत्तर कक्षा तथा उससे उपर।
(ख) स्नातक कक्षा तक।
(ग) मैट्रिक कक्षा या उसके निचे।

अभिभावक के रूप में माता–पिता के शैक्षणिक स्तर को दिखाया गया है। परन्तु अध्ययन हेतु पिता की शिक्षा को आधार मानकर सर्वेक्षण कार्य किया गया है।

प्रति

यह विदित है कि शिक्षा के अच्छे केन्द्र यथा विद्यालय व महाविद्यालय शहरों में अवस्थित होते हैं तथा उच्च व स्तरीय शिक्षा के प्रति जागरूक छात्र–छात्राएँ शहरों की ओर उन्मुख होते हैं। ऐसे में शोध हेतु प्रतिदर्श चयन के लिए उत्तर बिहार के केन्द्र रहे मुजफ्फरपुर शहर में अवस्थित अग्रणी महिला महाविद्यालयों को चुना गया। इन महाविद्यालयों का महिला शिक्षा एवं उनके सशक्तिकरण में विशिष्ठ योगदान रहा है। यहाँ से पढ़ चुकी छात्राओं ने विज्ञान, शिक्षा, राजनिति, समाज सेवा, चिकित्सा जैसे जीवन के सभी महवपूर्ण क्षेत्रों में विभिन्न पदों को अपने कर्म से सुशोभित किया है।

यह अध्ययन कार्य 300 स्नातकोत्तर छात्राएँ जो बी. आर.ए. बिहार विश्वविद्यालय, मुजफ्फरपुर के अंतर्गत संचालित हो रहे विभिन्न कॉलेजों में स्नातकोत्तर कक्षाओं में अध्ययनरत चयनित छात्राओं पर किया गया है। प्रतिदर्श का चयन यादृच्छिक प्रतिचयन विधि की सरल यादृच्छिक विधि से किया गया। इस विधि से तात्पर्य लापरवाही या अनियमितता का नहीं है। बल्कि इसके विपरीत इस विधि द्वारा किसी संपूर्ण जनसंख्या के प्रतिनिधि स्वरूप एक प्रतिदर्श के चयन का मतलब रहता है। इसी विधि के द्वारा 300 प्रतिदर्श का चयन एम. डी. डी. एम. कॉलेज, मुजफ्फरपुर, आर. बी. बी. एम. कालेज, मुजफ्फरपुर एवं एम. एस. के. बी. महिला कॉलेज, मुजफ्फरपुर में अध्ययनरत स्नातक कला संकाय से किया गया।

परिणाम

यह अध्ययन चयनित प्रतिदर्श पर माता–पिता के शैक्षिक स्तर का महिला जागरूकता मनोवृति पर पड़ने वाले प्रभाव के संदर्भ में किया गया है। सर्वेक्षण हेतु माता–पिता के शैक्षिक स्तर को तीन भागों में विभक्त कर व्यक्तिगत सूचना–पत्र के माध्यम से प्राप्त प्रदत्त का सांख्यिकीय विश्लेषण किया गया। संपूर्ण प्रतिर्श 300 स्नातकोत्तर छात्राओं को प्राप्त प्रदत्त के आधार पर तीन भोगों में विभक्त किया गया।

1- उच्च शैक्षणिक समूह
2- मध्यम शैक्षणिक समूह
3- निम्न शैक्षणिक समूह

तीनों ही समूहों के अंतर्गत प्रयोज्यों की संख्या उच्च समूह के लिए 106, मध्यम समूह के लिए 113 एवं निम्न समूह के लिए 81 निर्धारित हुए। तीनों ही समूहों के माता–पिता के शैक्षणिक स्तर का बालिकाओं के शैक्षणिक विकास पर किस रूप में प्रभाव पड़ता है इससे संबंधित प्राकल्पना की गई है। इस संदर्भ में यह प्राकल्पना की गई कि 'उच्च शैक्षणिक समूह के माता–पिता में मध्यम एवं निम्न शैक्षणिक स्तर के माता–पिता की अपेक्षा बालिकाओं के शैक्षणिक जागरूकता के प्रति अधिक अनुकुल मनोवृति पायी जाएगी।'

इन तीनों ही समूहों से संबंधित माता–पिता एवं बच्चे–बच्चियों से संबंधित प्राप्त प्रदतों का सांख्यिकीय तुलनात्मक विश्लेषण नीचे प्रस्तुत सारणी में किया जा रहा है।

सारणी

उच्च मध्यम एवं निम्न शैक्षणिक स्तर के माता–पिता एवं उनके स्नातकोत्तर कक्षा में अध्ययनरत छात्राओं के बीच शैक्षिक दृष्टिकोण से संबंध का तुलनात्मक विवेचन

समूह	उच्च समूह	मयध्म समूह	निम्न समूह
संख्या	106	113	81
मध्यमान	148.19	156.72	147.14
प्रामणिक विचलन	17.49	15.83	20.47
माध्यमानों की प्र. त्रुटि	1.96	1.51	2.00
मध्यमानों का अंतर	8.55	9.60	1.06
मध्यमानों के अन्तर की प्र. त्रुटि	क–ख 2.78	ख–ग 2.52	ख–ग 2.50
टी–अनुपात	क–ख 3.90	ख–ग 3.53	क–ग 0.398
सार्थकता स्तर	0.01	0.01	असार्थक

उपर दिए गए सारणी में वर्णित तीनों ही शैक्षिक समूहों के सांख्यिकीय परिणाम के तुलनात्मक विवेचन से यह स्पष्ट होता है कि उच्च शैक्षिक समूह के माता–पिता एवं उनकी बच्चियों के बीच शैक्षिक दृष्टिकोण से प्राप्त प्राप्तांको का मध्यमान उच्च समूह के लिए 148.19, मध्यम समूह के लिए 156.72 एवं निम्न समूहों के लिए 147.14 पाया गया है। तीनों ही समूहों के पृथक–पृथक तुलना से यह स्पष्ट हेाता है कि उच्च एवं निम्न समहों के बीच मध्यमानों का अन्तर 1.06 पाया गया है जबकि उच्च एवं मध्यम के बीच 8.55 का अंतर पाया गया है। मध्यम एवं निम्न के बीच 9.60 अंतर पाया गया है। यह अंतर बहुत बड़ा है। इससे यह स्पष्ट होता है कि मध्ययम वर्गीय शैक्षिक समूह के माता–पिता एवं उनकी बच्चीयों के बीच अधिक अनुकूल एवं जागरूक संबंध पाया गया हैं। प्राप्त ज अनुपात 'क' और 'ख' समूह के बीच 3. 90, 'ख' और 'ग' समूह के बीच 3.53 और 'क' और 'ग' बीच असार्थक संबंध दर्शाता है। जबकि क–ख एवं ख–ग के बीच 0.01 स्तर पर सार्थक सत्यापित

हो रहा है।

उपर्युक्त तीनों ही समूहों के माता–पिता एवं स्नातकोत्तर स्तर में अध्ययनरत छात्राओं से संबंधित प्राप्त निष्कर्ष इस प्रकार हैः–

(क) उच्च शैक्षिक समूह के माता–पिता एवं उनकी बच्चीयों की अपेक्षा मध्यम शैक्षिक समूह में अधिक अनुकुल संबंध एवं जागरूकता पायी गई है। जबकि बच्चीयों में उच्च शैक्षिक समूह के बीच भी अनुकुल संबंध पाया गया है।

(ख) शैक्षिक दृष्टि से माता–पिता के शिक्षा का संबंध पर प्रत्यक्ष प्रभाव पड़ता है। प्राप्त परिणाम से यह स्पष्ट होता है।

उपर वर्णित प्राकल्पना की विस्तृत समीक्षा के उपरांत निष्कर्ष स्वरूप कहा जा सकता है कि यह परिकल्पना विपरीत दिशा में सत्यापित हो रही है।

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A REVIEW ON CHANGE MANAGEMENT BARRIERS AND SOLUTIONS IN MANUFACTURING INDUSTRY

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ABSTRACT

This study is focusing on reviewing and analysing articles based on the topic barriers of change management and corresponding solutions in the manufacturing industry. Several barriers have been identified in manufacturing industries, which reduce overall performance in the manufacturing process, employee effectiveness, production rate, and overall revenue. Specific models of change management are also used in this study, which helps to reduce the barriers to change management in manufacturing industries. ADKAR model, Kotter's 8-step model, and Luecke's 7-step model of change management are used in this study, which are effective for reducing the barriers to change management. Moreover, the importance of blockchain and artificial intelligence technology is also described in this study for reducing the barriers. Besides these, sustainability measures are also derived.

Keywords: *Change management, barriers of change management, digital transformation, ADKAR model, Industry 4.0, transformational leadership, management barriers, legal barriers, workforce barriers, change management model, Kotter's 8-step model, Luecke's 7-step model, blockchain, artificial intelligence, sustainability, Triple bottom line approach*

1. Introduction

Change management refers to the process of continuously changing, renewing, and modifying an organisation's structure, direction, and capabilities to handle the ever-changing needs of internal and external customers. Change management affects both levels of an organisation, such as the strategic level and operation level. Change management of an organisation is also called an organisation's strategy which has been implemented by an organisation to implement changes and renovation. During changes and renewal, several barriers have been faced by an organisation. This study will focus on a paper review or article review based which describes the barriers to change management in the manufacturing industry. Based on the identification of barriers to change management in the manufacturing industry, a suitable model will be implemented to overcome and reduce such barriers. Main aim of this study is to critically review papers or articles to identify barriers regarding change management and predicted models for overcoming such barriers. ***Digital transformation*** is an example of change management which has been used by manufacturing industries. Lack of technological awareness and resistance to individual changes are the barriers identified in digital transformation. Cultural and social barriers are also identified regarding change management in manufacturing industries.

The remaining paper is as follows. Section 2 defines the change management barriers in manufacturing industry. Section 3 explains the change management models are deployed for overcome change management barriers. Section 4 defines the appropriate solutions to overcome change management barriers. In the last, conclusion is drawn in section 5.

2. Change Management Barriers in Manufacturing Industry

Most manufacturing industries have implemented and used ***Industry 4.0 technological revolution*** as change management. ***Industry 4.0*** refers to the fourth revolution of technologies in manufacturing industries (Horváth and Szabó, 2019). It includes changes and revolutions in manufacturing, distribution process, technological implementation, and production. This revolution of industries is an example of change management, which has been adopted by most manufacturing industries. Raj *et al.* (2020), have described the major barriers identified during the implementation of ***industry 4.0 technologies*** in the manufacturing industries. According to Raj *et al.* (2020), ***lack of skilled workforce, shortage of financial resources, conflicts between workers and***

team members due to changing work environment, and ***not capable of adopting new technological changes*** and modifications in the manufacturing process are major barriers. Furthermore, Raj *et al.* (2020), have also described ***low degrees of standardisation, system architecture,*** and ***poor understanding of integration*** are major challenges and barriers regarding change management in manufacturing industries.

As per the view of Raj *et al.* (2020), change management or digital transformation for industry 4.0 revolutions, includes the implementation of modern and engineering tools, such as big data analysis, cloud computing technologies, machine learning algorithms, artificial intelligence, additive manufacturing, and Internet of Things (IoT). These technologies are effective and helpful for improving the manufacturing process (Stentoft *et al.* 2021). Specific barriers have been identified during implementation of these technologies by the manufacturing industries. ***Lack of skilled workforces*** is a major barrier faced by change management in manufacturing industries. Due to these barriers, operating costs of industries have increased, reduction in production rate, increment in employee recruitment, providing training, and difficulties in business enhancement and overall growth have been reduced. On the other hand, Okorie *et al.* (2020), have described that almost 13% to 15% production growth has decreased during covid-19 pandemic in US, UK, and other European countries. Besides these, most manufacturing companies in the US have stated that they have faced challenges during covid-19 and in post-pandemic situations in finding skilled and trained labour to increase production rate.

Lack of financial resources is also a major challenge and barrier for change management in manufacturing industries, and other product and service-based industries. Raj *et al.* (2020), have stated the negative impacts of lack of financial support for small and medium-sized manufacturing industries. Such impacts are increased daily operation costs, reduction in productivity rate, slow revenue generation, employee termination, increased absenteeism, and financial issues among employees. Moreover, ***low degrees of standardisation*** is also a major barrier to change management (Lehominova *et al.* 2020). Due to low degrees of standardisation in manufacturing and other product-based industries, the rate of creativity in production and innovation has decreased, and the identification of unnecessary risks. Furthermore, some conflicts between employees due to implementing new technologies are also barriers which have been identified regarding change management.

Digital transformation is change management, which most manufacturing industries have implemented. On the other hand, Stentoft *et al.* (2021), have described the barriers faced by small and medium-sized manufacturing industries during ***digital transformation***. Stentoft *et al.* (2021), have depicted several ***drivers and barriers related to industry 4.0*** and digital transformation for small and medium-sized manufacturing industries. Such barriers are mainly related to legislation barriers, management barriers, and workforce barriers. Stentoft *et al.* (2021), have identified the main barriers associated with change management in manufacturing industries, which are described in the following:

Legislation barriers

It includes a lack of maintenance of government standards and a lack of awareness about the legal rules and regulations about technological revolution and digital transformation. Furthermore, the chance of violating legal principles, using others' personal information, risk of data security, and a chance of cybercrime are also included in legislative barriers for small and medium-sized manufacturing industries.

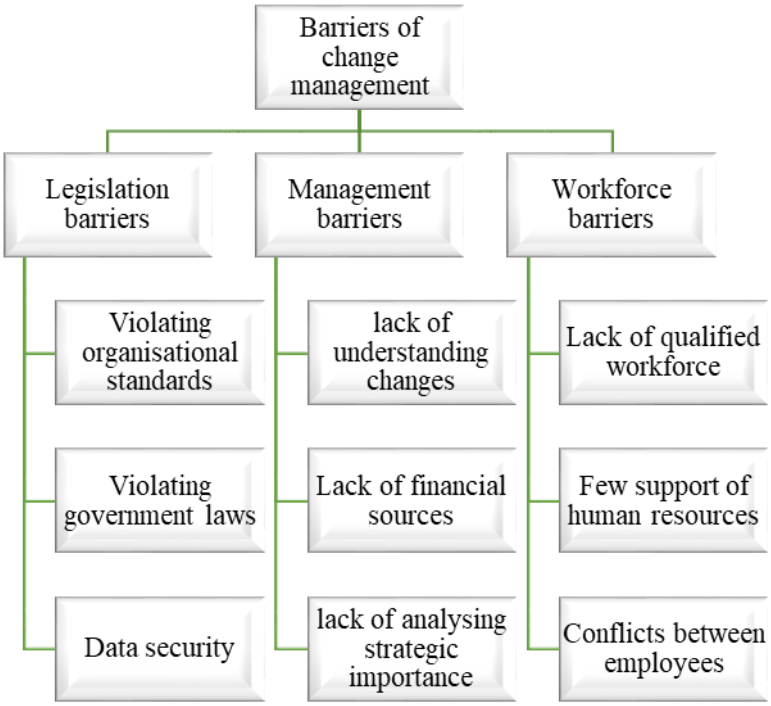

Figure 1: Barriers to Change Management in Manufacturing Industries
(Source: Self-developed)

Management barriers

According to Stentoft *et al.* (2021), ***management barriers of small and medium size manufacturing industries*** are lack of understanding of new technological implementation, lack of understanding of strategic importance, impacts of competitors, lack of financial resources and revenue support, and few support of human resources. ***Negative employee attitudes***are also a barrier identified regarding change management during the implementation of industry 4.0 (Drljevic *et al.* 2020). Limited understanding among the employees about new technologies and change management, inefficient communication, cultural resistance, inequality, social behaviour, unavailability of resources, and lack of collaboration are also identified as management barriers in manufacturing industries. ***Lack of Functional credibility*** is also a management barrier faced by the manufacturing industry. As described by Stentoft *et al.* (2021), management barriers and workforce barriers are majorly responsible for reducing human efforts and overall team performance.

