SORENSEN BASED MULTI-TENANT CLOUD MANAGEMENT BY TRAINED ANFIS MODEL

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ABSTRACT

Many of digital platform depends on cloud infrastructure provides services to its clients. These services need machines to execute user requests, so some of work outsource to tenants. In order to increase the privacy and security of cloud services tenant need to be monitor. This paper has proposed a trust based tenant machine evaluation. As per machine behavior in the network Sorensen trust value was estimate by the model. Calculated trust value used to train the ANFIS mathematical model. Experimental was performed on different cloud environmental conditions. Results were compared on different evaluation parameters and it was obtained that proposed ***Sorensen*** *Adaptive Neural Fuzzy Interference System (S-ANFIS) model has increase the work accuracy of malicious node detection.*

Index Terms*— Cloud computing, Social trust, Machine Learning, Classification, Trust Model.*

I. Introduction

The need for data access for ever-increasing internet users has expanded tremendously in recent years, with the traditional data centre paradigm unable to cope with access from anywhere and on any device [1]. The need for a new solution to support these demands has arisen as a result of the changing environment; the cloud. This setting establishes a model that allows for ubiquitous, on-demand services with the benefits of quick deployment and lower revenue [2]. Small firms are adopting cloud technology because it enables them to access enterprise infrastructure previously exclusively available to larger corporations [3]. Cloud computing encompasses both the applications that are supplied as services over the Internet and the technology and software that power the datacenters that deliver such services.

Virtualization is used in IaaS (Infrastructure as a Service) services to separate cloud nodes from the hardware on which they run. Virtual machines run on computational hardware that is shared among cloud tenants. This is the stage at which a major attack is recognized; as a result of these processes, services are disseminated throughout several organizations. At most, the physical platform restriction means that only the cloud provider, not the tenants, would have access to the trusted hardware [4]. Although the Xen hypervisor has a virtualized TPM implementation that is linked to a real TPM [5], there are no protocols for using the vTPM in an IaaS context. A subset of these requirements is addressed by cloud trusted computing systems, but none of them achieves all of them. Excalibur [6, 7] offers bootstrapping at scale, but neither system integrity monitoring or complete tenant trusted computing support within a VM (i.e., layering). In [7] authors developed a system that allows for safe layering and bootstrapping, but it lacks system integrity monitoring, is incompatible with existing cryptographic services, and has not been proved to scale to the cloud [7].

The remainder of this work is structured as follows. The cloud malicious node detection models offered by academics are explained in Section 2. The next portion of the study uses a flow chart to show how the S ANFIS model works. The entire work was documented in this part, including all essential equations and algorithms. The fourth section compares the suggested model to other current approaches in terms of experimental value. Finally, the paper summarizes its findings and the results of the suggested model.

II. Related Work

In [9], Wei She1et al. propose a blockchain trust model (BTM) for detecting rogue nodes in wireless sensor networks. For starters, it lays out the entire architecture of the trust model. The blockchain data structure is then built, which is utilised to detect malicious nodes. Finally, it uses the blockchain smart contract and the WSNs' quadrilateral measurement localization approach to detect rogue nodes in 3D space, and the voting consensus results are stored in the blockchain distributed.

A homomorphic fingerprinting-based detection and location of malicious nodes (HFDLMN)

approach in wireless sensor networks is presented by Zhiming Zhang et al. in [10]. The original data is divided into n packets and sent to the base station along n paths in the HFDLMN scheme; the base station determines whether there are malicious nodes in each path by verifying the validity of the packets; if there are malicious nodes in one or more paths, the location algorithm of the malicious node is implemented to locate the specific malicious nodes in the path; if all the packets are valid, the HFDLMN scheme is implemented; if all the packets are valid, The HFDLMN system does not require any monitoring nodes or a complicated assessment model to analyze and determine the node's trust value.

The goal of Sultan, S. et al. in [11] is to calculate the trust weight of each node across the network and to limit the number of rogue vehicular nodes in VANET. The proposed collaboration-based maliciousness detection technique includes a data trust module and a reputation calculation module that ensures honest data transfer and lowers the percentage of harmful vehicular node false positives. In the context of packet transmission, the data trust module applies a trust evaluation and reputation calculation approach to determine whether the vehicle is trustworthy. The vehicular trust authority employs a collaborative technique to combine many trust evaluation evaluations regarding a specific vehicular node and develop a comprehensive trust assessment. In a cloud setting, I. Indu et al. [12] overcome the multi-tenancy and third-party issue. Many academics and industry professionals have addressed the issues of secure access to cloud resources.

The concerns of authentication, access control, security, and services in a cloud environment are examined in this study, as well as the strategies recommended to address them. In this paper, Huaizhe Zhou et al. present SECLOUD, a framework for monitoring VMs in the cloud for security research. SECLOUD extends VMI approaches to provide configurable interfaces for monitoring runtime information of guest virtual machines (VMs) in a non-intrusive way to remote tenants or their authorised security service providers. By leveraging the architectural symmetry of the cloud environment, the suggested framework improves monitoring effectiveness. Furthermore, we strengthen our framework by providing tenants with the ability to maintain their privacy. [14] suggested a two-part method that allows the hypervisor to build believable trust connections with guest Virtual Machines (VMs) by taking into account objective and subjective trust sources and aggregating them using Bayesian inference. We build a trust-based maximin game on top of the trust model, with DDoS attackers attempting to decrease the cloud system's detection and the hypervisor attempting to maximise this minimization within a limited resource budget. The game solution instructs the hypervisor to choose the best detection load allocation among VMs in real time in order to detect DDoS attacks as quickly as possible.

III. Proposed Methodology

Proposed **Sorensen** Adaptive Neural Fuzzy Interference System (S-ANFIS) was detailed in this section of paper. Explanation of blocks shown in fig. 1 are detailed.

Tenants: Some organization provide machines as tenants in cloud having resource type {Bandwidth, Central Processing Unit, Memory}. Such individual machine is termed as tenants in the cloud. Machine owner can charge cloud as per its resource configuration and availability.

Virtual Cycle

Virtual packet movement is to perform for λ clock cycle. Tenants are unaware of this time period and routine of VC. In each cycle of virtual movement random source and destination tenants were select and packets were though in network. As centralized system knows about this movement to count successful and unsuccessful packet delivery. In this paper packet is a kind of task that a tenant needs to perform as per resource availability.

Resource Belief

Each tenant utilization was monitor for λ time to estimate its R_B value. Tenant provide a limit of resource utilization before they submit machine to cloud. So, if resources are over utilized then cloud has to pay extra amount to the tenants. It is desiring that resource belief value should be below 1. This belief value may get higher than 1 if resources are over utilized.

Over utilization is just a kind of alarm for the attack to the cloud. So, if T have r resources for cloud services and its maximum utilization limit is set up to T_M and during clock cycle duration tenant utilization is T_U, then Resource Belief value is estimate by Eq. 2.

$$R_{B,r} = \begin{cases} 1 \; T_U <= T_M \\ \frac{T_M}{T_U} T_U > T_M \end{cases} \text{----------Eq. 1}$$

$$R_T = \frac{\sum_1^r R_{B,r}}{r} \text{----------Eq. 2}$$

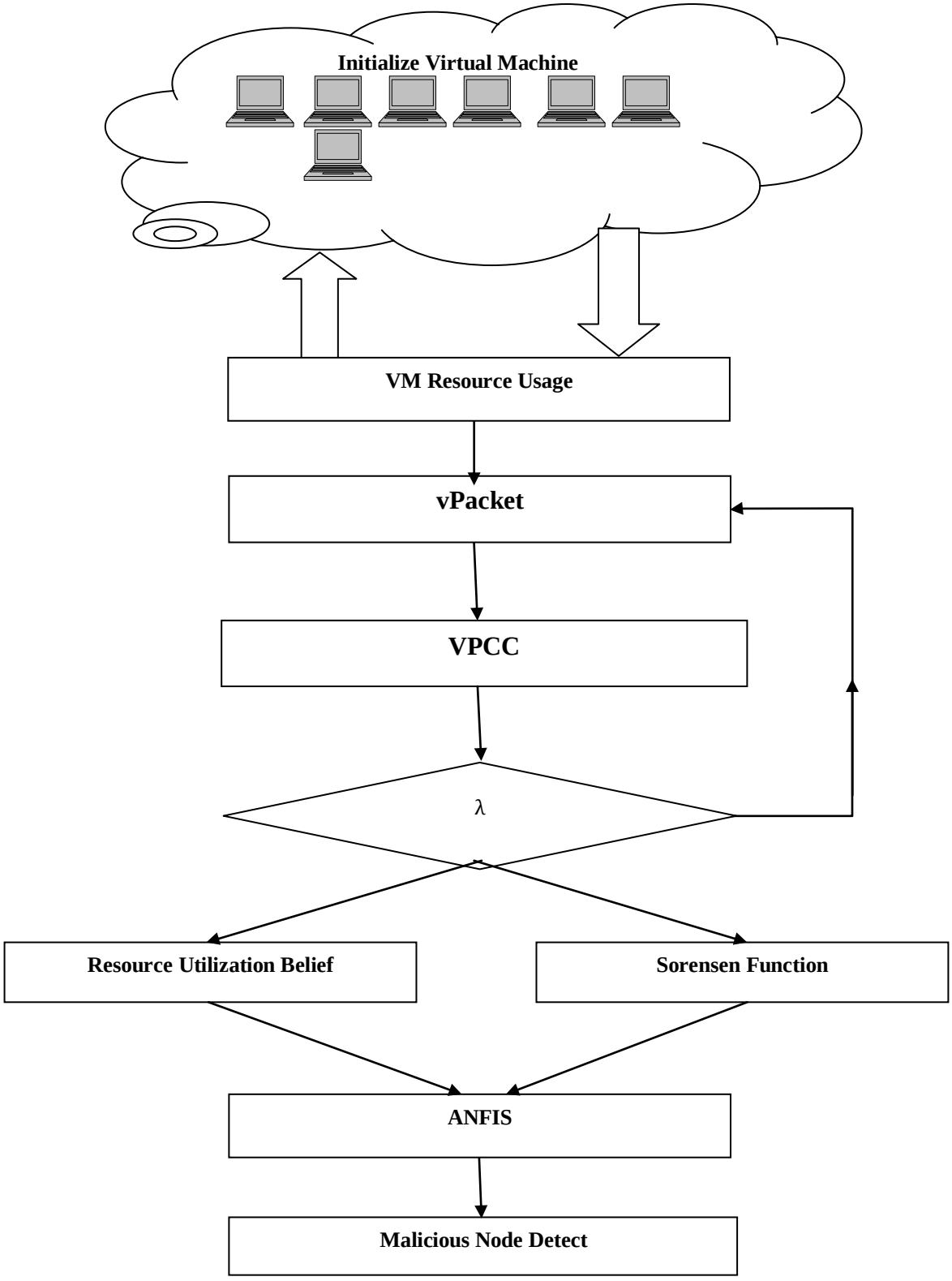

Fig.1Proposed malicious tenants detection.

Sorensen Function

Its an social platform user trust evaluation function proposed in [13]. Paper has use same function for the machine trust calculation. As per VPCC direct trust value was calculate for each VM as per successful and total number of packets. Direct trust D [] was estimate by Eq. 2.

$D_{ij} = \frac{Ps_{ij}}{Pt_{ij}}$----------Eq. 2

Further Sorensen function has find the

$\boldsymbol{S_n = \frac{Min(D_{i,1ton})}{Max(D_{i,1ton})}}$--------**Eq. 3**

Adaptive Neural Fuzzy Interference System

In 1990 [15] ANFIS neural learning model was proposed. As this Uses concept of neural network and fuzzy logic so it terms as ANFIS. Learning of neural network was improved by use of logical operators IF Else, as this help in remembering rules in the dataset. This logical operator improves the neural learning for non-linear data as well.

Learning of malicious tenant behavior is done by Adaptive Neural Fuzzy Interference System. Features of each tenant collect to train this mode. Input training vector is set of {L, R, D). For training malicious tenants were identified by 0 and real tenants were identified by 1.

In this learning model five layers of neurons were present. In first layer membership function is identify as per the input value set. This is an fuzzification layer used in the work. As per the premise parameters membership function is select. Second neural layer used for the firing of neuron from the input, so this second layer is named as rule layer. After this data is normalize as some of values are dominating others, hence third layer was used for the normalization of model. This normalization distributes computing firing strength of neurons. Fourth layer takes normalize values and consequence parameters to defuzzied values and finally pass to the fifth and final layer [8]

Fuzzification layer In ANFIS model activation function is not a sigmoid nor a step but work apply some data processing methods to convert values into fuzzy format.

Proposed S-ANFIS Algorithm

Input: T // Number of Tenants
Output: ANFIS // Trained Neural Network

1. C←Initial_Tenants(T)
2. Loop 1:CC
3. Loop 1:V
4. i←Rand()
5. j←Rand()
6. V←Packet(i, j)
7. EndLoop
8. R_B←Resource _belief(CC)
9. Loop 1:T
10. L[n]← **Sorensen**(R_B)
11. EndLoop
12. Loop 1:n
13. F[n]←Input_Feature(L,D,R_B)
14. Do[n]←Tenant_Class
15. EndLoop
16. NN←Train_ANFIS(E, D)

Detail steps of the proposed algorithm shows that after each trust values were update and nodes which performed malicious activity in cloud are filtered and removed by trained ANFIS.

IV. Experiments & Results Analysis

Proposed S_ANFIS model was implement on the MATLAB 2016a version. Machine have I3-6th generation hardware. Comparison of model was done by method implement in TMM [14] and SHCTM [18]. Evaluation parameters were taken from the [18]. Experiment was perform on ideal and attacked conditions. In case of ideal only real nodes present in the environment and in case of attack some of malicious nodes present in the environment.

Results

Table 1 Cloud node class identification models on the basis of precision values.

(MachinexMalicious)	SHCTM	TMM	**S_ANFIS**
30x5(Attack)	0.8667	0.5556	0.9565
40x5(Attack)	0.9	0.6364	0.9143
40x8(Attack)	0. 875	0.25	1
50x10 (Attack)	0.8148	0.5294	0.9474
50x0 (Ideal)	1	1	1

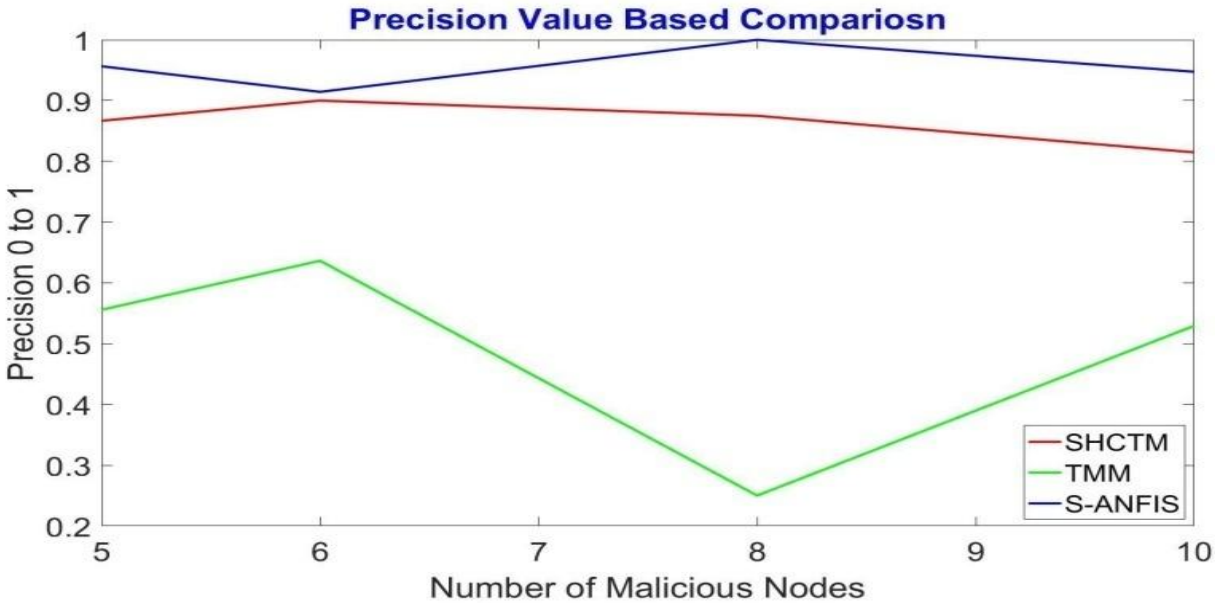

Fig. 2 prevision value based comparison.

As shown in Table 2 and fig. 2 precision value of proposed S_ANFIS model is higher as compared to previous models proposed in [14] and [18]. It was found that use of Sorensen function is common in [18] and S_ANFIS model but ANFIS learning model has increases the percent value of real +node detection.

Table 2 Cloud node class identification models on the basis of recall values.

(MachinexMalicious)	SHCTM	TMM	**S_ANFIS**
30x5(Attack)	0.8125	0.8333	0.88
40x5(Attack)	0.875	0.875	0.9697
40x8(Attack)	0. 7368	0.6667	0.8611
50x10 (Attack)	0.8148	0.8182	0.8182
50x0 (Ideal)	1	1	1

Table 2 shows recall value of node classification (Real / Malicious). Use of social feature Sorensen in the work recall value of S_ANFIS is higher while SHCTM also have good set of recall values. In case of [14] as social feature based classification is absent hence detection is missed in the work.

Table 3 Cloud node class identification models on the basis of f-measure values.

(MachinexMalicious)	SHCTM	TMM	**S_ANFIS**
30x5(Attack)	0.8387	0.6667	0.9167
40x5(Attack)	0.7368	0.7368	0.9412
40x8(Attack)	0.8	0.3636	0.9254
50x10 (Attack)	0.8148	0. 6429	0.8780
50x0 (Ideal)	1	1	1

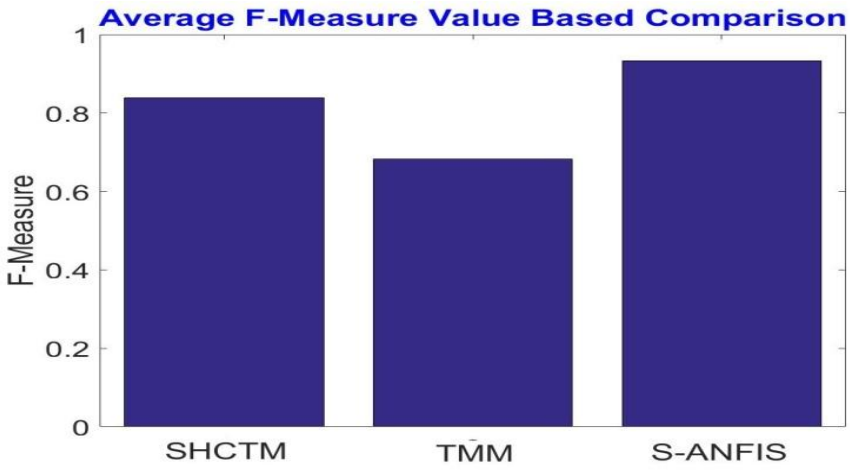

Fig. 3 F-measure average value based comparison.

F-measure values of different malicious node detection techniques shown in Table 3 and average f-measure values shown in fig. 4. Use of ANFIS mathematical for feature based node classification in the cloud environment is higher as compared to other existing model in [14] and [18].

Table 4 Cloud node class identification models on the basis of FNR values.

(MachinexMalicious)	SHCTM	TMM	**S_ANFIS**
30x5(Attack)	0.1875	0.1667	0.12
40x5(Attack)	0.1429	0.125	0.0303
40x8(Attack)	0.2632	0.3333	0.1389
50x10 (Attack)	0.2981	0.4271	0.1818
50x0 (Ideal)	0	0	0

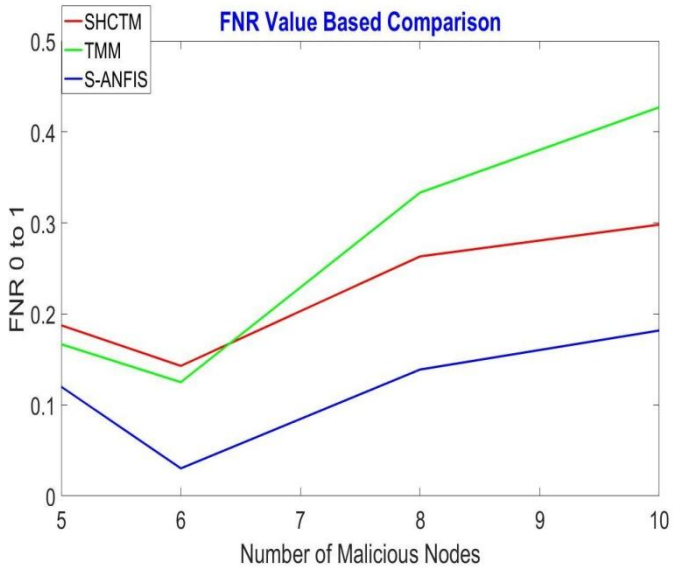

Fig. 4 FNR value based comparison.

Table 4 and fig. 4 FNR values shows that S_ANFIS model has lower as compared to SHCTM model. It was found that TMM has higher as compared to other comparing methods. It was shown that at some of points SHCTM model is better as compared to S_ANFIS.

V. Conclusion

Cloud security is highly demand as many of services depends on this virtual environment. Inner security is also a major concern to monitor. This paper has developed a multi tenant inner security model. Sorensen function

was used in the work for the estimation of machine social behavior in the network where behavior estimate as per number of session complete. Now extracted feature values were used to train the Adaptive neural fuzzy interference system mathematical model. Trained ANFIS model classify the machine into two class first is malicious node and other is real user. Experimental work was done on MATLAB software. Result shows that different evaluation parameter values were optimize in the work such as precision value was increased by 7.08% and F-measure value was improved by 10.1%. In future scholar can train some other deep neural network for identifying the malicious nodes in the cloud.

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MANAGING HIGHER EDUCATION INSTITUTIONS IN INDIA: A STUDY ON GROSS ENROLMENT RATIO AND FINANCING

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ABSTRACT

The Gross Enrolment Ratio (GER) is considered an indication of a high degree of participation and availing the educational opportunities. The Ministry of Education, Government of India, has been collecting and compiling huge educational statistics from colleges and Higher Education Institutions (HEIs) every year and publishing a report called All India Survey on Higher Education (AISHE). The last report of AISHE 2019-20 indicates a negligible increase of GER at 27.1% from the previous year. The National Education Policy 2020 was announced last year by the Government through NEP 2020 policy document, a higher goal of improving 50% of GER by 2035. The present study explores the nuances of GER and the pattern of funding of HEIs by the State and Central Government to realise the target of GER set by the NEP 2020. The secondary statistical data for the last nine years (2011-2020), mainly from the AISHE, has been used in the present study to interpret the trends of GER to help the policymakers, researchers, educational administrators to realize the Indian dream of achieving the goals of high GER in the next few decades. The study also touches upon the internal and external pressures on HEIs while improving the GER.

***Keywords**: All India survey on higher education (AISHE),Gross Enrolment Ratio, higher education institutions, student enrolment in Indian universities, financing universities.*

1. Introduction

Education is crucial in empowering young people with the required knowledge and skills by providing access to schools, colleges, and universities to provide them abundant employment opportunities. Providing education not only enhances citizens' overall efficiency but also improves their overall quality of life and helps them to uplift from poverty (Jana, 2020).

The Government of India published the All India Survey on Higher Education (AISHE) report 2019-20 in December 2020. The survey data indicates 38.5 million of total student enrolment (including distance mode) in HEIs. Out of which, female students constituted 18.9 million with 49%. The national average Gross Enrollment Ratio (GER) of students (aged between 18-23 years) in HEIs for 2019-20 is 27.1%, with 26.9% male students and 27.3%. The GER was at 24.3% during 2014-15, which reached 26.3% in 2018-19 after four years with a 2% increase. As per the Economic Survey of India 2018-19, demographic dividends in India are available in 2005-06 and maybe available until 2056. India has been compelled to expand the GER as more and more pupils are passing out from the schools and through the open schooling system in recent years. In contrast to the above trends, as per PRS data, "in India, GER in higher education has more than doubled over 11 years, going from 9% in 2002-03 to 24% in 2013-14". The National Education Policy (NEP) 2020 introduced by the Government of India is based on five pillars with three 'S', one 'Q' and one 'E' viz. Access, Affordability, Accountability, Quality, Equity. It promises to address the current challenges of illiteracy, high pupil dropouts and lack of multidisciplinary.

The NEP 2020 also stressed the need to use local language (Indian languages) as the medium of instruction to improve GER and promote strength, usage, and vibrancy. NEP 2020 also stressed the need for equal partnership by the Central and State governments to increase the public investment in the education sector to reach the goal of 6% of the GDP at the earliest. The broad objectives of the present study are (i) to analyse the student enrolment trends in the HEIs funded by Central and State Government in relation to private universities for the last nine years starting from 2011-12 to 2019-20; (ii) to

analyse and interpret the trends in the GER in HEIs for the period of nine years' period (2011-12 to 2019-20); and (iii) to review the pattern of funding of Centrally funded HEIs by the Department of Higher Education, Ministry of Education, Govt. of India.

2. Status of Higher Education in India, GER and Funding pattern of HEIs by Central Government

All the HEIs have formally adopted the NEP 2020 document, with one of the significant agendas being increasing the Gross Enrolment Ratio (GER) at least 50%, i.e. 40.6% by 2035. It is a mammoth job for the Government of India, its regulatory agencies like UGC, AICTE, NCTE and HEIs to achieve the GER target. This paper attempts to analyze and highlight the trends in student enrolment in the HEIs with the current AISHE data covering nine years from 2011-12 to 2019-20 in the context of the NEP 2020. Table-1 shows the types of HEIs in India. It may be seen from Table-1 that under the regulatory framework, the State public universities constitute 37% of the total HEIs as against 18% by Central Universities and Institutions of National Importance.

Table-1:Types of Higher Education Institutions (HEIs) in India (as on 31.3.2021)

Institution Type	***Status***	***Nos.***	***Remarks***
Central Universities	Created through an Act of Parliament and substantially funded by UGC or Ministry of Education, Govt. of India	48	3 Central universities affiliating powers
Central Open University (IGNOU)		01	With 56 Regional Centres across India
Institutions of National Importance *(IITs, IIMs, IISER, NITs, NIDs, NIFT etc.		135	Unitary with no affiliating powers
State Public Universities	Created through State Legislature or recognized by the Private Universities Act	386	With affiliating powers
Specialized Institutions created under State Legislature Act		05	Medical Colleges in five States
Private Universities		327	With no affiliating powers
State Open Universities		14	Functioning through a network of Regional Centres
State Private Open University		01	Located at Arunachal Pradesh
Deemed to be Universities established and funded by Government	Educational Institutions and Research Establishments established by the Central Government registered under Societies Registration Act, 1860	36	With no affiliating powers
Deemed to be Universities (Govt. Aided)	Specialized Educational Institutions created under private initiatives and registered as Charitable Institution or Not for Profit and registered under Societies Registration Act under Central Act or State Act	10	With no affiliating powers
Deemed to be Universities (Unaided)		80	With no affiliating powers
	Total	**1043**	

Source: AISHE 2019-20 (*) IIT- Indian Institute of Technology; IIM- Indian Institute of Management; IISER- Indian Institute of Science Education & Research; NIT-National Institute of Technology; NID-National Institute of Design; NIFT- National Institute of Fashion Technology.

Table-2 below shows the number of students enrolled at various academic programmes in HEIs in the academic year 2019-20. As may be seen from the table-2, as much as 83.52% of students have enrolled in the undergraduate programme in universities and affiliated or constituent colleges under State public universities and centrally funded HEIs in India. The enrollment in postgraduate programmes is around 12%.

Table-2: Level wise Student enrollment in HEIs in the year 2019-20

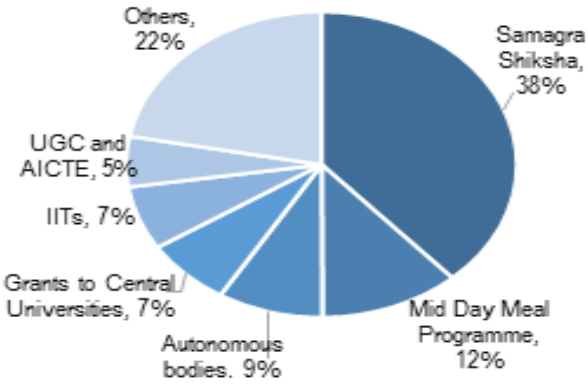
Level of the Programme	*No. of students enrolled*	*Percentage*
Undergraduate	29475652	83.52
Postgraduate	4217864	11.95
Ph.D	202061	0.57
P.G. Diploma	183694	0.52
M.Phil	23902	0.07
Integrated (UG+PG)	300257	0.85
Diploma	762111	2.16
Certificate	126566	0.36
Total	35292107	

Source: AISHE 209-20, Ministry of Education, Govt. of India

2.1. Financing of HEIs by the Central Government

Financing Higher Education Institutions (HEIs) also has a direct bearing on bringing improvement in the GER. From 2019-20 to 2021-22, the Central Universities in India were allocated Rs. 7988.84 crore for 2019-20; Rs. 8634.32 crore for Rs.2020-21 and Rs. 7643.26 for 2021-22 respectively as per the Demand for Grants 2020-21 by the Ministry of Education (Department of Higher Education) as approved by the Parliament of India. The per capita expenditure per year for 1509137 works out to Rs. 52,936/- for the financial year 2019-20. A bulk of the expenditure went towards payment either salaries or retirement benefits of teachers and employees of 48 Central Universities excluding National Open University (IGNOU) and Institutions of National Importance. Figure-1 shows that the Ministry of Education spent 7% of the total budget funding 48 Central Universities.

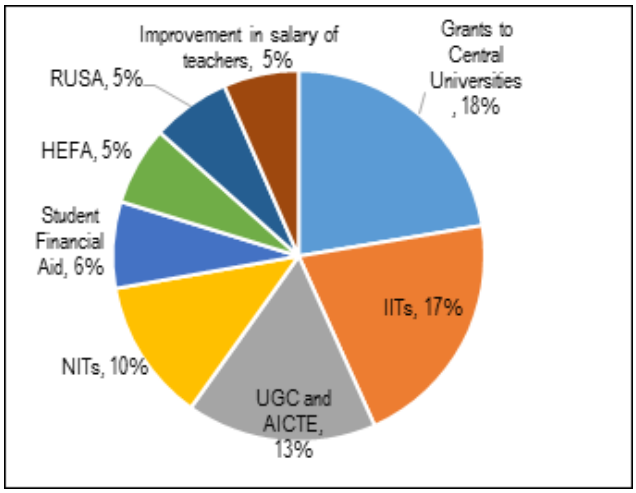
Figure 1: Top expenditure heads under the Ministry (2019-20)



Source: Ministry of Education, Department of Higher Education, Govt. of India: PRS

Figure-2 shows the head wise distribution of expenditure by the Department of Higher Education under the Ministry of Education for the year 2019-20. As evident from Figure-2, during the year 2019-20, 18% of the share was allocated for funding of 48 Central Universities, 17% for IITs, and another 10% for NITs. Both IITs and NITs fall under the category of Institutions of National Importance. The total share of three categories of HEIs stands at 45% of the total budget allocation. If the 5% of expenditure towards HEFA (Higher Education Financing Agency) for financing HEIs is included, the total allocated budget towards HEIs stands at 50%.

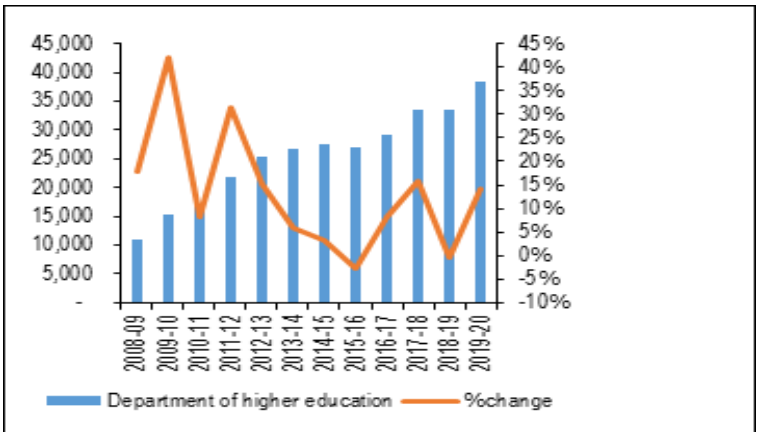
Figure 2: Distribution of expenditure on major activities for the Department of Higher Education for the year 2019-20 under the Union Budget, Govt. of India



Source: Ministry of Education, Department of Higher Education, Govt. of India: PRS

Table-3 shows the funds allocated to the Department of Higher Education, Government of India, from 2008-09 till 2018-19. As may be seen from Table-3 that there has been an increase of 14.3%, wherein Rs. 38,317 crore was allocated for the Department of Higher Education under the Union Budget. However, their share of GER of HEIs for 2019-20 was 4.28% for Central Universities and 0.83% for Institutions of National Importance.

Table-3: Allocation to the Department of Higher Education, Govt. of India for the period from 2008 to 2019 (Rupees in crore).



Source: Ministry of Education, Department of Higher Education, Govt. of India: PRS

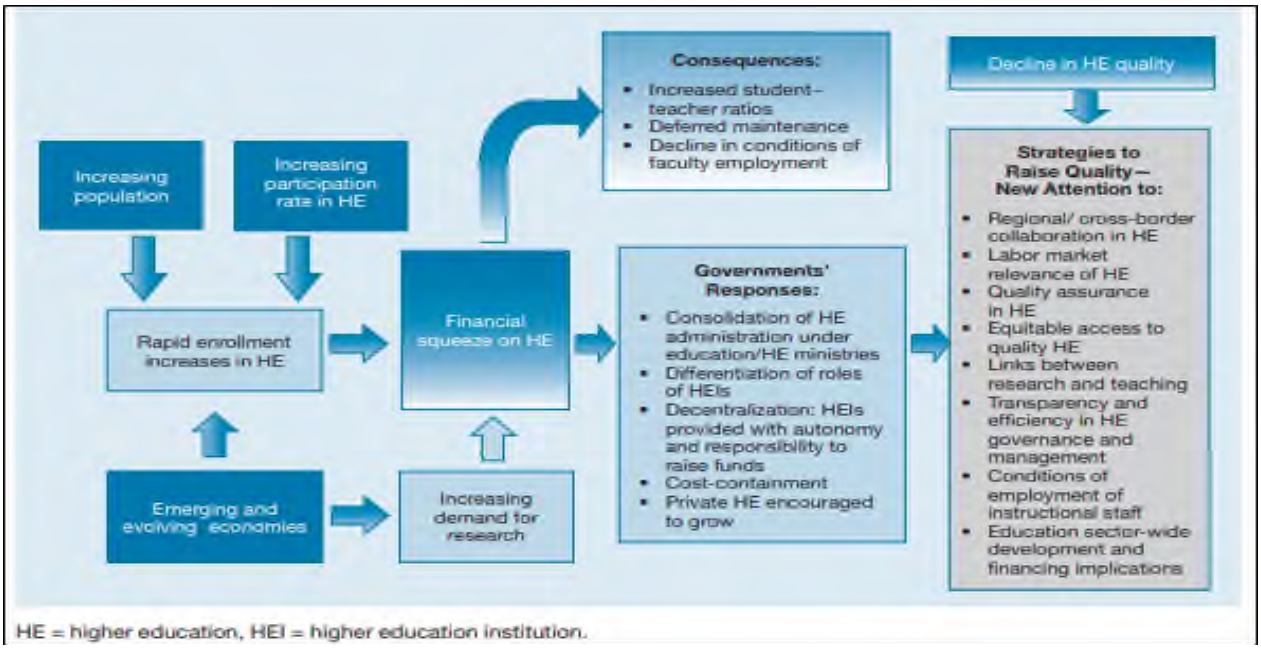
3. Literature Review

HEIs train the high level technical and administrative workforce for the business, industry and government services. "HEIs operate as incubators of the innovation and creative thinking" that is needed for an increasingly competitive society and the world" (ADB, 2011). The world has become digital now, and economic and social development largely depend on creativity and innovation. India is slowly emerging as a startups hub now, and several HEIs are creating innovation centres or incubators to help students and faculty members. To drive innovation culture, the Ministry of Education, Govt. of India, has been spearheading a startup and innovation culture in HEIs through National Innovation and Startup Policy (NISP). Past evidence indicates that countries invest heavily in the education of the people, and skill development always gets economic and social benefits for its citizens. Investments in education not only bring benefits to individuals but to the whole society. "Countries that give individuals one additional year of education can boost productivity and raise economic output by 3%−6% over time" (LaRocque 2007).

Figure 3 shows the external and internal pressures on typical HEIs in the context of Asian countries (ADB, 2011). The rapid increase in student enrolment in HEIs tend to

squeeze finances on HEIs with an increasing demand for research. The government would try consolidation under the Education Ministry, introduce decentralization by providing autonomy, encourage private participation.

Figure 3: External and Internal Pressures on HEIs in Asian Countries: ADB Model



Source: Asian Development Bank, 2011.

Governments generally employ a combination of strategies suitable for their country to bring continuous improvement in the system, strengthening the institutional framework and management, reducing the burden on the public exchequer for higher education. At the same time, they also work on developing an alternative model of funding. In India, the Government has continuously experimented with the new models of improving GER and funding of HEIs.

Importance of Gross Enrolment Ratio (GER)

GER is "calculated as a percentage of a total number of students enrolled in a specific level of education (higher education in this case) divided by the total population within the relevant age group" (PRS). GER in India is 27.1, which is calculated for the 18-23 years of age group (AISHE, 2020). A GER value of around 100% shows that a country has accommodated all of its school pass out of the population. Achieving such a high target of GER is the aim of a robust educational system in a country that becomes necessary for a country.

India is one of the youngest populations, with a median age of 28 years compared to 37 years in China and 49 years in Japan. As per the UNESCO Institute for Statistics, "GER can exceed 100% due to the inclusion of over-aged and under-aged students because of early or late entrants, and grade repetition. In this case, a rigorous interpretation of GER needs additional information to assess the extent of repetition, late entrants." In 2011, China had a GER of 25.65 as against India with 22.76 at the same period. Nevertheless, in the next 7-8 years, China doubled its GER to 50.6 in 2018. In comparison, India reached 26.3 in 2018-19 for the same period (Economic Times, 2020). In 2020, the Ministry of Education was batting for a higher allocation of funds to higher education before the Finance Commission of India.

In order to improve the female student representation, the Ministry of Education had issued directions to the Indian Institutes of Technology (IITs) to create 17% special quota for women students. The IIT Council headed the Cabinet Minister for Education had taken a decision to reserve 20% of seats in IITs from 2020-21(The Print, 2020). Similarly, IIMs have also decided to give more diversity points to women students with non-engineering background from 2021-21 onwards.

Eligibility Enrollment Ratio (EER)

There were some arguments by a group of researchers "The GER in higher education for India is lower as compared to developed nations because a large population of students in the relevant age group is simply not eligible to enrol in colleges because they have not completed the 12th grade higher secondary education," (Mittal et al., 2020). According to the researchers focusing on GER has been misplaced in India and looking for Eligibility Enrollment Ratio (EER). The EER is calculated based on the eligible population who attained 12 years of Schooling and are in the age bracket of 18-23 and eligible for a university programme.

4. Data Collection and Research Methodology

Data Collection

The study is based on secondary data and covers all types of Higher Education Institutions (HEIs) in India. Secondary data from the All India Survey on Higher Education (AISHE) from 2011-12 to 2019-2020 on students' enrolment in HEIs, undertaken and published by the Government of India, Ministry of Education (Department of Education Higher Education), New Delhi.

Research Methodology

The following methodology have been used for the analysis of the data:

(i) Growth Rate represents in percentage (%): The growth rate is also called as Percentage of Increase and while calculating growth rate annually it is called as Annual Growth Rate (AGR)
Annual Growth Rate = (New Value-Old Value/Old value) *100

(ii) Total Growth Rate= (New Value –Start Value/Start Value) *100

(iii) Compound Annual Growth Rate (CAGR): specific term for the geometric progression ratio that provides a constant rate of growth over the time period

$$CAGR = \left(\frac{V_{final}}{V_{begin}} \right)^{1/t} - 1 \qquad where$$

V_{begin}= Beginning value V_{final} = Final value
t =Time in years

5. Results and Interpretations

5.1. Status of Student Enrollment in HEIs from 2011 to 2020

The status of student enrolment in HEIs from the last nine academic years commencing from 2011-12 to 2019-20 has been tabulated at Table-4.

Table-4: Student Enrolment in different types of HEIs in India from 2011-12 to 2019-20

Academic Year	Central Universities	Central Open University (IGNOU)	Institutions of National Importance	State Public Universities	Institutions Under State Legislature Act	State Open Universities	State Private Universities	Deemed to be Universities-Government	Deemed to be Universities-Government Aided	Deemed to be Universities-Private	Others (incl. NIFT)	**Total (number of students) (In Lakh)**
2011-12	1415199	533293	111390	23440757	1699	910000	270495	36121	97025	551739	2392	**273.70**
2012-13	1374612	610883	142551	24020881	2371	986754	374567	38341	103434	604872	2381	**282.62**
2013-14	1490346	663715	150849	25897591	2580	982715	456817	43191	99910	629825	5939	**304.23**
2014-15	1541609	672571	186966	27497521	2843	957185	555262	39684	88134	629024	6687	**321.77**
2015-16	1565827	732291	181410	27650721	3728	1101186	603876	40325	70709	603760	8706	**325.63**
2016-17	1480198	815946	196664	28523835	3669	1080838	768389	44159	69901	611965	0	**335.96**
2017-18	1483522	861275	203197	28389091	3709	1090109	1035729	42921	55994	652151	0	**338.18**
2018-19	1467394	1035081	228431	28090241	5115	1174747	1157093	37496	59720	696926	0	**339.52**
2019-20	1509137	1167336	293336	28943100	6052	1212287	1276201	39727	56169	788762	0	**352.92**
***CAGR %**	**0.7**	**9.1**	**11.4**	**2.4**	**15.2**	**3.2**	**18.8**	**1.1**	**-5.9**	**4.1**		**2.9**

(*) Compound Annual Growth Rate-CAGR.

The student enrolment data, as indicated in Table-4 above, shows that the overall enrolment of students in HEIs has increased considerably except in Deemed to be Universities category. The highest growth of CAGR in the student enrollment is noticed in the category of State Private Universities at 18.8% as against 2.4% in the State public universities in India. Similarly, student enrolment in the case of Institution of National importance stands at 11.4% of CAGR as against 0.7% in Central Universities. At the same time, the student enrolment in the only centrally funded Open University, i.e. Indira Gandhi National Open University IGNOU) with its nationwide network of regional centres registered a compounded annual growth rate of 9.1% against 3.2% in 14 State Open Universities and one private state university. There is negative growth of -5.9 of CAGR observed in the case of Deemed to be Universities that receives grant-in-aid from the University Grants Commission and other government sources. However, the Deemed to be Universities established and administered by the Central Government are stagnating at 1.1% CAGR. Altogether the CAGR of the last nine years from 2011-12 to 2019-20 of all types of HEIs has registered a CAGR of 2.9%. At the beginning of 2011-12 was 273.70 lakh and rose to 352.92 at the end of the 9th year, i.e. 2019-20. The overall growth in terms of the number of enrolled students in these HEIs stands at 29%.

5.2. Share of Student Enrolment (percentage) in HEIs

Table-5 shows the student enrollment in HEIs for the last nine years starting from the academic year 2011-12 till 2019-20 in terms of percentile.

Table-5: Share of Student Enrolment (percentage)in HEIs from 2011-12 to 2019-20

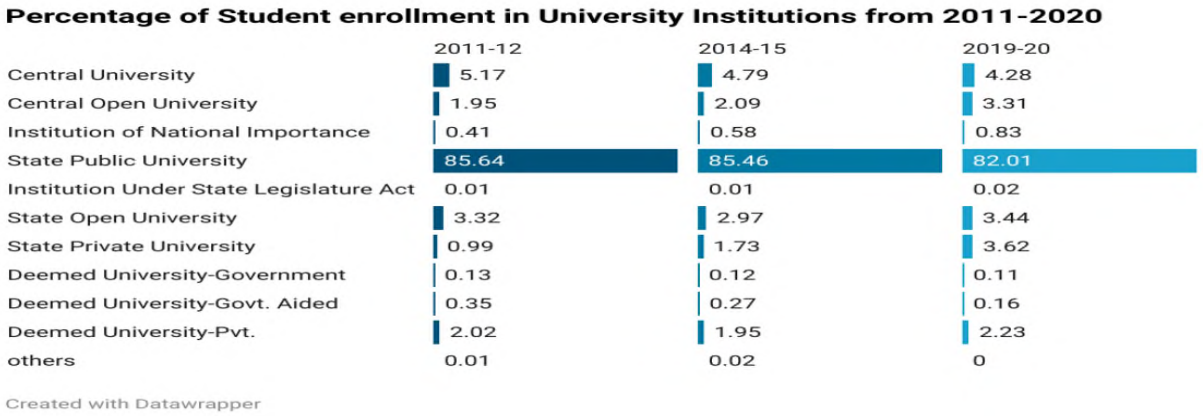
Academic Year	Central University	Central Open University	Institution of National Importance	State Public University	Institution Under State Legislature Act	State Open University	State Private University	Deemed University Government	Deemed University Government Aided	Deemed University- Private	Others (NIFT)
2011-12	5.17	1.95	0.41	85.64	0.01	3.32	0.99	0.13	0.35	2.02	0.01
2012-13	4.86	2.16	0.50	84.99	0.01	3.49	1.33	0.14	0.37	2.14	0.01
2013-14	4.90	2.18	0.50	85.12	0.01	3.23	1.50	0.14	0.33	2.07	0.02
2014-15	4.79	2.09	0.58	85.46	0.01	2.97	1.73	0.12	0.27	1.95	0.02
2015-16	4.81	2.25	0.56	84.92	0.01	3.38	1.85	0.12	0.22	1.85	0.03
2016-17	4.41	2.43	0.59	84.90	0.01	3.22	2.29	0.13	0.21	1.82	0.00
2017-18	4.39	2.55	0.60	83.95	0.01	3.22	3.06	0.13	0.17	1.93	0.00
2018-19	4.32	3.05	0.67	82.73	0.02	3.46	3.41	0.11	0.18	2.05	0.00
2019-20	4.28	3.31	0.83	82.01	0.02	3.44	3.62	0.11	0.16	2.23	0.00
Average	**4.66**	**2.44**	**0.58**	**84.41**	**0.01**	**3.30**	**2.20**	**0.13**	**0.25**	**2.01**	**0.01**

The data from Table-5 reveals that the State public-funded universities contribute 84.41% of the total student enrollments in all HEIs in India. The share of Central Universities and Institution of National Importance constitutes 5.24%. Open Universities together constitutes another 5.74%. While in the case of Private Universities established under State Legislature constitutes 2.20%. All the Deemed to be Universities constitutes 2.39%.

5.3. Trends of Student Enrolments at three intervals

Table-6below shows the share of student enrolment at three intervals viz. 2011-12, 2014-15 and 2019-20.

Table-6 :Trends of Student Enrolments (2011-12; 2014-15 & 2019-20)



Source: AISHE 2019-20

The comparison of three intervals – 2011-12; 2-14-15 and 2019-20 of the nine years shows a slight decline of 3.63% in the student enrollment in State public-funded universities from 85.64% to 82.01%. In comparison, there is a steady increase in student enrollment in Private Universities established under State Legislatures, which rose from 0.99% in 2011-12 to 3.62% in 2019-20 spanning nine years.

There is a declining trend of 0.89% noticed in the case of Central Universities from 5.17% at the beginning of the year 2011-12 to 4.28% at the end of the ninth year of study, i.e. 2019-20. However, a steady increase in student enrollment has been noticed in the case of Institutions of National Importance (primarily technical education) from 0.41% to 0.83, and the increase in their case is 102%. The growth rate between 2011-12 to 2014-15 was 41% and from 2014-15 to 2019-20 was 43% which shows a steady growth of enrolment in the case of Institutions of National Importance which are constituting such prestigious technical institutions IITs, IISER, NITs, NIDs, IIMs.

5.4. Students enrollment in University Departments and Affiliated/Constituent Colleges

Table-7 below shows the student enrollment in the Teaching Department of Universities and its Constituent or affiliated colleges with average annual and incremental growth for the period from 2011-12 to 2019-20. The Table also shows the CAGR percentage at the end.

Table-7: Students enrollment in University Teaching Departments and affiliated/constituent colleges from 2011-12 to 2019-20

Academic Year	**University Teaching Departments** (including Constituent Units/Off-campus Centres of Universities) (A)				**Affiliated and Constituent Colleges** (B)				**Total** (A+B)		
	Enrolment (In Lakh)	Annual Growth Rate (%)	Incremental Growth (%)	Total share of enrollment (%)	Enrolment (In Lakh)	Annual Growth Rate (%)	Incremental Growth (%)	Total share of enrollment (%)	Total Enrolment (In Lakh)	Annual Growth	**Incremental Growth**
2011-12	55.17			20.15	218.54			79.85	273.70		
2012-13	58.44	5.93	5.93	20.68	224.18	2.58	2.58	79.32	282.62	3.26	**3.26**
2013-14	63.80	9.17	15.65	20.97	240.44	7.25	10.02	79.03	304.24	7.65	**11.16**
2014-15	63.87	0.12	15.79	19.85	257.90	7.26	18.01	80.15	321.77	5.77	**17.56**
2015-16	66.89	4.73	21.26	20.54	258.73	0.32	18.39	79.46	325.63	1.20	**18.97**
2016-17	70.72	5.73	28.21	21.05	265.23	2.51	21.37	78.95	335.96	3.17	**22.75**
2017-18	72.65	2.73	31.71	21.48	265.52	0.11	21.50	78.52	338.18	0.66	**23.56**
2018-19	74.87	3.05	35.72	22.05	264.65	-0.33	21.10	77.95	339.52	0.40	**24.05**
2019-20	81.38	8.70	47.53	**23.06**	271.54	2.60	24.25	**76.94**	352.92	3.95	**28.94**
Average		**5.0**		**21.09**		**2.79**		**78.91**		**3.26**	
CAGR%	**4.4**				**2.4**				**2.9**		

Table-7 indicates that the universities' total number of student enrolment was 81.38 lakh as against 271.54 lakh in the colleges. The overall increase of student growth was 28.94% between 2011-12 to 2019-20. The total share of student enrollment in the Universities stands at 21.09% at the end of the study period of 2019-20 as against a whopping 78.91% in the University affiliated and constituent colleges.

The AISHE data 2019-20 shows that the student enrollment in UG level programmes stands 83.52 against 11.95% of PG level programmes. As most of the university department offers PG level programme, many students had to enrol in the affiliated or constituent colleges. Table-4 shows a slight increase of 5% in student enrolment in the Universities as against 2.79% growth in enrollment in colleges. The average growth of student enrolment between the base year 2011-12 to 2019-20 stands at 3.26%. The CAGR of student enrolment in the case of universities is calculated at 4.4% as against 2.4% in the case of Colleges. The trend of CAGR shows that the growth rate of Universities is doubled between the base years of 2011-12 to 2019-20 for nine years.

5.5. Gender wise student enrolment trends

Table-8, below shows the trends in gender wise student enrollment in HEIs for the three intervals from 2011-12 to 2019-20.

Table-8: Trends in gender wise student enrollment in HEIs (2011-12 -2019-20) In Lakh

Types of Universities	2011-12				2014-15				2019-20			
	Male	Female	Total	Percentage of female student	Male	Female	Total	Percentage of female students	Male	Female	Total	Percentage of female students
State Public University	126.70	107.71	234.41	45.95	143.35	131.63	274.98	47.87	140.66	148.77	289.43	51.40
Central University	7.02	7.13	14.15	50.37	7.77	7.65	15.42	49.60	7.36	7.73	15.09	51.22
Central Open University (IGNOU)	**3.10**	**2.23**	**5.33**	**41.81**	**3.62**	**3.10**	**6.73**	**46.11**	**6.46**	**5.22**	**11.67**	**44.69**
State Open Universities	5.45	3.65	9.10	40.14	5.57	4.00	9.57	41.81	7.34	4.78	12.12	39.42
State Private Universities	1.93	0.77	2.70	28.54	3.91	1.64	5.55	29.54	8.34	4.42	12.76	34.67
Deemed University-Pvt.	3.50	2.01	5.52	36.48	4.01	2.28	6.29	36.31	4.65	3.24	7.89	41.02
Institutions of National Importance	0.92	0.20	1.11	17.67	1.50	0.37	1.87	19.64	2.21	0.73	2.93	24.73
Deemed University-Govt. Aided	0.59	0.38	0.97	39.49	0.51	0.37	0.88	42.24	0.28	0.29	0.56	50.78
Deemed University-Government	0.28	0.08	0.36	23.44	0.29	0.11	0.40	26.86	0.26	0.13	0.40	33.42
Institution Under State Legislature Act	0.01	0.01	0.02	65.21	0.01	0.01	0.03	47.27	0.02	0.04	0.06	61.17
Others	0.01	0.01	0.02	54.10	0.02	0.04	0.07	63.75	0.00	0.00	0.00	0.00
Total	**149.51**	**124.19**	**273.70**	**45.38**	**170.57**	**151.21**	**321.77**	**451.00**	**177.59**	**175.33**	**352.92**	**49.68**

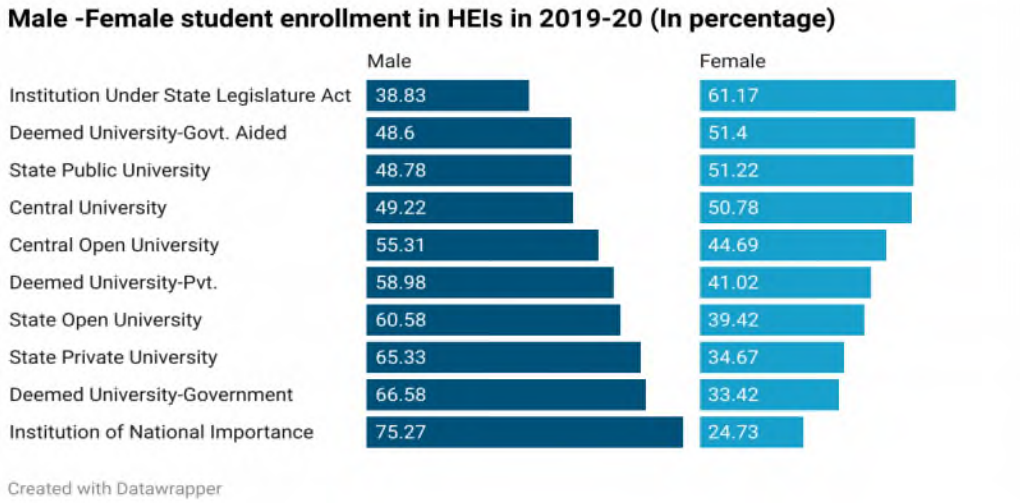
Table-8 shows an increasing trend in female students in the case of State Public Universities wherein there was an increase of 1.92% from 2011-12 to 2014-15. Similarly, there was an increase of female students to the tune of 3.53%, which is a silver lining in the gross enrolment ratio (GER). However, decreasing trends in enrolment of female students have been noticed in the case of State Open Universities. The percentage of female

students was 40.14% in the base year of 2011-12, which decreased to 39.42% at the end of the study period, i.e. 2019-20, which is about less than 1%. It may be seen from table-8 that the female student enrolment in the institutions of national importance was very low at 17.67% at the base year of 2011-12, and there was an improvement of around 2% in the year 2014-15. The percentage of female students was 46.11% in 2014-15 compared to 44.69% at the end of the nine-year review period 2019-20. However, the total number of female students enrolled in the year 2014-15 was 3.10 lakh as against 5.22 lakh in the year 2019-20.

5.6. Share of Male to Female student enrollment in HEIs (2019-20)

Table-9, below shows the trends in the share of Male to Female student enrollment in HEIs in the year 2019-20.

Table-9 : Share of Male to Female student enrollment in HEIs in the year 2019-20



Source: AISHE 2019-20

As may be seen from Table-9 above, the highest number of female students, over 61 %, have been enrolled in the five Medical Colleges/Institutions created under State Legislature Act in Telangana, Andhra Jammu & Kashmir, Bihar and Uttar Pradesh. In the case of Institution of National Importance (IITs, IIMs, NITs), the representation of female students are low but there has been an improvement as compared to 2011-12.

5. Discussions and Recommendations

The CAGR's overall growth of 2.9% was noticed during the nine-year study period (2011-2020). The student strength registered at the beginning of the nine years in 2011 was 273.70 lakh, which increased to 352.92 lakh at the end of the nine years (2019). There was an overall increase of 29% with 79.22 lakh students from 2011 to 2019. However, there was a decline of student growth in the Deemed to be universities category with a -5.9 of CAGR except government established and funded deemed to be universities that are stagnating with 1.1% CAGR. The highest growth of 18.8% of CAGR has been noticed in the case of State private universities as compared to 2.4% growth in State public universities. In comparison, there is a steady increase in student enrollment in Private Universities established under State Legislatures, which rose from 0.99% in 2011-12 to 3.62% in 2019-20 spanning nine years.

The 135 Institution of National importance also saw impressive growth of 11.4% against 0.7% in the case of 48 Central Universities. A declining trend of 0.89% was noticed in the case of Central Universities. The student enrollment in 2011 was 5.17% at the beginning of the year 2011-12 and reduced to 4.28% in 2019-20. The analysis also reveals that 82.03% of pupils seek admission in regular undergraduate programmes in colleges or universities at the end of the study period (2019-20) in public-funded state HEIs. Out of which 12.5% enrolled for postgraduate programmes, including the Postgraduate Diploma programmes. There are declining trends noticed in the case of State public universities to the extent of 3.63% in 2019-20, where it has been reduced from 85.64% to 82.01%.

Steady growth in GER is also observed in the case of IGNOU, the only national-level open university with 9.1%, as against its counterparts in 14 open State universities with 3.2%. The 48 Central Universities contribute 5.24% of GER; IGNOU alone had enrolled 5.74% of students at the end of the nine years (2019). Private Universities constitutes 2.20% and 2.39% by all Deemed to be Universities. Given the funding constraints at the level of Central and State Governments, there is substantial evidence of the increasing number of private funded universities and colleges in the last decade. Such trends also show the increasing number of students and their families to share the higher education cost to enroll in their programmes in India.

The CAGR of student enrolment in the case of universities is calculated at 4.4% as against 2.4% in the case of Colleges. The trend of CAGR shows that the growth rate of Universities is doubled between the base years of 2011-12 to 2019-20 for nine years. There is an increase of 1.92% in female student enrolment in the nine-year study period. The student strength increased from 124.19 lakh (45.38% in 2011-12) to 175.33 lakh (49.68% in 2019-20), which is encouraging. If the above trend continues, male to female ratio may cross the 50% ceiling in the next two years. Improvements in female students' enrollment are also observed in the case of 135 Institutions of National Importance (IITs, IIMs, NITs, IISERs, NIDs, NIFT), where the percentage of female students raised is raised from 17.64% (2011-12) to 19.64% (2014-15) and 24.73% (2019-20) with a total increase of 5.09%.

The female enrolment ratio in the institutions of national importance improved further to 24.73% at the end of the review period, i.e. 2019-20, registering an increase of 5.09%. The above trend clearly shows that more and more opportunities have been provided to female students in technical institutions like IITs, IIMs which is a welcoming trend. The Central Universities have been maintaining consistency in the female student enrolment somewhere from 50.37% to 51.22% from 2010-11 to 2019-20. In the case of enrollment in Central Open University (IGNOU), a decreasing trend in the enrollment of female students has been observed in the year 2019-20 compared to 2014-15. The steady improvements come after the intervention and persuasion of some of the elite HEIs like IITs and IIMs by the Ministry of Education to reserve a minimum percentage of seats for women. The growth in the number of women students is also possibly due to the high percentage of women student enrolment in NIFT, which offers professional programmes in Fashion Design through its 17 campuses/centres across India.

The 135 Institution of National importance also saw impressive growth of 11.4% against 0.7% in the case of 48 Central Universities. A declining trend of 0.89% was noticed in the case of Central Universities. The student enrollment in 2011 was 5.17% at the beginning of the year 2011-12 and reduced to 4.28% in 2019-20. The analysis also reveals that 82.03% of pupils seek admission in regular undergraduate programmes in colleges or universities at the end of the study period (2019-20) in public-funded state HEIs. Out of which 12.5% enrolled for postgraduate programmes, including the Postgraduate Diploma programmes. There are declining trends noticed in the case of State public universities to the extent of 3.63% in 2019-20, where it has been reduced from 85.64% to 82.01%.

A rapid increase in the GER requires active participation through private investment, and the State and Central Government can only facilitate their entry into the higher education sector. The last two decades have witnessed a considerable increase in the number of private universities across the States of India. The State Governments had justified their growth, citing the need for improved GER and private investment in the higher education sector. Their numbers had grown from 278 in 2015-16 to 407 in 2019-20, and about 131 more private universities are also coming up soon. Though the private universities constitute over 30% of total HEIs now, as per AISHE data, they cater to less than 3 per cent of GER. The state public universities, which are more or less equal in numbers with private universities, continued to cater to about 85% of the pupils.

Entering many private universities in India is expected to relieve the policymakers to ease the resource crunch and reduce some burden on

the government. Nevertheless, these Indian private universities will face a tough challenge when foreign universities enter the higher education field soon. Some students from elite backgrounds may look forward to them for the same standards these universities operate in their home countries. Many of the young population coming from the middle class of the society may be willing to pay and self-financing their studies. These may be one of the primary reasons why more and more private universities and self-financing colleges are mushrooming daily. At the same time, the Central and State governments also indirectly encourage such private initiatives in the higher education sector to believe that the GER of India would improve.

Large student enrollment in State public universities has been possible because of an extensive network of affiliated and regulated colleges. Whereas in the case of private universities, they end up serving those students, coming for a comfortable environment and flexible learning, which are rare in public-funded universities in India.

Financing Higher Education Institutions (HEIs) also has a direct bearing on bringing improvement in the GER. As regards the pattern of funding of the HEIs, the higher education sector is ever-expanding. Due to various reasons such as unaffordability due to economic conditions, staying away from native places, the opportunity cost for gainful employment after completing their undergraduate studies, marriage, migration for a job, and low socioeconomic status. It put enormous pressure on the HEIs in India for more and more seats in undergraduate, vocational and tertiary education. While in the case of the Central Government, more and more HEIs have been created or strengthened with significant public funding. There has been an increase of about 14% for the Department of Higher Education, Ministry of Education in 2019-20. An overwhelming trend is noticed in funding three categories of HEIs (Central Universities and Institutions of National Importance) by the Central Government through the Department of Higher Education. The allocated budget constitutes 45% of the total budget allotted to the Department.

There is more pressure on these HEIs to improve the GER to achieve the target of 40.6% by 2035 by reducing the Government of India's financial support and finding a more sustainable model of funding. On the other hand, 4% of Health and Education Cess are being charged from Income Tax, and the Government, in turn, also spend an equal portion of the Cess money for funding school and higher education. A colossal corpus has been created from the Cess money that has been collected, and a considerable portion was set aside for funding infrastructure requirements of HEIs under HEFA.

The Ministry of Education, Government of India, had kept achieving 32% of GER by 2022. However, the registered GER for 2019-20 is still at 27.1%, far from meeting the target set by the Government. The NEP 2020 set a more realistic new target of achieving 40.6% by 2035, with more funding to be set aside for the education sector by Central and State Governments. The implementation of the NEP 2020 is being monitored at the highest level of the Government, which has sent a clear signal to all HEIs for bringing systematic changes with accountability.

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DIGITAL TRANSFORMATION, IOTS AND AI APPLICATIONS IN ELECTRIC AND ELECTRICAL ENGINEERING SECTOR WITH RESPECT TO INDUSTRY 4.0

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ABSTRACT

This paper will present results and analyze results of digital technology indicator such as ICT index on business results including bank performance and performance of other firms such as manufacturing, schools and hospitals in the era of industry 4.0. Authors use both qualitative analysis including synthesis and inductive methods, combined with quantitative methods via a structured equation model.Research results show us that ICT and AI and IoTs application will affect considerably on electrical engineering sector and electric industry. For instance, AI and robots can contribute to enhance productivity while IoTs can help to record and resolve Big Data for these industries together with data protection and security solutions. Therefore, in term of ICT, digital technology , IoTs and AI combination can have good effects on firms and business will have more chance to enhance better communications channels via email, chatbox, e-meeting and video conference with cameras and speakers, etc. Finally when we mention ICT, AI and IoTs effects and applications, we need to suggest cyber security risk solutions attached for information security and prevent cyber attacks.

Keywords: *electrical engineering sector, ICT Index, Digital technology, Internet of things, IoTs, AI effects, cyber attacks.*

JEL classification: *M15, G20, O32*

1. Introduction

The Industry 4.0 is contributing to the level and effects of AI, ICT and digital technology on electric electrical engineering and manufacturing enterprises in emerging markets including Vietnam.
For ICT index as result of readiness rating for development and application ICT in 2019 of ministries, ministerial-level agencies, agencies attached to the Government and provinces and cities directly under the Central Government, We can see ICT Index ranking in Vietnam inbelow table:

Table 1 - ICT index ranking in Vietnam for governmental agencies

Order	Name of Ministries	IT infrastructure index	IT human resource index	Apply index	ICT index	Ranking		
						2019	2018	2017
1	Ministry of Finance	1.00	0.96	0.97	0.97	1	1	1
2	Vietnam Social insurance	0.87	0.91	0.95	0.91	2	2	2
3	Ministry of home affairs	0.7	0.6	0.82	0.72	4	7	7
4	Sport tourism Ministry	0.72	1.00	0.83	0.85	3	5	6
5	ICT Ministry	0.7	0.6	0.72	0.69	5	4	4
6	Ministry of Construction	0.73	0.63	0.69	0.68	6	12	16

7	State bank	0.76	0.46	0.69	0.64	8	3	5
87	Medicine Ministry	0.68	0.44	0.71	0.61	9	9	10
9	Industry and Trade Ministry	0.69	0.56	0.53	0.59	10	11	13
10	Ministry of Science and Tech	0.71	0.43	0.63	0.59	11	14	18
11	Ministry of Transportation	0.62	0.24	0.82	0.56	13	17	14
12	Natural Resources and Environment Ministry	0.58	0.25	0.76	0.53	17	18	12
13	Ministry of Agriculture	0.7	0.39	0.59	0.56	14	15	17
14	Ministry of Justice	0.73	0.29	0.61	0.54	15	16	9
….								

(http://egov.chinhphu.vn/Resources/2019_08_30/37749/Bao%20cao%20VN%20ICT%20Index%202019%20-%20Ban%20tom%20tat.pdf,date access 24/5/2021)

According to The Vietnam Informatics Association and the IT Department (Ministry of Information and Communications) have announced the readiness index for IT application and development in Vietnam (Vietnam ICT Index 2020). According to the rankings, Da Nang City continues to lead with a score of 0.9238. The second place belongs to Thua Thien Hue province with a difference of 12%.Especially in the IT application index, DaNang is far behind most other provinces. Besides, Da Nang is also ranked 5th nationwide on the IT industry index, after Ho Chi Minh City, Hanoi, Bac Ninh and Thai Nguyen.

We analyze the concepts of AI -Artificial intelligence: Humans use machine learning systems to make computers capable of simulating human intelligence in processes that humans normally dobetter than computers.

Binh, D.T., & Thuong, V.T. (2021) specified that AI is the use and analysis of input data to make predictions and then come to a final decision. The purpose of AI is to create expert systems -which are computer applications developed to solve complex problems in a particular field, at the level of human intelligence and expertise. AI implements human intelligence in machines to create systems that can understand, think, learn, and behave like humans.

In other words, we study the principles of human intelligence, modify and apply it to computers appropriately, so that they can handle requests from users with results like humans. or more than human

The criteria for evaluating machine AI is how they handle problems, leading to results equivalent to or better than humans, then they will be recognized as having intelligence.

This study will present results on ICT, IoTs , AI and digital technology effects on electric and electrical engineering and manufacturing firms, etc. Abraham(2021) said that the key factor to contribute to lots evolution and development in methods of machine learning tech is because the role of Artificial Intelligence (AI) which shows the viral functioninthefourthindustrialrevolution,andAI sofarconsideredtousebymanyengineersfor hitherto intractable problems (source: https://www.journals.elsevier.com/engineering-applications-of-artificial-intelligence,access date24/5/2021).

This paper organized with introduction, literature review, methodology, main results, discussion and conclusion.

2. Literature review

First, Bughin et al (2017) said that there are five system of AI technology systems, which

contribute to business solutions, involving: machine learning ML, robotics and autonomous vehicles, computer vision, language, virtual agents, that can serve for directing action. Among them some is about information-based action such as automatic cars and robotics, and some other are about study from information, such as ML.

Next, Picard (2006) mentioned that because of progress of machines (and ML) in which they programmed to express emotions and having sense of human stress and pleasure, etc. Then they became more helpful. And Al-Faouri (2011) said that levels of technology learning can be predicted with emotional intelligence which can connect to our organizations to be more effective.

Then, Shank (2014) stated that emotional intelligence can be approached from another way such as approach of sociological, then people emotion and how they express emotion affected by technology. And the intersection between emotion and technology can be tested with various viewpoints.

Next, Agu and Aguegboh (2020)presented that ICT had widely impacts on performance of banks in the short term in case of 35 banks in Africa; and these investments become very beneficial to improve the bank performance in long term.

Last but not least, Cibenko (2020) specified that scientists try to add EQ-emotional quotient to technology's IQ due to PCs can not connect events with emotions of human. Currently they try to combine AI -artificial with technology designed putting human as center and use technology to understand human emotions and needs then respond properly.

We also summarize related studies of Internet of things (IoTs) effects as below:

Authors	Year	Content, result
Kumar et al	2018	IoTs has presented in many sides of smart house, cities, transportation and pollution control with hi-tech styles.
Sheik	2018	IoTs has various applications which usufe for our life and based on IoTs, people can read many data from remote areas or locations
Khanna and Kaur	2020	IoTs has been considered in a few years ago and it is considered under many aspects including challengers, applications and tech.
Ghost et al	2020	Concentrates on applications and uses of IoTs for construction and building (smart objects)
Ahmad et al	2021	As IoT is in fast-growing stage and demand of smart devices also increasing so the manufactures oversight the security aspects and delivering the vulnerable devices in the market attackers easily targeting the devices using these vulnerabilities and performing a large number of DDoS and other types of Attacks to steal user personal information and data from IoT Devices.

Figure 1- A summary of IoTs effects

3. Research methods For qualitativemethods:

To achieve the results, authors use some research methods, including document analysis, pedagogical observation, qualitative analysis, synthesis and inductive methods, combined with dialectical materialism method in Vietnam.

Inaddition, Authors mainly use case studies methods applied in Vietnam enterprises, together with illustrated evidence.

4. Main results

4.1 Effects of AI - Artificial intelligence and IoTs on electric industry: First, for electric industry:

Vietnam Electricity (EVN) has started to coordinate with IBM to implement UAV project with benefits:

Creating a list of devices, classifying details of advanced equipment and accessories; "train" AI to recognize devices from general to detailed. This stage takes a lot of time and effort to "train" the AI to distinguish each detail, each type of failure and evaluate the condition of theequipment.

Completing the software, deploying the use of autonomous flying UAVs and applying artificial intelligence to analyze images. This phase will develop plans so that the UAV can fly automatically to check all accessories, lines and complete the AI software to analyze and evaluate the inspection images.

Initial use of AI in the production and business of the electricity industry

Currently, many units in the electricity industry are applying AI technology in electricity production and business activities. At the National Power Transmission Corporation (EVNNPT), AI technology is applied by using unmanned aerial vehicles (UAVs) with high-resolution video recorders in inspection and transportation management. operating the line, handling kite strings, objects caught in the wire.

The application of UAV saves time and effort of the workforce, especially reduces the risk of occupational accidents caused by climbing. At the same time, EVNNPT has created a list of equipment and loaded existing images to "train" the AI to learn and initially identify basic equipment on the line and the software has self-classified and sorted automatically. Data by column and column interval. EVNNPT is continuing to collect detailed images and "train" the AI to identify details of parts, accessories, types of damage and step by step test to assess the accuracy of the AI. (source: nangluongsach.vn, access date23/5/2021).

IoTs: IoT is becoming a technology trend that increasingly affects the life of the whole world and has extremely wide applications in many fields in the future, including the Electricity industry. The development of IoT can significantly improve the performance and operational capabilities of smartgrids.

Basically, a smart grid is a network of electricity generation, transmission, distribution and consumption, but with the application of information and communication technology, data digitization, and application of modern technologies in electricity generation. control, check and monitor. The system allows real-time two-way energy and information exchange between electricity suppliers and customers. In general, a smart grid is a system that provides energy through the consolidation of electrical infrastructure with communication infrastructure. Therefore, the amount of data is collected and processed into information for the operation and control of the power system as well as stored for different purposes as required by regulations in management and control. Electrical activity regulation is huge.

Ramos (2011) said that there are challenges in power industry in term of technology such as scheduling and planning and forecasting and controlling and risk management, as well as a risk of degradation with increasingly complex power systems. Then they can perform tasks, with designed engineering to reach targets of supplying a reliable with high quality energy supply and security.

Effects of AI on electrical engineering

Artificial intelligence (AI) currently holds a large role in the smartphone industry and brings many meaningful utilities to users.

AI has contributed to improving the phone's audio processing, enhancing image and voice recognition, and being able to predict user activity, translate languages, speed up search, and more enhanced security…

In terms of photography capabilities, the AI camera will be able to make photos better, automatically increase saturation, automatically recognize scenes and switch modes accordingly when recognizing objects, etc. These utilities will help people. Use to save time and have the most enjoyable experience on your phone.

In mobile sector, scientists has developed AI into many applications on mobile phone and

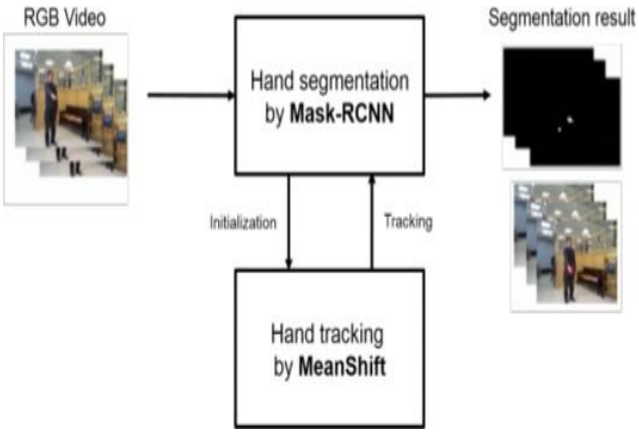
smart phone, not only chat application such as Zalo, Viber, Whatsapp, etc. But also linking to Facebook, Email, Linkedn, Cameras, etc. With really better qualified pictures and images.

Also for mobile phone, AI contribute to resolve voices better, recording and ordering smartphones to automatically call or connect to people we want AI help to increase security and data protection, increase speed of searching google, help to connect between people inshort and long distance, etc. AI technology is also used from helping people take better photos on smartphones, analyzing subjects' personalities in job interviews, to buying goods without having to pay cash for them. cashier. They are present everywhere, in all professions, in all areas of life, becoming effective assistants for people. It can be seen that AI technology is present in all areas of life, helping people save labor and improve work efficiency.

Cardenas(2018) pointed that the roles of AI-Artificial intelligence is for the case in which machine expressed cognitive roles which people associate with their minds for example, problem and solving issues concepts, and "Intelligent Electronic Device" (IED) is microprocessor -based relay protection. Authors has presented AI meanings and performing ability in the Electrical engineering Industry, for instance, presenting device with capability to identify extremely high resistance faults

(HiZ) in networks of distribution.

Impacts of IoTs and AI for other manufacturing industries:



Trung-Hieu Le, Nguyen Thuy Dung, Dinh Tran Ngoc Huy et al (2021) mentioned that Manufacturers can improve their competitive capacity if they use industrial sensors in manufacturing processes because they can help them to record errors and faults and for testing accuracy of devices. It will help to reduce cost, increase productivity and net profits.

Or for transporting inventory (goods or products) we can apply IoTs for transportation means and vehicles during the process of transporting our goods to customer place or transport inventory to our warehouses.

Last but not least, in manufacturing sector, renewable energy sector, AI- artificial intelligence is applied to build more optimal solutions aiming to create better production processes. AI technology also has high analytical capabilities, which serve as the basis for guiding decision- making in manufacturing industry.

Makala and Bakovic (2020) mentioned that there are also challenges in energy sector around the world, for instance, increasing demand and supply, and efficiency, and lacking analytics served for optimal management. Also efficiencies needed in the case losses as well as greater CO2 emissions, as consumers have little incentive to rationally use energy not paid yet. So AI has considered and used by power industry in developed markets and esp. technologies serving for better management and transparency and increasing renewable energy using, which allow for communication between smart grids, smart meters, and Internet of Things devices.

Regarding to other AI applications we also note that: hand segmentation through Mask R-CNN combined with tracking, a proposed method improves Mask R-CNN by integrating a Mean Shift tracker that tracks hands in consecutive frames and removes false alarms. We have also trained another model of Mask R-CNN on cropped regions extended from hand centers to obtain a better accuracy of segmentation.

See below figure:

Figure 2 - Hand segmentation from images and videos

(source: Dinh Ha, N., Hieu, L.T et al, 2020).

Next, Hoang Van tHuc, doan Thi Thanh Thao, Dinh Tran Ngoc Huy et al (2020) also stated that In addition to using classical wired transmission mediums from copper cables with tangled to modern cables such as fiber optic cables, or simple radio transmission mediums such as using microwave frequencies or radio that are prone to interference, then we need a simpler, more readily available and cost-effective solution.

AI and robots:

In particular, in the context that the Covid-19 epidemic is turning people's lives upside down all over the world, countries including Vietnam have widely used robots on the front lines in the fight against Covid-19. This helps to reduce the risk of cross-infection and improve the effectiveness of epidemic prevention and control.

AI and robots has combined together to finish tasks of the factories and in recent years many more factories has used AI and robots in order to check inventory, deliver inventory, serve in warehouses, etc. There are robots also serving in packaging stage of the finished products then deliver to customer place.

Moreover, AI can be used to design robots who can produce other robots. Or even AI can be applied to produce robots that help cleaning ans washing in factories, houses, etc.

AI technology in the manufacturing sector:

This is an area at the fore front of incorporating robotics in to workflows. Robots are used to perform single tasks and have been separated from humans. As a result, AI helps to save costs, effort and bring high productivity. It is forecasted that in the next 5 to 10 years, this science will develop to its peak. Let's wait for the latest achievements of mankind in this field.

4.3 Effects of IoTs in electric and electrical engineering sector

Nowadays, there are many applications of Internet of Things (IOT) in various industries including electric and electrical engineering: Internet is used as a global network connecting technological devices, becoming a tool that plays the role of creating advanced services and applications. The above factors are all based on the technology found at ion of the electrical engineering, telecom and IT industries. These are two key technical disciplines that allow the creation of infrastructure to connect, exchange, collect, store and process the huge information source of the digital world and create new values in the production chain and product distribution.

IoTs can be used with cloud technology and Big Data to help to record large data of electric companies, then combined with AI to generate solutions for designing and implementing electric and electrical system.