Workforce barriers

Stentoft *et al.* (2021), have also described that several workforce barriers are also identified for ***change management*** in manufacturing industries. During the implementation of industry 4.0, lack of awareness about technologies and lack of skilled workforce are the main barriers. Lack of data protection, lack of training, and lack of understanding of the interplay between technology and human beings are the major barriers identified for workforce barriers for small and medium size manufacturing industries. The above figure depicts the main barriers associated with the workforce of manufacturing industries. Such barriers are few support for human resources, conflicts between employees, and a lack of qualified, skilled, trained, and experienced workforce.

Okorie *et al.* (2020), have described major barriers due to ***covid-19 pandemic*** faced by manufacturing industries. In 2020, most manufacturing companies in the UK are faced with several limitations due to lockdown and the covid-19 pandemic. According to Okorie *et al.* (2020), the main barriers regarding covid-19 during change management are time constraints, disruptions in the supply chain, supply and demand issues, issues associated with material transportation, lack of human

support, and complexity regarding repurposing products and infrastructure of the industry. Moreover, Okorie *et al.* (2020), have also described some other barriers and challenges regarding change management and implementation of industry 4.0 revolutions. Other barriers manufacturing industries faced due to covid-19 are imposed restrictions by the government related to covid-19, covid-19 pandemic-related health concerns, lack of mitigating strategic goals, and unavailability of human resources. During covid-19 pandemic, the most crucial barrier for manufacturing industries and product-based companies is the lack of skilled labour and human support. Furthermore, employees in the digital workplace face lack of technical capability, technical acceptance, and lack of technological awareness among the employees (AlManei *et al.* 2018). In most situations, employees are working from home, which reduces the overall workflow and production rate. Besides these, Okorie *et al.* (2020), have also depicted that safety and regulatory concerns, constraints regarding costs and finance of the manufacturing industry are other barriers to change management. Supply chain disruptions and manufacturing barriers can be managed by implementation of technological tools and industry 4.0 technical revolutions.

The need for change and the strategic adaptation of the manufacturing industries in multinational labels has been essential so that effective and quality materials can be provided by the manufacturers. Different multidimensional challenges have also been faced by the manufacturing industry in India based on the technology, the advancement of globalisation and the change in demand by the customers (Bhat et al., 2021). The requirement of sustainability has also been enhanced due to the dynamic environment and agility based on the holistic approach of manufacturing. One of the major aspects that can be recognised regarding the need for change is the understanding of the different dimensional nature of manufacturing in the country (Forés-Garriga et al., 2021). This multi-dimensional change involves considering various factors which are interconnected in the manufacturing industries like the supply chain management, workforce skills, the integration of technology, and customer satisfaction. The operation of the manufacturers must have multiple perspectives so that different areas can be identified for improvement and innovative technology and ideas can be implemented in those areas so that a comprehensive understanding can be established (Acemoglu, 2021). All this may allow the manufacturing industry to develop effective strategies for maintaining the ecosystem which may allow the manufacturers to provide quality products in a time-efficient manner.

3. Change Management Models to Overcome Change Management Barriers

The above section deals with reviewing some articles for identifying the most important barriers to change management for manufacturing industries. In order to solve such barriers for manufacturing industries, some specific models have been implemented. ***Change management model*** is a type of theoretical approach, methodology, and concept which is mainly used for providing in-depth analysis and description of the changes and modifications in an organisation (Kulikowska-Pawlak, 2018). According to Alqatawenah, (2018), ***transformational leadership*** is an important leadership style, which can be used for influencing and motivating organisations and individuals for competitive advantage. Alqatawenah, (2018), has mainly focused on developing transformational leadership among the manufacturing industries, which affects idealise influence, inspirational motivation, and change management. As per the view of Alqatawenah, (2018), transformational leadership style can be stated as inspiring followers for transcending their interests for organisational benefits. Moreover, this style is also beneficial for improving desirable effects of leadership in organisational changes.

ADKAR Change Management Model

According to Ali *et al.* (2021), ***the ADKAR model*** is an effective change management model, which is helpful for overcoming barriers regarding innovation and changes in manufacturing industries. ***ADKAR change management model*** consists of five main elements, such as ***awareness, desire,***

knowledge, ability, and ***reinforcement,*** which help to strategize business and for limiting resistance related to change management and innovation (Ali *et al.* 2021). This model will be beneficial and applicable for overcoming the risk and chances of occurring these barriers in manufacturing industries.

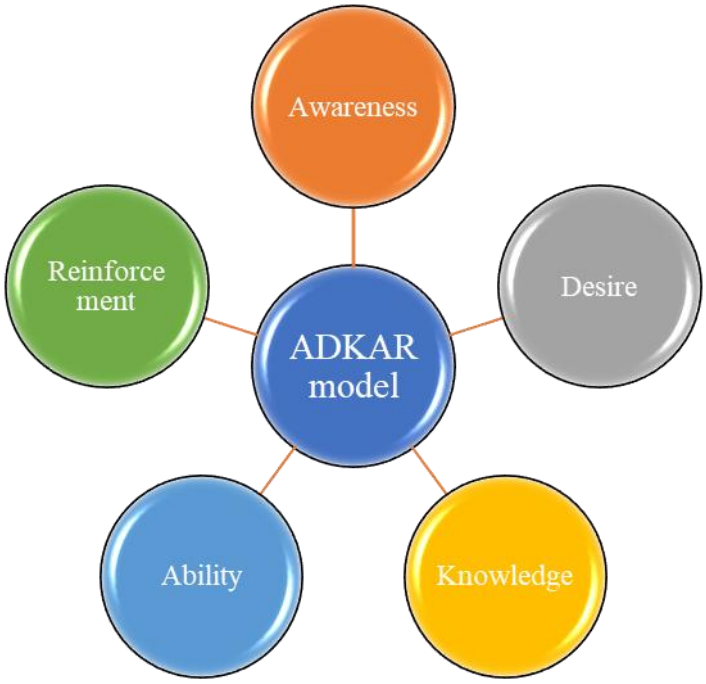

Figure 2: ADKAR change management model
(Source: Self-developed)

Awareness

Awareness is the first step of this change management model. The main aim of this stage is to identify the reason for changes. After identifying the main reasons for changes within the manufacturing industry, eliminating unnecessary wastes, reduction of time-consuming factors, granting a higher level of authority, and providing crucial equipment are mainly easy for overcoming barriers to change management. As described by Stentoft *et al.* (2021), management barriers for small and medium size manufacturing companies, technological implementation and industry 4.0 revolutions are effective for reducing barriers to change management. ***Eliminating time waste*** is effective and helpful for reducing extra costs and improving the financial strengths of manufacturing industries. As per the view of Ali *et al.* (2021), awaring the new technologies and their importance in manufacturing will be effective in reducing organisational barriers and obstacles to change management.

Desire

Desire is the second stage of this change management mode, which refers to empowering and engaging more individuals in changes and innovation in manufacturing industries. According to Ali *et al.* (2021), elements of change management, digital transformation, and revolution of industry 4.0 are complex, critical, and resistable for the employees within the manufacturing industries. Rather than resisting the elements of changes and innovation in the manufacturing process, increasing the desire for the changes will be beneficial for implementing changes and innovation within manufacturing industries. Ali *et al.* (2021), have described that regular communication and involvement of the employees in the change management process is effective for increasing desire within the employees and participants of manufacturing industries.

Knowledge

Knowledge is the third stage of this ADKAR model, which describes learning by sharing skills, abilities, and knowledge about the required changes in the industries and business

organisations. According to Ali *et al.* (2021), ***social learning*** is a beneficial tool for increasing knowledge and required skills for adaptive and maintenance. Furthermore, sharing personal thoughts, abilities, and personal capabilities in decision-making in critical situations is also helpful for reducing barriers and challenges for the manufacturing industries.

Ability

Ability is the fourth stage of the ADKAR model, which refers to identifying and addressing barriers in the manufacturing industry. According to Ali *et al.* (2021), the ability is the way of utilising theory, models, and required technologies which will be implemented for changes in industries. Besides these, ***encouraging people*** to believe in themselves and increase their abilities to adopt the upcoming changes within the industry (Rosdiana and Aslami, 2020). These changes are beneficial for reducing barriers to change and innovation.

Reinforcement

Reinforcement is the last stage of this change management model, which predicts the impacts and effects of changes and innovation within the industry (Cragg and Chraibi, 2020). In this case, mainly impacts on production, maintenance, management, and financial growth are predicted.

Kotter's organisational transformation

According to Odor, (2018), organisational changes and development can be performed using ***Kotter's transformational model*** within a business organisation. Furthermore, innovation and change management can be performed within an organisation by analysing the impacts of internal and external environments within the manufacturing industry. Tang, (2019), has described the importance and use of Kotter's 8-step model for organisational transformation. Kotter has developed 8 stages of change management, which are important and effective for improving organisational changes. Such 8 steps of ***Kotter's change management model*** are increasing urgency, building a guiding team, developing vision, communicating for buy-in, empowering action, creating short-term winnings, not letting up, and making change measurements.

Figure 3: Kotter's change management model for organisation transformation
(Source: Self-developed)

Increasing urgency

This is the first step of Kotter's 8 step model of organisational changes. It refers to identifying and highlighting the potential changes and required modifications within the manufacturing industry. By examining the opportunities which can be improved through continuous innovation and technical implementation, barriers can be reduced and eliminated from the manufacturing processes. Communication barriers in industries can also be reduced by increasing urgency and desire for changes.

Building a guiding team

According to Odor, (2018), developing a guiding team is effective for implementing changes for organisational development and managing innovations. Based on the requirements of the leaders and managers, identification of requirements and changes for manufacturing industries, barriers can be reduced. Moreover, identifying the weak areas and internal and external threats of the industry are also helpful for improving overall team performance and collaborative work culture.

Developing vision and strategy

Developing the vision or strategy of manufacturing industry can be achieved by identifying the core values and determining the required changes in the industry. In order to achieve this vision, the management team within the industries will do further communication and required meetings.

Communication with the vision

After determining the company's vision and aims, communicating with the aims is most crucial and powerful for achieving that. According to Odor, (2018), connecting the vision of the industry with all types of crucial aspects, such as training, reviews, and performance analysis is effective and beneficial for reducing barriers to the manufacturing process.

Empowering action and reducing obstacles

This step helps to ensure that the organisational changes and innovative approaches are effective and helpful for reducing challenges and obstacles during technical implementations. Continuously checking barriers to changes and resistors of manufacturing is also effective for identifying main obstacles within the industry. Besides these, analysing the impacts of these barriers is also effective for predicting solutions.

Creating short-term winnings

This stage of Kotter's 8-stage model helps to create short-term goals and targets which can be achieved easily. According to Odor, (2018), ***the divide and conquer approach*** is beneficial for implementing changes and achieving short-term goals for the manufacturing industry. This approach is based on creating divisions and partitions of the main problems and solving each part is better, rather than solving the whole problem for change management. In this stage, providing rewards and promotions for achieving short-term goals is also effective for improving motivation and personal thoughts. This will be efficient for inspiring employees and participants in the manufacturing process.

Not letting up

Consolidating gains and benefits of changes and innovation are predicted based on the implemented changes and innovative approaches within the manufacturing industry. This step refers to analysing personal strengths and experience to improve overall team performance and reduce barriers to change management.

Measuring changes

This model refers to a step-by-step procedure which consists of providing clear and concise descriptions of the success and positive impacts of implemented changes within the manufacturing industry. This step measures the impacts of changes and innovations within the manufacturing process. There are several advantages and benefits of implementing this Kotter's 8-step model of organisational changes and change management in the manufacturing industry. Such benefits are preparing and building the acceptability of required changes in the manufacturing industry. Besides these, this model is also effective for improving the motivation of all employees within the manufacturing industry.

Luecke's seven steps of organisational change

According to Luecke, (2003), there are seven main steps which are mainly used for managing organisational changes and improvement. Such main changing factors of an organisation are the perceived situation of changes, analysing the existing situation, preparing a change plan according to the

existing situation, trying the plan for implementing changes, overcoming barriers of changes, implementing the changing plan and required situation, and monitor and review the changes. As per the view of Luecke, (2003), these seven steps are mainly used for managing and implementing changes within an organisation.

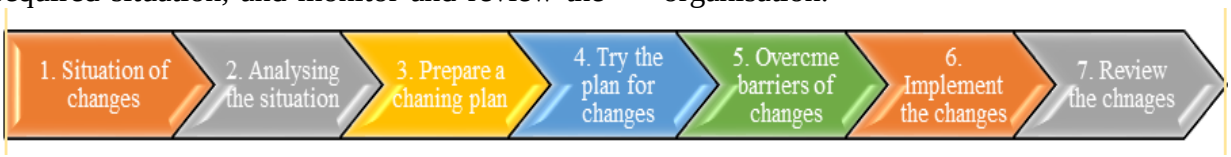

Figure 4: Luecke's seven steps of organisational changes
(Source: Self-developed)

The above image describes the required steps for implementing changes in an organisation. According to Luecke, (2003), at first, the existing condition of an organisation has been perceived before planning for changes, such that this step decides whether changes and innovation are required or not for the organisation. Secondly, analyse the impacts of internal and external variables of the organisation (Raisch and Krakowski, 2020). This helps to determine the strengths and weaknesses of the organisation, and also helps to identify each area required for innovation and changes. On the other hand, Errida and Lotfi, (2021), have also described the use of Luecke's seven steps of changes in an organisation. After analysing the impacts, a suitable plan has been prepared according to the existing situation of the industry or firm. At first try the plan for implementing changes, and monitor the prediction of change management. This model helps to overcome obstacles and barriers faced during implementing the changing plan or modern revolutions. According to ***Luecke's seven-step change management model***, rearrangement of people and employees within an organisation is effective for reducing conflicts and issues of change, Besides these, fear of insecurity, loss of social interactions, discontentment, and fear of position and status among members is also reduced by this model. This model helps to promote and motivate each employee according to the change within the manufacturing industry. Moreover, this model also helps to manage ***effective communication*** between staff and stakeholders (Halou *et al.* 2019). This will be effective in reducing obstacles and barriers to change management in the production and manufacturing industries. Errida and Lotfi, (2021), have described the ways and methods of measuring changes and reviewing changes in the firm or organisation. Such ways are tracking and monitoring change management activities according to the developed plan using Luecke's model, measuring the performance of employees after changes, and measuring the effectiveness of communication and collaboration.

Advantages of change management model

According to Lehominova *et al.* (2020), innovation and change management of an industry leads to competitive advantages, which can be measured by specific factors, such as overall performance, improvement in manufacturing process, and improvement in employees effectiveness and efficiency. Main advantages of change management model are described in the following:

- Understanding the need for changes and innovation
- Reducing human efforts and increasing efficiency
- Improve production rate
- Technological growth and competitive advantages
- Minimising resistance and barriers to change management
- Improving leadership and management role within the organisation

4. Solutions to Overcome Change Management Barriers

There are some specific solutions to overcome barriers and challenges of change management in manufacturing industries. According to Kouhizadeh *et al.* (2021), ***blockchain technology*** is an effective solution for reducing the obstacles, challenges, and barriers to change management in manufacturing industries. Blockchain technology is a

distributed system which is mainly used for ***data security*** and for improving privacy measures for information and communication technology (Tiron-Tudor *et al.* 2021). Kouhizadeh *et al.* (2021), have described the main features and factors which are effective in reducing the barriers of change management in manufacturing industry, and other product-based industries.

According to Kouhizadeh *et al.* (2021), ***implementation of blockchain technology*** plays a major role in improving security systems as well as reducing barriers to change management in the manufacturing industry. Blockchain technology helps to provide more transparency and end-to-end transaction process, which enables effective transaction process and improves overall security systems within the organisation (Breese *et al.* 2019). Moreover, ***end-to-end encryption*** is also used in blockchain technology, which helps with data security and privacy concerns of the consumers of the manufacturing industry (Balci and Surucu-Balci, 2021). Furthermore, Kouhizadeh *et al.* (2021), have also described the importance of blockchain technology for improving disruptions in the supply chain. With the help of blockchain technology, the manufacturing industry can ***digitise physical assets*** and will be able to create a ***decentralised immutable record*** of the transactions (Drljevic *et al.* 2020). Moreover, blockchain is also helpful for tracking assets from production to delivery to the end users of the industry.

On the other hand, Shrivastav, (2021), has described the ***implementation of artificial intelligence*** to reduce barriers to change management and disruptions in supply chain management. Furthermore, some specific barriers to manufacturing industry have also been described, such as technological barriers, political barriers, production barriers, legislation barriers, and socio-cultural barriers (Yams *et al.* 2020). Shrivastav, (2021), has described four main features of AI which help to reduce barriers to change management, such as ***learning, perceiving, acting,*** and ***designing*** (Yams *et al.* 2020**).** Artificial intelligence provides specific and important features for reducing barriers to change management, such as business forecasting, predicting production growth, detecting market growth, and analysing economic factors of the market. According to Shrivastav, (2021), forecasting and machine learning tools are used for ***learning,*** natural language processing and sensors are used for ***perception,*** optimisation, game theory, and simulation are used for ***decision***, and human-AI interaction is used for ***action***.

According to Orji, (2019), has described solutions for deriving sustainable changes in the metal manufacturing industry. Furthermore, several barriers have been examined to implement changes and improve sustainable features within the manufacturing industry. Orji, (2019), has described the importance of ***recycling, reuse,*** and ***reduction,*** for developing sustainable goals. Besides these, ***Triple bottom line approach*** is also used for developing sustainability within the manufacturing industry. Some specific barriers have been identified in this research. Such barriers are inefficient technology, financial constraints, lack of employee welfare packages, lack of sustainable waste management, inefficient legal framework, and lack of awareness about sustainability. Orji, (2019), has described a triple bottom line approach, and recycling, reuse, and reduction process for improving sustainability within the metal manufacturing industry. In order to solve these barriers of change management in the manufacturing industry, ***enforcing government regulations, integrating sustainability, implementing sustainable active plans, developing support of infrastructure,*** and ***promoting sustainable products*** are effective (Orji, 2019). These factors help to develop sustainability and reduce barriers to change management in manufacturing industries.

Resistance to change has been one of the most common barriers which have affected different organisations across different industries and mostly in the manufacturing part. In the case of manufacturing industries different employees resist the change in the process due to the lack of understanding of new technology and also due to the fear of loss of jobs (McGuinness et al., 2021). After working several years in one manner and the sudden change in the rules and responsibilities lead to different concerns about the ability of the employees regarding the adaptation of the new technology. All this has

been the prime factor regarding the implementation of changes.

5. Conclusion

This study was based on the descriptions of barriers to change management and their corresponding solutions to reducing barriers in the manufacturing industry. This study has described all the major barriers related to small and medium-sized manufacturing industries. Main barriers which have been identified in this study are lack of skilled workforce, shortage of financial resources, conflicts between workers and team members due to changing work environment, and not capable of adopting new technological changes within the manufacturing industry. Besides these barriers, lower degree of standardisation, and a lack of skilled workforces are crucial for creating negative impacts on the manufacturing process and overall financial growth. Moreover, this study has described the impacts and barriers regarding covid-19 pandemic faced by manufacturing industries in 2019 and 2020. Furthermore, the impacts of such barriers are also included in this study. In order to solve such issues and barriers to change management, specific models have been implemented in this review.

In this study, mainly three models of change management are used for reducing and solving the barriers to changes and modifications in manufacturing industries. ADKAR model, Kotter's 8-step model of change management, and Luecke's seven steps of change management are used for reducing the barriers to changes in an organisation. Moreover, this study has also described the importance of blockchain technology and artificial intelligence technology for reducing barriers to change management. Furthermore, this review has also contained measures of sustainability and implementation of the triple bottom line approach for reducing obstacles and barriers to the manufacturing industry.

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EXPLORING THE COACHING TECHNIQUES AND SUCCESSES OF JUDO COACH JEEVAN KUMAR SHARMA

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ABSTRACT

This essay explores Judo Coach Jeevan Kumar Sharma's instructional methods and outstanding accomplishments. A multidimensional approach that includes technical accuracy, mental toughness, goal-oriented training, injury avoidance, and unwavering athlete support has defined Coach Sharma's illustrious coaching career. Although the information at hand offers some insight into his teaching philosophy, a thorough examination would require specific insights from Coach Sharma and his athletes. However, the accomplishments of his athletes—such as their participation in the Olympics and many medals from international competitions—provide strong proof of the efficacy of his coaching methods. This case study emphasizes the holistic aspect of successful coaching and the value of athlete well-being, which has wider implications for the martial arts coaching industry. It emphasizes how important it is to conduct additional research on Coach Sharma's methods and whether they apply to other forms of martial arts. Furthermore, investigating methods for preventing injuries in martial arts instruction may enhance athlete security. In summary, the martial arts coaching community can benefit from Coach Jeevan Kumar Sharma's coaching methods and his athletes' accomplishments, which also pave the way for further study to improve coaching approaches and athlete development in combat sports.

Keywords: *Coaching techniques, Coaching successes, Martial arts coaching, Technical precision, Mental resilience, Goal-oriented training*

1. Introduction

Renowned for his decades-long adventure in Judo coaching, Jiwan Kumar Sharma has had an incredible journey. Jiwan Kumar Sharma was born in the Indian state of Himachal Pradesh on September 29, 1961, and has devoted his life to the sport of judo. He attended the Government High School Chintpurni in District Una, Himachal Pradesh, for his early schooling. From 1976 to 1977, he studied at the Government Degree College Hamirpur. Because of his love for judo, Jiwan Kumar Sharma studied for a Coaching Diploma in the sport from 1983 to 1984 at the esteemed National Institute of Sports in Patiala, where he succeeded academically.

His dedication to coaching and fitness was further refined in 2001 when he received an Excellent Grade in Coaching and fitness from TF University in Budapest, Hungary, an International Olympic Committee Diploma program. In addition, he participated in two international coaching clinics held by the International Judo Federation in 1996 and 2002 at Tokai University in Japan and the Kodokan International Institute in Tokyo, Japan. In 2016, Jiwan Kumar Sharma studied Sports Science at Birmingham University in addition to his vast coaching experience. His attainment of a 5th Dan (Degree) Black Belt in India in 2001 and a 4th Dan (Degree) Black Belt from Kodokan, Japan, is evidence of his dedication to being an expert in Judo. In addition, he has overseen multiple national and international competitions in India and has worked as a National A Grade referee since 1987–1988. Beyond coaching, Jiwan Kumar Sharma is devoted to organizing numerous national and international sporting events, seminars, and clinics.

Additionally, he teaches coaches at the National Institutes of Sports and the Judo Federation of India both online and offline. Jiwan Kumar Sharma has studied a wide range of sports-related topics throughout his career, with a focus on Judo. These subjects include general conditioning, sports medicine, sports psychology, sports sociology, general theory & training methods, sports pedagogy, biomechanics, anthropometry, physiology, and basic computer training. On November 5, 1984, he started his illustrious coaching career as a Judo Coach at the National Institute of Sports. He has worked as a coach for many years, having held deputations with the Punjab Sports Department and the Youth Services and

Sports department of the Government of Karnataka, Bangalore.

He also held the position of Chief Coach at the National Institute of Sports Patiala, Centre of Excellence (Judo) from 2000 to 2016, and SAI Bhopal until July 31, 2017. He was employed as a coach by the Sports Authority of India Southern Center in Bangalore. In addition to coaching the Junior National team in 1987, 1988, and 2002, Jiwan Kumar Sharma has vast experience as the Chief National Coach of the National (men and women) from 1996 to 1998, the Chief National Coach of the National women's team from 2002 to 2006, 2012–2013, and 2019–2020. He has prepared and traveled with national judo teams as a coach to numerous major international competitions, such as the Olympics, Grand Slams, Grand Prix, World Championships, Asian Championships, and Commonwealth Championships.

His influence as a coach is global as well. In addition to serving as the coach for Pakistan's women's national judo team in 2005, Jiwan Kumar Sharma has participated in international coaching clinics and seminars in a number of different nations, including the UK, China, Japan, South Korea, Sri Lanka, Egypt, Hungary, France, the Czech Republic, Malta, Vietnam, New Zealand, Syria, Uzbekistan, Kazakhstan, Qatar, Thailand, Austria, Indonesia, Taiwan, Israel, Kyrgyzstan, Spain, and more. In 1984, Jiwan Kumar Sharma became the National Champion in the sport in Kolkata. In 2001, he took part in international events in Osaka, Japan. He won a gold medal in the -81kg division in the inaugural National Masters Championships in Dehradun in 2007 and a bronze medal in the open division in April of the same year.

Figure 1. Dronacharya Awardee Jeevan Kumar Sharma received the prestigious honour from the President of India in 2018.

His accomplishments as a coach are even more remarkable. In 2018, Jiwan Kumar Sharma received the esteemed Dronacharya Award in recognition of his exceptional achievements to the Judo sport. Five Olympians who represented India in Atlanta 1996 (two athletes), Beijing 2008 (one athlete), London 2012 (one athlete), Beijing 2020 (one athlete), and Tokyo 2021 (one athlete) were created under his coaching tutelage. In addition, he has produced over 300 sports personalities who have represented India in a variety of international competitions, including the Olympic Games (Atlanta 1996, Beijing 2008, London 2012, Tokyo 2021), Asian Championships/Games, Commonwealth Championships/Games, World Championships, Grand Slams, Grand Prix, and more. He has also been instrumental in the success of over 200 international medals. Jiwan Kumar Sharma is regarded as a great luminary in the field of sports coaching in India and beyond because of his legacy as a coach and his dedication to the sport of judo. His commitment, expertise, and ceaseless work have inspired countless players and coaches and made a lasting impression on the Judo community.

2. Literature Review

This literature review examines four recent studies in the field of judo that provide light on

various aspects of coaching, athlete development, and coaching competences. These research were conducted in the past few years.

2.1 Discuss relevant literature on coaching techniques in judo and successful coaching in sports.

Palumbo et al. (2021) introduced research entitled ***"Educational Needs for Coaching Judo in Older Adults"***. In this study, Palumbo et al. (2021) address the growing need for specialized coaching in Judo for older adults. The research involved experts from an international consortium of judo and educational partners who participated in focus groups to discuss the educational requirements for coaches working with older judo practitioners. The study identified six key macro-areas, including aging process, safety and first aid, physiology and fitness, psychology and mental health, organization and environment, and adapted judo teaching and training. The findings emphasize the importance of creating educational programs to enhance the quality of older adults' sports experiences in Judo by ensuring safety, enjoyment, social interactions, and learning principles.

Aline Aparecida de Souza Ribeiro et al. (2021) proposed research entitled ***"Talent Identification and Development in Judo: A Perspective from Brazilian Coaches".*** Ribeiro et al. (2021) investigate the crucial role of coaches in identifying and nurturing talent in Judo. The study involves Brazilian judo coaches who were surveyed about the factors they consider important for talent development in young judokas. The results reveal that coaches primarily identify talent through training progression, competition performance, and specific tests. The technical factor is deemed the most important, followed by physical-motor, psychological, tactical, environmental, and anthropometric factors. Grip ability, projection, combination of attacks, and concentration are among the most highly regarded indicators of sporting potential. This study underscores the significance of coaches' knowledge and judgment in talent identification and development.

KwangWoo Nam et al. (2021) investigated research entitled ***"Relationship between Judo Coaches' Authentic Leadership and Athletes' Perceived Performance".*** Nam et al. (2021) explore the connection between authentic leadership in Judo coaches and athletes' self-management and perceived performance. Their study, involving Korean judo athletes, finds that authentic leadership exhibited by coaches positively impacts athletes' self-management, which, in turn, affects athletes' perceived performance. This research highlights the indirect role of authentic leadership in enhancing athletes' performance through the mediation of self-management. It emphasizes the importance of coaches' leadership qualities in shaping athletes' behaviors and outcomes.

Perondi Darlan et al. (2021) proposed research entitled ***"Learning Situations of Expert Brazilian Women Judo Coaches"*** In this study, Perondi Darlan et al. (2021) delve into the developmental trajectories of expert Brazilian women judo coaches. These coaches faced unique challenges, including gender-related barriers and the historical prohibition of women's participation in competitive judo. The research uncovers that personal characteristics, formal, informal, and non-formal learning situations, and the support of family and friends played pivotal roles in these coaches' development. Additionally, the study identifies teamwork and access to scientific information as crucial factors. This study underscores the resilience and resourcefulness of women coaches in overcoming obstacles in their coaching careers, including managing motherhood and household responsibilities.

Monika Kowalczyk et al. (2021) introduced research entitled ***"Principles of Judo Training as an Organised Form of Physical Activity for Children"*** literature review delves into judo training principles and safety considerations tailored for preschool (4-6 years) and school-age (7-12 years) children. It draws from data collected until October 2021 across international scientific databases. The review highlights the diverse training durations, with preschool sessions lasting 30-60 minutes and occurring 2-3 times weekly, while school-age training extends to 45-90 minutes, taking place 3-4 times a week. The most common injuries reported are upper arm injuries, followed by lower limb injuries, underscoring the importance of injury prevention in judo

training for children. Furthermore, the review points to the potential of judo training as a structured form of physical activity that aligns with the World Health Organization's recommendations for children's health. It concludes by emphasizing the need for systematizing judo training methodologies to enhance effectiveness and safety, encouraging further research in this domain for the benefit of young judo practitioners.