4.4 Effects of Digital transformation on business emotional intelligence

Dinh Tran Ngoc Huy, Nguyen Thi Hang et al (2021) said that Digital transformation is an inevitable trend of businesses when switching to new ways of doing business in the 4.0 digital era. Digital transformation is an opportunity for businesses to create a competitive advantage in the market. The way to implement digital transformation starts with small steps, with a well-defined strategic plan. The first key to a successful digital transformation business is technology. To successfully implement digital transformation, businesses need to choose the right IT partner. One of the criteria used to choose the right IT partner is based on reputation, capacity and customer experience. The first thing that businesses need to do to implement digital transformation is to design a process, each person in the enterprise's apparatus must be knowledgeable about digital transformation. If a business has not applied modeling, automation and continuous improvement in its operating processes, it should not start other digital transformation technologies. In addition, businesses need to choose tools and methods to perform digital transformation accordingly. Process management software is an optimal solution that businesses should use to improve the efficiency of their business processes. Digital transformation can be done at all businesses,

as long as businesses really want to transform when user behavior is changing in a complex direction. Technology is an important basis for businesses to better understand human behavior. Because now, each person exists two versions, of which, the digital version is even more obvious than the real lifeversion.

5. Conclusion

Applying AI can help computers and robots to think and give critical comments just like human being. With AI, also in the age of digital transformation, business will receive lots of benefits via applications of better smooth communication via email, chatbox, e-meeting and video conference with cameras and speakers, etc.

The research results presented how AI and IoTs impacts electric and electrical engineering sector in the era of industry 4.0.

We experienced in Vietnam that the better the companies perform, the More AI and ICT they apply, and the stronger digital transformation activities.

Makala and Bakovic (2020) stated that The use of AI in the power sector is now reaching emerging markets, where it may have a critical impact, as clean, cheap, and reliable energy is essential to development. The challenges can be addressed over time by transferring knowledge of the power sector to AI software companies. When designed carefully, AI systems can be particularly useful in the automation of routine and structured tasks, leaving humans to grapple with the power challenges of tomorrow.

Finally we note that there are cyber security risk solutions when apply IoTs, ICT and AI:

With the development of Industry 4.0, cyber attacks on innovative ICT technologies can be a fundamental problem, which is why networks and information systems of the combined economy, society or critical infrastructure in the era of digitization require ever stronger and efficient security.

Determining the basic safety recommendations for Industry 4.0 components, services, and processes based on risk analysis is the first step to resolve difficult technical constraints in this field. Accurately assess the current capacity and maturity of the business to manage cyber security risks, thereby helping to determine the priority of investment activities; Design and implement topics to improve and ensure the network security environment; Quick access to leading solutions to prevent network security incidents; Crisis investigation and handling.

Limitation of the research

We can expand our research model to other industries and othe remerging markets. And in case of hospitals, applying AI, ICT, IoTs and digital technology to what extent can help medical treatment with support of computer and LCDs.

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ANALYSIS OF PHYSICAL AND MECHANICAL PROPERTIES OF LOCAL NATIONAL FABRICS

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ABSTRACT

The article examines the physical and mechanical properties of local fabrics used in the design of women's ceremonial clothing and experimented at the Centexuz Certification Center under TTECI, identified and analyzed the physical and mechanical hygienic end other parameters of the samples.

Keywords: *toughness, thickness, hygienic, cotton, friction, wrinkle, surface density, harvest, back, introduction.*

Introduction

One of the Urgent tasks in Uzbekistan is to expand the production of garments from local fabrics, to study the local fabrics and on this basis to develop new models of women's ceremonial dresses. While one of the urgent problems and tasks of today is the study and rest oration of our national costumes is also at the forefront. Naturally, the creators of the dress faced two important tasks:

-Application of national traditios in modern costumes;

-Further development, renewal, enrichment and improvement of national costumes.

When we analyze women's ceremonial attire, it is a means of expressing the most distinct, strong ethnic identity that belongs to the elements of material culture [1].

The shape of the national dress, the pattern on the fabric, the multi-layered knees are important evidence in the study of the social life and world view of the people who lived at that time. This feature of the national dress how's that it is a more invaluable historical source in the study of our history.

The shape of women's ceremonial dress, it is individual elements, decorative decoration, color scheme show that it is adapted to the natural climate in the area where the population lives [2].

Materials and methods

Clothing came in different shapes and coplors, depending on the age of the population, social background, world view, days of joy or mourning. Such conditions and rules primarily affected the fabric, its decoration and ornament, that is, the shape, color, size of the pattern.

In experiments, the mechanical properties of fabrics include toughness, elongation, abrasion resistance, crease, stiffness, and other properties [3]. The physical properties of the fabric include hygroscopicity, air permeability, vapor permeability, waterproofing, absorb ency dust absorption, electrification and other properties. The requirements for physical properties are determined by the function of the fabrics and depend on their fiber composition, structure and finish [4].

Hygienic properties of the fabric. The hygienic properties of silk fabrics ensure that it is safe and harmless to human health. Accordingly, silk fabrics must have hygroscopicity, air permeability and vapor permeability properties [5].

A **B** **C**

Figure1. Experimental samples (including, A-atlas, B-address, C-banoras)

Experimental samples of fabrics were tested at the Centexuz Certification Ceter under TTECI, the irphysica-mechanical, phgienic and other parameters were determined, and approved by international standards (ISO,ASTM), existing standard methodologies in the country.

Table1. Experimental samples results of physical and mechanical indicators.

	Indicators	Fabrics		
	Fabric composition,%	Silk 100%	Silk50%+ Cotton50%	Silk 100%
1	2	3	4	5
1	Harvesting	Cloth	Cloth	Cloth
2	Surface density of the fabric, м^2	61,2	77,56	48,86
3	The thickness of the fabric,мм	0,1	0,15	0,05
4	Abrasion resistance, cycle	6000	6500	5500
5	Breaking strength, kg·c tanda back general	 518,109 389,656 453,882	 457,304 306,593 402,042	 395,952 296,445 343,698
6	Elongation at break,% tanda back general	 14,5 15,4 14,79	 18,29 12,57 15,43	 13,65 14,19 13,92
7	Friction resistance of fabric color, Nephew	4	4	4
8	Air permeability, sm^3/sm^2 sek	39,3	136,6	64
9	Compressibility, K% -tanda -back	 77,7 73,8	 70 64,2	 77,4 72,8
10	Introduction of fabric%, -tanda -back	 3,5 2,0	 3,5 2,0	 3,5 2,0
11	Hygroscopicity,%	27	24	32

The properties of the selected fabrics are influenced by factors such as fiber length, thickness, their strength, softness and toughness, thatis:

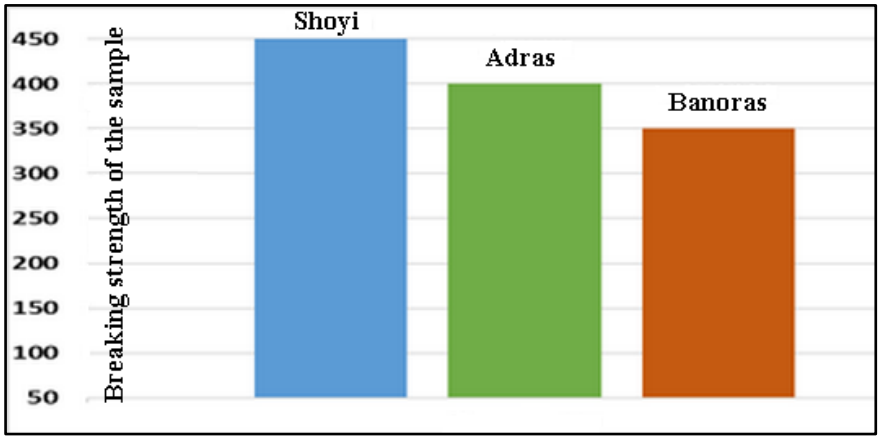

Figure2.Breaking strength of the sample

Elongation strength of samples. (kg·c). The tensile strength of the fabric is one of the most important indicators that determine its quality [6].The tensile strength of a fabric is defined as its tensile strength.

The tensile strength of the fabric is determined on an AG-1machine using a special computer program. Before starting work, the initial data required for the experiment is entered in to the program. Samples are prepared in the size of

300x50 mm in the body and back, as specified in GOST. The finished samples are clamped (the distance between the clamps is 200 mm).Then the START button is pressed and the top clamp begins to rise. When the sample is broken, the experimental results are displayed on the screen in the form of graphs and tables. In the cutting machine, along with the determination of the toughness of the fabric, its elongation is also determined [7].

Abrasion resistance of samples**.** In this case, the resistance of the fabric to various corrosive factors is called abrasion resistance. This indication is performed in a M235/3 machine. In this case, the samples are cut in to circles using a special cutter and fastened in series to the desired location. When the machine is started, the samples are rubbed against a special solid and rotated.

Figure3.Friction resistance

Wrinkling of samples, %.The formation of wrinkles and creases in the fabric when bent and pressed is called wrinkling [8].The viscosity is determined using the AW-6 instrument. In this case, 5 samples of size 40X15 mm are cut in the direction of the back and tor so. The sample is bent twice, brought to an 180^0 position, and compressed with a force of 500g. After five minutes, the recovery angle of the deformed specimen is measured.

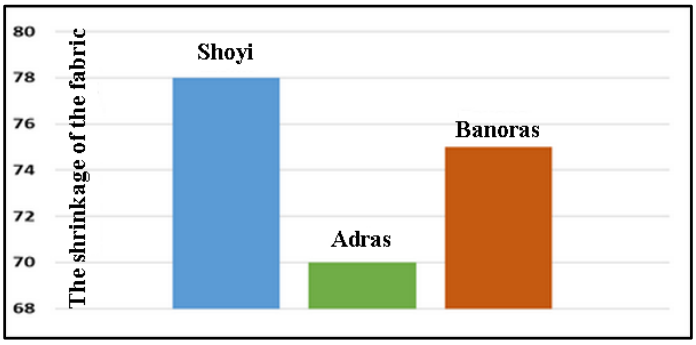

Figure4.The shrink age of the fabric

Air permeability of samples (sm^3/sm^2sek) . In this case, the air permeability of the fabric depends on its fiber content, density and texture. Air permeability is checked using an AR-360SM instrument. Before starting the experiment, the amount of water in the inclined and vertical manometer is checked. Depending on the thickness of the fabric, the stock is selected. The sample is placed in the camera using a clamp. The instrument fan is lowered. The hydro static pressure in the inclined manometer is12.7mm.The process is stopped and the hydrostatic pressure on the vertical monometer is determined [9,10].The pointer is determined using a special table. Sample fabric penetration %, occurs when the item is washed, soaked, ironed and pressed. To determine this figure, a sample measuring 10x10sm is prepared, wetted and dried. The length and width of the dried sample are measured in the direction of the body and back.

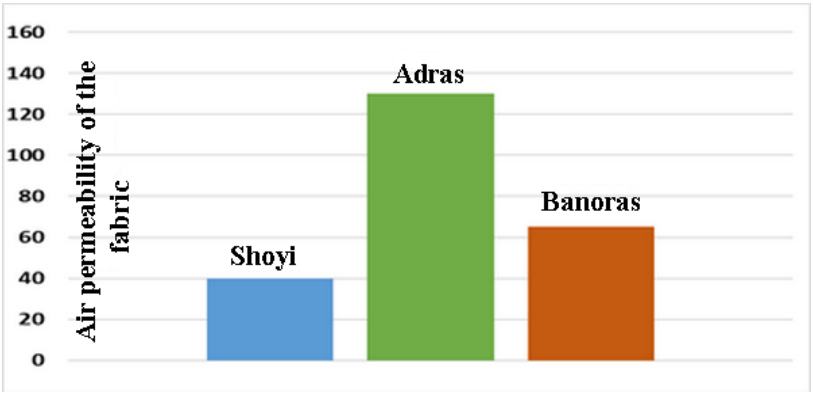

Figure5.Air permeability of the fabric

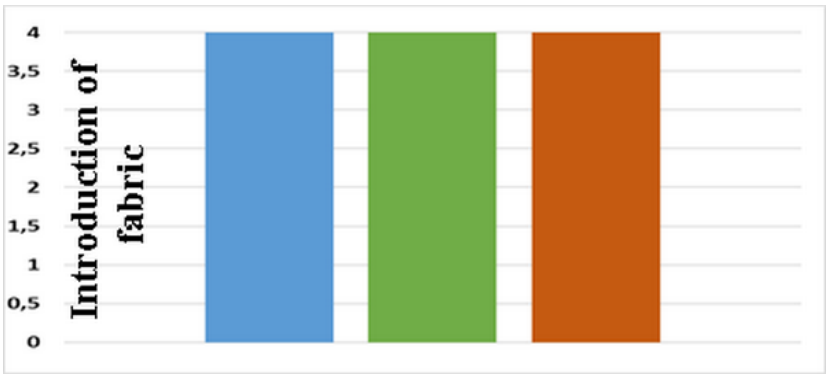

Figure6.Introduction of fabric

The results are put in to the following formula and the index is determined:

$$У_т = \frac{L_1 - L_2}{L_1} 100; У_a = \frac{L_1^1 - L_2^1}{L_1} 100;$$

In this case, L_1, L_1^1 are the initial dimensions of the fabric on the body and back; L_2, L_2^1 -are the dimensions of the fabric on the body and back after the test.[10].

Results and conclusion

The results obtained from the experiments are given in the following graphs.

Figure7.Surface density of the fabric

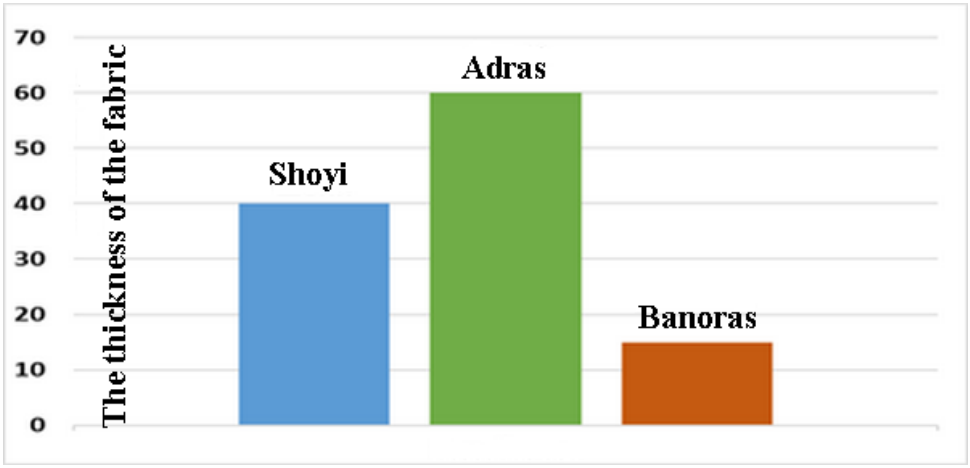

Figure 8.The thickness of the fabric

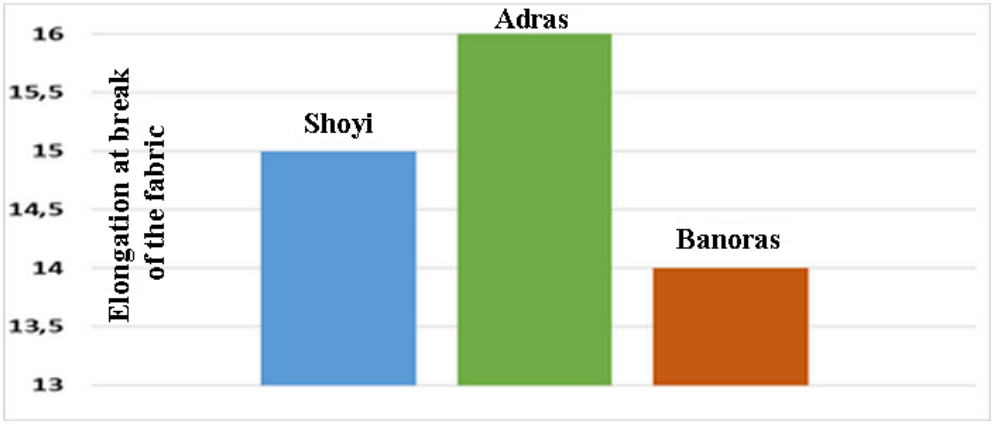

Figure 9 Elongation at break of the fabric

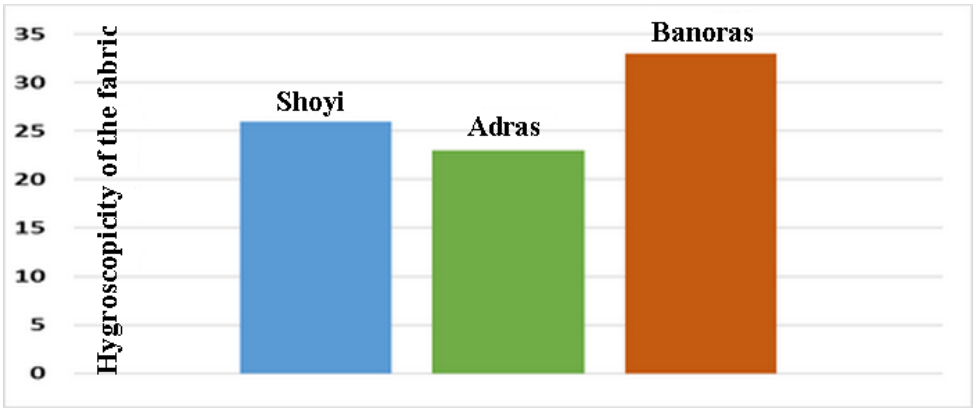

Figure10. Hygroscopicity of the fabric

The results of experiments obtained in the above diagram show that the physic-machanical and hygienic performance of silk ,adrasand banoras fabrics can meet the consumer demand on all parameters.

After experimental studies it was concluded as follows:

The fabrics are rugged ,durable due to the high density of the fabric, as well as the folds of the fabric; the elasticity of silk fiber leads to the rest oration of the shape of fabrics after deformation, increasing the non-wrinkling properties; woven from natural fibers fully meets the hygienic characteristics of the fabric, increases the level of hygroscopicity.

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AGENT FRAMEWORK: NOVEL APPROACH TO INVESTIGATE THE USABILITY OF THE ONLINE SHOPPING PORTAL

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ABSTRACT

It's commonly known that evaluating e-commerce websites' usability is essential, and researchers have devoted a lot of time and resources to it over the previous decade. Commerce has increased dramatically as e-retailers interact with clients online. They expect a great user experience in addition to exceptional products and services. The user experience is influenced by branding, functionality, navigation, content, aesthetics, and usability. This study examines usability assessment of e-commerce portal using agent framework.

Keywords:*Usability assessment, E-commerce, Evaluation methods*

1. Introduction

During the 1990s, the media exaggerated the impact of the Internet on consumer shopping habits and predicted a meteoric rise in online sales. Because of this explosive growth in the previous ten years, e-commerce can finally be relied upon to deliver real business results. Customer buying habits have changed, and it's uncommon that you meet someone who does not have Internet access, whether it's in their home or place of business (Saphores& Xu, 2021)).

E- commerce extends its reach beyond the direct selling of products to have an impact on offline retail sales and cultivate stronger client relationships. Research shows that customers who do their homework online before visiting a store account for 40–50% of all offline retail sales. In addition, 70% of online customers believe that a poor company website affects their overall perception of the brand. Consequently, websites are critical brand touch points because they allow firms to interact with their clients while also integrating them into their brand identity.All aspects and approaches of human-computer interaction can be included under the umbrella term of human-computer interaction (HCI). Because of this, usefulness is built on it (Alao et al., 2019). To put it another way, HCI is a field that studies interactive computing systems for human use, including the design, evaluation, and implementation processes as well as the phenomena that surround them. Human-computer interaction encompasses a wide range of disciplines, including psychology, sociology, ergonomics, and industrial design (HCI). People use an interface to communicate with computers, as previously stated. Concerning human-computer interaction (HCI), this user interface's design and usability are critical (Mirazet al., 2021). Different authors have defined and measured usability in different ways.

Usability, according to Nielsen (2003), is one of the most critical aspects of any user interface because it gauges how simple or difficult it is to use. In other words, usability assesses how well a person feels when interacting with a product or system, whether that's through the usage of an app on their smartphone or a computer programme (Kortum & Sorber, 2015).

As an alternative, usability was defined by Brinck et al. (2001) as "the degree to which users can complete a set of required tasks". The five criteria already identified by Nielsen (2003) as well as another goal referred to as 'functionally right' are all part of what contribute to usability. System or product functioning means users can perform what they want or need with this feature. Usability goals can occasionally conflict with design aims for aesthetics, as demonstrated by Brink et al. (2001). Efficiency and safety were added to the list of usability design goals by Rusu et al (2015). When a system or product performs as expected, it is said to be effective; when a system or product is safe to use, it is said to be safe to use, safeguarding consumers from potentially dangerous situations. There are a variety of definitions for usability, but they all refer to a system/qualities product's or design goals. This definition of usability comes from the International Standards Organization (ISO) and states: "Usability is the extent to which [a

product] can be utilised by defined users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11 1998). Specific users, specific aims, and specific context of use are all included in this definition of usability because it describes how well a thing works. As stated in ISO 9241-11, the usability of a product is dependent on several factors, including the context in which it is used, including the people using the product, the tasks they are performing, the equipment they are using (hardware, software, and materials), and their physical and social surroundings. There are three ways to measure how usable a product is in a certain setting, according to the ISO 9241-11 standard. Efficacy and efficiency (which evaluate performance) as well as satisfaction are the focus of these three metrics.

2. Usability assessment methods

When evaluating the usability of a product's user interaction, methods like those used in usability testing look for problems or opportunities for improvement in order to make the product better for users. Techniques like these are used in User-Centred Design (UCD) (Marien et al., 2019). Usability-centered design (UCD) is a design and development philosophy that centres on making products and systems that people want to use. User feedback is gathered throughout the design process using the UCD method (Rubin 1994). Usability methods can be used to collect this feedback at any point in the design cycle (Rubin 1994).

A variety of evaluation approaches have been developed to detect usability issues. To group these strategies together, a variety of authors have ascribed different designations to them. Nagpal et al. (2017) employed four different types of usability evaluation approaches, according to the findings. Methods like this are used in usability evaluation procedures. Instead of software in the first example, real-world consumers who have interacted with a user interface are used in the second. A rule-based interface is more difficult to evaluate because it necessitates the application of rules in addition to the use of skills, knowledge, and experience. Gray and Salzman (1998) made a distinction between analytical and empirical methods. A user testing method or procedure is an example of an empirical approach; a heuristic evaluation or cognitive walkthrough is an example of an analytical strategy. It was found that the most well-known methods of evaluating usability fall into one of three categories: users, evaluators, or tools. Because the study's goals and objectives were to look into and compare the usability issues identified from three different perspectives, this was the outcome.

Methods for measuring usability based on the evaluator's feedback

In this field, evaluators are involved in the detection of usability difficulties. Conducting user interface usability reviews or examinations is referred to as "usability inspection procedures," as outlined by Nielsen & Mack (1994).

Numerous strategies are used to discover user-experience issues when interacting with an interface and to make recommendations on how to improve the interface's usability.

Methods for evaluating usability based on user feedback

This group includes a wide range of tactics that involve the end user. As a result of these techniques, we may learn more about how people interact with an interface, and how satisfied they are with the results. The most widely used technique in this area is user testing. In addition to user testing methods, there are a variety of strategies that can be employed in conjunction with them.

Methods for assessing software's usability

Instead than depending on experts or end users, software tools can be used to evaluate the usability of an interface. A website's usability can be automatically tested using this method to see if it adheres to a set of usability guidelines (Brinck et al., 2001). The bulk of these tools use a set of standards to assess the HTML code quality of a website. An example of something they search for on a website's pages is the ALT property. As a result, these tools approximate professional inspection and evaluation methods (Lazar, 2007). The majority of individuals are concerned with a website's accessibility rather than its overall usefulness (Lazar, 2007).

Before, there was agreement that although usability evaluation methods have the same overall objective, namely to identify usability issues that prevent users from easily interacting with an interface, these methods differ in terms of the number and type of issues they identified, as well as in the cost of implementing them Comparing several methods indicated which were the most efficient in discovering usability difficulties while considering various criteria, such as the number of problems, the type and the cost of using each method have been disclosed

3. Evaluating usability for e-commerce websites

Few studies have evaluated e-commerce websites' usability, despite the fact that usability is critical for e-commerce sites. There were usability methodologies that included both users and assessors in the detection of usability issues. This section discusses the results of those investigations.

Researchers Hasan & Morris (2017) conducted a survey to learn more about how customers perceive the usability of e-commerce websites. 16 consumers conducted activities on each of 4 ecommerce websites (two of which offered clothing, and 2 of which sold products), expressing what they liked and disliked about each site, along with possible incentives or deterrents to purchase. Customer usability issues were identified by the researchers, who then gave recommendations for improving the usability of e-commerce sites as a result of their results.

To their credit, they did not apply the observation approach in their study, despite the fact that observing actual user interactions with sites is the most effective way to judge the usefulness of them (Porat&Tractinsky, 2012). Three supermarket websites selling a variety of goods were examined by Freeman (2009), who involved customers in the review and comparison process. However, he used observation and a post-test questionnaire as a method of user testing. Observations and preferences of users helped identify numerous usability concerns on the three sites, and the results were utilised to generate guidelines for improving usability.

In previous studies, evaluators utilised the heuristic method to determine if e-commerce websites were usable (Chen &Macredie 2005). Chen and Macredie (2005) employed this technique to determine whether or not four electronic supermarkets were actually useful. Heuristic guidelines were drawn from Nielsen's (2003) list of ten heuristics from his study of user behaviour in 2000, as well as three additional heuristics: support and extension of the user's current skills, joyous interaction with the user, and protection of personal information. Each heuristic has criteria assigned to it so that the sites could be thoroughly analysed. By compiling the criteria into one handy check list, the severity of each interface's usability problem was quantified. A huge number of usability difficulties (weaknesses) as well as numerous positive design qualities (strengths) were identified using the heuristic evaluation method.

According to Panda et al. (2015), in order to analyse and identify usability issues and design concerns that were crucial for South African e-commerce sites from both experts' and users' viewpoints, it was necessary to utilise a combination of user testing and heuristic evaluation approaches To analyse the usability of e-commerce sites, they devised a comprehensive set of e-commerce design standards that web specialists utilised as heuristics. Using heuristic evaluation and the user testing method (post-test surveys), experts and users discovered various usability issues on chosen South African e-commerce sites, demonstrating the efficiency of these methods in uncovering a comprehensive collection of usability issues. Each method's favourable correlation between identified problems helped to uncover major usability difficulties. When developing an e-commerce site in South Africa, the writers claim that these issues should be taken into account.

These studies, on the other hand, only looked at the post-test questionnaire to discover any usability difficulties from the perspective of the customers. In contrast to earlier studies (such as Nielsen 2003 and Sharp et al. 2007) that showed that content and navigation must be included to design usable e-commerce websites, a focus on e-commerce transaction usability (such as category and product pages

and customer support) was developed instead of general guidelines such as content and navigation.

To be clear, previous research on e-commerce website user friendliness have all given frameworks or sets of rules for designing and evaluating e-commerce websites that were based on their findings and regardless of the method they used to assess usability (Rekik et al.,2018). Incorporating effective product tagging, in-depth product information and obvious links to orders are some examples of these design guidelines. Other examples include having the shopping cart total visible and easily accessible, as well as a search function that is both visible and easy to use (Rekik et al., 2018; Freeman 2009; Chen and Macredie 2005).

As a result of these results, it will be easier to create e-commerce websites that work well. Important design issues for establishing an accessible e-commerce site have also been discussed in other review sources.

4. Comparative usability assessment criteria

Comparative usability assessment criteria can be divided into two categories: those that apply to the evaluation target and those that apply to all UEMs. Alhadreti et al. (2021)look at layout, terminology, data entry, and comprehensiveness as examples of the first sort of criterion for evaluating a web-based digital library. The criteria associated with the target system, on the other hand, vary substantially depending on the system's user interface paradigm. Other criteria apply to all UEMs rather than just the target system. The following points are mentioned in the study as being particularly important (Table 1.).

Table 1. Criteria for usability assessment

Realness	To determine whether or not a usability discovery is a true usability issue, use the term "realness" (or "importance"). Usability findings can be verified using Oyekunle et al.'s (2020) method, which compares usability findings to an established problem list, expert opinion, and end-user feedback. There are advantages and disadvantages to every strategy in terms of application, cost-effectiveness, and dependability. Any strategy. Research into the severity of this problem will continue in the future (Agustina et al., 2019), as will studies into the combination of severity and likelihood of occurrence.
Validity	There is a ratio of true usability problems to total finds (i.e. real or "false alarms") that can be used to quantify validity (or accuracy) for each application of UEM.
Thoroughness	The degree of thoroughness is determined by the number of (actual) usability issues detected by a UEM compared to the total number of usability issues in the target system (or completeness). Validity needs a comprehensive cross-examination of all UEM results in order to identify all actual flaws.
Effectiveness	The "accuracy and completeness" with which users achieve specified goals has been established for UEMs, which is congruent with the definition of effectiveness in the ISO 92412 standard for usability (Law &Hvannberg, 2004). As a result, the effectiveness of UEMs is directly related to their thoroughness and validity (Lewis, 2019). UEM predictive capability is introduced to the efficacy concept in a related study in relation to development teams' acceptance of usability findings. Because of this, development teams are far more likely to address usability concerns in usability reports with "objective" results than "subjective" outcomes (such as terminology discoveries). Additional methodological considerations must be addressed in the latter perspective.
Consistency	It's been proven to be linked to both reliability and consistency. We define UEM consistency at work as the degree to which successive applications of different useable inspection procedures produce "essentially identical" results, and we use this definition in practise. This is a working definition, similar to Molich et al. (2004). Another requirement is to establish trustworthy techniques to interpret similarity in usability data. This can be accomplished in the same manner as the realness issue.

5. Agent Based usability assessment of e- commerce portals

Traditionnal ways of conducting usability tests are prohibitively expensive and time consuming because they necessitate the involvement of domain experts. For usability testing, our Agent-based approach focuses on providing tools that quickly investigate large parameters and a large audience.

The AUA Framework only makes use of HTML source code analysis tools. Begin with analysing e-commerce portal usability guidelines using the AUA framework. The first step is to insert the e-commerce portal's URL into the web servers after initiating the AUA framework. The e-commerce portal's HTML code is stored in the database after the URL is saved in the Framework. After then, the framework assesses the portal's usability based on a predetermined set of criteria. The Framework extracts the HTML code for the website's main page from the database and performs usability tests according to a set of standards.

Conclusion

This paper highlighted that there are several techniques for evaluating the usability of e-commerce websites from three perspectives: users, evaluators, and the tools themselves.

There aren't a lot of research that look at how usable e-commerce sites are. On those that were deemed to be usable, users or other assessors submitted input. Web analytic tools have been used to examine other types of websites and have been effective in identifying potential design or functioning problems; however, there has been minimal usage of these tools to automatically collect statistics on the detailed use of e-commerce sites to date. The research comparing various usability assessment approaches were studied in the next area. The purpose of these methodological research was to compare evaluator-based evaluation approaches with those that used actual users. The comparison included both user testing and heuristic evaluation, but they were not the only approaches studied in each area. To study the potential problem areas revealed by these tools, no comparisons have been made between web analytics software and user- or evaluator-based usability methodologies. The literature in this paper makes it abundantly evident that comparative research can aid in identifying the usability evaluation approach that most successfully detects flaws while also being the most cost-effective. These strategies were used to detect usability issues in a few research.

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HIGHER ORDER THINKING SKILLS INCLUDE CRITICAL THINKING ABILITIES

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ABSTRACT

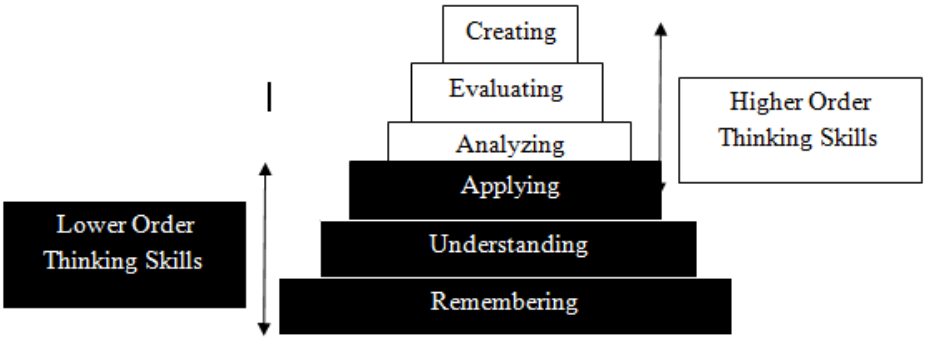
The research paper divided into three major parts. First part indicates higher order thinking skills include critical thinking abilities, which go beyond basic scientific experience so as to help students to accumulate knowledge and to apply solutions in order to gain potential answers in new circumstances. The development of higher order thinking skills facilitate the knowledge transfer process and strengthens the possible roles and functions of students in society. The second part of paper intended to determine the different factors that influencing students' higher order thinking skills development at elementary level. Investigators had used descriptive survey technique in this paper. The third part of the paper shows that it has three major variables such as teacher related, student related and institution related variables. All major variables are performing as influential factors for the development of higher order thinking skills among students at elementary level. The paper found that teachers' knowledge about higher order thinking skills, teachers' self-efficacy to implement higher order thinking skills in classroom, students' attitude to inculcate their analyzing, evaluating and creating skills and curriculum structure of the institutions are helpful to develop higher order thinking skills among students at various level.

Keywords: *Higher order thinking skills, teacher related factors, student related factors, institution related factors.*

Introduction

The willingness of students to comprehend ideas, construct knowledge, and solve problems is a function of their capacity to learn. The 'Revised Bloom's Taxonomy' model which supports knowledge and abilities shaping across cognitive domains, including remembering, understanding, application, analysis, evaluation and creation. The concept of thinking ability can be divided into two levels, such as higher order thinking skills and lower order thinking skills. Each level is linked, so that students can achieve the highest degree of cognition on how to build the concepts (Zaharin, Sharif, & Mariappan, 2018).

Figure-1: Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001)



Thinking skills which are selected from top three levels of thinking skills in 'Revised Bloom's Taxonomy' can be considered as 'Higher Order Thinking Skills'. Specifically analyzing, evaluating and creating are known as higher order thinking skills. Analyzing is the break down content into its components and decides how the sections contribute to each other. Evaluating is the requirements and norms for making judgment. Creation is the process to combine elements into cohesive pattern and recognize elements into new design (Anderson & Krathwohl, 2001; Coffman, 2013).

Higher order thinking skill is one of the main elements of addressing new challenges in the 21st century for individuals. The usage, relation or manipulation of past knowledge is also important in higher order thinking skills, so as

to solve new problems effectively. Higher order thinking skill is defined in the 'Revised Bloom's Taxonomy' as an incision between the three high levels of cognitive domain (analysis, evaluation, creation) and three levels of knowledge (conceptual, procedural, meta-cognitive) (Anderson & Krathwohl, 2001). Higher order thinking skills are the capacity to understand that just not only deals with the ability to recall and remember but also the higher abilities. Higher order thinking skills are the capabilities of students that allow them to face challenges, difficulties, questions or dilemmas. Higher order thinking skills help students to prepare for the challenges in whole life. That's why, higher order thinking skills can be used to forecast the students' success (Pogrow, 2005; Tanujaya, Mumu, & Margono, 2017). Higher order thinking skills are then assessed using tasks, including analysis, evaluation and development of logical, method or meta-cognitive skills. So it is important to familiarize students with higher order thinking skills based exercises to get ready to solve new problems, to acclimatize them into a new environment and to make decision on a specific issue Retnawati et al, 2018). In teaching-learning process, higher order thinking skills are significant aspects. In educational systems, thinking skills are crucial. An individual's thinking can impact on learning capacity, speed and performance. Thinking skills are also related to learning.

Students who are instructed to think can display a positive effect on their learning growth. Students with higher order thinking skills are capable of learning, doing well and reducing deficiencies (Yee et al, 2011; Tanujaya, Mumu, & Margono, 2017).

Rationale of the Study

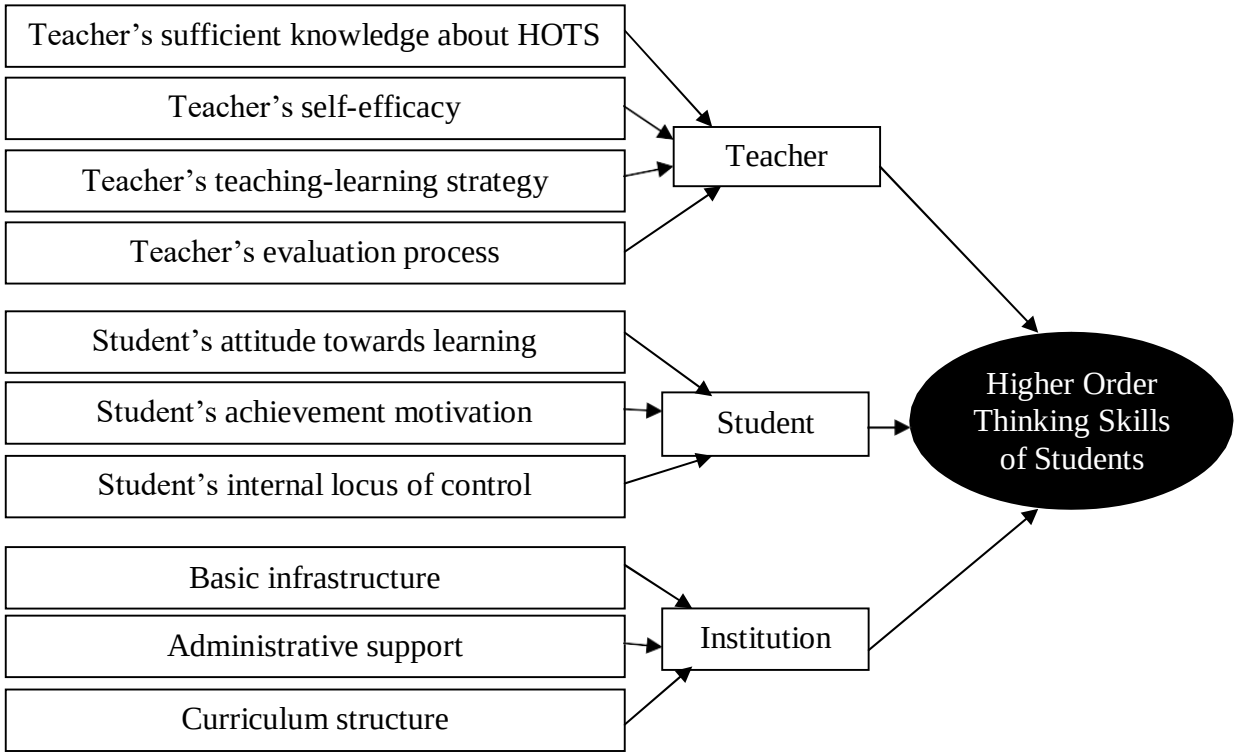
Recently one of the important aims of educational institution is to inculcate higher order thinking skills among students. That's why; institutions and teachers need to improve students' thinking ability by which they can get success and satisfy with their aspirations (Heong et al, 2016; Shukla, & Dungsungnoen, 2016). Several researchers have studied in this topic and found dynamic results; some of them are given in the following paragraph.

Saptono, Suparno & Wibowo (2020) revealed that factors like self concept, family environment and learning environment had positive influence on students' higher order thinking skills. Ichsan et al (2019) found that curriculum, teaching approaches, learning needs were essential factors for the development of students' higher order thinking skills. Yusoff & Seman (2018) revealed that educators' knowledge about higher order thinking skills can be considered as an important factor for the development of higher order thinking skills among students at primary level. Jerome, Lee, & Ting (2017) reported that learning subject, learning activities, teaching approaches can be performed as important factors to improve the higher order thinking skills of students. Schulz & FitzPatrick (2016) revealed that teachers had lack of knowledge about higher order thinking skills and their evaluation process was less effective to inculcate students' higher order thinking skills. Tajudin & Chinnappan (2016) indicated classroom practices, professional development of teachers and curriculum were crucial factors for the development of students' higher order thinking skills. Budsankom et al (2015) found that classroom climate, psychological functions had direct impact and family features had indirect impact on higher order thinking skills development of students. Lee (2015) highlighted that students' past knowledge, motivation, inclusive education, language proficiency, course materials, assessment were important factors for the development of students' higher order thinking skills.

Thongnuypram (2013) revealed that classroom environment, teachers' behaviours, students' locus of control, curriculum, learning strategies, learning resources can be performed as influential factors in the development of higher order thinking skills among students. Heong et al (2012) reported that problem solving attitude of learners, motivation, decision making ability, technological skills were key factors for the development of higher order thinking skills to generate ideas. Fischer, Bol, & Pribesh, (2011) revealed that teachers' autonomy, teacher training facility, students' assessment process were vital factors for the development of students' higher order thinking skills.

From the above discussion, it is clear that there are many influential factors for the development of students' higher order thinking skills. In the present study, Investigators had taken some of the factors (in the questionnaire) from above studies to see whether these factors would be impactful for the development of students' higher order thinking skills or not (Mentioned in Figure-2).

Figure-2: Conceptual Framework



Objective

(1) To determine the different factors that influencing students' higher order thinking skills development at elementary level.

Research Questions

(1) What are the factors that influencing students' higher order thinking skills development atelementary level?

(2) Is there any relationship exist among the factors?

Methodology

Research Method: Investigators had used descriptive survey technique in this study. The data collection was carried out through online questionnaire (by using Google form).

Population and Sample: The present study was conducted on 60 permanent government elementary school teachers (both male and female) of Howrah district, West Bengal, India. Investigators had used purposive sampling method to select the sample of the study. All government elementary schools of Howrah district of West Bengal were the target population of the study.

Tool: Investigators had used self-developed close ended questionnaire based on 5 points Likert Scale (Strongly Disagree, Disagree, Undecided, Agree, Strongly Agree). Investigators had used test-retest method to check the reliability of the tool. The reliability of the self-developed tool was 0.80.

Investigators had also checked the content validity of the self-developed tool by taking experts' views.

Delimitations

- The present study has observed only the influence of teacher, student and institution related factors on the

development of students' higher order thinking skills.

- This study was delimited to elementary level only.

Analysis and Interpretation

In the present study investigators had used factor analysis statistical method to summarize and interpret the data scientifically. This technique helped researchers to explain interrelationships among variables in terms of their common underlying dimensions i.e. factors. Investigators had used SPSS and AMOS statistical software to analyze the data.

Table-1: Descriptive Statistics

Code	Variables	N	Mean	SD
TE1	Teacher has sufficient knowledge about higher order thinking skills.	60	4.27	0.800
TE2	Teacher has enough self-efficacy to implement higher order thinking skills in classroom.	60	4.02	0.911
TE3	Teacher uses suitable teaching-learning strategy to inculcate higher order thinking skills among students.	60	3.80	1.038
TE4	Teacher frequently evaluates students to see whether students are improving their higher order thinking skills or not.	60	3.38	1.106
SU1	Students' attitude towards learning helps them to inculcate their analyzing, evaluating and creating skills.	60	4.08	0.671
SU2	Students' achievement motivation helps them to develop their higher order thinking skills.	60	3.65	1.022
SU3	Students' internal locus of control helps them to develop higher order thinking skills.	60	3.73	1.103
IN1	Basic infrastructure of the institute helps students to develop higher order thinking skills.	60	3.42	0.996
IN2	Administrative support of the institute helps students to develop higher order thinking skills.	60	3.70	0.908
IN3	Curriculum structure helps students to develop higher order thinking skills.	60	4.12	0.640

Table-1 indicates that four variables (TE1, TE2, SU1, and IN3) have highest mean value (Above 4.00). It means teachers' knowledge about higher order thinking skills, teachers' self efficacy to implement higher order thinking skills in classroom, students' attitude to inculcate their analyzing, evaluating and creating skills and curriculum structure of the institutions are helpful to develop higher order thinking skills among students at elementary level. Table-1 also highlights that two variables (TE4 and IN1) have lowest mean value (Below 3.50). It means teachers' evaluation process and basic infrastructures of the institutions are performing as less helpful variables to develop higher order thinking skills among students at elementary level than other variables.

Table-2: KMO and Bartlett's Test

KMO Measure of Sampling Adequacy		0.861
Bartlett's Test of Sphericity	Approx. Chi-Square	517.125
	df	45
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) is a statistical measure used to calculate the sampling sufficiency which needs to be more significant than 0.05 level for an appropriate study to proceed. Factor analysis can be inappropriate if the sample size of the study is below 50. The present study has 60 sample size and 0.861 sampling ampleness (Mentioned in Table-2) which is enough for factor analysis. Bartlett's test is used to assess the relationship consistency among factors. Table-3 highlights that Bartlett's trial of sphericity is significant at 0.01 level.

Figure-3: Factor Analysis Result (Standardized)

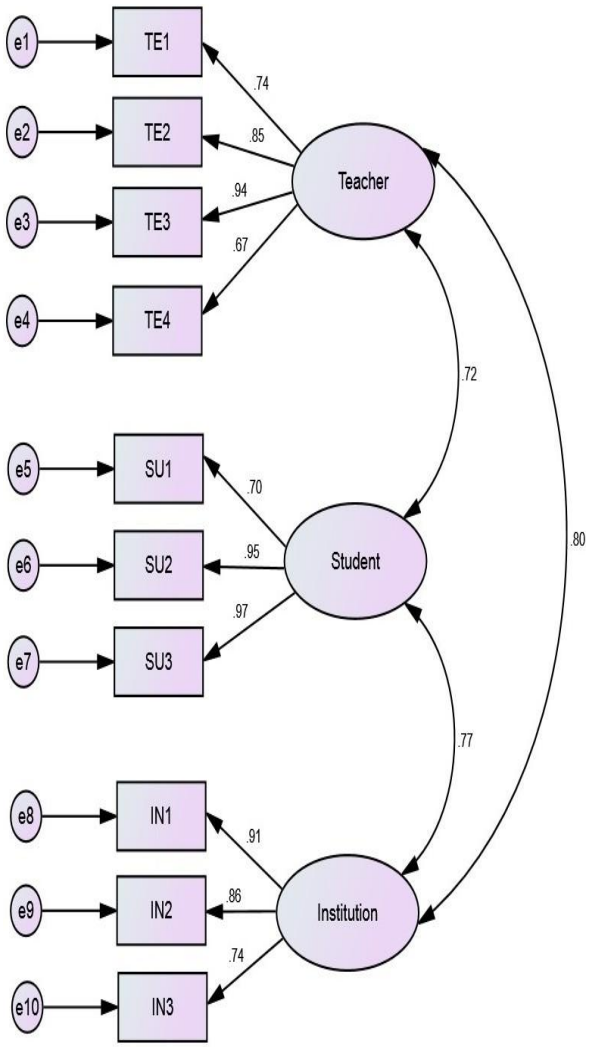


Table-3: Factor Analysis Result to Identify the Latent Variables

Variables	Factor Loadings
Teacher Related	
TE1	0.74
TE2	0.85
TE3	0.94
TE4	0.67
Student Related	
SU1	0.70
SU2	0.95
SU3	0.97
Institution Related	
IN1	0.91
IN2	0.86
IN3	0.74

The present study has analyzed data through confirmatory factor analysis method. The study has found total 23 variables (10 observed variables and 13 unobserved variables). The study is recursive in nature which means no variable in the study has any effect on itself. The result of the study indicates that it has three major variables such as teacher related, student related and institution related variables. All the observed variables have high factor loadings value (more than 0.5). Although latent variables like suitable teaching-learning strategy by teachers, students' achievement motivation, students' internal locus of control and infrastructure of the institutions have very high factor loadings value (more than 0.9). It means these latent variables are performing as very influential factors for the development of higher order thinking skills among students at elementary level (Mentioned in Figure- 3 & Table-3).

Table-4: Factor Analysis Result to Identify the Correlations

Variables	Estimates
Teacher Related Variables <--> Student Related Variables	0.72
Institution Related Variables <--> Student Related Variables	0.77
Institution Related Variables <--> Teacher Related Variables	0.80

Table-4 points out that three major variables such as teacher related, student related and institution related variables are highly correlated (above 0.7) among each other. It means all major variables are performing as influential factors for the development of higher order thinking skills among students at elementary level.

Findings

- Teachers' knowledge about higher order thinking skills, teachers' self efficacy to implement higher order thinking skills in classroom, students' attitude to inculcate

their analyzing, evaluating and creating skills and curriculum structure of the institutions are helpful to develop higher order thinking skills among students at elementary level.

- Teachers' evaluation process and basic infrastructures of the institutions are performing as less helpful variables to develop higher order thinking skills among students at elementary level than other variables.
- The result of the study indicates that it has three major variables such as teacher related, student related and institution related variables. All major variables are performing as influential factors for the development of higher order thinking skills among students atelementary level.
- All the observed variables have high factor loadings value (more than 0.5).
- Latent variables like suitable teaching-learning strategy by teachers, students' achievement motivation, and students' internal locus of control and infrastructure of the institutions have very high factor loadings value (more than 0.9). It means these latent variables are performing as very influential factors for the development of higher order thinking skills among students atelementary level

Educational Implications

- As the study found that basic infrastructures of the institutions are performing as less helpful variables to develop higher order thinking skills among students at elementary level than other variables; so government, school administrators, school inspectors and teachers must have to take necessary steps to overcome these barriers.
- As the study found that teachers' evaluation process is performing as less helpful variables to develop higher order thinking skills among students at elementary level than other variables; so teachers must have to improve their evaluation process and curriculum planner, school inspectors, principals must have to take necessary steps to eradicate the problem.
- Educationalists, academicians, investigators can invent different strategies by which students' higher order thinking skills can be developed easily.
- It's a duty and responsibility to every scaffolder to create favourable environment for students by which they can inculcate their higher order thinking skills.

Discussion

Higher order thinking skill is the capacity and experience to discover solutions or accomplish targets through diverse ways of thinking. Students must understand and exercise this ability so that answerscan be gained, decisions made and challenges overcome (Budsankom et al, 2015). The present study found that teachers' knowledge about higher order thinking skills is helpful to develop higher order thinking skills among students at elementary level. Yusoff & Seman (2018) agreed that teachers' knowledge about higher order thinking skills can be considered as influential factor for the development of students' higher order thinking skills at primary level. The present study found that suitable teaching-learning strategy of teachers, curriculum structure, students' achievement motivation and internal locus of control are positively influencing on the development of students' higher order thinking skills. Some investigators also found that teaching-learning strategy of teachers (Ichsan et al,2019; Jerome, Lee, & Ting, 2017; Thongnuypram, 2013), curriculum structure (Ichsan et al, 2019; Tajudin & Chinnappan, 2016; Thongnuypram, 2013), students' achievement motivation and internal locus of control (Lee, 2015; Thongnuypram, 2013; Heong et al, 2012) can be performed as influential factor for the development of students' higher order thinking skills. In the present study, teachers' evaluation process and basic infrastructures of the institutions are performing as less helpful variablesto develop higher order thinking skills among students at elementary level than other variables. Schulz & FitzPatrick (2016) highlighted that teachers' evaluation process was not effective to develop students' higher order thinking skills. Whereas, some investigators had found opposite result, they revealed that teachers' evaluation process

(Lee, 2015; Fischer, Bol, & Pribesh, 2011) and learning environment of the institutions (Saptono, Suparno & Wibowo, 2020; Budsankom et al, 2015; Thongnuypram, 2013) were vital factors for the development of students' higher order thinking skills.

Limitations

- Investigators had not measured influence of parents' related factors, peer group related factors and society related factors for the development of students' higher order thinking skills.
- Investigators had studied only on 10 observed variables and 13 unobserved variables. Some other related variables might be ignored.

Conclusion

From the above discussion it is clear that there are several teacher, student and institution related factors positively influencing on the development of students' higher order thinking skills at elementary level. It can be concluded that students' higher order thinking skills can only be developed through the integration of different positive factors and higher order thinking skills should have to be essential in learning process for all students in 21st century.

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Conflict of Interests: The authors declare that no competing interests exist.

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A STUDY WOMEN IN HIGHER EDUCATION: MORE THAN JOB SATISFACTION

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ABSTRACT

Higher education institutions are in the era of tremendous reform. The change has occurred due to various technological advancements and changing demands of market and learners. The change has converted whole scenario of teaching and learning and consequently expectations from teachers. Thus it becomes critical for each establishment to know work fulfillment level of representatives since achievement of organizations' objectives it reliant upon the fulfilled workers of the foundation. Thus job satisfaction now perceived as most significant contour of higher education. The present study explores factors and level of job satisfaction among women teachers in higher education. Data was collected with in-depth interviews with regular and contract teachers working in government and private colleges. For this thematic content analysis was used. During qualitative interviews it was found that discrimination prevails between permanent and contractual faculty in higher education institutions.

Keywords: *Women, Higher education, Job satisfaction*

Job satisfaction is the favorable or unfavorable subjective feeling with which employees view their work. It results when there is congruence between job requirement, demands and expectations of employees. The components of physical conditions and social nature influence work fulfillment and efficiency. Occupation fulfillment is characterized as a compelling or passionate reaction toward different certainties of one's activity. Fulfillment eludes to singular components of one's activity, as pay, development prospects, physical condition, working hours, etc. (Velmurugan, 2016).Occupation fulfillment is with respect to one's sentiments or perspective in regards to the idea of their work. It can be impacted by an assortment of elements, the nature of one's association with their administrator, the nature of the physical condition in which they work, level of satisfaction in their work, and so forth (Akhtara, Hashmib and Naqvi, 2010). Other than these numerous different components are likewise included to work fulfillment of instructors. Such factors, for example, the worker's age, wellbeing, personality, wants and level of desire ought to be considered. Further, his family connections, economic wellbeing, recreational outlets, movement in authoritative work political or absolutelysocial, contribute at last to the activity fulfillment (Mishra 2013).

Status of women teachers in Higher education

Higher education institutions in India comprised of 59.4% of male teachers and 40.6% of female teachers. Among the all states Bihar has lowest proportion of female to male teachers' ratio is 1:4. At the all-India level there are 68 female teachers per 100 male teachers. Similarly, in SC category the female teacher is 53 per 100 male teacher and in case of ST and OBC, it is 65 and 64 females per 100 males respectively. For Muslim minorities, it is 53 female teachers per 100 male whereas for other minorities, there are 142 females per 100 male. However, it is to be noted that female representation in teachers belonging to Persons with Disabilities (PWD) category is low, that is 43 females per 100 male teachers. Among various levels of posts, majority of teachers are of the level of Assistant Professor, followed by Associate Professor. There are 11,951 Visiting teachers also; among them 56.1% are male. The number of total teachers at University level is around 1.58 lakh out of which 64.9% are males and 35.1% are females. At college level, the number of teachers is 10.55 lakh with 58.6% of male teachers (AISHE 2016-17).

Job satisfaction of teachers

Analysts have clarified the wonder of employment fulfillment by looking at the sentiments or input of people. Teachers' activity fulfillment has maybe been explored to an ever

increasing extent, frequently in relationship to educator stretch, work duty, proficient self-rule, school atmosphere et cetera. (Schuler, 1986) Job satisfaction is combination of psychological, physiological and environmental circumstances that a person truthfully to say, "I am happy with my job" (Akhtara, Hashmib and Naqvi, 2010). Business satisfaction is a general demeanor which is the delayed consequence of various specific perspectives in three districts, to be specific (i) particular occupation factors; (ii) singular attributes; and (iii) amass relationship outside the activity. These components can never be disengaged from each other for investigation. The approach which since to be picked is that activity fulfillment is the idealness or unfavourableness with which representatives see their works. It comes about when work necessities suit to the needs and desire for the representatives.

Job satisfaction of teachers is a significant dimensions for their job the facet approach can be used to find out the various factors involve in job satisfaction or dissatisfaction among employees the significant contributor to job satisfaction consists of motivation challenge, conducive work environment, equitable opportunities, and cooperative callings .For better job satisfaction among employ social interaction and supportive work environment play significant role .Job satisfaction is also indicator of psychological health and emotions well-beings of the employ. Many studies also indicate that contractual employ have less job satisfaction in comparison to permanent employ due to less control overall their employment status and insecure employment status (Chamundeswari, 2013).

Factors Affecting Job Satisfaction

1. Individual Factors

i. Sex : In a large portion of the examinations regarding the matter, it is uncovered that for the most part ladies are happy with their activity than man. This might be a direct result of different part of ladies when they take position outside home. It was discovered that, ladies like to work with benevolent individuals, great social position notwithstanding less pay.

ii. Age: Studies have discovered diverse outcomes in various gatherings on the relationship of age with work fulfillment. Some vibe that age has little association with work fulfillment yet this relationship has significance in some activity circumstances. In a few gatherings work fulfillment is higher with expanding age in different gatherings it is lower.

iii. Training: In this relationship a few investigations demonstrate that there is a propensity for the more taught representatives to be less fulfilled and then again the less instructed workers to be more fulfilled. Be that as it may, different investigations demonstrates no relationship at all and certain factors, for example, organizations' progression strategy in connection to training must be considered.

iv. Time of Job: Several examinations demonstrate that activity fulfillment is higher in initial couple of days at that point falls gradually.

v. Sort of Work: The most vital factor in the activity is the kind of occupation. Studies have demonstrated that in work causes more noteworthy occupation fulfillment than the standard work. Different

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ROLE OF INDIAN PHILOSOPHY IN EDUCATION

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ABSTRACT

One of the important aspects of educational philosophy is that it helps to construct a comprehensive system of education. During different periods, India has witnessed various stages of development. New priorities have emerged in education with the influences of monastic scholastic, realistic, idealistic and pragmatic trends. While education institutions have evolved, there remain several gaps between the philosophical ideals proposed by educational institutions and their everyday functioning. The paper brings forth the urgent need to bridge the gaps in order to attain a comprehensive philosophy of education, in principle and in action. The authors posit that the Indian philosophy of education, normatively speaking, could extend the culture and tradition of the philosophical positions of Mahatma Gandhi, Rabindranath Tagore, Sri Aurobindo and Swami Vivekananda. Such an approach could help in developing an integrated approach of teachers towards education and assist in strengthening their role in shaping the inner potential of a learner in a constructive manner.

Keywords: *Indian Educational Philosophy, Mahatma Gandhi, Rabindranath Tagore, Sri Aurobindo, Swami Vivekananda*

Introduction

The landscape of Indian education system has witnessed fundamental structural transformation during the post Independence period both quantitatively and qualitatively. In today‟s Globalization Era, knowledge is increasingly a commodity that moves between the nations and people. Nevertheless, the attainment of philosophical education contributes significantly to establish a set of values and qualities to individuals (Kumara, 2016). While the growth of knowledge based philosophical analyses varies from one academic setting, or school of thought or socio cultural context to another, the education system plays a crucial role in establishing a nation‟s ability to succeed in the modern global scenario of educational philosophy.

With this perspective, the present paper attempts to examine the issues of educational philosophy in India. It addresses the different perspectives of philosophers from pre-independence to post- independence era. Different sources of philosophical ideas of education highlights the changes in terms of incorporating the integrated approach of teachers in shaping the inner potential of a learner through the development of content and of the philosophy of teaching.

Background of Indian educational philosophy

The salient features of Indian philosophy of life and thought are based on the quest for spiritual values which stresses upon the unity of existence, the divinity of man and harmony of creeds and religions. On the other hand, western traditions of educational philosophy stresses upon the pragmatic view of life to measure the value of the man in accordance to his/her utility in the society (Dupuis & Gordon, 2010). Indian philosophy of education gives importance to the essence of creating a sense of universal humanhood and spirituality. Tagore reiterates in his philosophy of education, the need to evolve the pattern of life encapsulated by the realisation of the sense of universal humanhood.

In order to face the changes in the modern world and adapt to the educational needs of the learner in the twenty-first century, Indian philosophy of education needs to maintain a proper balance between the past and the present to prepare the learners for the future and orient them towards the need to celebrate the diversity in social and cultural traditions (Sahan & Terzi, 2015). The educational institution has to take a constructive role to maintain the inter-linkages between science, spirituality and technology (Kumara, 2016).

Indian educational philosophy

India, like all other nations has been influenced by diverse educational philosophies because of the historical transformations of societies, influx of heterogeneous ideas from various communities, both from India and from outside

of the Indian context.

The Vedic period of Indian education stressed upon the holistic prosperity and spiritual well-being of a human, wherein the philosophical and metaphysical aspects of the divinity of mankind is acknowledged. During this period, learning was sought as the means to the highest end of life - the attainment of emancipation or Mukti, often considered as an essential aspect of Hindu religious discourses.

However, there were alternative perspectives which stressed on the fact that education should be related to the development of moral character rather than considered as an exclusive means of attaining scripture based intellectual capabilities (Sharma, 2003). Buddhism, for example, in the Indian context, considered it important to understand the cosmic sense of salvation. Indian educational philosophies and by extension, their expression as university spaces were acknowledged globally, for example, during the Buddhist era, universities and education system had the privilege to get universal fame (Chakrabarti, 1995). In the next few sections, the article will aim to lay out specific features of the trends in educational philosophies in broad historical periods, followed by educational philosophies of a few iconic educators.

Vedic period

In the educational philosophy of ancient India, respect for the teacher was considered to be of supreme importance. The teacher, who imparted the knowledge of Vedas was considered as a pivot of the whole educational system. Within Vedic educational philosophy, attainment of Moksha or liberation was of utmost importance. The educational philosophy in Upanishad is more closely tied to the social and cultural traditions. It emphasised on the all round development of a person, prioritising the development of personality and character, accountability towards national integration, knowledge of social roles and status and development of one‟s vocational efficiency. The pedagogic methods involved included questioning, induction and deduction, discussion, descriptions, illustrations, practical and narratives demonstration.

Within the social fabric of the four-fold Ashramas or life stages (Brahmacharya, Garhastya, Vanaprastha and Sannyasa) of the student, the educational philosophy in Vedic period was influenced by the stages to attain Moksha or Liberation. The basic purpose of education, it was stressed, does not end with the education of the students at the first stage but it should help them move towards the other stages of life. It should help the individual to understand the processes to engage in self-realisation by unfolding the spiritual realm within them (Sharma, 2003).

Medieval period

Medieval period witnessed strong influences of Jainism, Buddhism and Islam in the educational transformations. Based on core principles such as non-violence and the law of Karma, these schools, albeit with differences in their epistemic, ontological and metaphysical realities spoke of the ultimate goal of liberation, that is, the emancipation from the cycle of death and birth. The emphasis was laid on four noble truths (aryasatyas) as the ultimate goal of education: the linkages between the world, life and libreraton were explained as the following. The world is full of miseries (dukha) and the cause of miseries is ignorance (sukhasamudaya). Cessation of miseries (dukhanirodha) is important to achieve liberation and the learner should be aware of the ways to get rid of miseries (dukha-nirodh-marg). Jainism and Buddhism aspired, to a large extent to personify an individual God, provide greater assertion on morality, the aspirations of the common man and offer rational interpretations of the meanings of human life (Kumara, 2016).

The educational philosophy that was derived from the Islamic education system aimed to understand discourses from the Quran and sought to bring into focus, the development of practical skill for the cultural, economic and social cohesion. There was an attempt to balance scriptural knowledge and attainment of vocational expertise. An emphasis on learning agriculture, arts, medicine and various types of crafts and house building were an essential part of the curriculum. Military science, incidentally was also an important part of the curriculum. Depending on the governance and location of the school and its principles, the medium of instruction varied, though in most

contexts, medium of instructions in Tols was Sanskrit or regional languages, whereas in Madrassas, it was Arabic and Parsi. Several documents reveal that a typical syllabus from a medieval institutions would include subjects as diverse as philosophy, mathematics, logic, literature, history, geography, medicine, agriculture, grammar to name a few included under their gambit. In terms of focus areas, developing reading, writing and arithmetic were of importance (Bhatia, 1992).

Modern period

The Modern education system started under the British rule. Lord Macaulay introduced western educational philosophy in India. The educational views of Macaulay gave importance to the propagation of European literature and science, and this, eventually led to the neglect of vernacular Indian literature and the arts (Viswanathan, 1989). The British administrators and pedagogues in Europe prescribed and controlled the entire education system in India. Many scholars opine that the British educational system initiated a political and social awareness in the country. It also developed the cultural and literary consciousness for the nation. This education system had a dual purpose: it strengthened the foundations of the colonial superpower, that is, British rule and reinforced the theological and philosophical tenets of Christianity (Bhatia, 1992). Several scholars have critiqued the British philosophy of education, considering it to be against national interest.

While we laid out, in quite schematic fashion, the several changes and influences that Indian educational philosophy surpassed, I now turn towards a few specific pedagogues who had a key role in shaping a distinct sense of Indian philosophy of education. These philosophers of education attempted to reconstruct the ideals, educational values, *rebridge* the cleavages between philosophies, culture and Indian education system as an alternative educational approach.

Indian educational philosopher Mahatma Gandhi

Mahatma Gandhi experimented with the ideas of education and schooling through the establishment of Kocharab Ashrams, which posited that for a sound educational philosophy one needs a harmony of intellect, labour and passion. Gandhian philosophy stressed on the simplicity in language, literature and life. Gandhian thinking aimed to synthesise the value of *svadharma* and *swadesi* and the world of internationalism and brotherhood in the same field (Bhatia, 1992).

Education, he would often assert, has to emphasise the needs of the society. It has to be free, compulsory and universal, it has to give importance towards learning of craft, and it has to be delivered in the mother tongue. Moreover, he added that education has to inculcate the dignity of labour as the need of the hour and develop a sense of spirituality in the learner‟s life. Education has to contribute towards the reformation of the economy of the country, ensure national integrity and help build cohesion and solidarity in the society.

Rabindranath Tagore

Tagore's experimentation resulted in a unique sense of educational philosophy: the belief in unity in humanity. Rabindranath Tagore established Santiniketan with several objectives towards understanding citizenship, connections between man, nature and education and so forth. However, this later grew as a spiritual centre to change the inner life of participants. Rabindranath Tagore‟s ideals of educational philosophy resonates the harmony of the diverse facets of life, including, educational, cultural, artistic, political, social and intellectual. Tagore‟s philosophy aims to develop the spiritual as well as the physical growth of the learner as he believed that the manifestation of personality depends upon the self-realisation, spiritual knowledge and health of an individual. Education, he asserted, teaches people to realise the oneness of the globe and establish a universal brotherhood and based on intercultural understanding. In Tagore‟s humanism, the need of co-relation between man and nature is essential for ensuring peace and justice. He also asserted that since language expresses people‟s expression so it is essential that the medium of instruction be in mother tongue for the children‟s education.

Tagore gave importance on spiritual and moral education rather than on scriptural knowledge

for an integral development of a human. He considered cooperation, selfless activities, love towards fellows and a responsibility towards nurturing social relationships to be the main purpose of one‟s informed mind. It, he argued, enabled the individual to live as a worthy being (Bhattacharjee, 2014).

Sri Aurobindo

Sri Aurobindo's experimentation sought to develop an integral man. Sri Aurobindo‟s educational philosophy considered five principle aspects of human life as important: the vital, the physical, the psychic and the spiritual. All these elements are complimentary and need to be nurtured until the end of life. The scheme of education, according to him, has two integral senses as it is simultaneously an integral part of five aspects of the individual being and is also integral for the nation and to the humanity.

The educational philosophy of Sri Aurobindo is based on the evolution of the idea of „total humanity‟ with the emphasis placed on the principles of growth in unity that maintains the evolution of diversity. The education system that he proposed would prepare people as an individual through educating the person as a human being and as a member of a nation. It also gives importance to moral responsibilities of individuals to transcend narrower interests to wider ones. The circles of moral responsibility and loyalties proceed from wider to narrower and vice-versa. The man has to develop first as a human being, then as a citizen and finally as an individual. Most of the present confusion of values is due to an inversion of this order, he had asserted.

The integral education that he subscribed for can be attained by strengthening the five principles such as physical, vital, psychic, mental and spiritual aspects and it has to be developed together. The school cannot be isolated from the society, as it needs to develop the capacity of collaboration, silence and consultation. It has to be embedded in social systems, engaging and contributing to them whenever required. His philosophy provided a way to revisit opportunities that a curriculum can provide for discovering the powers of the mind, power and spirit of the students and learners (Kumara, 2016).

Swami Vivekananda

The educational philosophy of Swami Vivekananda considers education to be a powerful instrument of social change. Education is the continuous process of “the manifestation of perfection that is already in man”. It covers all the aspects of life such as intellectual, physical, material, emotional, spiritual and moral and it can remove the major evils as priest-craft, ignorance, poverty and tyranny of the wise.

The foundation of the philosophy of education in India is in its cultural context that strengthens the political and social strength of the nation. The educational thought of Swami Vivekananda has much significance to the modern education system which has lost its connection with the values of human life. The education system now emphasises on rote learning without paying attention to a reformation of the mind. There is a need to remove the obstacles and provide all the necessary opportunities to students so that they develop an understanding of concentration to acquire knowledge. True education, he added, contributes to the nation and should not be restricted by individual ambitions (Banerjee & M. M., 2015).

Major challenges of educational philosophy

The educational philosophy traced so far provides a foundation for the intellectual debate and dialogue that could deepen the understanding of educational philosophy and practice in the current context of India. The current education system in India is unable to address the learner's interest and be relevant to the learner and the educational values he/she needs to inculcate in the fast changing world (Griffiths, 2014; Hayden, 2012). It focuses only on employment and creates the obsession to memorise, rote learn and pass the examinations. This is a crucial time to look at the educational philosophies of great Indian philosophers and re- examine their educational thoughts and ideas for their relevance today. There is a need for an education system which not only nurtures the learner's souls with knowledge but also gives importance to instil a sense of sympathy for others. Additionally, it needs to help students move towards self-improvement and personal fulfilment

(Bhattacharjee, 2014).

It is in this context, I argue, that there is a need for the universities to have a deeper understanding of the educational theory and practice of Indian educational philosophers to provide the needed perspective for intellectual dialogues. There is also a lack of quality, clarity and rigour to promote the consistency and semantic meaningfulness of our educational philosophies. Coupled with a lack of scholarly research as well as the perspective for an informed debate in the field of educational philosophy, there is a conspicuous absence of communication between „pure" philosophers and philosophers of education, which has proved to be detrimental for its growth. Specifically, this gap has led to the failure in making education of today relevant, contemporary and yet rooted in our local contexts.

Implication of the study

The paper aims to the present education system which not only neglects the spiritual values but also fails to provide an adequate training for the mind. Plethora of indiscriminate information is forced on students, which fails to stimulate the thinking process. The educational philosophies of Indian educational philosophers, Rabindranath Tagore, Mahatma Gandhi, Swami Vivekananda and Sri Aurobindo are only taught in the classrooms but they are not transferred to students; values such as cutivation of humanity, morality and tolerance therefore, remains locked as unfulfilled promises within the scriptures as promising philosophical doctrines (Banerjee & M. M. 2015; Bhattacharjee, 2014).

It is important, at this juncture, to weave the basic principles of an educational philosophical framework as posited by these abovementioned educators. Taking the commonalities across these philosophers, we would observe that they argued for an education system that is effective in establishing equality, secularism and primacy of knowledge. They had also asserted that there is a need to engage with the rural society to bridge the gap between citizens of a state. They envisioned that the role of education is to develop creativity, skills and make students self reliant, conscious and situated in a local context. This, they thought would build the democratic fervour of the nation and strengthen its secular fabric, the achievement of which, we had pledged in the constitution.

To contribute to the democratic social transformation of the society, this paper proposes, the need to prepare a national educational framework that develops and encourages an integrated approach towards educational philosophy. The Indian education system has the responsibility to prepare the future learners to understand the value of culture and tradition, which when coupled with this framework, should pledge to instill a democratic vision, scientific temper and need for just and tolerant society in all students and learners.

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A COMPARATIVE ANALYSIS OF PUBLIC EXPENDITURE ON SECONDARY EDUCATION IN SOUTH ASIA

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ABSTRACT

The present study is an attempt to trace the trends of public expenditure of education in general and secondary education in particular in South Asia. Additionally, the study tries to capture the linkage of education expenditure and its possible outcomes at the secondary level. This study is largely driven by a comprehensive secondary data analysis, supported by literature review from relevant sources. The study adopts descriptive explorative research design for analyzing the statistics of education indicators. The study aims to identify gaps on account of secondary education in South Asia. One of the key findings from the study reveals the fact that there is 'significant heterogeneity in public spending' on education across the region. On the impact front, the study highlights that education funding resulted in different education outcomes at the secondary level. The case of South Asia demonstrates that progress towards secondary education has been uneven and the achievement of development goals requires greater resource mobilization and management. Further, on the policy front, the study emphasizes that to have inclusive and equitable quality education, it is crucial for the South Asian Governments to direct the appropriate funds to education sector, keeping in view the current and anticipated future financial needs.

Keywords: *Public Expenditure, Education, Gross Domestic Product, Education Outcomes.*

Introduction

South Asia is among the most heavily-populated region of the world comprising of India, Bangladesh, Pakistan, Nepal, Iran, Sri Lanka, Afghanistan, Bhutan and Maldives, together accounting for around 25 per cent of the world population[viii]. It is the fastest growing region with a GDP growth rate of 6.8 per cent in 2018 (The World Bank). The economic data reveals that the region is experiencing high economic growth and increasing per capita income. However, despite such encouraging figures, education is in crisis where still around 31.9 million children are out-of-school at the elementary and lower- secondary level (UNICEF South Asia).The major bottlenecks faced by the region include large number of out- of- school children, low enrolment rates, lack of public provisioning, gender inequalities, untrained teachers and poor quality of education, hampering the achievement of Sustainable Development Goal (SDG) 4.1 adopted in 2015[ix], which targets 'that all boys and girls complete free, equitable and quality elementary and secondary education leading to relevant and effective learning outcomes'. Allocation of sufficient funds, including sustainable financing options need to explored in the educational sector for the fulfillment of SDG 4 goals. .

On average, South Asia spends 3.95 per cent of Gross Domestic Product (GDP) towards education and this spending is well below the world average of 4.8 per cent (The World Bank). To achieve universal access to education i.e. ensuring that all the children of elementary and secondary age are enrolled in school, it is pivotal that the South Asian Governments direct sufficient funds to the education sector to cater to the needs of current and future generation.

The present Study is different from other studies as it poses the varied additions to the existing body of knowledge. The present study presents a consolidated analysis of public expenditure on education South Asia, which has also been discussed at a disaggregated level. Further, there is a dearth of literature that compares the government expenditure and education outcomes. The most important highlight of the present Study is revealing the true state of affair of secondary education in South Asia.

The present paper is segmented into four sections. Section I highlights the introduction

aspect of the study, wherein background and brief review of the topic is presented. Section II deals with the research methodology and data sources. Section III is devoted to discussions, driven by a thorough analysis of the trends of expenditure on education in general and secondary education in particular in South Asia. A brief snapshot of the linkage of government expenditure and education outcomes at secondary level is also discussed to further substantiate the analysis. Lastly, the Section IV brings forththe key conclusions of the study.

Research Methodology and Data ConsiderationsResearch Design

The study follows the descriptive explorative research design for analyzing the trends, structure of allocation and linkage between public expenditure and outcomes using the secondary data. This design is apt for the study because it rest on the premise of seeing the relationship between expenditure and outcomes, seeing their relevance and suggesting pathways with regard to secondary education in South Asia.

Sources of Data

For analyzing the trends in public expenditure on education and their implications in South Asia, the study relies exclusively on secondary data research tools. Data was collected from multiple authentic government sources, research articles, market intelligence reports, specific sectoral studies in South Asian markets, published journals and reports released by South Asian Governments, Ministry of Finance and various multilateral and bilateral agencies such as UNDP, IFC, World Bank, etc.

Some of these sources have been highlighted below.

- UNICEF South Asia
- Ernst & Young India, Viamo and UNICEF
- United Nation Educational, Scientific and Cultural Organization (UNESCO)
- The Economist Intelligence Unit (The EIU)
- International Monetary Fund (IMF)
- Asian Development Bank (ADB) etc.
- Index mundi

DISCUSSION

Trends relating to Public Expenditure on Secondary Education in South Asia

As a precursor step to the analysis pertaining to the 'public expenditure on secondary education in the South Asia', it may be useful to recall the comparative picture of public expenditure on education in general and at different levels in South Asia. These details have been captured in Table 1.

Table 1 Public expenditure on education in South Asia

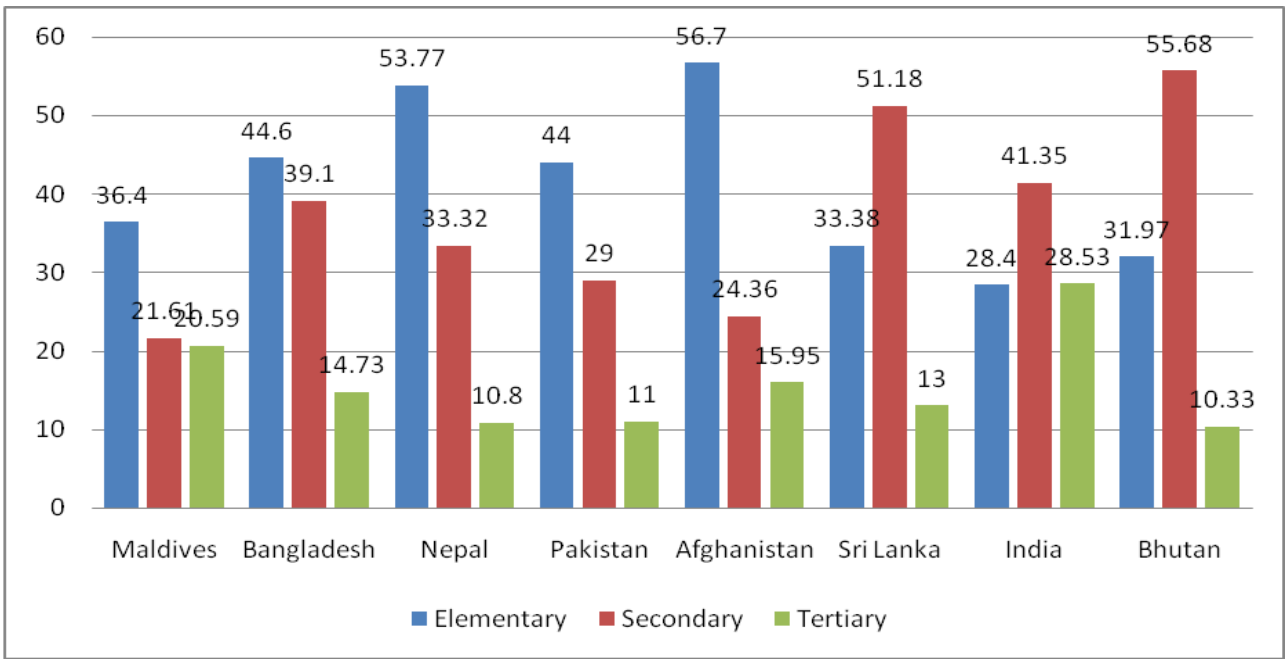
Region/Country	% of Gross Domestic Product(GDP)	Public spending on education (%)
Maldives	4.1	11.3
Bangladesh	2.00	14.6
Nepal	5.1	14.1
Pakistan	2.9	14.5
Afghanistan	4.06	15.7
Sri Lanka	2.8	14.5
India	3.8	14.1
Bhutan	6.85	22.8
Average	**3.95**	**15.2**

Source: *UNESCO Institute of Statistics (2020).*

The data in Table 1 clearly shows that there exists great heterogeneity within the region. Taking a closer inspection at the percentage figure by country separately, it is evident that Bhutan (6.85%) and Nepal (5.1%) have the 'maximum public spending as a proportion of GDP', a figure which is far greater than the world average of 4.8 per cent. Moreover, the situation in Bangladesh (1.54%) is even more grave as it has the lowest spending on

education. The education 2030 framework [x]for action recommends that the government must allocate at least 4-6 per cent of Gross Domestic Product and/or at least 15-20 per cent of total government expenditure towards education. According to these standards, the regional average of South Asia as well as average of individual member countries are close to or below the lower limit of recommended expenditure indicating the below par standard of education in South Asia.