Collectively, these studies provide valuable insights into the multifaceted world of Judo coaching, talent identification, leadership, and coach development, offering a comprehensive view of the factors influencing Judo coaching and athlete performance.

2.2 Identify key concepts and theories related to coaching in martial arts.

From the research findings that have been described, the following key principles and theories connected to coaching in martial arts can be identified:

1) ***Specialized Coaching for Older Adults (Palumbo et al., 2021):*** The concept of adapting coaching methods and programs to cater to the unique needs of older adults in martial arts, including safety, physical fitness, and psychological well-being.

2) ***Talent Identification and Development (Ribeiro et al., 2021):*** The theory of talent identification and nurturing, which involves coaches' expertise in recognizing potential in young athletes and developing their technical, physical, and psychological skills.

3) ***Authentic Leadership in Coaching (Nam et al., 2021):*** The theory of authentic leadership in coaching, where a coach's genuine and positive leadership style influences athletes' self-management and overall perceived performance.

4) ***Developmental Trajectories of Coaches (Perondi Darlan et al., 2021):*** The concept of coaches' development, including their personal characteristics, formal and informal learning experiences, and support networks, influencing their coaching careers and resilience in overcoming barriers.

5) ***Structured Judo Training for Children (Kowalczyk et al., 2021):*** The theory of organized martial arts training for children, which includes principles of training duration, safety, and injury prevention, aimed at promoting physical activity and aligning with health guidelines.

These studies collectively contribute to the understanding of coaching in martial arts by addressing age-specific coaching needs, talent development, leadership styles, coach development, and structured training programs for different age groups.

3. Methodology

3.1 Research Design

Depending on the particular subject matter that was investigated in each of the studies that were discussed, the research designs that were utilized included a mix of qualitative and quantitative approaches to data collection and analysis. These studies do not fall neatly into any one type of research design but rather make use of a variety of methods in order to answer their research questions in an efficient manner.

3.1.1 Data Collection Methods:

1. Interviews and Focus Groups (Palumbo et al., 2021; Perondi Darlan et al., 2021): Both studies conducted interviews and focus group discussions with participants to gather qualitative data. Palumbo et al. conducted focus groups with experts from an international consortium, while Perondi Darlan et al. interviewed expert Brazilian women judo coaches. These methods allow for in-depth exploration of the subject matter.

2. Questionnaires and Surveys (Aline Aparecida de Souza Ribeiro et al., 2021; KwangWoo Nam et al., 2021): Ribeiro et al. administered an online questionnaire to Brazilian judo coaches to collect quantitative data on talent identification and development. KwangWoo Nam et al. used questionnaires to gather data on the relationship between coaching leadership and athlete performance among Korean judo athletes.

3.1.2 Data Analysis Techniques

- **Thematic Analysis (Palumbo et al., 2021; Perondi Darlan et al., 2021):** Thematic analysis is a qualitative data analysis method used to identify, analyze, and report patterns (themes) within the data. It involves coding and categorizing qualitative data to identify recurring themes and patterns in the interviews or focus group discussions.

- **Quantitative Analysis (Aline Aparecida de Souza Ribeiro et al., 2021; KwangWoo Nam et al., 2021):** Quantitative data collected through surveys and questionnaires are likely analyzed using statistical methods. These may include descriptive statistics, correlations, and regression analyses to explore relationships and patterns in the data.

These investigations make use of a wide variety of research methods to acquire both qualitative and quantitative data. Some examples of these approaches are interviews, questionnaires, and focus groups. Ethical requirements, such as informed consent and confidentiality, are probably adhered to, and the process of data processing likely incorporates thematic analysis for qualitative data and quantitative analysis for surveys.

4. Case Description

4.1 Case Description: Judo Coach Jeevan Kumar Sharma

Jeevan Kumar Sharma is a well-known name in the field of judo instruction. He is revered for the extraordinary contributions he has made to the sport over the years. He was born on September 29, 1961 in Himachal Pradesh, India, and has had a considerable influence on the growth of judo both domestically and internationally. His birthday is September 29.

4.1.1 Coaching Career

More than three decades ago, Jeevan Kumar Sharma started out on his path to becoming a successful coach. In 1983 and 1984, he attended the prestigious National Institute of Sports in Patiala to get a Coaching Diploma in Judo. He received a first-class certification upon completion of the program. His commitment to judo as well as coaching pushed him to pursue additional international training and experience. In 2001, he earned an International Olympic Committee Diploma in Coaching and Conditioning from TF University in Budapest, Hungary, where he was awarded an Excellent Grade. Throughout his career as a coach, Jeevan Kumar Sharma held various major coaching positions, demonstrating his dedication to the growth of judo in India. These jobs include the following:

- **National Coach:** He served as the National Coach for the Judo Federation of India, overseeing the training and development of top-level judo athletes.
- **Chief Coach, Sports Authority of India (SAI):** Jeevan Kumar Sharma's contributions to Indian judo extended to his role as Chief Coach at the Sports Authority of India, where he played a pivotal role in nurturing young talents.
- **National Head Coach for Women:** He held the prestigious position of National Head Coach for the Indian women's judo team, demonstrating his expertise in coaching female athletes.
- **International Coaching Collaborations:** Jeevan Kumar Sharma collaborated with coaches from various countries, including Japan, Scotland, Uzbekistan, Belarus, and North Korea, in national training camps.

4.1.2 Achievements

The coaching skills of Jeevan Kumar Sharma and his commitment to the sport of judo have led to a number of victories, including the following:

- **Dronacharya Awardee 2018**: In recognition of his outstanding contributions to judo coaching, Jeevan Kumar Sharma was conferred with the prestigious Dronacharya Award by the Ministry of Youth Affairs & Sports, Government of India, in 2018.
- **Olympic Coaching:** He played a crucial role in preparing Indian judo players for the Olympics, with athletes like Nazib Aaga (1996, Atlanta), Sunith Thakur (1996, Atlanta), Divya Tewar (2008, Beijing), and Garima Chaudhary (2012, London) benefiting from his coaching expertise.
- **National A-Grade Referee:** Jeevan Kumar Sharma has been an A-Grade referee in judo since 1987-88, officiating in national and international events in India.
- **International Participation:** He attended various international coaching clinics and seminars, including those organized by the International Judo Federation and the Kodokan International Institute in Japan.

The coaching career of Jeevan Kumar Sharma and the accomplishments he has attained have left an everlasting impact on the world of judo in India as well as worldwide. Because of his unwavering commitment to both the judo

community as a whole and the athletes he trained specifically, he is now held in high esteem by all members of that community.

4.2 Judo athletes he has coached and their accomplishments.

Throughout his time as a coach, highly experienced judo instructor Jeevan Kumar Sharma has worked with a large number of judo competitors, instructing and advising them. The following is a list of some of the athletes he has coached and some of the notable milestones they have achieved:

1. Nazib Aaga:

- **Olympic Appearance:** Under the coaching of Jeevan Kumar Sharma, Nazib Aaga represented India in the 1996 Atlanta Olympics.
- **Notable Achievement:** Competing in the prestigious Olympic Games is a significant accomplishment in itself, showcasing the high level of coaching and training provided by Jeevan Kumar Sharma.

2. Sunith Thakur:

- **Olympic Appearance:** Sunith Thakur, another athlete under Jeevan Kumar Sharma's tutelage, also participated in the 1996 Atlanta Olympics.
- **Olympic Experience:** Competing at the Olympic level is a testament to the coaching expertise and athlete development provided by Jeevan Kumar Sharma.

3. Divya Tewar:

- **Olympic Appearance:** Divya Tewar, coached by Jeevan Kumar Sharma, represented India in judo at the 2008 Beijing Olympics.
- **Notable Achievement:** Qualifying and competing in the Olympics is a remarkable accomplishment for any athlete, underscoring the impact of Jeevan Kumar Sharma's coaching.

4. Garima Chaudhary:

- **Olympic Appearance:** Garima Chaudhary, a judoka coached by Jeevan Kumar Sharma, had the honor of competing in the 2012 London Olympics.
- **International Success:** Prior to her Olympic appearance, Garima Chaudhary secured the seventh position in the 63 kg category at the 2011 World Judo Championship and the World Cup, leading to her qualification for the London Olympics.
- **Commonwealth Games Medalist:** Garima Chaudhary also achieved success at the Commonwealth Games and other international events, further highlighting the impact of Jeevan Kumar Sharma's coaching.

The fact that these judoka competed in the Olympics and achieved success on the world arena is evidence of the superior coaching skills possessed by Jeevan Kumar Sharma. His counsel and instruction have been of critical importance in the development of talent and in the preparation of athletes to compete at the top levels of their sport.

Table no. 1 Show athletes, under the coaching of Jeevan 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

These athletes, while working with Jeevan Kumar Sharma as their coach, achieved a number of noteworthy milestones, including participation in the Olympics and victory in international judo championships. Their growth and accomplishments in the sport of judo have been significantly aided by Jeevan Kumar Sharma's teaching, who has been a significant contributor.

5. Findings

In the judo coaching community, Coach Jeevan Kumar Sharma is a highly regarded individual who is recognized for his outstanding

contributions to the sport. In 2018, the Ministry of Youth Affairs & Sports, Government of India, bestowed upon him the esteemed Dronacharya Award in recognition of his outstanding accomplishments in judo coaching. This honor highlights his unwavering dedication to the game and his important contribution to the growth of judo in India. Coach Sharma's reputation is defined by his persistent commitment to developing talent and getting athletes ready to compete at the top levels of the sport over the course of a three-decade coaching career. A notable aspect of Coach Sharma's coaching career has been his crucial involvement in getting Indian judo athletes ready for the Olympics. Several judo competitors, including as Nazib Aaga, Sunith Thakur, Divya Tewar, and Garima Chaudhary, have had the honor of representing India on the biggest platform in the world because to his advice and knowledge.

This achievement is a testament to Coach Sharma's skill as a coach and his capacity to develop elite players. The Olympic adventures of these athletes are proof of Coach Sharma's success-oriented coaching methods and his unshakable dedication to their achievement. The impact of Coach Sharma's coaching is not limited to the Olympic stage. His major influence on the direction of judo in India is further demonstrated by the important coaching posts he has held at both the national and international levels. Coach Sharma has shown his broad participation in the sport by holding positions as National Head Coach for the Indian women's judo team, Chief Coach at the Sports Authority of India (SAI), and National Coach for the Judo Federation of India. His knowledge and skills have been crucial in helping individuals develop and reach their goals of becoming world-class judo practitioners. Coach Sharma has attended coaching clinics and seminars hosted by the International Judo Federation and the Kodokan International Institute in Japan in an effort to get exposure and collaboration on a global scale in addition to his coaching responsibilities. These encounters have probably enhanced his coaching methods and expertise, enabling him to approach coaching from a worldwide viewpoint.

In addition to his work as a judo instructor, Coach Sharma has been a National A-Grade referee since 1987–1988. His involvement in planning seminars and national and international sporting events demonstrates his aptitude for organization and his dedication to the advancement of judo in India as a whole. In an effort to encourage gender inclusivity in the sport of judo, Coach Sharma has held the position of National Head Coach for the Indian women's judo team. His coaching philosophies might include tactics and methods that address the unique requirements and potential of female judo competitors, therefore increasing the sport's diversity and representation. The case study's conclusions draw attention to Coach Jeevan Kumar Sharma's outstanding teaching career, his impact on Indian judo, and his commitment to developing potential on a national and worldwide scale. He is now well-known and revered in the judo world as a result of his accomplishments and dedication to the sport, and in 2018 he was given the esteemed Dronacharya Award. Aspiring judo instructors and athletes can draw inspiration from Coach Sharma's legacy.

5.2 Coaching techniques employed by Coach Sharma.

Although Coach Jeevan Kumar Sharma's exact coaching theories and methods are not covered in great detail in the information that is available, we can deduce some features of his style from his accomplishments and duties as a coach. The following are some possible methods and ideologies of coaching that are connected to Coach Sharma:

1. Individualized Training: Coach Sharma likely emphasizes personalized training programs tailored to each athlete's strengths, weaknesses, and goals. This individualized approach can maximize an athlete's potential and address their unique needs.

2. Technical Emphasis: Given the success of the athletes he has coached, including Olympians, it's likely that Coach Sharma places a strong emphasis on technical proficiency. He may prioritize refining judo techniques, such as throws, pins, and submissions, to ensure athletes have a solid foundation.

3. Mental Preparation: High-level judo demands mental toughness and resilience. Coach Sharma may incorporate mental training techniques to help athletes manage stress, maintain focus, and build confidence in competition.

4. Adaptation for Women Athletes: Serving as the National Head Coach for the Indian women's judo team, Coach Sharma may have a philosophy of adapting coaching methods to cater to the specific needs and potential of female athletes. This approach can foster gender inclusivity and promote women's participation in the sport.

5. International Exposure: Coach Sharma's involvement in international coaching clinics and collaborations with coaches from various countries suggests a commitment to staying updated with the latest coaching techniques and international best practices. This exposure can bring a global perspective to his coaching.

6. Injury Prevention: Given his long coaching career, Coach Sharma likely emphasizes injury prevention strategies to ensure the long-term health and well-being of his athletes. This may include conditioning, recovery, and injury management techniques.

7. Goal-Oriented Training: Athletes under Coach Sharma's guidance may be trained with clear, measurable goals in mind, whether those are related to qualifying for major competitions like the Olympics or achieving specific rankings in international events.

8. Family Support: The mention of "family support" in the accomplishments section of his profile suggests that Coach Sharma recognizes the importance of a support system outside of training. This may imply that he encourages a healthy work-life balance for his athletes.

Although Coach Sharma's career and accomplishments suggest certain aspects of his coaching approaches and ideas, a more thorough examination or direct statements from Coach Sharma would offer a more complete picture of his coaching methodology.

5.3 Highlight the successes and achievements of the athletes he has coached.

1) Nazib Aaga (1996, Atlanta Olympics) : Under Coach Sharma's guidance, Nazib Aaga represented India at the 1996 Atlanta Olympics. Competing on the world's biggest stage is a remarkable achievement in itself, and Coach Sharma played a pivotal role in preparing Nazib for this prestigious event.

2) Sunith Thakur (1996, Atlanta Olympics): Another athlete who benefited from Coach Sharma's coaching expertise is Sunith Thakur. Sunith also represented India at the 1996 Atlanta Olympics, showcasing the successful coaching approach employed by Coach Sharma in nurturing talent.

3) Divya Tewar (2008, Beijing Olympics): Divya Tewar, coached by Jeevan Kumar Sharma, had the honor of representing India at the 2008 Beijing Olympics. Competing at the Olympics is a dream for many athletes, and Divya's journey to this global event reflects Coach Sharma's ability to groom and prepare athletes for international success.

4) Garima Chaudhary (2012, London Olympics): Garima Chaudhary, another athlete under Coach Sharma's tutelage, secured a place in the 2012 London Olympics. Her success in entering the Olympic arena is a testament to Coach Sharma's coaching prowess and his commitment to athletes' development.

5) Tokyo 2021 Olympics: Coach Sharma's coaching career also extends to the Tokyo 2021 Olympics. While specific athlete names are not provided, the fact that he trained athletes for this event underscores his continued involvement in preparing Indian judo athletes for the world's most prestigious sporting competition.

6) More Than 200 International Medals: Athletes coached by Coach Sharma have collectively earned more than 200 international medals. These medals represent success at various international competitions, including Asian Championships, Asian Games, Commonwealth Championships/Games, World Championships, Grand Slams, and Grand Prix events.

7) Commonwealth Games 2020 (Birmingham): Coach Sharma's coaching influence extended to the Commonwealth Games in Birmingham in 2020. Again, while specific athlete names and accomplishments are not provided, his involvement in this event demonstrates his ongoing contributions to the success of Indian judo athletes on the international stage.

All of these accomplishments demonstrate Coach Jeevan Kumar Sharma's capacity to develop, educate, and ready judo competitors for victory at the greatest levels of competition. Indian judo has become more well-known internationally as a result of his teaching skills, which have been crucial in helping competitors qualify for and perform well in major competitions like the Olympics, Commonwealth Games, and other international championships.

Table 2. The notable successes and achievements of athletes coached by Judo Coach Jeevan Kumar Sharma:

Athlete	Olympic Participation	Other Notable Achievements
Nazib Aaga	1996, Atlanta	
Sunith Thakur	1996, Atlanta	
Divya Tewar	2008, Beijing	
Garima Chaudhary	2012, London	
Unnamed Athletes (Tokyo 2021 Olympics)	Tokyo 2021	
Collective Achievements		- More than 200 international medals
		- Success at Asian Championships,
		Asian Games, Commonwealth
		Championships/Games, World
		Championships, Grand Slams,
		Grand Prix, and more
		- Commonwealth Games 2020,
		Birmingham

6. Discussion

Coach Jeevan Kumar Sharma's accomplishments and those of his athletes in the field of martial arts instruction, specifically judo, are indicative of various important ideas and concepts that have been covered in the literature. Even with the scant information given, some conclusions can be made. The apparent emphasis on technical quality is one noteworthy feature. The success of Coach Sharma's athletes at the international level suggests that a great emphasis is placed on learning the fundamentals of judo. This is consistent with the body of research on martial arts coaching that emphasizes the need of technical mastery as the cornerstone of combat sport success. Mental preparedness is another important component. It takes more than just athletic skill to succeed in competitions like the Olympics—mental toughness is also necessary. It's possible that Coach Sharma's athletes participated in mental training, a well-researched martial arts coaching technique meant to improve athletes' capacity for mental toughness, concentration, self-assurance, and stress reduction. For judo and other martial arts practitioners to perform at a high level, the integration of physical and mental training is essential. The results suggest a training strategy that is goal-oriented. Athletes under Sharma's coaching have accomplished incredible feats, such as competing in the Olympics. This implies using goal-setting techniques in training, which is a standard coaching technique in martial arts. Throughout their training adventures, athletes may stay inspired, monitor their progress, and stay focused with the support of specific, measurable targets. It's interesting that injury prevention is brought up. It seems sense to believe that Coach Sharma gave injury prevention and management techniques for his athletes top priority given his long coaching career. This is consistent with the literature on martial arts coaching, which emphasizes the importance of player safety and well-being as essential elements of an effective coaching strategy.

6.1 Effectiveness of Coach Sharma's Coaching Techniques

The accomplishments of Coach Sharma's athletes provide witness to the efficacy of his teaching methods, even though a thorough examination of them would necessitate more specific data. His ability to develop athletes to the Olympic level and win multiple medals at the international level demonstrates how effective his coaching methods are. He probably blends goal-setting, mental toughness, technical training, and injury avoidance in his holistic coaching approach, which enhances his overall success.

7. Conclusion

We have examined the teaching methods and accomplishments of Judo Coach Jeevan Kumar Sharma in this extensive case study. A more thorough analysis would require access to specific coaching approaches and firsthand knowledge from Coach Sharma and his athletes, even though the information that was accessible gave a look into his coaching career and the accomplishments of his athletes. A significant emphasis on technical proficiency, mental preparation, goal-oriented training, injury avoidance, and the value of a support system are probably all part of Coach Sharma's coaching philosophy. These components are consistent with current martial arts teaching practices and have helped his athletes succeed, as seen by their participation in the Olympics and other international medals. This case study has ramifications that go beyond Coach Sharma's accomplishments personally. It emphasizes the value of comprehensive coaching methods that take into account both mental and physical components. His accomplishments in preparing players for international tournaments highlight how crucial goal-setting, individualized training regimens, and mental toughness are to martial arts coaching.

A commitment to athlete safety and well-being is seen in the emphasis on injury prevention, which is an essential component of ethical coaching in combat sports. The success and general well-being of athletes are influenced by their support network, which includes their families. This case study is important for the martial arts coaching industry as a whole. It serves as a reminder of the complexity of good coaching, which includes injury avoidance, mental toughness, goal-setting, and technical skill. As martial arts continue to grow in popularity throughout the globe, developing future champions and protecting players' wellbeing depend on coaches having a solid understanding of effective coaching methods.

7.1 Areas for Future Research

This case study clarifies Coach Sharma's coaching career but also emphasizes the need for more study in this area. Direct interviews and a thorough examination of Coach Sharma's coaching techniques may be beneficial additions to future research. Insights regarding how his coaching affected his athletes' professional and personal growth might also be gained by looking at their viewpoints and experiences. Future studies should look into how well Coach Sharma's coaching methods translate to different martial arts specialties and athletic environments. Additionally, studies on injury avoidance techniques and how well they work in martial arts instruction may improve athlete safety. Lessons for the wider martial arts teaching industry can be learned from Coach Jeevan Kumar Sharma's methods and his athletes' accomplishments. This case study emphasizes the value of a comprehensive coaching strategy and lays the groundwork for future studies to improve athlete development and coaching methods in combat sports.

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ABUNDANCE OF AVIFAUNA DIVERSITY IN DIFFERENT TRANSECTS OF SOUTH KASHMIR, INDIA

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ABSTRACT

The understanding of avifaunal diversity and distribution plays a vital role in making appropriate conservation efforts. This study was conducted to explore the diversity, distribution and relative abundance of bird species in four transects of South Kashmir viz Lalchowk, Hutmurah, Seer and Akad. The data was collected over a period of one year i.e. from 2021 to 2022, during both wet and dry seasons. Point count methods were employed to identify and record birds in the four transect areas of South Kashmir viz Lalchowk, Hutmurah, Seer and Akad. Natural forest, plantation, settlements etc were identified as a significant habitat for the birds. During the study in the four selected transects, n=23 species of birds spread over 6 orders and 13 families were observed. In the entire four transects, order Passeriformes were found to be predominant order amongst all orders with overall number (n=26) species and family Hirundinidae (n=2) and Leoithrichidae (n=2) were found to be dominant families amongst all families. Transect wise highest species diversity was recorded in transect II with Shannon-wiener's diversity index value 2.06 followed by transect IV with a species diversity index 2.21. The least species diversity index was observed in transect I and III with a species diversity index value of 2.07 and 1.99, respectively. Statistical analysis through ANOVA showed that there is no statistically significant difference in the mean avifauna diversity in different seasons (F=2.6, F Crit= 3.49, df = 3,12, p-Value = 0.09 (p value > 0.05). During the current study, the most predominant species in terms of abundance are Acridotheres ginginianus, Columba livia, Corvus splendens, Passer domesticus and Pycnonotus leucogenys. The present study concluded that the predominant species have successfully adapted themselves to the challenging environment.

Keywords: Avifauna, Diversity, Relative Abundance, Species richness, species evenness, Transect, South Kashmir

1. Introduction:

Environmental changes and modifications in natural ecosystem structure have attracted worldwide public concern due to rapid loss of biodiversity. Changes in landscapes caused by human induced disturbances and often result in habitat loss and sub-division significantly influencing the patterns of terrestrial species distribution and abundance. Birds are among the best indicators of environmental changes. They are being eye-catching and sensitive towards environmental changes, seen as the most suitable biological indicators for monitoring the ecosystem health. Studies of avifauna diversity is an essential ecological tool in the ecosystem. Bird species not only add aesthetic value to our life but also helps in control of pest in agricultural crops, dispersal of seeds and also in maintaining a healthy ecological balance, thus they form an important components in natural ecosystem.

Most of the anthropogenic activities have made greater impact on distribution and abundance of avifauna. Most of the anthropogenic activities have negative effect on fitness, reproduction, feeding and even normal social behaviour. However avifaunal abundance in lesser human interference has not been documented. The present study aims to understand bird abundance and its distribution in urban and rural areas of South Kashmir. This study would also be baseline for further studies on bird species distribution and its abundance in four transects of South Kashmir one urban area i.e., Lalchowk, three rural areas viz Hutmurah, Seer and Akad.

Kashmir valley is home to 187 breeding species spread over 46 families and 16 orders (Shah and Qadri, 1988; Shah *et a*l. 2013). Avian abundance is also affected by other factors like migration, natality, and mortality or due to changes in habitat structure and distribution patterns of food resources. Birds are inevitable predictors and determiners of integrity and function of habitats (Mukhopadhyay and Mazumdar 2019) ecosystem vibrancy and stress (MacArthur and MacArthur 1961: Taper *et al* 1995), richness and conservation significance (Pearman 2002 Bensizerare *et al.* 2013)

2. Materials and methods:

The study was conducted in four transects of South Kashmir. The central site of the study was selected as District Anantnag with geographical coordinates 33.7050°N latitude, 75.2479°E longitude at an elevation of 5300 feet (1600 m) above sea level. The district is located at a distance of 53 kilometers (33 miles) from the union territory capital Srinagar. The plant diversity in the study area includes Platanus orientalis, Juglans, Acacia nilotica, Morus, Vitis vinifera, Malus domestica, Populus deltoids, Salix, Pyrus communis, Prunus avium, Prunus armeniaca, Cedrus deodara, Pinus, Pinus wallichiana, Prunus domestica, Brassica nigra etc.

2.1 Transects of study area:

Study Area	Name of the Transect	Geographical coordinates
Southern landscape of Kashmir valley	Transect I (Lal chowk)	33.7303°N latitude, 75.1505°E longitude
	Transect II (Hutmurah)	33.89845°N latitude, 75.36281°E longitude
	Transect III (Seer)	33.7888°N latitude, 75.2431°E longitude
	Transect IV (Akad)	33.8084°N latitude, 75.2501°E longitude

2.2 Data Collection:

During the period of one year (from December 2021 to November 2022), data were collected in four transects of South Kashmir. Data were collected using Line Transect method and Point Count method. Sampling was taken by walking through the transects. The avifauna diversity was also observed and recorded using Point Count method. In addition to these methods, birds were observed and identified with a pair of 8*43 resolution binoculars and a field guide book was used. Visiting period from season to season differs as harsh climatic conditions restricted the bird movements.

2.3 Data analysis:

The abundance of different species in the transects was recorded. The results can be used to calculate the species diversity or biodiversity for the said transects by using various index parameters. An index of diversity is the measurement that describes the relationship between the number of species present and how each species contributes to the total number of organisms that are present in the community. These indices are statistical representations of biodiversity in different aspects (richness, evenness and dominance).

(a) Species diversity is measured by using Shannon- Weiner's index (H) and Simpson's Diversity index (D). The formula for calculating Shannon- Weiner's diversity index is:

$$H = -\sum pi * \ln pi$$

Where ∑ is a Greek symbol that means 'Sum', pi represents the proportion of entire community of i*th* species, H represents 'Shannon's Diversity Index.

The formula for calculating Simpson's diversity index is calculated as:

$$D = 1 - \left(\frac{\sum n(n-1)}{N(N-1)}\right)$$

Where 'n' is the total number of individuals of a particular species.

N is the total number of individuals of all species or total population.

∑ means sum and 'D' is Simpson's index, which ranges from 0-1.

(b) Species richness: It is the number of species within a defined region. It is represented by following equation:

$$Richness = \frac{Species}{Area}$$

However, this equation does not account for how sample size might affect the results. So, for this Margalef's index or Menhinick's index are used. The Margalef's index is represented by the equation:

$$\text{Richness} = 1 - \frac{S}{\ln(N)}$$

Whereas, Menhinick's index is calculated by:

$$\text{Richness} = \frac{S}{\sqrt{N}}$$

In both the above equations, higher the number returned, higher the richness of the species.

(c) Relative abundance: It is calculated by:

$$\frac{ni}{N} * 100$$

Where *ni* represents the number of i*th* species, *N* is the total count in the area.

(d) Species Evenness: It is also known as Equitability and is denoted by 'E'. It is calculated by:

$$E = \frac{H}{Hmax}$$

E= H/Hmax = ln(R), where R is species richness, H represents observed species, Hmax is the log of total number of species richness (Krebs 1985).

To compare the data and analyse if there is significant difference or no difference in mean diversity between the transects, ANOVA is employed. The attributes of ANOVA include*:* *F* Distribution value, *F Crit*, *df* and P value. If P value is greater than 0.05 validates null hypothesis and if P value is less than 0.05 validates rejection or null hypothesis.

3.Result and discussion:

3.1 Avifauna diversity observed in Transect I:

Table 1: Species diversity observed in Transect I (Lal Chowk)

S.NO	COMMON NAME	SCIENTIFIC NAME	ORDER	FAMILY
1	House Sparrow	*Passer domesticus*	Passeriformes	Passeridae
2	Himalayan Bulbul	*Pycnonotus leucogenys*	Passeriformes	Pycnonotidae
3	Blue Rock Pigeon	*Columba livia*	Columbiformes	Columbidae
4	Large billed crow	*Crovus macrorhynchos*	Passeriformes	Corvidae
5	Wood Pigeon	*Columba palumbus*	Columbiformes	Columbidae
6	Common Swallow	*Hirundo rustica*	Passeriformes	Hirundinidae
7	Common Myna	*Acridotheres tristis*	Passeriformes	Sturnidae
8	Black Kite	*Milvus migrans*	Accipitriformes	Accipitridae
9	common babbler	*Turdoides caudata*	Passeriformes	Leoithrichidae
10	House Crow	*Crovus splendens*	Passeriformes	Corvidae
11	Eurasian Hoopoe	*Upupa epops*	Buccrotiformes	Upupidae
12	Great tit	*Parus major*	Passeriformes	Pridae
13	Eurasian jackdaw	*Crovus monedula*	Passeriformes	Corvidae
14	Himalayan woodpecker	*Dendrocopos himalayensis*	Piciformes	Picidae

3.2 Relative abundance of avifauna month wise in transect I:

In Transect 1, a total number of 14 bird species were observed during the study period. Common Myna (*Acridotheres tristis)* was observed to be the most predominant species in terms of abundance with annual relative abundance of 22.37, followed by Blue Rock Pigeon (*Columba livia)* with annual relative abundance of 20.67, House Crow (*Crovus splendens) with annual relative abundance* of 17.91 and House Sparrow (*Passer domesticus)* with an annual relative abundance of 16.04. The other dominant species are Himalayan Bulbul (*Pycnonotus leucogenys*) with annual relative abundance of 5.52, followed by Wood Pigeon (*Columba palumbus*) with annual relative abundance of 3.11, Black Kite (*Milvus migrans),* Himalayan Woodpecker (*Dendrocopos himalayensis),* Large Billed Crow (*Crovus macrorhynchos*) with annual relative abundance of 3.65,3.83, 2.67 respectively. Least dominant species were Common Swallow (*Hirundo rustica)* with annual relative abundance of 1.06 and Eurasian Hoopoe (*Upupa epops*) with annual relative abundance of 1.06.