Figure 1: Public spending on education across different levels as a proportion of total expenditure



Note: The statistics are for the years: 2012-13 (Bangladesh), 2014-15 (Bhutan) 2015-16 (Afghanistan &Nepal) and 2016-17 (Maldives, Sri Lanka & Pakistan). For some countries and education levels, latest data was available, but for the purpose of comparison, we use years with data available for all levels.

Source: *Author's compilation based on UNESCO Institute of Statistics (2020) & index mundi (2020).*

Figure 1 shows the allocation of education expenditure across different levels (elementary, secondary and tertiary) by South Asian governments. In Nepal (54%) and Afghanistan (57%), more than 50 per cent of the resources are allocated to elementary level, whereas in Sri Lanka (51%) and Bhutan (56%), major proportion of the funds goes to the secondary education. For the tertiary education, India and Maldives allocate more funding than the other countries. The variation in funding across different education levels by each country can be attributed to diverse factors such as level of participation in elementary, secondary and tertiary level, population size, economic status, demographics and economic structure of each country, etc.

The comparison for government provisioning for education in South Asia may be captured in abetter fashion by 'per student' expenditure. By 'per student' it's mean that the total government expenditure for the given level of education (elementary, secondary and tertiary) divided by the total enrolment in the same level. Table 2 presents the trends relating to per student expenditure by country as per the latest data available for each level.

Table 2: Per student expenditure by level of education (% of GDP per capita)

Region/Country	Elementary	Secondary	Tertiary
Maldives	14.46	NA	29.91
Bangladesh	7.69	10.20	30.85
Nepal	13.01	11	25.43
Pakistan	7.69	15.22	63.80
Afghanistan	10.02	11.04	41.47
Sri Lanka	10.10	10.34	26.39
India	9.77	16.82	49.17
Bhutan	13.84	32.07	54.60

Note: NA represents data not available.

Source: *Author's compilation based on index mundi (2020).*

As one may expect, numbers for 'per student' expenditure are quite low. Expenditure per student for elementary level as a per cent of per capita Gross Domestic Product ranges between 7-15% for all the regions. There is more diversity at the tertiary and secondary level: expenditure 'per student' vary from 10 per cent in Sri Lanka and Bangladesh to 32 per cent in Bhutan for the secondary level whereas for the tertiary level, Sri Lanka (26.39%) and Nepal(25.43%) has the lowest 'per student' expenditure and Pakistan (63.80 %) has the highest expenditure 'per student'.

In the preceding discussion, some of the important aspects relating to trends of expenditure on education in the South Asia were presented. Now to see whether government goals are in line with the needs of the South Asian Governments, we can compare education expenditure with educational outcomes.

For comparing the expenditure on education with education related outcomes, there is ample choice of indicators such as infrastructure facilities, teacher training, etc. but for the present study we limit our analysis to the important educational outcomes like literacy rate, graduate rate, net enrolment and out-of-school children (OOSC) as they act as representatives of broader terms in education sector. Table 3 provides the country-wise comparison of expenditure and educational outcomes at the secondary level.

Table 3: Comparison of expenditure and outcomes at secondary level

Government Expenditure			**Outcomes**							
	% of GDP	**% of Spending**	**LR**		**GR**	**NE**			**OOSC**	
	Total	**Total**	**A**	**Y**	**Ls**	**S**	**Ls**	**Us**	**Ls**	**Us**
MDV	4.10	11.3	97.7	98.8	97.8	47	92.3	NA	10.1	34.3
BGD	2.00	14.6	73.9	93.3	71.1	63.7	65.8	46.3	25.7	42
NPL	5.10	14.1	67.9	92.4	89.5	57.5	57.6	38.3	5.3	24.1
PAK	2.90	14.5	59.1	74.5	46.1	38.5	27	25.5	28.9	51.5
AFG	4.06	15.7	43	65.4	37.5	48.6	53.5	31.3	NA	58.3
SRL	2.80	14.5	91.9	98.9	103	89	97.3	78.3	1.3	18.9
IND	3.80	14.1	74.4	91.7	70.1	61.6	66.3	44.5	14.9	47.9
BTN	6.85	22.8	66.6	93.1	86.5	70.2	67.3	30.7	12	27.7
Average	**3.95**	**15.2**	**71.8**	**88.5**	**75.2**	**59.5**	**65.8**	**42.1**	**14**	**38.1**

Note: MDV=Maldives, BGD=Bangladesh, NPL=Nepal, IND=India, BTN= Bhutan, SRL=Sri Lanka, PAK=Pakistan, AFG=Afghanistan, S=Secondary, A=Adult, Y=Youth, LR=literacy rate, GR= Graduation rate, NE= Net Enrolment, OOSC=Out-of-school children, Ls=Lower Secondary, Us=Upper Secondary & NA= Data not available.

Source: *Author's compilation based on UNESCO Institute of statistics (2020), World Bank (2020) andUNICEF South Asia.*

On average, South Asian countries invest around 3.95 per cent of Gross domestic product towards education. Out of eight countries, four countries exceed the regional average: Maldives (4.10%), Bhutan (6.85%), Afghanistan (4.06%) and Nepal (5.1%). However, variation in education expenditure across four regions results in different education outcomes. In Afghanistan, over half of the population is illiterate with low education outcomes than others in the region except for Pakistan. Maldives, on the other hand, has the highest literacy rate around 100 per cent for both youth and adult, but still has space for development when it comes to secondary education as the school enrolment remains very low.

Bhutan has the highest government spending as a proportion of Gross Domestic Product (6.85%) and 'per student' expenditure(32.07%) at the secondary level, but with a literacy rate of 67 per cent for the youth population and home to a number of out-of school children at the lower (12%) and upper secondary level(27.7%).

After Bhutan, Nepal has the highest government spending as a proportion of Gross domestic product (5.1%).Overall the secondary education in Nepal is quite depressing with the with a low net enrolment at the secondary level(57.5%), below the regional average.

Looking at the other hand, Bangladesh, India, Pakistan and Sri Lanka all have the public spending on education below 4 per cent of the Gross Domestic Product. Bangladesh with a total population of 164.6 million has the lowest education spending. Its literacy rate (both for youth & adult) and enrolment exceeds the regional average both for upper and lower secondary level. While Sri Lanka, which is the second lowest spending region, has the best education outcomes in the southern region. The country's literacy rate for both youth and adults are above 90 per cent with few of out-of- school children for both upper (18.9%) and lower secondary level (1.3%).

India is a lower middle income country with the public expenditure on education almost same as the regional average. In terms of education outcomes, it has the large number of out-of-school children for both the lower (14.9%) and upper secondary level (47.9%). Further, the situation is more alarming in Pakistan with a low school enrolment rate (lower: 27% & upper: 25.5%) and large number of out-of-school children for both lower (29.8%) and upper secondary level (51.5%).

Conclusion

The study found that there is a significant heterogeneity in public spending across the South-Asian region. Due to different level of participation in elementary, secondary and tertiary level, population size, economic status, demographics, economic structure of each country, etc., public spending across different level of education as a proportion of total expenditure on education varies. 'Per student' expenditure is quite low with greater variations across secondary and tertiary level. Further, the study reveals that education spending in these 8 countries has resulted in widely different education outcomes.

The case of South Asia depicts that the progress towards the secondary education has been uneven and the achievement of Sustainable development goals (SDGS) require fund-raising, management and mobilization of resources. In line with the theory, higher public investment in education contributes to better educational outcomes on average, but this relationship is highly dependent on variables such as the income of a population, institutions, demographics, etc., which should be key inputs to the determination of present and future financial needs. So, policy instruments targeted at improved government spending to the education sector, according to the countries and sector specific targets need to be drafted. The study definitely points towards improved financing mechanisms to address the gaps in educational spending in South Asia.

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STRATEGIES FOR BUDGETARY PROCESS IN INDIA AND PROFESSIONAL DEVELOPMENT IN HIGHER EDUCATION INSTITUTES

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ABSTRACT

Micro learning based on micro content and micro content is information in short form. Micro learning included models and concepts can be understood in different ways which can be refer to micro aspects. Micro learning is important for knowledge creation in different learning processes are based on survey and observation. Each observation is a micro-step in the process of learning and knowledge creation. Researcher focused on development of micro learning strategies for professional development for that he used multi method. 50 teachers were used as a sample form different affiliated college of Savitribai Phule Pune University, Pune. The findings of the study are that all teachers were moderate level of micro learning strategies and the framework of micro-learning strategies for professional development is significantly effective. Also, the present study focuses on the different parameters of professional development (trainings, personality, attitude, skills etc.) of teachers.

Keyword: *Micro-learning, Micro-learning strategies, Professional Development.*

Introduction

Micro learning is the learning strategy that distributeslearning content to learners in small chunks, bite- sized and simply digestible learning nuggets. A micro learning is engrossed used on meeting one exact learning outcome. Dividing a large topic into several small-sized modules and letting the learner to take them in the order of own choice. Micro learning begins from micro content. Micro content is small bits of digital information. It is one topic, short length, acquire immediately and limited by device. It is openly access resources. It is connected in human-to-human interaction and interaction with digital media. It takes on an active role in the riddling and the supply of data. Micro learning can offer and pledge information with the help of the knowledge about the learning situation of the learner. New technological and social changes initiation the need for different concepts and strategies to support continuous learning. Work-based learning is in need of alteration, requiring changes and new innovative ways of relating suitably to the way people live, work and learn. (Job, 2012)

Definitions

1. **Micro-Learning Strategies:** Micro learning strategies includes self-directed learning, situated learning, community-based learning, Discovery learning. These micro learning strategies inspiring co-creation and sharing of content and learning can be enhanced easily digestible learning nuggets.
2. **Self-directed Learning:** "A process in which persons take creativity, with the help of others, in identifying their own learning needs, deciding goals, categorizing human and digital resources for learning, taking and applying appropriate learning strategies and assessing learning outcomes" is a self-directed learning. (Malcolm Knowles, 1975)
3. **Situated Learning:** Situated learning means learning in a natural way context and learners become in a society of preparation, understanding within the context, and see the belief in a touchable way, certainly require intended skills and behaviors.
4. **Community-basedLearning:** Community based learning is a extensive variety of instructional methods and activities that learners use to connect what is being learn in classroom, communities, different institutions, history, literature and natural learningenvironments(Das, 2016)
5. **Discovery Learning:** Discovery Learning is a method of inquiry-based learning and is knowna constructivist-based approach to

education. (Cecilia Dumas, 2016)

Need and Importance

1. Micro learning helps teachers to achieve one learning objective at a time. (Iiona, B., 2010)
2. Micro learning provides specific and targeted information to teachers.(Hilda, 2004)
3. Micro learning addresses short attention spans. (Iiona, B., 2010)
4. Micro learning strategies comes in various formats. Such as-a bite size video, an info-graphic,whiteboard animations, quiz, scenarios.
5. Micro learning strategies includes use of social media such as – youtube, whatsapp etc. but there is no scientific procedure developed regarding micro learning. (Goschlberger, 2016)

Objectives

1. To find out status of micro learning strategies for professional development in teachers.
2. To develop micro learning strategies for professional development in teachers.
3. To test the effectiveness of micro learning strategies for professional development in teachers.

Research Question

1. What is the status of micro learning strategies for professional development in teachers?

Hypothesis

Research Hypothesis: Micro learning strategies are useful for professional development in teachers. Null Hypothesis: There is no significant difference between the mean score of control group andexperimental group of micro learning strategies.

Research Methodology

As the study is interdisciplinary in nature multi-method approach was used.

Table 1: Objective-wise Research Methodology

Sr. No.	Objectives	Methodology	Data Collection Tool	Data Analysis Tool
	To find out status of Micro-learning strategies for professional development in teachers.	Survey	Questionnaire, Interview	Percentage, QualitativeAnalysis
	To develop Micro-learning strategies for professional development in teachers.	Product Development	-	-
	To test the effectiveness of Micro-learning strategies for professional development in teachers.	Experiment	Teacher madetest and Observation	t-test

Population

All the senior college of teacher of affiliated colleges of the Savitribai Phule Pune University, Pune.

Sample

50 teachers form the affiliated colleges in Savitribai Phule Pune University, Pune.

Sampling Method

Sample was selected by random sample technique.

Research Design

Two group pre-test –post-test experimental design was used.

O1 O2
O3 X O4

O1 – Control group pre-test
O2 – Control group pre-test
O3 – Experimental group pre-test
O4 – Experimental group post-test
X - Treatment

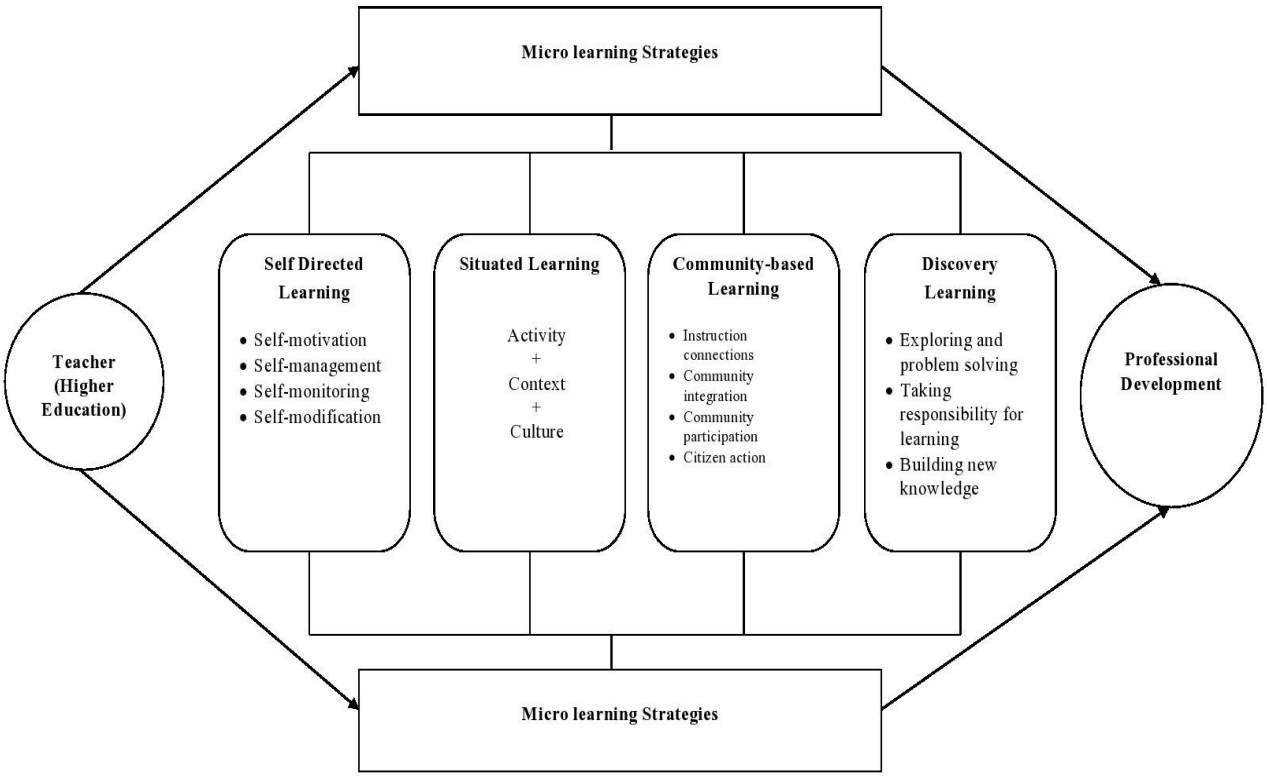

Fig.1 Framework of Micro-learning strategies for Professional Development

Data Analysis and Interpretation

Objective-1

Table 2: Status of Micro-learning Strategies

Sr. No.	Micro learning strategies	N	Mean	S.D.	Interpretation
1.	Self-directed learning	50	10.11	2.25	Moderate
2.	Situated learning	50	11.76	1.75	Moderate
3.	Community based learning	50	11.12	1.90	Moderate
4.	Discovery Learning	50	9.21	2.45	Moderate

Observation: Above the table self-directed learning mean is 10.11 and S.D. is 2.25, situated learning Mean is 11.76 and S.D. is 1.75, Community based learning Mean is 11.12 and S.D. is 1.90 and discovery learning Mean is 9.21 and S.D. is 2.45.

Interpretation: the data shows that all the micro learning strategies (self-directed, situated, community based and discovery) are moderate level.

Objective 3:

Table 3: Comparison of mean score of control and experiment group pre-test

Group	N	M	S.D.	TreatmentVariable	Pairedt-value	Table t-value at 0.01 level	dF
Control GroupPre-test	30	11.15	1.97	Micro learning Strategies	10.18	10.41	29
Experimental Group Pre-test	30	10.85	2.15				

Observation and Interpretation: since the obtained 't' value (10.18) is less than/equal the table 't' value (10.41) with dF equal to 29 at 0.01 level, the difference is not significant. Therefore, the null hypothesis is accepted.

Table 4: Comparison of mean score of control and experiment group post-test

Group	N	M	S.D.	TreatmentVariable	Paired t-value	Table t-value at 0.01 level	dF
Control GroupPre-test	30	11.35	1.99	Micro learning Strategies	12.88	4.12	29
Experimental Group Pre-test	30	15.75	1.03				

Observation and Interpretation: since the obtained 't' value (12.88) is greater than the table 't' value (4.12) with dF equal to 29 at 0.01 level, the difference is significant. Therefore, the null hypothesis is rejected and research hypothesis is accepted.

Findings

1. Teachers used moderate level micro learning strategies in their learning.
2. Micro learning strategies is useful for developing professional development of teachers.

Micro learning strategies benefits:

1. Time saving learning
2. Small very small units
3. Knowledge nuggets

Conclusion

Micro-Learning is a holistic approach for skill-based learning which deals with relativelysmall learning units. Once, a teacher is complete in teaching-learning process, the outcome of students in the form of learning. By analyze the present research focus on the different parameters of professional development (trainings, personality, attitude, skills etc) of teachers. So, teacher is able to do sustainable role in the world of technology.

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STUDY OF DYNAMICS PROFESSIONAL ETHICS

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ABSTRACT

The rapid developments in science and technology and the challenges of globalization are posing additional challenges to the education system in India. The unique power of higher education in shaping the destiny of individuals, societies and nations is highly acclaimed. The Society also expects ethical behavior of highest order from certain sections of citizens. Teachers, researchers and administrators associated with institutions of higher learning are amongst them. The society thus, expects them to adhere to 'Professional' ethics and values. Professional competence is of little value if professional ethics are forgotten. Like all other professions, the teaching profession should also move towards self regulation, which implies that every teacher should have the inner urge to adhere to the ethical principles embedded in the code of professional ethics for teachers. This article generates some reflections on the policy perspectives on professional ethics and values in Indian higher education from lens of the dichotomy between theory and practice.

Keywords: *Teaching, Profession, Teacher, Ethics, Professional Ethics, Indian HigherEducation*

Introduction

Whatever be the advancement in technology, the teacher is not replaceable. Teachers are the greatest assets of any education system. The teaching profession in India has much to celebrate. Our teachers and academic leaders are having a profound impact on our society. They stand in the interface of the transmission of knowledge, skills and values. They are accepted as the backbone of education system. The National Policy of Education, 1986 accepted this influence of teachers in powerful words,

"The status of the teacher reflects the socio-cultural ethos of a society; it is said that no people can rise above the level of its teachers. The Government and the community should endeavour to create conditions, which will help motivate and inspire teachers on constructive and creative lines. Teachers should have the freedom to innovate, to devise appropriate methods of communication and activities relevant to the needs and capabilities of and the concerns of the community" (Government of India, 1986, para. 9.1).

Professional ethics and values have once again been a topic of discussion among the stakeholders and policy makers of education. The society expects the teaching profession to be role models and, thus, expect them to adhere to 'Professional' ethics and values. This societal expectation is not without reason. The teachers and other faculty, and those concerned with administering the institutions of higher learning in particular have obligations to the society. These obligations are incomparable to those of people in other professions. The society, to put in brief, expects those involved with institutions of higher learning to be role models. The high expectations are justified because, as a group, the institutions of higher learning directly deal with vital human resource, the students. They are highly impressionable and prone to exploitation by several forces to meet their ends. Therefore, the pupils look upon teachers as some sort of role models (Rao, 1999). This article generates some reflections on the policy perspectives on professional ethics and values in Indian higher education from lens of the dichotomy between theory and practice.

Epitomising the Concept of Ethics and Professional Ethics

Before conceptualising the terms 'Ethics' and 'Professional Ethics' an understanding about the term 'Profession' should be made. Profession is different from occupation. Truly many occupations are designated as profession. An occupation undergoes in its evolution to become a profession. Profession is an occupation, the practice of which requires complex knowledge. A profession is a vocation and it implies acquisition of a fund of knowledge, range of skills and their application in the service of humanity, especially in some specific field. The learned professions may be said to be Law, Medicine, Teaching, etc. A

profession is an occupation which performs a crucial social function. To accomplish this function it requires a considerable degree of skill requires a body of systematic knowledge grounded in theory. Ornstein and Levine (2003) identified ten characteristics of a full profession. Theyare:

a) A sense of public service; a lifetime commitment to career, b) A defined body of knowledge and skills beyond that grasped by laypersons, c) A lengthy period of specialized training, d) Control over licensing standards and / or entry requirements, e) Autonomy in making decisions about selected spheres of work f) An acceptance of responsibility for judgements made and acts performed related to services rendered; a set of standards of performance, g) A self-governing organization composed of members of the profession, h) Professional associations and / or elite groups to provide recognition for individual achievements, i) A code of ethics to help clarify ambiguous matters or doubtful points related to services rendered and j) High prestige and economic standing (p. 30).

Therefore, the term 'profession' denotes occupations characterized by certain attributes – a body of specialized and expert knowledge together with a code of ethics emphasizing service to clients.

The term 'ethics' has been derived from the Greek word 'ethikos' which has come from the word 'ethos', meaning character or manners. In practice, ethics seeks to resolve questions of human morality, by defining concepts such as good and evil, right and wrong, virtue and vice, justice and crime. It involves critical reflection on morality, and the ability to make choices between values and to examine the moral dimensions of relationships. Therefore, Ethics is the science which enables us to understand humanity as it is and humanity as it could be and then instructs us on how to move from reality to the ideal (Sandhu, 2015, p. 48). 'Ethics', a normative science of the conduct of human beings living in the society, judges human actions to be right or wrong, to be good or bad. Conduct may include inward activities like motivation and desires as well as outward activities like speech and bodily movements of a person. Ethics tells us not what men actually do but what men ought to do. It describes moral principles, ideals and values which govern the conduct or behaviour of persons in the society"(Chopra, 2006, pp. 74-75). It can thus be defined as the moral values, rule and standards, governing the conduct of a particular individual, group, profession and culture. Ethics can be termed as the science of character of a person expressed as right or wrong conduct or action.

Professional is a term denoting a level of knowledge and skills possessed by an individual or required of an individual to perform an assignment, that is attained through extensive education and training. Every profession is expected to evolve a set of ethical principles to guide the conduct and behaviours of its members. The ethical principles provide the basis to differentiate between desirable and undesirable professional conduct and behaviour. In several developed countries, such as United States of America, ethical standards are enforced through specific mechanisms such as the American Association of University Professors. Professions such as law, medicine, dentistry etc. prescribe their own ethical standards. This is not to mean that in the less developed and developing countries such ethical standards arc non-existent. Almost all the countries are having ethical standards prescribed for various professions (Rao, 1999, p. 2).

As in many other countries, the professional bodies such as the Medical Council of India, Dental Council of India, Veterinary Council of India and the Bar Council of India have code of ethics and the professionals are expected to swear by it. The Bar Council of India has its own a code which is enforced since several decades. For the academic profession as a whole, the All India Federation of University and College Teachers Organisations (AIFUCTO) adopted a note on Code of Professional Ethics in 1976 and the Federation agreed in principle that "in keeping with their noble profession, teachers of colleges and universities in India should observe a code of Professional ethics".

Nevertheless, the society expects the teaching profession to be role models and, thus, expect them to adhere to 'Professional' ethics and codes of conduct. If the conduct of the teacher is not compatible with his professional

responsibilities to the students, it must be judged as unethical.

This expectation is not without reason. The Society's expectations from the institutions of higher learning are highland are far beyond the normally accepted norms of behaviour. The teachers and other faculty, and those concerned with administering the institutions of higher learning have obligations to the society. These obligations are incomparable to those of people in other professions.

The society, to put in brief, expects those involved with institutions of higher learning to be role models. The high expectations are justified because, as a group, the institutions of higher learning directly deal with vital human resource, the students. They are highly impressionable and prone to exploitation by several forces to meet their ends. Therefore, the pupils look upon teachers as some sort of role models (Rao, 1999). National Council for Teacher Education (NCTE) clearly reiterated that "It is universally felt that like all other professions, the teaching profession should also have its own Code of Professional Ethics which indeed is a pre-requisite to ensure its dignity and integrity Increased awareness of the ethical principles governing the teaching profession is essential to ensure 'professionalism' among teachers" (NCTE, 2010).

Code of Conduct and Code of Professional Ethics- The Dichotomy

The terms, 'code of ethics' and 'code of conduct' have been used interchangeably by teachers and organizations. There are, however, differences between the terms 'ethics' and 'conduct'. Banks (2003) explains that "a code of ethics is usually a written document produced by a professional association, occupational regulatory body, or other professional body with the stated aim of guiding the practitioners who are members, protecting service users and safeguarding the reputation of the profession". The term 'code of conduct' as used by a profession discusses or describes the behaviours of a group. The code sets out principles of action and standards of behaviour, how the members of the group will operate or work (Nuland, 2009, p. 20).

National Council for Teacher Education (NCTE, 2010) makes the difference between the Code of Conduct and the Code of Professional Ethics with example that

"as far as the provision of the Right of Children to Free and Compulsory Education Act, 2009 is concerned, particularly with reference to Section 24 of the Act pertainingto duties of teachers, enforcement of the Code of Conduct is perhaps the answer. This enforcement is the responsibility of the appointing/disciplinary authority. However, the provisions which define the Code of Conduct could also be incorporated in the Code of Professional Ethics, as making them ethical provisions will always desist teachers from violation of the Code of Conduct (p. 9).

In other professions, as for instance, medicine, law, etc. after completion of the professional course, the pass-out is registered as a bonafide practitioner of the profession and is bound by a Code of Professional Ethics relevant to his/her profession. In case of any reported violation of the code, the authorized professional body initiates disciplinary action which may even lead to cancellation of the license to practice the profession. No such provision exists in the case of the teaching profession (NCTE, 2010, pp. 9-10). It is expected that the code of professional ethics if observed sincerely by the teachers shall enhance their commitment to the profession on one hand and improve their effectivenesson the other.

Over the past few decades, the need for making the teaching profession self-regulatory, by evolving a code of professional ethics for college and university teachers has been articulated from time to time by various commissions and committees on education. Code of professional ethics is essentially a set of professional ethical standards with which teachers are required to comply.

Increased awareness of the ethical principles governing the teaching profession is essential to ensure 'professionalism' among teachers. The Code of Professional Ethics for teachers provides a framework of principles to guide them in discharging their obligations towards students, parents, colleagues and community. Like all other professions, the teaching profession should also move towards self – regulation, which implies that every teacher should have the inner urge to adhere to the

ethical principles listed in the Code of Professional Ethics for Teachers (NCTE, 2010, p. 9). Ideally, the Code of Professional Ethics should be prepared by the professional organizations of teachers themselves as it is their responsibility to ensure its observance as a self-imposed discipline on the part of their members.

Educational Implications of Professional Ethics

1) The prime need of professional ethics is to provide a framework of principles to guide them in discharging their obligations and duties towards students, parents, colleagues, community and society. Professional ethics also help the teachers to act in a professional and ethical manner at all times. By building better teaching and learning environments, these codes contribute significantly to the quality of learning (Nuland & Khandelwal, 2006, P. 18).
2) Why professional ethics matters most in Higher Education Institutions was been reflected in the Report of the Task Force on Code of Professional Ethics for University and College Teachers (UGC, 1989) that "higher education has to produce leaders of society and economy in all areas of manifold activities with a commitment to the ideals of patriotism, democracy, secularism, socialism and peace, and the principles enunciated in the preamble of our Constitution" (p. 1).
3) Today corruption has spread its roots in education system also due to ethical deterioration in education. To curb the ever increasing corruption, code of professional ethics and conduct is essential. Professional ethics will fight against corruption and lead to a Hygienic life. Professional ethics helps the teachers to be protected from the unfair and unjust treatment.
4) If the teacher bears good professional ethics in relation to his profession, the ethics are automatically transformed to the coming generations. The deteriorating status of the profession will gain back its potential status through an effective framework of the professional ethics.
5) Professional ethics help in creating cohesion among faculty and staff, and healthy interactions make each one to draw individual benefits and collectively fuel institutional growth. Professional ethics enable the teachers do justice to the roles and responsibilities assigned to them. Professional ethics will also help in the spread of peace and international understanding across the Globe.
6) An effective use of the professional ethics has the power to stop the so called terrorism in the world. Ethical guidelines always help the teachers and academic administrators to improve the quality of teaching. It inculcates the feeling of professionalism among teachers and develops a positive attitude towards teaching profession. Moreover, it promotes public trust.
7) To foster a culture of high standards of honesty, integrity, ethical and law-abiding behaviour among teachers; to enable the teacher to deal consistently and fairly with all students in classroom; to serve as an instrument of self-regulation and to represent a status symbol that protects the profession, professional ethics performs a lot.

Policy Discourse on Professional Ethics for Teachers

Every profession is supposed to have an accepted code of ethics specific to the nature of the profession. Each professional organisation develops a code of professional ethics for its members to adhere to. Professions such as law, medicine, dentistry etc. prescribe their own ethical standards.

These codes of professional ethics vary from profession to profession. As in many other countries, the professional bodies such as the Medical Council of India, Dental Council of India, Veterinary Council of India and the Bar Council of India have code of ethics and the professionals are expected to swear by it (Rao, 1999, p. 2). The Medical Council of India, the Bar Council of India and the Veterinary Council of India have codified ethics codes which are enforced since several decades.

Most of the teachers' organisations in India are regional or institutional in nature. The only two teachers' organisations having a national

character at present are the All India Federation of University and College Teachers' Organisation (AIFUCTO) and the Federation of Central Universities Teachers' Associations (FEDCUTA). AIFUCTO is a much bigger organisation, and unlike FEDCUTA which only represents the Central (government) universities teachers' associations, it represents the very large number of State universities and other institutions of higher learning. For the academic profession as a whole, the All India Federation of University and College Teachers Organisation (AIFUCTO) adopted a note on 'Code of Professional Ethics' in its meeting held in Calcutta in November, 1976 and the Federation agreed in principle that "in keeping with their noble profession teachers of colleges and universities in India should observe a code of professional ethics" (UGC, 1986, P. 135).

The Code of professional ethics proposed by AIFUCTO made introductory remarks in the Note that

"The Governments, the universities and college authorities have to create such congenial conditions as would enable the teachers to properly observe the code of professional ethics and give of their best in discharging their professional responsibilities. It should further be noted that some objective code of conduct should be formed for each of the other components of higher education i.e. the university authorities, the college authorities, the Education Department and the Directorate of Education of the Government, the students and the non-teaching staff. Unless these codes are framed and observed simultaneously, observance of a code of professional ethics by teachers in isolation is hardly possible and will fail to yield the desired result i.e. improvement of higher education (Ibid, 1986, p. 135).

Report of the National Commission on Teachers in Higher Education 1985 (Rais Ahmed Commission Report) pointed out that teachers at higher education in India ought to have some elements as professional groups. They are (1) emphasis on principle (2) rationalism (3) sensitivity to environment freedom and equality (5) respecting cultural differences and intervention in the making of History. As to professional values the National Commission for Teachers in Higher Education listed the following:

- ❖ Acquisition, transmission and addition of new knowledge
- ❖ Social relevance of Knowledge
- ❖ Extension-organic links with community
- ❖ Continuous renovation and innovation with the growing irrelevance of some knowledge.
- ❖ Decolonisation of the Third World mind
- ❖ Cultivation of excellence
- ❖ Importance of freedom to collaborate and work together.
- ❖ Importance of. freedom to work together
- ❖ Critical awareness and articulation of the tradition
- ❖ A social consciousness unafraid to undertake social criticism
- ❖ Problem solving approach and emergence of new social order

Moreover, the Report of the National Commission on Teachers in Higher Education pointed out that teachers are more concerned with lower order of Maslow's need that is security value - better material condition, higher salary, promotional facilities etc. It also mentioned the factors repugnant to professional ethics - (i) Earning money by publishing bazaar notes, (iii) Teaching on the basis of notes prepared long ago, (v) Dictating notes instead of teaching, (vi) Giving higher or lower grade by way of favouritism, (viii) Skipping classes without leave, (x) Undertaking tuitions to earn money, (xi) Instigating students against another colleague or group of colleagues.

In this context, the Mehrotra Committee 1986 (Report of the Committee on Revision of Pay Scales of Teachers in Universities and Colleges) also considered what should be the content of a code of professional ethics for teachers. It noted with satisfaction that teachers' associations have been concerned on this point. Obviously, a code of professional ethics will cover an altogether wider context and the teaching community as a whole will have to take the responsibility of enforcing it (UGC, 1986, para. 5.10.3). Regarding the code

of ethics, the Committee was obliged to the All India Federation of University and College Teachers (AIFUCTO) for suggesting a model with which it was in general agreement.

Later, University Grants Commission (UGC) in collaboration with AIFUCTO (All India Federation of University and College Teacher Organization) formed a 14-member task force, which has prepared a code of professional ethics for the University and College teachers (UGC, 1989). The Report of the Task Force on Code of Professional ethics for University and College Teachers adopted by the commission was sent to all the University Vice-Chancellors and College Principals for its implementation. The preamble to the code reiterated that the goal of higher education in our country is to produce leaders of society and economy in all areas of manifold activities, with a commitment to the ideals of patriotism, democracy, secularism, socialism, and peace. Higher education should strive for academic excellence and progress of arts and science. This did not have an adequate section on teachers' rights, but did have a brief statement – "Teachers should enjoy full civic and political rights of our democratic country. Teachers have a right to adequate emoluments, social position, just conditions of service, professional independence and adequate social insurance" (UGC, 1989, p. 1). The code of professional ethics for teachers in higher education institutions were enlisted in seven parts —(i) Teachers and their responsibilities; (ii) Teachers and the Students; (iii) Teachers and colleagues; (iv) Teachers and authorities; (v) Teachers and non-teaching staff; (vi) Teachers and guardians; and (vii) Teachers and Society as a whole. There were total thirty-eight (38) ideals related to the guidelines for a teacher's professional behaviour. Evidently it was initially conceived as guidance for good practice, with some concern for teachers' rights. In addition to that, this code didn't have any articulation regarding initiating disciplinary action if the code is not adhered to by the teachers in higher education institutions.

This bold initiative on the part of the UGC has by and large remained ineffective even though the National Policy on Education (NPE) 1986 categorically stated that 'the process of introducing discipline into the system will have to be started, here and now, in what exists (para. 7.1.)". This policy statement implies that there is an urgent need to stem indiscipline in the teaching profession. Again the NPE 1986 recommended that "Teachers' associations must play a significant role in upholding professional integrity, enhancing the dignity of the teacher and in curbing professional misconduct. National level associations of teachers could prepare a Code of Professional Ethics for Teachers and see to its observance" (para. 9.3). The code of Medical Ethics evolved by Medical Council of India is also similar except that there is an additional provision for initiating disciplinary action if the code is not adhered to by the professionals (Rao, 1999, p. 4).

UGC is now more concerned with promoting academic excellence, raising academic standards, readiness to reform and innovate by recommending drastic improvement in service conditions, higher pay and professional avenues for personal growth, like new CAS (Career Advance Scheme). The UGC is of the view that by providing a highly motivated package the teachers in higher institutions would be able to inculcate a sense of professionalism among the teachers. Recently, UGC Regulations on Minimum Qualifications for Appointment of Teachers and Other Academic Staff in Universities and Colleges and Measures for the Maintenance of Standards in Higher Education 2010 and 2018 reiterated a code of professional ethics under the domains of (i) Teachers and Their Responsibilities,

(ii) Teachers and the Students, (iii) Teachers and Colleagues, (iv) Teachers and Authorities, (v) Teachers and Non-Teaching Staff, (vi) Teachers and Guardians and (vii) Teachers and Society. Surprisingly, all the regulations didn't mention any disciplinary action if the code is not adhered to by the professionals.

If we look at the school education, we will find a difference in terms of inclusion of mechanism to deal with non-observance. The Right of Children to Free and Compulsory Education Act came into force from 1st April 2010. In view of the provision 24(1) of RTE Act, 2009

regarding duties and functions of teachers, NCTE under the direction of the Ministry of HRD developed a Code of ProfessionalEthics of Teachers (draft) in 2010 in consultation with World Bank, All India Primary Teachers Federation (AIPTF) and some State Governments. This bold initiative on the part of the NCTE has also remained ineffective in terms of operation even after the implementation of the RTE Act more than one decade.

Implementation Issues: Constraints and Loopholes

The codes of professional ethics have been framed, no doubt, with lofty ideals several times for teachers both in school education and higher education institutions in India after independence. But, the crux of the problem is in their implementation. If we scrutinise all the codes, we will notice few constraints and loopholes in the methodology of their implementation.

Firstly, the codes of professional ethics for teachers in higher education institutions are silent on procedural mechanism to deal with non-observance. Surprisingly, all the UGC regulations on minimum qualifications for appointment of teachers and other academic staff in universities and colleges and measures for the maintenance of standards in higher education did duly mention code of professional ethics with lofty ideals but didn't attach any disciplinary action taking mechanism if the code is not adhered to by the professionals.

Secondly, the highest apex body of higher education in India, that is, UGC frames codes of professional ethics time to time in consultation with teachers' organizations at national level. If UGC adopts the methodology for implementation developed by the professional bodies such as the Bar Council of India, the Medical Council of India, the UGC would not be able to handle the magnitude of numbers amounting to 14.16 lacs teachers working in 39931 colleges and in 993 universities for 3.73 crore students in India (AISHE, 2018-19). The single national level body like UGC has no capacity enough to deal with non-observance the procedural mechanism due to the magnitude of numbers. This calls for establishment of State Councils. The State Councils of Higher Education have been established by some States in India but they do not, as yet, have the responsibility to enforce the code of conduct by law (Rao, 1999). Depending on the type of misconduct and its impact on the academic institution and social fabric appropriate punishments have to be defined.

The other alternative is for the individual institutions to evolve their own codes of conduct. There are so many institutions have evolved codes of conduct but find it extremely difficult to enforce the same. The reasons may be several but the institution's lack of will to enforce the code is the foremost one. In India all the teachers' organizations claim that they are apolitical in nature and teachers' interest and rights are their foundations. In reality, most of the teachers' organizations are developed and backed by political ideology. The political inference with vested interest within the disciplinary action taking mechanism is totally detrimental to the proper implementation at any level.

In the landscape of Indian education there has been found a gap between policy and implementation. Even though the guidelines based on the Report of the Task Force on Code of Professional ethics for University and College Teachers were accepted for adoption by the University Grants Commission, and communicated to all Universities in the country more than three decades ago, its implementation has not been proper. The NPE 1986 duly reiterated that "teachers will continue to play a crucial role inthe formulation and implementation of educational programmes. Teachers' associations must play a significant role in upholding professional integrity, enhancing the dignity of the teacher and in curbing professional misconduct. National level associations of teachers could prepare a Code of Professional Ethics for Teachers and see to its observance" (Government of India, 1986, para. 9.2 & 9.3). Inference can easily be drawn that implementation at any level has not been successful due to sheer lack of will, motivation and commitment among the teaching

community, teachers' organizations and policy makers and educational bodies.

Ethics mechanism in institutions of higher learning always centres around teachers and researchers. The Vice-Chancellor of the university, the other administrators, technical and supporting staff, academic administrators in the directorate of education responsible for administration of universities and other academic institutions of higher learning. Moreover, parents, students and local public representatives are also the people who are involved and play important roles in the administration and functioning of the institutions. It is not that teachers alone are responsible for the protection of academic standards and norms of behaviour in academic institutions. Why the others who are involved functioning of the institutions from top to bottom should not be evaluated under the scanner of any code of conduct. Should they also not have codes of conduct? This crucial aspect has been often ignored. Probably, that's why implementation of the code of professional ethics for teachers isconsistently ignored. Top-to-Bottom Approach may be taken for consideration. The other important functionaries of academic administration such as the Deans, Directors of Instruction, Registrars, and Principals and so on should be brought under the code to protect the values and ethics associated with the institutions. Moreover, the students as well as their parents who have an important stake in the functioning of academic institutions should also be bound by code of ethics. The parents particularly should intervene and correct the behaviour and attitude of their wards if they are found to be responsible for disturbing campus peace (Ibid, 1999).

Implementation: Means and Ways

1) The code of professional ethics should be formulated in cooperation with all the teachers Organisations at national level and must have a sound implementation device with at least three- tier mechanism at national level, state level and institutional level. After all, the Disciplinary Committees are manned by teachers and their decision related to professional misconduct should be accepted. This concept has to be instilled in the minds of the Teachers by the Professional Organisations representing the Teachers interest.

2) Another strategy can be adopted to implement the code of professional ethics by using a sound Annual Performance Based Appraisal Methodology under Career Advancement Scheme (CAS) Promotions for Teachers in Colleges and Universities. But the performance appraisal under CAS has no room for evaluation done by students. The National Policy on Education (NPE) 1986 duly hinted at this system that "a system of teacher's evaluation - open, participative and data-based - will be created and reasonable opportunities of promotion to higher grades provided. Norms of accountability will be laid down with incentives for good performance and disincentives for non- performance (Government of India, 1986, para. 9.2). The Task Force Report also reiterated that "The record of evaluation made by the teachers and verified by the institutions will be an open document which should be the basis of recognition of excellence in performance as well as for further improving the overall efficiency of the system" (UGC, 1989). However, peer-review and evaluation by students need to ensure objectivity in this system. The mechanism provides for a valuable feedback assisting in improving the performance of the teachers.

3) The Governments, political functionaries associated with the running of the Government, administration responsible for funding of universities and the citizens in general should also conform to codes of conduct, the most important of them being non-interference in academic matters (Rao, 1999).

4) In the proper implementation of the code of professional ethics or code of conduct, teachers need to undergo orientation and deepen their understanding about the gravity of the lofty ideals embedded in the code.

5) The Code should also contain a section on rights of teachers since in more senses than

one, rights and responsibilities are inalienable (A Note by the AIFUCTO, 1976 Cited in the Mehrotra Committee 1986). Code should not contain any section which may curb the creative freedom of teachers. Code should not be a violation of basic human rights.

6) The institutions governed by codes of conduct and ethics, written or un-written, administered by academicians of repute, enjoying autonomy are not being subjected to political influences and activities of pressure groups are the ideal ones. It is the bounden duty of all the stake holders to stick to code of ethics and prevent degeneration of academic institutions (Rao, 1999).

7) A code of professional ethics should be developed by professional national level teachers' organization in consultation with institutions of higher education and mechanism evolved for ensuring its observance. UGC should provide a forum to national level teachers' organizations to develop norms for teacher appraisal, teacher accountability and code of professional ethics and mechanism evolved for observance of the norms.

8) Successful implementation activities include workshops on ethics and rights of educators, acollectively developed, detailed handbook about the code, copies provided for all teachers, part of broader discussions versus isolated discussion of the code, government statements to support the code, and collaboration with national, institutional, local and individual stakeholders (for instance teacher education institutions, teacher unions, schools, and administration) (Nuland, 2009, pp. 7-8

Concluding Remarks

The rapid developments in science and technology and the challenges of globalization are posing additional challenges to the education system in the country. This is also the time when parental care to the children is on the wane. The adverse effects of the media on the mental development and moral values of the younger generation are being felt increasingly in all spheres of life ... while the education system needs to keep pace with the scientific and technological developments in terms of building the skills and knowledge, it also needs to address the more fundamental issues of the social and moral consequences of such unregulated activities. In this context, there is now a growing demand to lay greater emphasis on education to inculcate, nurture and develop values, particularly among the youth of the country (UGC, 2003).The unique power of higher education in shaping the destiny of individuals, societies and nations is well known. The obligations imposed on the teachers are, therefore, heavy. The Society expects ethical behaviour of highest order from certain sections of citizens. Teachers, researchers and administrators associated with institutions of higher learning are amongst them.

Professional competence is of little value if professional ethics are forgotten. Each University should evolve its own professional ethics after full discussion in the academic bodies and associations and incorporate the same in its Acts, Ordinances and/or Statute, as the case may be, for strict observance by the academic faculty. Self appraisal and regulation are generally the accepted norms for persons associated with academic institutions for maintenance of high ethical standards. The teacher's organisations in India should not always fulfil union type function. They should be more concerned with quality of working life than with issues concerned with profession. The institutions, teachers, students, parents and politicians, worldwide, have a crucial role in evolving ethical standards based on the traditional values and our constitutional ideals. To sum up, it can be stated that like all other professions, the teaching profession should also move towards self regulation, which implies that every teacher should have the inner urge to adhere to the ethical principles embedded in the code of professional ethics for teachers.

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CRITICAL STUDY ON THE BUYING BEHAVIOUR OF RURAL AND URBAN CONSUMERS TOWARDS MOBILE PHONES IN INDIA

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ABSTRACT

The present study aims to examine the comparative buying behaviour of rural and urban counterparts towards the purchase of mobile phone. To achieve these objectives an attempt is made to compare and analyze the factors (Price, Quality, Style, Functions and Brand) which act as motivators both for rural and urban people in purchase of mobile phone. A structured questionnaire was prepared using the 5-point Likert scale that was administered to 400 mobile users /respondents for obtaining primary data from both urban and rural consumer of Ganjam district of the state of Odisha, India. The present study indicates that there is no significant difference of price and style consciousness for purchase of mobile phone between rural and urban consumers but there is significant difference of quality, functions and brand consciousness for purchase of mobile phone between rural and urban consumers. Study indicates that rural consumers are less quality, functions and brand conscious as compared to their urban counterparts. The study indicates that rural consumer mostly use friends (45%), TV(17%) and mobile phone retailer(12%) as the source of information, the purchase decision is taken by self decision(52%) with the help of family (29%) and friends (18%) and most of rural consumers are satisfied (84%) in Ganjam District. Further, the research findings may guide various mobile manufacturing companies about modification required in present marketing strategies applied for tapping urban markets and to decide, if possible, and to what extent these strategies can be moulded and applied successfully to the rural markets.

Introduction

The Indian consumer market (rural and urban) represents a huge demand base, by offering a vast opportunity for the existing and emerging companies. The Indian market is still not exploited fully and is regarded as one of the fastest growing in global economy. This lures more number of domestic and foreign companies to venture into Indian market opportunity. An urban area as per the Census of India is defined as "all places with a municipality, corporation cantonment or a notified town area" and "All other places satisfying the following criteria:

"Minimum population of 5000 ; At least 75 percent of male working population in non-agricultural pursuit; and Density of population is at least 400 persons per square kilometer." Therefore, an area that does not satisfy the criteria specified above can be considered as a rural area (as there is no official definition for an area which could be called as a Rural area). In this paper, we define rural marketing as any marketing activity in which one dominant participant is from a rural area. For the purpose of defining the domain of rural marketing, "rural" and "urban" can be visualised on a continuum consisting of three broad groups, namely, rural, rurban (the overlap between rural and urban, with physical features closer to urban areas and proximity to large urban centres, but with deep rural sociological moorings) and urban. The domain of rural marketing, thus can be seen in a two dimensional space as a flow of goods, services, and ideas from one area to another, except in the case of urban to urban flow.

A complex set of factors influence rural consumer's behaviour. Social norms, traditions, caste, and social customs have greater influence on the consumer behaviour in rural areas than in urban areas. The seasonality of agricultural production influences the seasonality of rural consumer's demand. Given the fact that the landless labourers and daily wage earners get their income in instalments, their purchasing is restricted to small quantities of products at a time, mostly on a daily basis or once in two or three days. (Jha Mithileswar 2007) .A farmer in rural Punjab is more progressive than his counterpart in Odisha, a farmer in Karnataka is far more educated that one in Bihar, and so on and so forth. In an urban family, the husband, the wife and others even the children are involved in the buying and purchase decision making process. Urban individuals are free to

take independent purchase decisions. However in a village, due to cultural/social/traditional practices men are the prime purchase decision makers. The urban population is more exposed towards the advertisements and technological developments as compared against their rural counterparts.

Domestic as well as MNCs and foreign marketers are focusing more on rural India, where there are areas, which are not exploited fully. The 740 million potential consumers and 6,30,000 villagers in rural Indian make up for 41 percent of India's middle – class and 58 percent of the country's total disposable income. Little wonder then that almost all of corporate India is falling head over heels to reach out to rural India, which can add substantially to their bottom lines.

Motivation for present Study

The present study aims to examine the comparative buying behaviour of rural and urban counterparts towards the purchase of mobile phone. A comparative study is needed to assess the similarities and differences between buying behaviour displayed by both urban and rural consumers with regards to mobile phone. Further, the research findings may guide various mobile manufacturing companies about modification required in present marketing strategies applied for tapping urban markets and to decide, if possible, and to what extent these strategies can be moulded and applied successfully to the rural markets. To achieve these objectives an attempt is made to compare and analyze the factors (Price, Quality, Style, Functions and Brand) which act as motivators both for rural and urban people in purchase of mobile phone.

Objectives of the Study

This paper is an attempt to explore the motivational factors for mobile purchase in view of the emergence of vast opportunities for rural markets. The present study aims to examine the comparative buying behaviour of rural and their urban counterparts towards the purchase of mobile phone. A comparative study is needed to assess the similarities and differences between buying behaviour displayed by both urban and rural consumers with regards to mobile phone.

The specific objectives of the study are:

1. To examine the Sources of Information considered.
2. To examine the role of Family Members in influencing brand choice.
3. To examine Consumer Satisfaction.

Hypothesis Development Based on Literature Survey

The study attempts to compare and analyze the motivational factors for purchase of mobile phone among rural and urban consumers. The motivational factors selected for purchase of mobile phone are: Price, Quality, Style, Functions and Brand.

Following Hypotheses are tested:

1. **H1:** There is no significant difference between rural and urban consumers regarding mobile phone on "Price Consciousness."
2. **H2:** There is no significant difference between rural and urban consumers regarding mobile phone on "Quality Consciousness."
3. **H3:** There is no significant difference between rural and urban consumers regarding mobile phone on "Style Consciousness."
4. **H4:** There is no significant difference between rural and urban consumers regarding mobile phone on "Functions Consciousness."
5. **H5:** There is no significant difference between rural and urban consumers regarding mobile phone on "Brand Consciousness."

Literature Review

Ananda & Hundal, B.S. (2007) examined the comparative buying behaviour of rural and their urban counterparts towards the purchase of refrigerator. The factors considered by them: item of necessity, symbol of social status, advertising influence, brand reputation and time saving device (Punjab) .Gupta (1987) examined the factors motivating consumers to buy durables, the factors considered by them in making brand choice: source of information

considered, role of family members in influencing brand choice and to examine consumer satisfaction (Amritsar city) .Chirag V. Erda made a Comparative Study on the buying behaviour of rural and urban consumers on mobile phone (Ganjam District) . Shanthi, R. (2005) examined the Perceptual Dimensions of Brand Associations with reference to mobile Users (Chennai City) . Shashi Kumar Sharma, L & Chaubey, D.S. (2007) assessed the consumers' awareness and their attitude toward different mobile service providers operating in Lucknow.

Research Methodology

For the purpose of the study, both the rural and urban consumers are asked to rate the five mobile phone purchase motivators (price, quality, style, functions and brand) on 5-point Likert (importance) scale for, mobile phone: Extremely important (5), Somewhat important (4), Neither important nor Unimportant (3), Somewhat important (2) and Extremely unimportant (1), appendix-3). For the purpose of testing Hypothesis, the scores is averages and standard deviation is calculated, the Z - Test is used to test the Hypothesis, (appendix-2). Additionally, percentage analysis is used to analyze the sub-objectives: source of information, Role of family indecision making and Consumer Satisfaction (appendix 1). The Z - Test is a parametric test to determine the statistical significance between a sample distribution mean and population parameter. The Z - Test is selected as parametric tests are more powerful because their data are derived from interval and ratio measurements. The Z - Test is used for two independent samples, large sample size and two tailed test. (Appendix - 2)

The Assumptions Made:

1. The random sampling distribution of a statistics is approximately normal.
2. Values given by the samples are sufficiently close to the population value and can be used in its place for calculating the standard error of the estimate.

The present study is mainly based on primary data. The mobile phone consumers belonging to both rural and urban areas of Ganjam District (Odisha) India are examined.

1. Data Source: The present study is mainly based on primary data from Ganjam District.
2. Research Approach: Survey Research.
3. Research Instrument: Questionnaires both in English and Odia.
4. Sample Size:

1. Sampling Unit: Data collected from users of mobile phone from Ganjam District
2. A sample of around 400 mobile users. 200 each from rural and urban areas from Ganjam District Is selected.
3. Sampling Procedure: In Ganjam District there are 22 blocks, Rural and Urban sample are selected on Judgment and Convenience basis.
4. Data Analysis: For the purpose of study, both the rural and urban samples were asked to rate the five mobile phone purchase motivators (price, quality, style, functions and Brand) on 5 – point Likert (importance) scale for mobile phone. The Z- Test is used for analysis.

Data analysis and Discussion

Following is the summarized result from analysis of data.

Demographic Profile

The demographic data (Table I) indicates that, Most of the respondents of rural sample fall in the age category of 20 - 30 years (37%) and of urban sample fall in the age category of 20-30 years (47%)

84% of rural sample belong to male and 16% belong to female while in urban sample 52% belong male and 48% belong to female.

Educational profile of the rural sample indicates that most of the respondents are under graduate (60%) in urban sample too most of the respondents are under – graduate (59%)

Occupation profile of the rural sample indicates that most of the respondents are from service (36%) while in the urban sample most of the respondents are from students (other) (55%)

Income profile of the rural sample indicates that most of the respondents are having monthly family income between Rs. 5,000/- to

10,000/- (48%), while in the urban sample most of the respondents are having monthly family income Rs.10, 000 and above (65%).

Mobile phone used

Information pertaining to the mobile phone used (Table II) indicates that in rural sample most of the respondents are having Nokia Phone (71%) and in urban sample too most of the respondents are having Nokia Phone (68%)

Source of Information

The received information pertaining to sources of information (Table III) indicates that most of the respondents use Friends (rural-45%, urban-34%) followed by T.V. (rural-17%, urban-22%), mobile phone retailer (rural-12%, urban-19%) and News Paper (rural-11%, urban- 12%) as sources of information to purchase mobile phone.

Purchase Decision

Information regarding Purchase Decision (Table IV) indicates that most of the respondents from rural sampletake self decision only (52%) even more than urban sample (43%), followed by family help(rural-29%, urban-41%) and friends help (rural-18%, urban -13%) to make the purchase decision of mobile phone.

Customer Satisfaction

Respondents are asked whether they recommend their mobile phone to a friend, it is assumed that positive answer (yes) will indicate satisfaction and negative answer (no) will indicate dissatisfaction (it is important to note that there are so many factors affect to the level of satisfaction and dissatisfaction.)

The received information pertaining to consumer satisfaction (Table V) indicates that most of the respondents are satisfied (rural-84%, urban- 91%), yet few are dissatisfied (rural-16%, urban- 9%) through the reasons are not known.

The Motivational Factors

The calculated value of Z- Test statistics at 5% level of significance indicates the following findings

The difference between Price consciousness of rural and urban sample for purchase of mobile phone in Ganjam District is not significant.

The difference between Quality consciousness of rural and urban sample for purchase of mobile phone in Ganjam District is not significant.

The difference between style consciousness of rural and urban sample for purchase of mobile phone in Ganjam District is not significant.

The difference between Function consciousness of rural and urban sample for purchase of mobile phone in Ganjam District is not significant.

The difference between Brand consciousness of rural and urban sample for purchase of mobile phone in Ganjam District is not significant.

The present study indicates that there is no significant difference of price and style consciousness for purchase of mobile phone between rural and urban consumers but there is significant difference of quality, functions and brand consciousness for purchase of mobile phone between rural and urban consumers. Study indicates that rural consumers are less quality, functions and brand conscious as compared to their urban counterparts. The study indicates that rural consumer mostly use friends (45%), TV(17%) and mobile phone retailer(12%) as the source of information, the purchase decision is taken by self decision(52%) with the help of family (29%) and friends (18%) and most of rural consumers are satisfied (84%) in Ganjam District.

Limitation of the Study

The present study is confined to Ganjam District only and the findings may not be applicable to the other states of the country because of socio-cultural, consumer preference, spendable income and other differences. Again consumer behaviour, preference, and technology being dynamic in nature, there is every possibility that over time and space findings of today may become invalid tomorrow.

Conclusion

In order to utilise the immense potential of rural market in India, companies need to

develop specific marketing strategies and action plans taking into account the complex set of factors that influence consumer's behaviour.

Rural marketing cannot succeed if the marketing strategy and action plans are only extrapolation or minor modification of the urban marketing strategy and plans. Innovative companies who adopted an integrated of the urban marketing strategy and plans. Innovative companies who adopted an integrated approach have succeeded in utilizing market opportunities that rural areas offer.

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PSYCHOLOGICAL WELL-BEING AND PERCEIVED SOCIAL SUPPORT AMONG KASHMIRI STUDENTS

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ABSTRACT

The present study was a cross-sectional study. The main aim of present study was to explore the significance psychological well-being among college studentsof Kashmir valley. The data were collected from students 480 students from various degree colleges of Kashmir (18-24 years old age). The data was analayzed by computing Pearson's correlation to test the relationship between study variables. The main intent was to estimate relationship between perceived social supportwith psychological well-being. The psychological well-being questionnaire and perceived social support questionnaire were administrated. Results demonstrated that there was significant difference was found on the basis of gender, area of residence and family monthly income. Findings also indicated that there is a perceived social support is positively correlated with psychological well-being.

***Keywords**: Psychological well-being, Perceived social support, College Students Kashmir.*

Introduction

The Psychological well-being is a multi-dimensional concept it includes various ,aspects such as optimism, self-control, happiness, sense of interests, free of failures, anxiety and loneliness have been considered as the special aspects of well-being) (Bordbar et al., 2011). Psychological well-being is essential concern to lead a happy productive life. Psychological wellbeing is a multidimensional concept that cheerfulness, optimism, playfulness, self-control, a sense of detachment and freedom from frustration, anxiety and loneliness are indicators of psychological well-being (Sinha and Verma, 1992). Psychological dimension of well-being is the combination of positive affective state such as happiness and functioning with optimal effectiveness in individual and social life (Amalu, 2018). There are several factors which are responsible for various psychological problems associated with low psychological wellbeing and other aspects of mental health issues such as, Depression. Anxiety, PTSD, Drug abuses and behavioural disorders. The aim of current study was to enhance positive constructs among the college students such as perceived social support and psychological well-being among Kashmiri college students.Psychological well-being is about lives going well. It is the combination of feeling good and functioning effectively (Ryff& Singer, 2008). Psychological well-being is, however, compromised when negative emotions are extreme or very long lasting and interfere with a person's ability to function in his or her daily life. The concept of functioning effectively involves the development of one's potential, having some control over one's life, having a sense of purpose (e.g. working toward a specific goal), and experiencing positive relationship Psychological well-being is, however, compromised when negative emotions are extreme or very long lasting and interfere with a person's ability to function in his or her daily life.

Perceived social support refers to the process of getting support from institutions and people around us such as family, friends and neighbours. Social support can improve psychological well- being and help in affective, physical and cognitive aspects of individual development. Also, it fulfils individuals' physical and psychological and social needs through self-esteem, loyalty, love and the sense of belonging to a group (Panahi, 2016). The term "Social Support" is defined as "the perception or experience that one is loved and cared for by others, esteemed and valued, and part of a social network of mutual assistance and obligations.(Dar & Dar, 2021)Social support is an essential factor which encourages positive behaviours and contributes to positive outcomes of mental health and wellbeing in response to life crisis or at the times of

adversity in the form of friends, family and the community at large. It plays a vital role in bringing positive psychological changes in the individual that are essential for the maintenance of their mental health.(Dar & Dar, 2021)

Objectives

1.To find out the significant differences among socio-demographic variables with to psychological wellbeing among college students.
2. To examine relationship between psychological wellbeing with perceived social support among college students.

Hypotheses

1.There will be a significant difference in psychological well-being of college students' demographic variables across gender, age, area of residence and monthly family income.
2. There will be asignificant relationship of social support with psychological well–being of Kashmiricollege students.

Methods

Design

A cross-sectional correlational research design was followed in the current study. For data collection purposive sampling was used in the present study.

Sample

A sample of 480 college students (male 230 and female 250) wasparticipated in this study. The research participants were taken from different colleges of Kashmir, from November 2019 to January 2020, by using a purposive sampling method. The participants were recruited from undergraduate courses, irrespective of the educational stage of the students in the institution. During the process of data collection, available students in the institutions were recruited based on their voluntary consent and participation as subjects in the current study.

Procedure

The institutional authorities (Principals in the Colleges) were approached before the process of data collection and approval was obtained from them to collect data from enrolled students. Further, students were approached and the objectives of the study were briefed to them. They were also briefed about their rights as study subjects. Furthermore, a consent form was provided to all the participants and they were requested to sign on the same before taking part in the study. Participation in the study was voluntary. The participant's took15–25 min to respond to the questionnaires.

Measures

Meanwhile the medium of instruction in colleges is English.Therefore all the measures of this study were distributed among the participants in English to collect the data. The description of each of the measures is provided as follows:
Instruments used in this study were as follows:

Demographic questionnaire The Socio-demographic information of the participants was recorded with the help of a background information questionnaire such as, gender, age, area of residence monthly family income of the participants, For instance, the participants were asked: "What is your age" (18–21 years or 22–24 years), "What is your gender" (male or female) "What is your monthly family income, below <10000 INR and above 10000 /INR> ,area of residence etc.

Psychological well-being scale (PSBW) developed by Ryff's and Keyes (1995 to determine the psychological well-being levels. It has 42 items in 6 factors. It is a 6 point Likert scale type scale .it has six sub scales exposure to among the participants, The Ryff's Scales of Psychological Well-Being is a theoretically sound instrument that focuses on measuring multiple aspects of PWB (SPWB, Ryff's, 1989).: Psychological Well-being Scale Ryff's designed Psychological Well-being Scale (1989) with six dimensions: Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, and Self - Acceptance. This forty-two-item scales consisted of statements like, "My decisions are not influenced by what everyone else is doing", "In many ways, I feel disappointed about my achievements in life", "I like most aspects of my personality". The subject's responses were recorded using a six-point Likert scale from Strongly Agree to Strongly Disagree. The higher scores on each

dimension showed the greater Well-being on that dimension. This scale showed significant reliability and validity in the researchers reported from different countries. The overall Cronbach's alpha is 0.88 and had high internal consistency. In the present scale six alternatives response have been given to each statement I.e. strongly disagree, moderately disagree, slightly disagree, and slight agree, moderately agree and strongly agree. Positive items are scored as 1, 2, 3, 4, 5 and 6 and negative items are reversed scored i.e. 6, 5, 4, 3, 2 and 1.

Multidimensional Scale of Perceived Social Support (MSPSS): The MSPSS developed by Zimet et al. [29] in 1988, was used to assess the perceived social support among respondents. There are 12itemsin MSPSS which are rated on a 7-point Likert scale. The response of the scale items ranges from 1 meaning "strongly disagree" to 7 meaning "strongly agree". The score on MSPSS ranges from12 to 84. The reliability of MSPSS was obtained with the help of Cronbach's alpha coefficient that was ascertained to be 0.85.

Data analysis

The description of analysis followed in the study is provided as follows: Descriptive analysis was carried out by using frequency, percentage, mean, SD, range. Inferential analysis was conducted with help of correlation and t-test.

Table-1 Demographic detail of the participants (*N* = 480)

Variable	N	Percentage
Gender		
Male	230	47.9
Female	250	52.1
Age		
18 to 21 years	251	52.3
22 to 24 years	229	47.7
Area of residence		
Rural	282	58.8
Urban	198	41.3
Monthly family income		
Below 10000	255	53.1
Above 10000	225	46.9

Table1 shows the demographic details of the participants (*N* = 480) in which more than half of them were females 250 (52.1%) and less than half were males 230 (47.9%). Most of the student's i.e. 251 (52.3 %) of the respondents were aged 18 to 21 years while 229 (47.7 %) were aged 22 to 24 years. Regarding residence 282 (58.8%) belonged to rural areas whereas 198 (41.3%) belonged to urban areas. More than half of sample 255 (53.1%) had monthly income of below 10000 rupees and less than half 225(46.9%) had monthly income of above 10,000 INR.

Table- 2 Description of psychological well- being (*N* = 480)

Variable	Actual range	Possible range	Mean	SD
Psychological well- being	112-212	42- 252	156.16	14.54
Perceived social support	16-83	12-84	59.11	15.53

Table -2. Indicates the actual range, possible range of scores, mean scores and standard deviation, of study variables. The actual score ranges of psychological well -being was (112-212) followed by possible range (42 -252) and mean standard deviation (M= 156.16, SD =14.54). The actual score ranges of perceived social support was (16-83) followed by possible range (12- 84) and mean standard deviation (M= 15.11, SD =15.53).

Table-3 Showing mean, SD, t-value and level of significance of participants with psychological well -being on the basis of gender. age,area of residence monthly family income

Psychological well- being	Group	N	Mean	S.D	t-value
Gender	Male	230	154.33	14.28	-2.667**
	Female	250	157.85	14.60	
Age	18- 21 22-24	251 229	155.97 156.38	4.23 13.13	-.304
Area residence	Rural Urban	282 198	158.07 153.45	15.90 11.87	3.465**
Monthly family income	Below 10000 Above 10000	255 225	156.86 155.37	15.38 13.52	1.119

*Note: *p< 0.05, ** p <0.01*

Table-3 depicts the mean SD, t- value in terms of psychological wellbeing, with respect, gender age, area of residence and monthly familyincome. The result shows that the Mean, SD, of male (M= *154.33.56, SD =14.28),* female mean, SD (*M= 157.85, SD = 14.60).*The obtained t value was *(*-2.667**).A significant difference was found on the basis of gender hence proposed hypothesis was retained. Regarding the age the result of study revealed that no significant difference was found , the Mean ,SD of 18- 21yeas were (M= 155.97, SD= 4.3)and 22-24 yearswere (156.38, SD= 13.13). Similarly a positively significant difference was found with respect to area of residence the Mean SD, of rural area (158.07, SD= 15.90) and urban mean (153.45, SD=11.87). The obtained t value was *(*-3.465**). Thus alternative hypotheses were accepted. In addition to this theMean, SD, of participants having monthly income below 10,000was(M= 156.86, SD=15.38) and above 10,000 (155.37, SD = 13.52).

Table- 4. Correlation of perceived social support with psychological well- being

	AUNTY (*r*)	EM (*r*)	PG (*r*)	PR (*r*)	PIL (*r*)	SA (*r*)	PSWB (*r*)
Perceived-social support	.222**	.115*	.000	.215**	-.102*	.100*	.148**

*Note: *p*< 0.05 and **p*< 0.01

Results demonstrated that perceived social support has significantly positive correlation with autonomy (*r=.222**, p<0.01),* environmental mastery *(r=.155*, p<0.005),*positive relations *(r=.215**, p<0.01),* self-acceptance *(r=.100*, p<0.005),*however significant others it was negatively correlated with purpose in life *(r=-.102*, p<0.05)* respectively. Simultaneously perceived social support is positively correlated with psychological wellbeing (*r=.148**, p<0.01*).

Discussion

The findings of the current study indicated that female college students have better psychological well- being as compared male counter parts. The objectives of the present study were achieved successfully and hypotheses verified.Similarly a positively significant difference was found with respect to area of residence. Thus alternative hypotheses were accepted. Regarding the age the result of study revealed that no significant difference was found.With respect to income above 1000 participant have better psychological -well-being as compared below 10000 monthly income participants.The findings of the current indicated that Perceived social support has significantly positive correlation with psychological well- being respectively.

Conclusion

To conclude the relationship of psychological well- being was validating in this study. Findings of present study conclude that perciveied social support is a protective factor of psychological well-being which is help full college students. Therefore improving perceived-social support will boost student's personality development to achieve their goal and youth promote their psychological well-being.

Conflict of interest

The author (s) declared no conflict of interest.

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MENTAL HEALTH AND SELF-EFFICACY AMONG COLLEGE STUDENTS OF KASHMIR

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ABSTRACT

The present study assessed the mental health of college students in Kashmir. A cross-sectional study was conducted on 480 students in the 18-24 years old age group. The students were recruited from various colleges of Kashmir valley. The Mental Health Inventory and General self-efficacy scale was administrated. The data was analysed by computing Pearson's correlationto test the relationship between study variables. The main intent was to estimate the relationship the relationship of self-efficacy with mental health and differences among mental health.Results illustrated that no significant difference were found on mental health with regard to demographic variables. The findings revealed that self-efficacy had a positive correlation with mental health. The role of self-efficacy in enhancing mental health was validated in the present study. Therefore findings suggest the need for enhancement of self-efficacy for promotion of mental health among college students.

Keywords: *Mental health, Self-efficacy,College students and Kashmir*

Introduction

There is an interdependence of the individual's physical, mental and social functioning and neither of these can exist alone. The WHO has considered mental health as one of the essential components of health in its definition of health. However, the promotion of mental health is important because mental disorders impose heavy burden on the individual in particular and on the community in general (Dar, 2021).College students are one of the backbone forces for the future development of society. Mental health as animportant part of general health concept is the talent of creating harmonic relationship with others, the ability to participate in dynamic social environment and the talent of accepting effective changes. For achieving such precise goal, prevention of mental health problems, especially affective disorders, anxiety, depression, and evaluate the performance is essential (Rezaei et al., 2015). World Health Organization (WHO) states that, health is a state of well-being that a person is in a state of complete physical, mental and social set.Mental health is characterized by the lack of mental diseases and life satisfaction, and enjoyment (Teodor 2001).Mental health is an expression of our emotions and signifies a successful adaptation to a range of demands. A person is said to be physically fit when his/her body is functioning well and he/she is free from pains &troubles. Similarly, a person is in good mental health when his/her mind and personality is functioning effectively and he/she is free from emotional disturbances.Mental health is the ability to make adequate adjustments to theenvironment on the plane of reality. It is as the ability to balance feelings, desires, ambitions and ideals in one's daily living.

An individual's belief about being successful on a particular task or achieving a goal may influence the performance on that task is named as self-efficacy (Bandura (1997).Self-efficacy, the confidence people have in their ability to do certain tasks (Jordan & Carden, 2017), Self-efficacy is one of the important factors affecting mental health. Studies of self-efficacy in academic environments revealed that the most specific academic self-efficacy has a strong effect on academic outcomes, while the more generalized measures were less closely associated (Multon et al., 1991). Perceived self-efficacy emerged as an important predictor of mental health among elderly males and females i.e. elderly who perceive themselves self-efficacious to have control over their environment reported better mental health and vice versa (Singh et al ., 2010).

Objectives

1. To find outsignificant differences among demographic variables with respect to mental health.

2. To determine the relationship of self-efficacy with mental health of college students in Kashmir.

Hypotheses

1. There will be a significant difference in mental health among college students across demographic variables such as gender, age, area of residence and monthly family income.
2. There will be a significant relationship of self-efficacy with mental health of college students in Kashmir.

Methods

Design

A cross-sectional correlational research design was followed in the current study.

Sample

A sample of 480 college students (male 265 and female 215) participated in this study. The research participants were taken from different colleges of Kashmir, from November 2019 to January 2020, by using a purposive sampling method.During the process of data collection, available students in the institutions were recruited based on their voluntary consent and participation as subjects in the current study

Procedure

The institutional authorities (Principals in the Colleges) were approached before the process of data collection and approval was obtained from them to collect data from enrolled students. Further, students were approached and the objectives ofthe study were briefed to them. They were also briefed about their rights as study subjects. Furthermore, a consent form was provided to all the participants and they were requested to sign on the same before taking part in the study. Participation in the study was voluntary. The participants took 20–25 min to respond to the questionnaires and no compensation was providedto them for their participation in this study.

Instruments

Since in Kashmir the medium of instruction in colleges is English, therefore all the measures of this study were distributed among the participants in English to collect the data. The description of each of the measures is provided as follows:

Background information questionnaire

The Socio-demographic information of the participants was recorded with thehelp of a background information questionnaire. It consisted of elements like gender, age, educational qualification. For instance, the respondents were asked: "What is your age" (18–21 years or 22–24 years), "What is your gender" (male or female) "What is your educational stream" (Arts or science) and so on.

Mental health inventory (Jagdish and Srivastava, 1996)

This inventory was developed and standardized by Dr. Jagdish, Department of Psychology, R.B.S. College, Agra and Dr. A. K. Srivastava, Department of Psychology, Banaras Hindu University, Varanasi. The questionnaire has 56 items which are distributed in six dimensions which are as follows:

Positive Self-Evaluation (PSE), Perception of Reality (PR), Integration of Personality (IP), Autonomy (AUTNY), Group Oriented Attitudes (GOA) and Environmental Mastery (EM).

In Positive Self-Evaluation, there are six positive and four negative items. The item nos. 1*, 7*, 13*, 19, 23*, 27, 32, 38, 45, 51 are concerned with this category.

In Perception of Reality, there are eight items: four positive and four negative items. The item nos. 6, 8, 14*, 24*, 35*, 41, 46*, 52 are of this category.

In Integration of Personality, there is one positive and eleven negative items. The item nos. 2*, 9*, 15*, 18*, 20, 25*, 28*, 33*, 36*, 40*, 47*, 53* are concerned with this category.

In Autonomy, there are two positive and four negative items. The item nos. 3*, 10*, 29, 42*, 48*, 54 are of this category.

In Group Oriented Attitude, there are four positive and six negative items. The item nos. 4, 11*, 16*, 21*, 26, 30*, 39, 43, 49*, 55* are of this category.

In Environmental Competence, there are seven positive and three negative items. The item nos. 5*, 12, 17*, 22*, 31, 34, 37, 44, 50, 56 are of this category.

[* the items stared are negative (false keyed) items]

In the present scale, four alternative responses have been given to each statement i.e.. Always,

Often, Rarely and Never. 4 scores to 'Always', 3 scores to 'Often', 2 scores to 'Rarely' and 1 scores to 'Never' marked responses as to be assigned for true keyed (positive) statements whereas 1,2,3, and 4 scores for 'Always', 'Often', 'Rarely' and 'Never' respectively in case of false keyed (negative) statements. * Marked items are negative while remaining items are positive.The reliability of the inventory was determined by "split-half-method" using odd-even procedure.The reliability coefficients of overall mental health (OMH) were 0.73 and the validity of the inventory was found 0.54.

General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995)

General Self-Efficacy Scale was designed by Schwarzer and Jerusalem in 1995. This scale was designed to analyze general sense of perceived self-efficacy along with predicting coping with day to day problems as well as adapting after facing various types of stressful situations. Self-efficacy is considered as positive resistance resource factor. In this scale 10 items are included to analyze this construct of self-efficacy. Self-efficacy is useful in clinical practice and behavior change. This scale is created for adult population as well as adolescents; children below 12 years of age are not included. This scale is a self-report scale. The scale has four alternatives ranging from not at all true=1, hardly true=2, moderately true=3 and exactly true=4. The Cronbach's alpha ranged from point 0.76 to 0.90. This scale has sufficient criterion related validity. Responses were taken on 4 point scale. The scores were calculated by totaling the scores of all the 10 items which will range from 10 to 40.

Data analysis

The description of analysis followed in the study is provided as follows: Descriptive analysis was carried out by using frequency, percentage, mean, SD, and range. Inferential analysis was conducted with the help of the t-test and Spearman's Correlation Analysis. The statistical package used for the analysis was SPSS 21.0 version.

Results

Table-1. Demographic detail of the participants (*N* = 480)

Variable	n	Percentage
Gender		
Male	265	55.2
Female	215	44.8
Age		
18-21 years	320	66.7
22-24 years	160	33.3
Area of residence		
Rural	305	63.5
Urban	175	36.5
Monthly family income		
Below 10,000 INR	280	58.3
Above 10,000 INR	200	41.7

Table 1 shows the demographic details of the participants (*N=480*) in which more than half of participants were males 265 (55.2%) and less than half were females 215 (44.8%).Most of the students i.e. 320 (66.7%) belonging to age group 18-21years were 160 (33.3%) belonging to age group 22-24 years. Regarding residence 305 (63.5%) belonged to rural areas whereas 175 (36.5%) belonged to urban areas.More than half of sample 280 (58.3%) had monthly family income of below 10,000 INR and less than half 200 (41.7%) had monthly family income of above 10,000.

Table-2. Description of Mental health and Self-efficacy (*N* = 480)

Variable	Actual score range	Possible score range	Mean	SD
Mental health	105-195	56-224	146.20	12.72
Self-efficacy	11-40	10-40	28.14	5.26

Note: *SD= Standard deviation*

Table 2 indicates the actual score range and possible score range, mean score and standard deviation of study variables.The actual score range of mental health was (105-195) followed by possible range of (56-224) and mean and standard deviation for mental health was (146.20) and (12.72). The actual score range of self-efficacy is (11-40) followed by possible range of (10-40) and mean (28.14) and standard deviation for self-efficacy was (5.26).

Table-3. Depicts mean, SD, t- value respondents with respect to mental health on the basis of gender, age, area of residence and family monthly income.

Mental Health	Group	n	Mean	S.D	t-Value
Gender	Male	265	146.40	11.36	.374
	Female	215	145.96	14.23	
Age	18-21 years	320	146.40	12.72	.477
	22-24 years	160	145.81	12.73	
Area of residence	Rural	305	146.33	13.01	.288
	Urban	175	145.98	12.23	
Monthly family income	Above 10,000	280	146.37	12.53	.341
	Below 10,000	200	145.97	13.01	

*Note: *p<0.05 and **p<0.01*

The mean, SD, t-value of mental health with respect to gender, age, area of residence and family monthly income are shown in table-3. The result depicts that there was no significant difference found on gender. Mean and SD of males *(M= 146.40, SD= 11.36)*and females mean, SD *(M= 145.96, SD= 14.23)*. The obtained t-value was *(t=.374)*. There was also no significant difference found on mental health with respect to age. The mean, SD of 18-21 years of age group *(M= 146.40, SD= 12.72* and 22 -24 years *(M= 145.81, SD= 12.73)*. The t-value was *(t= .477)*which is not significant. Further results also illustrated that no significant difference was found on mental health with respect to area of residence. The mean and SD of rural participants *(M= 146.33, SD= 13.01)* and urban*(M= 145.98, SD= 12.23)*.The obtained t-value was *(t= .288)*.In addition to this findings also demonstrated that mean and standard of participants having monthly family income above 10,000 INR was as *(M= 146.37, SD= 12.53)*and below 10,000 INR was *(M= 145.97, SD= 13.01.* The obtained t-value (.341) which is also not significant. Hence our proposed alternative hypothesis ist was not accepted.