3.3 *Species Diversity in Transect I:*

***(a) Shannon-Weiner's index value*:** The species diversity in Transect I was recorded highest in the month of May, June and August. The lowest value was recorded in the month of January, November and December with Shannon= Weiner's index value (H) was 2.07.

(b) Species Richness: The species Richness was highest recorded in the month of May (12 species), June (12 species) and August (12 species) followed by February, March, April, September and October with number of 11 species each month. The least species richness was recorded in the month of November, December and January with richness of 10,10 and 8 species respectively.

(c) Species Evenness or Equitability (E): The species Evenness was highest recorded in the month of January with an evenness of 1.00 followed by December and November with an evenness of 0.90 each. Evenness was also recorded high in the month of February, March, April, July, September and October with an evenness of 0.86 each month. The lowest evenness was recorded in the month of May, June and August with an evenness of 0.83.

Table 2: Species Richness and Species Equitability Transect I

Month	**Dec. 2021**	**Jan. 2022**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sept.**	**Oct.**	**Nov.**
Species Richness	10	8	11	11	11	12	12	11	12	11	11	10
Species Equitability	0.90	1.00	0.86	0.86	0.86	0.83	0.83	0.86	0.83	0.86	0.86	0.90

3.4 Avifauna diversity observed in Transect II:

Table 3: Species diversity observed in Transect II (Hutmurah)

1	Common Myna	*Acridotheres ginginianus*	*Passeriformes*	*Sturnidae*
2	House crow	Crovus splendens	*Passeriformes*	*Corvidae*
3	Blue Rock Pigeon	*Columba livia*	*Columbiformes*	*Columbidae*
4	House Sparrow	*Passer domesticus*	*Passeriformes*	*Passeridae*
5	Black Kite	*Milvus migrans*	*Accipitriformes*	*Accipitridae*
6	Himalayan Bulbul	*Pycnonotus leucogenys*	*Passeriformes*	*Pycnonotidae*
7	Wood Pigeon	*Columba palumbus*	*Columbiformes*	*Columbidae*
8	Eurasian Hoopoe	*Upupa epops*	*Buccrotiformes*	*Upupidae*
9	Great tit	*Parus major*	*Passeriformes*	*Pridae*
10	Common Golden backed woodpecker	*Din opium Javanese*	*Piciformes*	*Picidae*
11	Grey warbler	*Gerygone igata*	*Passeriformes*	*Acanthizidae*
12	White Tailed Eagle	*Haliaeetus leucogenys*	*Accipitriformes*	*Accipitridae*
13	Golden Eagle	*Aquila Chrysaetos*	*Accipitriformes*	*Accipitridae*
14	Himalayan vulture	*Gyps himalayensis*	*Accipitriformes*	*Accipitridae*
15	Indian koel	*Eudynamys scolopaceus*	*Cuculiformes*	*Cuculidae*
16	Snow Pigeon	*Columba leuconota*	*Columbiformes*	*Columbidae*

3.5 Relative abundance of avifauna month wise in transect II:

In Transect II, a total number of 16 bird species were observed during the study period. Common Myna (*Acridotheres tristis)* was observed to be the most predominant species in terms of abundance with annual relative abundance of 28.92, followed by Blue Rock Pigeon (*Columba livia)* with annual relative abundance of 19.08, House Crow (*Crovus splendens) with annual relative abundance* of 17.36.The other dominant species are House Sparrow (*Passer domesticus)* with an annual relative abundance of 7.46 followed by Golden Eagle (*Aquila Chrysaetos)* with annual relative abundance of 6.52, Black Kite(*Milvus migrans)* with annual relative abundance of 6.19 and Himalayan Bulbul (*Pycnonotus leucogenys)* with annual relative abundance of 5.64. Least dominant species were Common Golden Woodpecker (*Din opium Javanese*), White Tailed Eagle (*Haliaeetus leucogenys*), Wood Pigeon (*Columba palumbus*), Eurasian Hoopoe (*Upupa epops*) and Great Tit (*Parus major)* with an annual relative abundance of 2.98,1.43,1.16,0.71 and 0.22 respectively.

3.6 Species Diversity in Transect II:

(a)Shannon-Weiner's index value: The species diversity in Transect II was recorded highest in the month of July, August, September, April, October and November. The lowest value was recorded in the month of March and June. The second lowest number was to be recorded in the month of January, February and December with Shannon= Weiner's index value (H) was 2.06.

(b)Species Richness*:* The species Richness was highest recorded in the month of March (15 species), December (14 species) and October (13 species) followed by January, February, April, and July with number of 12 species each month. The least species richness was recorded in the month of august (11 species) followed by May and September with (10 species) each.

(c)Species Evenness or Equitability (E)**:** The species Evenness was highest recorded in the month of December, June and March with an evenness of 0.94,0.78 and 0.76 followed by

August with an evenness of 0.86 and January, February, April, July and November with an evenness of 0.83. The lowest evenness was recorded in the month of May, September and October with an evenness of 0.14,0.14 and 0.02 respectively.

Table 4: Species Richness and Species Equitability in Transect II

Month	Dec. 2021	Jan. 2022	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.
Species Richness	14	12	12	15	12	10	9	12	11	10	13	12
Species Equitability	0.78	0.83	0.83	0.76	0.83	0.14	0.94	0.83	0.86	0.14	0.02	0.83

3.7 Avifauna diversity observed in Transect III:

Table 5: Species diversity observed in Transect III (Seer)

S. No	Common name	Scientific name	Order	Family
1	Common Myna	*Acridotheres ginginianus*	*Passeriformes*	*Sturnidae*
2	House crow	Crovus splendens	*Passeriformes*	*Corvidae*
3	Blue Rock Pigeon	*Columba livia*	*Columbiformes*	*Columbidae*
4	House Sparrow	*Passer domesticus*	*Passeriformes*	*Passeridae*
5	Black Kite	*Milvus migrans*	*Accipitriformes*	*Accipitridae*
6	Himalayan Bulbul	*Pycnonotus leucogenys*	*Passeriformes*	*Pycnonotidae*
7	Wood Pigeon	*Columba palumbus*	*Columbiformes*	*Columbidae*
8	Eurasian Hoopoe	*Upupa epops*	*Buccrotiformes*	*Upupidae*
9	Great tit	*Parus major*	*Passeriformes*	*Pridae*
10	Golden Eagle	*Aquila Chrysaetos*	*Accipitriformes*	*Accipitridae*
11	Grey warbler	*Gerygone igata*	*Passeriformes*	*Acanthizidae*
12	White Tailed Eagle	*Haliaeetus leucogenys*	*Accipitriformes*	*Accipitridae*
13	Indian koel	*Eudynamys scolopaceus*	*Cuculiformes*	*Cuculidae*
14	Himalayan vulture	*Gyps himalayensis*	*Accipitriformes*	*Accipitridae*

3.8 Relative abundance of avifauna month wise in transect III:

In Transect III, a total number of 14 bird species were observed during the study period. Common Myna (*Acridotheres tristis)* was observed to be the most predominant species in terms of abundance with annual relative abundance of 23.52, followed by House Crow (*Crovus splendens)* with annual relative abundance of 20.21, Blue Rock Pigeon (*Columba livia)* with annual relative abundance of 19.75 and Golden Eagle(*Aquila Chrysaetos)* with annual relative abundance of 11.22. The other dominant species are black Kite (*Milvus migrans)* with an annual relative abundance of 8.79 followed by House Sparrow (*Passer domesticus)* with annual relative abundance of 7.29, Himalayan Bulbul *(Pycnonotus leucogenys*) with annual relative abundance of 5.01. Least dominant species were Wood Pigeon (*Columba palumbus),* Himalayan Vulture (*Gyps himalayensis),* Eurasian Hoopoe (*Upupa epops),* Great Tit (*Parus major),* Indian Koel (*Eudynamys scolopaceus)* , White Tailed Eagle (*Haliaeetus leucogenys),* Grey warbler (*Gerygone igata)* with an annual relative abundance of 1.33,0.98,0.87,0.36,0.36,0.25 and 0.20 respectively.

3.9 Species Diversity in Transect III:

***(a)Shannon-Weiner's index value*:** The species diversity in Transect III was recorded highest in the month of July, September and October. The lowest value was recorded in the month of June, August, April, May and November. The second lowest number was to be recorded in the month of December, January, February and March with Shannon= Weiner's index value (H) was 1.99.

(b)Species Richness: The species Richness was highest recorded in the month of February and November (13 species each) followed by December, January, June and October with number of 11 species each month. The least species richness was recorded in the month of March (10 species) followed by April (9

species), May, August and September with (10 species) each.

(c)Species Evenness or Equitability (E): The species Evenness was highest recorded in the month of April and July with an evenness of 0.91 each month followed by March, May, August and September with an evenness of 0.87 each month. The lowest evenness was recorded in the month of December, January, June and October with an evenness of 0.83 each month and February, November with an evenness of 0.80.

Table 6: Species Richness and Species Equitability Transect III

Month	**Dec. 2021**	**Jan. 2022**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sept.**	**Oct.**	**Nov.**
Species Richness	11	11	12	10	9	10	11	9	10	10	11	12
Species Equitability	0.83	0.83	0.80	0.87	0.91	0.87	0.83	0.91	0.87	0.87	0.83	0.80

3.10 Avifauna diversity observed in Transect IV:

Table 7: Species diversity observed in Transect IV(Akad)

S.NO	**Common Name**	**Scientific Name**	**Order**	**Family**
1	House Sparrow	*Passer domesticus*	*Passeriformes*	*Passeridae*
2	Black Kite	*Milvus migrans*	*Accipitriformes*	*Accipitridae*
3	Himalayan Bulbul	*Pycnonotus leucogenys*	*Passeriformes*	*Pycnonotidae*
4	Wood Pigeon	*Columba palumbus*	*Columbiformes*	*Columbidae*
5	Common Myna	*Acridotheres ginginianus*	*Passeriformes*	*Sturnidae*
6	Grey warbler	*Gerygone igata*	*Passeriformes*	*Acanthizidae*
7	White Tailed Eagle	*Haliaeetus leucogenys*	*Accipitriformes*	*Accipitridae*
8	Golden Eagle	*Aquila Chrysaetos*	*Accipitriformes*	*Accipitridae*
9	Hill pigeon	*Columba rupestris*	*Columbiformes*	*Columbidae*
10	Snow Pigeon	*Columba leuconota*	*Columbiformes*	*Columbidae*
11	Blue Rock Pigeon	*Columba livia*	*Columbiformes*	*Columbidae*
12	Large billed crow	*Crovus macrorhynchos*	*Passeriformes*	*Corvidae*
13	Black Kite	*Milvus migrans*	*Accipitriformes*	*Accipitridae*
14	Greater spotted Eagle	*Clanga clanga*	*Accipitriformes*	*Accipitridae*

3.11 Relative abundance of avifauna month wise in transect IV:

In Transect IV, a total number of 15 bird species were observed during the study period. Common Myna (*Acridotheres tristis)* was observed to be the most predominant species in terms of abundance with annual relative abundance of 21.25, followed by House Crow (*Crovus splendens)* with annual relative abundance of 18.96, Blue Rock Pigeon (*Columba livia)* with annual relative abundance of 15.03 and Large Billed Crow (*Crovus macrorhynchos)* with annual relative abundance of 7.8. The other dominant species are Hill Pigeon (*Columba rupestris)* with annual relative abundance of 6.25, Golden Eagle (*Aquila Chrysaetos)* with annual relative abundance of 5.89, Black Kite (*Milvus migrans)* with annual relative abundance of 4.96 and Himalayan Bulbul *(Pycnonotus Leucogenys)* with annual relative abundance of 4.49. Least dominant species were Wood Pigeon (*Columba palumbus)* with annual relative abundance of 1.08, Snow Pigeon (*Columba leuconota*), White Tailed Eagle (*Haliaeetus leucogenys)*, Greater Spotted Eagle (*Clanga clanga)* and Black Kite *(Milvus migrans)* with an annual relative abundance of 0.87,0.77,0.72 and 0.62 respectively.

3.12 Species Diversity in Transect IV:

***(a)Shannon-Weiner's index value*:** The species diversity in Transect IV was recorded highest in the month of June, July, August, September and October. The lowest value was recorded in the month of February, April, May, October and November. The second lowest

number was to be recorded in the month of December, January and March with Shannon= Weiner's index value (H) was 2.21.

(b)Species Richness: The species Richness was highest recorded in the month of February (15 species), January, March and November with 14 species each. The least species richness was recorded in the month of December and July with 13 species each, April, May, June, September and October (12 species), May and August (11 species).

(c)Species Evenness or Equitability (E): The species Evenness was highest recorded in the month of May and August with an evenness of 0.92 each month followed by April, June, September and October with an evenness of 0.89 each month. The lowest evenness was recorded in the month of December and July with an evenness of 0.86 each month, January, March and November with an evenness of 0.84 and February with an evenness of 0.82.

Table 8: Species Richness and Species Equitability Transect IV

Month	**Dec. 2021**	**Jan.2022**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sept.**	**Oct.**	**Nov.**
Species Richness	13	14	15	14	12	11	12	13	11	12	12	14
Species Equitability	0.86	0.84	0.82	0.84	0.89	0.92	0.89	0.86	0.92	0.89	0.89	0.84

Table 9: Seasonal Diversity of Avifauna in four transects of South Kashmir

Season / Transect	Winter (Dec to Feb)	Mean±S.E	Spring (Mar. to May)	Mean±S.E	Summer (Jun to Aug.)	Mean±S.E	Autumn (Sept. to Nov)	Mean±S.E
Transect I	163	5.62±0.88	313	7.45±1.40	377	9.04±1.89	269	6.43±1.58
Transect II	390	8.12±1.74	446	9.29±2.02	496	10.33±2.49	477	9.93±2.35
Transect III	333	7.92±1.79	446	10.61±2.49	600	14.28±2.92	555	13.21±2.61
Transect IV	382	8.48±1.44	404	8.97±1.58	587	13.04±2.33	562	12.48±2.15
Statistical Analysis ANOVA	F=2.63, F Crit =3.49, df = 3,12, P-value = 0.09 (p value >0.05) No statistically significant difference in the diversity of birds between seasons.							

4.Conclusion:

The abundance of bird species varied between the transects across the different seasons during the study period. Among the total bird species observed in the area, 14 species were recorded in transect I (Lal Chowk), 16 in transect II (Hutmurah), 14 in transect III (Seer) and 14 in transect IV (Akad). Among the birds recorded from the four transects, Common Myna was the most abundant species. Other predominant species were Blue Rock Pigeon, House Crow, House Sparrow and Himalayan Bulbul. The high species abundance of these birds was noted between plantation forest and farmland habitats. The data was collected using point count method and transect method. ANOVA was employed to compare the data and analyse the significant or no significant difference in the mean diversity of birds between the transects and consequently validate or reject Null hypothesis. There was no statistically significant difference in the diversity of birds between seasons. In short, the current study provides the information on the avifauna parameters such as species diversity, species richness, relative abundance and equitability by using various indices.