Table-4. Correlation of Self-efficacy with Mental health (*N* = 480)

	Positive self-evaluation (*r*)	Perception of reality (*r*)	Integration of personality (*r*)	Autonomy (*r*)	Group oriented attitude (*r*)	Environmental mastery (*r*)	Mental health (*r*)
Self-efficacy	.144**	.064	.349**	.208**	.161**	.046	.294**

Note: *p<0.05 and **p<0.01

Table-4 depicts that self-efficacy has significantly positive correlation with self-evaluation, a dimension of mental health (*r= .144**, p< 0.01)*, Integration of personality (*r= .349**, p<0.01)*, autonomy (*r= .208**, p< 0.01)*, group oriented attitudes (*r= .161**, p< 0.01)*. Further findings also indicated that self-efficacy had also significantly positive correlation with overall mental health (*r= .290**, p< 0.01)*. Hence our 2nd hypothesis is retained.

Discussion

The current study was undertaken to examine the relationship of self-efficacy with mental health in a sample of college students from Kashmir.It is evident from the findings that male participants scored slightly higher as compared to their counterparts. Similarly age group 18-21 years scored high on mental health. Findings also demonstrated that participants from rural area had slightly better mental health than urban areas. Regarding

monthly family income, the participants having monthly income above 10,000 showed better mental health than participants having monthly family income below 10,000. In addition to this findings also illustrated that self-efficacy was positively correlated with mental health. The present findings are supported by earlier researcher (Gull 2016).

The present study like other studies has its limitations. First only college students were covered in the study. Second, the self-report measures tools were used in the current study. Third, the students who participated in the study were Muslim students. So further studies should be taken into consideration in other religious communities.

Conclusion

It is thus concluded that relationship of self-efficacy with mental health was validated in this study among college students of Kashmir. Self-efficacy emerged as a protective factor of mental health. Therefore enhancing self-efficacy will helpful for college students and youth which in turn will promote their mental health.

Disclosure statement

The author(s) declared no potential conflicts of interest with respect to the research,authorship, and/or publication of this article.

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CONTEMPORARY CHALLENGES TO GST IN INDIA

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ABSTRACT

India's goods and services tax law is a multi-stage, destination-based tax that is imposed on every value addition. Taxation policy has a significant impact on a country's economy. The government's primary source of revenue is taxes collected on citizens, which might be direct or indirect. Direct tax occurs when the impact and incidence fall on the same person, whereas indirect tax occurs when the impact and incidence fall on two distinct people, i.e. the burden can be moved to another person.Before the implementation of GST, India had a confusing indirect tax system with different taxes imposed by the union and states individually. With the introduction of GST, all indirect taxes will be consolidated, ensuring a smooth national market with a high rate of economic growth. GST is a single-point tax imposed on the delivery of goods and services from the producer to the customer. The primary goal of this study is to identify current GST-related concerns and challenges in India.

Introduction

The GST, or Goods and Services Tax, is India's most significant tax reform since independence, and it was long overdue. Its goal is to streamline the country's indirect tax system by replacing a slew of taxes with a single, unified tax. Every value addition is subject to GST, which is a multi-stage, destination-based tax. GST would provide the Indian economy a new dimension by creating a common market and decreasing the tax's cascading effect on the cost of products and services. The entire indirect tax system will be affected, including the tax structure, tax incidence, tax computation, compliance, input credit utilisation, and reporting procedures. [1] India has implemented a dual GST system, with CGST and SGST.

The following reasons support the requirement for a concurrent dual GST model: [2]

1. According to India's constitution, both the national and state governments have concurrent authority to levy taxes on domestic commodities and services.
2. Under the dual GST model, the national and state governments can levy taxes separately, but both will use the same platform to levy taxes, and the responsibilities would be the same.

Silent Features of GST [3]

1. Except for exempted products and services, all transactions on goods and services shall be covered up.
2. GST is divided into two categories: central GST and state GST. State GST will be paid to the relevant state government, while central GST will be paid to the federal government.
3. In both the CGST and the SGST, the meaning of a taxable person, taxable events, chargeability, tax measure, and so on will be the same.
4. The CGST will be administered by the central government, while the SGST will be administered by the individual state governments. Both the federal and state governments have the authority to enact legislation on the taxation of goods and services. The central government's GST law would not take precedence over state GST laws.
5. The taxpayer would be given a Pan card-based identification number to make tax payments and returns easier.
6. Separate tax returns must be submitted to the central government for CGST and the state government for SGST.
7. Input credit can be claimed from the department where GST was paid, i.e., central GST paid on inputs can be claimed against central GST alone, and state GST can be claimed against state GST only.
8. If goods and services are imported, the GST will be applied.
9. For various commodities and services, the GST slabs have been set at 0%, 5%, 12%, 18%, and 28%.
10. Integrated goods and services tax (IGST), also known as interstate goods and services tax, is a component of GST that is levied on the supply of goods and services in the course of interstate commerce and collected by the

federal government before being distributed to imported states as a destination based tax. An additional 1% tax on interstate goods supply is levied by the federal government and is apportioned directly to the exporting state. According to the GST council's recommendation, this tax will be charged for a period of two years or more.

11. On the GST council's suggestion, the union government will reimburse states for revenue losses resulting from GST implementation for a period of 5 years or longer.

12. A president has been appointed to the GST Council, which is led by the Union Finance Minister. It will be made up of union ministers of state in charge of revenue and finance, as well as any other field selected by the state government. The council is made up of two-thirds state representatives and one-third union representatives. A 3/4th majority of the votes cast is required for a council decision, and a quorum of 50% is required.

Legal Framework

The new GST'system' (system because it is not a single law) consists of four central laws, the Central Goods and Services Tax (CGST) Act, the Integrated Goods and Services Tax (IGST) Act, and the Union Territories Goods and Services Tax (UTGST) Act, as well as twenty-four state laws, the relevant State Goods and Services Tax (SGST) Act, all of which are nearly identical. In addition to these laws, the GST system includes another Central statute, the Products and Services (Compensation to States) Act, which imposes a compensation cess on some sales (mostly luxury and depreciating goods) to compensate states for any revenue loss caused by the new tax system. [4]Because the GST system necessitates coordinated action from the Center and the States, any modifications to the GST system must be approved by the GST Council, which is made up of the finance ministers of the states and the federal government.

Policy Framework

The GST system is based on a mechanism that assigns different rates to different types of sales (0 percent , 5 percent , 12 percent , 18 percent , 28 percent and additionally 0.25 percent for precious stones and 3 percent for gold). The GST rate is imposed on a common basis by the Center and States on all within-State sales, with each levying half of the rate as applicable to the sale, and the relevant virtually similar statutes are the CGST Act and the related SGST Act. When the buyer and seller are from different states, or when the sale is for export, the total rate is applied to the sale, and the applicable statute is the IGST Act.There are also a number of sales that are exempt, and finally, exports are zero-rated. The Harmonized System Nomenclature (HSN) Code for products and Services Accounting Code (SAC) for services, which identifies all goods and services, are used to identify sales that are exempt or under various rates. [5] The HSN/SAC Code must be identified up to the 4 digit level in most cases, however select sales must be identified up to the 8 digit level in some cases. Taxpayers having a taxable turnover of 7.5 million dollars (US$114,500) or more charge GST at the statutory rates on their sales and can deduct any taxes paid on their purchases. All taxpayers with a turnover of between Rupees 2 million and Rupees 7.5 million are subject to a 'composition plan,' in which they pay tax on turnover rather than value added. For restaurant services, the tax rate is 5% of turnover, for manufacturers it is 2% of turnover, and for all other cases it is 1% of turnover. Such taxpayers are not permitted to impose any sales tax.

Tax Administrative Framework

The GST is administered in parallel by the Central and State GST administrations, with auditing and administration functions shared. [6] To aid in the management of taxpayers, the GST Network (GSTN) has been established as a unified national IT backbone through which all tax returns must be lodged. The GSTN would also assist in the selection of taxpayers for audit through a risk-based selection system, as well as supporting the Central and State Tax Administrations' other key tax administration duties.

Enforcement framework through matching invoices

Because the two sides of B2B transactions (sales and purchases) are reported in their separate tax filings, the enforcement structure

flows naturally from the nature of the GST/VAT. This is frequently enforced during audit in most other nations by matching invoices in certain audit situations. In the event of firms with a turnover of Rupees 7.5 million or more, compliance is enforced during the filing process by requiring 100 percent matching of all invoices on all B2B transactions. [7]At the time when businesses file their tax returns, the GSTN handles all invoice matching. If there are any discrepancies, the taxpayer must file an amended tax return. The GST tax owed is collected from the purchaser through a reverse charge method to gather taxes due from purchases by unregistered taxpayers. [8]

Treatment of exporters and refund mechanism

Prior to the GST, exporters did not have to pay VAT on their imported inputs. Exporters must pay GST taxes on all inputs, including imported inputs, under the new GST, and these taxes can be debited; however, because exports are zero-rated, the whole tax is repaid to the exporter. However, a reimbursement will be granted only if the suppliers of these inputs deposit all of the input taxes. [9] Furthermore, if an exporter does not have a Letter of Undertaking or Bond, the new GST requires them to collect tax on exports as if they were domestic sales.

Key Issues and Challenges [10]

Issues faced in GST implementation

There has been a lot of (mainly unfavourable) press coverage on the problems businesses encounter in complying with the new Goods and Services Tax regime, which went into effect on July 1, 2017. The complaints, as reported in the press, cover a wide range of issues, including poor GSTN system availability, non-availability of certain forms and formats (Letter of Undertaking and Bank Guarantees for exporters), delays in GST refunds, transitional issues in carrying over input tax credit from the old VAT and CENVAT systems, and inability to fill out outward sale invoices in the GSTN system, Issues with the GST rate, as well as the difficulties experienced by the informal sector and industries like textiles that run on cash with little documentation. Many of the concerns are legitimate and temporary in nature, and the GST Council and Government are working to resolve them.

Issues in collecting taxes on sales

Multiple rates and classifications cause problems. For example, it has been stated that pamphlets are taxed at 5%, letterheads at 12%, files at 18%, and hardbound registers at 28% in the paper business. For enterprises with total sales over Rupees 75 million, a four-digit HSN code must be reported for each transaction, and for imports and exports, an eight-digit HSN code must be reported for all sales. This causes problems for some organisations, who are risk adverse and charge at the highest rate possible to prevent complications during audits. However, it is believed that this problem will be remedied over time as businesses would gain clarification on the exact HSN Code and the corresponding rate for their transaction. However, classification difficulties may arise during an audit, causing further complications for organisations.

Issues in preparing the tax returns

This is due to the onerous information requirements in the tax form, which include transaction level data from all sales, the requirement to match purchases data, and detailed information on the HSN code for goods and Service Accounting Code (SAC) for services for each sale in order to determine the correct rate to apply. In addition, the tax return demands information on any interstate B2C purchases worth more than 0.25 million dollars. All of this data needs to be organised, which necessitates the services of an accountant as well as the tools needed to do it. The cost of compliance has increased significantly in recent years for organisations who are not used to such thorough data collection as part of their business. The majority of merchants will be required to use two, four, or eight-digit HSN/SAC codes for their commodities under GST, depending on their previous year's turnover.

- Dealers with a turnover of less than Rs 1.5 crore are exempt from using HSN codes for their commodities.

- Dealers with a turnover of Rs 1.5 crore to Rs 5 crore will have to adopt two-digit HSN numbers for their commodities.
- Dealers with a turnover of Rs 5 crore or more would have to adopt four-digit HSN codes for their commodities.
- HSN codes of eight digits will be required for imports and exports, as GST must comply with worldwide standards and procedures.

Issues in uploading of tax returns

The tax return's onerous information requirements are putting even more strain on businesses and the GSTN when it comes to uploading them to the system. Every month, tax returns must be filed, necessitating the need for additional accounting help. The additional expense of accountants, particularly for SMEs, is not insignificant. According to studies, the additional cost of an accountant is on average Rs.10,000-15,000 (US$ 150-230) per month per SME due to a scarcity of skilled accountants.

Issues in the return filing process

The return filing process necessitates the matching of B2B invoices on both sides of the transaction, with any invoice mismatches resulting in a second return. The final return is filed when these discrepancies are rectified. Businesses, on the other hand, encounter difficulties when both parties to a transaction fail to complete it by the end of the month, resulting in mismatches. Some buyers will ratify the sale after more than a month, at which point the buyer may or may not agree on the agreed-upon transaction amount following delivery. There is limited tolerance for errors in the return filing procedure, which is why businesses are having such practical challenges with the filing process. Businesses are concerned that mismatched invoices may result in further examination of those transactions by various tax administrations, raising the expense of GST compliance.

Issue in refunds for exporters and others

In an ideal world, reimbursements should be limited to exporters and long-term projects where things are supplied after inputs have been acquired. However, because the GST is designed with several rates, refunds may be possible. In the normal course of business, refunds may arise if enterprises make lower-priced sales but pay higher-priced input taxes. Exporters have been severely harmed by the necessity to pay tax on imports in advance, causing cash flow problems, despite the fact that they previously benefited from tax breaks on their inputs. Their working capital requirements have been put under a lot of strain as a result of this. Furthermore, refunds are not being granted as quickly as they should be because the system is meant to minimise the danger of refund fraud. Delays in supplying formats for Letters of Undertaking and Bonds allowing exporters to export without paying taxes on export sales are among the other transition concerns.

Conclusion

The Goods and Services Tax (GST) is the government's unconcerned attempt to rationalise the country's indirect tax structure. Before implementing the GST, the government should thoroughly examine the mechanisms used by other countries throughout the world, as well as the consequences. GST, without a doubt, has streamlined the present indirect tax structure and helps to avoid the tax cascade effect. The measure was intended to implement one country, one tax, but it became a trap when the price of basic goods and services increased, despite government demands for a favourable change in the economy. The economy is clearly faltering as a result of the unplanned implementation of GST, and the disruptions may have hastened the slide. The only way to avoid this interruption is to make the GST transition easier.

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COMPENSATION AND REHABILITATION OF RAPE SURVIVORS

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ABSTRACT

When we talks about the provisions related to compensation to victim of any crime in Indian Criminal Justice system, we found that the term was used by the rulers from the ancient time for the rehabilitation of the victim. During the Vedic Period concept of compensation, we found in Manu Smriti and Brahaspati Smriti. Not only in Ancient Hindu law, also in Islamic law, had we found the provisions of compensation for the victims. The idea of compensation to the victim of crime lost its identity and importance during the end of medieval era, when State was the adequate authority to give punishment to a criminal, but victim of crime was forgotten by the rulers/ authorities. Since, Independence and the promulgation of the Constitution rapid stride have been made in almost all fields of life. The communication revolution has opened the eyes, ears and minds of millions of people. Before 2008 no active role had been played by the Indian Legislature and Judiciary in defining 'Victim of crime'. It is desired by every person to get quick, fair and affordable justice for any crime happened with him.

Introduction

Articles 1 & 2 of United Nations General Assembly Declaration of Basic Principles of Justice for Victim and Abuse of Power adopted in November 1985, elaborate the term[1]Protection of life and liberty have been given a pre-eminent position in our Constitution by enacting Article 21 as a fundamental right and imposing a duty on the State to protect life and personal liberty of every citizen. This precious fundamental right becomes mere a pipe dream to many millions to whom justice is delayed, distorted or denied. The entire existence of the orderly society depends upon sound and efficient functioning of the Criminal Justice System. Apart from the different functionaries of any Criminal Justice System, victim is one of them. Initially, under the Indian Criminal Justice System the victim whose rights were invaded by the accused was not accorded any right to participate except as a witness. The system does not afford him any opportunity to assist the court such as adducing evidence or putting questions to the witnesses. The system is thus utterly insensitive to the rights of the victim. The focus is all on the accused and none on the victim. As in every civilized society, Criminal Justice System is expected to provide the maximum sense of security to the people at large by dealing with crimes and criminals effectively, quickly and legally. The main objective is to reduce the level of criminality in society by ensuring maximum detection of reported crimes, conviction of the accused persons without delay, awarding appropriate punishments to the convicted to meet the ends of justice.

Ordinarily the prosecution places such evidence as it considers necessary during the trial of the case. The court has no means to know if there is any other evidence which can throw light on truth of the case. The victim not being a party has no role to play in the trial except giving evidence as a witness. In the Inquisitorial System the Judge of instructions is a part of the investigating machinery charged with the responsibility of ascertaining truth. In the Adversarial System, the Judge is not a part of the investigating machinery. The victim may have information about the evidence available in regard to commission of the crime. He

[1]. **Article1.** "Victims" means persons who, individually or collectively, have suffered harm, including physical or mental injury, emotional suffering, economic loss or substantial impairment of their fundamental rights, through acts or omissions that are in violation of criminal laws operative within Member States, including those laws proscribing criminal abuse of power.
Article2. A person may be considered a Victim, under this Declaration, regardless of whether the perpetrator is identified, apprehended, prosecuted or convicted and regardless of the familial relationship between the perpetrator and the Victim. The term "Victim" also includes, where appropriate, the immediate family or dependants of the direct Victim and persons who have suffered harm in intervening to assist Victims in distress or to prevent victimisation.

would also be very much interested in the vindication of justice by securing conviction of the person who has committed the offence. He would be eager to assist the prosecution. Therefore the victim may be made a party to assist the court in discovering truth.

Victim means a person, who has come to feel helpless and passive in the face of misfortune or ill-treatment, suffered injury, loss or any other type of loss due to any act committed by some other person. In a legal sense victim can be defined as a person, harmed, injured or killed as a result of a crime, accident, or other event and also suffered direct or indirect loss either physical mental, emotional loss due to the act of another person called the offender. They are not associated with any particular type of crime by the name or its nature. At the present in common parlance the term "victim" is understood as with the various types of crimes by the name of such crime such as- Child Victims of sexual abuse, victims of human trafficking, victims of drug trafficking, victims of mass violence, victims of economic offences, victims of acid attack etc. The Punjab and Haryana High Court held[2] that the word "victim" means not only a person, who has suffered any loss or injury caused by reason of the act or omission of the offender and victim also includes his or her guardian or legal heir. The penal philosophy in India has accepted the concepts of prevention of crime and treatment and rehabilitation of criminals, which we can see by many judgments of the Supreme Court of India and High Courts but victims have no rights under the Criminal Justice System, and the State undertakes the full responsibility to prosecute and punish the offenders by treating the victims as mere witnesses. In1983, the Supreme Court[3] first time recognized the petitioner's right to claim compensation for illegal detention and for that awarded a total sum of Rs. 35000 by way of compensation. It is rightly observed by a great Indian legal luminary that "Tears shed for the accused are traditional and 'trendy' but has the law none for the victim of crime, the unknown martyr?"[4]

The Malimmath Committee[5] in his report clearly stated that justice for victims and the Indian criminal justice system are inseparable. It stated that victims of a crime have to be participated in the criminal proceedings as the concern of their right and they must be permitted to claim the compensation for the impairment or damage suffered by them. The committee also emphasizes for holistic justice to the victims and has also accurately pointed out that the increase in the number of hostile witnesses over the years is a result of inadequacy of law in protecting the witnesses[6]. After the recommendations of Malimmath Committee, the Criminal Procedure Code, 1973 was amended by Parliament and Sections 2(wa)[7] and 357A, was added in Cr. P.C. Section 5 of the Probation of Offenders Act, 1958tells about the power of court to direct the offender to pay such compensation as the court thinks reasonable. The Government has established a Central Victim Compensation Fund (CVCF) with an initial corpus of Rs. 200 crore to support to victims of rape, acid attacks, human trafficking and women killed or injured in the cross border firing etc[8]. The UN General Assembly Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power contained one of the most important aspects to established norms and minimum standards in international law for the protection

[2]Ram Kaur @ JaswinderKaur v. Jagbir Singh AIR,2010 (P&H).

[3]RudulSah v. State of Bihar, (1983) 4 SCC 141

[4] Justice Krishna Iyer, Hon'ble Judge, Supreme Court of India in his writing "The Criminal Process and Legal Aid", Published in Indian Journal of Criminality. P.10 available at http://www.legalservicesindia.com/law/print/8

[5]Committee on Reforms of Criminal Justice System Government of India, Ministry of Home Affairs, Vol.1, March, 2003.

[6] Prof. N.V. Paranjape: Criminology, Penology, Victimology,Eastern Book Company (2018) ,p. 763

[7] Criminal Procedure Code, 1973,Section 2(wa) reads: "Victim" means a person who has suffered any loss or injury caused by reason f the act or omission for which the accused person has been charged and the expression victim includes his or her guardian or legal heir.

[8] Central Victim Compensation Fund Scheme: https://www.mha.gov.in/document/national-advisories/central-victim-compensation-fund-scheme-cvcf-guidelines

of Victims of crime[9]. The UN Declaration recognized four major components of the rights of Victims of crime, Access to justice and fair treatment[10], Restitution[11], Compensation[12] and Assistance[13].

Compensation for Rape Victim

Rape is one of the most heinous crimes against mankind, as no other crime in itself includes all the costs i.e. transaction cost + social cost + psychological cost. n *Bodhisattwa Gautam* v. *Subhra Chakraborty*, the Supreme Court reiterated that:

"Rape is not only a crime against the person of a woman (victim), it is a crime against the entire society. It destroys the entire psychology of a woman and pushed her into deep emotional crises. It is only by her sheer will power that she rehabilitates herself in the society which, on coming to know of the rape, looks down upon her in derision and contempt. Rape is, therefore, the most hated crime. It is a crime against basic human rights and is also violative of the victim's most cherished of the fundamental rights, namely, the right to life contained in Article 21."

The Criminal Law (Amendment) Act, 2013 was enacted to address the inadequacy in law relating to sexual offences against women and children[14], which led to the creation of the Nirbhaya Fund. The Central Government also set up the Central Victim Compensation Fund Scheme vide the notification dated 14-10-2015, by the Ministry of Home Affairs. However, last year, it was reported that only 36 per cent of the Nirbhaya Fund had been utilised in the past seven years, which speaks in volumes of the enforcement backdrops apropos India's bureaucracy. Moreover, 99 per cent of the minor rape victims of sexual assault remained without any compensation.

The Supreme Court in *Nipun Saxena* v. *Union of India*, deemed it appropriate for National Legal Services Authority (NALSA) to set up a Committee to prepare Model Rules for Victim Compensation for sexual offences and acid attacks. Thereafter, the Committee finalised the Compensation Scheme for Women Victims/Survivors of Sexual Assault/other Crimes — 2018. As per the scheme, a victim of gang rape would get a minimum compensation of Rs 5 lakhs and up to a maximum of Rs 10 lakhs. Similarly, in case of rape and unnatural sexual assault, the victim would get a minimum of Rs 4 lakhs and a maximum of Rs 7 lakhs. The victims of acid attacks, in case of disfigurement of face, would get a minimum compensation of Rs 7 lakhs, while the upper limit would be Rs 8 lakhs. The court then accepted the said scheme to be applicable across India, which remains the law of the land.

Importance of Compensation and Rehabilitation

The Criminal Justice System includes three broad fields of study: Criminology (the scientific study of crime), Penology (the study of penal actions consequent to the crime) and Victimology (a comparatively newer branch which centers around the measures such as compensation, rehabilitation, and justice to the victim). The victim is a forgotten party, as the historical evolution of the system, from private vengeance to State administered justice, has resulted in a criminal justice process in which the victims play only a secondary role. The modern day emergence of the idea of compensation for victims of crime commenced only in the 1950s when it was pressed by the British Magistrate and social reformer, Margery Fry. It further took concrete shape when the United Nations Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power was unanimously adopted by the General Assembly on 11-11-1985, Clause 8 of which deals with compensation to the victims of the crime.

Articles 41 and 51-A of the Indian Constitution lay down the duty of the State to secure "the right to public assistance in cases of disablement and in other cases of undeserved want" and to "have compassion for living creatures" and "to develop humanism" respectively. Justice Krishna Iyer, in *Maru*

[9]UN General Assembly Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power, November 29, 1985.
[10]Id. Clause 4 and 5.
[11]Id. Clause 8 and 11.
[12]Id. Clause 12.
[13]Id. Clause 14 (Part B).

Ram v. *Union of India*, said that victimology, a burgeoning branch of humane criminal justice, must find fulfilment, not through barbarity but by compulsory recoupment by the wrongdoer of the damage inflicted not by giving more pain to the offender but by lessening the loss of the forlorn.[15]

In 2003, the Justice Malimath Committee observed that, "victims of crime are important players in criminal justice administration both as complainant/informant and as witness for the police/prosecution. Despite the system being heavily dependent on the victim, criminal justice has been concerned with the offender and his interests almost subordinating or disregarding the interest of the victim. In civil law systems generally, the victims enjoyed better status than in Administration of Criminal Justice." In *Ankush Shivaji Gaikwad* v. *State of Maharashtra*,[1] it has been observed that: "The object and purpose of the provision is to enable the Court to direct the State to pay compensation to the victim where the compensation under Section 357 was not adequate or where the case ended in acquittal or discharge and the victim was required to be rehabilitated. Under this provision, even if the accused is not tried but the victim needs to be rehabilitated, the victim may request the State or District Legal Services Authority to award him/her compensation."

Victim Compensation Regime

The Law Commission of India observed that, "We have a fairly comprehensive provision for payment of compensation to the injured party under Section 545 of the Criminal Procedure Code, 1898. It is regrettable that our courts do not exercise their statutory powers under this section as freely and as liberally as could be desired. The section has, no doubt, its limitations. Its application depends, in the first instance, on whether the court considers a substantial fine as proper punishment for the offence. In the most serious cases, the court may think that a heavy fine in addition to imprisonment for a long term is not justifiable, especially when the public prosecutor ignores the plight of the victim of the offence and does not press for compensation on his behalf." Later, taking note of the insensitive attitude of subordinate courts, the Supreme Court in *Hari Singh* v. *Sukhbir Singh*, while directing the courts to exercise their powers liberally, observed that Section 357 is an important provision but the courts have seldom invoked it, perhaps due to the ignorance of the object of it.

Thereafter, the debate gained momentum and Section 357-A CrPC was inserted into the CrPC, which provides the State to frame a Victim Compensation Scheme. Compensation shall be paid to the victim depending on the facts and circumstances of the case as per such scheme. Enquiry has to be held by the State Legal Services Authority or the District Legal Services Authority, as the case may be. The law as it stands today, has provisions relating to compensation of victims such as Sections 357, 357-A, 357-B, 357-C, 358 and 359 of CrPC. There is one more provision in Section 250 CrPC, 1973, wherein if the prosecution is launched based on false accusation, and ultimately after trial, if the person is acquitted and if the trial court finds that false case is foisted, then, the compensation is to be levied on the complainant under Section 250 CrPC. In such matters, the alleged accused is the victim of the illegal prosecution. Because of the guilt of the complainant/State, the accused has suffered. Even FIR attaches a stigma in certain cases. Therefore, if an accusation is made without unreasonable cause and if the court feels that a false case is launched, then the court may impose compensation under Section 250 CrPC[16].

Section 357 of the CrPC is an amalgamation of Sections 545 and 546 of the erstwhile Code of Criminal Procedure, 1898, which was based on the recommendations of the Law Commission of India. The Supreme Court in *Palaniappa Gounder* v. *State of T.N.*, observed that an

[15]https://doj.gov.in/sites/default/files/Agenda.pdfhttp://www.oup.com/uk/orc/bin/9780199218103/easton_ch01.pdf.

1. [16]RekhaRai, "Right of Victim for Compensation in India: A Historical Background" International Journal of Law, ISSN: 2455-2194, RJIF 5.12, Volume 2; Issue 4; July 2016

order for compensation can be passed under Section 357(1)(*c*) only when a Court imposes a sentence of fine or a sentence of which fine forms a part. With the insertion of Sections 357-A and 357-B, the horizons of the victim compensation regime stood broadened. Before this amendment, it was the duty of the accused to compensate the victim after the conclusion of the trial, but the State had no duty to pay compensation whatsoever. The victim compensation scheme is retrospective in nature, if a crime was committed before the scheme was implemented, the victim still cannot be denied compensation if it deserves the compensation. A victim is granted compensation under Section 357-A because the fundamental right to life is violated, and denial or delay of compensation would "continue such violation and perpetrate gross inhumanity on the victim in question.[17]"

In *Ashwani Gupta* v. *Govt. of India*, the Delhi High Court held that mere punishment of the offender cannot give much solace to the family of the victim. Since the civil action for damages is a long drawn/cumbersome judicial process, the compensation of Section 357 would be a useful and effective remedy. In *Rattan Singh* v. *State of Punjab*, Krishna Iyer J., held that it is a weakness of our jurisprudence that the victims of the crime do not attract the attention of law. The law in many jurisdictions particularly in continental countries recognises two types of rights of victims of crime, firstly, the victim's right to participate in criminal proceedings and secondly, the right to seek and receive compensation from the criminal court for injuries.[18]

A three-Judge Bench of the Delhi High Court in *Karan* v. *State NCT of Delhi*, reiterated that there exists a mandatory duty on the Court to apply its mind to the question of victim compensation under Section 357 of the CrPC in every criminal case. The court is duty-bound to provide reasons, in every criminal case, based upon which it has exercised its discretion in awarding or refusing the compensation. While observing that the quantum of the compensation is to be determined by the courts, based on factors such as the gravity of the offence, severity of mental and physical harm/injury suffered by the victim, damage/losses suffered by the victims and the capacity of the accused to pay, the court laid down the following steps to be followed:

Post-conviction of the accused, the trial court shall direct the accused to file particulars of his income and assets through an affidavit accompanied with supporting documents within 10 days. After the conviction of the accused, the State shall file an affidavit disclosing the expenses incurred on the prosecution within 30 days.On receiving the accused's affidavit, the trial court shall send the copy of the judgment and the affidavit to the Delhi State Legal Services Authority (DSLSA). The DSLSA shall then conduct a summary inquiry to compute the loss suffered by the victim and the paying capacity of the accused. It shall submit the victim impact report along with its recommendations within 30 days. The DSLSA may request the assistance of the concerned SDM, SHO and/or the prosecution in this exercise.

The trial court shall then consider the victim impact report, considering the factors enumerated above, hear the parties involved including the victim(s) and accordingly award compensation to the victim(s) and cost of the prosecution to the State if the accused has the capacity to pay. The court shall direct the accused to deposit the compensation with DSLSA whereupon DSLSA shall disburse the amount to the victims according to their scheme. If the accused does not have the capacity to pay the compensation or the compensation awarded against the accused is not adequate for rehabilitation of the victim, the court shall invoke Section 357-A CrPC to recommend the case to the Delhi State Legal Services Authority for award of compensation from the victim compensation fund under the Delhi, Victims Compensation Scheme, 2018.In matters of appeal or revision where Section

[17]https://doj.gov.in/sites/default/files/Agenda.pdfhttp://www.oup.com/uk/orc/bin/9780199218103/easton_ch01.pdf.

[18]David Miers," Offender and State Compensation for Victims of Crime: Two Decades of Development and Change" International Review of Victimology December 2013.

357 has not been complied with, the public prosecutor shall file an application seeking court's direction for enforcing this procedure in accordance with Section 357(4) of the CrPC.

Indian Laws Relating to Rape

Rape and sexual crimes against any gender have long since been considered a crime under the ambit of Indian Law, by virtue of the Indian Penal Code, 1860 (IPC). As far as the definition goes, it has been provided under section 375 which defines rape as the following:

A man is said to commit â€œrapeâ€• who, except in the case hereinafter excepted, has sexual intercourse with a woman under circumstances falling under any of the six following de-scriptions:

- Against her will.
- Without her consent.
- With her consent, when her consent has been obtained by putting her or any person in whom she is interested in, fear of death or of hurt.
- With her consent, when the man knows that he is not her husband and that her consent is given because she believes that he is another man to whom she is or believes herself to be lawÂ¬fully married.
- With her consent, when, at the time of giving such consent, because of unsoundness of mind or intoxication or the administration by him personally or through another of any stupeÂ¬fying or unwholesome substance, she is unable to understand the nature and consequences of that to which she gives consent.[19]
- With or without her consent, when she is under sixteen years of age as per the law. This implies that any sort of penetration is sufficient to constitute the sexual intercourse necessary to constitute the offence of rape. However, there still exist certain exceptions which are a topic for much debate. These exceptions can be summarised below:

Any sexual intercourse by a man with his wife, the wife not being under eighteen years of age, is not rape. As per the provisions, before 2017, sexual intercourse, even without the consent of a man with his wife, even if the wife was a minor, however, above the age of 15, shall not constitute as rape either. But, in 2017, a Division Bench of the Supreme Court of India, constituting of Justices Madan B Lokur and Deepak Gupta in the matter of Independent Thought (Petitioners) and The Child Rights Trust (Intervener) vs. Union of India and Others, read down Section 375 of IPC and held that sexual intercourse with any minor girl, even if the minor is married and the accused is the husband, shall now constitute the offence of rape. This Bench stated that it found no reason as to why a married minor female of the ages 16 till 18 should not have protection against unwanted sexual intercourse against her husband, simply due to their marriage. The Bench, however, refrained from making any comments on forcible sexual relations between an adult husband and an adult wife. The Delhi High Court is still deliberating the issue of marital rape of an adult married woman by her husband.

While normal rape, comprises of the element of lack of consent, or consent obtained through fraud or force, statutory rape varies in the sense that the consent so obtained, is not considered to be valid. This offence has been created to protect the exploitation of minors by such adults who would manipulate their way into having sexual intercourse with an otherwise unwilling party. Under this sort of offence of rape, the adult gets punished in case he had any kind of physical interaction with any woman or a girl, of the age of 18 or below, regardless of whether she had voluntarily participated in the act or not. Such consent, if obtained by the minor is inconsequential and shall not be considered as a defence to the accused.[20] The

[19] JhalakKakkar and ShrutiOjha,"An Analysis of the Vanishing Point of Indian Victim Compensation Law" Journal of Indian Law and Society, Volume. 2 : Published in Article Section of www.manupatra.com

[20] RekhaRai, "Right of Victim for Compensation in India: A Historical Background"International Journal of Law, ISSN: 2455-2194, RJIF 5.12, Volume 2; Issue 4; July 2016

minimum age of consent in India is 18 years old and the age of consent implies the age at which an individual is considered legally old enough to consent to participate in any sexual activity. The individual who is still of 17 years of age or younger, shall not be considered as legally old enough to give their viable consent to participate in any kind of sexual activity. Hence, if a male and a female, both of the age 17 enter into voluntary intercourse, the male can still be arrested and charged with rape. However, more often than not in such cases, wherein there is no actual exploitation of the minor, taking into consideration the statement of the minor female, the accused is often let off.

Criminal Law (Amendment) Act 2013

In the year 2012, the national capital of Delhi witnessed a the most horrific gang rape, which is still widely referred to as the Nirbhaya rape case, which shook the conscience of the entire nation and lead to the introduction of tougher laws in the form of the Criminal Law (Amendment) Act, 2013.Under the new amendment Act, the minimum sentence for rape was altered from seven years to ten years. Furthermore, in cases which resulted in the death of the victim or the victim being left in a vegetative state, the minimum sentence had been duly increased to twenty years. However, under the case cited above since one of the accused was still a minor, he had to be tried as a juvenile at that time and thus this one specific accused escaped the complete brunt of the law despite being 17 years old and just a few months shy of becoming an adult.In order to avoid such cases in the future, the age for being tried as an adult for violent crimes such as rape and murder had been rightfully altered from 18 to 16.The legislation further upheld that if children within the age of 16 to 18 undertake in activities comprising of gruesome and violent murders and rapes, they deserved to be tried and punished as adults.

Conclusion

While considering the problem of penology the court should not overlook the plight of victimology. Considering the victim compensation scheme under CrPC, along with the NALSA guidelines, it appears that a court must order the specified amount of compensation for the victims of rape. It is submitted that the idea of a victim compensation scheme under the CrPC is complete and ideal on principle, however, the courts have been assigned the greater duty to pass orders for compensation, based on the facts and circumstances of a particular case. Once the order for compensation has been passed, the duty shifts onto the bureaucracy, for grant of compensation to victims.In 1994, it was for the first time that the SC, while hearing a petition on behalf of the Delhi Domestic Working Women's Forum, in a case where six tribal domestic servants were subjected to indecent sexual assault by Army personnel while travelling in a train, directed the National Commission for Women "to evolve such (compensation) scheme as to wipe out the tears of such unfortunate victims". While writing this judgement, the court made special reference to a passage from 'The Oxford handbook of Criminology' that not only delineated historical developments of making compensation in London but also highlighted "a major shift in penological thinking, reflecting the growing importance attached to restitution and reparation over more narrowly retributive aims of conventional punishment". However, the procedural law was amended only in December 2009 and a special provision (Section 357-A) was added to incorporate Victim Compensation Scheme[21].

It is now 25 years that India need to emulate again a much desired counselling program on the lines of British Columbia's Crime Victim Assistance Program Counselling Guidelines 2018. It is quite a comprehensive programme that includes establishment of counselling services (to respond to the psychological, or counselling needs) or expenses as a benefit that may be available

[21]JhalakKakkar and ShrutiOjha,"An Analysis of the Vanishing Point of Indian Victim Compensation Law" Journal of Indian Law and Society, Volume. 2 : Published in Article Section of www.manupatra.com

not only to victims but also to their immediate family members and some witnesses. It provides for maximum number of hours of counselling up to 48 hours for victims, 36 hours for immediate family members and 12 hours for witnesses. However, if the claimant is a minor, the maximum limit of hours of counselling may exceed on approval. In most cases, the provision is to make payment of fees for counselling directly to the service provider and the fee rate payment is determined on the basis of counsellor's work experience, academic and professional accreditation. Further, the choice of counsellor is entirely that of the claimant but the hourly maximum fee rate is fixed under the programme[22].

There are many rape survivors who need immediate psychological counselling to handle emotional distress and adversities. The 1993 'UN Declaration on the Elimination of violence against Women' also stipulates creating support structures to promote safety, physical and psychological rehabilitation of women. It is, therefore, high time that India, taking cue from British Columbia, evolves a comprehensive counselling support system for the victims of violent crime. Only monetary compensation may not always be sufficient to ensure rehabilitation of such victims. The state is duty bound to provide compensation if it fails to protect the fundamental rights of its citizens. In furtherance of this duty the state also has a duty to ensure true rehabilitation of survivors by providing them institutional support and counselling.

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THE MEDIATING ROLE OF TOURISM SERVICES: A PLS-SEM STUDY ON SATISFACTION AND BEHAVIOURAL INTENTION

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ABSTRACT

The remarkable growth in tourism sector and its contribution in national growth and development has drawn attention towards understanding tourism behavior. Existing tourism literature lacks an empirical examination of relationship between constructs like motivation, satisfaction with tourism services, overall satisfaction with destination and future behavioural intentions. The present study fills this gap. This study uses Smart PLS–SEM to assess the influence of travel motivation and the mediating role of tourism services on destination satisfaction and behavioural intentions. The study analyses 477 valid surveysout of 1193 responses collected at one of India's largest airport in terms of passenger handling- Delhi airport. Non-probabilistic sampling has been used. The study illustrates that an effective assessment of traveler's needs and desire and subsequent satisfaction with tourism services can culminate into destination satisfaction and can generate positive recommendations and revisits. The results of the study can help tour companies to sustain competitiveness, more so in an increasingly saturated market place.

Keywords: *Travel Motivation, Destination Satisfaction, Behavioural Intention, India, PLS-SEM, Tourism Services*

1. Introduction

Growing at a remarkable rate of 6 percent in 2018 (UNWTO, 2019), travel and tourism industry has evolved as one of the largest industriesacross the globe (WTTC, 2019). With a significant multiplier effect on national income, employment, and government revenues (Yang, Fik & Altschuler, 2018), policymakers, practitioners, and researchers are working towards improving and sustaining industry competitiveness. Marketing literature stresses consumer behavior as being one of the main foci driving competitiveness (Szmigin & Piacentini, 2018) and defines it as "concerned with all activities directly involved in obtaining, consuming and disposing of products and services, including the decision processes that precede and follow these actions" (Engel, Blackwell &Miniard, 1995). In tourism studies, consumer behaviorexpressed as*travel behavior* or *tourist behavior* encompasses three stages of tourist consumption process- pre-visit, during-visit, and post-visit (Williams & Buswell, 2003). Pre-visit includes travel motivation, making pre-trip arrangements, and gathering trip-related information. Travel experience, satisfaction with tourism services, and overall satisfaction with destination form subsequent trip evaluation, generating future behavioral intentions.

While most of the studies in extant literature have reviewed travel motivation in terms of push and pull factors (Thakur, 2016) some have focused on monetary and time-related travel costs and psychological stress (MdKhairi et al., 2019), and few have given importance to accomplishments, personal benefits and seeking distinctive experiences from the trip (Vada et al., 2019).The present study lists 35 travel motives and seeks tourist response on their motivation to travel. This would help in developing an improved understanding of the varied components of travel motivations. Although previous studies have paid attention to the constructs- travel motivation and satisfaction; these constructs have been examined independently. Researchers (Baker & Crompton, 2000) have focused on interrelationships between quality, satisfaction, and behavioral intentions. While few recent studies (El-Adly, 2019) have incorporated perceived value, there are studies (De Vos, 2019) that have found an empirical association between perceived value and satisfaction. Researchers (Leri & Theodoridis, 2019) have also found that perceived value, quality, and satisfaction affect future behavioral intentions. To the best of our knowledge, the conceptual clarification and linkages between constructs like motivation, satisfaction with tourism services, overall satisfaction with the destination, and future behavioral intentions have been superficially discussed and an empirical examination of the relationship

between these constructs is lacking in the literature.

Based on the above discussion, the current study aims to develop an integrated model of the tourist consumption process in a developing country, India. With the growing importance of the tourism sector and its contribution to national growth and development attributable toseveral factors including higher disposable income, more leisure time,and improved awareness, there is a growing need to understandtourism behavior and the associated value creation process in the tourist industry.Since tourism is a competitive and perishable product and there is a continuous shift in travelers' behavior owing to changes in their preferences and values, it is of paramount importance for tour companies to understand the factors affecting motivation to travel. A proper synthesis of tourist motivation to travel would affect marketing decisions like product development, positioning, segmentation, and advertising (Bieger&Laesser, 2002). Similarly, tour satisfaction can be influenced by bringing about changes in strategic decisions. Further, only a few tour managers have precise information on whether a tourist is revisiting a particular destination and/or involved in the same tour activity repeatedly. Such information can reveal the preferences of tourists (Hill & Alexander, 2017). Apart from affecting a tour company's profitability, destination loyalty in terms of repeat visits indicates the tour's current position in the destination life cycle and paves way for marketing ramifications accordingly. By using Partial least squares structural equation modeling (PLS-SEM), this paper explores the interrelationships between constructs employed in the study. At present, the available published tourism literature lacks the empirical examination of these constructs. Through this study, tour managers will be better able to understand the relationship between future intentions and their determinants and therefore they can work towards enhancing tour attractiveness and can allocate the company's resources accordingly. The study, therefore, defines the following objectives:

- Understanding the impact of travel motivation on satisfaction with tourism services, destination satisfaction, and behavioral intention.
- Understanding the relationship of travel motivation with destination satisfaction and behavioral intentionwith satisfaction with tourism services as a mediating variable.

The study will follow the following structure. In section 2, the relevant literature on travel motivation, satisfaction with tourism services, overall satisfaction with the destination, and behavioral intentions will be reviewed and discussed. Section 3 presents the conceptual framework and hypotheses development. The methodology employed in the study has been described in Section 4. Section 5 discusses the results. Implicationsof the study and directions for future research have been discussed in Section 6.

2. Theoretical Background

2.1.Travel Motivation

Tourism literature (Binbasioglu, 2019)has given considerable importance to travel motivation and has viewed it from the psychological and/or biological needs of an individual (Kerr and Houge Mackenzie, 2020). While understanding the travel phenomenon, previous studies have generated multiple perspectives to the fundamental question as to '*why does a person travel*' and have emphasized that motivation to travel depends upon encouragement forces leading people to look for travel destination (Novais et al., 2018) and attraction forces creating a liking for destination-related attribute (Akgün et al., 2020). Mclntosh and Goeldner (1990) have differentiated between physiological, cultural, interpersonal, and status motivators of tourism. A further review of past studies on travel motivation relate it to different tourist settings-excitement, leisure and family togetherness (Wu et al., 2019); relaxation and socialization in known group/strangers (Wong et al., 2018); visiting beaches/religious/ historical places and exploring culture (Christou et al., 2019) and exploring a destination independently (Bianchi, 2016).

2.2.Satisfaction with tourism services

Tourism literature (Suhartanto et al., 2020) postulates satisfaction from tourism services as a positive feeling experienced and the pleasure

derived by tourists through their involvement in tours and their related activities. This would include satisfaction from services provided pre-trip, en-route, destination, and return trip (Neal et al., 1999). Pre-trip activities are largely drawn from travel motivation, making pre-trip arrangements, and gathering trip-related information. The support extended by tour operators and service providers formulates the en-route satisfaction. Experience from other tourism services like accommodation, entertainment, restaurants,etc. influences the level of satisfaction from destination services. The interactions with travel carriers and personnel during return travel from destination to home formulates the return satisfaction from tourism services (Neal et al., 1999). Since customer satisfaction is the subjective evaluation of a product's perceived performance with prior expectations (Kotler & Keller, 2016), consumers tend to be satisfied if actual performance exceeds expectations (Agyeiwaah et al., 2016; Oliver, 1980).

2.3.Overall satisfaction with the destination

Researchers (Ali et al.,2016) have described overall satisfaction as an outcome of a company's overall servicesderived from individual attributes (Truong et al., 2018). McIntyre (1993) defines destination as "the location of a cluster of attractions and related tourist facilities and services which a tourist or tour group selects to visit or which providers choose to promote". Since destinations embrace a bundle of goods and services (Durasevic, 2015), individual consumer's experience is a derived function of overall experiences from consumption (Oliver, 1997). Further, tourism literature investigates destination attributes in the context of "attractions, accessibility, amenities, available packages, activities, and ancillary services" (Buhalis,2000). Consisting of multiple individual attributes, overall satisfaction with the destination is, therefore, a multidimensional construct and is drawn from the conformity between aspirations and the perceived reality of experiences (Agyeiwaah et al., 2019).

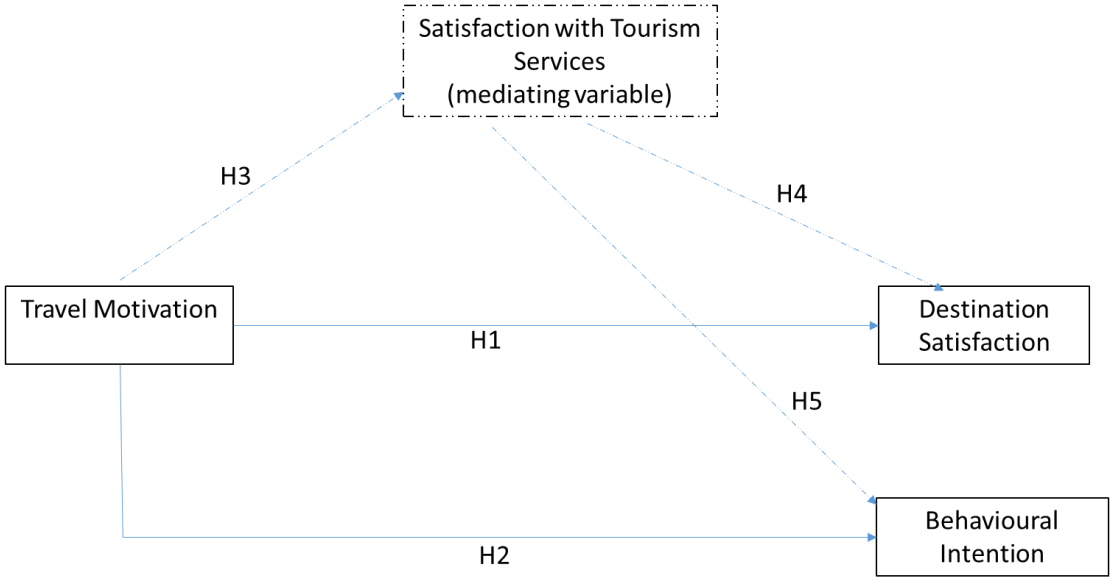
2.4.Behavioral Intentions

Reflecting consumer's purchase orientation, behavioral intention indicates consumer's predictable buying behavior in the short term (Altunel & Koçak, 2017).Previous studies (Mansour &Ariffin, 2017) have used behavioral intention as a predictor of retention and defection of consumers.Intention to revisit and intention to recommend are the most frequently used indicators of studying behavioral intention. These are important performance measures not just in the marketing literature (Chiu et al., 2014) but also in tourism literature (Cossío-Silva et al., 2019). Tourism literaturehas identified five motives for repeat visits- satisfaction with a particular destination, developed an emotional liking, meeting the same kind of people, exploring it further, reduction in risks, and taking more people along at the same destination (Han & Hyun, 2018). Further, due to the intangible nature of tour products/services, consumers rely more on information and suggestions of others through WOM communication (Jaapar et al., 2017). Hence it is assumed to be one of the most credible and high-impact generating channels of communication (Papadimitriou et al., 2018).

1. Conceptual Framework and Hypotheses development

In this section, the hypothesized relation between constructs employed in the study has been explained. Figure 1 depicts the conceptual reflective formative model (Ringle et al., 2012) used in the current study. In a reflective measurement model, since it is assumed that the construct leads to the measurement model (Hair et al., 2016), the arrow is directed from the construct to the indicator (motivation, satisfaction with services, and their indicators). On the other hand, based on the assumption that indicator variable leads to construct measurement, the arrow is directed from indicator variables to construct in a formative measurement model. Since the use of the reflective measurement model has become a standard practice among researchers to examine the relationship between exogenous (travel motivation and satisfaction with tourism services) and endogenous (destination satisfaction and behavioral intention) constructs, the present study employs both the measurement models to create a second higher model.

Figure 1. Conceptual model



Source: Authors'.

Note: Weighted arrows show direct effects; dotted arrows show mediating effect of Satisfaction with Tourism Services.

3.1. Travel Motivation and Destination Satisfaction

Travel motivation comprising of behavioral beliefs and subjective norms (Japutra et al., 2019) influence the level of destination satisfaction (Yoon &Uysal, 2005). Since satisfaction is the extent of fulfillment of consumers' expectations (Chiu et al., 2020) and thereby provides a positive assessment of travel experience; motivation to travel has been recognized as a factor in satisfaction formation (Suhartanto et al., 2020). Thus satisfaction is driven by the need and motivation to purchase the tour product. Olya et al. (2019) have demonstrated that travel motivation is an antecedent of destination satisfaction. Hence, we posit:

H1. Travel motivation is significantly and positively related to destination satisfaction.

3.2. Travel Motivation and Behavioral Intentions

Travel motivation is believed to initiate tourists' decision-making process and leads to the formulation of post-purchase behavior in terms of intention to revisit and intention to recommend (Han & Hyun, 2018). While few studies indicate that motivation to travel stimulates behavioral intention (Caber &Albayrak, 2016), and there is a positive relationship between travel motivation and intention to revisit, some studies have shown the absence of a relationship between these two (Nowacki,2009).Thus there is a further need to examine the relationship between travel motivation and behavioral intention. Further, consumer retention and revenue generation are of paramount importance to tour companies (Mansour & Ariffin, 2017), depending on consumers' future buying behavior and word of mouth communication. Hence we posit:

H2. Travel motivation is significantly and positively related tobehavioral intentions.

3.3. Travel motivation and Satisfaction with Tourism Services

For conceptualizing the determinants of consumer satisfaction, satisfaction researchers have evaluated the various attributes of a product/ service (Hong et al., 2020). Satisfaction with tourism services comprises of travelers' experience across the four different facets of travel, namely pre-trip, en route, destination, and return services (Neal et al., 1999). Though, motivation to travel is one of the factors that transpires all aspects of tourism services; its impact is larger on the satisfaction from pre-trip services (Neal et al., 2007). Tourism literature has inadequately covered the

relationship between travel motivation and satisfaction with tourism services. Hence we posit:

H3. Travel motivation is significantly and positively related tosatisfaction with tourism services.

3.4. Satisfaction with Tourism Services, Travel motivation, and Destination Satisfaction

A potential linkage exists between travel motivation and destination satisfaction (Su et al., 2020). An evaluation of tourist satisfaction presents a reflection of travel motivation and the need to travel with the assessment of tourism services. Further, destination satisfaction is an outcome of tourist evaluation of destination attributes and the subsequent satisfaction drawn from tourism services (Neal et al., 1999).Thus there seems to exist a relationship between travel motivation, satisfaction with tourism services, and destination satisfaction. Prior research has failed to test the mediating effect of satisfaction with tourism services on travel motivation and destination satisfaction. Hence we posit:

H4. Satisfaction with tourism services mediates the relationship between travel motivation and destination satisfaction.

3.5. Satisfaction with Tourism Services, Travel motivation and Behavioural Intention

Previous studies have explored the relationship between travel motivation and behavioral intention (Pestana et al., 2020). While determining the factors influencing consumer intentions, researchers have found travel motivation as a key determinant of consumer intentions (Hosany et al., 2020). Further, positive experiences during different aspects of tourism services- pre, en-route, destination, and return services are viewed by potential tourists as the most reliable source of information and thus they generate revisits and recommend intentions (Han et al., 2020). Although travel motivation and behavioral intention have been widely studied in tourism literature, a further investigation of satisfaction with tourism services mediating the relationship between travel motivation and behavioral intention will provide a comprehensive understanding. Thus we posit:

H5. Satisfaction with tourist services mediates the relationship between travel motivation and behavioral intention.

2. Methodology

4.1 Blue Print for collecting data

The target population of the study was travelers of 18 years and above age. Delhi airport was selected as a sample area as it is India's largest airport, handling the maximum number of passengers. Non-probabilistic sampling was used. Questionnaires were distributed personally to people who were at the airport, waiting for departure, and were traveling with family/friends for vacation. People were approached purely based on our judgment. While few people turned out the request for filling up or sharing their responses, there was a positive response from few travelers. Respondents were informed about the purpose of a survey before getting it filled. Sixteen such airport visits led to the generation of 1193 responses out of which 477 (approximately 40%) were valid surveys and were taken up for analysis. Researchers attempted to have demographic diversity in data collection in terms of gender, income, family size, and age. The sample consists of 38 percent females and 61 percent males with 71 percent of the respondents below the age of 35 years. Responses were collected from people aged 18 and above. This was done as by and large age indicates the level of maturity and decision-making capability of an individual. More than half of the respondents belonged to a family size of 4-6 members. Further,74.4 percent had planned the trip by themselves and remaining through the tour operator. Around 24.7 percent of respondents reported a monthly household income greater than INR 75,000. The survey was conducted for four weeks between December 15, 2019, and January 15, 2020. Christmas and New Year holidaysaround the world affect work in private offices in India, particularly in the IT sector where most of the clients from the USA or Europe are on leave. Also, almost all local schools observe Christmas and New Year break. Hence people/families pre-book and plan their travel itineraries. While trying to avoid repetition and

demonstration, we collected responses from only one member of the group/family. Out of the valid responses, it was found that approximately 84 percent had recently taken domestic trips whereas 16 percent had gone on an international trip.

Table 1. Demographics

Travel Destination	**Percent**	**Travel Plan**	**Percent**	**Gender**	**Percent**
Domestic	84.3	Planned through tour operator	25.6	Male	61.0
International	15.7	Self-planned	74.4	Female	38.0
Age	**Percent**	Total	100.0	**Monthly Household Income**	**Percent**
<35	71.1	**Family Size**	**Percent**	<35000	27.0
35-45	13.6	1 member	4.2	35-50000	19.3
45-55	10.3	2-3 Member	24.9	50-75000	28.9
>55	5.0	4-6 Member	60.8	>75000	24.7
Total	100.0			Total	100.0

n = 477

Source: Authors'.

4.2 Measures

The study focuses on reflective constructs which have been adopted from Prebensen (2004).These were, however, modified to meet the objectives of our study. Motivations for choosing travel destinations were rated on the importance given by the respondents on a Likert scale. The overall satisfaction of respondents was measured through their responses on destination satisfaction, intention to revisit, and intentions to speak positively about the destination.

4.3 Phase I

In phase, I, the content validity of the questionnaire was established by carrying out discussions with six academicians and four practitioners having expertise in tourism marketing. Based on the suggestions received, few items in the questionnaire were refined. Further, 45 responses were collected in the pilot study. It was found that all the items of reflective constructs were internally consistent (as their value was greater than 0.708).

4.4 Errors addressed

Statistical procedures were followed to enhance the content validityand reliability of the constructs. To reduce the response bias, the languageof the questionnaire was simplified and ambiguities were removed. The objective of the study was stated clearly to the respondents before seeking their responses. To identify the suitability of the candidate to act as a respondent, cross-questioning was done. Also, logical sequencing of the questionnaire was ensured so that respondents could relate to the flow of questions being asked (Danaher &Haddrell, 1996). Common Method Bias was addressed by checking VIF values(Kock, 2015). All the values in the study were within the prescribed limit of 3.3. KMO (0.819) test showed sampling adequacy of data to support the analysis.

Table 2. Inner VIF values (signifying –no common method bias)

	Behavioral Intention	Destination satisfaction
Motivation	1.186	1.298
Satisfaction with tourist services	1.159	1.374

Source: Authors'

Note: VIF- Variance Inflation Factors (VIF)

Further, potential errors were eliminated (Davidshofer& Murphy, 2005) by ensuring the non-occurrence of coverage error (Moutinho&Chien, 2007)- only visitors acted as respondents and avoiding the chance of non-response error (Johnson & Owens, 2003) as 40 percent (477/1193) response rate was achieved. The questionnaire was checked for the possibility of measurement error by formulating balanced measurement scales (5-point Likert scale).

3. Data Analysis and Results

5.1.Phase II

The study employs PLS-SEM to assess the impact of travel motivation on satisfaction with tourism services, destination satisfaction, and behavioral intention and also to explore the relationship of travel motivation with destination satisfaction and behavioral intention with satisfaction with tourism services as a mediating variable. This technique was chosen because it is a non-parametric technique and requires fewer assumptions about the distribution of data and data size (Hair et al., 2013). To deal with the missing values, missing value analysis was used. To specify the pattern of loadings, a confirmatory factor analysis (CFA) was conducted by using the factorial scheme (Esposito-Vinzi et al., 2010).

5.2. Motivation: Higher-order construct

Exploratory factor analysis (EFA) for motivation construct was carried out in SPSS and nine factors were found. CFA was carried out in SmartPLS and nine factors represented the sources of motivation- fun, family, lifestyle, water activities, relaxation, explore, heritage trip, stress buster, and self-development. These nine constructs (the first-order constructs) together reflected the higher-order construct, motivation.

Table 3. Factors for Travel Motivation

	Factors	Self-Development	Water activities	Explore	Stress Buster	Heritage trip	Relax	Fun	Lifestyle	Family
Indicators										
RTD 21		**0.724**								
RTD 22		**0.726**								
RTD 23		**0.768**								
RTD 24		**0.711**								
RTD 27		**0.718**								
RTD 2			**0.825**							
RTD 4			**0.696**							
RTD 6			**0.757**							
RTD 17				**0.729**						
RTD 18				**0.740**						
RTD 19				**0.738**						
RTD 20				**0.654**						
RTD 32					**0.815**					
RTD 33					**0.716**					
RTD 34					**0.804**					
RTD 35					**0.633**					
RTD 13						**0.784**				
RTD 14						**0.766**				
RTD 16						**0.823**				
RTD 10							**0.660**			
RTD 11							**0.703**			
RTD 8							**0.693**			
RTD 9							**0.799**			
RTD 1								**0.829**		
RTD 31								**0.826**		
RTD 28									**0.816**	
RTD 29									**0.865**	
RTD 25										**0.839**
RTD 7										**0.835**

Source: Author's.

Exploratory factor analysis (EFA) for Travel Motivation construct

5.3. Measurement model assessment (outer model)

The study takes into consideration the values of composite reliability, indicator reliability,and amount of AVE to assess the proposed model. Asall the items have loadings greater than 0.70, composite reliability is achieved (Table 4). Table 4 shows that these values range between 0.512 and 1.0 and are therefore higher than the minimum acceptable value of 0.50 (Hair et al., 2011).

Table 4. Measurement model assessment

	Cronbach's Alpha	CR	AVE
Fun	0.739***	0.813	0.684
Family	0.874***	0.824	0.701
Lifestyle	0.788***	0.828	0.707
Behavioral Intention	0.713***	0.837	0.719
Water activities	0.737***	0.804	0.579
Relax	0.781***	0.807	0.512
Explore	0.783***	0.808	0.513
Heritage Trip	0.704***	0.834	0.626
Stress Buster	0.73***	0.832	0.556
Self-Development	0.78 ***	0.85	0.532
Satisfaction with tourist services	0.8	0.852	0.524
Motivation	0.89	0.904	0.519
Destination Satisfaction	1	1	1

Source: Author's.

Note: Significance at ***P < 0.001, AVE- Average Variance Extracted; CR- Composite Reliability

To achieve discriminant validity, Fornell and Larcker's (1981) criteria were used. According to them, if the squared root of AVE for all the items is higher than the correlation among constructs, there is a presence of discriminant validity. As can be seen from table 5, this criterion is easily met (Hair et al., 2016). The item loadings ranged from 0.672 to 0.855 which ishigher than the prescribed value of 0.6 (Nunnally, 1978), thus establishing indicator validity.

Table 5. Discriminant Validity: Fornell-Larcker test

Behavioral Intention	**0.848**												
Relax	0.188	**0.715**											
Destination Satisfaction	0.538	0.027	**1**										
Explore	0.25	0.291	0.239	**0.716**									
Family	0.206	0.374	0.166	0.352	**0.837**								
Fun	0.281	0.261	0.336	0.384	0.331	**0.827**							
Heritage Trip	0.189	0.305	0.127	0.548	0.392	0.324	**0.791**						
Lifestyle	0.203	0.358	0.18	0.341	0.288	0.293	0.286	**0.841**					
Motivation	0.324	0.63	0.224	0.698	0.6	0.55	0.656	0.626	**0.499**				
Satisfaction with tourist services	0.481	0.134	0.522	0.296	0.301	0.338	0.194	0.232	0.344	**0.651**			

Self-Development	0.164	0.392	0.069	0.392	0.362	0.255	0.359	0.445	0.748	0.183	**0.73**		
Stress Buster	0.207	0.342	0.147	0.356	0.363	0.317	0.318	0.428	0.717	0.208	0.537	**0.746**	
Water activities	0.245	0.416	0.057	0.275	0.192	0.238	0.296	0.329	0.546	0.164	0.305	0.313	**0.761**

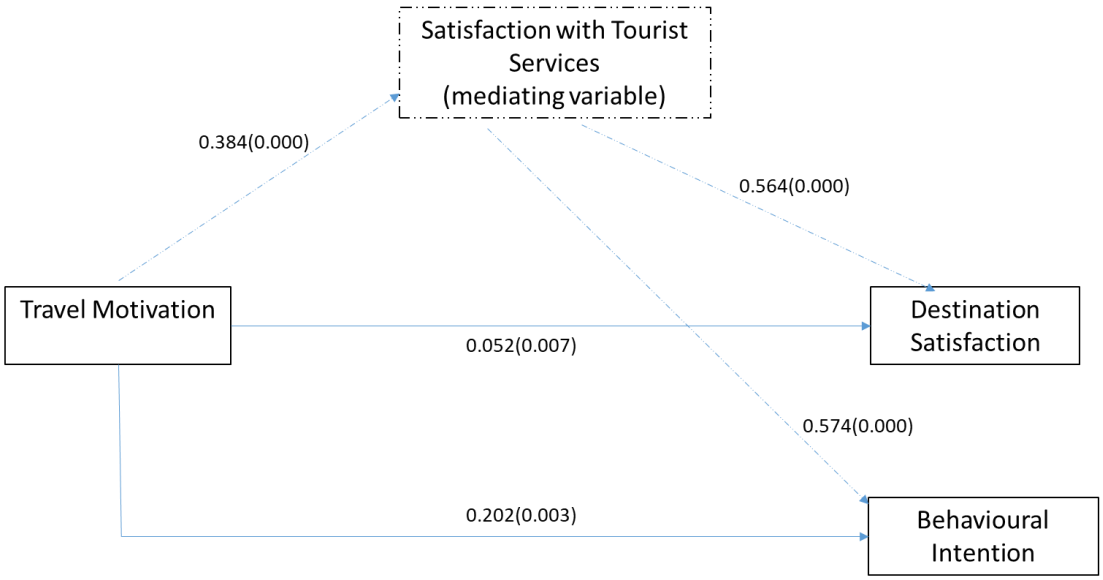
Source: Authors'.

Note: Values are square root of Average variance extracted. Off diagonal values are shared variance.

5.4. The structural model

The SmartPLS algorithm calculated R^2 measures for each endogenous variable and the path coefficients for each path within the model. R^2 for destination satisfaction, behavioral intention, and satisfaction with tourism services was 0.330, 0.484, and 0.270 respectively, which can be considered to be moderate.The significance of each path coefficient was calculated by bootstrapping (consistent PLS) using the replacement method. Results are shown in Figure 2. After bootstrapping, the significance of each path coefficient was derived. Hypotheses 1,2, and 3 were supported and partial mediation was seen in hypotheses 4 and 5 (Table 7). Model fit indices SRMR and NFI values were found to be within an acceptable range (Hair et al., 2017)- SRMR < 0.08 and NFI > 0.90. SRMR for the model was 0.07 and NFI was 0.96.

Figure 2. Structural Model



Source: Authors'.

Note: *** significant at 0.001 level; Weighted arrows show direct effects; dotted arrows show mediating effect of Satisfaction with Tourism Services.

5.5. Satisfaction with Tourism Services as a mediator

The direct, total indirect effect, specific indirect effects and total effect obtained in Smart PLS help in conducting a mediation analysis(Hair et al., 2016) and allow analyzing the single and multiple mediation models(i.e., parallel and serial mediation). This study follows Zhao et al. (2010) for understanding mediating effect.

Travel Motivation acts as a predictor of destination satisfaction and behavioral intention and is mediated by satisfaction with tourism services. After bootstrapping, direct and indirect effects were checked. In the case of travel motivation, we found that indirect effects with both the dependent variables- destination satisfaction and behavioral intention are significant. The relationship between travel motivation and destination

satisfaction as well as behavioral intention is found to be significant. This implies satisfaction with tourism services is doing partial mediation with destination satisfaction and behavioral intention.

Table 6. Mediation effects

SPECIFIC INDIRECT EFFECTS	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Motivation -> Satisfaction with tourist services -> Behavioral Intention	0.22	0.228	0.045	4.861	0
Motivation -> Satisfaction with tourist services -> Destination satisfaction	0.216	0.225	0.044	4.966	0
PATH COEFFICIENTS	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Motivation -> Behavioral Intention	0.202	0.207	0.067	3.023	0.003
Motivation -> Destination satisfaction	0.052	0.056	0.058	0.902	0.007

Source: Authors'.

Table 7. Support of Hypotheses

H1 Travel motivation significantly and positively affects destination satisfaction.	Supported
H2 Travel motivation significantly and positively affects behavioral intentions.	Supported
H3 Travel motivation significantly and positively affects satisfaction with services.	Supported
H4 Satisfaction with tourist services mediates the relationship between travel motivation and destination satisfaction.	Supported(Partial Mediation)
H5 Satisfaction with tourist services mediates the relationship between travel motivation and behavioral intention.	Supported (Partial Mediation)

Source: Authors'.

Note: Significance at $P < 0.001$

6. Discussions and Implications

Extant tourism literature has reviewed constructs like satisfaction, travel motivation, and future behavioral intentions; yet a conceptual model on these variables in the Indian context has not been examined. The present study is believed, to be capable of generating precise and useful applications for analyzing destination behavior. The study provides relevant theoretical and managerial implications. Because of the significant direct and indirect economic impact of the travel and tourism industry with other sectors of the economy (Statista, 2019), there is increasing attention by tourism marketers to market and brand tour destinations. From an academic and a tourism firm perspective, it is important to understand the consumer decision-making process concerning what and why tourists prefer and how does it affect the overall satisfaction with a particular destination.

The findings of our study suggest that the motivation behind travel is having fun, traveling around, and spending time with family. A tour manager's assessment aimed towards understanding specific needs and wants can play a useful role in influencing tourist behavior. It is only after understanding a tourist's attachment with a specific place that an attempt can be made to create unique memorable experiences. A manager's evaluation of tour attributes and motivation to travel is representative of consumers' satisfaction level and future behavioral intentions. Apart from this, a strong rationale for understanding motivation lies in planning and resource management in the tourism industry in general and particularly at destinations. For marketing promotions and communications to be successful, it is required that they be aligned with consumers' motivation to travel and they should explicitly address the way tourists seek information, their motivations behind travel, and the benefits that they seek during such travel. Further, investigating the effect of satisfaction from tourism services on destination satisfaction can enable tour companies to identify the strengths

and weaknesses of a particular destination, giving them insights for improvement.

One of the central constructs in analyzing consumer behavior is satisfaction as it is taken as an assessment barometer of consumption experiences. The findings of our study indicate that satisfaction with tourism services leads to positive WOM communication and generates repeat purchases. It is one of the key variables for customer retention (Tu, Li, &Chih, 2013), building a stronger brand image (Popp &Woratschek, 2017), enhancing revenues (Fornell, Morgeson III, &Hult, 2016), evoking consumers to pay a price premium (Homburg,Koschate and Hoyer, 2006) and maintaining firm's competitiveness. Based on this, managers need to realize the importance of analyzing satisfaction derived from various tour attributes; encourage satisfied tourists to spread a positive WOM for their product, and use this communication to promote their products or services. Managers should also realize that since favorable tourist perceptions and experiences impact post-purchase behavior positively and create company differentiation; it becomes an important driver of sustained competitive advantage; more so in an increasingly saturated marketplace. Since satisfied tourists generate recommendations and act as one of the most economical and effective ways of marketing and promotion, retaining existing (economical) consumers, apart from attracting new (costly) customers should be a built-in company's marketing strategy. By using our study, managers in the tourism industry can weave in trip motivations, satisfaction, and the willingness of tourists towards future buying and recommending behavior to assess management strategies most suitable for their companies. Managers also need to focus on tourists' emotional feelings for creating loyalty. Such relation-building prevents customer defection and its associated costs and calls for a customer satisfaction management strategy with a focus on service delivery capabilities.

The important question facing tourism marketers, following from here is, how to generate higher levels of satisfaction and product confidence amongst tourists. A proper analysis of attributes leading to tourist satisfaction and its mechanism can provide valuable inputs to marketers to enhance the existing levels of satisfaction. This can be achieved either through making suitable manipulations in the marketing mix of the product or maybe through certain strategic decisions like customer segmentation and targeting. Adopting differentiating strategies to generate higher levels of tourist satisfaction and retention can also be practiced. Personalization and customization of tour products enable customers to get closer to their desired motive/s for travel. Since travel and tourism has evolved as a sophisticated and specialized product, managers in this industry should communicate through suitable diversification of goods and services for potential tourists. Managers need to realize that satisfaction creates differentiation and vice-versa.

Also because of an increase in packaged tour demand in the recent past, destinations have acquired more importance than individual attractions. Hence it becomes important to understand that it is not the satisfaction from individual facility rather the tourist satisfaction from a destination that would generate repeat visits. It becomes important to realize and act accordingly that tourists look forward to a unique and memorable experience in the context of particular destination/s which is conditioned by their motivation to travel, satisfaction from tourism services, and circumstantial occurrences. Destinations, therefore, need to be marketed differently to ensure competitive advantage and sustained performance in highly aggressive markets. Hence managers must indulge in destination management in directing tourism supply. Further, since destinations are a bundle of goods and services and are endowed with higher levels of complexity in comparison to a single product, practitioners must realize that branding of tourist destinations would be different from the branding of products.

This study has few limitations which create scope for future research. The study was conducted in Delhi-NCR making it difficult to generalize the findings to other parts of the country and other countries. More studies should be conducted to ensure the applicability of results across nations. The study has used nonprobabilistic samples. To ensure

representativeness of the sample and better results, researchers in the future may use probabilistic samples. The current study investigated the consumer responses only for two months. This study assessed only cross-sectional data and did not examine long-term tourist behavior. To rigorously examine this model, a long-term study analyzing tourist data for multiple years can be planned. The study may also suffer from selection bias as people under 18 years are not included. As the study has been conducted in a specific setting, for model generalization, we suggest that future researchers replicate it in other settings with different attributes.

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WATER MEDIATED C-N COUPLING REACTION

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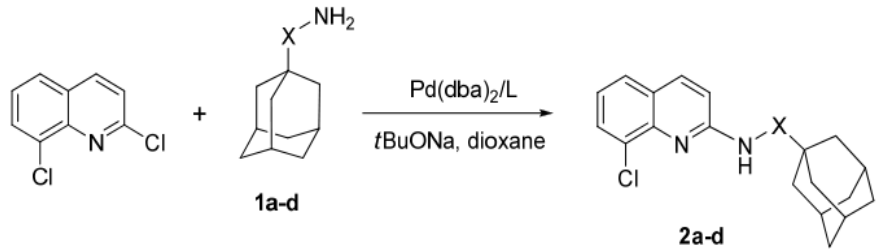
ABSTRACT

C-N Couplingreaction which can be used in a variety of chemical reactionsis discuss in this paper. Research methodology based on cheap process for C-N coupling between aryl halide and aliphatic amines.It is new develop a process that explores Buchwald-Hartwig amination reaction for C-N Coupling reaction for making N-alkyl aminoquinoline which has multiple industrial applications as a ligand.

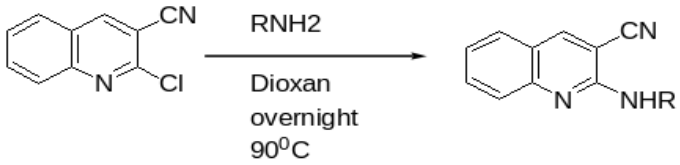
1. Introduction

Nitrogen containing compounds are of great importance because of their interesting and diverse biological activities. The construction of the C–N bond is of significant importance as it opens avenues for the introduction of nitrogen in organic molecules. Beside advancements, still the C–N bond coupling is still a major challenge for organic chemists. Because it involve harsh reaction conditions or the use of expensive catalysts in many cases. Thus, it is a challenge to develop alternative, milder and cheaper processes for the construction of C–N bonds.

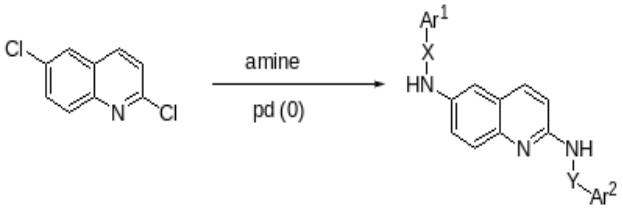
Synthesis, beginning from bulkier amine, catalyst and 2, 8-dichloroquinoline for C-N coupling has been described by Anton S. Abel et al. Drawback associated with this process is use of expensive bulkier amine which causes steric hindrance. Steric hindrances lower the rate of reaction and also lower the yield of product.



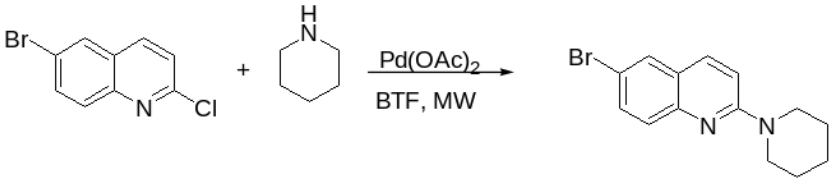
Another C-N coupling, comprising the amination of 2-chloroquinoline-3-carbonitrile along with primary amine[1] has been optimized at longer reaction time.



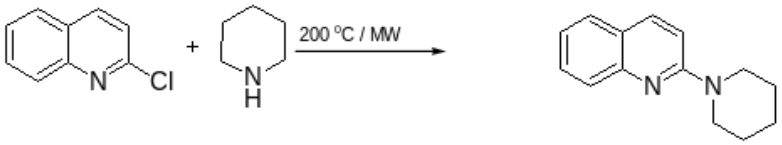
WO 2008037626 discloses that the C-N coupling reaction occurred by treating the 2, 6-dichloroquinoline with amine and palladium as catalyst under harsh reaction condition.[2] Product yield reported as only 67%.



A C-N coupling beginning with 6-Bromo, 2-chloroquinoline and secondary amine requires catalyst and harsh reaction condition as disclosed by Jessica A. Smith et al.[3]



The C-N coupling process as described by Melissa Miller *et al*, requires high temperature.[4]



In view of aforementioned drawbacks, there is a need to develop a new process for C-N bond formation.

2. Material and Methods

C-N Coupling reaction is optimized with 2-chloroquinoline-3-carbonitrile 1 (1.0 equiv), aryl/heteroaryl amine (3.0 equiv) and 3 ml water. at 25°C. The scheme of the reaction is as shown below.

1 2

Reagent: NH_2CH_2 Ph / H_20
Condition: 25 ^{0}C

R = H, Me, MeO, Et, Cl, Br

Following amines and quinolines were used to optimize the reaction.

S. No	Amines	Quinolines
1	Benzyl	6Me
2	Methyl	6MeO
3	Ethyl	7Me
4	n-Butyl	7MeO
5	Cyclohexyl	8Me
6	Isopropyl	8Et
7	N,N-Dimethyl	6Br
8	Piperidine	7Cl
9	Morpholine	
10	Aniline	

C-N Coupling reaction performed at roomtemperature. With the help of open capillary tube and using Buchi Melting-point apparatus the melting point of formed product is detected and are found that more accurate.

The structure of synthesizes product was characterized spectral analysis for example NMR, IR and etc. FTIR spectrophotometers VARIAN 3300 are used for IR detection. JEOL spectrometer is used for 1 H (300 MHz) and 13C (75 MHz). Frequency used is of AL 300 MHz TMS (tetramethylsilane) was used as internal reference for both 1H and 13C detection. CDCl3/DMSO both are used to operate the NMR analysis.

Carbon, Nitrogen and Hydrogen percentage and Mass analyses was performed on CHN Analyzer Model CE-400. Thermo LCQ

Advantage Max (ESI and APCI) Ion Trap (LCeMS/MS). All these instruments are available with from Department of Chemistry, IIT, Delhi.

Thin-layer chromatography (TLC) was used to moniter the reaction. TLC plate that used are made up of glass coated with silica gel. Mixture of polar and non-polar solvent were used as eluent.

UV chamber with UV lamp were used to visualize the spots.

Formed crude product was purified via column chromatography. Silica gel (60-120 mesh) Qualigen's was used for column chromatography.

3. Results and discussion

Initially we have optimized reaction between 2-chloroquinoline-3- carbonitrile 1a and benzyl amine. Benzyl amine (3 equiv) with 2-chloroquinoline-3- carbonitrile in water optimized at 25^0C for 3 h.

The reaction proceeded through SNAr smoothly. Amino group of benzylamine displace chlorine atom of substrate and leads to the desired product **2a** in good yields, Scheme 1.

The above mentioned C-N Coupling reaction initially optimized with various solvents such as EtOH, DMF, MeOH, CH3CN. It observed that product using ethanol as solvent obtained in quantitative yield (Table 1, entries 1-4).

Amongs various solvents, fortunately the reaction with aqueous methyl amine using ethanol as solvent under similar reaction condition proceeded very fast and overall reaction completed only in 10 min. Yield of formed product was quantitative yield (entry 5).

This result prompt us further to reoptimized reaction under similar reaction condition in water. On optimization it observed that reaction completed only in 55 min. Product yield are found to be 82% (entry 6).

On lower the molar ratio of benzyl amine (Using 2 equiv) not leads to complete reaction even after 24 h (entry 7).

Further, it is to be noted that without solvent C-N Coupling reaction resulted in incomplete conversion of reactant into product (entry 8).

1 2

Reagent: NH_2CH_2 Ph / H_20
Condition: 25 ^{0}C
R = H, Me, MeO, Et, Cl, Br

Scheme 1. C-N Coupling between **2-choloroquinoline-3-carbonitrile (1a) and benzylamine**

Table 1 Optimization reaction conditions with different solvent on C-N Coupling between 2-choloroquinoline-3-carbonitrile (1a) and benzylamine[a]

Entry	Solvent	Time (h)	Yield of 2a[b] (%)
1	EtOH	3.0	90.2
2	MeOH	3.5	60.3
3	CH3CN	5.0	75.4
4	DMF	3.5	55
5[c]	H2O	5 (min)	92
6	H2O	50	82
7[d]	H2O	24	35

a 2-Choloroquinoline-3-carbonitrile (1 mmol), benzyl amine (3.0 mmol), solvent(1 ml/mmol), 25^0C.

b Isolated yields.

c 2-Choloroquinoline-3-carbonitrile (1 mmol), benzyl amine(3.0 mmol), water(1 ml/mmol), 25 ^{0}C.

d Using 2 equiv of benzylamine.

In next step, reaction further examined using water as solvent with other amines under similar reaction. With primary and secondary amines it observed that coupling reactions proceeded smoothly. The results are discussed in Table 2 (entries 1-9).

Reagent: NH_2CH_2Ph/ H_20 Condition: 25 ^0C \

Table 2 C-N Coupling between 2-choloroquinoline/pyridine-3-carbonitriles and different alkyl/aryl amines in water

Entry	R	R'	Product	Time	Yiels(%)
1	H	Benzyl	2a	50	82
2	H	Methyl	2ab	5	92
3	H	Ethyl	2ac	20	80
4	H	n-Butyl	2ad	90	75
5	H	Cyclohexyl	2ae	25	79
6	H	Isopropyl	2af	30	82
7	H	N,N-Dimethyl	2ag	25	78
8	H	Piperidine	2ah	40	92
9	H	Morpholine	2ai	35	90
10	H	Aniline	SM	40h	00
11	6Me	Benzyl	2b	50	82
12	6MeO	Benzyl	2c	65	88
13	7Me	Benzyl	2d	57	80
14	7MeO	Benzyl	2e	70	85
15	8Me	Benzyl	2f	50	84
16	8Et	Benzyl	2g	48	88
17	6Br	Benzyl	2h	40	82
18	7Cl	Benzyl	2i	45	80
19	3	Benzyl	4a	60	85
20	3	Methyl	4b	10	80
21	3	n-Butyl	4c	95	78
22	3	N,N-Dimethyl	4d	30	72
23	3	Morpholine	4e	20	85

Amines with lengthy alkyl chain do not alter the yield of desired product (entries 2-4). Alternatively, under similar reaction conditions amines with branched alkyl chain increase the yield of the products. Difference in result arises due to inductive effect which is associated with alkyl groups (entries 5 and 6).

In discussing secondry amines aliphatic open chain (entry 7), and cyclic secondary amines, it seems that cyclic enhance the yields significantly (entries 8 and 9).

While aromatic amine does not react at all even at higher temperature (entry 10).

Further C-N Coupling reactions also examined using different 2-chloroquinoline-3-carbonitrile derivatives (1b-i) under similar reaction condition. Results are mentioned in Table 2 (entries 11-18).

In 2-chloroquinoline-3-carbonitrile when electron withdrawing groups present at benzene ring increase the reaction rate whilealternatively electron donating groups in contrast decrease the rate of the reaction.

Along with quinoline derivative we have also examined same reaction under similar reaction condition with pyridine (Scheme 2). Thus, 2-chloro-5-phenylpyridin-3-carbonitrile (3) with different amines primary/secondary, aliphatic/aromatic provided desired amino pyridines 4ae in good yields.

The results are summarized in Table 2 (entries 19-23).

3 4

Reagent: NH_2CH_2Ph/ H_20
Condition: 25 ^{0}C
Scheme 2. Synthesis of 2-aminosubstituted pyridine-3-carbonitrile (4a) from 2-choloropyridine-3-carbonitrile (3).

3. Conclusions

In conclusion, a noval route for C-N Coupling between 2- chloroquinoline-3-carbonitriles and different amines in aqueous media is to be discovered. The reaction proceeded via simple SNAr reaction.

4. Experimental section

4.1. General procedure for synthesis of 2-N-Benzylaminoquinoline-3-carbonitriles (2)

2-Chloroquinoline-3-carbonitrile (1 eq.) was treated with benzylamine (3 eq.) in presence of water (3ml) at room temperature. The reaction proceeded after 15 min as monitored by thin layer chromatography (TLC) and completed after 3 hrs checked by same techniques. After completion of reaction, the reaction mixture was poured into ice-cold water. As a result a yellow-green precipitate of 2-N-Benzylaminoquinoline-3-carbonitrile appeared which was filtered out and washed out 2-3 times by pure water. After drying 2-N-Benzylaminoquinoline-3-carbonitrile, the spectral analysis was carried out to confirm the product. 2-N-Benzylaminoquinoline-3-carbonitrile hence obtained further undergoes purification by column chromatography and is obtained in quantitative yield.

4.1.1. 2-Benzylaminoquinoline-3-carbonitrile (2a). mp 118 _C; 1H NMR (300 MHz, CDCl3): d¼4.81 (d, J¼5.2 Hz, 2H), 5.52 (s, 1H, D2O exchangeable), 7.34-7.43 (m, 3H), 7.62-7.731(m, 6H), 8.22 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼45.9, 95.3, 116.4, 121.5, 123.6, 126.7, 127.7, 128.7, 128.7, 128.8, 132.4, 138.3, 143.1, 149.2, 153.4; IR (KBr): 2217 (CN), 3382 (NH)Anal. Calcd for C17H13N3: C, 78.74; H, 5.05; N, 16.20%. Found: C, 78.62; H,5.00; N, 16.20%.

4.1.2. 2-Methylaminoquinoline-3-carbonitrile (2ab). mp 120 ^{0}C (d); 1 H NMR (300 MHz, CDCl3): d¼3.16 (d, J¼4.1 Hz, 3H), 5.81(s, 1H, D2O exchangeable), 7.59-7.75 (m, 4H), 8.21 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼48.1, 95.8, 116.6, 121.1, 123.1, 126.2, 128.2, 132.7, 143.5, 149.8, 154.8; IR (KBr): 2222 (CN), 3385 (NH). Anal. Calcd for C11H9N3 C, 72.11; H, 4.95; N, 22.94%. Found: C, 72.08; H, 4.95; N, 21.32%.

4.2.3. 2-Ethylaminoquinoline-3-carbonitrile (2ac). mp 60-63 ^{0}C; 1 H NMR (300 MHz, CDCl3): d¼1.33 (t, J¼7.3 Hz, 3H), 3.66 (q, J¼7.1 Hz, 2H), 5.17 (br s, 1H, D2O exchangeable), 7.54-7.64 (m, 4H), 8.18 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼14.3, 36.6, 95.3, 116.4, 121.2, 123.3, 126.4, 128.1, 132.6, 143.9, 149.9, 153.3; IR (KBr): 2223 (CN), 3399 (NH). Anal. Calcd for C12H11N3 C, 73.06; H, 5.62; N, 21.31%. Found: C, 73.06; H, 5.65; N, 21.34%.

4.2.4. 2-n-Butylaminoquinoline-3-carbonitrile (2ad). mp: 191^{0}C (decomp.); 1 H NMR (300 MHz, CDCl3): d¼0.98 (t, J¼7.2 Hz, 3H), 1.42-1.55 (m, 1H), 1.63-1.75 (m, 2H), 3.63 (m, 2H); 5.21 (br s, 1H, D2O exchangeable), 7.55-7.71 (m, 4H), 8.20 (s, 1H); 13C NMR (75 MHz, CDCl3): d 13.9, 20.7, 31.8, 41.9, 95.4, 116.8, 121.4, 123.2, 126.9, 128.2, 132.8, 143.9, 149.6, 153.8; IR (KBr): 2217 (CN), 3369 (NH). Anal. Calcd for C14H15N3 C, 74.64; H, 6.71; N, 18.65%. Found: C, 74.66; H, 5.61; N, 18.63%.

4.2.5. 2-Cyclohexylaminoquinoline-3-carbonitrile (2ae). mp: 131^{0}C; 1 H NMR (300 MHz, CDCl3): d¼1.24-1.32 (m, 4H), 1.65-1.84 (m, 4H), 2.12-2.16 (m, 2H), 4.14-4.24 (m, 1H), 5.08 (br s, 1H, D2O exchangeable), 7.56-7.69 (m, 4H), 8.19 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼13.9, 20.2, 31.4, 41.3, 95.3, 116.8, 120.8, 123.1, 126.2, 128.9, 132.9, 143.5, 149.7, 153.9; IR (KBr): 2219 (CN), 3405 (NH). Anal.

Calcd for C16H17N3 C, 74.92; H, 6.37; N, 17.71%. Found: C, 74.92; H, 6.38; N, 17.74%.

4.2.6. 2-Isopropylaminoquinoline-3-carbonitrile (2af). mp: 111-113^{0}C; 1 H NMR (300 MHz, CDCl3): d¼1.31 (d, J¼6.3 Hz, 6H), 4.45-4.56 (m, 1H), 5.02 (s, 1H, D2O exchangeable), 7.52-7.71 (m, 3H); 7.95 (t, J¼7.8 Hz, 1H), 8.19 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼22.7, 42.9, 95.4, 116.6, 120.8, 123.2, 126.9, 128.4, 132.8, 143.6, 149.9, 153.3; IR (KBr): 2229 (CN), 3448 (NH). Anal. Calcd for C13H13N3 C, 73.91; H, 6.20; N, 19.89%. Found: C, 73.88; H, 6.18; N, 19.89%.

4.2.7. 2-Dimethylaminoquinoline-3-carbonitrile (2ag). mp 191^{0}C; 1 H NMR (300 MHz, CDCl3): d¼3.34 (s, 6H), 7.61-7.72 (m, 4H), 8.31(s, 1H); 13C NMR (75 MHz, CDCl3): d¼40.7, 96.4, 118.6, 121.5, 123.7, 126.8, 127.7, 132.5, 146.9, 148.5, 156.8; IR (KBr): 2222 (CN), 3383 (NH). Anal. Calcd for C12H11N3 C, 73.07; H, 5.62; N, 21.30%. Found: C, 72.08; H, 5.61; N, 21.27%.

4.2.8. 2-Piperidine-1-yl-quinoline-3-carbonitrile (2ah). mp 171^{0}C; 1 H NMR (300 MHz, CDCl3): d¼1.68-1.79 (m, 6H), 3.67 (t, J¼4.8 Hz, 4H), 7.35 (t, J¼7.4 Hz, 1H); 7.65-7.77 (m, 3H), 8.32 (s, 1H); 13C NMR (75 MHz, CDCl3): d 24.6, 25.8, 50.2, 99.4, 117.9, 122.1, 124.4, 127.6, 127.7, 132.4, 146.1, 148.9, 158.7; IR (KBr): 2232 (CN), 3422 (NH). Anal. Calcd for C15H15N3: C, 75.92; H, 6.37; N, 17.71%. Found: C, 74.91; H, 6.37; N, 17.71%.

4.2.9. 2-Morpholine-4-yl-quinoline-3-carbonitrile (2ai). mp 81^{0}C; 1 H NMR (300 MHz, CDCl3): d¼3.71 (t, J¼4.5 Hz, 4H), 3.92 (t, J¼4.8 Hz, 4H), 7.41 (t, J¼6.9 Hz, 1H), 7.66--7.82 (m, 3H), 8.39 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼49.3, 66.9, 99.1, 117.7, 122.3, 125.2, 127.7, 127.8, 132.5, 146.3, 148.4, 157.9; IR (KBr): 2217 (CN). Anal. Calcd for C14H13N3O: C, 70.28; H, 5.48; N, 17.56%. Found: C, 70.21; H, 5.46; N, 17.58%.

4.2.10. 2-Benzylamino-6-methyl-quinoline-3-carbonitrile (2b). mp 1356 ^{0}C (decomp.); 1 H NMR (300 MHz, CDCl3): d¼2.44 (s, 3H), 4.82 (d, J¼5.7 Hz, 2H), 5.43 (s, 1H, D2O exchangeable), 7.27-7.43 (m, 5H), 7.53 (d, J¼9.3 Hz, 1H), 7.63-7.66 (m, 2H), 8.18 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼21.1, 45.6, 95.9, 116.3, 121.4, 126.5, 126.3, 127.7, 127.5, 128.5, 133.9, 135.4, 138.6, 143.5, 147.7, 153.9; IR (KBr): 2217 (CN), 3339 (NH). Anal. Calcd for C18H15N3: C, 79.10; H, 5.53; N, 15.37%. Found: C, 78.91; H, 5.42; N, 15.19%.

4.2.11. 2-Benzylamino-6-methoxy-quinoline-3-carbonitrile (2c). mp 122 ^{0}C; 1 H NMR (300 MHz, CDCl3): d¼3.88 (s, 3H), 4.78 (d, J¼5.4 Hz, 2H), 5.38 (s, 1H, D2O exchangeable), 6.92 (s, 1H), 7.24-7.42 (m, 6H), 7.65 (d, J¼9.3 Hz, 1H), 8.13 (s,1H); 13C NMR (75 MHz, CDCl3): d¼45.3, 55.4, 95.5,105.8,116.7, 121.8, 125.2, 127.3, 128.1, 128.2, 128.8, 138.6, 142.9, 145.`1, 152.9, 157.; IR (KBr): 2224 (CN), 3379 (NH). Anal. Calcd for C18H15N3O: C, 74.72; H, 5.23; N, 14.52%. Found: C, 74.66; H, 5.07; N, 14.49%.

4.2.12. 2-Benzylamino-7-methyl-quinoline-3-carbonitrile (2d). mp 121-124^{0}C; 1 H NMR (300 MHz, CDCl3): d¼2.48 (s, 3H), 4.82 (d, J¼5.4 Hz, 2H), 5.48 (br s, 1H, D2O exchangeable), 7.12 (d, J¼7.5 Hz,1H), 7.22-7.55 (m, 7H), 8.19 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼22.1, 45.1, 94.2, 116.8, 120.2, 125.8,126.5,127.8,127.9,127.4,128.5,138.9,143.3,143.3,149.5,153.8; IR (KBr): 2215 (CN), 3428 (NH). Anal. Calcd for C18H15N3: C, 79.10; H, 5.53; N, 15.37%. Found: C, 79.03; H, 5.48; N, 15.36%.

4.2.13. 2-Benzylamino-7-methoxy-quinoline-3-carbonitrile (2e). mp 121^{0}C; 1 H NMR (300 MHz, CDCl3): d¼3.92 (s, 3H), 4.72 (d, J¼5.4 Hz, 2H), 5.37 (br s, 1H, D2O exchangeable), 6.95 (s, 1H), 7.14 (s, 1H), 7.24-7.42 (m, 2H), 7.52-7.53 (m, 1H), 7.63 (d, J¼9.3 Hz, IH), 7.97 (d, J¼9.3 Hz, 1H), 8.17 (s, 1H), 8.46 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼42.6, 55.3, 97.3, 105.8, 112.2, 116.9, 117.7, 123.4, 126.8, 127.3, 128.1, 128.2, 138.2, 143.9, 148.7, 152.2; IR (KBr): 2217 (CN), 3391 (NH). Anal. Calcd for C18H15N3: C, 74.72; H, 5.23; N, 14.52%. Found: C, 74.71; H, 5.18; N, 14.43%.

4.2.14. 2-Benzylamino-8-methyl-quinoline-3-carbonitrile (2f). mp 122^{0}C; 1 H NMR (300 MHz, CDCl3): d¼2.61 (s, 3H), 4.82 (d, J¼5.7 Hz, 2H), 5.63 (br s, 1H, D2O exchangeable), 7.14 (t, J¼7.5 Hz,1H), 7.26-7.36 (m, 2H), 7.42-7.51(m, 5H), 8.21 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼17.1, 45.2, 95.1, 116.3, 121.1, 123.1, 125.2, 127.5, 127.8, 128.4, 132.7, 134.5,

138.2, 144.1, 148.2, 152.8; IR (KBr): 2221 (CN), 3452 (NH). Anal. Calcd for C18H15N3: C, 79.10; H, 5.53; N, 15.37%. Found: C, 78.98; H, 5.45; N, 15.18%.

4.2.15. 2-Benzylamino-8-ethyl-quinoline-3-carbonitrile (2g). mp 118-120^{0}C; 1 H NMR (300 MHz, CDCl3): d¼1.24 (t, J¼7.4 Hz, 3H), 3.05 (q, J¼7.6 Hz, 2H), 4.86 (d, J¼5.6 Hz, 1H), 5.67 (s, 1H, D2O exchangeable), 7.17-7.37 (m, 3H), 7.47-7.57 (m, 5H), 8.24 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼14.4, 24.6, 45.7, 95.4, 116.9, 121.4, 123.4, 125.5, 127.6, 127.4, 128.5, 131.6, 138.7, 140.5, 144.3, 147.8, 152.9; IR (KBr): 2225 (CN), 3445 (NH). Anal. Calcd for C19H17N3: C, 79.41; H, 5.96; N, 14.62%. Found: C, 79.35; H, 5.55; N, 14.64%.

4.2.16. 2-Benzylamino-6-bromoquinoline-3-carbonitrile (2h). mp: 161^{0}C (decomp.); 1 H NMR (300 MHz, CDCl3): d¼4.81 (d, J¼5.4 Hz, 2H), 5.52 (br s, 1H, D2O exchangeable), 7.32-7.42 (m, 3H), 7.52-7.74 (m, 5H), 8.24 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼45.5, 95.5, 116.4, 119.6, 124.3, 127.4, 128.5, 128.6, 128.7, 128.8, 131.6, 138.5, 143.7, 149.9, 154.2; IR (KBr): 2217 (CN), 3372 (NH). Anal. Calcd for C17H12BrN3: C, 60.37; H, 3.58; N, 12.43%. Found: C, 60.31; H, 3.58; N, 12.41%.

4.2.17. 2-Benzylamino-7-chloroquinoline-3-carbonitrile (2i). mp: 141^{0}C; 1 H NMR (300 MHz, CDCl3): d¼4.81 (d, J¼5.4 Hz, 2H), 5.51 (br s, 1H, D2O exchangeable), 7.21-7.41 (m, 4H), 7.49-7.63 (m, 4H), 8.21 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼43.8, 94.1, 116.7, 119.2, 125.3, 126.3, 127.2, 128.3, 138.3, 143.7, 143.3, 149.5, 153.8; IR (KBr): 2211 (CN), 3391 (NH). Anal. Calcd for C17H12ClN3: C, 69.51; H, 4.12; N, 14.30%. Found: C, 69.51; H, 4.12; N, 14.25%.

4.2.18. 2-Benzylamino-5-phenyl-pyridine-3-carbonitrile (4a). mp: 131^{0}C (decomp.); 1 H NMR (300 MHz, CDCl3): d¼4.72 (d, J¼5.4 Hz, 2H), 5.52 (br s, 1H, D2O exchangeable), 7.32-7.34 (m, 4H), 7.43-7.45 (m, 4H), 7.88 (s, 1H), 8.56 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼40.4, 45.5, 91.5, 116.7, 126.4, 127.4, 128.9, 129.4, 136.8, 138.1, 139.3, 142.2, 150.1, 151.3, 157.1; IR (KBr): 2212 (CN), 3362 (NH). Anal. Calcd for C19H15N3: C, 79.98; H, 5.30; N, 14.73%. Found: C, 79.91; H, 5.29; N, 14.71%.

4.2.19. 2-Methylamino-5-phenyl-pyridine-3-carbonitrile (4b). mp: 119^{0}C; 1 H NMR (300 MHz, CDCl3): d¼ 3.12 (d, J¼4.8 Hz, 3H), 5.22 (br s,1H, D2O exchangeable), 7.43-7.45 (m, 5H), 7.85 (s, 1H), 8.56 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼41.6, 91.7, 117.6, 125.8, 125.7, 126.5, 127.4, 129.4, 136.5, 139.3, 151.4, 157.7; IR (KBr): 2219 (CN), 3362 (NH). Anal. Calcd for C13H11N3: C, 74.62; H, 5.30; N, 20.08%. Found: C, 74.62; H, 5.18; N, 19.94%.

4.2.20. 2-Butylamino-5-phenyl-pyridine-3-carbonitrile (4c). mp: 83^{0}C; 1 H NMR (300 MHz, CDCl3): d¼0.94-1.03 (m, 3H), 1.43-1.44 (m, 2H), 1.64-1.66 (m, 2H), 3.53-3.59 (m, 2H), 5.19 (br s, 1H, D2O exchangeable), 7.33-7.43 (m, 5H), 7.83 (s,1H), 8.53 (s,1H); 13C NMR (75 MHz, CDCl3): d¼13.3, 20.4, 31.4, 41.5, 91.5, 116.5, 125.6, 126.6, 127.3, 129.3, 136.3, 139.8, 151.3, 157.9; IR (KBr): 2217 (CN), 3361 (NH). Anal. Calcd for C16H17N3: C, 76.46; H, 6.82; N, 16.72%. Found: C, 76.40; H, 6.79; N, 16.58%.

4.2.21. 2-Dimethylamino-5-phenyl-pyridine-3-carbonitrile (4d). mp: 122^{0}C; 1 H NMR (300 MHz, CDCl3): d¼3.32 (s, 6H), 7.32-7.48 (m, 5H), 7.94 (s, 1H), 8.54 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼40.5, 90.6, 119.5, 125.4, 126.4, 127.4, 129.3, 136.4, 142.4, 150.4, 158.8; IR (KBr): 2214 (CN), 336 (NH). Anal. Calcd for C14H13N3: C, 75.31; H, 5.87; N, 18.82%. Found: C, 75.12; H, 5.81; N, 18.72%.

4.2.22. 2-Morpholin-4-yl-5-phenyl-pyridine-3-carbonitrile (4e) mp: 108 ^{0}C; 1 H NMR (300 MHz, CDCl3): d¼3.79 (d, J¼4.5 Hz, 4H), 3.88 (d, J¼4.8 Hz, 4H), 7.41-7.46 (m, 5H), 7.97 (s, 1H), 8.52 (s, 1H); 13C NMR (75 MHz, CDCl3): d¼48.9, 66.2, 94.2, 117.1, 126.1, 127.6, 127.8, 129.3, 135.7, 141.8, 150.2, 159.2; IR (KBr): 2222 (CN), 3361 (NH). Anal. Calcd for C16H15N3O: C, 72.43; H, 5.70; N, 15.84%. Found: C, 72.31; H, 5.69; N, 15.79%.

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ROLE OF KISAN CREDIT CARD SCHEME IN THE GROWTH OF APPLE PRODUCTION IN DISTRICT SHOPIAN, JAMMU AND KASHMIR, A CASE STUDY OF JAMMU AND KASHMIR BANK

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ABSTRACT

For horticulture growth, Kisan Credit Card was one of the best schemes and programmes launched and designed by National Bank for Agriculture and Rural Development (NABARD) to help the farmers during harvesting and plantation. This scheme was established in 1998 for issuing credit facilities to the farmers based on their farm holdings so that the farmers use these credit facilities to produce farm adjuration such as Plants, Seeds, Fertilizers, and Pesticides. In Jammu and Kashmir, The Jammu and Kashmir Bank plays a crucial role in providing the Kisan credit loan to the farmers for horticulture purposes. The present research work tells about the role and performance of the KCC scheme in the growth and development of Apple production in Jammu and Kashmir. Also, it focuses on the number of cards issued by Jammu and Kashmir Bank and the amount disbursed among the cardholders in-district Shopian.

Keywords: *Jammu and Kashmir Bank, Kisan Credit Card Scheme, Apple Production*

1. Introduction

In 1998-99, the Union Finance Minister stated about the banks' introduction of Kisan Credit Card' in his budget speech. The KCC scheme has been designed as per the model and scheme prepared by NABARD[1]. The KCC was introduced for issuing credit facilities to the cardholders on the ground of their farm holdings. Then, the farmers use these credit facilities to produce farm inputs such as Seeds, Plants, Fertilizers, and Pesticides. Kisan Credit Card (KCC) scheme has played a significant role in developing the horticulture sector[2]. KCC aims at adequate and timely support from the banking system to the farmers for their short term production.Credit needs for cultivating crops, purchasing input, etc.,flexibly and effectively. The National Bank for Agriculture and Rural Development (NABARD) prepared this model scheme, mainly to provide loans to the farmers for agricultural needs. Another aim of the KCC-Scheme is to fulfil timely and short-term credit facilities to the farmers for planting and harvesting the crops in such seasons. This scheme was established to decrease the dependence of Indian farmers on the informal banking sector like money lenders[3].

In India, farmers face so many problems in acquiring adequate finance from banks, such as long draw out documentation and processing, complex practices by banks and other financial institutions, deficiency of awareness, and detainment in processing among farmers regarding benefits of the KCC scheme.The information collected from the public sector banks and NABARD 187.03 lakh KCC with a credit limit of Rs.1.76lakh crore have been sanctioned to farmers across the country during 29th January 2021. The KCC programme has been successfully carried with 10 82,647 issued up to the end of June 2017[4].

2. Methodology of the Research Study:

The study is based on the secondary data source collected from Corporate Head Office Srinagar, Cluster head office district Shopian, and other Jammu Kashmir Bank Shopian district branches. For analyses, the data, simple percentage method has been used to Kisan Credit Card scheme

3. Review of Literature

Sheikh, T. H., et al. (2019)[5] focused on the progress and achievement of the Kisan Credit Card scheme in the outcome of Horticulture Sector in district Anantnag of Jammu and Kashmir. The researcher attempts to show the number of Kisan credit cards issued by Jammu and Kashmir bank and the amount disbursed among Anantnag, the cardholders in the Anantnag district. From this research study,

about 47848 Kisan Credit Cards were issued with5431633952 amount disbursed.

Jahangir Ali et al. (2018)[6]reportedbehaviour of prices and arrivals of apple fruit inNarwal market of Jammu to estimate their trend. This research work was based on secondary data of one decade. From all the above studies of the research problem, the result showed a positive trend in both price and arrivals of apple in Narwal market of Jammu. It was informing people about the latest technology nor training the cultivators. So the economic status of growers had severely affected by the bargain-basement prices of apple fruits.

Amin, I. U., & Jan, A. (2017)[7]examined the literature of the apple industry and almost tries to examine the different financing sources, which are functioning presently in the apple industry. In this study period, the researchers explained that among the non-institutional financing sources, the local peasant entrepreneurs and outside state fruit merchants play asignificant role.

Hirwe, R. A et al. (2016)[8]discoveredthat the Kisan Credit Card Scheme's strike among those provided credit facilities by Financial Institutions in Maheshwar block, Khargone district of Madhya Pradesh. This credit facility is for the support of crops cultivation and improving farmers' standard of living.

Bhat.TA (2014)[9] explained in this research paper that the apple industry is the backbone of the Kashmir economy, particular the Shopian district; about 60% of householders are dependent on apple production. The researcher attempts to know the concussion of apple production aftermath in rural areas and examine the marketing system prevailing in the apple trade. The Horticulture department is not keenly watching the apple fields, nor the other things for the wellbeing of the apple crop.

4. Objectives

This study is based on the following objectives

- To analyses the number of Kisan Credit Cards issued by the Jammu Kashmir bank and the amount distributed among the apple farmers in district Shopian to fulfil their basic needs of apple cropping.
- To know the role of KCC scheme in the growth of Apple crop in district Shopian.

5. Area of Study

For the research work, the area selected by the researcher is district Shopian. Shopian is located in the southern part of the Kashmir valley of Jammu and Kashmir. It is also called the apple town of Kashmir valley.Shopian is located at 33.72^0 North to 74.83^o East. District Shopian is spread over an area of 612.87 km. As per the census 2011, the district has 2011 villages, among which 03 villages are uninhabited. The district's population is 2 66,215, giving the district Shopianranking of 577^{th} in India (out a total of 640). It has a population density of 852 inhabitants per square kilometre. District Shopian is 45 km (28 miles) from Srinagar.

6. Kisan Credit Card Scheme and Growth in Horticulture Sector

There is an apprehensible change in horticulture growth and development in Jammu and Kashmir. Nearly 7 lakh families comprise 33 lakh people totally dependent directly or indirectly on the horticulture sector in Jammu and Kashmir. The horticulture sector is the backbone of Jammu and Kashmir, especially Kashmir Valley. It is amount area for the Government of Jammu and Kashmir. In the past, various programmes have been enforced, aftermath higher level of income is associated with the growth and development of the horticulture sector, thereby improving the quality of life in Jammu and Kashmir. KCCScheme is the most fruitful programme for providing financial aid to the farmers in the Union Territory of Jammu and Kashmir.The KCC Scheme provides timely and interim loans to the cardholders during theharvesting and planting of apple trees.

In 2007 it was reported that Jammu and Kashmir government pointed out that 74301 Cards were issued with the disbursement of 283.7 crores, but 124365 Kissan Credit Cards was issued in 2012. The KCC programme has been successfully carried with 10,82,647 issued up to the end of June 2017. The following table 1 gives the details of KCC issued and the amount disbursed branch wise in district Shopian.

Table 1: Details of Kisan Credit Cards (KCC) issued and amount disbursedbranch wise in districtShopian, Jammu and Kashmir

Sr.No	Branch Name	Detail of KCC Issued	Percentage of KCC Issued	Amount Disbursed (Crores)	Percentage of Amount Disbursed Among Beneficiaries
01	**Batpora**	684	2.24%	876.48	1.66 %
02	**Check Choland**	445	1.46%	776.32	1.47 %
03	**ChitragamShopian**	638	2.10%	1288.11	2.45 %
04	**Court Road Shopian**	739	2.42%	919.99	1.74 %
05	**D K Pora**	318	1.04%	570.13	1.08 %
06	**Heff**	131	0.43%	162.8	0.30 %
07	**Herman**	1701	5.58%	3477.64	6.61 %
08	**Hospital Road Shopian**	1687	5.54%	2860.86	5.44 %
09	**Imam Sahib Shopian**	2375	7.80%	5145.35	9.78 %
10	**Kachdora**	1733	5.69%	3437.39	6.54 %
11	**Kaprin**	1798	5.90%	2316.31	4.40 %
12	**Keller**	2887	9.48%	4165.01	7.91 %
13	**Keygam**	1404	4.61%	2543.51	4.83 %
14	**Kundalan**	530	1.74%	774.9	1.47 %
15	**NagbalShopian**	1023	3.35%	2070.6	3.93 %
16	**Pinjura**	1841	6.06%	3611.23	6.90 %
17	**Ratnipora**	569	1.86%	749.48	1.42 %
18	**Shopian Main**	2512	8.24%	4257.58	8.08 %
19	**Trenz**	816	2.67%	1414.23	2.68 %
20	**Turk Wangan**	1308	4.30%	2443.98	4.64 %
21	**Vehil**	3045	10.04%	4560.79	8.67 %
22	**Wachi**	485	1.60%	584.2	1.10 %
23	**Zainapora**	1780	5.85%	3624.67	6.90 %
	Total	**30449**	**100%**	**52631.56**	**100%**

Source: Cluster Head Office District Shopian, JK Bank

7. Analysis of the Research study

The total number of Kisan Credit Cards issued by Jammu Kashmir bank among the cardholders in district Shopian is 30449 with amount {52631.56}crores disbursed among the KCC holders. From the following above data, it is observed that Vehicle Branch is at the top with 3045 Kisan Credit Cards issued of [10.04%] among the farmers with4560.79 crores disbursed among the KCC holders, at the second position Keller branch issued 2887 of cards{9.48%}with 4165.01 crores disbursed among the farmers followed by the Vehicle branch, Shopian main branch issued 2512{8.24%} cards, while as branch Imam Sahib Shopian issued 2375 {7.80%} cards. It is also observed that the Heff branch issued only 131 cards with the percentage of 0.43%; this branch is on the bottom among all the branches of issuing the Credit cards with the amount disbursed among the KCC holders {0.30%}. The Imam Sahib branch is at the top among all the branches of Jammu and Kashmir in Shopian district with the amount disbursed 5145.35crores{9.78%} of among the KCC holders and Vehil branch is on the second position in the disbursement of amount with 4560.79crores {8.67%} followed by the Imam sahib branch. Same as the Heff branch is on the bottom level with the disbursement of amount 1.62 crore of {0.30%}, actually it is a trial branch in the Heff area from last three years.

8. Conclusion

i. It is observed that Vehil branch is at the top in the number of KCC issued 3045, Keller branch is at the second position in the number of cards issued 2887 followed by the Vehil branch. Also,the Shopian Main branch issued 2512 cards among the apple farmers,Heff branch issued only 131 cards among the farmers.

ii. It is also observed that Imam Sahib Shopian branch is at the top among all the branches in district Shopian in the disbursement of amount with 5145.35Crores, Vehil branch is on the

second position with the amount disbursed among the farmers 4560.79 crores followed by Imam Sahib branch, and Heff branch is at the bottom with the amount disbursed 162.8 crores among the farmers.

iii. It is observed that 30449 Kisan Credit Cards were issued with 52631.56 crores amount disbursed by the different Jammu and Kashmir bank branches in the Shopian district.

iv. It is also summed up that 10, 82,647 Kisan credit cards were issued from Jammu and Kashmir Bank in 2017. This scheme is used by farmers very regularly ascompared to 2012 with the number of cards issued 74301.

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STRUCTURAL, MORPHOLOGICAL AND MAGNETIC STUDY OF TERBIUM DOPED $NIFE_2O_4$ SPINELFERRITES VIA A SAFE HONEY MEDIATED GREEN SYNTHESIS METHOD

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ABSTRACT

Spinel structured $NiTb_xFe_{2-x}O_4$(X=0.00, 0.15)spinel ferrite nanostructures were successfully prepared above 800°C by novel natural honey-mediated green-synthesis route. The comprehensive characterizations of the ferritenanostructures and study of the magnetic properties werecarried out by XRD, SEM,TEM, and VSM like instrumentation techniques, respectively. The consequence of Tb^{3+} ions on structural, morphological and magnetic characterizations of nickel-ferrite nanostructures wasexamined. XRD confirmed the inverse spinel cubic structure of the prepared material. Magnetic measurement derived from Hysteresis-Loop revealed that there is a decline in saturation magnetization (M_s) due to the lower magnetic ordering of Tb^{3+} cations. TheRemanence(M_r) and Coercivity (H_c)also showed a decline with Tb^{3+}substitution and thus predominating the superparamagneticbehaviour in terbium doped Ni-ferrites.

Keywords: *Green Synthesis, Magnetic Ni-ferrite, Tb^{3+}Cations, Morphology, Magnetic studies, Magnetization, CoerciveField.*

1. Introduction

Material science has fashioned the growthand development of civilizations since the crack of dawn of mankind. Materials are regarded as an essential aspect of civilization. The dramatic development in living standards is only by advancing new materials. The modern age is genuinely known as the age of smart materials that have a promising ability to alter the mode via external stimuli in the form of stress, temperature, electro-magnetic fields, moisture, etc**.** It has been reported that a particle reveals remarkable and exciting properties at the dimension below 100 nm, mostly from two physical effects, viz.

a) The quantization of electronic states leads to very sensitive size-dependent effects such as optical and magnetic properties and
b) The high surface-to-volume ratio property revisesboth the physical and chemical parameters of materials.

Among them,ferrite nanomaterials are objects of deepresearch because of their promisingand fascinating properties. Thenano-magnetic materials displaysmart magnetic properties and have captured the attention of young magnetic material researchers. Nanomagnetic materials are also widely used in television, communication andradio techniques.,owing to their superparamagnetic performance, high coercive field, magnetic resistance, chemical stability, and other mesmerizing properties [1, 2].

Nickel ferrite, a promising and smartcontender of spinal type ferrite nanomaterials,has captured attention of material scientists to a larger extent, because of its captivating magnetic and electric as well as magnetic properties [3]. An extensive research has been carried out on Ni-ferrites and substituted ferrites due to their high saturation magnetization (M_s), large magnetic permeability (μ_r), low coercive field (H_c), relatively low magnetic losses (hysteresis and eddy current losses), high cut-off frequency, high Curie temperature (T_c), chemical stability, and environmently benevolent [4].

$NiFe_2O_4$having general formula AB_2O_4 exhibit spinel type structure[5], where all Ni ions occupy octahedral B- sites, while Fe ions occupy both A-sites and B-sites [6] as depicted in Figure 1. Nickel ferrite is exceptionally used in electronics because of itsexcelent permeability (μ_r)at high frequency, superior electric resistivity and mechanical stability [7]. The magnetic and dielectric characteristics of $NiFe_2O_4$ are decidedly dependent on the cation distribution, which in turn ispowerfully dependent on method employed for synthesis[8-11].Various magnetic [9-13], as well as non-magnetic atoms for cation (substitution) [14-19], have been reported to

fashionatomic-level changes in ferrite materials, which eventuallyinfluence the Fe^{3+}-O^{2-}-Fe^{3+} interaction of the ferritesand hence the magnetic properties [20].

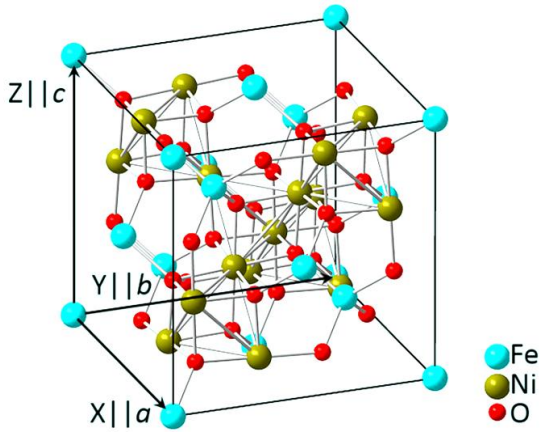

Figure 1.Schematic illustration of $NiFe_2O_4$ crystal structure. The coordinate system of the crystal is chosen along principle crystal axes of the $NiFe_2O_4$ unit cell [21]

$NiFe_2O_4$ possessesa face-centred crystal structure, and there are 8 Ni^{2+}, 16 Fe^{3+} and 32 O^{2-} ions per unit cell, where oxygen ions form 64 tetrahedral and 32 octahedral sites, including 24 distributed cations[22]. Octahedral and tetrahedral sites are populated with eight Fe^{3+} ions each, and eight Ni^{2+} cations occupy half of the octahedral sites [23]. The properinsertion of di-valent, tri-valent or tetra-valent dopant ionsare capable oftuning the characteristics and properties of ferrite nanomaterials. Replacing Fe^{3+} ions with magnetic and non-magnetic ions, researchers have also exploredthe substitution of rare-earth elements to the ferrites [24, 25]. It has been experimentally observed that relatively larger rare-earth ionbring lattice expansion in ferrites, which can amend the super-exchange interaction of Fe^{3+}- O^{2-}-Fe^{3+} [26]. Experimentally in ferrites, the substitution of rare-earth elements such as Nd^{3+}, Gd^{3+}, Ho^{3+}, Er^{3+}, Tm^{3+}, Y^{3+}, and Lu^{3+} decreases the Curie temperature [25,27] and become more valuable for magneto-optical storage devices [25,28]. Furthermore, rare-earth ion doping at the octahedral (A) site affects the hole transfer rate between Ni^{2+} and Ni^{3+}, contributes to rising the electrical resistivity of the material, and enables its high-frequency application. We have specifically chosen Terbium, Tb^{3+} as dopant to understand its impact on the magnetic properties of $NiFe_2O_4$[29]. Thus, the presence of Tb^{3+} can greatly alter the A-B site interaction via Fe^{3+}- O^{2-}-Fe^{3+}(Tb^{3+}) interaction. Bharathi et al.2009 [27] synthesizedNi-ferrite by the Gd and Nd ion dopants. Khan, M. Azhar, et al. (2011) [30] successfully synthesized $Mg_{1-x}Tb_xFe_2O_4$ ($0.0 \leq x \leq 0.2$) ferrites via the ceramic method and reported the impact of Tb-dopant on various properties of Mg-ferrite. Sagayaraj, R. et al.(2020) [31] demonstrated the Spectroscopic, Structural, and Magnetic parameters of Terbium-Ni-Ferrite synthesized via unique Oxalate Co-Precipitation reaction. Akhter et al.2018 [32]reportedwork on spinel ferrites and the influence of RE-dopant, Cesiumon their structural and magnetic properties. Jacob et al.2013 [33] confirmed the consequence of RE-dopant Tb^{3+} on nickel nano-ferrite's structural, electrical and magnetic parameters. Guragain et al. 2020[34]established the impact of Tb^{3+} dopant on structural and magnetic parameters of nickel-ferrite.

Here we willanalyze the impact of RE-Tb^{3+}on the structural and magnetic characteristicsof nickel-ferrite nano-crystals. Here rare earth (RE) terbium (Tb) has been preferred asa dopant ion. So first of all, successful doping of Tb^{3+}in Ni-ferrite via green synthesis method will be confirmed and then various intricate characteristics brightly and scientifically.

We have already mentioned that the structural and magnetic characteristics of ferrites also depend on their composition and microstructure; which isfirmly decided by the applied synthesis methodand conditions [11, 35]. Some of the usual synthesizing methods for ferrites are mechanical milling [36], co-precipitation [37], hydrothermal reaction [38], microemulsion method [39] and sol-gel process [40].

In our time, there is a great need to develop simple, cost-effective and eco-friendly methods for producing spinel ferrite nanoparticles. Recently, biosynthesis has been an alternative synthesis technique to synthesize spinel ferrite nanoparticles.Geetha, K. et al. 2021[41] synthesisedspinel $MgCe_xFe_{2-x}O_4$ ($0 \leq x \leq 0.5$) nanoparticles by means of microwave-combustion technique by making use of the *Aloe vera* plant extract. Routray*et al.* (2019) [42] reported a work on green prepration of $CoFe_2O_4$ by *Aloe-vera*mediated sol-gel

autocombustion technique.Matinise*et al.* (2018) [43] synthesized zinc ferrite using *Moringaoleifera*(Drumstick tree)extract using the synthetic green method.Patil*et al.* (2018) [44] synthesized $ZnFe_2O_4$ nanoparticles (ZF-NPs) using the combustion method withsugarcane juice as a fuel.Mahajana P *et al.* (2019) [45] successfullysynthesized Ag-ferrite byemploying sol-gel auto-combustion green methodassisted by*tulsi*seed (*Ocimum sanctum*) extract and garlic cloves (*Allium sativum*).

Considering the importance of the rare earth substituted $NiFe_2O_4$, we report the synthesis of $NiFe_{2-x}Tb_xO_4$ (X= 0.00, 0.15) nano-ferrites through a green and safe synthesis route. This research work uses a green route of a honey mediated sol-gel auto-combustion method to prepare pure and Terbium doped-ferrite nanoparticles.

The sugars like fructose and glucose contained in natural honey have a fundamental role as a viscous medium, natural reducing agent and protecting stability agentin the preparation of nanocrystals. The use of honey in synthesizing nanomaterials is an environmentally benevolent, handy and competent route. That's whyhoney is used to synthesise pure and Tb^{3+} doped $NiFe_2O_4$ nanoparticles in this work. Besides this, the consequence ofTb^{3+} dopant ions on the structural, morphological and magnetic properties of Ni-ferrites has been investigated.

2. Experimentation

2.1. Precursor Materials

The necessary precursor chemicals used for the synthesis of ferrite nanoparticles are Nickel Nitrate [Ni $(NO_3)_2.6H_2O$], Ferric Nitrate [Fe $(NO_3)_3.9H_2O$], Terbium Nitrate [Tb $(NO_3)_3.5H_2O$]. All these chemicals were purchased from Sigma-Aldrich with grade purity (purity ≥99.9%). Honey and Ammonia Solution was also used. The solvent used in this method was double-distilled water. Honey was purchased from Chidambaram, Tamil Nadumarket.

2.2. Synthesis procedure

Terbium (Tb)-doped Nickel Ferritenanoparticles (NPs) are prepared using an eco-friendly honey mediated auto combustion sol-gel method.To obtain pure Ni-ferrite (NT_0) nanoparticles, a stoichiometric amount of Nickel Nitrate [Ni $(NO_3)_2.6H_2O$] and Ferric Nitrate [Fe $(NO_3)_3.9H_2O$] were dissolved in 100mldouble-distilled water to obtain a mixed solution. An aqueous honey solution (10g) was addedto it. The mixed solution containing honeyis placed on a magnetic stirrer at 100 °C. The pH of the solution is maintained at 7 by adding ammonium hydroxide drop-wise. Aviscous, sticky gel is formed during evaporation; after drying,it undergoes self-ignition and turns into as-burnt ferrite powder. After grinding it thoroughly, the as-burnt powder is finally transformed into a fine powder. The as-prepared fine powder is finallycalcined at 800°C for 3 hoursto obtainhighly crystalline ferrite powderthat is ready for various cheracterizations.

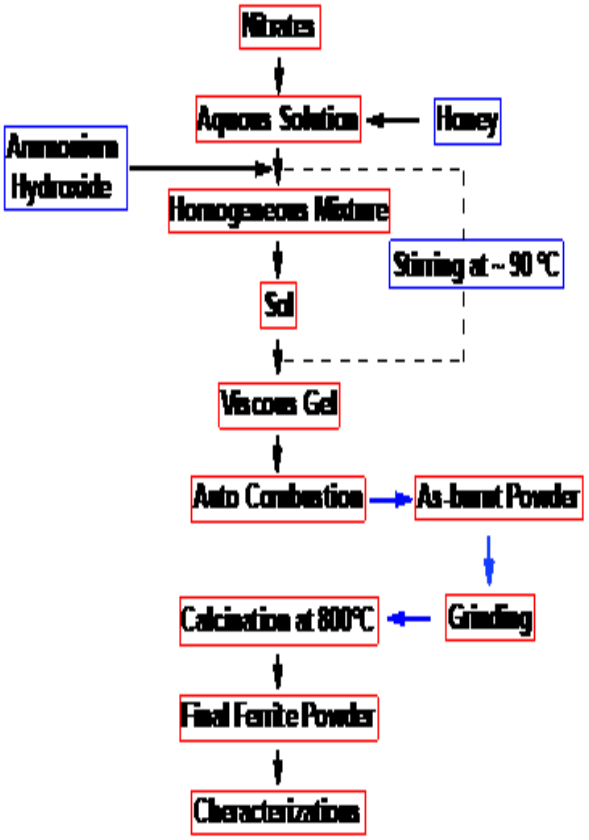

Fig.2. Schematic diagram of honey mediated auto-combustion method.

A similar synthetic procedure is used to synthesize Tb-doped $NiFe_2O_4$(NT_1) nanostructures. All the samples were calcined at 800°C temperature in a muffle furnace. NT_0 and NT_1 denote the final powder of pure Ni-ferrite and Tb-doped Ni-ferrite.The

representation diagram of the honey-mediated auto-combustion method is shown in fig.2.

2.3.Characterization Techniques

The crystalline phases of the prepared sample have been studied by employing the powder X-ray diffractograms recorded by X-PERT PRO X-ray Powder Diffractometer with CuKα (λ=1.5406Å) radiation. Particle morphology is studied using a Transmission Electron Microscope (Philips- CM200) operating at 20-200 kV with a resolution of 2.4 Å. The morphology of both the NT_0 and NT_1 samples has been examined byScanning Electron Microscopy (SEM) (Model- JEOL JSM-6360).A Vibrating Sample Magnetometer (Model-Lakeshore7404) was used to conductmagnetic studies at room temperatureusing an applied magnetic field of 30,000 Gauss.

3. Results and Discussion

3.1.XRD Analysis

Figure 3shows the XRD pattern of the NT_0 and NT_1 ferritescalcined at 800°C. The samples NT_0 and NT_1substituted nickel ferrites showed a single-phase spinel structure. The diffraction patterns of NT_0 and NT_1agree with the typical XRD pattern of 'Joint Committee on Powder Diffraction of nickel ferrites (JCPDS # 00010-0325). No impurity peaks were detected within the detection limit of the instrument. NT_1 sample shows the single spinel phase pattern similar to theundopedNT_0, probably due to the less doping concentration. The diffraction angle (2θ) of the XRD pattern is slightly shifted in the NT_1 sample than that of NT_0.

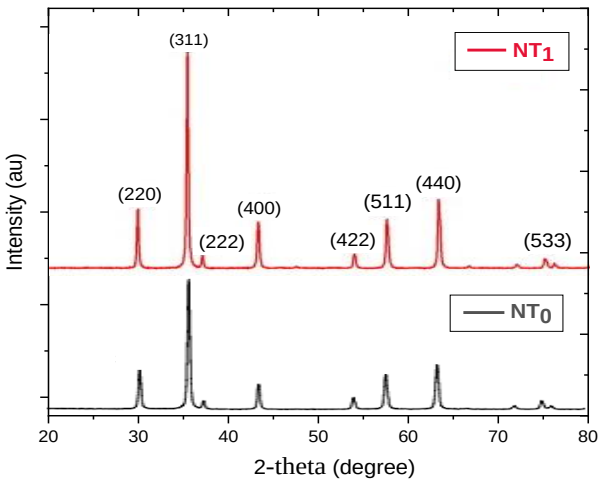

Fig. 3: XRD pattern of NT_0 and NT_1 ferrite samples.

The average crystallite sizes (D_x) were caculated from the maximum intensity plane (311) by applyingthe Scherer formula

$$\mathbf{D}_x = \frac{\mathbf{0.9\lambda}}{\mathbf{\beta cos\theta}}\text{nm}$$

Where λ, β and θ is the X-ray wavelength, full width at half maximum (FWHM) in radians & Bragg's diffraction angle in degrees respectively[46].

The average crystallite sizes range from 61 to 47 nm (Table 1) for NT_0 and NT_1, respectively. The grain size is well within the nano-regime. The grain size declinesin the Tb^{3+} ion-doped NT_1 sample notably. The addition of Tb^{3+}ions for Fe^{3+} ions induces crystalline anisotropy due to the significant ionic radius mismatch between $Tb^{3+}$and Fe^{3+} ions. The strain within the crystal's unit cell increased byTb^{3+}doping ions due to the induced crystalline anisotropy [47]. Therefore, the doping of Tb^{3+} ions acts as a kinetic barrier to further grain growth. Hence, crystallite size decreased with Tb^{3+} ion-doping.

The lattice constant (a) values of ferrite samples were calculated by using Bragg's equation

$$a = \sqrt{d^2(h^2+k^2+l^2)}\text{Å}$$

Where d is the inter-planner distance and$h$, k&l are the Miller indices of the XRD - diffraction plane.

The lattice parameter 'a' of NT_1(8.33.3)is more thanNT_0 (8.3231), whichcan be explained based on relative ionic radii of $Tb^{3+}$and Fe^{3+}. Since the ionic radius of Tb^{3+}(~0.923 Å) is more significant than that of Fe^{3+}(~0.645 Å). Consequently, Tb^{3+} has a strong preference for the B- site, and a partial replacement of Fe^{3+} by Tb^{3+}causes an expansion of the lattice, thereby increasing thelattice constant.

X-ray density (ρ_x) values were determined using the equation [48].

$$\rho_x = \frac{8M}{Na^3}\text{g / cm}^3$$

Where '8'in represents an 8-formula unit in a unit cell,M is the molecular weight of thesamples, N is the

Avogadro's number (6.02252×1026 $kmol^{-1}$), and a is the lattice constant.

The value of X-ray densities 'ρ_x'of the synthesized samples varied from 5.50 g/cm^3 (NT_0) to 5.95g/cm^3 (NT_1). The aggregationhappened on the grain boundary,

compression of spinel lattice takes place by Tb^{3+} ions and the density of the lattice values increases. Hence the X-ray density value of Tb^{3+}-doped NT_1 is slightly more than NT_0. These results are in agreement with the results reported elsewhere [49]. Various structural parameters of samples NT_0 and NT_1 are tabulated in table 1.

Table1.1: Structural parameters of NT_0(X=0.00) and NT_1(X=0.15)

Sample (X)	Crystalline Size(D_x) (nm)	Lattice Constant (a) (Å)	Density(ρ_x) (gcm^{-3})
NT_0 (X=0.00)	61	8.3231	5.50
NT_1(X=0.15)	47	8.3303	5.95

3.2. SEM and TEM Analysis

The surface morphology and particle size of Tb^{3+}-doped Ni-ferrite samples were analyzed by a Scanning Electron Microscope (SEM) and are shown in Fig.4 (a &b). The samples at 800°C are composed of approximately spherical morphology, and the particle sizes are mainly between 50 and 100 nm. The morphology of NT_1altersowing to Tb^{3+}dopant. SEM images show that substituting Tb^{3+} ions suppressed the grain size in the spinel lattice of NT_1, and the grains became smaller than the undoped NT_0. Due to the incorporation of terbium, porosity decreases, and the particle size distribution becomes more homogeneous.

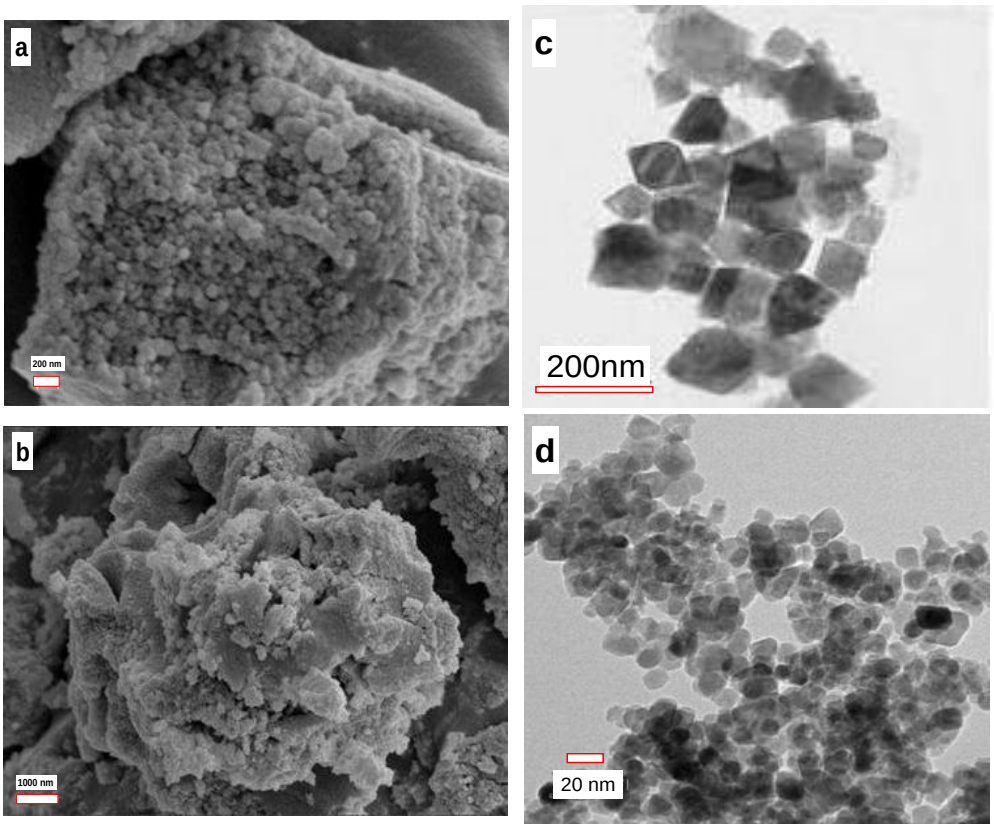

Fig 4: SEM and TEM images Of NT_0 and NT_1 samples.

TEM analysis estimated the particle size. The NT_0 and NT_1 sample TEM images are shown in Fig.4 (c & d),respectively. The decline in particle size in NT_1 is evident from TEM images. Nearly all of the nano-particles are almostsphere-shaped and largely agglomerated. Agglomeration of nano-crystals is probably due to the tendency of nanoparticles to aggregate to achieve a low free energy state by reducing the specific superficialarea by the interface reduction with other particles. The average particle size calculated from the TEM images varies between 42nm to 85 nm, almost consistent with the crystallite size obtained from XRD.The particle size-distribution histogramsfor SEM and TEM images of NT_0 and NT_1arerespectively shown in Fig.5 (a & b) and (c & d).

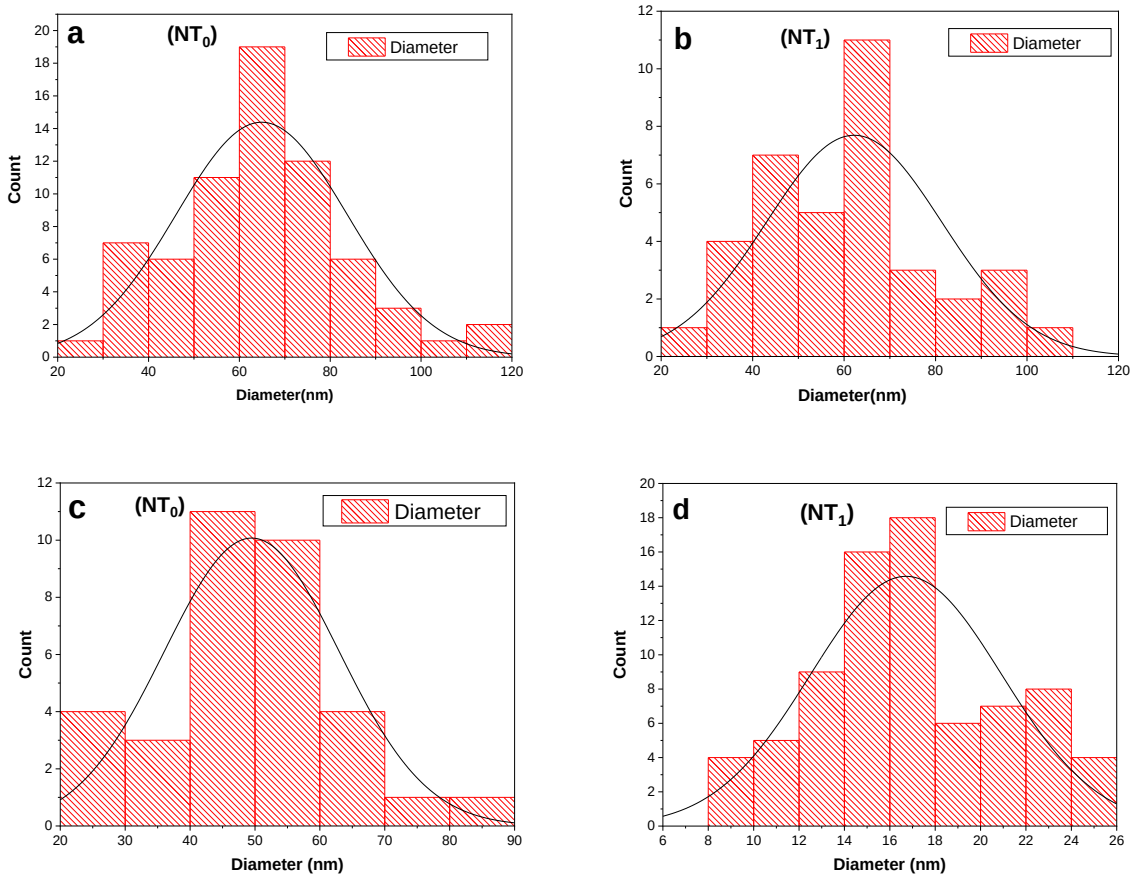

Fig.5. Normal size-distribution plots of SEM (a & b) and TEM (c & d) of NT_0 and NT_1

3.3.

3.4.Magnetic Studies

The room temperature magnetization study (M-H loop) of NT_0(a) and NT_1(b) is shown in Fig.6. The magnetic parameters of NT_0 and NT_1 are calculated from their M-H loops and are given in Table 1.2.M-H curve shows, the magnetization (M)increasesas the magnetic field (H) is increased. The saturation magnetization (M_s)occurs at a magnetic field of about 3×10^4 Gauss. Tb^{3+} ion dopingchanges the magnetic properties of Ni-ferrites, as noted in the reviews[50, 51].

The value of saturation magnetization decreases with the incorporation of Tb^{3+}. The $M_s$value decreases from 27.2 emu/g for NT_0 to 22.3 emu/g for NT_1. Notably the magnetic super-exchange interactions are influencedby the cations distributedat tetrahedral (A) and octahedral (B) sites. Principallymagnetization arises due to Fe^{3+}ionsat octahedral B- site [52]. The larger Tb^{3+}ions enter the B-site because of the small-sized gap in the tetrahedral A-site. Since electrons are not present in the 4f-orbit of Tb^{3+}ions, making the Tb^{3+}ions are non-magnetic [53]. So the reduction in $M_s$value could mainly arise from replacing magnetic Fe^{3+} with non-magnetic Tb^{3+}ions. The decline in $M_s$is due tothe change in interaction between A- and B- lattice sites [53, 54].A decrease in super-exchange interaction leads to spin-canting at the nano-surface that results in a decrease in M_s. Moreover, terbium atomsareparamagnetic, so substituting Fe^{3+} ions with Tb^{3+} ions diminishes the effective magnetism between A and B sites [55]. Consequently, the other magnetic parameters likeRemanence Magnetization (M_r) and Coercive Field (H_c) are also achieved lower in NT_1 than NT_0.

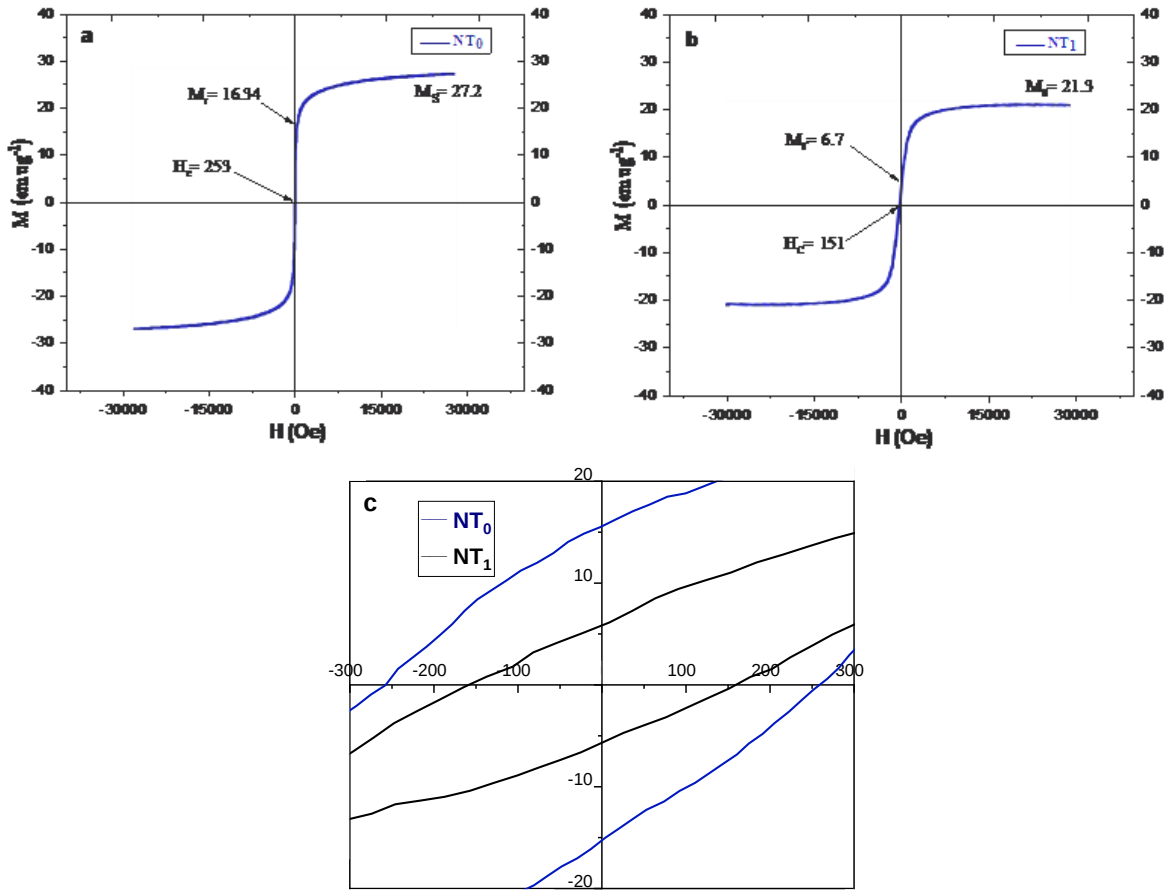

Fig. 6: M-H plots of NT_0 (a) and NT_1 (b) samples and enlarged M-H plots of the NT_0 and NT_1 samples(c).

Table 1.2: The magnetic parameters, Saturation Magnetization (M_s), Remanence Magnetization (M_r), Squareness Ratio $\left(\frac{M_r}{M_s}\right)$and Coercive Field ($H_c$) of NT_0 and NT_1samples (obtained from Fig.5).

Sample (x)	M_s (emg/g)	M_r (emg/g)	M_r/M_s	H_c (Oe)
NT_0	27.2	16.34	0.6	253
NT_1	21.3	6.71	0.3	163

The properties of the nano-ferrites can be studied using a vital quantity known as *Squareness Ratio*given by :

Squareness Ratio= $\frac{M_r}{M_s}$

The Squareness ratio$\left(\frac{M_r}{M_s}\right)$values decrease quickly from 0.6 for NT_0 to 0.3 for NT_1, respectively.From Stoner-Wohlfarth, the squareness ratio can attain two values; one around 0.83 corresponds to magnetic anisotropy and another around 0.5, which corresponds to uniaxial anisotropy [56]. The $\left(\frac{M_r}{M_s}\right)\geq$ 0.5 points out particles in a single-domain structure, and $\left(\frac{M_r}{M_s}\right)<$ 0.5 indicatesparticles with a multi-domain arrangement. Squareness Ratio alsodesignatesthe characteristicfeature of the ferrites and depends on the magnetic anisotropy, indicating how easily magnetization direction is reoriented to the nearest easy axis magnetization direction when the magnetic field is eliminated. The lower value of the $\left(\frac{M_r}{M_s}\right)$ratio indicates lesser anisotropy. Additionally, the low value of $\left(\frac{M_r}{M_s}\right)$value confirms the increased superparamagnetic fraction and spin-canting [57].

4. Summary and Conclusion

Rare earth Tb^{3+}-doped Ni-ferrites were effectively prepared by a novel honey-

mediated green synthesis method. A thorough study was done on the doping effect of Tb^{3+} doping ions on Ni-ferrite's structure and magnetic properties. The larger ionic radius of Tb^{3+}modified the Ni-ferrite's structural and magnetic properties.

- XRD analysis established the single-phase cubic spinel structure of the NT_0 and NT_1 ferrite samples calcined at 800°C temperature without any impurity. The average crystallite size was found to be within the nano-range. The grain size of NT_0 was found to be greater than that of NT_1, i.e. the grain sizes decreased with Tb^{3+} ion doping in Ni-ferrite samples. This might be because of the induced crystalline anisotropy by Tb^{3+} doping due to the large ionic radius mismatch between Tb^{3+} and Fe^{3+} ions. Also, the lattice constant (a) values are found to increase with Tb^{3+} ions doping.
- The surface morphology of the ferrite samples arealmost sphere-shaped, largely agglomerated and the particle sizeis found in the range of 42 to 85 nm, which is in accordance with XRD data.
- The magnetization results from M-H plots revealed that theTb^{3+}substitution for Fe^{3+}tuned the magnetic properties of the Ni-ferrite. The substitution of Fe^{3+} with larger ionic size Tb^{3+} in the NT_1 sample leads to lattice expansion and possibly distortion in Fe^{3+}-O^{2-} - Fe^{3+} bond angle, eventually the superexchange interaction get weakened. The decrease in the saturation magnetization(M_s), Coercivity (H_c) and squareness ratio $\left(\frac{M_r}{M_s}\right)$are consequences of the deterioration of the super-exchange interaction, thus destroying the original magnetic moment in doped NT_1 sample and enhancingthe superparamagnetic nature. This makes the $NiFe_{2-x}Tb_xO_4$(X=0.00, 0.15) ferrites, a better aspirant for soft-magnetic applications such as constructing inductor cores and high-frequency applications.

5. Funding

we declare that no external fundingis received for this work.

6. Conflicts of Interest

we declare that there is no conflict of interest.

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PLASMONIC METAL NANOPARTICLES COATED SURFACES - POTENTIAL CANDIDATES FOR EFFICIENT PHOTOVOLTAIC SYSTEMS

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ABSTRACT

The adversely changing climate has attracted the research community to explore efficient systems to harvest energy from renewable sources like sun, wind, etc. Fabrication of novel photovoltaic surfaces capable of absorbing a wider band of solar radiation can help improve photovoltaic cell efficiency. In the present study, we synthesized the metal nanoparticle e.g., Au and Ag, and prepared NP-diode surface on Silicon wafer applying the concept to n-ZnO/p- Si heterojunction solar cells. The short-circuit current densities (I_{sc}) of Au and Ag nanoparticles coated surfaces were enhanced from 0.24 mA/cm^2 (without NPs) to 0.59 mA/cm^2 and 0.87 mA/cm^2, respectively. Further, the energy conversion efficiency of the n-ZnO/p-Si photovoltaic cell comes out to be 0.37% and it was increased to 130% and 261% with the deposition of Au and Ag NPs, respectively, on the top surface of the designed photovoltaic cells. These findings were well in corroboration with FDTD simulation studies. Thus, surface plasmon resonance stimulated by metal nanoparticle coating on the Photovoltaic surface can exhibit promising results for efficiency enhancement for PV cells.

***Keywords**: Plasmonic metal nanoparticle, Photovoltaic surface fabrication, I-V Output.*

Introduction

World over, the competitive environment, among the countries for growing economy and development has escalated the level of challenge in energy supply, which is putting tougher constraints before developing countries like India. In addition, the present generation is duty-bound to pass on a safe and sustainable environment to its successors. Therefore, the continuity, of research and development (R&D) efforts, is a must to resolve the problem of interrupted power supply. As an alternative to conventional sources of energy (e.g., fossil fuel, etc.) the increase in efficiency of existing solar cells is necessarily required to ensure the availability of energy supply at an affordable cost. Research groups across the globe are consistently attempting to explore a wide range of novel materials for the advancement of solar cells. Mixed metal oxides and perovskites are the latest class of material in this series.[1] However, the idea of surface plasmon resonance has not been fully exploited in designing photovoltaic surfaces. Photovoltaic (PV) cell technology has emerged as a promising device for harvesting the most abundant source of renewable energy, on our planet, i.e., solar energy and adversely changing climate has further enhanced its significance. Several research groups are investing efforts to translate it into a more efficient and affordable technology. Semiconductor films prepared by metal oxides have been extensively explored and have attracted significant responses in recent years because of their optical and electrical properties.[2] Some of them are good candidates for transparent conductive oxide films.[3] Zinc oxide is one of the suitable semiconductor metal oxides used in optoelectric devices. ZnO thin films turned out to be the most promising candidates to produce optoelectronic devices in the UV region.[4,5] Moreover, Zinc oxide has a wide bandgap of 3.2 eV, low resistivity, and high transparency in the visible range.[6] However the problem of absorbing the solar radiation in the low-frequency range has not been yet resolved. Plasmonic metal nanoparticles, like Au and Ag, have great potential to be used in chemical and biological sensors because of two major properties: (a) sensitive spectral response to the local environment of the nanoparticle surface; and (b) ease of monitoring the light signal due to their strong scattering or absorption.[7] Silver nanoparticles have found applications in catalysis, optics, electronics, and other areas

due to their unique size-dependent optical, electrical, and magnetic properties.[8-10] Similarly, Gold nanoparticle demonstrates one of the prominent physical properties i.e. surface plasmon resonance.[11]

Finite-Difference Time-Domain (FDTD) algorithm is one of the most common computational tools in classical electromagnetism.[12-16] It can precisely guide in selecting the metals for nanoparticle synthesis, based on simulation studies for assessing the effect of metal nanoparticles on light absorptivity in Si substrate. So, the plasmonic metal nanoparticles could be found as potential candidates for designing the surface of PV cells. When incident radiation illuminates the metal nanoparticles, it can trigger off the localized surface plasmon resonance, which is a collative oscillation of the conduction electrons.[17,18] An enhancement in the efficiency of light scattering by metal nanoparticles is observed at wavelengths near the resonance. When the surface of semiconductors like ZnO is coated with nanoparticles, light is favorably scattered into the semiconductor.[18,19] Over the last decades, this peculiar phenomenon of enhanced light scattering has been studied extensively to improve the performance of PV cells. [2-5, 17-20]

In the present study, we focused on expanding the absorption range of incident solar radiation using concepts of nano-science and thereby increasing the efficiency of the solar cell. We precisely selected Au, Ag, SiO_2, and ZnO nanoparticles for this purpose. We applied this concept to *n*-ZnO/*p*-Si heterojunction solar cells to increase the efficiency of photovoltaic systems.[21] Nanoparticles of plasmonic metals i.e., Au and Ag were synthesized and characterized. These nanoparticles were coated onto *n*-ZnO/*p*-Si heterojunction solar cells doped with Aluminium. The current-voltage (I-V) output measurements of designed hetero-junction cells were also studied in detail to find out their applications in photovoltaic systems, due to wide energy bandgap (3.2 eV) and reduced optical loss owing to the transparent characteristic nature of ZnO.[6]

Materials and Methods

Materials

Chemicals were procured from Fisher Scientific and Alofich. Silver Nitrate (AR), Sodium Citrate (LR) Mono-ethanolamine (AR), and 2-Methoxy ethanol (AR) were purchased from Fisher Scientific and $HAuCl_4.3H_2O$ (AR) was purchased from Alofich. ZnO and Zinc acetate dihydrate, $Zn(CH_3COO)_2.2H_2O$ (AR) was procured from BDH Chemicals. One side polished single-crystal Silicon wafers of grade Prime-CZ (with thickness 380 +/- 25 µM and 1-10 Ohm cm resistivity) was purchased from Market.

Synthesis of ZnO Nanoparticles and Preparation of ZnO coated Surface

Zinc acetate dihydrate, $Zn(CH_3COO)_2.2H_2O$, was used as starting material. 2-methoxy ethanol and monoethanolamine (MEA) were used as a solvent and stabilizer, respectively. $AlCl_3$ was used as a doping agent. Zinc acetate dihydrate was initially dissolved in 2-methoxyethenol and MEA.[6]

The *p*-type (100) single crystal silicon with a thickness of 380 µm, possessing a resistivity of 1-10 Ω-cm, was used. The wafer was cleaned with hydrofluoric acid and deionized water. ZnO thin films were prepared using aluminium chloride ($AlCl_3$), as a doping agent by 1%. Zinc acetate dihydrate and aluminium chloride were initially dissolved in a mixture of 2-methoxy ethanol and MEA. The concentration of zinc acetate was 0.35 M and the molar ratio of zinc acetate to MEA was maintained at 1:1. This reaction mixture was heated at 60°C for 2 h with constant stirring to yield a clear and homogeneous solution.[6,22] This solution was used for coating after two days. The solution was dropped onto just cleaned wafers which were rotated at 2500 rpm for 30 s and then dried for 10 min at 150°C on a hot plate. Coating and drying processes were performed 8 times to achieve an approximately 100 nm thick film. After deposition, thin films were heated in an air muffle furnace at 500°C for 1 h.

Ag and Au nanoparticles were prepared by the chemical reduction method using tri-sodium citrate as the reducing agent. 50 mL of 0.001M Silver Nitrate ($AgNO_3$) was heated to boil and 5 mL of 1% tri-sodium citrate was added dropwise to this solution with vigorous mixing, continued heating till the solution attained pale yellow colour. After the heating was off, the solution was

continuously stirred until it was cooled down to room temperature.[23] Au nanoparticles were prepared using 1 mL of 1% w/v $HAuCl_4.3H_2O$ in 90 mL of deionized water and the mixture was stirred for 1 minute. 2 mL of 38.8 mM trisodium citrate was added with constant stirring for 1minute. Subsequently, 1 mL of fresh 0.075% w/v $NaBH_4$ in 38.8 mM tri-sodium citrate was added in the reaction mixture with constant stirring for 5 min.[24] Metal nanoparticles were deposited onto the ZnO layer by a spin coating method. For Ohmic contacts on *p*-type and *n*-type layers, conductive aluminium (Al) electrodes were made by the thermal evaporation process. The schematic structure of the fabricated solar cell is shown in Fig.1.

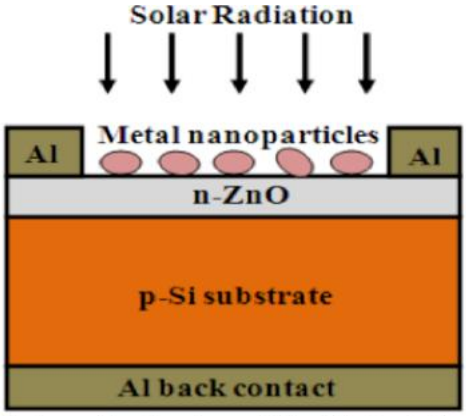

Fig. 1. Schematic structure of the fabricated solar cell

Characterization of Nanoparticles and Fabricated Photovoltaic Surface

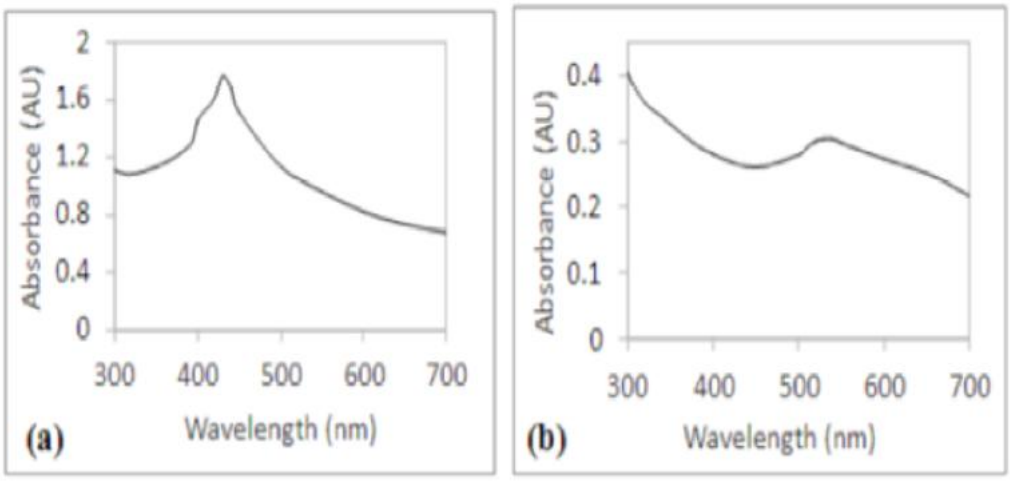

Fig. 2. Absorption spectrum of (a) Ag- and (b) Au- nanoparticles

The size of synthesized metal nanoparticles was measured using "Zetasizer Nano-ZS Malvern Instruments inc. UK". Light absorption spectra of the metal nanoparticles were recorded with a UV-VIS spectrometer, wherein optical absorption depends on the size of the nanoparticles. Both, Ag and Au nanoparticles demonstrated a specific absorption peak in the visible region (300-700 nm). The maximum absorption peaks were observed at 430 nm and 540 nm for Ag and Au nanoparticles, respectively (Fig. 2a & 2.b). Images indicate that nanoparticles are distributed on the ZnO film in a uniform pattern. The sizes of metal nanoparticles ranged from 10 nm to 20 nm with an interparticle surface-to-surface spacing of 10 nm.