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बिहार के चयनित जिलों के माध्यमिक स्तर के छात्रों के गणित में कम अंक प्राप्त करने के कारणः एक अध्ययन

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सार

भारतीय संविधान के अनुसार, मौलिक अधिकारों में से एक शिक्षा का अधिकार है, और माध्यमिक शिक्षा संपूर्ण शिक्षा प्रणाली का एक महत्वपूर्ण उप–क्षेत्र है। शिक्षा बच्चे को भविष्य का स्वरूप गढ़ने और उसे उज्जवल बनाने में सहायक होता है। बिहार ऐतिहासिक रूप से शिक्षा का एक प्रमुख केंद्र रहा है जहाँ देश के सबसे प्रचीन विश्वविद्यालयों में से एक अवस्थित था। लेकिन राज्य की आधुनिक शिक्षा प्रणाली एक अलग चित्र प्रदर्शित करती है। स्कूली शिक्षा प्रणाली में माध्यमिक शिक्षा सबसे महत्वपूर्ण चरण है। इन कक्षाओं में छात्रों को विज्ञान, मानविकी और सामाजिक विज्ञान (भारत सरकार, 1998) की विभिन्न भूमिकाओं से परिचित कराया जाता है। बिहार सरकार ने माध्यमिक स्तर पर महत्वपूर्ण प्रयास किए हैं, जैसे बी.एस.टी.पी.सी. के माध्यम से सभी माध्यमिक छात्रों को कम कीमत पर पाठ्य पुस्तकें उपलब्ध कराना और बिहार शताब्दी मुख्यमंत्री बालिका पोशाक योजना, मुख्यमंत्री साइकिल योजना और शैक्षणिक परिभ्रमण योजना जैसी कई योजनाएँ शुरू करना। प्रारंभिक से माध्यमिक शिक्षा में समग्र संक्रमण दर 84.64 प्रतिशत बनी हुई है। बिहार में माध्यमिक शिक्षा से जुड़े प्रमुख मुद्दों पर प्रकाश डालाने की आवश्यकता है ताकि यह सुनिश्चित किया जा सके कि उच्च गुणवत्ता वाली शिक्षा बनी रहे।

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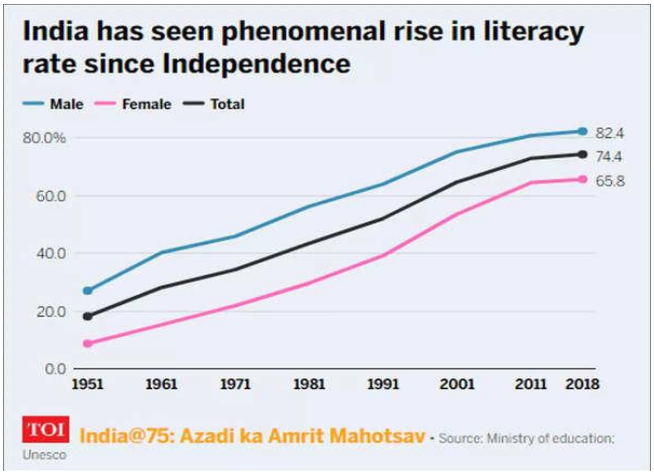
स्कूली शिक्षा

शिक्षा, मौलिक अधिकारों में से एक के रूप में, किसी व्यक्ति के समग्र विकास के लिए महत्वपूर्ण है। विकास का स्वरूप सामाजिक हो या आर्थिक, यह विभिन्न तरीकों से प्रकट होता है, जैसे संज्ञानात्मक सोच, सकारात्मक सोच, इत्यादि। किसी समाज की साक्षरता और शैक्षिक उपलब्धि का स्तर उसकी प्रगति के महत्वपूर्ण संकेतक हैं। यह सुनिश्चित करने के लिए कि सभी बच्चों को बुनियादी शिक्षा मिले, सरकार द्वारा कई कदम उठाए गए हैं जिनमें से एक है अनिवार्य स्कूली शिक्षा कार्यक्रम। प्रारंभिक शिक्षा आठ वर्षों की निःशुल्क और अनिवार्य स्कूली शिक्षा कार्यक्रम है जो तब प्रारंभ होता है जब बच्चे की उम्र छह साल की हो जाती है। दूसरी ओर माध्यमिक शिक्षा के साथ ऐसा नही है। माध्यमिक शिक्षा के सार्वभौमिकरण को सुनिश्चित करने के लिए कोई कदम नहीं उठाया गया है, क्योंकि यह न तो अनिवार्य है और न ही मुफ्त है। यह प्राथमिक और माध्यमिक शिक्षा के बीच एक कड़ी के रूप में कार्य करता है, 14 से 18 वर्ष की आयु के युवाओं को उच्च शिक्षा के लिए तैयार करता है। कई नीतिगत उपायों के कार्यान्वयन और वर्ष 2009 में 6 से 14 वर्ष की आयु के बच्चों के लिए शिक्षा का अधिकार (आर.टी.ई.) अधिनियम लागू किए जाने के कारण प्रारंभिक स्तर पर लैंगिक अंतर कम हो गया है। फिर भी, शिक्षा में लिंग असमानताएँ बनी हुई हैं, खासकर माध्यमिक स्तर पर स्तर (कक्षा प–ग्प)। भारत की शिक्षा प्रणाली को 10+2 प्रणाली के रूप में जाना जाता है। यह स्कूली शिक्षा की एक समान संरचना का अनुसरण करती है। अब तक, इस प्रणाली का पालन सभी भारतीय राज्यों और केंद्र शासित प्रदेशों द्वारा किया जाता रहा है। हालाँकि, सिस्टम के अनुसार, ये सभी एक ही प्रारूप का पालन नहीं करते हैं। भारत में, स्कूली शिक्षा के चार चरण हैंः प्राथमिक, उच्च प्राथमिक, माध्यमिक और उच्चतर माध्यमिक, जिसमें स्कूली शिक्षा 12 साल तक चलती है और ''10+2 प्रारूप'' का पालन करती है। पाठक (2012) के अनुसार, ''प्राथमिक शिक्षा को छोड़कर शेष स्कूली शिक्षा को माध्यमिक शिक्षा कहा जाना चाहिए।'' (पृ. 58)। माध्यमिक शिक्षा में दो चरण होते हैंः हाई स्कूल (प्र और ग्र कक्षाएँ) और उच्चतर माध्यमिक (अर्थात ग्प और ग्प्र कक्षाएँ)। स्कूली शिक्षा प्रणाली में माध्यमिक शिक्षा सबसे महत्वपूर्ण चरण है। इन कक्षाओं में छात्रों को विज्ञान, मानविकी और सामाजिक विज्ञान (भारत सरकार, 1998) की विभिन्न भूमिकाओं से परिचित कराया जाता है। इस स्तर पर बच्चे उच्च शिक्षा के लिए तैयार होते हैं। वहीं युवाओं को उच्च शिक्षा या व्यावसायिक शिक्षा में से चुनाव करना होता है। हालाँकि, विभिन्न राज्यों के स्कूली शिक्षा के पहले दस वर्षों के संरचनात्मक प्रारूप में महत्वपूर्ण अंतर स्पष्ट देखा जा सकता है।



चित्र–1ः स्वतंत्रोत्तर भारत में साक्षरता दर

भारत के कुछ राज्यों या केंद्र शासित प्रदेशों में माध्यमिक स्तर की शुरूआत जहाँ आठवीं कक्षा से होती है वहीं कुछ राज्यों या केंद्र शासित प्रदेशों में इसकी शुरूआत नौवीं

कक्षा से होती है। अरुणाचल प्रदेश, मणिपुर, बिहार, हरियाणा, हिमाचल प्रदेश, जम्मू और कश्मीर, मध्य प्रदेश, नागालैंड सहित 19 राज्यों/केंद्र शासित प्रदेशों में कक्षा प्र– ग को माध्यमिक चरण में पढ़ाया जाता है। जबकि पंजाब, राजस्थान, सिक्किम, तमिलनाडु, त्रिपुरा, उत्तर प्रदेश, पश्चिम बंगाल, अंडमान और निकोबार, चंडीगढ़, दिल्ली और पांडिचेरी का कराईकल क्षेत्र, आंध्र प्रदेश, असम, गोवा, गुजरात, कर्नाटक, केरल, महाराष्ट्र, मेघालय, मिजोरम, उड़ीसा, दादरा और नगर हवेली, दमन और दीव, लक्षदीप, और पांडिचेरी के माहे और यमन क्षेत्र उन 13 राज्यों/केंद्र शासित प्रदेशों में से हैं जहाँ आठवीं से दसवीं कक्षा को माध्यमिक चरण में पढ़ाया जाता है।

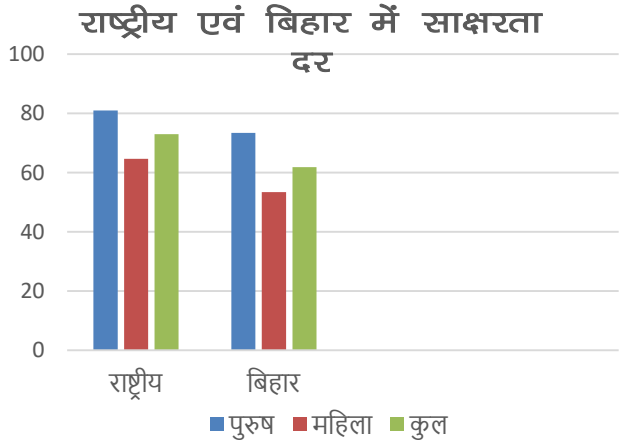
स्कूली शिक्षा प्रणाली में पढ़ाए जाने वाले विषयों में गणित और विज्ञान का विशेष महत्व है। गणित मानव सभ्यता का एक आधारभूत स्तंभ होने के साथ–साथ विकास का सबसे महत्वपूर्ण कारक है। गणित विज्ञान के लिए महत्वपूर्ण है और विज्ञान प्रौद्योगिकी के लिए महत्वपूर्ण है। पिछले दो दशकों में विज्ञान और प्रौद्योगिकी के क्षेत्र में हुए विकास ने लोगों के जीवन में भारी बदलाव किए हैं। गणित के महत्व को समझते हुए इसे विद्यालयी पाठ्यक्रम में विशिष्ट स्थान दिया गया है। माध्यमिक स्तर पर गणित में छात्रों की अपेक्षाकृत कम उपलब्धि भारत में एक लम्बे समय से चली आ रही समस्या है। सरकार द्वारा किए गए निरंतर प्रयासों के बावजूद गणित में कम उपलब्धि की समस्या अभी भी बनी हुई है। यह स्पष्ट है कि पिछले दशकों में विद्यालय स्तर पर गणित की स्थिति में सुधार के प्रयास काफी हद तक अप्रभावी रहे हैं।

बिहार में शिक्षा की स्थिति

बिहार ऐतिहासिक रूप से शिक्षा का एक प्रमुख केंद्र रहा है और 5वीं शताब्दी ईसा पूर्व से ही देश के सबसे पुराने विश्वविद्यालयों में से एक 'नालन्दा विश्वविद्यालय' यहीं अवस्थित था जो शैक्षणिक उत्कृष्टता का केंद्र था। यहीं आर्यभट्ट जैसे वैज्ञानिक ने अपनी गणितीय और खगोलीय अभिरुचियों को आगे बढ़ाया। नालंदा के विनाश के बाद भी, शैक्षणिक गतिविधियों से इस भूमि का संबंध कायम रहा – अबुल फजल–ए–अल्लामी ने अपनी पुस्तक आईन–ए–अकबरी में उल्लेख किया है कि राजगीर में अच्छा कागज बनाया जाता है। यह आश्चर्य का विषय है कि इतने गौरवशाली इतिहास एवं समृद्ध शैक्षणिक परंपरा की यह भूमि कैसे एक ऐसे राज्य में सिमट गई है जहाँ एक तिहाई से अधिक आबादी निरअक्षर है? इससे भी अधिक दुःखद तथ्य यह है कि लगभग आधी महिलाएँ इस बुनियादी दुर्बलता की शिकार हैं।

बिहार की निराशाजनक साक्षरता स्थिति सरकार की लंबे समय से शिक्षा की उपेक्षा का परिणाम है। ब्रिटिश शासन के दौरान बिहार 1857 के प्रथम स्वतंत्रता संग्राम में बिहार का प्रमुख स्थान था। परिणामस्वरूप, औपनिवेशिक शासन यहाँ शेष भारत की तुलना में अधिक दमनकारी था। औपनिवेशिक प्रशासन द्वारा शिक्षा की उपेक्षा उन की दमनकारी नीति का हिस्सा बनी। किसी भी औपनिवेशिक चीज का विरोध करने की उत्सुकता में, बिहार के लोगों ने औपचारिक स्कूली शिक्षा से भी परहेज किया था।

स्वतंत्रता प्राप्ति के बाद केन्द्र एवं राज्य सरकारों ने शिक्षा पर विशेष ध्यान दिया और शिक्षा की स्थिति में सुधार एवं विकास के लिए कई सार्थक प्रयास किए गए। राष्ट्रीय शिक्षा आयोगों का गठन, नई शिक्षा



नितियों को लागू कर शिक्षा की दशा और दिशा में समीचीन परिवर्तन लाने की दिशा में किए गए कुछ सार्थक प्रयास हैं जिनके सार्थक परिणाम प्राप्त हुए हैं।

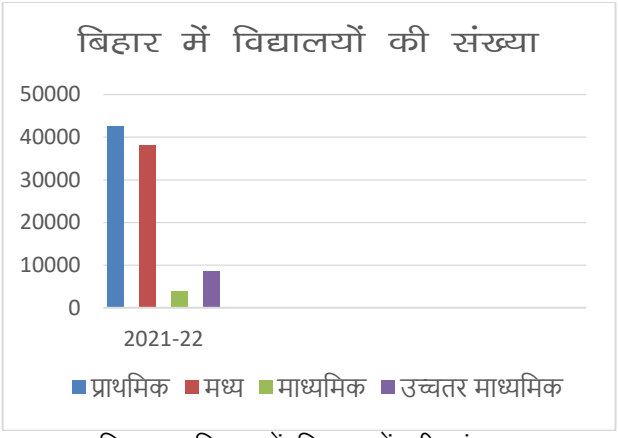
चित्र–2: राष्ट्रीय एवं बिहार में साक्षरता दर
स्रोत – (जनगणना 2011)