The surface evenness of fabricated solar cells was analyzed using Scanning Electron Microscopy (SEM) (TESCAN MIRA III, Scanning Electron Microscope at the University of Delhi, Delhi India). SEM images (Fig.3) show ultrasonically deposited nanoparticles on substrate i.e., a Silicon wafer. A thin layer of ZnO film was deposited on the sizes varying from 10-20 nm were uniformly distributed on the thin-film layer of ZnO (Fig. 3b). The deposition of a uniform layer of gold nanoparticles can be seen on a thin layer of ZnO (Fig. 3c). Further, a uniform layer of silver and gold nanoparticles can be observed in images to confirm the presence of uniformly deposited layers of metal nanoparticles.

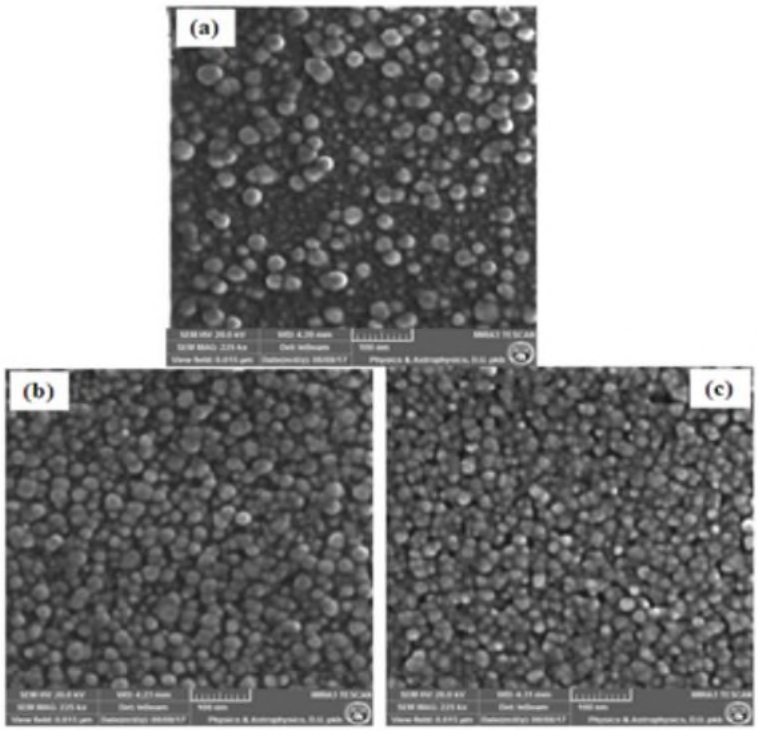

Fig. 3. SEM images of (a) ZnO thin film deposited on a silicon wafer, (b) Ag nanoparticles on ZnO film, and (c) Au nanoparticles on ZnO film

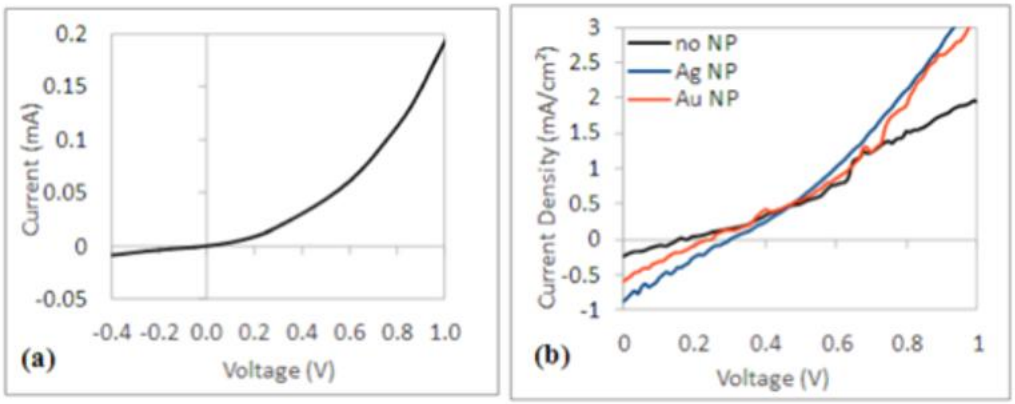

Fig. 4. (a) Dark I-V characteristics of the n-ZnO/p-Si heterojunction solar cell (b) Photo-current I-V characteristics of the fabricated solar cells with and without metal nanoparticles (NPs)

The Current-voltage (I-V) measurements of the fabricated surface were carried out using Keithley 2400 source meter with a xenon lamp of 10 mW/cm^2, to investigate the electrical properties of the solar cells. Fig. 4(a) showed the dark I-V characteristics of the *n*-ZnO/*p*-Si hetero-junction solar cell. Fig. 4(b) demonstrated the I-V output of plasmonic metal nanoparticles (Ag & Au) coated surface.

Finite-difference time-domain (FDTD)

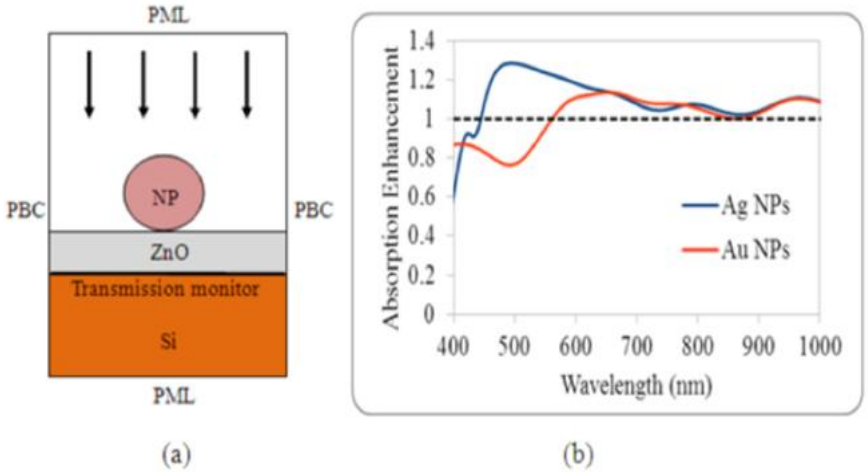

Fig. 5. (a) Schematics of the computational unit cell (b) Characteristic spectra of absorption enhancement in the silicon layer with metal nanoparticles.

2-D Finite-difference time-domain (FDTD) simulations were performed using MIT Electromagnetic Equation Propagation (Meep).[17] A (30 nm × 1000 nm) unit computational cell with a grid size of 1 nm was taken to study the present hetero-junction photovoltaic cell. Perfectly matching layers (PMLs) were used on the top and bottom boundaries of the cell (Fig. 5). Periodic boundary conditions (PBCs) were used along with the lateral directions. Even mirror symmetry in X-direction was used to reduce the computation time. Aspherical nanoparticle of 20 nm diameters was placed on 100 nm thick ZnO layers, which was deposited on the c-Si layer. Si layer was extended into the bottom PML to make it appear semi-infinite. A plane wave source, with wavelength 400-1000 nm of X-polarized electric field, was placed 200 nm above the nanoparticle. Optical constants of various materials were acquired from the literature.[11] Absorption power of Si layer was measured by a frequency-domain transmission monitor placed at the interface between ZnO and Si layers. Absorption enhancement was calculated as the ratio of absorption power with metal nanoparticles to that of without nanoparticles.

Results and Discussion

The main mechanism, proposed in the present work, to explain varying light absorption below and above the resonance is the scattering of light by the nanoparticles, which redirect the light favorably into the high index Si layer. In Fig. 3(b), it can be observed that loss at shorter wavelengths with Ag nanoparticles was significantly reduced as compared to that of Au nanoparticles. Enhancement in the absorption of radiation was recorded at 430 nm and 550 nm for Ag and Au nanoparticles, respectively. Light absorption observed at wavelengths below the resonance may be attributed to the destructive interference between the incident and scattered light. In the case of wavelengths above the resonance, absorption was enhanced by the presence of metal nanoparticles. This may be due to the smaller surface plasmon resonance wavelength of Ag compared to Au. A blue shift in resonance for Ag nanoparticles expands the absorption range of the incident radiation, which leads to an improved result. Due to the lower cost and higher efficiency of light scattering, Ag may be considered as a better choice for nanoparticle coating.

The results were well corroborated with the literature reports.[23-27] Further, SEM studies of (a) ZnO thin film deposited on a silicon wafer (b) Ag and (c) Au nanoparticles on the ZnO film were conducted and images were captured (Fig. 3) Images indicate that nanoparticles are distributed on the ZnO film in a uniform pattern. The sizes of metal nanoparticles were in the range of 10 nm to 20 nm with an interparticle surface-to-surface spacing of 10 nm.[28]

Lastly the electrical properties i.e., the Current-voltage (I-V) output of fabricated photovoltaic surface were measured using Keithley 2400 source meter with a xenon lamp of 10

mW/cm^2. Fig.4 (a) shows the dark I-V characteristics of *n*-ZnO/*p*-Si hetero-junction solar cell, the characteristics of a simple *p*-*n* diode, which confirm the successful fabrication of hetero-junction diode. Fig. 4(b) shows the results of Photo-Current I-V characteristics of the fabricated photovoltaic surface with and without metal nanoparticles. The results demonstrate that the short-circuit current density (I_{sc}) was enhanced from 0.24 mA/cm^2 (without NPs) to 0.59 mA/cm^2 and 0.87 mA/cm^2 with Au and Ag NPs, respectively. The energy conversion efficiency of the *n*-ZnO/*p*-Si photovoltaic cell comes out to be 0.37% and it increases to 130% and 261% with the deposition of Au and Ag NPs, respectively, on the top surface of the photovoltaic cells (Table 1). The enhancement in the photo-current may be attributed to the scattering or absorption of light by the metal nanoparticles and increased surface area of the fabricated surface of the photovoltaic cell.[7,17] These findings were well in corroboration with theoretical calculations i.e., FDTD simulation results (Fig. 5).

Table 1: Parameters of the fabricated n-ZnO/p-Si hetero-junction solar cells with and without metal nanoparticles

S. No.	Surface	J_{sc} (mA/cm^2)	V_{oc} (V)	Fill Factor (FF)	Efficiency (%)
1.	Without NPs	0.24	0.16	0.25	0.37
2.	With Ag NPs	0.87	0.31	0.25	2.61
3.	With Au NPs	0.59	0.24	0.23	1.30

Conclusion

To conclude, the present study demonstrated that metal nanoparticles deposited surface of photovoltaic cells exhibited significant enhancement in photo-generated current in terms of I-V output. Our findings demonstrated that the energy conversion efficiency of the *n*-ZnO/*p*-Si photovoltaic cell comes out to be 0.37% that increases to 130% and 261% with the deposition of Au and Ag NPs, respectively. The improved performance of the solar cells can be attributed due to the increased surface area of the photovoltaic surface and the enhanced light scattering by the metal nanoparticles on the excitation of surface plasmon resonance. Outcomes indicate that this study can further be extended to characterize various other plasmonic metals as nanoparticles in photovoltaic surface designing, thereby, discovering the novel plasmonic metal nanoparticles to enhance the efficiency of the photovoltaic cell.

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Conflict of Interest

Authors declare no conflict of interest.

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वाराणसी के पंचघाटः पौराणिक से आधुनिक काल के परिप्रेक्ष्य में, एक ऐतिहासिक अध्ययन

शिवांगी सिंह
इतिहास विभाग, चौधरी चरण सिंह विश्वविद्यालय परिसर, मेरठ

वाराणसी नगर भारत ही नहीं अपितु विश्व के प्राचीनतम शहरों में से एक है। वाराणसी भारत के **उत्तर प्रदेश राज्य** का प्रसिद्ध नगर है। कहा जाता है कि यह नगर शिव के त्रिशूल पर बसा है। **वरणा तथा असि** नदी के बीच में पडने वाली भूमि को **वाराणसी** कहते हैं। वाराणसी नगर की प्राकृतिक संरचना में गंगा नदी का मुख्य स्थान है। काशी गंगा के पश्चिमी तट पर बसा हुआ है। वाराणसी में गंगा की धारा उत्तरवाहिनी है। विभिन्न पुराणों से ज्ञात होता है कि गुप्त–युग तक भारतीय मानस में वाराणसी एवं गंगा की पवित्रता का विश्वास सुदृढ़ हो चुका था।

देवो देवी नदी गंगा मिष्ठामन्नं शुभा गतिः।
वाराणस्यां विशालाक्षी वासः कस्य रोचते।। (मत्स्य पुराण)

अर्थात् हे विशालाक्षी, जहाँ देव हैं, देवियाँ हैं, गंगा है, मिठाइयाँ हैं और शुभगति है, वह वाराणसी किसको न रूचिकर होगी?

गंगा नदी भारत की सबसे महत्वपूर्ण नदी है। **गंगा नदी उत्तराखण्ड में हिमालय** से लेकर **बंगाल की खाड़ी के सुन्दरवन** तक **लगभग 2525 किमी0** के भू–भाग को सींचती है। काशी में गंगा की इतनी महत्ता है कि समय–समय पर राजा–**महाराजाओं, रानियों** तथा अन्य लोगों ने इसके तट पर कई घाटों का निर्माण करवाया है। काशी को **'तीर्थराज'** कहा गया है। **तीर्थ** का अर्थ है **'तरण–स्थल'।** वह स्थान जहाँ रहने या स्नान करने से सांसारिक पापों का प्रक्षालन होता है। नदी में उतरती सीढियों से निर्मित स्थल को **घाट** कहते हैं। हिन्दी तथा संस्कृत में घाट जैसे स्थानों के लिए एक और शब्द का प्रयोग होता है– **दीघा।** काशी में प्रत्येक घाट से सम्बन्धित किसी न किसी तीर्थ की मान्यता है। काशी में **गहड़वाल काल** से ही स्नान के लिए **तीर्थों (घाटों)** का निर्माण होता रहा है। गहड़वाल काल के बाद भी घाटों का विकास गंगा तट पर होता रहा। **16 वीं शताब्दी** में घाटों का सजीव चित्रण एक अंग्रेज यात्री (1583–91) ने अपने यात्रा विवरणों में किया है। उस समय घाट कच्चे थे तथा **घाटिया (घाट के पुरोहित)** स्नान, गंगापूजन आदि कराते थे। घाटों के बनने का क्रम **17 वीं शताब्दी** में भी जारी रहा। घाटों पर स्वेच्छा से प्राणत्याग करने वालों का वर्णन तत्कालीन अंग्रेज यात्री **एलेक्जेण्डर हेमिल्टन (1650–1700 ई0)** ने किया है। **अट्ठारहवीं शताब्दी** को घाटों के निर्माण की दृष्टि से **स्वर्णयुग** कहा जा सकता है। इस समय अनेक पक्के घाटों का निर्माण अनेक **राजाओं, मराठों और उत्तर भारतीय सरदारों** ने किया था। इसमें **पूना के पेशवा, महारानी अहिल्याबाई (इन्दौर), ग्वालियर के सिंधिया, उदयपुर, बंगाल, नागपुर** आदि के राजाओं के नाम विशेष रूप से उल्लेखनीय हैं। अलग–अलग समय में इन घाटों की संख्या बढ़ती रही है। **गहड़वाल शिलालेख (12 वीं शताब्दी)** में मात्र **पाँच घाटों** का उल्लेख किया गया है। परन्तु **वरदराज कृत गीर्वाणपदम×tjh (1600–1650 ई0)** में **25 घाटों** का उल्लेख हुआ है। **जेम्स प्रिंसेप (1822 ई0)** ने अपने प्रसिद्ध ग्रन्थ **'बनारस इलस्ट्रेटेड'** में घाटों के **57 चित्र** बनाए हैं। परन्तु **ग्रीब्स (1909)** ने **64 घाटों** का उल्लेख किया है। काशी में गंगा तट **6.4 किमी0 (4 मील)** में फैला है जिस पर **84 घाट** बने हुए हैं। कुछ नए घाट बन रहे हैं और कई प्रस्तावित हैं, अतः शीघ्र ही इनकी संख्या सौ के निकट पहुँच सकती है। **मत्स्यपुराण** के अनुसार **विश्वेश्वर** के **आनन्द कानन (वाराणसी)** में **पाँच प्रमुख** तीर्थ हैं– **(1) दशाश्वमेध, (2) लोलार्क, (3) केशव (आदि केशव), (4) बिन्दुमाधव और (5) मणिकर्णिका। वर्तमान** में प्रमुख **पंचतीर्थ/पंचघाट** हैं–

1. वरणा–गंगा संगम (आदि केशव घाट)
2. पंचगंगा घाट
3. मणिकर्णिका घाट
4. दशाश्वमेध घाट
5. असि–गंगा संगम (असि घाट)

मान्यता यह है कि इन पाँच घाटों पर विभिन्न धार्मिक कार्य करने से महान फल मिलता है तथा यहाँ स्नान करने से मोक्ष की प्राप्ति होती है।

आदिकेशव घाट

'आदि' का अर्थ है **'सूत्रपात'** तथा **'केशव'** शब्द **'विष्णु'** का परिचायक है। वाराणसी के पाँच प्रमुख तीर्थों में से प्रथम एवं प्रमुख तीर्थ आदिकेशव घाट को माना गया है। यह घाट वाराणसी के उत्तर में स्थित प्रथम घाट है। पश्चिम से आकर **वरणा (वरुणा)** नामक छोटी सी नदी यहाँ गंगा जी में मिलती है। गंगा तथा वरणा नदी के संगम पर स्थित होने के कारण इस घाट को **वरणा–संगम घाट** भी कहा जाता है।[1] मान्यता है कि ब्रह्मलोक निवासी दिवोदास को शर्त के अनुसार ब्रह्मा जी ने काशी की राजगद्दी सौंप दी और देवतागणों को मंदराचल पर्वत जाना पड़ा, ऐसा जानकर भगवान शिव अत्यन्त ही दुखी हो गए क्योंकि काशी उन्हे अत्यधिक प्यारी थी। अतः उन्होंने भगवान विष्णु को काशी प्राप्त करने के लिए भेजा था।[2] आदिकेशव घाट तथा वरणा संगम के बीच 12 जलतीर्थ अवस्थित होने की मान्यता है। ये बारह तीर्थ आदिकेशव के पूर्व तथा उत्तर–पूर्व में

थे। इनके क्रम इस प्रकार हैं[3]– 1. पदोदक तीर्थ 2. श्वेतद्वीप तीर्थ 3. क्षीराब्धि तीर्थ 4. शंखतीर्थ 5. चक्रतीर्थ 6. गदातीर्थ 7. पद्मतीर्थ 8. महालक्ष्मी तीर्थ 9. गरुड़तीर्थ 10. नारद तीर्थ 11. अम्बरीष तीर्थ 12. आदित्यकेशव तीर्थ। **वेदेश्वरा गहड़वाला शिलालेख (1100 ई0)** में आदिकेशव घाट का उल्लेख **वेदेश्वर घाट** के नाम से किया गया है।[4] आदिकेशव घाट की स्थिति गहड़वाल राजवंश काल से ही है। घाट के सामने गहड़वाल राजवंश के शासकों का किला था। **ग्यारहवीं शताब्दी** में गहड़वाल राजाओं ने आदिकेशव मंदिर व घाट का निर्माण कराया था। घाट का उल्लेख **चन्द्रदेव, मदनपाल, गोविन्दचन्द्र** और **जयचन्द्र** के लेखों में आया है। गहड़वाल लेखों से पता चलता है कि घाट पर आदिकेशव **मंदिर** की अत्यधिक प्रसिद्धि थी। **चन्द्रदेव के चन्द्रावती (वाराणसी)** के एक **ताम्रपत्र** से ज्ञात होता है कि **1100 ई0** में **चन्द्रदेव गहड़वाल** ने यहाँ सोने–चाँदी का तुलादान, हजार मुहरों के साथ किया था तथा पाँच सौ ब्राह्मणों को सम्मिलित रुप से बत्तीस गाँव दान में दिए थे। **जयचन्द्र के कमौली ताम्रपत्र** से ज्ञात होता है कि **1168 ई0** में जयचन्द्र ने अपने पिता विजयचन्द्र की अनुमति से आदिकेशव घाट पर नहाकर कृष्णभक्ति की सेवा की दीक्षा ली थी और इस समारोह में एक गांव **प्रहराज शर्मा** को दान में दिया। जयचन्द्र के एक दूसरे ताम्रपत्र से ज्ञात होता है कि वे आदिकेशव के भक्त थे।[5] इस घाट को **1194 ई0** में **कुतुबुद्दीन ऐबक** ने नष्ट कर दिया था। घाट का पक्का निर्माण **1790 ई0** में सिंधिया के दिवान ने करवाया था। वर्तमान मंदिर का निर्माण **ग्वालियर के महाराजा दौलतराव सिंधिया (1794–1827)** के **दीवान मालो जी ने सन् 1806–07 ई0** में करवाया था।[6] आदिकेशव घाट का पुनः पक्का निर्माण **बंगाल के नाटौर रियासत की रानी भवानी** ने करवाया था। परन्तु कुछ समय बाद यह क्षतिग्रस्त हो गया था। अतः इसका फिर से निर्माण **1906 ई0 में ग्वालियर के दीवान मालवजी नरसिंह राव शितोले** ने करवाया। आदिकेशव घाट के पुजारी **राजेश कुमार त्रिपाठी** बताते हैं कि 1857 की क्राँति के समय अंग्रेजी सेना ने इस मंदिर का अधिग्रहण कर लिया और पुजारी को बाहर कर दर्शन पर प्रतिबंध लगा दिया। लगभग 2 वर्ष **1859 ई0** में मंदिर के पुजारी **केशव भट्ट** ने वाराणसी के अंग्रेज कमिश्नर को प्रार्थना–पत्र भेजकर मंदिर में पुनः पूजा करने की आज्ञा माँगी, तब कमिश्नर की आज्ञा से मंदिर में पूजा प्रारम्भ हुई। जबकि आम लोगों के लिए मंदिर में प्रवेश वर्जित ही रहा। **1863 ई0** में ही यहाँ आम श्रदालुओं को प्रवेश करने की अनुमति मिल पायी। सन् **1985 ई0** में राज्य सरकार ने नगर निगम द्वारा घाट की मरम्मत करवायी थी तथा वर्तमान में इसकी स्वच्छता को बनाये रखने के लिए विशेष कदम भी उठाए जा रहे हैं। आदिकेशव घाट पर अनेक मंदिर स्थित हैं। जिसमें **आदिकेशव मंदिर** के अतिरिक्त **ज्ञानकेशव, संगमेश्वर शिव, चिन्ताहरण गणेश, पंचदेवता** तथा **एक अन्य शिव मंदिर** स्थित है।

पंचगंगा घाट

पंचगंगा घाट वर्तमान में सर्वाधिक जीवन्त घाटों में से एक है। मान्यता है कि यहाँ **यमुना, सरस्वती, किरणा** और **धूतपापा** नामक नदियाँ गुप्त रुप से **गंगा जी** में आकर मिलती हैं; इसी कारण से इस घाट का नाम **पंचगंगा घाट** पड़ा है। प्राचीन समय से ही इस घाट की मान्यता काशी के दूसरे प्रमुख (आदिकेशव के पश्चात्) **विष्णु क्षेत्र** के रुप में रही है। यह काशी का एकमात्र घाट है जिसके ऊपरी भाग की सीढियाँ प्राचीन समय से वर्तमान तक सुरक्षित हैं। पाँच नदियों के संगम के कारण इसे **पंचनदतीर्थ** कहा जाता है तथा यहाँ भगवान विष्णु का मंदिर होने के कारण इसे **बिंदुमाधव घाट** भी कहा जाता है। स्कन्दपुराण के काशीखण्ड के अनुसार जब काशी में **सूर्य देव** ने अत्यन्त कठिन तपस्या की। उस पवित्र तीर्थ में तपस्या करते हुए मयूखादित्य नामक सूर्य की किरणों से बहुत पसीना (स्वेद) प्रकट हुआ। वह महास्वेद की धारा **किरणा** नाम से प्रसिद्ध पुण्य फलदायिनी नदी के रुप में परिवर्तित हो गयी। तत्पश्चात् किरणा नदी **धूतपापा नदी** से मिल गयी। माना गया है कि धूतपापा से मिली हुई किरणा में स्नान करने से सभी पापों से मुक्ति प्राप्त होती है। इसके पश्चात् दिलीप के पुत्र भागीरथ के साथ **गंगा नदी यमुना** और **सरस्वती** के साथ मिलकर वहाँ (पंचगंगा) आ गयीं। इस प्रकार यहाँ तीर्थ में **किरणा, धूतपापा, पुण्यसलिला सरस्वती, गंगा और यमुना**– ये पाँच नदियाँ मिली हुई हैं ऐसी मान्यता है।[7] **काशीखण्ड** में कहा भी गया है–

किरणा धूतपापा च पुण्यतोया सरस्वती।
गंगा च यमुना चैव प×चनद्योऽत्र कीर्तिताः।। (काशीखण्ड 59/115)

सतयुग में इस तीर्थ का नाम धर्मनद था। इसे त्रेतायुग में धूतपापा, द्वापरयुग में विन्दुतीर्थ और कलियुग में पंचनद कहा गया है। इसी घाट पर अग्निविन्दु के द्वारा भगवान विष्णु की तपस्या करने पर घाट का अन्य नाम विन्दुमाधव हुआ। घाट के सामने आठ धार्मिक जल तीर्थों की उपस्थिति मानी गयी है। इनके क्रम इस प्रकार हैं।[8]– 1. पिप्पलाद तीर्थ 2. विन्दुतीर्थ 3. मख तीर्थ 4. मयूखार्क तीर्थ 5. ज्ञानह्रद तीर्थ 6. पंचनद तीर्थ 7. मार्कण्डेय तीर्थ[9] 8. विष्णु–कांची तीर्थ[10]। यद्यपि काशी के लगभग सभी घाटों का महत्त्व गहड़वाल काल से ही रहा है तथा इस घाट की भव्यता का उल्लेख **11वीं शताब्दी** के ग्रंथों में भी मिलता है। पंचगंगा घाट का पक्का निर्माण **1580 ई0** में **रघुनाथ टण्डन (टोडरमल)** जो मुगल बादशाह अकबर के अर्थ मंत्री थे, ने करवाया था।[11] घाट पर स्थित **बिन्दुमाधव का मंदिर** किसने बनवाया था? इस विषय में इतिहासकारों में मतभेद है। किन्तु कुछ तथ्य यह बताते हैं कि इसका निर्माण **आमेर के राजा मानसिंह** ने करवाया था। राजा मानसिंह ने काशी में मानमंदिर घाट और मानसरोवर घाट बनवाया था। अतः उसी क्रम में यह मंदिर भी बनवाया था।[12] घाट के जामा मस्जिद की दक्षिण दिवार पर पंचगंगा घाट की सीढियों के ऊपर एक लेख है जिससे पता चलता है कि **महाराजा जयसिंह**

ने 1642 ई0 में यहाँ की यात्रा की थी।[13] दिल्ली की राजगद्दी पर आसीन होने के पश्चात् **औरंगजेब** ने मूर्ति पूजकों से प्रतिशोध लेना चाहा। अतः अपने सूबेदारों के नाम फरमान जारी किया कि वे अपनी इच्छा से काफिरों के सभी मंदिर एवं पाठशालाएँ गिरा दें तथा अपने–अपने क्षेत्र में धार्मिक पूजा–पाठ तथा अन्य कृत्य बन्द करा दें। इसी क्रम में बनारस का विश्वनाथ मंदिर गिरा दिया गया तथा उस स्थान पर ज्ञानवापी की मस्जिद उठा दी गयी। इसी के चपेट में बिन्दुमाधव का मंदिर भी रहा। मंदिर को तुड़वाकर वहाँ **आलमगीर–मस्जिद** बना दी गयी। तभी से घाट का नाम बिन्दुमाधव से बदलकर पंचगंगा हो गया। **टैवर्नियर** के अनुसार बिन्दुमाधव का मंदिर पंचगंगा घाट से रामघाट तक फैला था। इसके परिसर में **श्रीराम** व **मंगलागौरी के मंदिर** और पुजारियों के आवास आदि थे।[14] लगभग **1830 ई0** में मस्जिद और मीनारों की मरम्मत हुई थी, क्योंकि मीनारे 15 इंच एक तरफ झुक गयी थीं। इसके पश्चात् अट्ठारहवीं शताब्दी के मध्य में औंध (सतारा) महाराष्ट्र महाराजा **पंथ प्रतिनिधि भावन राव** ने वर्तमान बिन्दुमाधव के मंदिर का निर्माण करवाया था। **1735 ई0** में **पेशवा बाजीराव प्रथम** ने **सदाशिव नाइक** के साथ मिलकर घाट की मरम्मत कर पुर्ननिर्माण करवाया था। **1775 ई0** में पुनः **श्रीपतराव पेशवा** और आंध्र के पंथ प्रतिनिधि ने घाट की मरम्मत करवाई।[15] घाट पर आलमगीर मस्जिद बनने से हिन्दू–मुस्लिम के परस्पर संबंध करीब आए हैं। किन्तु इसी क्रम में एक और कड़ी है मध्यकालीन युग के **संत कबीर** की। ऐसी मान्यता है कि एक मुस्लिम जुलाहे के बेटे कबीर ने अपनी कृतियों से हिन्दू तथा मुस्लिम दोनों वर्गों में समान लोकप्रियता एकत्रित की थी। बताया जाता है कि कबीरदास जी **संत रामानन्द** से दीक्षा लेना चाहते थे। उस समय रामानन्द की काशी में भारी पूछ थी। वे दक्षिण भारत से काशी आए थे। स्वामी रामानन्द कहा करते थे कि भक्ति के पथ पर जो आ गया, उसके लिए जाति का बंधन व्यर्थ है। स्वामी जी के **12 शिष्य** बताएँ गए हैं जिसमें कबीर की भी गिनती होती है। किन्तु प्रथम बार दीक्षा के लिए निवेदन करने पर स्वामी रामानन्द ने मना कर दिया था। प्रतिदिन प्रातः स्वामी रामानन्द पंचगंगा घाट पर स्नान करने जाया करते थे। कबीरदास जी उसी घाट पर पहुँच कर उसकी सीढियों पर लेट गए। जब रामानन्द के पैरों से कबीर टकरा गए, तब उनके मुख से राम–राम निकल गया। यहीं से कबीरदास ने स्वामी रामानन्द से राम–नाम गुरु मंत्र की दीक्षा प्राप्त की थी।[16] **गोस्वामी तुलसीदास जी** कुछ समय तक इस घाट (1582–1590 ई0) पर रहे थे। यहाँ इन्होंने **विनय–पत्रिका** (राम को याचिका) नामक ग्रंथ लिखा था। इस पुस्तक में विन्धुमाधव मंदिर की महिमा का वर्णन किया गया है। वर्तमान में घाट पक्का, स्वच्छ एवं दृढ़ है। घाट के समीप महाराष्ट्र, आन्ध्र, गुजरात एवं राजस्थान के मूलनिवासी अधिक रहते हैं। सन् **1965 ई0** में राज्य सरकार ने नगर–निगम के द्वारा घाट के निचले भाग का पुनः निर्माण कराया था। वर्तमान में घाट पर अनेक मंदिर एवं मठ है। मठों में **स्वामी रामानन्द मठ (श्री मठ संस्थान), श्री संस्थान गोकर्ण पर्तकाली जिवोत्तम (गोकर्णमठ), सत्यभामा एवं तैलंगस्वामी मठ** प्रमुख हैं। मंदिरों में **बिन्दुमाधव, बिन्दु विनायक, राम–मंदिर (कंगन वाली हवेली), राम–मंदिर (गोकर्णमठ), रामानन्द मंदिर, घूतपापेश्वर (शिव), रेवेन्तेश्वर (शिव) मंदिर, एवं आलमगीर मस्जिद है।**

मणिकर्णिका घाट

ऐसा माना जाता है कि इस घाट को भगवान शिव ने असीम शांति का वरदान दिया था। मोक्ष–प्राप्ति के लिए इस घाट पर प्रतिदिन **200 से 300 शवों** का अंतिम संस्कार किया जाता है। यहाँ पर शवदाह चौबीसों घंटे होता ही रहता है। इस घाट की यही विशेषता है कि यहाँ पर चिता की अग्नि कभी ठंडी नहीं पड़ती है। इसलिए इस घाट को **महाश्मशान घाट (The Burning Ghat)** भी कहा जाता है। पारम्परिक मान्यताओं के अनुसार जब शिव तथा पार्वती कुण्ड का अवलोकन कर रहे थे, तब पार्वती जी के कान का मणि चक्रपुष्करिणी में गिर गया। पार्वती जी के कान का मणि गिरने के कारण कुण्ड का नाम मणिकर्णिका पड़ा तथा इस कुण्ड के कारण घाट को भी **मणिकर्णिका घाट** नाम मिला।[17] इसी घाट पर राजा हरिश्चन्द्र ने सत्य की रक्षा के लिए स्वयं को तिनके के समान मानकर घाट के अधिकारी चण्डाल (डोम) के हाथों स्वयं को बेच दिया था।[18]

तृणीकृत्य निजं देहं यत्र राजर्षिसत्तमः।
हरिश्चन्द्रः सपत्नी को व्यकीणाद् भूरियं हिसा।।
(काशीखण्ड–33/110)

मणिकर्णिका घाट के सम्मुख कुछ मुख्य तीर्थों की उपस्थिति मानी गयी है, जो इस प्रकार हैं।[19]– 1. विष्णु तीर्थ 2. भवानी तीर्थ 3. स्कन्द तीर्थ 4. तारक तीर्थ 5. अविमुक्तेश्वर तीर्थ 6. पशुपति तीर्थ 7. मणिकर्णिका तीर्थ 8. इन्द्रेश्वर तीर्थ 9. चक्रपुष्करिणी तीर्थ 10. उमा तीर्थ 11. पितामह तीर्थ 12. वीर तीर्थ। साक्ष्यों के आधार पर पता चलता है कि मणिकर्णिका तीर्थ का महत्त्व गुप्त–काल से ही था, क्योंकि **चौथी शताब्दी के गुप्त शिलालेख** में मणिकर्णिका का उल्लेख मिलता है।[20] इसका उल्लेख **सातवीं सदी** में भी मिलता है। मणिकर्णिका कुण्ड को तो गुप्त काल से पहले का बताया गया है। गहड़वाल शासक **गोविन्दचन्द्र** के **मंत्री लक्ष्मीधर** की **कृति कृत्यकल्पतरु** में मणिकर्णिका कुण्ड का उल्लेख मिलता है।[21] तेईसवें जैन तीर्थंकर **पार्श्वनाथ** का जन्म भी काशी में ही हुआ था। इनके संबंध में एक कथा मिलती है; जिसके अनुसार इन्होंने बाल्यकाल में मणिकर्णिका पर पंचाग्नि यज्ञ की लकड़ी से एक जलते साँप को निकालकर यज्ञादि कर्मों से लोगों को विरक्त किया था।[22] **सत्रहवीं शताब्दी के ग्रंथों** से काशी के ब्राह्मणों के जीवन पर विशेष प्रकाश पड़ता है। महाप्रयोग के बाद ब्राह्मण मणिकर्णिका घाट पर स्नान करते थे। इसके पश्चात् ही संध्या, ब्रह्मयज्ञ, निर्वाप, तर्पण और देवपूजा करते थे। **आठारहवीं सदी के अन्त और उन्नीसवीं सदी के आरम्भ** में मणिकर्णिका घाट की भूमि अत्यधिक महंगी थी, जो इसके महत्त्व को दर्शाती है। **जेम्स प्रिंसेद** उल्लेख करते हैं कि अठारहवीं सदी में इस

घाट के आस–पास जंगल रहा होगा। घाटियों (घाट के पुरोहित) ने उन्हें बताया कि घाट के पास स्थित मकानों में जो पेड़ दिखाई देते हैं। वे उसी जंगल के बचे हुए वृक्ष हैं।[23] इस घाट का पक्का निर्माण **1302 ई0** में **दो शासक भाईयों** ने करवाया था।[24] **पेशवा बाजीराव प्रथम** के आदेश पर उनके बनारस के प्रभारी **सदाशिव नाइक जोशी** ने **1730 ई0** में घाट का पुर्ननिर्माण कराया था।[25] **1791 ई0** में **महारानी अहिल्याबाई होल्कर** ने सम्पूर्ण घाट का पुर्ननिर्माण करवाया था। **1872 ई0** में घाट की मरम्मत तथा नवीनीकरण किया गया।[26] इतिहासकारों का मानना है कि मणिकर्णिका घाट पर श्मशान अधिक पुराना नहीं है। इनका कहना है कि **अवध के नवाब सफदरजंग** के तोपखाने के खजांची **लाला कश्मीरीमल** की माँ की मृत्यु हुई, तब लोग अंतिम संस्कार के लिए उनका शव हरिश्चन्द्र घाट पर ले गए। किन्तु वहाँ के डोम–चौधरी से कर को लेकर विवाद हो जाने पर लाला कश्मीरीमल शव लेकर मणिकर्णिका घाट पर आ गए तथा वहाँ के जमींदार व घाटियों को धन देकर एक नया श्मशान बनवा कर अपनी माँ का अंतिम संस्कार किया। इस घाट पर सदैव चिताएँ जलती रहती हैं। कहा जाता है कि **1930 ई0** में केवल **10 मिनट** के लिए घाट शांत हुआ था।[27] **1988 ई0** में राज्य सरकार के सहयोग से सिंचाई–विभाग ने घाट का पुनःनिर्माण कराया था। घाट का उत्तरी भाग स्वच्छ तथा पक्का है, जहाँ लोग स्नान आदि करते हैं, किन्तु दक्षिणी भाग पर शवदाह होता है। घाट पर **रानी भवानी शिव, रत्नेश्वर शिव, तारकेश्वर शिव, मणिकर्णिकेश्वर शिव, आमेठी शिव (शिव एवं महिषासुर मर्दिनी), मनोकामेश्वर शिव, रूद्रेश्वर शिव (हनुमान), सिद्धिविनायक (गणेश), मणिकर्णिका विनायक (गणेश), विशालाक्षी मंदिर** आदि प्रमुख मंदिर हैं। यहाँ के अधिकांश मंदिर शिव को समर्पित हैं।

दशाश्वमेध घाट

यह घाट नगर के मध्य भाग में स्थित है तथा समीप ही विश्व प्रसिद्ध **काशी विश्वनाथ का मंदिर** स्थित है। यहाँ पर प्रातः काल तथा संध्या का दृश्य अलग–अलग रहता है। जहाँ दिन में धार्मिक दृश्य दिखाई देता है वहीं संध्याकाल में दृश्य मनोरंजन तथा विचरण आदि से परिपूर्ण रहता है। प्रातः कालीन आध्यात्म संध्या में भौतिक अवस्था में बदल जाता है। स्कन्दपुराण के काशीखण्ड के अनुसार भगवान ब्रह्मा ने महादेव की आज्ञा से यहाँ दस अश्वमेध यज्ञ किया था, इसलिए इस घाट का नाम दशाश्वमेध घाट पड़ा। दशाश्वमेध घाट पर **रूद्रसरोवर तीर्थ** के होने की मान्यता है। इसके अतिरिक्त यहाँ **दशाश्वमेध तीर्थ** स्थित है।दशाश्वमेध घाट का इतिहास हजारों साल पुराना है। अपनी पुस्तक **'हिस्ट्री ऑफ इंडिया'** में हिन्दू–राष्ट्रवाद के जनक **काशी प्रसाद जायसवाल (1881–1937) ने भारशिव–नागों** जिन्होंने देश को **शक–कुषाण** के विदेशी शासन से मुक्ति दिलाई थी, को नायकों के रूप में प्रस्तुत किया है।[28] **जायसवाल** लिखते हैं कि भारशिव नागों ने ईसा की दूसरी शताब्दी में कुषाणों को हराकर काशी में दस अश्वमेध यज्ञ किया था तथा इसके पश्चात गंगा में **अवभृथ (यज्ञ के अन्त में किया जाने वाला स्नान) स्नान** किया। तभी से इस स्थान का नाम दशाश्वमेध पड़ गया।[29] भारशिवों ने अवभृथ स्नान घाट के उत्तर में जिस स्थान पर किया था, आज उसे **घोड़ा घाट** कहते हैं।[30] महत्त्वपूर्ण है कि **प्रयाग घाट** वह स्थल है जहाँ अश्वमेध यज्ञ किया गया था तथा **घोड़ा घाट** का नामकरण यज्ञ के घोड़ों को बाँधने के स्थल (घाट) के लिए किया गया था।[31] भारशिव–नागों द्वारा इस यज्ञ के पश्चात यज्ञ के प्रतीक के रूप में घाट के उत्तरी भाग में पत्थर का एक घोड़ा स्थापित किया गया था। जिस कारण इसे घोड़ा घाट कहा गया। एक अन्य ऐतिहासिक वर्णन के अनुसार, **नाग वंशीय शासक वीरसेन** ने चक्रवर्ती बनने की इच्छा से यहाँ दस अश्वमेध यज्ञ किया। अतः इसका नाम दशाश्वमेध पड़ा।[32] गुप्त शासक **समुद्रगुप्त** ने भी इस घाट पर यज्ञ किया था।[33] 18वीं शताब्दी के पूर्व तक दशाश्वमेध घाट का विस्तार **अहिल्याबाई घाट** से **राजेन्द्रप्रसाद घाट** तक था। 18वीं–19वीं शताब्दी के बीच यह घाट **अहिल्याबाई, शीतला, प्रयाग** तथा **घोड़ा घाटों** (वर्तमान राजेन्द्र प्रसाद घाट) में विभक्त हो गया।[34] **पेशवा बाजीराव प्रथम** ने अपने बनारस के प्रभारी **सदाशिव नाइक जोशी** को बनारस में घाट बनवाने की आज्ञा दी थी। सदाशिव ने अपनी राय से **पंचगंगा, मणिकर्णिका** तथा **दशाश्वमेध** पर घाट बनवाना निश्चित किया था। इसमें से **दशाश्वमेध घाट** का निर्माण **1735 ई0** में कराया गया था।[35] **पेशवा बालाजी बाजीराव** ने **1748 ई0** पुनः इस घाट का निर्माण करवाया था।[36] घाट के **दक्षिणी** भाग का पक्का निर्माण **पेशवा बाजीराव प्रथम** ने **1740 ई0** में करवाया था। पुनः इस भाग का निर्माण **इंदौर की महारानी अहिल्याबाई** ने **1775 ई0** में करवाया था।[37] आसपास ही स्थित दो घाटों (अ एवं ब) का एक ही नाम है, जो प्रयाग घाट द्वारा बँट जाता है। 19वीं शताब्दी के मध्य तक बेनिया तालाब से गोदौलिया तक गोदावरी नामक एक नाला बहता था, जो आगे दशाश्वमेध पर गंगा से मिलने के पहले दो मुँहा हो जाता है। इसके परिणामस्वरूप एक छोटा द्वीप बन जाता है। कालक्रम में उक्त नाले को भर दिया गया तथा उस छोटे द्वीप पर एक नया घाट सृजित हुआ, जिसे **प्रयाग घाट** कहते हैं। प्रिंसेप (1822) के मानचित्र पर पुराना मार्ग दर्शाया गया है।[38] वर्तमान दशाश्वमेध घाट का जीर्णोद्वार **1965 ई0** में राज्य सरकार ने नगर निगम द्वारा कराया था तथा इस घाट की स्वच्छता का वर्तमान में काफी ध्यान रखा जा रहा है। मान्यताओं में प्रचलित दस यज्ञ होने का यहाँ सबूत भी मिला है। वर्ष **1929 ई0** में यहाँ **रानी पुटिया के मंदिर** के नीचे खुदाई की गई थी जिसमें कई यज्ञ कुण्ड निकले थे। इन कुण्डों के निकलने के बाद घाट के इतिहास पर लोगों को और अधिक श्रृध्दा तथा विश्वास हो गया और तब से यहाँ स्नान करना तीर्थ यात्रियों के लिए और अधिक पवित्र समझा जाने लगा। दशाश्वमेध घाट पर अनेक मंदिर स्थित हैं जो घाट के ऐतिहासिक महत्त्व को और भी अधिक बढ़ा देते हैं। कुछ मंदिर इस प्रकार हैं– **ब्रह्मेश्वर मंदिर, गंगा मंदिर, काली मंदिर, राम पंचायतन मंदिर,**

शिव मंदिर, शूलटंकेश्वर मंदिर, वाराहेश्वर मंदिर, अभय–विनायक मंदिर, बंदी देवी मंदिर।

असि घाट

'असि' शब्द **तलवार** अथवा **खड्ग** का पर्याय है। **लोक भाषा में** इस घाट को **'अस्सी'** उच्चारित करते हैं, जो असि का अपभ्रंश है। यह घाट काशी के दक्षिण में स्थित है। असि घाट **असि नदी (वर्तमान में असि नाला)** तथा गंगा नदी के संगम पर स्थित है। पूर्व में असि घाट वर्तमान **भदैनी घाट** तक विस्तृत था। मान्यताओं के अनुसार **माता दुर्गा** ने **शुम्भ–निशुम्भ** का वध करने के पश्चात् अपनी **असि (तलवार)** इस स्थान पर फेंक दी थी। तलवार की चोट से भूमि से धारा निकली, इस धारा से ही असि नदी का प्रादुर्भाव हुआ। स्कन्धपुराण के काशीखण्ड के अनुसार भगवान शिव की आज्ञा मानकर सूर्यदेव काशी में राजा दिवोदास का भेद जानने चले गए। किन्तु राजा तो राजा वे साधारण मनुष्य का भी छिद्र (दोष) नहीं जान पाए। तब काशी की महिमा जानने वाले सूर्यदेव स्वयं को **बारह स्वरूपों** में व्यक्त करके काशी में स्थित हो गए। **इसमें पहले लोलार्क हैं, दूसरे उत्तरार्क, तीसरे साम्बादित्य, चौथे द्रौपदादित्य, पाँचवे मयूखादित्य, छठे खखोल्कादित्य, सातवें अरुणादित्य, आठवें वृद्धादित्य, नवें केशवादित्य, दसवें विमलादित्य, ग्यारवें गंगादित्य तथा बारहवें यमादित्य– ये बारहों काशी में स्थित हैं।** कहा जाता है कि भगवान सूर्यनारायण का मन काशी के दर्शन के लिए **लोल (चंचल)** हो उठा था, इसलिए काशी में उनकी **लोलार्क** नाम से प्रसिद्धि हुई। असि घाट पर कुछ प्रमुख तीर्थ हैं– ये तीर्थ इस प्रकार हैं– 1. असिसंभेद तीर्थ 2. हरिद्वार तीर्थ 3. लोलार्क तीर्थ। इस घाट का उल्लेख **गहड़वाल–युग** के लेखों में मिलता है। असि–संगम पर गहड़वाल काल में **लोलार्केश्वर सूर्य** का मंदिर था।[39] वर्तमान में स्थित **भदैनी घाट** तक का सम्पूर्ण भाग पहले असि घाट के अंतर्गत आता था। इस घाट पर अनेक महान साधु–संत आदि ने अपना जीवन व्यतीत किया है, जिसमें से एक हैं **गोस्वामी तुलसीदास**। इन्होंने इसी घाट पर एक गुफा में निवास किया था तथा **रामचरित मानस** जैसे ग्रंथ की रचना की थी। तुलसीदास जी का देहान्त असि घाट पर **1623 ई0** में हुआ था। इनकी मृत्यु के संबंध में एक दोहा भी प्रसिद्ध है[40]–

संवत सोलह सौ असी, असि गंग के तीर।
श्रावण शुक्ला सप्तमी, तुलसी तज्यौ शरीर।।

अर्थात् **विक्रमी सम्वत् 1680 ई0 (सन् 1623 ई0)** में गंगा के असि घाट पर श्रावण मास में शुक्ल पक्ष की सप्तमी तिथि को तुलसीदास जी ने अपने शरीर का त्याग किया था। आगे चलकर यह घाट पाँच अन्य घाटों में बँट गया। असि घाट के बाद पड़ता है **गंगामहल घाट।** इसका निर्माण **1830 ई0** में काशी नरेश ने करवाया था। गंगामहल घाट के तुरन्त बाद **रीवाँ घाट** स्थित है। इसका निर्माण रीवाँ के महाराजा ने करवाया था। रीवाँ घाट के बाद **तुलसी घाट** आता है, इसका निर्माण **1807 ई0** में **अमृत राव पेशवा** ने करवाया था। तुलसी घाट के बाद पड़ता है **भदैनी घाट।** इसका निर्माण **1907 ई0** में **म्युनिसिपल कॉर्पोरेशन** ने करवाया था। इस प्रकार असि घाट 19वीं शताब्दी के बाद पांच अलग–अलग घाटों में विभक्त हो गया था। घाट पर स्थित अधिकतर इमारतों का निर्माण **18वीं–19वीं** शताब्दी में मराठों के संरक्षण में हुआ था तथा बाद में घाट तथा अन्य स्थल **काशी नरेश (महाराजा, बनारस) ने 1830 ई0** में बनवाया था।[41] **1902 ई0** में **बिहार** के **सुरसण्ड स्टेट** की **महारानी दुलहिन राधा दुलारी कुंवर** ने **काशी नरेश प्रभुनारायण सिंह (1891–1931)** से घाट तथा मंदिर बनवाने के लिए भूमि को खरीदा था, किन्तु **1927 ई0** में महारानी की आकस्मिक मृत्यु होने के कारण घाट का निर्माण नहीं हो पाया, लेकिन उनके द्वारा बनवाया गया **लक्ष्मीनारायण पंचरत्न मंदिर** महारानी के कलाप्रिय होने का प्रतीक है। **1988 ई0** में राज्य सरकार के सहयोग द्वारा घाट का पक्का निर्माण कराया गया है। वर्तमान में घाट पर विभिन्न कार्यक्रम होते हैं तथा घाट की स्वच्छता का विशेष ध्यान रखा जाता है। इस घाट पर स्थित मंदिर 19वीं शताब्दी के पूर्वार्ध्द के है। घाट पर **जगन्नाथ** का प्रसिद्ध मंदिर है। इसके अतिरिक्त **लक्ष्मीनारायण, नृसिंह, बाणेश्वर, मयूरेश्वर और असिसंगमेश्वर** आदि मंदिर है। मंदिरों के अतिरिक्त घाट पर कई अखाड़े भी हैं, जिसमें **बड़ा गूदड़जी, छोटा गूदड़जी, टीका राम, कृष्णचारी** आदि अखाड़े हैं।

एक **लोक किवदंती** के अनुसार यह **पाँच जलतीर्थ** भगवान के पाँच शारीरिक अंगों का प्रतिनिधित्व करते हैं– "**असि सिर है; दशाश्वमेध छाती है; मणिकर्णिका नाभि है; पंचगंगा जांधें हैं; और आदिकेशव चरण हैं।**" ऐसी मान्यता है कि किसी कारणवश जो **पंचक्रोशी** की यात्रा करने में सक्ष्म नहीं है उनके लिए पंचतीर्थ का विधान है। पंचतीर्थ यात्रा से भी पंचक्रोशी यात्रा के समान ही फल प्राप्त होता है। इस प्रकार यह सत्य सिद्ध होता है कि जितना महत्व काशी के सम्पूर्ण तीर्थों का है, उतना ही महत्व मात्र ये पाँच घाट रखते हैं। ये पाँच घाट स्वयं में ही साक्षात् **शिव** के समान हैं।

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ENVIRONMENTAL INFLUENCE ON BEHAVIORAL CHANGES DURING COVID -19

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ABSTRACT

Behavior is a set of actions and characteristics that an individual exhibits in response to their surroundings, which include the physical, social, economic, and technological environments. Depending on the environment in which they live, their behavior may be assertive or aggressive. When the environment is favorable, an individual's behavior is positive; however, when the environment is unfavorable, an individual's behavior is negative. The structural framework for this study is based on the following four factors: physical, social, economic, and technological environments, and their influence on attitude and how it leads to changes in behavior during Covid -19.

Introduction

"Some people notice your change in attitude toward them, but they fail to notice their behavior that caused you to change." Change is an unavoidable occurrence. Any change or alteration in human behavior is referred to as behavior change. It is also due to a shift in an individual's attitude, which is influenced by their surroundings. During a disaster situation, such as a Corona virus attack, an individual's behavior changes because they must stay at home without going out, maintain social distance, and the closure of TASMAC affects alcoholics. As individuals, we must exercise social responsibility, exercise self-control, and be health-conscious. When there is a positive attitude, it influences positive behavior change, which aids in the protection of public health. It is a chance to change individual attitudes and thus prevent disease. Social and behavior change communication is a term used to describe behavior change in public health.

The Johns Hopkins Center for Communication Programs was established to address the world's pressing health issues through social and behavior change communication (SBCC). They work with theory and evidence to support innovation and creativity. When a health disaster occurs, such as Ebola or Corona, they try to solve the problems that arise. It is true that people's behaviors cannot be changed overnight because they have become accustomed to a certain way of life and customs that have been practiced for generations. However, during Covid 19, people must maintain social distance and stay at home, which will benefit their health as well as the health of future generations.

Objectives

• To comprehend the influencing factors in physical, social, economic, and technological environments.
• To examine the relationship between change in attitude and change in behavior.

II. Literature Review

Coronavirus, according to Chris Murphy, Steven Naert, and Colin Strong in their article Coronavirus &Behavior change-| (March 2020), poses challenges to policymakers. The public takes protective measures against the virus, and their health and financial constraints influence behavioural changes as a result of the social and economic environment's influence. Consumer behavior changes in areas where people are affected by the Corona virus, such as bulk-buying, a rush to buy necessities, and crowd avoidance, motivate isolating. Behavior is a complex phenomenon that is influenced by both internal and external factors.

Jennifer Cole stated in his article "why changing human behavior is the best defense in tackling the virus" (March, 2020) that COVID-19 has increased the importance of responsibilities. Political leaders, health experts, police, the media, and celebrities, as well as neighbours and loved ones, are urging everyone to act responsibly in order to slow the spread of the virus and reduce the number of people affected by the corona pandemic.

III. Methodology of Research

This research relies on both primary and secondary data. The primary data is collected using a tested questionnaire that includes both optional type and statements on a Likert 5

point scale. Secondary data sources include websites, newspapers, and other published articles. The research questions and hypothesis evolved gradually as a result of the research gaps identified through the literature reviews. The study relied heavily on primary data gathered from 100 respondents. To collect responses from respondents, the researcher used a simple random sampling method. The data is analysed with the statistical package for social science (SPSS) and other computer programmes. In the study, the following statistical tools were used: percentage analysis, multiple regression analysis, and two-way ANOVA. Behavioural Influencing Factors Physical environment: This includes both natural and man-made surroundings. It includes air pollution, healthy food, and the closure of TASMAC. Unforeseen consequences occur in the physical environment, resulting in environmental damage and disasters such as covid 19. The closure of TASMAC will assist alcoholics in protecting their health by overcoming their drinking habit. People are influenced by their family and peer networks in their social environment. Individual behaviour is influenced by his or her family, friends, and partner.

People must maintain social distance in order to avoid People find it difficult to spread covid because they are unable to participate in social events. It encompasses religious and cultural values, as well as media. Individuals live in societies and have social relationships. The economic environment refers to the external factors that influence consumer purchasing patterns. It is critical in determining the success of a business. When the unemployment rate is high, labour can be acquired at a lower cost. Due to covid 19, governments have issued orders to halt manufacturing in order to maintain social distance, resulting in a reduction in the country's total income. Daily labourers are unemployed and without a source of income. Changes in technology affect everyone because it is difficult to update technology for everyone. Even teaching professionals found it difficult to take online classes, attend and present lectures via Webinar due to covid 19. All professionals must be eager to learn new things and have a strong desire to keep up with technological advancements. As a person, he or she is influenced by their attitude, emotions, and beliefs. A belief, trust, sentiment, or consent towards something is referred to as an attitude. Behaviour is an accomplishment or reaction to an event.

Table 1: Descriptive statistics of respondents' characteristics

		Frequency	Percent	Valid Percent	Cumulative Percent
Marital status	Marital Status	34	37.4	37.4	37.4
	Unmarried	57	62.6	62.6	100
	Total	91	100	100	
Gender	Male	47	51.6	51.6	51.6
	Female	44	48.4	48.4	100
	Total	91	100	100	
Size of Family	Up to 2 members	12	13.2	13.2	13.2
	Up to 4 members	52	57.1	57.1	70.3
	Above 4 members	27	29.7	29.7	100
	Total	91	100	100	
Educational Qualification	Diploma	1	1.1	1.1	1.1
	Degree	13	14.3	14.3	15.4
	Post Graduate	60	65.9	65.9	81.3
	Professional	16	17.6	17.6	98.9
	Others	1	1.1	1.1	100
	Total	91	100	100	

Annual Income	up to 3 lakhs	60	65.9	65.9	65.9
	up to 5 lakhs	15	16.5	16.5	82.4
	Above 5 lakhs	16	17.6	17.6	100
	Total	91	100	100	
Nature of Job	Private Job	45	49.5	49.5	49.5
	Government Job	11	12.1	12.1	61.5
	Business Job	14	15.4	15.4	76.9
	Others	21	23.1	23.1	100
	Total	91	100	100	
AGE	Below 30 years	66	72.5	72.5	72.5
	31 to 45 years	16	17.6	17.6	90.1
	46 to 60 years	9	9.9	9.9	100
	Total	91	100	100	

Table 2 : Two ways ANOVA Size of family, Annual income and Change in Behaviour

Between-Subjects Factors

		Value Label	N
Annual Income	1	up to 3 lakhs	60
	2	up tp 5 lakhs	15
	3	Above 5 lakhs	16
Family	1	Up to 2 members	12
	2	Up to 4 members	52
	3	Above 4 members	27

Tests of Between-Subjects Effects

Dependent Variable: Change in Behaviour

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6.911[a]	8	.864	.521	.838
Intercept	177.796	1	177.796	107.139	.000
Annual Income	.638	2	.319	.192	.826
Family	3.375	2	1.688	1.017	.366
Annual Income * Family	3.809	4	.952	.574	.682
Error	136.079	82	1.659		
Total	511.000	91			
Corrected Total	142.989	90			

a. R Squared = .048 (Adjusted R Squared = -.045)

Null Hypothesis (HO): There is no relationship between the sizes of family members; annual income and Change in Behaviour.

Alternate Hypothesis: There is relationship between the sizes of family members; annual income and Change in Behaviour.

The calculated values is less than .05, we accept the null hypothesis

Table 3: Regression – Nature of Job and change in behaviour pattern of the respondent
Sources Computed Data

R	R Square		Adjusted R Square	Std. Error Estimate	F	Sig.	Variables	Beta	T	Sig.
.370[a]	.137		.086	1.19924	52.701	.026[a]	Stress To Stay In Home	-.014	-.117	.907
							Tension of Repayment of Loan	-.122	-.945	.347
							Attitude During Corona Fear of Losing Job	.034	.239	.812
							Decrease In Income	.009	.068	.946
							Purchase And Spending Attitude Change	-.328	-300	.004

a. Nature of job (independent variable),b. Stress Due To Stay In Home ,Tension of Repayment of Loan ,Attitude During Corona, Fear of Losing Job, Decrease In Income, Purchase And Spending Attitude Change (dependent variables). From the above table it is found that F= 52.716, P=.026(less than .05 means significant or (statistically significant at 5% it implies there is dependant relationship between Nature of job and change in behaviour pattern of the respondent

IV. Findings

• The majority of families have four members, and the majority of respondents are postgraduates with annual incomes of up to three lakhs.
• The majority of them work in private firms, and the majority of respondents are under the age of 30. • COVID-19 has infected more men than women, and the death rate of men is higher.
• Because women adapt to changes in their environment more easily, the death rate of women is lower. According to a Chinese Center for Disease Control study of 44,600 people infected with COVID-19, men died at a rate of 2.8 percent, while women died at a rate of 1.7 percent.
• When compared to men, women devote 76.2 percent of their time to work and family responsibilities. During this period, 19 working women are able to balance their work and personal lives.
• The ANOVA test revealed that there is no relationship between the sizes of family members, annual income, and Change in Behaviour. • The Tamil Nadu government has taken effective steps to combat the corona virus disease.
• It was discovered through regression analysis that there is a dependent relationship between the nature of the job and the change in the respondent's behaviour pattern. • Doctors were kind enough to provide psychological support to Corona virus patients.
• The police department also used technology, such as drones, to effectively control social distance.
• Children, pregnant women, the elderly, the malnourished, and the sick are more vulnerable during a disaster. Women look after them with a positive attitude.
• Because women change human behaviour easily, they bear the overall burden and areconcerned about the entire family in order to protect them from harm.

COVID-19

• Because schools are closed during this lockdown period, many working parents find it difficult to nurture their naughty children at home, as well as do household work and office work from home.
• Opposition parties should not try to make politics during a critical disaster period, but should instead motivate the ruling party. • Many philanthropists contributed voluntarily to the PM CARES fund in response to Covid 19 in order to support the government. We are pleased to note that Tata group contributed Rs 1500 crores, Reliance Industries and Aditya Birla group contributed Rs 500 crores each, L&T contributed Rs 150 crores, Infosys, Adani

group, JSW, Vedanta, Hreo, ITC Ltd, Mittal steel and Bharathi enterprises contributed Rs 100 crores each, Jindal steel, Kotak bank, TVS and Patanjali contributed Rs 25 crores each, and Nestle contributed Rs 15 crore

• As the economy slows as a result of Covid 19, people experience tight credit, low ROI, high unemployment, salary cuts, and reduced savings. People go through a process known as "consciousness raising," in which they learn new ideas and engage in positive behaviour by reducing debt. However, some people engage in negative behaviour, which leads to mental depression, and some commit suicide.

• Direct experience-based attitudes are more predictive of behaviour.

V. Suggestions

• Increased awareness and knowledge are needed to change attitudes and generate a desire to change.

• Instead of distributing financial assistance to all ration card holders, the government could focus more on economically disadvantaged citizens such as daily wage earners.

• Liquor stores (TASMAC) can be closed in part by reducing their numbers.

• People must follow the government's rules and strictly adhere to social distancing.

• The central government may offer tax breaks and financial assistance to poor farmers in order to help them get out of debt.

• It is an opportunity for engineers to create low-cost equipment and medicine for Corona virus victims, as necessity is the mother of invention.

• In order to get out of the Covid 19 disaster, the public must work with the government and follow their instructions.

VI. Conclusion

During COVID, 19 women were stressed about the health of their family members,and they are in grave danger during disasters. Women face a greater threat than men during Covid 19 due to diseases and emotional distress. Women use a variety of approaches to improve their emotional well-being. When family members have a strong bond, it gives women more confidence to face the threat. Women work effectively and efficiently to manage the crisis. It is a difficult time to manage the young children, who are present in the house 24 hours a day. The psychological and social environment provides women with the confidence to face challenges head on. Human behaviour is influenced by three factors: desire, emotion, and knowledge.Have we ever fantasized about this transformation?

Carriages in a train have been converted into hospitals!!

Bus stations as a vegetable market!! Temples with shut doors!! Cinemas must be closed!!

Marriages conducted without ostentation!! Air pollution has been reduced!! Newspapers – unintentional news!! Lock your children at home!!

Make the change you want to see in the world.

Make the change you want to see in the world.

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NON-LINEARITY STUDY ON COMBUSTION QUALITY MONITORING IN POWER STATION BOILERS USING ANN AND IMAGE PROCESSING ALGORITHMS

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ABSTRACT

The combustion quality determination in power station boilers is of great importance so as to avoid air pollution. The emission of harmful gases as a result of incomplete or partial combustion can be reduced by monitoring the flame images at the furnace of the boiler. Complete combustion minimises the exit of NOx, SOx, CO and CO2 emissions also ensuring the consistency in load generation. If the combustion was complete then the flue gas emissions are maintained within minimum limits. Flame image analysis was done using Support Vector Machine (SVM) and classification based on the combustion quality was done with Meta Classification via Clustering, Cross Validation Parameter Selection (CVP), Radial Basis Function Network (RBFN) and MultiLayer Perceptron (MLP). Various performance measures are used for cross validation to estimate the combustion conditions. This research work is a combination of Fisher's linear discriminant analysis and radial basis function method for identifying the combustion conditions from the flame images of a boiler. The images in the control room are acquired using an infrared camera fixed to the inner portion of the boiler. The features of the image are further extracted using correlation. The dimensions of the input for the training patterns are reduced from 30 to 2 using optimal discriminant plane technique. Two projection vectors φ1 and φ2 is calculated for reducing the dimension of the input pattern. During training and testing of Radial Basis function Network (RBF), the number of input nodes is 2. Nineteen patterns have been used for training RBF and another 19 patterns for testing the RBF. Results obtained are promising and positive to implement for closed loop monitoring of the boiler.

Keywords: *Combustion quality, Support vector machine, Radial basis function network, Multilayer perceptron, Meta Classification via Clustering, CV Parameter Selection, intelligent technique, Automation.*

1. Introduction

The boilers are steam generators which convert pre-heated water into super heated steam. This high pressure super heated steam drives the turbine coupled to a generator which in turn generates power [1]. The Thermal Power Station (TPS) – Expansion-I at Neyveli (NLC) has two units with generation capacity of 210MW each. The total height of the boiler is 90m and the entire firing process gets over within 42m. The furnace is located at the 18th metre of the boiler. The heavy oil is used for initial firing and thereafter the firing process is enhanced by using lignite as the fuel whose calorific value is 2350 kCal/kg and fired at a rate of 189 to 230 t/hr. The firing system is called as tangential firing system. It includes six mills to crush the coal so that it becomes fine powder. The coal is also pre-heated so that it is used as the pulverized coal. The figure for tangential firing system is shown in figure 1 below.

1.1 Existing Vs Proposed flame monitoring system

The existing set-up at NLC has an infra-red camera placed inside a water-cooled jacket with servo-motor mechanism for retracting the same. The video captured by the camera is displayed on the CRT monitor is used for identifying the presence or absence of the flame to avoid explosion of the boiler [8]. The repeated loading of the furnace without monitoring the flame status causes explosion of the boiler which is very dangerous [5, 4]. The figure 2a shows the block diagram for the existing set-up at NLC. In the proposed system shown in figure 2b includes an additional device for transferring the video from the CRT monitor onto the laptop with various image processing algorithms. The video was splitted into frames these frames where further analyzed for the same.

2. Materials and Methods

2.1. Fisher's Linear Discriminant Function (FLD)

The process of changing the dimensions of a vector is called transformation. The transformation of a set of n-dimensional real vectors onto a plane is called a mapping operation. The result of this operation is a planar display. The main advantage of the planar display is that the distribution of the original patterns of higher dimensions (more than two dimensions) can be seen on a two-dimensional graph. The mapping operation can be linear or non-linear. R.A. Fisher developed a linear classification algorithm [1] and a method for constructing a classifier on the optimal discriminant plane, with minimum distance criterion for multi-class classification with small number of patterns [2]. The method of considering the number of patterns and feature size [3], and the relations between discriminant analysis and multilayer perceptron has been addressed earlier. A linear mapping is used to map an n-dimensional vector space $\Re^n$ onto a two-dimensional space. Some of the linear mapping algorithms are principal component mapping, generalized de-clustering mapping, least squared error mapping and projection pursuit mapping. In this paper, the generalized de-clustering optimal discriminant plane is used.

2.2. Radial basis function Network (RBFN)

A neural network is constructed by highly interconnected processing units (nodes or neurons) which perform simple mathematical operations. Neural networks are characterized by their topologies, weight vectors and activation function which are used in the hidden layers and output layer [4]. The topology refers to the number of hidden layers and connection between nodes in the hidden layers. The activation functions that can be used are sigmoid, hyperbolic tangent and sine. The network models can be static or dynamic. Static networks include single layer perceptron and multilayer perceptron. A perceptron or adaptive linear element (ADALINE) refers to a computing unit [5-6]. This forms the basic building block for neural networks. The input to a perceptron is the summation of input pattern vectors by weight vectors. Information flows in a feed-forward manner from input layer to the output layer through hidden layers. The number of nodes in the input layer and output layer are fixed. It depends upon the number of input variables and the number of output variables in a pattern. In this application, the network parameters suchas the number of nodes in the hidden layer and the number of hidden layers are found by trial-and-error method. In most of the applications one hidden layer is sufficient.

The Radial Basis function (RBF) network (Figure 1) is a feed forward neural network with input layer, hidden layer and output layer. It is a real valued function [7], whose value depends only on the distance. The nodes of the hidden layer use an activation function $f(x) = \exp(-x)$ which varies monotonically with respective to the distance from the centre. The activation function is used to develop RBF output in each node in the hidden layer. A bias value of '1' is also used. The input to the activation function is the modulus of distance between the input pattern and the mean centre of patterns. The centres should be chosen such that all the patterns in a group cluster around the respective centres. When the centres are not chosen properly then the results may not be promising. Hence, a rule of thumb can be used to find centre as the mean of each class. If the classes are considered, then mean for each class can be used as centre to find distance among input patterns and the centres.

2.3. Procedure for Data Collection

The flame images corresponding to three different combustion conditions were collected by varying the air/fuel ratio and taking the corresponding readings of flame temperature, NOx, SOx, CO and CO2 emissions [3, 2]. The sample images corresponding to the above said three categories (shown in figure 3) with their respective parameters are tabulated in the table 1 below.

2.4. Pre-Processing

The images extracted are pre-processed for removal of noise. The noise removal is done with a median filter. The size of each frame is 320x240. A square image of 240x240 is taken into consideration for further processing Histogram analysis was done to identify the range of intensities corresponding to each

group as shown in figure 4 below. The colour flame images are converted into gray scale images using threshold-based edge detection technique.

2.5. Feature Extraction

The features denote the basic pattern of an image that gets repeated in various directions. The features like orientation, centroid, area, area through equation, average intensity etc., are extracted from the image using Matlab. The extracted features are normalized to reduce computational complexity.

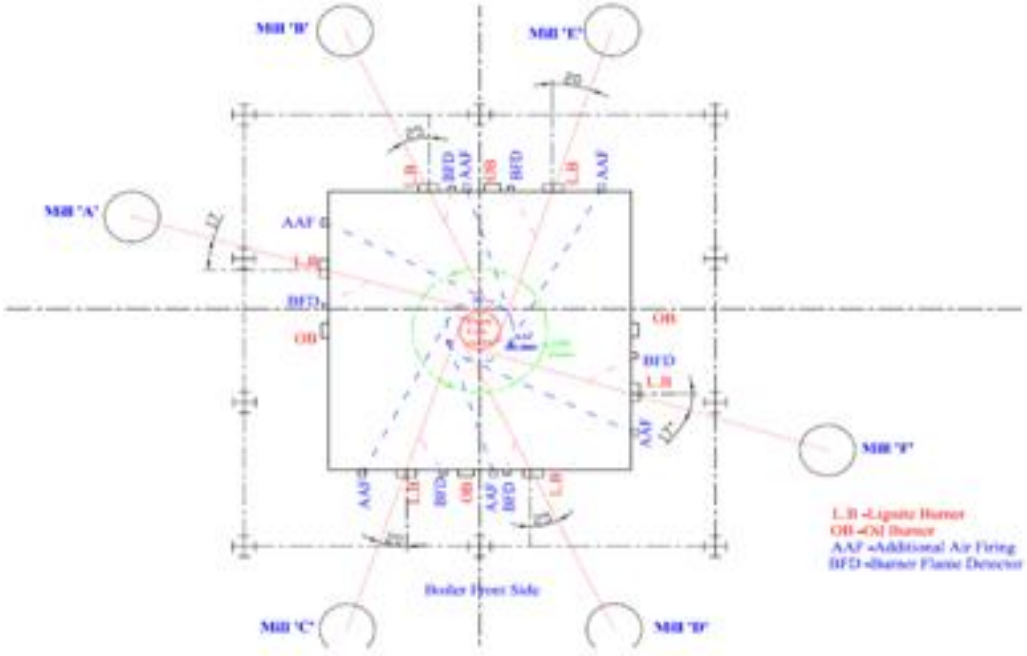


Figure 1. Tangential firing system

2.6. Feature Reduction

The features are reduced using SVM technique. Support vector machines (SVMs) are a set of related supervised learning methods used for classification. Intuitively, an SVM model is a representation of the points in space, mapped so that the features of the separate categories are divided by a clear gap that is as wide as possible. New features are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall on. Support vector machine constructs a hyper plane or set of hyper planes in a high or infinite dimensional space, which can be used for classification tasks. Here the attributes are ranked by the SVM technique [7]. The results obtained by SVM feature reduction and the screen shots are shown in figure 5and its variation during classification are exhibited in Figure 6 (a) to (f). The ranking of the features by SVM are given in table 2 below

Table 1(a). Measurement of parameters corresponding to each group of images

Class	NOx mg/Nm3	CO ppm	CO2 Nm3/hr	SOx Nm3/hr
1	70	100 to 120	1000	70
2	120	200 to 210	3000	120
3	200	300	7000	200

Table 1(b). Measurement of parameters corresponding to each group of images

Combustion conditions	Flame Temperature in (deg Celsius)	Air/fuel ratio (No units)
Complete	1250	Ratio is 4:1, 890 t/hr-air, 182 t/hr- lignite
Partial Combustion	900	Ratio is 3:1, 600 t/hr – air, 213 t/hr- lignite
Incomplete Combustion	300	Ratio is 2:1, 230 t/hr- lignite, 400 t/hr - air

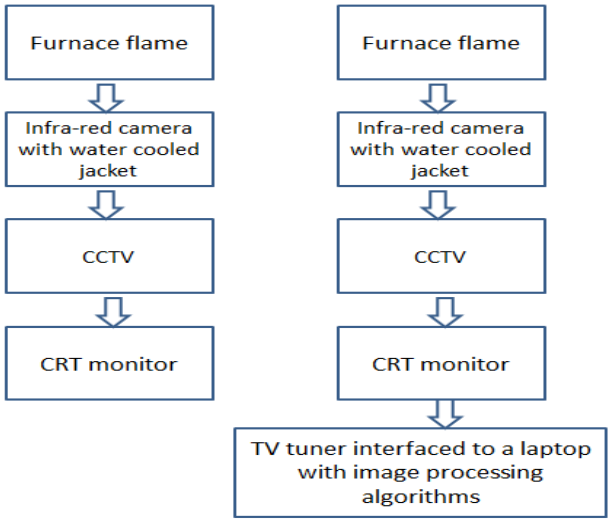


Figure 2. Existing Vs Proposed Set up

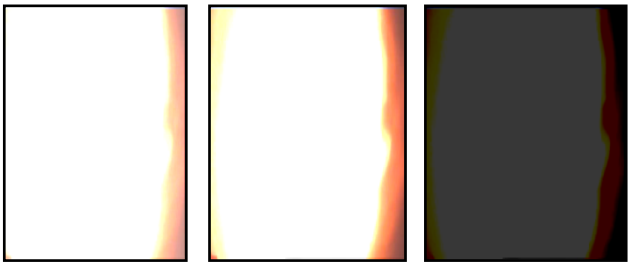
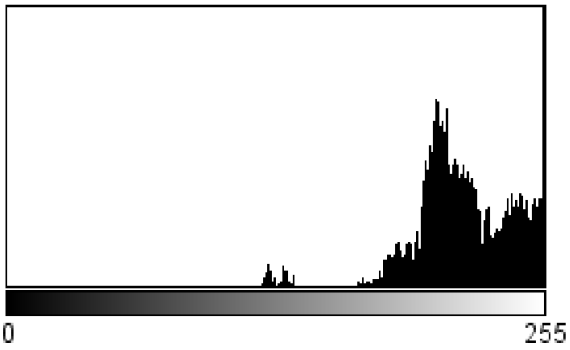
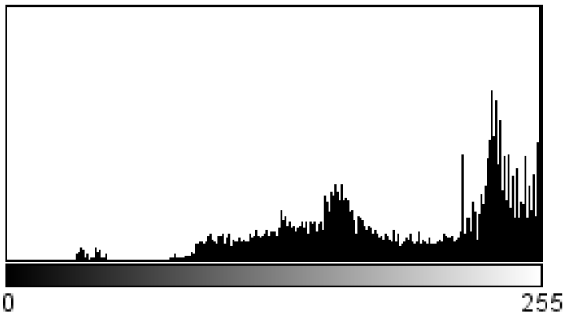


Figure 3. Flame images-complete, partial and incomplete combustion



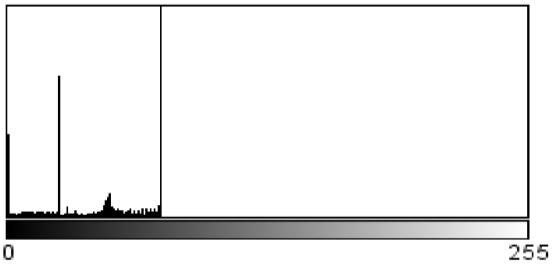
Count: 76800 Min: 120
Mean: 250.114 Max: 255
StdDev: 15.529 Mode: 255 (67368)

a) Complete combustion



Count: 76800 Min: 31
Mean: 240.648 Max: 255
StdDev: 36.659 Mode: 255 (60934)

b) Partial combustion



Count: 76800 Min: 0
Mean: 66.132 Max: 75
StdDev: 19.825 Mode: 75 (60367)

c) Incomplete combustion

Figure 4. Histogram Analysis for flame images

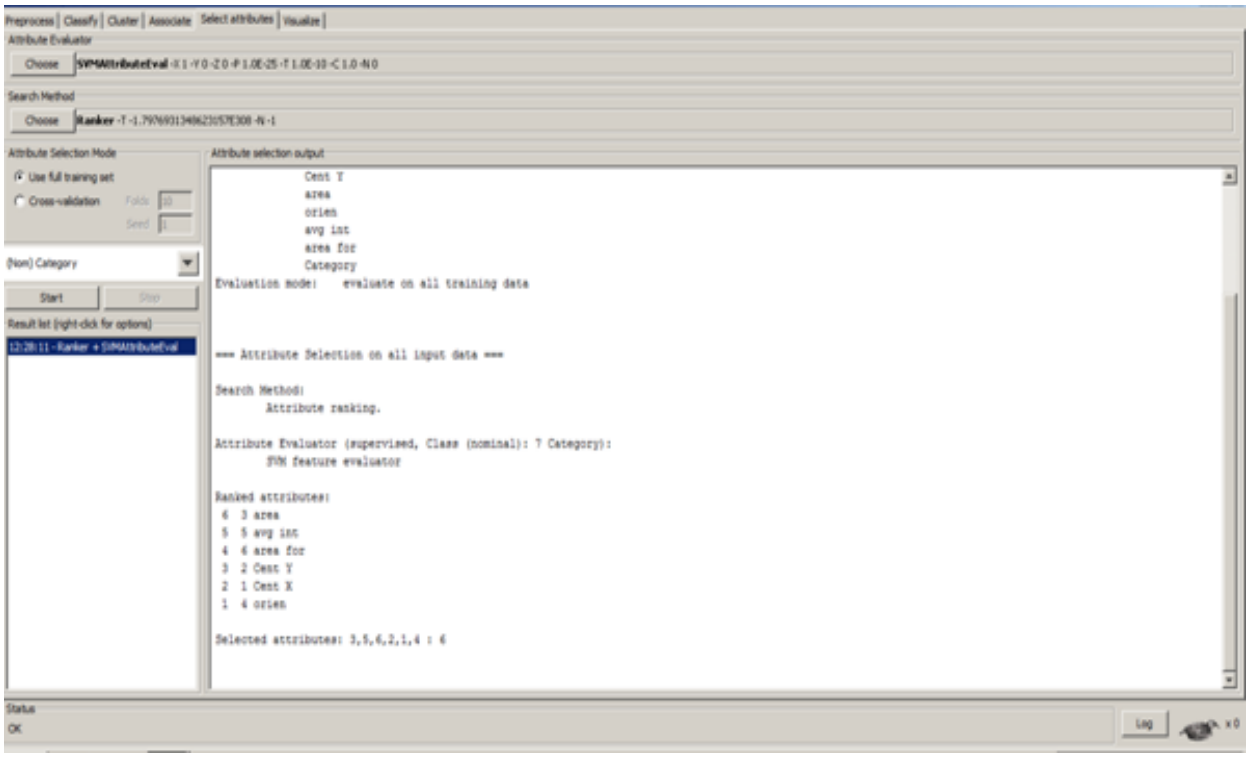


Figure 5. Screen shot for feature ranking by SVM

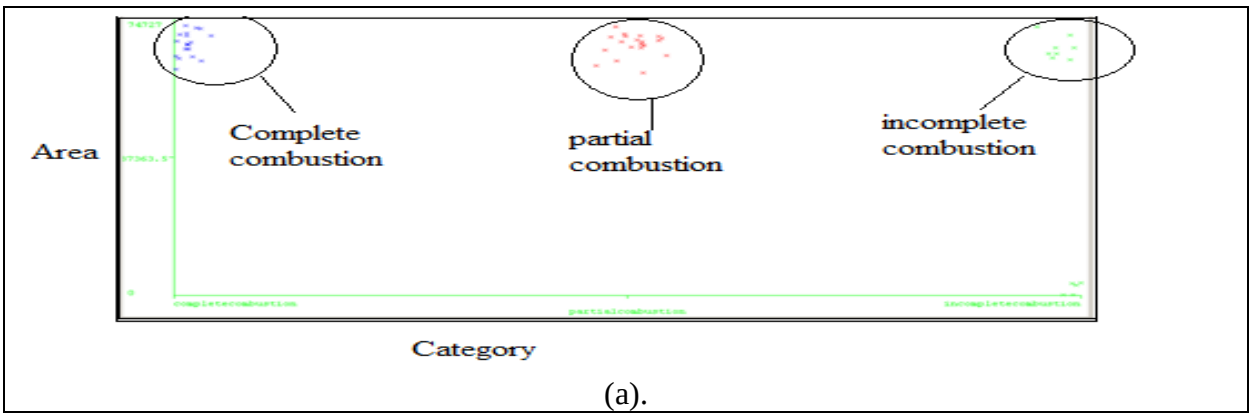
Table 2. Ranking the features using SVM

S.No	List of the Features extracted	Position of attributes as ranked by SVM
1.	Centroid about X	2nd Position
2.	Centroid about Y	3rd Position
3.	Area	6th Position
4.	Orientation	1st Position
5.	Average Intensity	5th Position
6.	Area through equation	4th Position

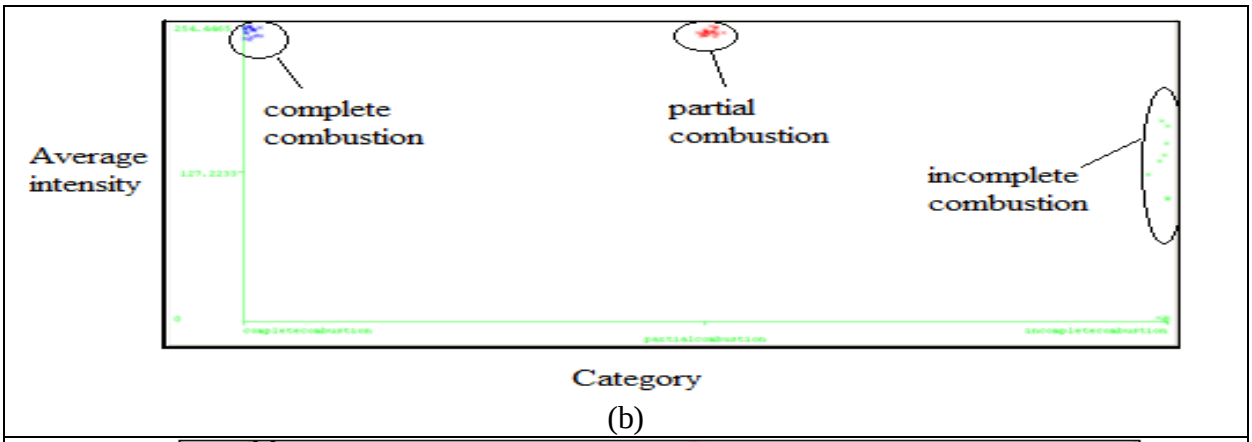
2.7. Classification

2.7.1. Radial Basis Function Network (RBFN)

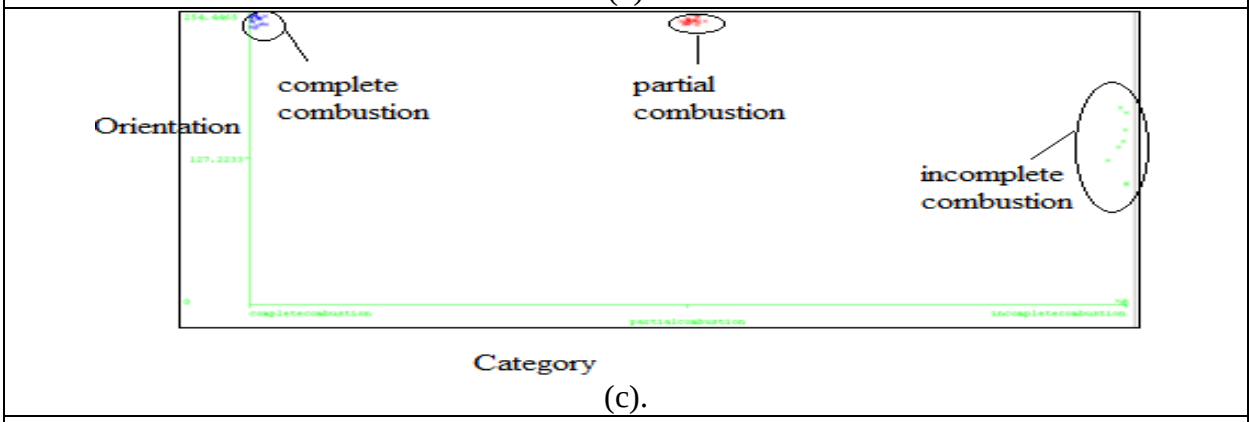
The intelligent classifier [6] used is a Radial Basis Function Network (RBFN). The Radial Basis function (RBN) network is a feed forward neural network with input layer, hidden layer and output layer. Centres are created from the training data. The distance between training pattern and the centres are found. The output of hidden layer is obtained by using the Gaussian function. A bias value of '1' is used for matrix multiplication. The input to the activation function is the modulus of distance between the input pattern and the mean centre of patterns. The centres should be chosen such that all the patterns in a group are around the respective centres. Hence, a rule of thumb can be used to find the centre as the mean of each class, the distance among input patterns and the centres [3, 8].



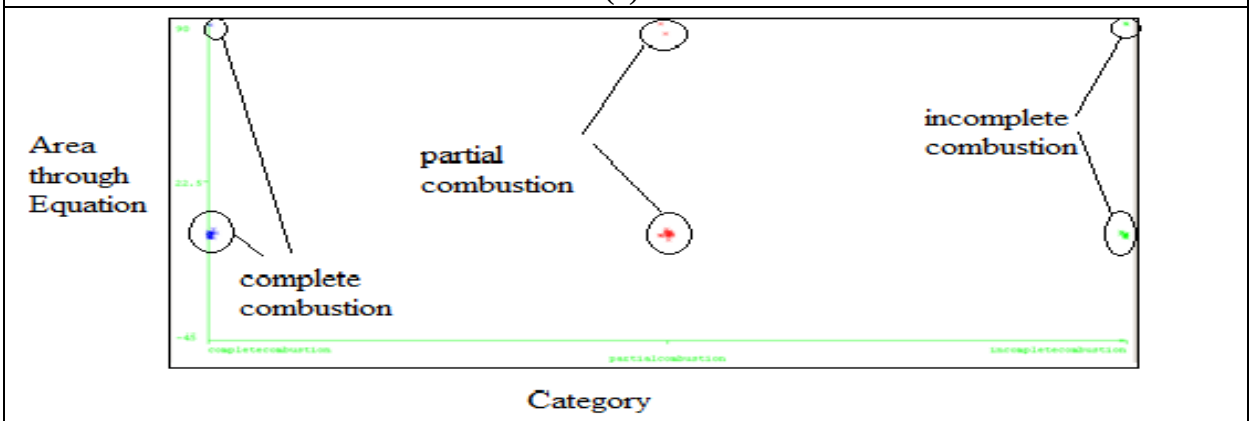
(a).


Average intensity
complete combustion
partial combustion
incomplete combustion
Category

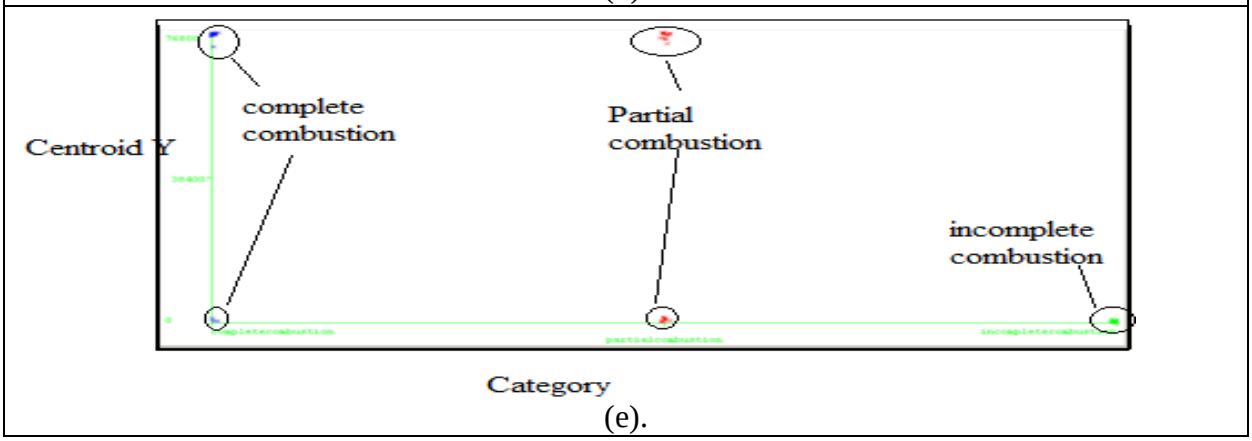
(b)


Orientation
complete combustion
partial combustion
incomplete combustion
Category

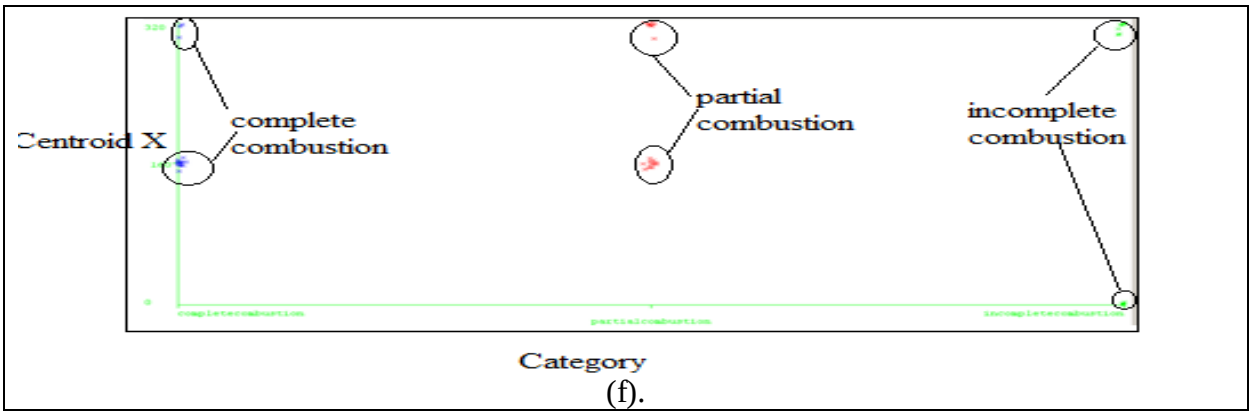
(c).


Area through Equation
complete combustion
partial combustion
incomplete combustion
Category

(d).


Centroid Y
complete combustion
Partial combustion
incomplete combustion
Category

(e).



(f).

Figure 6. Variation of the features-Category by SVM feature reduction

2.7.2. Multilayer Perceptron (MLP)

Another type of intelligent classifier called Multilayer perceptron (MLP) classifier was also used for inferring combustion quality in power station boilers [9]. The MLP has three layers namely the input layer, hidden layer and the output layer. The activation function used is a sigmoid function. The number of nodes in the input layer is six, number of nodes in the hidden layer is twenty and that in the output layer are three to identify the combustion quality. The mean squared error is the objective function [6, 9].

2.7.3. Meta Classification via Clustering

Various classification and clustering algorithms became available due to a surge of interdisciplinary research interests in the areas of data mining and knowledge discovery. We develop a statistical meta-model which compares the classification performances of several algorithms in terms of data characteristics. This empirical model is expected to aid decision making processes of finding the best classification tool in the sense of providing the minimum classification error among alternatives. Concepts and algorithms of feature selection, surveys existing feature selection algorithms for classification and clustering, groups and compares different algorithms with a categorizing framework based on search strategies, evaluation criteria, and data mining tasks, reveals unattempt combinations, and provides guidelines in selecting feature selection algorithms. With the categorizing framework, we continue our efforts toward building an integrated system for intelligent feature selection.

2.7.4. Cross Validation Parameter (CVP) Selection

Cross-validation is determined by holding all of the model parameters, $\gamma = \{\beta, \sigma\hat{}\ 2\ ,\theta\}$, constant while creating n models using each subset of the remaining n-1 points, and calculating the error at each omitted location in turn. Computationally an efficient formula can be used for the "leave-one out" CV error of prediction at the deleted site for a constant trend function in the model. The q is the inverse of the diagonal of R−1. The elements of q are placed on the diagonal of a matrix Q, allowing the cross-validation of a more complex trend function. By minimizing the average squared bias, the estimated values of trend function coefficients are found out, where Q2 is QTQ , or Q with each element squared. Minimized over the correlation function parameter space by substituting the optimal β, which is a function of the correlation function parameters. This method is similar to the profile log-likelihood method to reduce the number of variables to be optimized. An advantage to CV is that it does not assume any probability distribution shape for the observations, which may result in a better estimate of the optimal model parameters [10].

3. Results and Discussion

The flame images are obtained from the control room of the thermal power plant boiler. The image is preprocessed to make sure that correct image is used for analysis and monitoring purposes.The group 1 and group2 images have been considered for training and testing of RBF as shown in Table 1. From each group nearly 50% of images have been considered for training and 50% of images have been

considered for testing. Each image is processed and a suitable square matrix of the image is considered after experimenting for various combinations. Step 1 to step 7 outputs 30 values as shown in Table 2 as the size of the image cropped is 30 x 30 from the actual size 47 x 35 acquired.

3.1. Training of RBFN, MLP, Classification via Clustering and CVP algorithms

Totally 39 images were taken for training. 39 images, includes images obtained under complete combustion, partial combustion, incomplete combustion conditions along with NOx, CO2, CO and SOx emissions. According to the ranking of the features, if the feature 4 and feature 1 alone are considered for training, the Root Mean Squared Error (RMSE) is 0.3908 and if the features 4,1,2,6 are considered for training the RMSE was 0.3358 along with meta classification via clustering and CVP algorithms as shown in Figure 7(a), (b), (c) and (d). Hence features 4,1,2,6 is considered for testing of the RBFN.

```
Incorrectly Classified Instances         0               0       %
Kappa statistic                          1
Mean absolute error                      0.019
Root mean squared error                  0.0377
Relative absolute error                  4.2803 %
Root relative squared error              7.9877 %
Total Number of Instances               39

=== Detailed Accuracy By Class ===

                 TP Rate   FP Rate   Precision   Recall  F-Measure   ROC
                   1          0          1          1          1          1
                   1          0          1          1          1          1
                   1          0          1          1          1          1
Weighted Avg.      1          0          1          1          1          1

=== Confusion Matrix ===

  a  b  c   <-- classified as
 13  0  0 |  a = complete combustion
  0 13  0 |  b = incomplete combustion
  0  0 13 |  c = partial combustion
```

(a). Training by RBFN

```
Kappa statistic                          1
Mean absolute error                      0
Root mean squared error                  0
Relative absolute error                  0       %
Root relative squared error              0       %
Total Number of Instances               39

=== Detailed Accuracy By Class ===

                 TP Rate   FP Rate   Precision   Recall  F-Measure   ROC
                   1          0          1          1          1          1
                   1          0          1          1          1          1
                   1          0          1          1          1          1
Weighted Avg.      1          0          1          1          1          1

=== Confusion Matrix ===

  a  b  c   <-- classified as
 13  0  0 |  a = complete combustion
  0 13  0 |  b = incomplete combustion
  0  0 13 |  c = partial combustion
```

```
Incorrectly Classified Instances        13              33.3333 %
Kappa statistic                          0.5
Mean absolute error                      0.2222
Root mean squared error                  0.4714
Relative absolute error                 50       %
Root relative squared error            100       %
Total Number of Instances               39

=== Detailed Accuracy By Class ===

                 TP Rate   FP Rate   Precision   Recall  F-Measure   ROC Area
                   1          0          1          1          1          1
                   0          0          0          0          0          0.5
                   1          0.5        0.5        1          0.667      0.75
Weighted Avg.      0.667      0.167      0.5        0.667      0.556      0.75

=== Confusion Matrix ===

  a  b  c   <-- classified as
 13  0  0 |  a = seventy mg/nominal cubic metre
  0  0 13 |  b = hundred and twenty mg/nomial cubic metre
  0  0 13 |  c = two hundred mg/nomial cubic metre
```

(c). Training by Meta classification via clustering

```
Incorrectly Classified Instances         26               66.6667 %
Kappa statistic                          0
Mean absolute error                      0.4444
Root mean squared error                  0.4714
Relative absolute error                100      %
Root relative squared error            100      %
Total Number of Instances               39

=== Detailed Accuracy By Class ===

               TP Rate   FP Rate   Precision   Recall  F-Measure   ROC Area
                 1         1          0.333      1         0.5        0.5
                 0         0          0          0         0          0.5
                 0         0          0          0         0          0.5
Weighted Avg.    0.333     0.333      0.111      0.333     0.167      0.5

=== Confusion Matrix ===

  a  b  c   <-- classified as
 13  0  0 |  a = complete combustion
 13  0  0 |  b = incomplete combustion
 13  0  0 |  c = partial combustion
```

(d). Training by CVP

Figure 7 Screen shots for training by various algorithms for temperature estimation

3.2. Testing of RBFN, MLP, Classification via Clustering and CVP Algorithms

The testing was done and the results are also validated. Totally 39 images were taken for testing. The values of True Positive (TP), Recall and Precision are '1' for the classification by the RBFN and MLP networks. On the other hand, the values of False Positive (FP) are '0' is shown in figures 8, 9, 10 and 11 below. The comparison chart in figure 12 shows that the images were classified based on their combustion quality, NOx, CO2, CO and SOx emissions by SVM feature analysis. The TP, recall and precision values are nearly '1'for all the three categories by RBFN and MLP classifier.

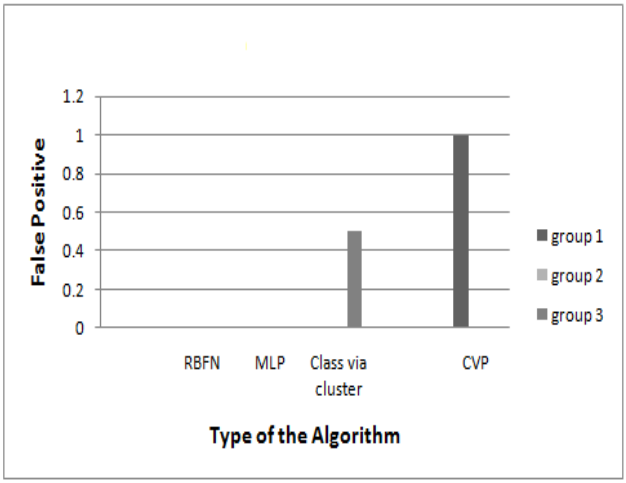


Figure 9. False Positive for various algorithms during testing

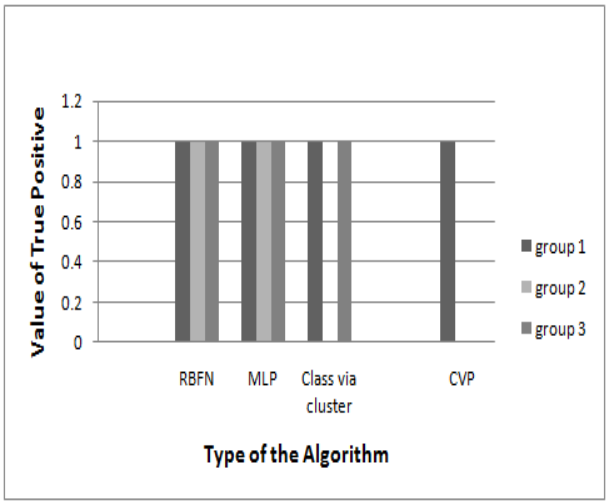


Figure 8. True Positive for various algorithms during testing

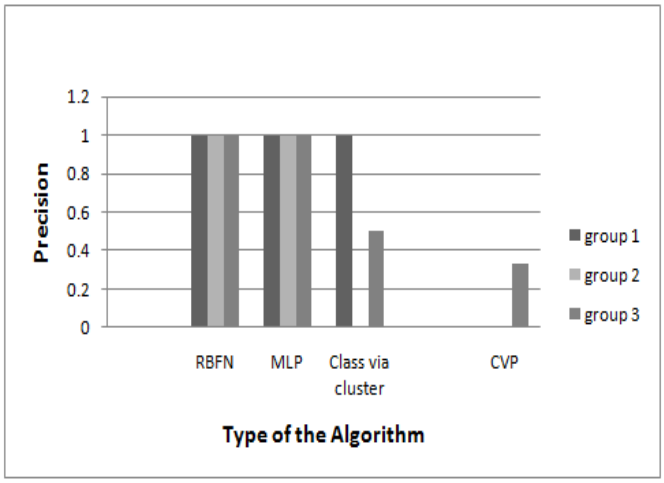


Figure 10. Precision for various algorithms during testing

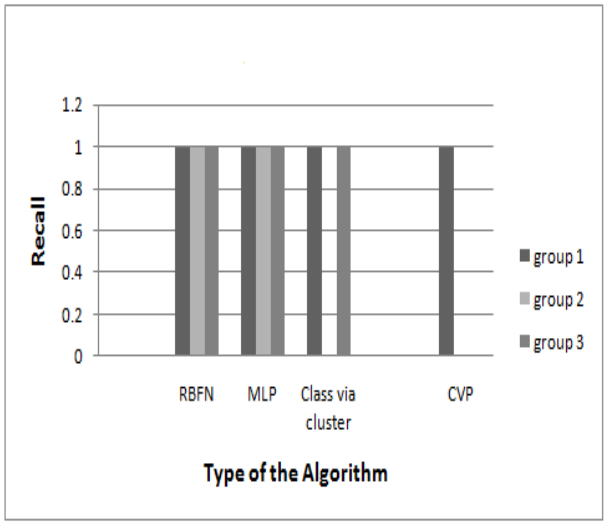


Figure 11. Recall for various algorithms during testing

Table 3. Distribution of images for training and testing RBF

Group	Number of images for training	Number of images for testing
1	10	9
2	10	9
Total	20	18

The φ1 and φ2 vectors obtained after processing the 38 images from group 1 and group 2 are given in Table 3. The centres are calculated based on the 2D vector of all the 40 (Figure 11) The triangular points show group 2 and square points represent group 1. The common centre for group 2 and group 1 are indicated. The distance between these two common centres are large and ther is no overlapping of centres from either group, that indicates, the images of complete combustion and incomplete combustion are distinct.By the process of FLD, φ_1 and φ_2 discriminant vectors are obtained by using three flame images. RBF is trained with 2D vector formed by processing φ_1 and φ_2 with the eigenvector of images. A set of final weights are obtained by training RBF with desired target values. Testing of image to know the complete combustion or incomplete combustion is done with final weights obtained. Testing results indicate only 31 images were correctly classified out of 38 images which indicate 81.58 % classification (Figure 13).

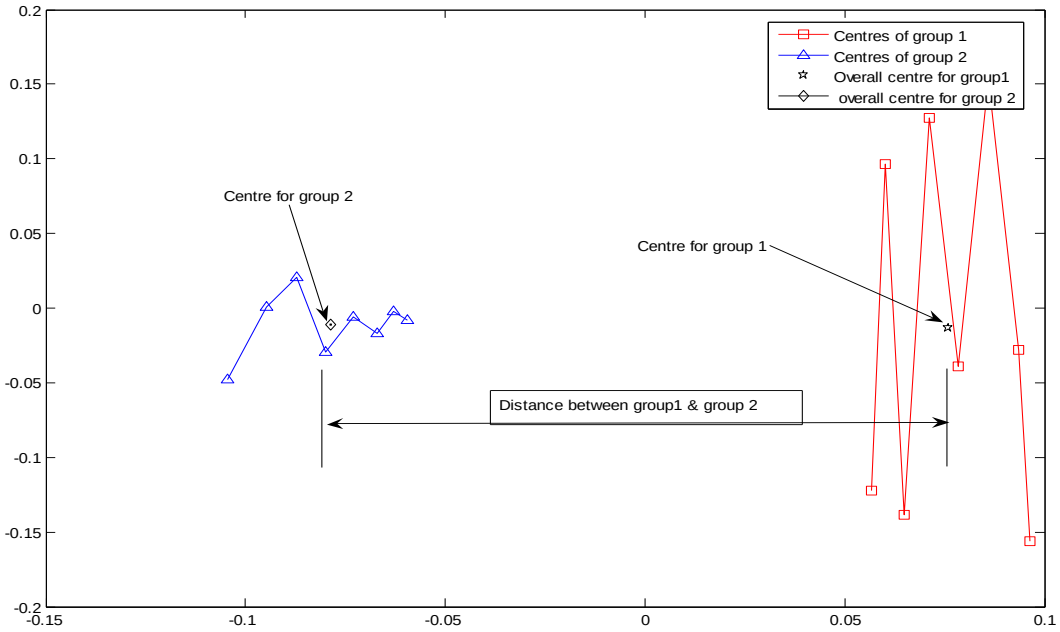


Figure 12. Centres for group 1 and group 2 images

4. Conclusion

Thus, the automation of combustion quality was done by analysing the flame images for a power station boiler. The features were extracted and reduced using SVM technique and classified by using RBFN, MLP, and Classification via Clustering and CVP algorithms. The True Positive (TP) for RBFN and MLP is '1' for all the three categories of combustion whereas for the other two algorithms the TP value is '0'. The False Positive (FP) for RBFN and MLP is '0' whereas for the other algorithms it has themaximum value. The precision and recall values for all the three categories by RBFN and

MLP is '1' whereas for the other algorithms it is very much less than 1 or even '0' nearly. This states that monitoring and control of combustion quality in power station boilers can be done successfully using intelligent techniques like SVM based feature reduction with RBFN and MLP classification.In this work, sixty flame images were collected from the control room of boiler and forty correct images were identified. Fisher's linear discriminant function is used to transform image into 2D vector. Training of RBF was done with 38 images. Testing results indicate only 31 images were correctly classified out of 38 images which indicate 81.58 % classification. Classification performance can be further improved by further preprocessing of the acquired images.

Table 4.φ1 and φ2 vectors

No.	φ1	φ2
1	-0.3984	0.7183
2	-0.3826	-0.1149
3	-0.3434	0.0248
4	-0.3016	0.1389
5	-0.2445	0.0354
6	-0.1749	0.0458
7	-0.1165	0.1589
8	-0.0778	0.1823
9	-0.0552	0.1387
10	-0.0424	0.0331
11	-0.0302	-0.0095
12	-0.0200	0.0168
13	-0.0079	-0.0340
14	0.0041	-0.0864
15	0.0190	-0.1157
16	0.0362	-0.1382
17	0.0550	-0.1758
18	0.0745	-0.1794
19	0.0949	-0.2394
20	0.1129	-0.2624
21	0.1283	-0.2643
22	0.1455	-0.1811
23	0.1593	-0.1028
24	0.1704	-0.0939
25	0.1823	-0.0732
26	0.1910	-0.0780
27	0.1990	-0.0160
28	0.2071	0.0124
29	0.2132	0.0045
30	0.2192	0.0638

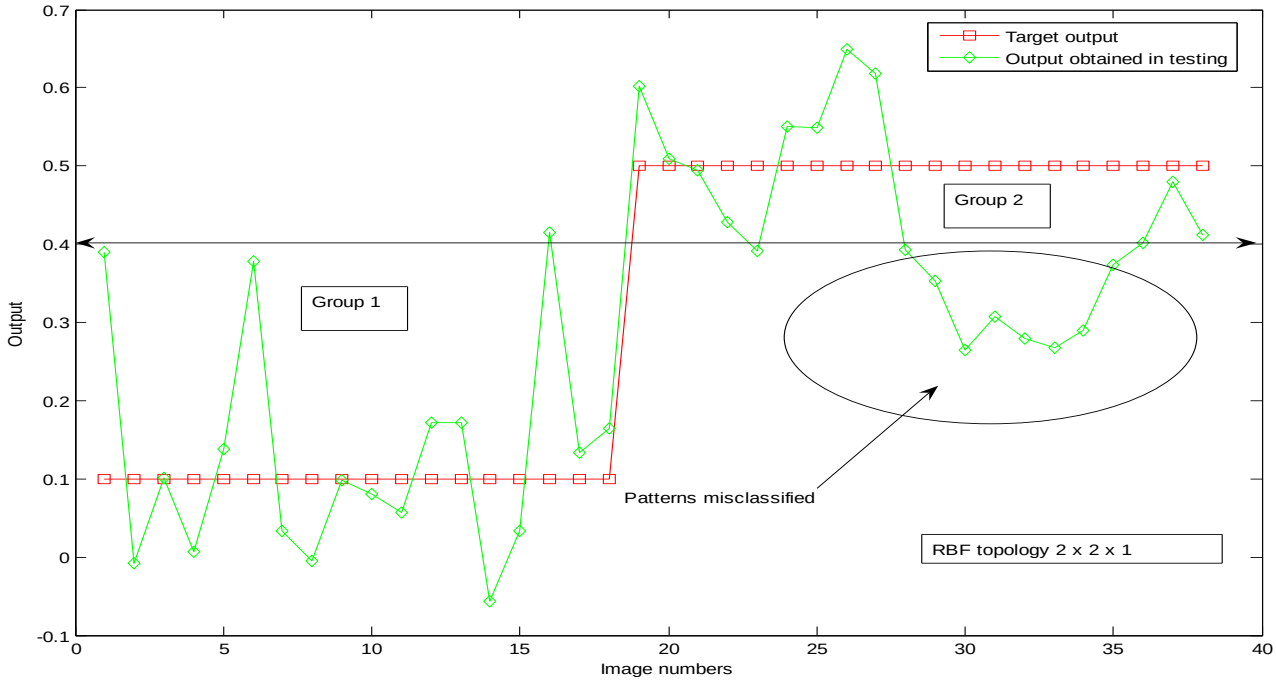


Figure 13. Target outputs and tested outputs of images

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EMOTIONAL LABOR AND JOB-RELATED BURNOUT AMONG SELECT UNIVERSITY TEACHERS IN NORTHERN INDIA

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ABSTRACT

Purpose: *The aim of the study was to determine the effect of Emotional Labor on Job-Related Burnout among university teachers.* ***Design:*** *Cross-sectional data was collected using survey technique from select teachers serving in universities in Chandigarh, Punjab and Haryana. 9-item Emotions at Work Scale* ***(EWS-9; Castro et al, 2006)*** *and Teacher Burnout Scale* ***(Seidman and Zager, 1987)*** *were employed to measure emotional labor and teacher burnout respectively. 385 responses were received and analysed using Descriptive analyses, Confirmatory Factor Analyses, Structural Equation Modeling and Independent Samples T-Test* ***Findings:*** *It was found that emotional labor significantly predicts teacher burnout. Also, the level of emotional labor was higher among the select private university teachers as compared to the government university teachers.* ***Limitations:*** *Results are not generalizable to the whole of India. Larger samples from across the country may be selected for more accuracy.* ***Practical Implications:*** *The model of emotional labor and teacher burnout offers a practical approach to eliminating stress associated with teaching career.* ***Social Implications:*** *The findings of the study indicate that emotional labor positively affects teacher burnout. This means that teachers who modify or mask their true feelings to display organizationally desirable behavior are more exhausted than those who display genuine behavior. Thus, this study helps to highlight the role of emotional labor in the experience of burnout among university teachers.* ***Originality/Value:*** *This study is one of the few that explores the linkages between emotional labor and burnout among university teachers in northern India. It also draws a comparison between the emotional labor of government and private university teachers.*

Keywords*: Emotional Labor, Burnout, Job-Related Burnout, Teachers, Surface Acting, Deep Acting, Career Satisfaction, Perceived Administrative Support, Coping with Job-Related Stress, Attitude towards Students.*

1. Introduction

In 2019, the world population reached 7.67 billion of which 3.46 billion (45%) were a part of the labor workforce **(United Nations, 2019).** In India, out of a population of 1.36 billion in 2019, 494 million comprised the labor workforce and 20% of this workforce comprised women **(United Nations, 2019).** The world is today more globalized than ever before. With the momentum of globalization continuing to mount, competition related to products and services, costs, prices, target markets, labor, technology etc. has also increased. This world-wide phenomenon has led the leadership to create a competitive workplace and maximize production. Globalization is recognized as an important antecedent of job-related stress **(Kaewanuchit et al., 2015).**

Emotional labor has emerged as the latest job stressor **(Jeung et al., 2018).** Employees are performing emotional labor when they are required to suppress or modify their emotions to display required behavior. The concept of emotional labor is more relevant than ever in today's scenario where employees are always expected to deliver their best in high-pressure jobs. This involves self-control and emotional management adding to their burden as they get paid for work but not emotional work. As the employees face unrealistic expectations from the management, it affects their mental and physical well-being and performance. Subsequently, employees who are high on emotional labor undergo deterioration in their well-being, personality, and lifestyle.

Emotions are psychological states that involve thoughts, feelings, moods, behaviors and tendencies to behave in a certain way. Emotions are difficult to measure and for this reason, the psychological concept was till date largely ignored by researchers **(Al-Serkal, 2006).** However, since the last few decades, the research on emotions has gained pace and the antecedents and outcomes of emotions in the workplace are being thoroughly investigated.

Emotional labor is mainly performed by the service industry workers as they are in direct contact with the clients or customers. It is most prominent in the service industry professions such as teaching, hospitality, nursing, call centres, aviation, banking, administrative services, social services etc.

Contrary to what most people believe, teaching is one of the most stressful jobs. A survey in England reported that 20% teachers are always tensed as compared to 13% of other professions. Further, it was observed that teachers work more intensively than other employees leading to a poorer work life balance than other employees **(National Foundation for Education Research, 2019).** Many teachers are calling it quits and switching over to other professions. In the light of the above, the present study attempts to examine the emotional a and burnout among university teachers.

1.1. Research Objectives

- To determine the level of Emotional Labor and Job-Related Burnout among select university teachers.
- To determine the effect of Emotional Labor on Job-Related Burnout among the select university teachers.
- To determine the effect of gender and type of ownership on the level of emotional labor and Job-Related Burnout and among the select university teachers.

1.2. Emotional Labor

The term 'emotional labor' was first introduced by the sociologist **Arlie Russell Hochschild (1983)** when she was studying the behavior of flight attendants towards the passengers. **Hochschild** observed that flight attendants mainly deal with their emotions and the passengers. In other words, they control their true emotions and display publicly desirable behavior. She defined emotional labor in *The Managed Heart: The Commercialization of Feeling* as "the management of feeling to create a publicly observable facial and bodily display" (p.7). She further differentiated emotional labor from emotional work suggesting that emotional work took place in a private context while emotional labor occurred in the societal or organizational context.

Emotional labor is a concept of the service industry. Numerous researchers have defined this process. Emotional labor is "the act of displaying appropriate emotion (i.e., conforming with a display rule)." **(Ashforth and Humphrey, 1993)**

Emotional labor is "the effort, planning, and control needed to express organizationally desired emotion during interpersonal transactions" **(Morris and Feldman, 1996).**

Emotional labor, "may involve enhancing, faking, or suppressing emotions to modify the emotional expression . . . in response to display rules for the organization or job" **(Grandey, 2000).**

Emotional labor is "the act of displaying appropriate emotion (i.e., conforming with a display rule) regardless of whether the emotion is discrepant with internal feelings" **(Glomb and Tews, 2004).**

Researchers focus on two kinds of emotional labor, namely, surface acting and deep acting.

Surface acting is also known as emotive dissonance. It involves expressing emotions which are not felt. This means that true emotions are modified or suppressed as the work environment does not permit it or situation demands a different kind of behavior. In surface acting, the inner or felt emotions are not changed but through facial and bodily display, emotions are faked. Therefore, a person feels a certain emotion and expresses another. Here, the emotional expressions are regulated.

Deep acting also described as emotive effort occurs when an individual thinks deeply about the emotion, he/she needs to feel and act through it. This means that emotions are internalized and then expressed. Thus, such a behavior appears genuine to the others. There is more effort involved in deep acting as the individual reviews the emotion, experiences the emotions and expresses it to look genuine. Here, the feelings are modified to express socially desirable emotions.

1.3. Job-Related Burnout

Herbert Freudenberg, an American psychologist first coined the term 'burnout' in 1974 as a gradual physical and emotional depletion and reduced productivity and reduced commitment among the volunteer. 'Burnout' describes a psychological syndrome that results due to overexposure to pressures and demands of the job ultimately leading to negative reactions to one's job. **Freudenberg (1977)** further added that the first symptom of burnout is working harder and longer and yet

perceiving those accomplishments are declining.

This concept was further developed by **Maslach** and her colleagues. **Maslach and Jackson (1984)** defined burnout as "a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment, that can occur among individuals who work with people in some capacity." She developed the Maslach Burnout Inventory (MBI) which is the most extensively used self-reporting instrument used to measure burnout. She described three dimensions of burnout namely, exhaustion, cynicism and inefficacy. Exhaustion is the feeling of being overstretched. Cynicism means being sceptical of other's efforts and tending to believe that people are motivated by self-interest rather than organizational interest. Inefficacy refers to the failure of an individual in achieving the desired outcomes.

Although, most of the research on burnout focuses on human service workers, it was later observed that workers in other professions also experience it. An incompatibility or misfit between the individual and six job factors namely, workload, control, reward, community, fairness and values increase the probability of burnout **(Maslach and Leiter, 2008, 2016).**

Apart from extraneous factors, personal traits such as hardiness also affect the likelihood of burnout **(Kobasa, 1979).** People high on hardiness can cope easily with stressful situations while the less hardy people experience more burnout.

Rotter (1966) observed that burnout levels are higher among people with an external locus of control due to which they feel that external agencies oversee their experiences. Those with an internal locus of control are less susceptible to burnout.

Teacher burnout is a negative pattern of responding to stressful teaching events, to students, and to teaching as a career as well as a perception that there is a lack of administrative support. **(Seidman and Zager, 1987).**

2. Emotional Labor and Job-Related Burnout – A Literature Review

It is well-known that emotional labor is a significant part of the work-life of every service sector employee as all organizations are governed by display rules which are mandatory for all employees to follow. Likewise, burnout is also a process which every employee is likely to go through due to emotional exhaustion, lack of personal accomplishment etc.

According to the Conservation of Resource Theory **(COR; Hobfoll, 1989)**, individuals experience stress when their resources such as objects, conditions, personal characteristics, energies etc. are threatened or depleted. Individuals strive to protect their resources **(Hobfoll, 1991).** Since faking emotions or acting superficially requires cognitive effort, it results in a loss of energy or resources thereby creating stressful environment.

Acting superficially or against one's authentic emotions can also be stressful due to the extra effort involved in going against one's will. Also, modifying one's true or felt emotions according to external situations adversely affects the mind and body **(Wood et al., 2008).**

Previous studies have established that emotional labor significantly affects burnout among the service sector employees **(Basım&Begenirbaş, 2012; Brotheridge &Grandey, 2002; Brotheridge & Lee, 2002, 2003; Çelik et al., 2010; Hülsheger&Schewe, 2011; Köksel, 2009; Maslach, 1982; Oral and Köse, 2011; Schwab et al., 1986; Zapf et al., 2001).**

A study by **Bayram et al. (2012)** was conducted among 202 service sector employees in Turkey. The authors used the 9-item Revised Emotional Labor Scale **(Lee, Lovell and Brotheridge, 2010a; Lee, Lovell and Brotheridge, 2010b; Lee and Brotheridge, 2011)** in which the surface acting dimension was further sub-divided into faking emotions and hiding emotions. Burnout was measured using the 22-item Maslach Burnout Inventory **(MBI, Maslach and Jackson, 1986)** containing three dimensions namely, emotional exhaustion, depersonalization and low personal accomplishment. It was found that hiding emotions dimension of emotional labor was significantly associated with emotional

exhaustion dimension of burnout. Also, none of the three emotional labor dimensions was significantly associated with personal accomplishment dimension of burnout.

A study on 370 primary school teachers in Ankara (Turkey) by **Akin et al. (2014)** revealed that emotional labor significantly predicted burnout among the participants. Also, it was found that female teachers performed more emotional labor than their male counterparts. Further, the private school teachers employed deep acting and expressed genuine emotions more than public school teachers.

Yilmaz et al. (2015) examined the emotional labor and burnout among 410 schoolteachers in Kütahya (Turkey). Results revealed that the participants performed a low level of emotional labor in their jobs. Further, teachers resorted to genuine behavior the most followed by deep acting and surface acting. It was found that deep acting was not a predictor of emotional exhaustion and depersonalization components of burnout. Multiple regression analyses revealed that all three dimensions of emotional labor together explained 7% of the variance in emotional exhaustion, 16% in depersonalization and 15% in lack of personal accomplishment dimensions of burnout.

Virk and Malhotra (2016) conducted a study on emotional labor among 118 managers in the manufacturing sector in India. Frankfurt Emotion Work Scale **(FEWS; Zapf, 1999)** and Burnout Scale **(Pines and Aronson, 1988)** were used to measure emotional labor and job-related burnout, respectively. Regression analysis revealed that emotional labor predicted 28% of the variance in burnout among the select managers.

Kim (2016) conducted a study among 152 middle school teachers in South Korea using the Dutch Questionnaire on Emotional Labor **(D-QEL; Näring et al., 2005)** and the 22-item Dutch Educators Survey **(MBI-NL-ES; Horn & Schaufeli, 1998).** It was found that the participants performed high level of emotional labor. Further, the surface acting dimension of emotional labor significantly affected the emotional exhaustion and depersonalization components but not the personal accomplishment component of burnout.

Fischer (2019) carried out a study among 193 mental health clinicians in USA. Data was collected longitudinally from 127 participants after a gap of 3 months, 6 months, 9 months and 12 months. The 14-item Emotional Labor Scale **(ELS; Diefendorff, Croyle, &Gosserand, 2005)** having the dimensions surface acting and deep acting was used to measure emotional labor. Burnout was determined using the Maslach Burnout Inventory **(MBI; Maslach & Jackson, 1981)** containing three dimensions namely, emotional exhaustion, depersonalization and low personal accomplishment. Multiple regression analysis revealed that surface acting positively affected all dimensions of burnout. Deep acting had no effect on burnout.

Another study by **Kaur (2019)** conducted among 592 nurses serving in private and public hospitals in Punjab (India) employed the Dutch Questionnaire on Emotional Labor **(D-QEL; Näring et al., 2005)** and Burnout Scale **(Pines and Aronson, 1988).** Structural Equation Modelling revealed that Emotional labor predicted 74% of the variance in burnout among the participants.

A study conducted among 321 football coaches in Turkey by **Tolukan (2019)** employed the Emotional Labor Scale **(ELS; Diefendorff, Croyle, &Gosserand, 2005)** adapted to Turkish by**Basım and Beğenirbaş (2012),** and Maslach Burnout Inventory **(MBI; Maslach & Jackson, 1981)** and adapted to Turkish by **Ergin (1992).** It was found that levels of burnout and surface acting among the coaches was low, while the level of deep acting and genuine emotions was high. Further, it was found that burnout was weakly and negatively related to surface acting. Also, a weak and positive relation was found between burnout and genuine emotions dimension of emotional labor.

A meta-analytic study by **Yin et al. (2019)** based on 85 empirical research papers and 33,248 teachers revealed that surface acting positively affects individual and interpersonal components of burnout. On the other hand, deep acting predicts only the efficacy component of burnout.

To sum it up, emotional labor causes individuals to suppress or alter true emotions which aggravates the stressful conditions and

adversely affects their psychological makeup thereby resulting in a feeling of being "burned out".

2.1 Research Gaps

- There is a lack of empirical studies on the relationship between emotional labor and burnout among university teachers in India and foreign countries. Not even 1% of the studies are empirical in nature (**Mahato et al., 2014)**
- Numerous studies on emotional labor in education sector have been conducted but very few in the higher education sector.
- There is a dearth of studies on the effect of gender on the emotional labor and job-related burnout.
- Comparative studies between government and private sector regarding the level of emotional labor and job-related burnout are scanty.

3. Research Model and Hypotheses

Based on the studies by **Basım&Begenirbaş (2012), Brotheridge &Grandey (2002), Brotheridge & Lee (2002, 2003), Çelik et al. (2010), Hobfoll (1989, 1991), Hülsheger&Schewe (2011), Kaur (2019), Köksel (2009), Maslach (1982), Oral and Köse (2011), Schwab et al. (1986), Virk & Malhotra (2016)** and **Zapf et al. (2001),** the research model depicting the effect of emotional labor on job-related burnout was built (See Figure 1).

The first hypothesis stated that emotional labor (surface acting and deep acting) significantly predicts teacher burnout (career satisfaction, perceived administrative support, coping with job-related stress and attitude towards students.

H1 Surface Acting **(H*1.1*)** and Deep Acting **(H*1.2*)** have a significant effect on Teacher Burnout.

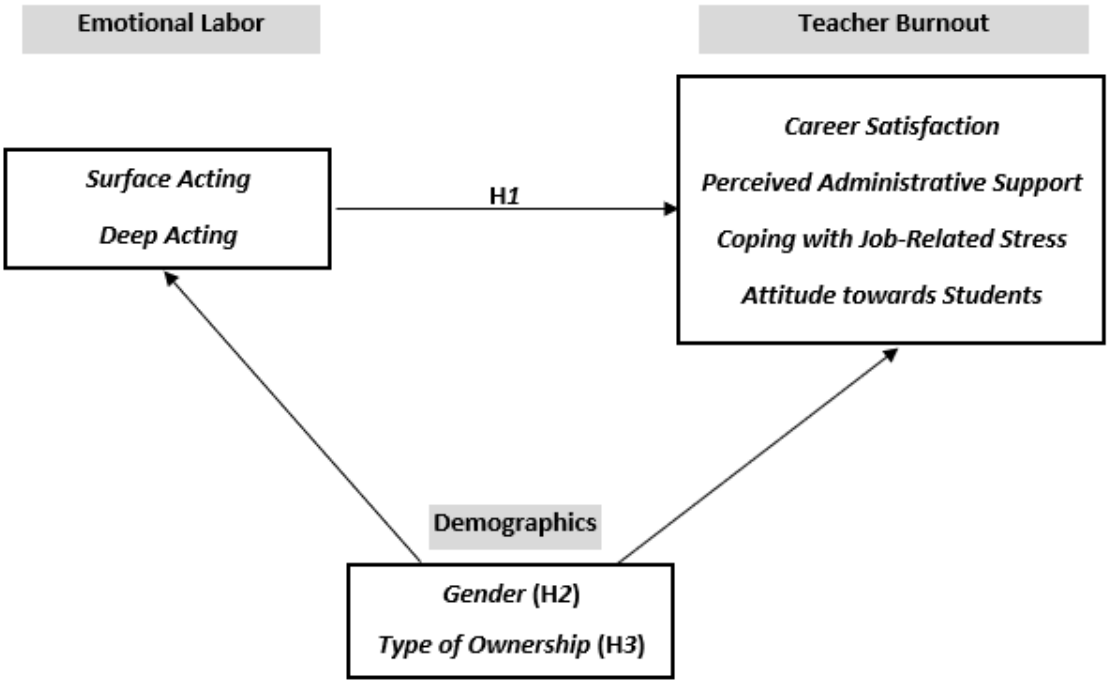

Figure 1: Conceptual Framework for the Study

Women are expected to engage in more emotional labor than men in their careers **(Akin et al., 2014; Erickson & Ritter, 2001; Guy & Newman, 2004; Hochschild, 1983, Meier et al., 2006, Wharton & Erickson, 1995).** According to **Purvanova&Muros (2010),** women are likely to experience more burnout than men. Based on these studies, the second hypothesis regarding the effect of gender on emotional labor and burnout were formulated.

H2 There is a significant difference between the male and female teachers regarding their level of surface acting **(H*2.1a*),** deep acting **(H*2.1b*)** and job-related burnout **(H*2.2*).**

Private sector bank employees are found to be engaging in surface acting and deep acting more than their public sector counterparts **(Mehra &Bedi, 2018).** In order to test the

differences among the private and government university teachers regarding their level of emotional labor and burnout, the third hypothesis was formulated.

H3 There is a significant difference between the private and government university teachers regarding their level of surface acting **(H*3.1a*),** deep acting **(H*3.1b*)** and job-related burnout **(H*3.2*).**

4. Research Methodology

4.1 Scope of the Study

The government and private universities located in Chandigarh, Punjab and Haryana were selected for the study. As shown in Table 1, there are a total of 2, 28 and 50 universities in Chandigarh, Punjab and Haryana respectively. Of the 80 universities, 2 are central, 30 are private, 9 are deemed and 39 are private. To make the sample representative of the population, one university was selected from Chandigarh, two from Punjab (1 – Government, 1 – Private) and four from Haryana (2 – Government, 2 – Private). As the study is limited to the states of Chandigarh, Punjab and Haryana, the results are not generalizable to the rest of India.

Table 1: Number of Universities in Chandigarh, Punjab and Haryana

State/U.T.	Central	State	Deemed	Private	State-wise Total
Chandigarh	Nil	1	1	Nil	**2**
Punjab	1	9	2	16	**28**
Haryana	1	20	6	23	**50**
Ownership wise Total	**2**	**30**	**9**	**39**	**80**

Source: Adapted from **University Grants Commission (2020),**Consolidated List of All Universities

In the year 2014-15, there were a total of 14,73,255 teachers serving in Universities and Colleges in India **(Ministry of Statistics and Programme Implementation, 2017).** Of these 5,69,209 (38%) were women teachers. Table 2 shows the education statistics for Chandigarh, Punjab and Haryana for the year 2014-15.

Table 2: Number of Teachers in Universities & Colleges in Chandigarh, Punjab and Haryana

State/U.T.	Female	Total
Chandigarh	21845	49438
Punjab	28607	52472
Haryana	1842	3237
Total	**52294**	**105147**

Source: Adapted from Ministry of Statistics and Programme Implementation, Government of India, Education – Statistical Year Book India – 2017

4.2 Research Design

The data was collected from respondents only once during the study. Thus, the study was cross-sectional in nature. Also, the research was quantitative, descriptive, and diagnostic in nature.

4.3 Sources of Data

4.3.1 Primary Data

Online questionnaires were administered to select respondents. Respondents for the study comprised teachers serving in three government universities, two private universities and five colleges situated in Punjab, Haryana and Chandigarh.

4.3.2 Secondary Data

Online Research Databases such as ScienceDirect, Emerald Insight, EbscoHost, Citeseer X, Academia, NCBI, PubMed, were accessed for research papers using the keywords, “emotional labor”, “emotional work”, “burnout”, “emotional exhaustion”, “job related burnout”. “teacher burnout” etc.

4.4 Sample Size Determination

As the statistics given in table 2 are for teachers in universities and colleges taken together, it was deduced that the number of teachers serving in universities was lesser than 105147. **Cochran's formula(1977)**estimated 379 to be the effective sample size for the study.

4.5 Sampling Method

Due to cost, time and manpower constraints, the convenient sampling method was used.

4.6 Measures

a. **Demographics:** Four demographics namely, age, gender, years of service and type of ownership were considered important for the present study.

b. **Emotional Labor:** 9-item Emotions at Work Scale (EWS-9) refined by **Castro et al. (2006)** was used. The internal consistency cronbach's coefficient alpha of the scale was 0.96. An example of the items is, "A big part of my job is keeping other people happy." The scale comprised two subscalesnamely, surface acting and deep acting.

i. **Surface Acting –** This subscale measures the extent to which an individual fakes emotion to display socially desirable behavior. It comprises 6 items. The internal consistency cronbach's coefficient alpha was 0.71.

ii. **Deep Acting –** This subscale measures the extent to which an individual modifies his/her felt emotions and thinks deeply about the specific emotion that is required of him/her. It comprises 3 items. The internal consistency cronbach's coefficient alpha was 0.67.

c. **Job Related Burnout:** 21-item Teacher Burnout Scale developed by **Seidman and Zager (1987)** was used to measure job related burnout among university teachers. An example of the items is, "I feel that the administrators will not help me with classroom difficulties." The scale consists of four sub-scales namely, career satisfaction, perceived administrative support, coping with job-related stress and attitude towards students.

i. **Career Satisfaction** – This sub-scale measures the overall level of satisfaction or happiness one feels in the teaching career. It comprised 5 items. The internal consistency cronbach's coefficient alpha was 0.89.

ii. **Perceived Administrative Support –** This sub-scale measures the degree to which the teacher feels that the administration tries to make his/her work easier and improve their teaching. It comprised 6 items. The internal consistency cronbach's coefficient alpha was 0.84.

iii. **Coping with Job-Related Stress –** This sub-scale measures the extent to which a teacher can balance the demands and pressures of the job with his/her capabilities. It comprised 6 items. The internal consistency cronbach's coefficient alpha was 0.80.

iv. **Attitude towards Students –** This sub-scale measures a teacher's positive or negative feelings towards the students. It comprises 4 items. The internal consistency cronbach's coefficient alpha was 0.72.

Teachers with higher burnout scores indicated that they were more depressed and exhausted than those with lower scores. Ten-point likert scale ranging from 1 (strongly disagree) to 10 (strongly agree) was used for more accuracy and ease of use **(Nunally, 1978).**

4.7 Data Collection

Survey method was used to collect data. Online questionnaires were employed, and links were sent to over 500 teachers of which 385 teachers responded. The responses were saved in Google Sheets and downloaded as Microsoft Excel file for analysis.

4.8 Data Processing

The data saved as MS Excel file was imported into IBM SPSS for analysis. Each construct was labelled using alphabets as shown in the data code book in table 1. The negatively worded items were reverse scored to obtain the true scores.

Table 1: SPSS Data Codebook

SPSS Label	SPSS Name	Scale
Surface Acting	SA1 to SA6	Ordinal
Deep Acting	DA1 to DA3	Ordinal
Career Satisfaction	CS1 to CS5	Ordinal
Perceived Administrative Support	PAS1 to PAS6	Ordinal
Coping with Job-Related Stress	Cop1 to Cop6	Ordinal
Attitude towards Students	Att1 to Att4	Ordinal

4.9 Data Analyses

The SPSS file was first screened for outliers, errors and missing values and then data was analysed. IBM SPSS V. 22 (Trial) was used for descriptive analysis and Independent Samples T-Test. IBM SPSS AMOS V. 26 (Trial) was used for Confirmatory Factor Analysis and Structural Equation Modeling.

5. Results

5.1 Sample Characteristics

Table 2 shows the frequencies and percentages for the respondents by age, gender, years of service and type of organization.

Table 2: Sample Characteristics (N = 385)

Variable	Group	Frequency	%
Age (years)	Below 30	120	31.2%
	31 to 40	166	43.1%
	41 to 50	78	20.3%
	Above 50	21	5.4%
Gender	Male	208	54.0%
	Female	177	46.0%
Years of Service	Less than 5 years	86	22.3%
	5 to 10 years	160	41.6%
	10 to 20 years	120	31.2%
	20+years	19	4.9%
Type of Ownership	Government	185	48.0%
	Private	200	52.0%

Source: Author's Research

5.2 Confirmatory Factor Analyses

CFA was conducted to test how well the data fits the measurement model of the study. The independent variables namely, surface acting and deep acting were first order constructs while the dependent variable namely, job-related burnout was a second order construct with four sub-constructs. As can be seen in Figure 2, Job-related burnout had factor loadings of 0.91, 0.95, 0.91 and 0.92 on career satisfaction, perceived administrative support, coping with job-related stress and attitude towards students respectively.

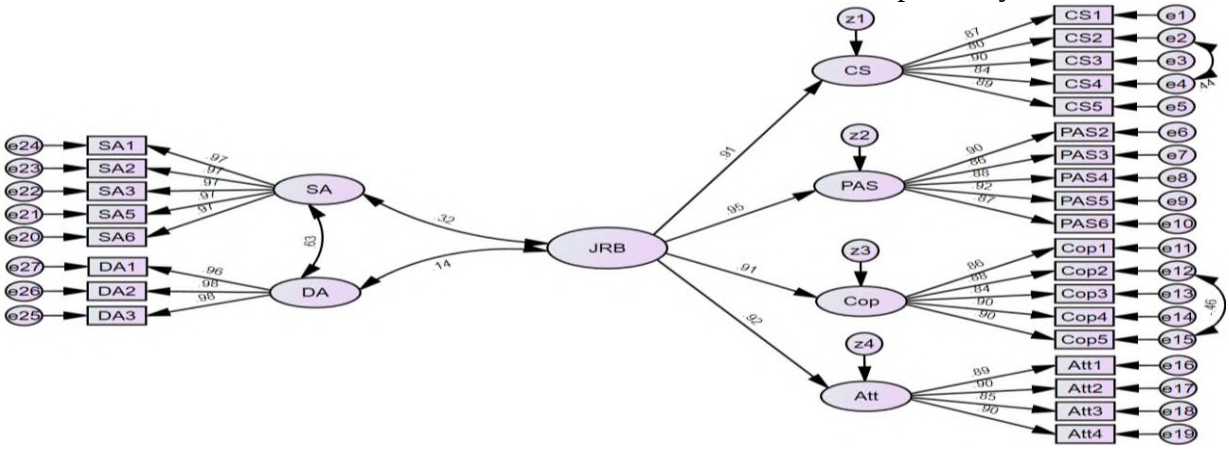

Figure 2: Measurement Model – Surface Acting, Deep Acting and Job-Related Burnout

The model fit indices for the measurement model (See Figure 2) are illustrated in Table 3. The model was determined to be fit as the threshold values were attained. Thus, further analysis could be carried out.

Table 3: Fitness Indices for the pooled CFA measurement model

Name of Category	Index	Estimate	Threshold	Interpretation
1. Absolute fit	GFI	0.805	>0.90	Acceptable
	RMR	0.147	>0.080	Excellent
	RMSEA	0.075	>0.08	Acceptable
	PClose	0.000	>0.05	Acceptable
2 Incremental fit	AGFI	0.767	>0.90	Acceptable
	NFI	0.893	>0.90	Acceptable
	TLI	0.933	>0.90	Excellent
	CFI	0.940	>0.90	Excellent
3. Parsimonious fit	CMIN/DF	2.127	Between 1 and 3	Excellent

Source: Author's Research

Once the model fit was achieved, the effect of the main construct namely, job-related burnout on its sub-constructs was found to be significant (See Table 4).

Table 4: The regression path coefficients from job-related burnout to its sub-constructs

Sub-construct	Path	Construct	Estimate	S.E.	C.R.	P	Result
CS	□	JRB	0.910		Reference Point		
PAS	□	JRB	0.949	0.080	14.209	***	Significant
Coping	□	JRB	0.914	0.080	12.889	***	Significant
Attitude	□	JRB	0.916	0.077	13.394	***	Significant

Source: Author's Research

The correlation between the two independent variables namely, surface acting and deep acting was also found to be significant. (See Table 5).

Table 5: The correlation between surface acting and deep acting

Construct	Path	Construct	Estimate	S.E.	C.R.	P	Result
DA	<-->	SA	0.629	0.635	7.350	***	**Significant**

As can be seen from table 4, the two components of emotional labor namely, surface acting and deep acting were also significantly correlated.

5.2.1 Validity and Reliability of Measurement Model

In order to assess the validity and reliability of the measurement model, the Composite Reliability (CR), Average Variance Extracted (AVE), Maximum Shared Variance (MSV) and Maximum Reliability (MaxR(H)) of all constructs were computed and tabulated in Table 6.

Table 6: CFA results for the measurement model for all main and sub-constructs

Construct	Item	Factor Loading	R^2	CR (> 0.7)	AVE (> 0.5)	MSV (<AVE)	MaxR(H) (>0.9)
SA	**SA1**	0.970	0.941	0.988	0.941	0.396	0.988
	SA2	0.973	0.947				
	SA3	0.972	0.945				
	SA5	0.970	0.941				
	SA6	0.966	0.933				

Construct	Item	Factor Loading	R^2	CR (> 0.7)	AVE (> 0.5)	MSV (<AVE)	MaxR(H) (>0.9)
DA	**DA1**	0.962	0.925	0.984	0.954	0.396	0.987
	DA2	0.985	0.970				
	DA3	0.983	0.966				
JRB	**CS**	0.910	0.828	0.958	0.851	0.103	0.960
	PAS	0.949	0.901				
	Cop	0.910	0.828				
	Att	0.916	0.839				
CS	**CS1**	0.868	0.753	0.935	0.743	0.740	0.940
	CS2	0.800	0.640				
	CS3	0.904	0.817				
	CS4	0.843	0.711				
	CS5	0.891	0.794				
PAS	**PAS2**	0.899	0.808	0.947	0.782	0.762	0.950
	PAS3	0.857	0.734				
	PAS4	0.876	0.767				
	PAS5	0.921	0.848				
	PAS6	0.866	0.750				
Cop	**Cop1**	0.858	0.736	0.943	0.769	0.746	0.945
	Cop2	0.879	0.773				
	Cop3	0.843	0.711				
	Cop4	0.900	0.810				
	Cop5	0.902	0.814				
Att	**Att1**	0.888	0.789	0.936	0.786	0.762	0.938
	Att2	0.902	0.814				
	Att3	0.853	0.728				
	Att4	0.903	0.815				

Source: Author's Research

In table 7, the numbers in bold represent the square root of the AVE of the constructs while the others show the correlation between the constructs. As the square root of the AVE of the constructs was higher than the correlation between them, it was concluded that discriminant validity was achieved, and the constructs were distinguishable from each other.

Table 7: Discriminant Validity Index Summary for the Main Constructs

Construct	Surface Acting	Deep Acting	Job-Related Burnout
Surface Acting	**0.970**		
Deep Acting	0.629***	**0.977**	
Job Related Burnout	0.321***	0.136	**0.922**

Source: Author's Research

Table 8: Discriminant Validity Index Summary for the Sub-Constructs of Job-Related Burnout

Construct	CS	PAS	Cop	Att
CS	**0.862**			
PAS	0.860***	**0.885**		
Cop	0.840***	0.864***	**0.877**	
Att	0.826***	0.873***	0.840***	**0.887**

Source: Author's Research

It can be deciphered from tables 6, 7 and 8 that unidimensionality, convergent validity, construct validity, discriminant validity and reliability (AVE, CR, MSV, MaxR(H)) were achieved.

5.3 Descriptive Analysis

The mean scores and standard deviations were computed for all constructs and tabulated (See Table 9). As can be seen, surface acting showed a high mean score indicating that the select teachers resorted to emotional labor to a great extent in their jobs. The mean scores for deep acting were moderate suggesting that the teachers made lesser use of deep acting than surface acting. A plausible explanation could be that deep acting involves more effort as one must think deeply about the emotion, he/she wants to display.

Table 9: Mean and standard deviations for main constructs and its sub-constructs

Variable	Mean (SD)	Max	Min	Interpretation
Surface Acting	7.44(2.99)	10	1.4	High
Deep Acting	4.95(2.58)	10	1	Moderate
Job Related Burnout	8.85(1.35)	10	1	High
Career Satisfaction	*8.79(1.43)*	10	*1*	*High*
Perceived Administrative Support	*8.89(1.50)*	10	*1*	*High*
Coping with Job Related Stress	*8.81(1.46)*	10	*1*	*High*
Attitude towards Students	*8.96(1.45)*	10	*1*	*High*

Source: Author's Research

Similarly, the mean scores for teacher burnout in terms of career satisfaction, perceived administrative support, coping with job related stress and attitude towards students were also high. This indicated that the select teachers had low satisfaction levels, felt that the administrative behavior was not supportive, had trouble coping with the demands and pressures of the job and had a poor attitude towards the students.

5.4 Structural Equation Modeling

Once the Confirmatory Factor Analysis was performed, the regression model was tested for the effect of surface acting and deep acting on job-related burnout. Figure 3 shows the structural equation model along with the standardized regression weights and factor loadings.

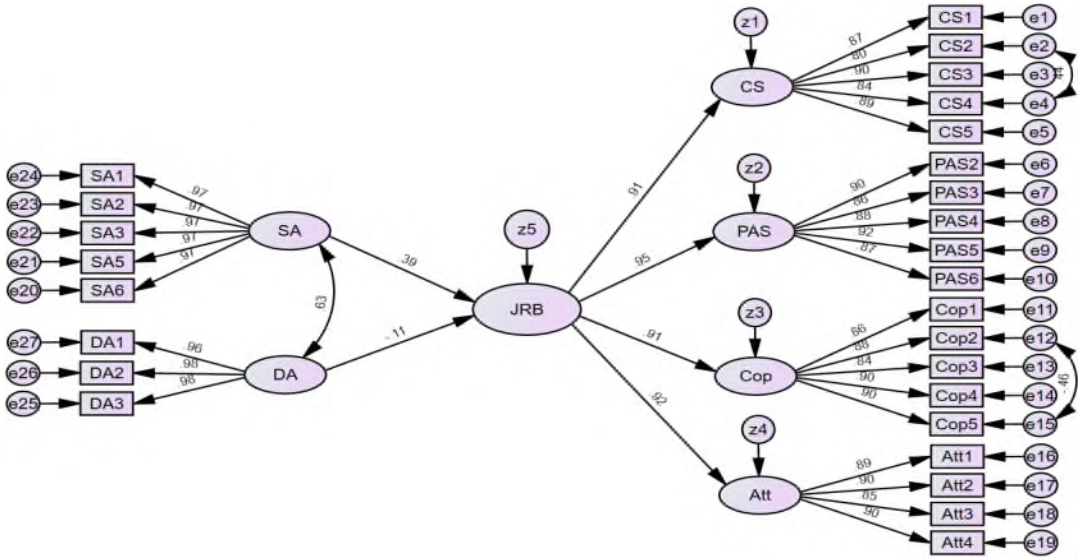

Figure 3: Structural Equation Model – Effect of Surface Acting and Deep Acting on Job-Related Burnout

Table 10: Path coefficient and its significance for direct effect of surface acting and deep acting on job related burnout

Variable	Path	Variable	Estimate	S.E.	C.R.	P	Result
JRB	□	**SA**	**0.389**	0.040	4.221	***	**Significant**
JRB	□	**DA**	**-0.109**	0.044	-1.206	0.228	Not Significant

Source: Author's Research

It can be deduced from Table 10 that surface acting has a significant and positive effect on job-related burnout while deep acting did not have a significant effect on job-related burnout.
Result: Hypothesis *1.1* is **supported** and hypothesis *1.2* is not supported.

5.5 Inferential Analyses

5.5.1 Effect of Gender on Emotional Labor and Teacher Burnout

To compare the level of emotional labor and teacher burnout among male and female university teachers, an independent samples T-test was performed (See Table 11).

Table 11: Independent Samples T-Test results for differences in Emotional Labor and Teacher Burnout across Gender

Variable	Male	Female	t	p	Result
Emotional Labor					
Surface Acting	7.57(2.94)	7.27(3.05)	.710	.315	Not Significant
Deep Acting	5.24(2.72)	4.60(2.35)	1.748	.227	Not Significant
Teacher Burnout					
Career Satisfaction	8.78(1.63)	8.78(1.16)	-.037	.299	Not Significant
Perceived Administrative Support	8.77(1.61)	9.01(1.35)	-1.157	.196	Not Significant
Coping with Job-Related Stress	8.74(1.61)	8.88(1.26)	-.644	.388	Not Significant
Attitude towards Students	8.82(1.57)	9.11(1.27)	-1.423	.169	Not Significant
Overall Teacher Burnout	8.78(1.50)	8.94(1.15)	-.851	.400	Not Significant

Source: Author's Research

As shown in Table 11, there was no significant difference between male and female teachers regarding level of emotional labor and job-related burnout.
Result: Hypothesis *2* is not supported.

5.5.2 Effect of Type of Ownership on Emotional Labor and Teacher Burnout

Table 12 illustrates the results of the independent samples T-test for the effect of type of ownership on emotional labor and teacher burnout.

Table 12: Independent Samples T-Test results for differences in Emotional Labor and Teacher Burnout across Type of Ownership

Variable	Private	Government	t	p	Result
		Emotional Labor			
***Surface* Acting**	7.89(2.80)	7.02(3.11)	2.084	.038	**Significant**
Deep Acting	5.02(2.57)	4.88(2.58)	.371	.711	Not Significant
		Teacher Burnout			
Career Satisfaction	9.39(.46)	8.22(1.76)	6.584	.000	**Significant**
Perceived Administrative Support	9.49(.40)	8.32(1.88)	6.159	.000	**Significant**
Coping with Job-Related Stress	9.38(.51)	8.27(1.81)	6.004	.000	**Significant**
Attitude towards Students	9.53(.49)	8.43(1.80)	6.050	.000	**Significant**
Overall Teacher Burnout	9.44(.20)	8.30(1.69)	6.831	.000	**Significant**

Source: Author's Research

As can be seen in Table 12, there was a significant difference between the private and government university teachers regarding the level of surface acting. No significant differences were obtained in case of deep acting. Further, it was found that private university teachers experienced more burnout than government university teachers.

Result: Hypotheses *3.1a* and *3.2* are **supported** while hypothesis *3.1b* is not supported.

6 Discussion and Conclusion

The present study primarily aimed to determine the effect of emotional labor on the job-related burnout among teachers in select universities in northern India. It was found that the surface acting dimension of emotional labor positively and significantly affected job-related burnout among the participants. Surface acting explained 39% of the variance in job-related burnout. There was a lack of relationship between deep acting and job-related burnout.

The results were in conformity with those by **Nèring, Briët and Brouwers (2006)** and **Zhang and Zhu (2008)** in which positive association was observed between surface acting and burnout and negative association between deep acting and burnout. Also, the findings on the lack of relationship between deep acting and job-related burnout were consistent with those of **Fischer (2019), Grandey (2003), Hülsheger et al. (2010)** and **Martínez-Iñigo et al. (2007).**

The positive effects of deep acting may be responsible for the lack of significant relationship between deep acting and burnout. It is observed that deep acting is more satisfying for employees when they perceive their tasks as more challenging **(Huang et al., 2014).** Deep acting is associated with positive social feedback **(Côté, 2005; Côté& Morgan, 2002)** and job satisfaction **(Huang et al., 2014).** It is also less effortful than surface acting **(Goldberg &Grandey, 2007;Ma & Huang, 2006).** Consequently, one gains resources while deep acting and loses resources while surface acting. This explains the association between surface acting and burnout.

Secondly, the study aimed to determine the effect of gender on emotional labor and burnout among the select university teachers. In line with the studies by **Bayram et al., (2012), Kőksel (2009), Erickson & Ritter (2001), Oral &Kőse (2011)** and **Uysal (2007),** no significant effect of gender was found on emotional labor. In conformity with **Bayram et al. (2012)** and **Erickson & Ritter (2001),** gender also did not predict emotional labor of university teachers. This was in contrast with the studies by **Purvanova&Muros (2010)** which suggested that women experience slightly more burnout and emotional exhaustion and overall burnout than men while men experience more depersonalization than women. Also, the results of the present study were not in line with **Akin et al. (2014)** suggesting that female teachers engage in surface acting and deep acting significantly more than males in their careers.

Thirdly, in line with the study by **Akin et al. (2014),** it was found that private university teachers engaged in surface acting more than government university teachers. Further, the private university teachers were also more "burned out" than the government university teachers. A plausible explanation is the hectic work schedules, performance-driven work culture owing to the increased pressure and demands from private university teachers in response to globalization.

7 Limitations and Further Research

The limitations of the study are as follows-

The study is focused on teachers serving in select universities in Chandigarh, Punjab and Haryana. Thus, the results may not hold true for the whole of India. Extensive research using larger samples from across the country may be required to improve generalisability of results.

The study emphasizes on the negative aspects of emotional labor and ignores any positive consequences that may arise. A balanced approach is required to measure the overall effect of emotional labor.

Data was collected only once from respondents. Longitudinal studies may be carried out to confirm the results of the study.

As self-reporting questionnaires were used to collect data, it is subject to respondent bias. This may affect the accuracy of the results.

Techniques like multisource assessment may be used to improve psychometric evaluation.

The role of possible mediators and moderators in the relation between emotional labor and burnout may be explored in further studies.

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POSTMODERN POETICS AND REVISIONIST MYTHMAKING: A CRITIQUE OF SAMITBASU'S THE SIMOQIN PROPHECIES

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ABSTRACT

Postmodernism uses a wide variety of terms to describe a wide range of cultural phenomena and objects. To begin, the term "postmodernism" refers to a range of artistic and cultural movements that emerged in the second half of the 20th century. This version of postmodernism takes its cues from the different modernist movements that swept over Europe during the first half of the 20th century. Essentially, artistic postmodernism is a rejection of the premise that art can exist independently of the rest of society. In the minds of some critics, this represents a return to the necessary linkages between art and the social and political realms that modernism had previously abstracted. Modernism focused on the idea that art should be seen as a perfected and self-sufficient object, but in postmodernism, the artistic object dissolves and the fascination with temporal process is characteristic of certain forms, such as conceptual and performance art of the 1960s and beyond. A counter-impulse appears here. A new emphasis for complexity over purity, plurality over stylistic integrity, and contingency or connectivity over autonomy may sum up the shift from modernism to postmodernism in attitudes regarding art. Such shifts and preoccupations in literary analysis and critique include devices like parody, intertextuality and pastiche. These terms, moreover, find essentials space in mythological revisionisms and help counter essentialist tendencies which postmodernism is popular for revoking. In this paper, an attempt has been made to analyseSamitBasu's The Simoqin Prophecies in light of such considerations and to elaborate upon how Basuutilises such postmodern and revisionist devices in the novel.

***Keywords**: Postmodernism, Revisionism, GameWorld, Intertextuality, Fantasy.*

"Postmodernism" became a controversial term used to characterise a growing movement that began in the late 1950s and was often seen as an antidote to modernism. *The Dismemberment of Orpheus: Toward a Postmodern Literature* by Ihab Hassan or *Learning from Las Vegas* by Robert Venturi and Denise Scott Brown may best reflect this period. A massive cross-disciplinary debate erupted around the concepts of "postmodernism" and "postmodernity" during a second, more explosive period in the 1980s and early 1990s. It's because of this that the definition of postmodernism has been up for debate for quite some time now. Postmodernism, as Judith Butler noted, is in fact a question because is there something called postmodernism? (32). Postmodernist philosopher Jean-Francois Lyotard of France and Marxist literary critic Frederic Jameson of the United States dominated the conversation, though. By ritually repeating in debates a few books that worked as anchorage points, such as Lyotard and Jameson's essay "Postmodernism, or, The Cultural Logic of Late Capitalism," its extraordinary scale and dissemination were challenged. Described by Jameson as the "hypothesis of some radical split or coupure" (1), this critical trend may be traced all the way back to the end of the 1950s or the beginning of the 1960s. His influential description of postmodernism as the era's "cultural dominant" (borrowing Roman Jakobson's idea of "the dominant") and the cultural expression of a new stage of Western socio-economic development, "late capitalism," is still used today (4). Others viewed the idea of periodization as suspicious and undesirable since they regarded realism, modernism, and postmodernism as chronologically succeeding each other. Realism, modernism, and postmodernism all coexisted and recurred in the arts, according to Lyotard's article "Answering the Question: What Is Postmodernism?" He posited that the modern era is divided into two distinct phases: postmodernism and realism. It's during the postmodern era when artists are free to experiment and innovate, inventing new laws of art. Literature and art operate inside a "existing paradigm," because we are so used to it, and "look like a mirror of reality" after a new paradigm is created and literature and art act within it, customarily repeating it (59).

Postmodernist critics often point to 'intertextuality' and 'self-referentiality' (or 'metaliterature') as two of the genre's defining

characteristics. There is an overt and explicit engagement with and re-signification in postmodern intertextuality of canonical discourses and texts, such as canonical literary texts and myths and folktales, which are oral, anonymous, collectively authored texts. The intertextual relationship between *Wide Sargasso Sea* by Jean Rhys with *Jane Eyre*, Tom Stoppard's *Rosencrantz and Guildenstern Are Dead* with *Hamlet*, and Atwood's *The Penelopiad*with the *Odyssey* are prime example of this. Others have found and praised an agonistic, contesting, critical relationship to the canonical text, but Jameson saw in postmodern literature a flat and uncritical "pastiche" of the original (16). In a number of her short stories, Angela Carter updated European folk tales. Both "The Courtship of Mr Lyon" and "The Tiger's Bride" (in her 1979 collection *The Bloody Chamber and Other Stories*) revisit "Beauty and the Beast," for instance. With references to Indian mythology as well as canonical Western literature, Salman Rushdie's *Midnight's Children* opens with nods to *The Arabian Nights*, *Tristram Shandy*, and Charles Dickens' *David Copperfield*. For Rushdie and others, this opens the door for readers to embrace hybridization, embark on a journey of cross-cultural apprenticeship, and become more aware of the contemporary multiplicity of traditions, cultures, and canons.