वर्तमान परिदृश्य में प्रारंभिक शिक्षा का उद्देश्य बच्चों को पढ़ना, लिखना और अंकगणित जैसी न्यूनतम अनिवार्यताएँ प्रदान करना है। दूसरी ओर, माध्यमिक शिक्षा शिक्षा प्रदान करने का वह चरण है जो बच्चों को एक जटिल आधुनिक समाज का पूर्ण सदस्य बनने में मदद करता है। यह बच्चों के चरित्र की क्षमताओं, योग्यताओं, रुचियों और गुणों की उच्चतम क्षमता तक विकसित करने का प्रयास होता है। यह उन्हें एक जानकार, सक्रिय और मिलनसार व्यक्ति के रूप में भावी जीवन में प्रवेश करने में सक्षम बनाता है। माध्यमिक शिक्षा वास्तव में राष्ट्र निर्माण की शिक्षा है। इसे आर्थिक और सामाजिक विकास के अवसरों और लाभों का प्रवेश द्वार माना जाता है। इसलिए इसकी गुणवत्ता बनाए रखना उल्लेखनीय है। प्रारंभिक शिक्षा के साथ–साथ उच्च शिक्षा के मानक माध्यमिक शिक्षा के मानकों पर काफी हद तक निर्भर करते हैं। माध्यमिक शिक्षा को प्रारंभिक शिक्षा और उच्च शिक्षा की श्रृंखला के बीच की एक महत्त्वपूर्ण कड़ी माना जाता है। यह एक ऐसा उपकरण है जिसके उपयोग से देश तीव्र आर्थिक, तकनीकी, वैज्ञानिक, राजनीतिक, सामाजिक और सांस्कृतिक विकास प्राप्त कर सकता है।

विगत कुछ दशकों में हुई राजनैतिक और सामाजिक परिवर्तनों के कारण

सामाजिक न्याय के बारे में बढ़ती जागरूकता के परिणामस्वरूप, शिक्षा की मांग नाटकीय रूप से बढ़ी है। साथ ही राज्य सरकार ने अपने शिक्षा खर्च में उल्लेखनीय वृद्धि की है। इसका प्रभाव विद्यालयों की संख्या में वृद्धि के रूप में देखा जा सकता है। बिहार में जहाँ प्रारंभिक विद्यालयों की कुल संख्या 2011–12 में 41,170 से बढ़कर 74,006 हो गई वहीं उच्च प्राथमिक विद्यालयों की संख्या

2011–12 में 236 से बढ़कर 2017–18 में 31,074 हो गई। इसी तरह माध्यमिक विद्यालयों की कुल संख्या 2011–12 में 40,934 से बढ़कर 2017–18 में 42,932 हो गई है।



चित्र–3: बिहार में विद्यालयों की संख्या
स्रोत – *अद्यतन UDISE+ Report 2022* (सौजन्यः ezyschooling.com)

इसके बावजूद माध्यमिक स्तर पर गणित में छात्रों की अपेक्षाकृत कम उपलब्धि भारत में एक लम्बे समय से चली आ रही समस्या है। सरकार एवं शिक्षण व्यवस्था के स्तर पर सराहनीय प्रयासों के बावजूद छात्रों की गणित में कम उपलब्धि अभी भी समस्या बनी हुई है।

उद्देश्य

इस शोध पत्र का उद्देश्य लक्षित क्षेत्र में माध्यमिक विद्यालयों में गणित में कम उपलब्धि हासिल करने वाले छात्रों की पहचान कर उन छात्रों की बुद्धिमता, शैक्षणिक उपलब्धि अभिप्रेरणा, गणित के प्रति दृष्टिकोण और सामाजिक–आर्थिक स्थिति का अध्ययन करना है।

इसका लक्ष्य लिंग, स्थान और स्कूल के प्रकार के आधार पर गणित में कम उपलब्धि प्राप्त करने वाले छात्रों की बुद्धिमत्ता, अकादमिक उपलब्धि, अभिप्रेरणा, गणित के प्रति दृष्टिकोण और सामाजिक–आर्थिक स्थिति का तुलनात्मक अध्ययन करना। इन सभी कारकों का प्रभाव माध्यमिक शिक्षा प्राप्त करने के दौरान छात्रों की उपलब्धि पर पड़ता है। इस अध्ययन का उद्देश्य गणित में कम अंक प्राप्त करनेवाले छात्रों, उनके शिक्षकों और उनके माता–पिता के दृष्टिकोण के आलोक में छात्रों के गणित में कम उपलब्धि के कारणों को सूचीबद्ध करना भी है।

परिकल्पनाएँ

(क) ग्रामीण–शहरी, सरकारी–निजी विद्यालयों में पढ़नेवाले, पृथक या संयुक्त समूह के रूप में गणित में कम उपलब्धि प्राप्त करने वाले छात्र–छात्राओं के बुद्धिमता का स्तर भिन्न होता है।

(ख) गणित में कम उपलब्धि प्राप्त करने वाले छात्र–छात्राओं के लिंग, स्थान और स्कूल के प्रकार के सापेक्ष उनके बौद्धिक स्तर में कोई महत्वपूर्ण अंतर नहीं है।

(ग) ग्रामीण–शहरी, सरकारी–निजी विद्यालयों में पढ़नेवाले, पृथक या संयुक्त समूह के रूप में गणित में निम्न उपलब्धि प्राप्त करने वाले छात्र–छात्राओं की शैक्षणिक उपलब्धि अभिप्रेरणा के स्तर भिन्न होते हैं।

(घ) गणित में निम्न उपलब्धि प्राप्त करने वाले छात्र–छात्राओं के लिंग, स्थान और स्कूल के प्रकार के सापेक्ष उनकी शैक्षणिक उपलब्धि अभिप्रेरणा में कोई महत्वपूर्ण अंतर नहीं है।

(ङ) ग्रामीण–शहरी, सरकारी–निजी विद्यालयों में पढ़नेवाले, पृथक या संयुक्त समूह के रूप में गणित में निम्न उपलब्धि प्राप्त करने वाले छात्र–छात्राओं की गणित के प्रति दृष्टिकोण भिन्न होते हैं।

(च) गणित में निम्न उपलब्धि प्राप्त करने वाले छात्र–छात्राओं के लिंग, स्थान और स्कूल के प्रकार के सापेक्ष उनके गणित के प्रति दृष्टिकोण में कोई महत्वपूर्ण अंतर नहीं है।

(छ) ग्रामीण–शहरी, सरकारी–निजी विद्यालयों में पढ़नेवाले, पृथक या संयुक्त समूह के रूप में गणित में निम्न उपलब्धि प्राप्त करने वाले छात्र–छात्राएँ भिन्न सामाजिक–आर्थिक स्तर से संबंधित हैं।

(ज) गणित में निम्न उपलब्धि प्राप्त करने वाले छात्र–छात्राओं के लिंग, स्थान और विद्यालय के प्रकार के सापेक्ष उनकी सामाजिक–आर्थिक स्थिति में कोई महत्वपूर्ण अंतर नहीं है।

(झ) गणित में निम्न उपलब्धि प्राप्त करने वाले छात्रों, उनके शिक्षक और उनके माता–पिता की गणित में कम उपलब्धि के कारणों के बारे में अलग–अलग धारणाएँ हैं।

विधि

शोध कार्य के क्रम में प्राप्त प्रदत्त के विश्लेषण से प्राप्त द्वितीयक डेटा इस शोध–पत्र का आधार बना। इस शोध पत्र के लिए आंकड़ा संकलित करने के लिए विभिन्न जनगणना रिपोर्ट, बिहार के सभी जिलों के लिए जिला जनगणना पुस्तिका, भारत सरकार तथा वित्त विभाग, बिहार सरकार की आधिकारिक वेबसाइट और आर्थिक सर्वेक्षण 2019–20 आदि का उपयोग उपयोग किया गया था।

पारिभाषिक शब्दावली

वर्तमान अध्ययन में इन प्रयुक्त शब्दोंवलियों को समझने में किसी भ्रम और अस्पष्टता से बचने के लिए ऐसे शब्दों की व्याख्या इस प्रकार है

(क) बुद्धिमता

यह सीखने या समझने या चुनौतीपूर्ण परिस्थितियों में से निपटने की छात्र की क्षमता है। यहाँ इस अध्ययन में बुद्धिमता का अर्थ अत्यधिक तार्किक गणितीय बुद्धिमता है जो किसी प्रकार की कारण प्रणाली, संख्याओं, मात्राओं और उनके प्रचालन के अंतर्निहित सिद्धांतों को समझती है।

(ख) अकादमिक उपलब्धि अभिप्रेरणा

इसे छात्र की उपलब्धि और शैक्षणिक सफलता के महत्वपूर्ण निर्धारकों में से एक माना जाता है। उपलब्धि अभिप्रेरणा एक अवधारणा है जो किसी व्यक्ति के व्यक्तित्व के गुण और सामाजिक पृष्ठभूमि को उपलब्धि के लिए उसकी आवश्यकता के स्तर से संबद्ध है। उपलब्धि

अभिप्रेरणा छात्र की अधिग्रहीत प्रवृत्ति है जो उसके द्वारा निर्धारित मानक के आलोक में दूसरों के साथ उसकी आकांक्षा, प्रतिस्पर्धा में प्रयास और उपलब्धि हासिल करने के लिए एसे प्रेरित करता है।

(ग) गणितीय अभिवृति

यह बिना किसी हिचकिचाहट या भय के तत्परता के साथ गणितीय समस्याओं को हल करने के लिए एक मानसिक अवस्था है।

(घ) सामाजिक–आर्थिक स्थिति

किसी छात्र की सामाजिक–आर्थिक स्थिति उसके सामाजिक संरचना के भीतर उसकी स्थिति है। सामाजिक–आर्थिक स्थिति गणित में कम अंक प्राप्त करने वाले छात्रों के व्यवसाय, शिक्षा, आय, धन और निवास स्थान सहित चरों के संयोजन पर निर्भर करती है।

(ङ) गणित में कम अंक प्राप्त करना या कम उपलब्धि

यहाँ इस अध्ययन में कम अंक प्राप्त करना या कम उपलब्धि का अर्थ है गणित में 33–40 के बीच अंक प्राप्त करना। छात्रों ने परीक्षा तो उत्तीर्ण की लेकिन गणित में बहुत कम अंक प्राप्त किए।

(च) गणित में कम अंक प्राप्त करने के कारणों के बारे में माता–पिता, शिक्षकों और छात्रों की धारणा

धारणाएँ एक व्यक्ति से दूसरे व्यक्ति में भिन्न होती हैं। अलग–अलग लोग एक ही स्थिति के बारे में अलग–अलग समझ रखते हैं। इस अध्ययन में गणित में कम अंक प्राप्त करने या कम उपलब्धि प्राप्त करने वालों, उनके माता–पिता और शिक्षकों की धारणाएँ देखी गई। चेकलिस्ट के माध्यम से संबंधित कारकों के तीन क्षेत्रों (व्यक्तिगत कारक, पारिवारिक पृष्ठभूमि से संबंधित कारक और विद्यालय से संबंधित कारक) की जाँच की गई।

प्रतिदर्श

यदि हम एक प्रतिदर्श पर किए गए अध्ययन से प्राप्त किए गए निष्कर्शों द्वारा किसी जनसंख्या का मूल्यांकन करना चाहते हैं, तो यह आवश्यक है कि प्रतिदर्श जनसंख्या का प्रतिनिधि हो। वर्तमान अध्ययन में प्रतिदर्श के रूप में वैसे छात्रों को सम्मिलित किया गया जिन्होंने माध्यमिक परीक्षा में गणित कम अंकों के साथ उत्तीर्ण की है। बिहार राज्य के तीन जिलों (सीतामढ़ी, शिवहर और मधुबनी) के 354 छात्रों का प्रतिदर्श लिया गया है, जिन्होंने 2019–20 के दौरान बिहार विद्यालय परीक्षा समिति की माध्यमिक परीक्षा उत्तीर्ण की है। जिन छात्रों ने गणित विषय में 30 से अधिक परन्तु 45 से कम अंक और अन्य विषयों में 45 प्रतिशत से अधिक (कम से कम चार विषय) प्राप्त किए हैं, उन्हें प्रतिदर्श के रूप में चुना गया है। इस अध्ययन के लिए ग्रामीण एवं शहरी क्षेत्रों तथा सरकारी एवं निजी विद्यालयों से समान संख्या में गणित में कम अंक या उपलब्धि प्राप्त करने वाले छात्र एवं छात्राओं का चयन किया गया है। गणित में कम अंक या उपलब्धि प्राप्त करने वाले छात्रों के माता–पिता और उन्हें पढ़ाने वाले शिक्षकों को भी प्रयोज्य बनाया गया। वर्णित तीन जिलों के माध्यमिक और उच्च माध्यमिक विद्यालयों का दौरा किया गया और प्रयोज्य छात्रों, उनके तामा–पिता और शिक्षकों से गणित में कम अंक या उपलब्धि के उनके व्यक्तिगत दृष्टिकोण, सामाजिक, मनोवैज्ञानिक और आर्थिक कारणों के बारे में जानकारी एकत्र की गई।

गणित में कम अंक या उपलब्धि प्राप्त करने वाले 354 छात्र–छात्राओं का जिलावार वितरण नीचे दिया गया है:

जिला का नाम	छात्र	छात्रा	ग्रामीण	शहरी	सरकारी	निजी	कुल
सीतामढ़ी	67	58	71	54	60	65	125
शिवहर	52	61	59	54	60	53	113
मधुबनी	58	58	51	65	51	65	116

उपकरण

बिहार के 3 जिलों से 10वीं कक्षा में गणित विषय में 30 से अधिक परन्तु 45 से कम अंक प्राप्त करने वाले 354 छात्रों, 177 लड़कों और 177 लड़कियों के प्रतिदर्श से प्रदत्त प्राप्त किया गया है। गणित में कम उपलब्धि हासिल करने वालों के साथ–साथ उनके माता–पिता और शिक्षकों की धारणाओं को भी गणित में कम उपलब्धि के कारणों का अध्ययन करने के लिए एकत्र किया गया है। अध्ययन के प्रत्येक चर से सम्बन्धित आँकड़े एकत्र करने के लिए निम्नलिखित उपकरणों का प्रयोग किया गया है।

1. ओझा और चौधरी का बुद्धि परीक्षण
2. शर्मा एकेडमिक अचीवमेंट मोटिवेशन टेस्ट
3. एटिट्यूड टुवर्ड्स मैथमेटिक्स स्केल ऑफ गखर एंड रजनी
4. मीनाक्षी द्वारा सामाजिक–आर्थिक स्थिति पैमाना

छात्रों की कम उपलब्धि के कारणों के बारे में शिक्षक और माता–पिता की धारणाओं का पता लगाने के लिए एक स्व–निर्मित चेकलिस्ट का उपयोग किया गया था।

परिसीमन

1. यह अध्ययन बिहार राज्य के तीन जिलों सीतामढ़ी, शिवहर और मधुबनी 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।
2. गणित में कम उपलब्धि के कारणों का अध्ययन करते हुए, अध्ययन के चरों जैसे बुद्धिमता, शैक्षणिक उपलब्धि अभिप्रेरणा, गणित के प्रति दृष्टिकोण और सामाजिक–आर्थिक स्थिति और गणित में कम उपलब्धि के कारणों के बारे में माता–पिता, शिक्षकों और छात्रों की धारणाओं तक सीमित किया गया था।
3. अध्ययन बिहार राज्य के तीन जिलों सीतामढ़ी, शिवहर और मधुबनी तक सीमित था।
4. यह अध्ययन मध्यमिक कक्षाओं में गणित पढ़ाने वाले शिक्षकों और गणित में कम अंक प्राप्त करने वाले छात्रों और उनके माता–पिता तक सीमित था।