This is where Jean Baudrillard's "precession of simulacra" theory comes in. According to Baudrillard, our time is the "age of simulacra" (3), in which representations come before reality in texts like *Symbolic Exchange and Death* and *Simulacra and Simulation*. Simulacra, on the other hand, are copies that don't have a counterpart in reality. A mimetic relationship with reality was important to Dickens and George Eliot, who valued "truthfulness" and aspired to maintain one. Postmodern intertextuality has retreated into a hall of mirrors rather than engaging with reality. Fredric Jameson agreed and lamented the "waning of historicity" and the "loss of the historical "referent," as he put it (18). As a result of new mass media's constant influx of representations, some argue that reality itself must be re-defined to take them into account. An intertextual engagement with canonical texts by postmodernist literature would be mimetic in a new sense because it would be a new form of postmodern engagement with representations. A 'resignification' is a poststructuralist term for a re-presentation of representations that contests the canonical shaping and interpretation of reality and sets out to shape and interpret it anew. This is how the postmodern writer sees reality in the age of 'simulacra.' For the first time, postmodern realists are acutely aware of the fact that representations shape and give meaning to reality rather than simply mirroring it. A postmodernist approach to the world engages with historical actuality, including dominant representations that circulate in our time and place as a part of that actuality. As a result, postmodern literature has a global feel to it, as evidenced by the frequent mixing of historical and fictional events (Goulimari 247-48).

Self-referentiality or metafiction are other characteristics of postmodernism (and postmodern literature). Linda Hutcheon calls postmodern literature "historiography metafiction" in her book *The Politics of Postmodernism* (49). In other words, this is literature that deliberately distances itself from itself, mixing literature with criticism, as well as the aesthetic and the critical. There are numerous ways to accomplish this. The narrator, for example, is acutely aware of the particularity and interest (rather than disinterest) of their point of view, as well as the barriers to objectivity in narration. While reading Salman Rushdie's *Midnight's Children*, the narrator, Saleem Sinai, is caught between two conflicting accounts of the 1965 Indo-Pakistani war, and ponders whether narration can ever be objective. Saleem's metafictional awareness, on the other hand, is insufficient to turn him into a trustworthy narrator, and he shows his untrustworthiness in a conscious manner. Saleem theorises his narrative practise by using a metaphor he inherited: a pickling factory. As a result, his writing is like a "pickling process" in which he pickles historical facts and memories, and the chapters are his jars (459). In a passage that is both metaliterary and metatheoretical, Saleem refers to himself in the third person as a persona he has created. For example, the reader is made aware of their own situatedness, interest, and unreliability as a result of this literary strategy.

This opens up the possibility of considering reading ethics. There are continuities in modernist literature as well as realist fiction; this isn't all new. Take George Eliot's *Adam Bede*, where the authorial persona says, "The mirror is almost certainly defective" (175).

In this context, mythological revisionism seems to be resonant with postmodern preoccupations such as intertextuality and simulation as well as metafictionality and representation. Guy Beiner's article "Revising Revisionism" examines the relationship and interaction between postmodernism and revisionism. He makes the following observation:

…revisionism is defined here by 'its disposition', which 'is one of scepticism in the possibility of unadulterated truth'. The reader is told that revisionists are the first postmodern…since they are aware of 'the illusions of logocentrism' and 'receptive to the ambiguities and uncertainties of truth'. The inevitable conflict between postmodernist inclinations towards relativism and revisionist self-professed empiricism is supposedly squared with reference to a seemingly common methodological commitment to deconstruction. (124)

Thus, re-interpretation has revision as its foreground. The entire text has been transformed into a completely new work that incorporates fresh perspectives, ideas, and concepts entirely unrelated to those found in the original. It includes a review of the text from both the inside and outside. Similarly, mythological revisionisms use postmodern devices such as intertextuality, metafictionality, and so on to reinterpret and re-evaluate popular paradigms of mythical (or mythological) representations. In spite of the fact that its origins can be traced back to feminist works (such as Angela Carter's *The Bloody Chamber* and Margaret Atwood's *Penelopied*), the discourse has since developed while receiving impetus from myths' self-reflective integrant. To grasp mythological revisionism, *A Handbook to the Reception of Classical Mythology* is an indispensable resource. 'Revisionism' is the title of a chapter in which Lillian Doherty examines diachronically alternative readings of Homeric mythologies. This chapter is important because it examines the revisionist use of myth's idealising tendencies in Homeric epic by focusing on Odysseus and Penelope in selected works. Realism and irony have both been important tools in the revisionist use of mythology because they allow for the juxtaposition of opposing points of view or for contrasts between words and deeds to emerge. Despite the fact that "every version of a myth is revisionist, especially in the modern era when the ideological underpinnings of our societies are radically different from those of antiquity," some versions still stand out for the challenges they pose to literary traditions and social norms (Doherty 158).

In their books *Indian Mythology: Tales, Symbols and Rituals from the Heart of the Subcontinent* and *Myth and Mythmaking: Continuous Evolution in Indian Tradition*, DevduttPattanaik and Julia Leslie express similar concerns about Indian myths. According to Pattanaik, revision and transformation are interchangeable terms in the third chapter of his book, aptly titled 'Mythopoesis: Transforming Myth,' and he cites numerous examples to demonstrate that Indian myths have been undergoing revision and transformation for as long as anyone can remember. Using myths and rituals as examples, Pattanaik tries to show how important context is. He illustrates his point with a number of well-known examples. However, by placing them in their proper historical and cultural context, he hopes to dispel some of the mystery surrounding them. According to Julia Leslie's book, the "great themes of myth" (Leslie XV) that recur in Indian mythical narratives are well-researched. As stated earlier, the book's main point is "myths are created and destroyed in vastly different contexts, stretching from the very beginning of historical time to the present day" (Leslie XXII).

Therefore, the interest in the "reconstruction" of myth can be assessed by looking at the relationship between the authorial intent behind the myths and their utility as cultural documents in a constantly "shifting" social reality. For example, "the palpable functions within the original myth are... re-focused or reversed" when myths are re-constructed (Budkuley 16). According to C. N. Srinath,

every Indian writer, whether consciously or unconsciously, uses references to ancient Indian epics like the *Ramayana* and the *Mahabharata* "to build up their narratives or else to subvert and dismantle certain myths" (144). Pre-independence Indian writers, for example, were preoccupied with the subjugation of their country by the British. These myths were used to oust the foreign rulers, and myths and archetypal prototypes were invoked to instil a sense of national pride among the people. The Indian writers did not only use stories about the freedom struggle to express their personal and political situations; they also took up post-independence events like the infamous 'Emergency' of the 1970s in light of various Indian myths. As a result, writers from the nineteenth century's Bankimchandra Chattopadhyay (*Anandamath*) to the twenty-first century's Shashi Tharoor have had a preoccupation with myths as a plot device (*The Great Indian Novel*).

As in George R.R. Martin's *Song of Ice and Fire* series, SamitBasu's*Gameworld* trilogy is a fusion of eastern and western mythologies that results in a world as rich and complex as the one found in *The Simoqin Prophecies*, *The Manticore's Secret*, and *The Unwaba Chronicles*. In keeping with his Indian heritage, Basu names a major city Kol, which translates to "cradle of civilization" (Basu 117) in Bengali. There are references to great Indian epics like the *Ramayana* and *Mahabharata*, as well as *Star Wars* and other sci-fi franchises throughout the series. *The Simoqin Prophecies* is the first book of the series. Although there are no maps in the book, it takes place in a fantasy world with three magically gifted young people who must face a dark force that threatens their world. The three main characters are Kirin, a cynical and arrogant half ravian; Maya, a spellbinder; and Asvin, a noble but quiet prince. Both Kirin and Asvin are equally important in this story, and both of them could be considered "heroes," which is on purpose on the part of the author.

The Simoquin Prophecies is a mash-up of all popular myths and legends, fantasy series, and science fiction pulp. In addition to the clever puns and references, the mash-up has a subtle sense of humour running through it that keeps it from becoming an outright parody of all its sources. The book opens in the year of the greatest rakshasDanh-Gem's rebirth and the rebirth of another hero who will bring his downfall, which is the first in the *GameWorld* trilogy. The premise is fairly standard for most works of fantasy fiction, but Basu injects a lot of intrigue into the storey with his surprising turns and a slew of fantastical creatures and oddball characters. In this book, readers find all of the mythological creatures from Greek, Egyptian, and Hindu mythology, as well as some new ones (such as characters and subplots from the *Ramayana*). A ravian named Kirin, a handsome prince by the name of Asvin, and the sharp-tongued daughter of one of the most potent spell-casters in history, Maya, make up our cast of characters. If Chief Civilian of Kol City is concerned with increasing numbers of rakshas and increasing amounts of magical activity, then Mantric is busy in Bolvudis putting together the world's first magical film production company. And so, they set out for Bolvudis in order to meet Mantric with Asvin, May, Kirin and Spikes (a pashan), the Dagger (disguised as Amloki), the Centauress Red Pearl and the VamanGaam. There's a lot of action and suspense on this wild journey, and they must say their goodbyes to Kirin.

The book is replete with intertextual references to many epics, legends, and even cultural motifs. In many cases, the comparisons made to real-world cultures are a bit obvious. For example, Asvin's home country of Avranti is based on Ayodhya's description in the *Ramayana*, which has been taken almost verbatim. It is well known that the Avrantic warriors are world-class archers who give their arrows unique names and embark on daring Ashwamedh expeditions. In their chivalric practises, they are misogynistic, and they dwell near forests where Rakshas and Vanars live. For example, Asvin refuses to engage in combat with Maya during his training simply because she is a female. However, Maya is a native of Durg, a neighbouring country of Avranti that is well-known for its fierce and tenacious women warriors. ‘It'd be like the Amazonians had formed a cult around the Goddess Durga if they'd done so’ (Alpana Online). Apart from the Ravians, the Avrantics are the only people in GameWorld who are

said to practise caste differentiation in their society. The rest of GameWorld views the Avrantics with suspicion for these and other reasons. In the eyes of the rest of the world, they are out of touch with modernity and stuck in the past. The modern world is exemplified by the great metropolis of Kol. As a result of this reference to their caste system, we can deduce that the Ravians are highly regarded and revered. There is also a comparison to be made between Artaxerxia and Avranti. Avranti represents subcontinental Hindu-centric cultures on GameWorld, while Artaxerxia represents Arabian cultures. Ventelot (a reference to Camelot) represents Britain, and Imokoi represents Mordor.

The novel also provides inter-generic nods to 'Young-Adult' fiction. 'Young-Adult' love triangles have redefined all rivalry, and Asvin and Kirin are rivals because they were born to be rivals. To put it another way, they are both well-built, successful young men who do not have any flaws. A huge benefit is that, unlike most 'Young-Adult' love interests, neither of these young men exhibits any form of abuse. Lastly, like Harry and Neville, either of them could be the Simoqin Prophecy's chosen one. Like in most love triangles, the author has a clear preference (Feminist Quill Online). He goes to great lengths to demonstrate how naive and self-centered Asvin truly is. This guy has it all made for him, including the title of Chosen One. The path ahead for Kirin, on the other hand, will be more difficult. Narak Demon-hunter, his father, left him a mysterious legacy that he must unravel. However, putting Kirin in the role of the underdog is a risky move, given his royal ancestry. When it comes to Kiran and Asvin's stories, the progression is non-linear, and neither character follows any conventional plotlines. And Maya would have been caught in the middle of it all if it weren't for her unfortunate tendency to get distracted by side trips that turn out to be far more exciting and eventful than anything the Romance gods had in store for her.

What point in time the book takes place is a contentious question. The 'GameWorld,' which was created by the gods specifically for the purpose of playing a game, is not a replica of our world, past, present, or future, but a unique planet with its own culture and civilization. Despite this, it resembles our world's past and present in many ways. It's populated by characters from world mythology, contemporary pop culture, and history, as well as a bizarre menagerie of beasts. Consequently, mythical creatures and people such as the Egyptians live side by side with beer-drinking biker gangs and cunning businessmen in the 'GameWorld.' The 'GameWorld' as a whole is pre-industrial, if not quite mediaeval, in terms of scientific, technological, and civilised progress. Parts of the story are set in quasi-Egyptian pyramids (reminiscing of an ancient world before the invention of the wheel) while other parts are set in dazzling, modern cities, suggesting that progress has been uneven around the world. In the state of Avranti, the 'asvamedha' ceremony is performed in an anachronistic manner while spaceships carrying extra-terrestrials invade the world. That the book becomes a fantasy that subverts and even parodies its own generic canon is in part because of the uneven setting in time—the narrative jumping from prehistoric settings to futuristic ones. The book clearly leans towards fantasy elements rather than science fiction. Instead of parodying genre fantasy, Basu uses elements of science fiction to gain momentum in his parodying of the genre (Ray 17-19). For example, in the *Star Wars* films, there is an intriguing interplay between the past and the future. 'A long time ago in a galaxy far, far away...' opens the films. As the qualifier 'in a galaxy far, far away' shows, this is not our past and can thus be different from our own past; it may resemble our future in terms of technological progress. Invoking the past accomplishes two things: it gives the films a mythological texture and feel, and it places them in a deep time, a "different time" (Clute and Grant 946-47), similar to fairy tales' mythic 'once upon a time' past. Interestingly, *Star Wars* has a big influence on the GameWorld trilogy. It is revealed at the end of *The Simoqin Prophecies* that Kirin's father is Dark Lord Danh-Gem, who asks him to join the "dark side" (Basu 387) A nod to *The Empire Strikes Back*'s famous climax, with the exception that Kirin accepts the offer instead of being sanctimonious about it.

Basu also makes heavy use of folklore and fairy tales, but he never tells the tales as they

really are, instead inverting and parodying them. *The Simoqin Prophecies* sometimes parody Islamic folklore, such as the storey of Aladdin in *One Thousand and One Nights*, which features a wish-granting genie. To question Basu's presumption that these spirit beings are inherently good and subservient:

'My three wishes!' said Hasan. 'You will grant me three wishes, won't you?'

The jinn thought for a while. 'Why?' it asked.

'That's what jinns do! Don't you know that? Everyone knows that!'

Three wishes, thought the jinn. What was he talking about? (Basu 110)

This amuses and puzzles the jinn, who promptly eats Hasan and his camel before dozing off for the rest of the day.

In Basu's book, references to world mythology and folklore are trivialised and parodied in abundance, and these instances of parody and pastiche, full of humorous jabs at diverse mythological sources, help Basu create a few myths of his own. Postmodern experiments with mythology, folklore and fairy-tales can be found throughout the work, such as references to Achilles' rage in the *Iliad*, the changeability of Greek gods, Egyptian burial customs, 'asvamedha' ceremonies and even Hanuman and Bali in the *Ramayana*.

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A SURVEY ON PERFORMANCE COMPARISON OF MAP REDUCE AND SPARK AND ARCHITECTURAL IMPROVEMENT OF SPARK

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ABSTRACT

Hadoop and Apache Spark are Apache Software Foundation open-source projects, and both of them are premier large data analytic tools. Hadoop has led the big data industry for five years. The processing velocity of the Spark can be significantly different, up to 100 times quicker. However, the amount of data handled varies: Hadoop Map Reduce can process data sets that are far bigger than Spark. This article compares the performance of both spark and map and discusses the advantages and disadvantages of both above-noted technologies.

***Keywords**: Hadoop, spark, Map reduce.*

1. Introduction

The large-scale information scanning has become a remarkable platform for organizations to take advantage and exploit heaps of vital information. In the course of this vast information rise, Hadoop has progressed fiercely as an on-or cloud-based stage as the single-size solution for the huge scale problems of the corporate sector. [1] While Utilizing Hadoop has met a substantial part of the advertising, the best arrangement may be in some conditions while performing tasks on a traditional data collection. Hadoop is not an information base, but a general programming system was deliberately used to handle enormous quantities of structured and moderately information.

[1] For large-scale information evaluation, associations contemplating using Hadoop should examine if their present or future information demands require the type of capabilities that Hadoop offers. Organized information is described as information that resides in the fixed bounds of a record or document.

Due to the way structured information may be recorded, disclosed, questioned and explored, even in large quantities, in an essential and immediate method, a conventional set of data is usually implemented. [2] Unstructured data is referred to as information from a variety of sources, including communications, text archives, recordings, pictures, sound records, internet media postings.

A usual dataset cannot handle or examine unstructured information as both puzzling and voluminous. Hadoop's ability to add, Totals, and explore huge multi-source information stores without initially structuring allows associations to gain additional knowledge quickly. In this sense, Hadoop is perfect for storing, monitoring and evaluating large quantities of unstructured information for companies [3]

2. Map Reduce

MapReduce is a programming paradigm that provides enormous scalability over a Hadoop cluster's hundreds or thousands of computers. MapReduce, as the processing component, lies at the heart of Apache Hadoop. The phrase "MapReduce" refers to two independent activities performed by Hadoop applications.[2] The first type of task is the map job, which takes a collection of data and turns it into another set of data, where individual components are split down into tuples (key/value pairs).The reduction task takes as input the result of a map and merges those data tuples into a smaller collection of tuples. The reduction task is always run after the map job, as the term Map Reduce indicates.[2]

2.1 Mapper

The task of the mapper is to process the supplied data. In most cases, input data comes in the form of a file or directory, which is then stored in the Hadoop file system (HDFS). Line

by line, the mapper function is fed the input file. The mapper parses the input and generates numerous tiny data pieces.[2]

2.2. Reducer

This is a hybrid of the Shuffle and Reduce stages. The Reducer's role is to process the mapper's data. It generates a new set of outputs after processing, which is saved in HDFS.[3]

3. Spark

Apache Spark is a free and open-source distributed computing system with high-level APIs in Java, Scala, Python, and R. It has access to data stored in HDFS, Cassandra, HBase, Hive, other Hadoop data source. it may be operated under Standalone, YARN, or Mesos cluster managers. [3]

3.1 Hadoop vs Spark

Hadoop is built on batch processing of large amounts of data. This means that the data is kept throughout time and then processed with Hadoop. Processing in Spark, on the other hand, can be done in real time. This real-time processing capability in Spark enables us to tackle the Real Time Monitoring use cases discussed in the preceding section. In addition, Spark can do batch processing 100 times quicker than Hadoop Map Reduce. As a result, Apache Spark is the industry's go-to technology for large data processing.[4]

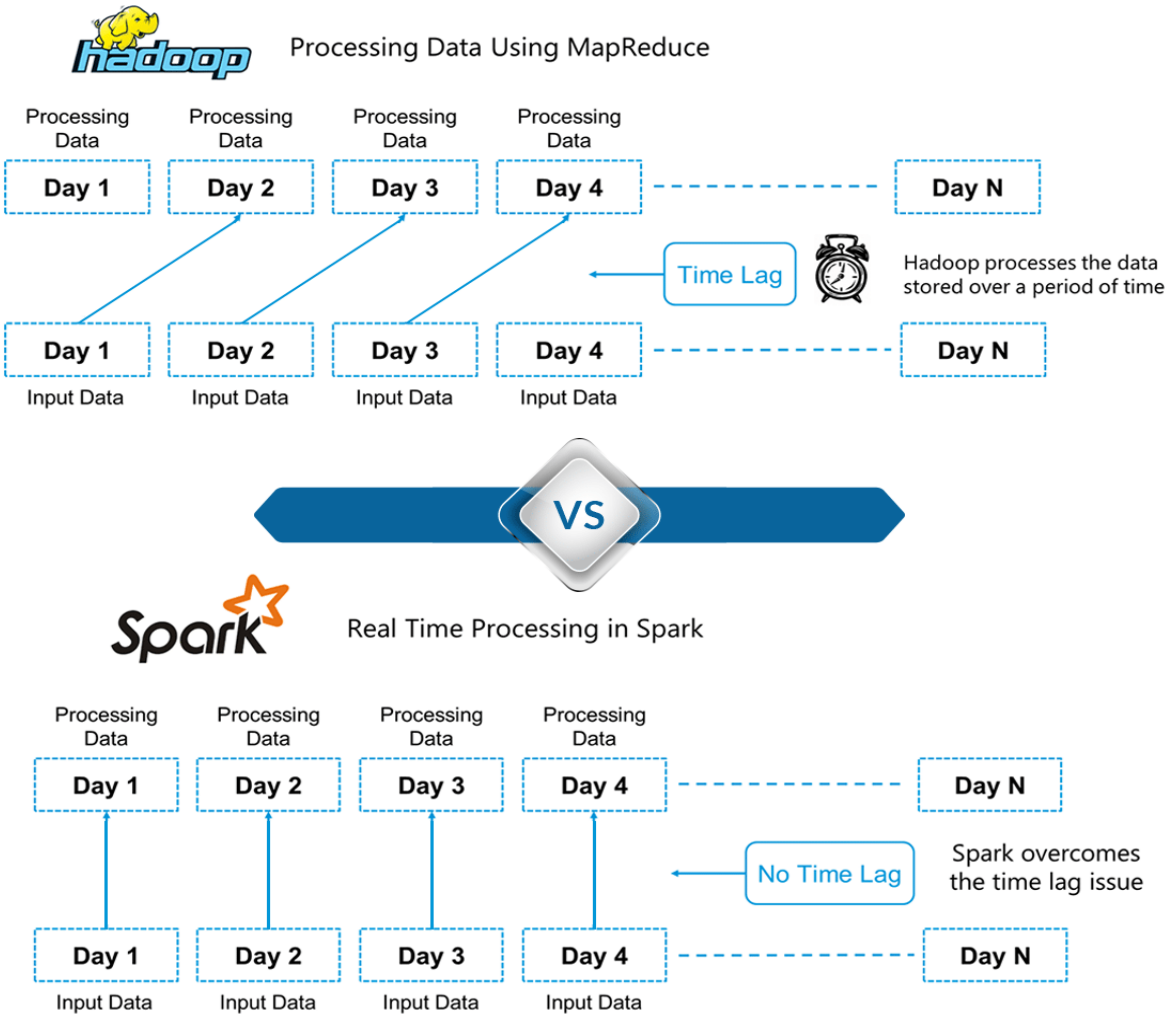


Fig 1: Hadoop vs Spark

4.Performance Comparision Map Reduce and Apache spark.

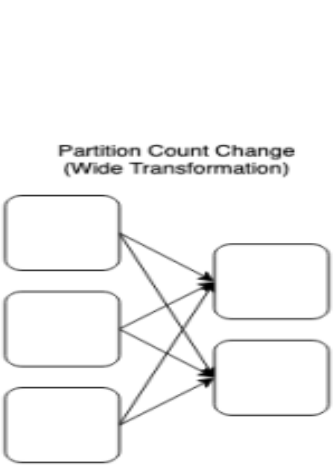
The speed of Apache Spark is well recognized. It outperforms Hadoop Map Reduce in memory by 100 times and on disc by 10 times. The reason for this is because Spark processes data in RAM, but Hadoop Framework must

store data to disc after each Map or Reduce operation. The computational power of Spark provides near-real-time analytics, making it a perfect tool for IoT sensors, payment processing systems, advertising campaigns, security assessment, pattern recognition, social networking sites, and log surveillance.Spark offers built-in APIs for Scala, Java, and Python, as well as Spark SQL for Database users.[5] Spark also offers basic building pieces that make it simple for users to construct user-defined functions. When performing commands, you may leverage Apache Spark in interactive environment to obtain instant response.[5] Hadoop Map Reduce, on the other hand, is written in The java programming and is tough to construct. Unlike Spark, Map Reduce doesn't really support interactive use. Considering the above - mentioned characteristics, it is possible to infer that Apache Spark is more user-friendly than Map reduce.Spark, like Map Reduce, uses speculative execution and restarts for each job.[6] However, the fact that Map Reduce relies on hard disks provides it a minor edge over Apache Spark, that relies on RAM. If an unexpected incident occurs and a Map Reduce activity breaks in the middle of operation, the function may resume where it was left off. It is not really feasible with Spark since it must responsibilities with respect from the beginning. In terms of security, Map Reduce surpasses Spark Spark. For instance, Apache Spark's security is set to "OFF" by nature, making users exposed to cyber attacks. Spark implements RPC channel verification using a secret key. It also includes event recording and the ability to protect Web User Interfaces using Javax Servlet Filters. Furthermore, because Apache Spark can operate on Yarn and leverage HDFS capabilities, it can use Hadoop File Permissions, Kerberos Authentication, and node security. Map Reduce can make advantage of all Hadoop security capabilities and interact with other Hadoop Security Projects. As a result, Map Reduce provides more security than Hadoop.

5. Limitations of Spark

Spark does not have its own file system. This does not include a filing system. It is usually dependent on other file management systems. As a result, it must integrate with one , if not Hadoop one more cloud-based data platform. This is one of Spark's core problems.Spark will not allow universal processing. The live data that enters is automatically split into bunches using Spark streaming. If such batches are of a predefined interval, each chunk of data is treated as a Spark Resilient distributed.[6]

6 .Architectural Changes in spark



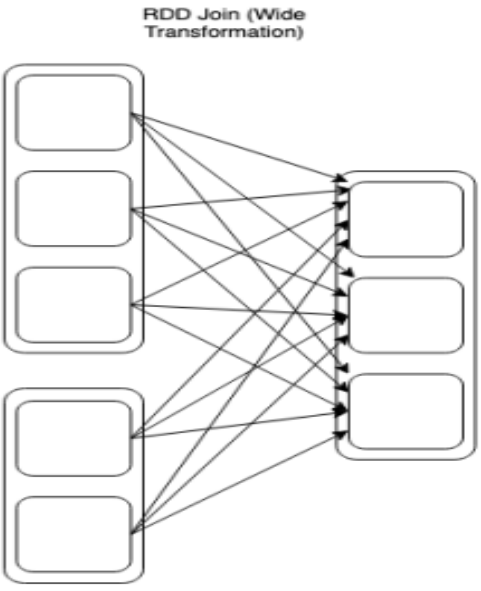


Fig 2 : Single RDD vs Multi RDD

Multiple RDDs are defined by the fact that the worker nodes will need to move data across a network to accomplish the required job. A merge is an instance of this, because we may need to acquire data from throughout the cluster to perform a comprehensive and proper

join of different datasets.

Single RDDs are defined by a single input partition and have a single output partition. A filter is an illustration of this: we could have a data frame of data which we can refine down to a tiny datasets without requiring to understand any data kept on every other worker node.

Conclusion

This article compares the performance of both spark and map and discusses the advantages and disadvantages of both above-noted technologies and provides the required archietctural changes needed for the improvement of spark performance.

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RAMAYANA: A GUIDELINE FOR LEADERSHIP DEVELOPMENT

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Introduction:

Ramayana is an epic which has lessons of management huminity, virtueobedience, leadership and courage .Ramayana is although has many character but lord Ram and Ravan are two main characters on whom the Ramayana is based.but apart from these two characters there were many more who played an extremely important role in winning lord Ram.

Munniapan Balkrishnan were stated first time about transformational leadership.Lord Ram has the quality not only to lead but also to develop new leaders. SO in short we can say that Ramayan has all managerial lessons, team work and leadership.

We get the new concept of good governance which still given as an example. Ramayana has many characters which gives a lesson of leadership. Although lord Ram was a Centre leader but Hanuman, Sugrive, Jambvant and many more were in the key role in winning moment of lord Ram.

The Paper is based on the tuck man team development model and the three leadership style which is participative, transformational, and situational.

The paper is basically focused on the ability of lord Ram in creation of new team for the war against Ravan. It is really an admirable as lord Ram build the team in the forest where he did not knew any one.This is the most important influencive character of lord Ram. He leads to unknown people who were ready to take fight against Ravan. Lord Ram has performed a role of transformational leader where he developed the quality of Sugrive who was a depressed person.

A good leader has to create confidence in his followers.Angad was down in spirit after his father's death, and was even sceptical of his uncle. Lord Ram developed the quality of Angad who lead the team and played an important role in war.Ethical behavior is one of the key elements which have shown by the Lord Ram. We can see many acts of lord Ram in Valmiki Ramayana which is really ethical.

Team work and leadership development:

Team work is an important part of leadership development leader no matter how powerful he is but need a team to win.In Ramayana lord Ram formed a group of people as a team including Hanuman ,Sugrive ,Nal and Neil.As a leader it was difficult task for Ram to create a team at such place where he did not know anybody. He met Hanuman who helped lord Ram in searching Sita G.He met him with Sugrive who promised to help Ram with his sena to search Sita.

Lord Ram played a role of transformational leader who developed the quality of Sugrive,Angad and Vibhishan. As a team leader he identified the quality of their team members and cultivates them.

1: Planning and vision: The vision of Lord Ram was very clear to set free Sita g from Ravan.WhenJatayu confirmed that Ravan has kidnapped Sita and took her to Lanka in the south he send his most reliable leaders to search them.

सुनहुनीलअंगदहनुमाना। जामवंतमतिधीरसुजाना॥
सकलसुभटमिलिदच्छिनजाहू।सीतासुधिपूँछेहुसबकाहू॥1॥

2: Making Allies: If lord Ram had taken it upon himself to execute the entire plan and gets his wife back to all by himself. But lord Ram realied on others .He helped Sugrive and as a mark of gratitude Sugrive helped lord Ram in searching Sita and fight against Ravan.

3.Building employees confidence and trusting them:

When lord Ram and Laxman were abducted by the Ahiravan,Hanuman showed his leadership quality and make Ram and Laxman free from Ahiravan .This happens because lord Ram trusted on Hanuman and Hanuman gave his best.A good leader should train their employee to face adverse situation himself as leader may not present every time or he himself be in danger.

4: Making employees feel valued: As a team leader it is responsibility of a leader to give preference or valued to every employees. Lord

Ram never showed his team that he is from a royal family and never show ego. He was very cool in nature and give respect to everyone. Even when Vibhishan g came to Ram after throne back from Lanka he invited him in his team and promised to make him King which he fulfilled later on.

Leadership style and team development:

1: **Participative leadership style:**
Throughout the story of Ramayana we find Rama being a participative leader.He involves initially his siblings and later on his lieutenantsin all his decision making process.He does not impose his decision on others due to authority and power and this makes him participative leader.

2:**Transformational leadership style:** MunniapanBalkrishnan has discussed about the transformational leadership. Lord had transformational leadership style where he did not focus on guiding the team but also transformed many others as a leader. He developed the quality of Sugrive, Angad and many more.

3: **Situational Leadership**: Once in a war with Ravan lord Ram made Ravan weaponless but he did not kill Ravan as it was against the war .It shows the great quality of lord Ram. He helped Sugrive and took Vibhishan with himself just for making situation positive for himself.

Blake and Mountains Managerial grid model:

1,9								9,9
1,1								9,1

1: Concern for task 2: Concern for people

In 9.1 leader is autocratic has strick work rules, policies and procedures

He views punishment as an effective way of motivating team members .This approach focuses on result only but low team morale and motivation affects team performance. This autocratic belongs to Ravan who believes in punishment.

In 9.9 Team management is the most effective leadership style it reflects a leader who is passionate about his work and who does his best he can for the people he works with.

Team dynamics and team building lesson from Ramayan

1: Plan: Lord Ram as a leader created a milestone as a team leader.In search of Sita he faced different problems .He knew nothing about the jungle.But later he met different people like jatayu who fight with Ravan to save Sita and informed lord Ram about Sita g before death.

2: Leading unknown people: The most important quality we can see that lord Ram has lead the people who were new to everyone. It needs a really a majestic relation building quality and understand the followers whom he is leading.

3: Communicate with different species: Lord Ram was leading vanar sena and it is really challenge for him how he has communicated with and reached at his goal. They all helped lord Ram in search of Sita. It happened just because of lord Ram and his leadership quality.

4: The importance of making allies: A leader is not only known by his own work only but by his team efforts also.Lord Ram relied on others and made allies who helped him to achieve his goal.He helped Sugrive to get his kingdom and wife back In return Sugrive helped lord Ram by sending his Vanar sena to search Sita G.

5: Transformational Leader: Lord Ram has the ability not only to lead but also create leaders from the team.He developed the quality of Sugrive who was a depressed person. He lost his kingdom and wife by Bali.Lord helped Sugrive in return he helped lord Ram in searching Sita. Sugrive played an important role in war between Ram and Ravan.

6: Assign Duties: As a leader he identified the strength of his sena.During the war he choosedNal, Neil, Angad, Hanuman and Jambvant especially towards South to search Sita .He had utilized the best of his resources and all the four warriors gave their best.

Leadership Style of Lord Ram and Team development

1: **Participative Leader**: Throughout the story Ram being a participative leader.He involved

initially his siblings and later on his lieutenants in all his decisions. He did not impose his decision on others due to power and authority.

Author Dr.Alpana Sharma from SSR College from dept.of political science in his paper Lord Ram: An ideal leader stated various leadership qualities of lord Ram like learner, equanimity, courage, making allies,vision,self-belief, and many more.

2**: Transformational leadership**: Dr. Munniapan Balkrishnan introduces transformational leadership in his paper Transformational leadership style demonstrated by Sri Ram in Valmiki Ramayana. DrMunniapan has come with new concept where a leader is not only supposed to lead or direct the team but also transform the new leaders. He developed the quality of Sugrive,he developed Angad and Vibhishan.

3: **Situational leadership**: Lord Ram had a very good quality of relationship building. In the forest where he did not knew any one he developed the relation with Hanuman, Sugrive,Angad and Vanar sena who played an important role during the war against Ravan.

4: **Democratic Leadership**: In this style leader makes decisions based on the input of each team member. In Ramayan Lord was the centre leader but he never imposed his decision on others.He always took opinion of team members before taking any decions. He always gave respect to each members and never showed that he belonged to a king family.

Conclusion: We can conclude from the study that Ramayana is not only the epic but a guideline for the leaders. We can see that there are many leadership lessons like styles, theories and many more. The study included Tuckman team development model .We can learn that team work is extremely important to win over enimies. Lord Ram showed his great leadership quality and managed his team very well. He was a kind of leader who showed a right path to the followers and followers happily followed the instruction of Lord Ram.As a leader Lord Ram showed that ethical values are most important .He showed its during the war and left Ravan alive when he was weaponless.He gave shelter to Vibhishan which shows the greatness of Lord Ram.

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RELATIONSHIP BETWEEN LEARNING STYLES AND ACADEMIC ACHIEVEMENTS OF BACKWARD STUDENTS OF UPPER-PRIMARY CLASSES

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ABSTRACT

Experts assert that individuals enjoy various learning styles. In many cases what is being taught has a less impact on learners' achievement than the way materials are presented. In other words, learning styles make an important component in the learning environment. The Learning Styles Survey (LSS), employed in this study, appears to be a viable tool to determine students' learning style. The presentresearch paper is an investigation of the relationship between learning styles and overall academic achievement. In order to investigate this relationship. The Learning Styles Survey (LSS) instrument which is based on Joy Reid's Perceptual Learning-Style Preference Questionnaire (1987) was used. The statistical procedures employed in this study were one-way ANOVA, and multiple regression analysis. The analyses of the data indicated a significant relationship between overall academic achievement and learning styles. It was also found that the high, moderate and low achievers have a similar preference pattern of learning in all learning styles. Moreover, the learning styles framework does not change with subjects, where it actually plays an important role across all the subjects. Therefore, the results here suggest avenues of future research to understand this phenomenon.

Keywords: *learner; learning styles; school; academic achievement; learning environment*

Introduction

From the NAEP (National Assessment of Education Progress) results and other data, we conclude that more than 70% of high school graduates are not prepared to do the ordinary geographic reasoning that everyone in our society must do in the course of caring for themselves and their families, making consequential decisions in the workplace, and participating in the democratic process. (Edelson, Shavelson, & Wertheim, 2012) Over the past 20 years, social studies and geography in particular, have been marginalized in the curriculum (McMurrer, 2007). With the rise of high stakes testing and rigid accountability mandates, teachers often "abandon student centered, community based instruction in an effort" (Mathews & Adams, 2016, p. 297) to cover the required curriculum. Further compounding the status of geography as a protected subject within social studies is the precarious place that it holds within teacher education programs across the country (Schell, Roth, & Mohan, 2013; Theobald, Dixon, Mohan, & Moore, 2013). On a more positive note, advances in technology (Milson & Kerski, 2015), renewed emphasis on inquiry teaching (NCSS, 2013; NCSS 2014), more attention to global issues (Lipscomb & Doppen, 2013), and collaborative efforts on the part of national geographic associations (Edelson, Wertheim, & Schell, 2013), provide geography educators with an opportunity to improve their practice like never before. What Does the Research Say About Geography Teaching Practice? Over the past four decades, a small group of dedicated geography educators and researchers have fought to maintain geography's place within the social studies curriculum. This struggle, although it has had its share of successes over the years, is in need of a reboot. Although national commissions and standards documents have highlighted the importance of geography to citizenship education, there has "been no measurable improvement in overall NAEP scores" in geography assessments given to US students over the past 17 years (Edelson, Wertheim, & Schell, 2013, p. 2). Geography has fallen victim to the same traditional pedagogical mindsets and practices (Knowles & Theobald, 2013) as the other social sciences that constitute social studies. That is, a superficial understanding of the discipline, on the part of teachers, students, and social studies teacher education programs dominates preservice and inservice experiences. The good news is that, within the literature on geography teaching practice, there has been a recent push to balance geographic knowledge (i.e., geographic body of knowledge

represented by the "5 Themes" content) with geographic action (i.e., inquiry and problem solving). This development in the field stresses the importance of integrating geographic knowledge and geographic practices in instruction rather than teaching them separately. A traditional view, and one that would feel more comfortable to many people, would be that factual understanding should be taught first, followed by conceptual understanding, and then reasoning skills. However, educational research teaches us that it is ineffective to separate learning of facts, concepts, and reasoning because they need to be used together in practice. (Edelson, Wertheim, & Schell, 2013, p. 4) Research on the teaching of geography is a mixed bag (Segall & Helfenbein, 2008)—some studies point to an emphasis on "doing geography" (Bednarz, Downs, & Vender, 2003) while others support the assertion that traditional pedagogy dominates most geography classrooms (Knowles & Theobald, 2013; Marran, 1994). In addition, there is some evidence that the ideals that teachers bring to the geography classroom do not always match those same teachers' enacted curriculum. In a survey by the Texas Alliance for Geographic Education (Acheson, 2003), it was revealed that geography teachers approach their subject in highly idiosyncratic ways and that they believed that they were teaching students to "think geographically," paying attention to higher order thinking concepts in the field. However, when these same teachers were asked to describe the content of their geography lessons, they were mainly teaching students to read maps. In short, "their higher-order goals were not supported by their lower-order practices" (Bednarz, Acheson, & Bednarz, 2010, p. 125). In recent years, the "Creating a Road Map for 21st Century Geographic Education" (http://education.nationalgeographic.org/programs/road-map-project/) project has attempted to address these persistent issues within geography education in the United States. The National Geographic Society, the Association of American Geographers, the American Geographical Society, and the National Council for Geographic Education have joined together for the "Road Map" project to address research, assessment, instruction, and professional development in geography. For the purposes of this article, we will point to two of their recommendations and how they fit with and may be supported by the concept of Authentic Intellectual Work (AIW). First, we examine the notion of geographic inquiry and how this may be used to improve geography teaching and learning. After all, " …the aspect of geography that has been implemented the least in schools is the application of geography understanding to answer questions or solve problems" [emphasis added] (Edelson, Wertheim, & Schell, 2013, p. 3). Secondly, we focus on six categories of geographic practice identified by the committee that should drive inquiry focused geography instruction. These geographic practices are: Posing geographic questions, Acquiring geographic information, Organizing geographic information, Analyzing geographic information, Answering questions and designing solutions, and Communicating geographic information. We believe that the 2 core concepts of inquiry and geographic practice can be used as starting points for geography instruction that utilizes AIW as a framework for organizing and implementing curriculum. What Does It Mean to do Authentic Intellectual Work? "Authentic" is used here not to suggest that students are always unmotivated to succeed in conventional academic work, or that basic skills and proficiencies should be devalued, but only to identify some kinds of intellectual work as more complex and socially or personally more meaningful than others. (Newmann, King, & Carmichael, 2007, p. 3). Social studies education scholars have long pointed to the low quality of instruction found in many social studies classes (Barton & Levstik, 2003; Cuban, 1991; Levstik, 2008; Ross, 2000). The stereotype of lower-order thinking activities, worksheet dominated classes, and memorization of isolated facts continues to be pervasive in our field. If the purpose of the social studies as a school discipline is "…to help young people make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world" (NCSS, 2010, p. 9), then our social studies classes/spaces should reflect this ideal. In short,

social studies classes should reflect the activities, mindsets, and skills that are actually required of citizens—social studies should match the world/space that students enter/inhabit. Authentic Intellectual Work ensures that students are engaged with challenging (i.e., real) tasks that, rather than representing a "series of contrived exercises to earn credentials" (Newmann, King, & Carmichael, 2007, p. 2), represent activities that are required of citizens in their day-to-day lives. In this sense, the term "authentic" does not necessarily mean "real" (although it can) but it does serve a term that separates the work that students typically do in schools (for grades) and the organized, purposeful application of knowledge in a meaningful ways (for jobs and daily problem solving). Because AIW is focused on applying knowledge and ideas to real world issues and tasks, the in-depth study of a problem concludes with products that have meaning beyond the traditional classroom parameters (i.e., assignments and grades simply to earn a grade). With this brief introduction in mind, AIW can be summarized by its focus on 1) construction of knowledge, 2) disciplined inquiry, and 3) value beyond school (Newmann, King, & Carmichael, 2007). Construction of Knowledge When framing social studies instruction around the "Construction of Knowledge" idea, we are essentially asking our students to take on the mindset of social scientists doing work in a discipline. In this way, they are producing knowledge in much the same way as historians or geographers. For example, in a geography classroom examining the racial segregation in the city of Detroit (http://www.metrotimes.com/Blogs/archives/2015/08/31/the-racial-dot-map-shows-theworld-just-how-segregated-metro-detroit-is_), students would use "documents, graphic sources, and inferential reasoning to make judgments" (Scheurman & Newmann, 1998, p. 2) to answer inquiries about why people live where they do. In the same way the geographers attempt to answer questions about society using geographic tools and reasoning, so would our students. Having students use the tools of social scientists to answer real questions is, in some school climates, aradical idea and constitutes a very different type of social studies experience for students (Newmann & Associates, 1996). As King, Newmann, and Carmichael (2009, p. 44) write, AIW involves "organizing, interpreting, evaluating, or synthesizing prior knowledge to solve new problems." Allowing students to develop geographic inquiries directed towards problems in their communities allows students to "do geography" with an eye towards the local, and that supports their investigation from a disciplinary perspective (next section). In this way we are helping students to understand the philosophical foundations of geography as well as how geographic knowledge is created, used, and represented. Disciplined Inquiry With the publication of the NCSS C3 Framework (2013), there is a renewed interest in inquiry pedagogy in social studies education. Within this category of AIW, students are asked to 1) "use a prior knowledge base, 2) strive for in-depth understanding rather than superficial awareness, and 3) develop and express their ideas and findings through elaborated communication" (King, Newmann, & Carmichael, 2009, p. 44). As teachers know, social studies content is better understood if it connects to some prior knowledge the student already possesses. Prior knowledge in social studies could take the form of any number of experiences (Newmann, Marks, & Gamoran, 1996). In geography, the good news is that all students have had some experiences with this subject matter from watching the news to using GoogleMaps on their smart phones to getting lost on a road trip. In fact, everything happens somewhere, thus geography is everywhere. Depending on the lesson, prior knowledge in social studies can be strengthened by infusing common readings, videos, discussions, or mini-lectures into your unit of study. The task of "indepth understanding" requires that we look beyond the superficial understandings (i.e., labeling place names) and work to understand how geography can be used as a lens (Alleman, 2010) for understanding the world. Students in a geography class would need to understand the problems and issues that are inherently a part of the discipline (Segall, 2010; Schmidt, 2011). Finally, the concept of elaborated communication speaks to the ways in which students use the language that experts within a given field use in their day-to-day work. "The

language they use—verbal, symbolic, and visual—includes qualifications, nuances, elaborations, details, and analogues woven into extended expositions, narratives, explanations, justifications, and dialogue" (Newmann, Marks, & Gamoran, 1996, p. 284). When students have the requisite prior knowledge and in-depth understanding, they can begin to use the language of geography to convey their understanding of the inquiry under investigation (see Pang, Fernekes, & Nelson, 2010; Todd, 2011). Value Beyond the Classroom If you have ever had a student ask the question "Why do we have to learn this?" then you are familiar with the "Value Beyond the Classroom" aspect of AIW. Teaching and learning that addresses this part of AIW has meaning beyond a grade or a checkmark for credit. "When experts in history, geography, economics, or political science do their work, there is a purpose to their work that is outside the bounds of simply displaying their competence in a field. Most assignments in school, by contrast, are only designed to document the 'competence' of the learner" (Chandler, Branscombe, & Hester, 2015). Assignments that are simply connected to grades "lack meaning or 4significance beyond the certification or success in school" (King, Newmann, & Carmichael, 2009, p. 45). Students find geography more interesting and consider it more useful when they are allowed to engage in projects and activities that foster active environments that challenge students' thinking (Trygestad, 1997). In the next section, we briefly outline some simple ways that geography teachers can begin to integrate aspects of AIW into their teaching practice. Authentic Intellectual Work In Real Life: Interdisciplinary Unit in Physical Geography When I was a student, I can remember asking the million-dollar question, "When am I going to use this after high school?" That question now drives my decision-making when I create lessons for my students. Now the question is "How can this material best prepare my students for life after high school?" When trying to prepare for my first year of teaching, I read and researched a lot to try and make the transition through my first year smoother. Armed with my beliefs and research, I came across AIW. During my teaching, AIW is woven throughout my classroom lessons; in fact, it is foundational part of my classroom culture as well. Below I share some brief examples of how I integrate this idea into my geography classroom. Specifically, the purpose of this lesson was help students understand the negative impact that rainforest deforestation has on climate and ecosystems. Construction of Knowledge: Construction of Climate Maps For the first part of our human-environment interaction unit, I co-taught with a science teacher about climate types around the world. My geography students and the science students were heterogeneously grouped to construct a map of the world as well as to color code the climates on the map. Previously, the students had learned about the climates around the world. They learned about location, seasons, weather, plants, and animals. By creating these maps, students were constructing something tangible and this helped to make a connection between where those climates were located on a map and what places had similar climates. After the students created the maps, each group had to research a "food chain" for one of the climates. In each group there were at least two science students that had to explain what a food web was and what aspects of their climate to research. Students utilized computers to research "producers and consumers" that were related within each climate. The importance of this lesson was for students to see how organisms survived in different climates and what the effect could be if an organism was removed from the area. Students were able to understand where animals were on the food chain depending on that certain climate. This information was being used to create a base of knowledge as they approached the next part of the unit. Disciplined Inquiry: Deforestation With climate types and food webs as prior knowledge, students were able to work together to solve real world problems. One of the problems the world faces today is the destruction of the rainforests. The school I currently teach at has a strong emphasis on teaching towards standardized tests because most students only need to pass the Ohio Graduation Tests (OGTs) in order to graduate. In order to accommodate real world issues and standardized tests, I researched past OGTs to find questions that would accommodate real

world issues and standardized tests. Forexample, a question that has popped up in previous science and social studies OGTs involves negative environmental consequences. I wanted my students to study not only the climates around the world, but also how they can be affected by human interaction. Instead of just giving students the answers, they used prior knowledge of climates and food webs to work in groups and discuss how to develop a solution. The students were using a real world example of human environment interaction and a higher order of thinking to come up with the possible solutions to this issue. As some additional insight, students were all given the same problem about providing negative consequences of rainforest deforestation, which ultimately challenged students to come up with several different consequences of this deforestation process. Elaborated communication: Impact of Rainforests A technique that I utilized for communication was a process called "Think, Pair, Share" which allowed students to first work individually on their conclusions before they discussed in a group setting. As students felt more comfortable with their conclusions and rationales, they were then able to pick fellow classmate to partner with and further discuss their responses. After about ten minutes, the pairs joined with another pair to become a group of four to repeat this process in larger groups. In the groups of four, students had to create a response of two negative consequences for deforestation. Once students came up with a strong response, the discussion opened up to the class. The groups were able to discuss their findings with a great sense of confidence because of all the previous steps that were taken. During this process, most groups said pollution, loss of animal habitats, and the dangers of the climate changing. Because of this group discussion, students were able to see how much damage was being done by humans negatively interacting with the environment. The use of machines creates pollution that damages our environment and can cause human suffering due to poor air quality. The loss of animal habitats would lead to animals becoming extinct and disrupting the food web. The biggest realization to the students was that the climate in the rainforest was dependent on the trees. When more trees are cleared, the whole system is disrupted. After the discussion, students had to complete an exit ticket. The exit ticket helped me to assess if the students learned the objective of explaining two negative consequences of rainforest deforestation. One of the questions on the exit slip for the students to answer was, "How can rainforest deforestation change the climate in places like Brazil?" Value Beyond School: School Recycling Program As a bell ringer the next day, I asked students to write down three to five ways that they individually and negatively impact the environment. Having discussed some of their responses, I then asked them to think of ways they could reduce their negative impacts on the environment. For example, one student said cutting down on the amount of hairspray she uses would have a positive impact on the environment, and another student said to walk more places rather than driving. To elaborate on the discussion further, I created a lesson to connect to students' lives by thinking about what the school does as a whole that negatively impacts the environment—then we brainstormed on ways to "fix the problem." A matter that came up through discussion was the fact that our school does not have a recycling program. Because of this unit, students are currently writing letter to the principal to see if that situation can be changed. I spoke to the principal firstand told him that the students were going to try and change something around this issue. If the students are able to make this happen, my hope for them is that they realize that they can foster positive change in their worlds and make a difference. Moving forward as I plan a unit such as this in the future, I hope to make it overall a stronger, more comprehensive lesson. To do this, I plan to have a field trip to a recycling center or water treatment plant to ensure that the students fully understand the processes they are suggesting. As another idea, I would request my class do an art project with recycled goods and to have an interdisciplinary lesson with the art teacher. After the students wrote the letters, there was a formal test on the material. The test consisted of multiple-choice and short answer items. The multiple-choice questions were about climates and map reading. The short answer questions

were focused on defining deforestation, where deforestation was occurring, and naming 2-3 consequences of deforestation. Below is a chart that helps show our ideas and how they connect to the 6 geographic practices and AIW. Organization Interdisciplinary Unit Authentic Intellectual Work 6 Geographic Practices Content, Methods, Outcomes Construction of Knowledge 1. Posing Geographic Questions 2. Acquiring Geographic Information Climate Maps Disciplined Inquiry Deforestation Elaborated Communication 3. Organizing geographic information 4. Analyzing geographic information 5. Answering questions/designing solutions6. Communicating geographic information Think-Pair-Share, Exit Tickets Value Beyond School Recycling Program Conclusion Ultimately, strengthening geography in the US will involve highlighting its usefulness towards citizenship education. As this very brief example bears out, this sort of geography instruction is possible. We believe that AIW can aid in this process. As scholars (King, Newmann, & Carmichael, 2009) of AIW have noted, this idea is uniquely suited towards this end. Authentic intellectual work prepares our students for the workplace and citizenship, increases student engagement, and "strengthens the professional community" (p. 49) of teachers. Meaningful geography instruction that draws from recent developments in the field of geography and that deploys AIW as a teaching stance is only limited by our imagination.

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INTERACTION BETWEEN SCIENTIFIC CREATIVITY, GENERAL CREATIVITY AND LANGUAGE CREATIVITY

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ABSTRACT

In India the education system is heavily loaded towards memorizing in order to obtain higher grades in the examination. There is tremendous pressure of parents on students to score higher marks in the examination which has resulted in different methods of coaching by teachers. It is important for educators to have clear understanding of creativity so that teaching methods are modified to enhance it. In this paper first the relationship between creativity and innovation with knowledge and learning is established. Later few methods are suggested for providing space for students in their curriculum to develop creativity. One of the suggestions is that at least one period per week can be devoted to "teaching beyond curriculum". In this period students may be asked to decide themselves what they will like to do in one year or in one semester. This project may involve anything like writing poetry, news report, scientific fantasies.

Keywords: S*cientific fantasies, teaching methods, understanding of creativity, Innovations with knowledge, Scientific Creativity, Language Creativity and General Creativity*

Introduction

Creativity refers to the invention or origination of any new thing (a product, solution, artwork, literary work, joke, etc.) that has value. Creativity may be defined as 'idea generation'. Being creative is to be able to generate or to come up with ideas or even to gather ideas. The new idea can be simple or it can be complex. Retrieved from http://www.yim.my/ index.cfm. Innovation is the production or implementation of ideas. The National Innovation Initiative (NII) defines innovation as "The intersection of invention and insight, leading to the creation of social and economic value". Retrieved from http://www.creativityatwork.com. Creativity is a multidimensional phenomenon that manifests itself in many fields and contexts, from arts and crafts to design, science, research and entrepreneurship. It is regarded as a cognitive ability, but – though intelligence favours creative potential – it is not the same as 'intelligence'. (Florida Richard 2004) ibid; Boden Margaret (1990).

Creativity and innovation have strong links with knowledge and learning. It is therefore, important to provide opportunities from school level itself for encouraging creativity. This work emphasizes the need to encourage the development of pupils' and students' creative and innovative potential for several reasons:

1. The upsurge of new media and technologies that learners use in their everyday lives can be exploited in creative and innovative ways and contribute to formal and informal learning.
2. The immersion in this media-rich environment leads new cohorts of students to learn and understand in different ways, and therefore teachers need to develop creative approaches and find new methods, solutions and practices to grab their attention.
3. Creativity is a form of knowledge creation; therefore, stimulating creativity has positive spillover effects onto learning, supporting and enhancing self-learning, learning to learn and life-long learning skills and competences. Retrieved from ftp://139.191.159.34/pub/EURdoc/JRC52374_TN.pdf.

The process of learning

Learning constitutes three parts: (i) Memory (ii) Understanding (iii) Concept.

The application of all three ways of learning constitutes wisdom formation. Wisdom means use of knowledge especially when the individual is encountered with some real world problems. In learning through memorization, some parameters have to be remembered, for example, copper is good conductor of electricity or heat. When a person has been caught in electric shock, what should he do? If he has been earthed somewhere and if he leaves

the earth by jumping he will get rid of electric shock.

Now the question arises whether the boy should be given a shock to make him realize or should the experiment of Faraday cage be demonstrated. But this is practically not possible in all the schools. The best way is that the teacher should tell the students that a lot of birds sitting on a live electric wire do not get electric shock by wire because their body is not earthed. The moment the electric pole and wire both are touched simultaneously the bird would be electrocuted.

For self-learning, exposure is essential. Generally, innovation and creativity cannot be achieved by sitting and thinking at one place. Some strategies should be followed by educational system to develop creative and innovative ideas among students.

In Indian education system, students are only capable of pushing each and every line in the book to their mind, but when they are asked to put that into practice they just stand and shiver. For example, it's very easy to read all the parts of a machine and say it again when they are asked orally, but when they are given with a machine and asked to name the parts then generally they are not able to do that.

For example, teachers can encourage creativity and innovation in the subject of Geography, by using a globe instead of giving a paper for marking the location of the country; a plane globe should be given and student should be asked to draw a location on the blank globe. Through Astronomy, it is an established fact that altitude of a polaris star is the latitude of that place in northern atmosphere.

Learning by doing

This method can be adopted to encourage creativity and innovation in education system. The subject of pure sciences and social sciences give the abstract principle. The Engineers and managers exploit these principles to solve problem of real world, and are most of the time giving a product which fulfills a human need and makes the life easy. Innovation in teaching and learning aimed at development of creative and original thinking skills are rare. Students should be encouraged to think in different ways for a given problem and must apply permutation and combination to see the cause and its effect for a particular problem. For example, a bulb is glowing at a particular voltage of 12V, so pure sciences tell that if resistance of the circuit is increased, the glow of bulb reduces. If students themselves connect a bulb in series, they can see the effect.

Similarly, in another example if a torch is not glowing properly and its light is dim then the possible reasons for low intensity of light may be the following:

1. The battery of the torch has become weak. This possibility may be ruled out by replacing the old batteries with new ones. And if the torch still does not glow properly, it would mean that this hypothesis is wrong.
2. Another reason could be that the resistance of the circuit has increased. This may be because of corroded terminals of the battery which may be cleaned and Vaseline may be applied. So if torch starts glowing even with the older batteries, this would indicate the correctness of the hypothesis.

There is very little focus on application of knowledge and development of relevant practical skills. Direct teaching method discourages student's curiosity, questioning and innovation. Therefore, only after giving such examples in the lab, Ohm's law may be taught so that students can have clear concepts about relationship of voltage, current and resistance. In this way student will get the knowledge of abstract, relevance and skill development.

Steps for encouraging creativity in class rooms

Students will be more motivated to work on projects theyhave chosen for themselves. Practically, teachers will need todefine the problems some of the time. However, if studentshave practice with problem finding, and define at least someportion of their own challenges, motivation and creativity canbe enhanced.

(Sternberg's 1996) "How to Develop Student Creativity" lists25 steps that can promote creativity in classroom.Table 1 25 steps to promote creativity in classroom

Using just a few of these 25 strategies based on the investmenttheory of creativity can produce

results in yourself aswell as in others. Although we present the strategies in termsof teachers and students, they apply equally to administratorsworking with teachers, parents working with children, orpeople trying to develop their own creativity. The strategiesare easy to use and are outlined in Table 1.

The Prerequisites 1. Modeling Creativity 2. Building Self-Efficacy Basic Techniques 3.QuestioningAssumptions 4. Defining and Redefining problems 5. Encouraging idea generation 6. Cross-Fertilizing Ideas Tips for Teaching 7. Allowing Time for creative Thinking 8. Instructing and assessing Creativity 9. Rewarding Creative Ideas and products Avoid Roadblocks 10. Encouraging Sensible Risks 11. Tolerating Ambiguity 12. Allowing Mistakes 13. Identifying and Surmounting Obstacles	Add Complex Techniques 14. Teaching Self-Responsibility 15. Promoting Self-Regulation 16. Delaying Gratification Use Role Models 17. Using Profiles of Creative People 18. Encouraging Creative Collaboration 19. Imagining Other Viewpoints Explore The Environment 20. Recognizing Environmental Fit 21. Finding Excitement 22. Seeking Stimulating Environments 23. Playing to Strengths The Long-Term Perspective 24. Growing Creatively 25. Proselytizing for Creativity

(Nickerson 1998), (Cropley 2001) and (Piirto 2004) mention multiple idea-getting techniques which include brainstorming and divergent thinking methods and other instructional approaches to increasing creativity.

The role of teachers

The role of the teacher within and outside virtual spaces is important in teaching students how to be creative and innovative. It is unfortunate that in education sector, majority of the teacher opt for primary and secondary level teaching as a job and not as a hobby. Teachers themselves have very poor exposure in the area of science and technology. Most of the time students are afraid of doing any new activity in the class or in lab which is not told by the teacher. And if he or she indulges in that activity, and things go wrong then students are generally fined or punished. Teachers must support learners in taking risks and in making mistakes in a non-threatening environment.

Students should be encouraged to perform more and more new activities and they should also be told that experimental kits are generally working on 12V d.c. or less which is not fatal to human life.

Teachers should also encourage students to inculcate reading habits like newspaper, catalogue and instructional manual. In addition to that every city should have scientific library, technological park, hobby centre and skill development centre at minimal charges so that students of lower and middle class family can also gain knowledge by visiting these centers. These visits may be organized by their respective schools. Persons working at these places should be mentally and behaviorally involved in this instead of taking their duties as job only.

Observations and discussion

This paper is based on the following work which is based on a survey that was carried out especially for this study. The survey has been conducted among the students of senior secondary school, which includes both boys and girls of science stream. Survey forms were critically analyzed and results have been compiled. It has been found that for each question, the percentage of students who support and understand the importance of creativity and innovation in education are given in Table 2.

Table 2 Observations of questionnaire

Question No.	Percentage of NO	Percentage of YES
Q1	9.166	90.84
Q2	29.166	70.834
Q3	15.833	84.166
Q4	52.5	47.5
Q5	30	70
Q6	41.666	58.333
Q7	16.666	83.333
Q8	9.166	90.84
Q9	25	75
Q10	5	95

The survey results reveal the following:

1. The 90.84% students, as shown in Figure 1, have strong opinion that the teachers can play key role in promoting creativity and innovation in Indian education system.

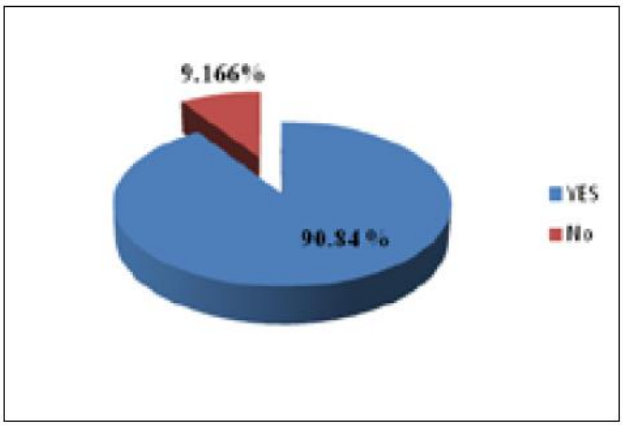

Figure 1 Role of teachers in creativity and innovation

In order to do this, teachers need to generate ideas using a variety of techniques. For example, multimedia technologies can be used to support a range of creative activities. A number of tools are also available that enable quicker authoring, more immediate interaction with students and new ways to represent ideas. Further, teachers can encourage students to use technology so that:

- Learners can develop ideas in a range of ways, using animation tools, simulations and multimedia presentations. This can support imagination and exploration of concepts and ideas.
- Learners can be connected to a range of experts and resources, in and out of the classroom by using search engines to find new information to support and develop their own work.
- Collaboration with other learners in and outside of the classroom through shared authoring and networked technology.
- Publishing to a range of audiences and receiving feedback to inform that future practice is more accessible through the use of video conferencing, emails, blogs and wikis. Retrieved from http://www.innovativeteachertoolkit.com/documents/skills/creativity.pdf]

2. Rising demand of coaching centers may be one of the reasons which kill the creative power of the students. Survey analysis shows in Figure 2 that 58.33% students do agree with the fact. It is a well established fact that coaching centers are ruining creative mind of children even then teachers in schools and colleges encourage student to study in these coaching centers also, parents tend to send their wards to these centers, so that their children can score better.
3. The 83.33% students have also reported that teachers should make study environment in such a way that children start thinking not only mugging up their lessons as a burden on their heads.

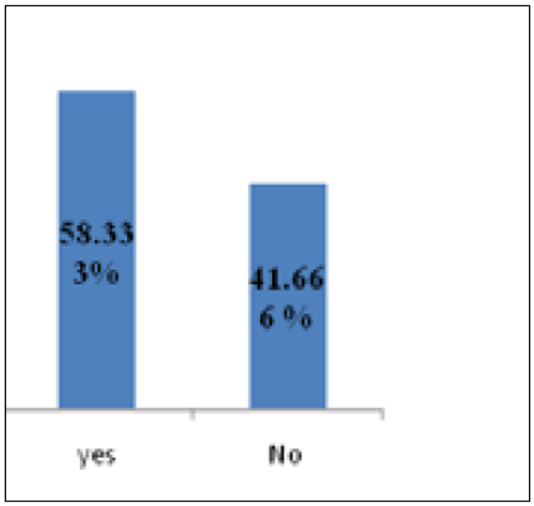

Figure 2 Coaching kills creative power

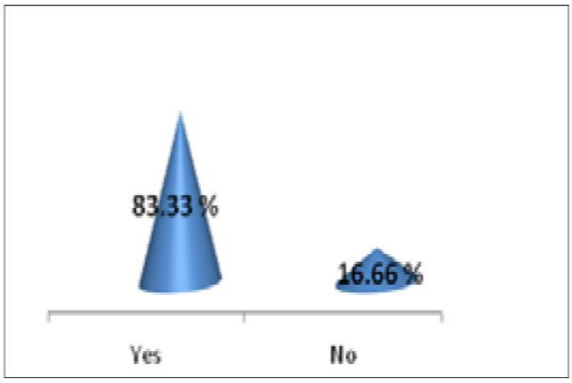

Figure 3 Start thinking and not mugging up lessons

Authors think that Indian education system need to get a bit modified both from the side of institutions, parents and governments. This is because as compared to other foreign countries, our country lags behind because of the burden that is put on a student i.e. the vast portions have to be read for the finals and hence "Mug up the content --- no need of the concept" is happening in our school level system. Instead of gaining knowledge from voluminous books and lectures, children must be made to interact in groups and express their views on various topics. Rather than taking notes from the teacher and textbooks, children must be made to research information on their own from library books and the Internet and share them in the class. This will help them to develop good reading habits, self-confidence and openness to criticism. It will also help them in developing critical reading and analytical skills.

The teachers should be more innovative and creative to students so that they will be able to access the material, not only that but they should also encourage participating in class room activity and discussion and this will enable student to acquire much skills.

4. A huge number of 90.84% students, as shown in Figure 4, feel that there should be a sense of freedom in students to choose their field of interest and does not go with what marks and degree one has.

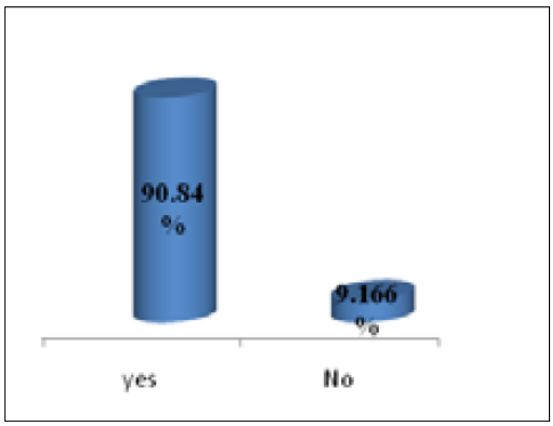

Figure 4 Freedom to choose their field of interest

It is suggested that one should recognize the student on the basis of her/his skills and talents and not by just looking at their report card having good marks. But unfortunately the first question asked to a Xth class or a XIIth class student is his/her percentage and not the area of interest. This attitude has to be changed and children must be allowed to choose subjects according to their interests.

5. Our schools are full of numerous pages of outdated theories and there is a lack of practical knowledge, and this fact is also supported by 70% students as shown in Figure 5.

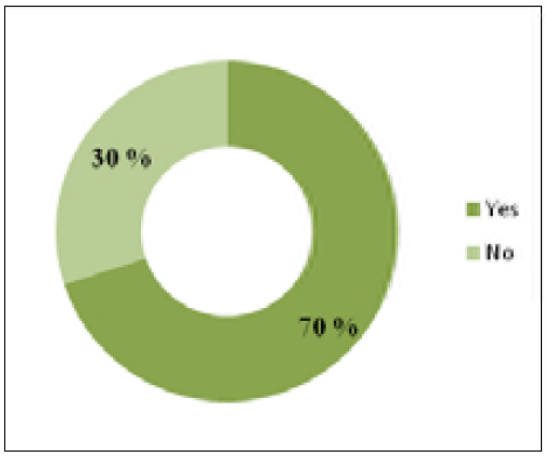

Figure 5 Pages of outdated theories and lack of practical knowledge

The authors think that it is the practical knowledge which holds greater importance than theoretical knowledge. There is no use of squeezing a huge book and drinking it. Whatever students may study, if they can't apply it to real life situations, it is of no use. Even though they learn less, they should know how to put that in practice. In most cases, failure is due to lack of practical knowledge, and students can gain practical knowledge only if we have practical oriented education. So we have to reduce the theory subjects and increase the practical subjects according to student's area of interest.

Conclusion

There is a critically important need to boost innovation because by the standards of developed countries India is no more than medium ranked on overall measures of innovative capability. In most Indian schools, emphasis is more on exam oriented learning.

We have to reorient our course curriculum towards practical knowledge and art of doing things.

This paper presents the methodology of encouraging creativity and innovation in Indian education system. Significant percentage of students has shown their keen interest in increasing more practical knowledge than memorizing the well known facts.

Authors feel that another way for enhancing better understanding and retention, teaching and learning should be through multimedia projects of any subject and this will play instrumental role in imparting more enriched information flow. This is because multimedia (through its media elements namely text, graphics, still image, audio, video and animation) helps in better understanding of the concepts and better retention.

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A STUDY WOMEN IN HIGHER EDUCATION: MORE THAN JOB SATISFACTION

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ABSTRACT

Higher education institutions are in the era of tremendous reform. The change has occurred due to various technological advancements and changing demands of market and learners. The change has converted whole scenario of teaching and learning and consequently expectations from teachers. Thus it becomes critical for each establishment to know work fulfillment level of representatives since achievement of organizations' objectives it reliant upon the fulfilled workers of the foundation. Thus job satisfaction now perceived as most significant contour of higher education. The present study explores factors and level of job satisfaction among women teachers in higher education. Data was collected with in-depth interviews with regular and contract teachers working in government and private colleges. For this thematic content analysis was used. During qualitative interviews it was found that discrimination prevails between permanent and contractual faculty in higher education institutions.

Keywords: *Women, Higher education, Job satisfaction*

Job satisfaction is the favorable or unfavorable subjective feeling with which employees view their work. It results when there is congruence between job requirement, demands and expectations of employees. The components of physical conditions and social nature influence work fulfillment and efficiency. Occupation fulfillment is characterized as a compelling or passionate reaction toward different certainties of one's activity. Fulfillment eludes to singular components of one's activity, as pay, development prospects, physical condition, working hours, etc. (Velmurugan, 2016).Occupation fulfillment is with respect to one's sentiments or perspective in regards to the idea of their work. It can be impacted by an assortment of elements, the nature of one's association with their administrator, the nature of the physical condition in which they work, level of satisfaction in their work, and so forth (Akhtara, Hashmib and Naqvi, 2010). Other than these numerous different components are likewise included to work fulfillment of instructors. Such factors, for example, the worker's age, wellbeing, personality, wants and level of desire ought to be considered. Further, his family connections, economic wellbeing, recreational outlets, movement in authoritative work political or absolutelysocial, contribute at last to the activity fulfillment (Mishra 2013).

Status of women teachers in Higher education

Higher education institutions in India comprised of 59.4% of male teachers and 40.6% of female teachers. Among the all states Bihar has lowest proportion of female to male teachers' ratio is 1:4. At the all-India level there are 68 female teachers per 100 male teachers. Similarly, in SC category the female teacher is 53 per 100 male teacher and in case of ST and OBC, it is 65 and 64 females per 100 males respectively. For Muslim minorities, it is 53 female teachers per 100 male whereas for other minorities, there are 142 females per 100 male. However, it is to be noted that female representation in teachers belonging to Persons with Disabilities (PWD) category is low, that is 43 females per 100 male teachers. Among various levels of posts, majority of teachers are of the level of Assistant Professor, followed by Associate Professor. There are 11,951 Visiting teachers also; among them 56.1% are male. The number of total teachers at University level is around 1.58 lakh out of which 64.9% are males and 35.1% are females. At college level, the number of teachers is 10.55 lakh with 58.6% of male teachers (AISHE 2016-17).

Job satisfaction of teachers

Analysts have clarified the wonder of employment fulfillment by looking at the sentiments or input of people. Teachers' activity

fulfillment has maybe been explored to an ever increasing extent, frequently in relationship to educator stretch, work duty, proficient self-rule, school atmosphere et cetera. (Schuler, 1986) Job satisfaction is combination of psychological, physiological and environmental circumstances that a person truthfully to say, "l am happy with my job" (Akhtara, Hashmib and Naqvi, 2010). Business satisfaction is a general demeanor which is the delayed consequence of various specific perspectives in three districts, to be specific (i) particular occupation factors; (ii) singular attributes; and (iii) amass relationship outside the activity. These components can never be disengaged from each other for investigation. The approach which since to be picked is that activity fulfillment is the idealness or unfavourableness with which representatives see their works. It comes about when work necessities suit to the needs and desire for the representatives.

Job satisfaction of teachers is a significant dimensions for their job the facet approach can be used to find out the various factors involve in job satisfaction or dissatisfaction among employees the significant contributor to job satisfaction consists of motivation challenge, conducive work environment, equitable opportunities, and cooperative callings .For better job satisfaction among employ social interaction and supportive work environment play significant role .Job satisfaction is also indicator of psychological health and emotions well-beings of the employ. Many studies also indicate that contractual employ have less job satisfaction in comparison to permanent employ due to less control overall their employment status and insecure employment status (Chamundeswari, 2013).

Factors Affecting Job Satisfaction

1. Individual Factors

i. Sex : In a large portion of the examinations regarding the matter, it is uncovered that for the most part ladies are happy with their activity than man. This might be a direct result of different part of ladies when they take position outside home. It was discovered that, ladies like to work with benevolent individuals, great social position notwithstanding less pay.

ii. Age: Studies have discovered diverse outcomes in various gatherings on the relationship of age with work fulfillment. Some vibe that age has little association with work fulfillment yet this relationship has significance in some activity circumstances. In a few gatherings work fulfillment is higher with expanding age in different gatherings it is lower.

iii. Training: In this relationship a few investigations demonstrate that there is a propensity for the more taught representatives to be less fulfilled and then again the less instructed workers to be more fulfilled. Be that as it may, different investigations demonstrates no relationship at all and certain factors, for example, organizations' progression strategy in connection to training must be considered.

iv. Time of Job: Several examinations demonstrate that activity fulfillment is higher in initial couple of days at that point falls gradually.

v. Sort of Work: The most vital factor in the activity is the kind of occupation. Studies have demonstrated that in work causes more noteworthy occupation fulfillment than the standard work. Different

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A FRAMEWORK OF MACHINE LEARNING ALGORITHMS AND STATIC FRAUD DETECTION RULES THAT ARE INTERCONNECTED TO COMBAT CREDIT CARD FRAUD

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ABSTRACT

Over the last several years, a substantial increase in credit card transactions were observed which indicates well for future growth in e-commerce. As a result of the increased volume of card transactions, it is necessary to safeguard transactions. Machine learning is extensively employed and plays an important role in detecting credit card fraud. The selection of the best classifier algorithm for a fraud detection system is a complex task. This study identifies credit card fraud using a hybrid classifier that incorporates k-nearest neighbors (KNN)and Naive Bayes methods. The research employed K- Nearest Neighbour as a base classifier, which returns the distance value that is utilized as a new feature, and the result is fed to the Naive Bayes classification model. To evaluate performance, recall, precision, accuracy, and execution time are all measured. The k-nearest neighbors (KNN) and naive Bayes(NB) classifiers have a maximum accuracy of 99.43 percent. These hybrid methods have been proven to improve fraud detection rates and are predicted to be more efficient than the used majority voting method. It will help lower the probability of big losses in the future, as well as the risk of financial institutions suffering losses.

Keywords: *credit card, fraud detection, data mining, hybrid framework, k nearest neighbor, naïve Bayes*

1. Introduction

Credit card use has increased greatly as a result of rapid advancements in electronic commerce technologies. Due to the popularity of credit cards as a form of payment, the number of fraud cases related to them is also increasing. Millions of dollars each year are lost due to these fraudsters. The requirement for an effective and methodical procedure for identifying criminal activities has now become critical for all financial institutions.

The motive of the presented study is to look for credit card fraud. This method is sometimes referred to as prediction analysis since it is capable of making accurate predictions based on previously accumulated data. This methodology includes two primary stages: feature extraction and feature classification. This method uses the KNN and Naive Bayes algorithms in combination. KNN was used as a primary classifier for this project. An important machine learning algorithm is vital to machine learning. This research used an unbalanced dataset of fraud transactions in which around 0.172% of them are fraudulent. Accuracy, f1 score, precision, and confusion matrix are all taken into consideration when assessing the performance difference.

2. Related Work

2.1 Single model

To identify cybercrime, [7] proposed the use of an Artificial Immune Recognition System. This model improves on the previous artificial immune system, which exploited negative selection to increase precision. This resulted in a 25% increase in incorrectness and a 40% decrease in system reaction time.

In the year 2000, a technique for detecting credit card fraud was released. It contained a filter that was based on rules, a Dumpster–Shafer adder, a transaction history database, and a Bayesian learner. The hypothesis of Dempster–Shafer collects various pieces of data to create a first idea of whether a transaction is normal, suspicious, or aberrant. When a transaction seemed to be questionable, Bayesian learning [13]was employed to investigate the belief further. The genuine positive rate was 98 percent, according to simulation data [13].

In [18], classification methods are used to distinguish behavioral patterns in situations of robbery. The data set was limited to Chilean businesses. The Fuzzy Query 2+ data mining software [18] was used to de-fuzzify and analyze data samples. Financial statement fraud is another significant financial loss that was detected using a variety of approaches,

including Support Vector Machine (SVM), Genetic programming (GP), and Probabilistic Neural Network (PNN) [15]. A total of 202 Chinese firms were included in the data collection. In two scenarios, the t-statistic was utilized to choose selected features of 18 and 10 features, respectively. The Probabilistic Neural Network (PNN) was shown to be the most effective, followed by Genetic Programming (GP) [15].

A computational fraud protection approach was provided to detect financial reporting fraud.[2].Data was taken from 10-K filings with the Securities & Exchange Board. The computational fraud detection model (CDFM) model was able to identify fraudulent and non-fraudulent files. [12] proposed a fraud detection approach User account-based viewing and threshold-type detection. To visualize information, a self-organizing map was used. Self-organizing map (SOM) Using real-world data sets, it was possible to conduct studies on the following: communications fraud, computer network penetration, and credit card fraud. The Self-organizing map (SOM) was used to project high-dimensional data sets into a basic two-dimensional domain. [12]Both data analysts and non-experts found the findings aesthetically pleasing.

2.2 Hybrid models

A mix of several diverse models is made up of hybrid models.[16] used a hybrid model that incorporated the Multilayer Perceptron, neural network, support vector machine, and Harmony Search optimization to predict company tax evasion. HS was useful in determining the appropriate classification model parameters. The multilayer perceptron (MLP) with Harmony search(HS) optimization achieved the best estimation accuracy of 90.07 percent using data from Iran's industries that produce food and textiles[16]. [3]Used a hybrid clustering approach for identifying online gaming and lottery theft with outlier detection capabilities. The system combines live approaches with input data statistics to detect various sorts of fraud. New data samples may be progressively added to the data storage cubes as the training process was compacted into the main memory. The system has an accuracy rating of 98 percent with a 0.1 percent false alert rate [3].

Detection strategies for automobile insurance fraud are discussed in [14], [18] and[19], respectively. According to [14], it has been recommended that the possible-neighbor Principal Component Analysis (PCA) approach be used for the construction of a Random Forest model that is based on principal component analysis (PCA). In Random Forest, the conventional majority voting system was replaced with a prospective closest neighbor voting system. The experimental investigation employed a total of 12 distinct data sets. When compared to the Random Forest and DT techniques, the Principal Component Analysis (PCA) based model achieved greater classification accuracy and reduced variance [14]. [19] presented the GA with fuzzy c-means (FCM) for detecting vehicle insurance fraud. Based on the clusters created, the test records were classified as authentic, malevolent, or suspicious. The suspicious instances were subsequently evaluated using a Decision tree (DT) Support vector machine (SVM), Multilayer perceptron (MLP), and a Group Analysis after the legitimate and fraud data were discarded.

3. Problem Statement

Credit card fraud detection algorithms must handle a huge quantity of data to train the system. The model's execution time rises while dealing with a large amount of data, hurting performance. In previous work, the voting classifier was employed for the prediction analysis. [22] The majority voting-based classifier picks the best classifier from a pool of several classifiers for credit card fraud detection. This has an impact on the prediction analysis and causes the execution time to increase. An effective predictive analytic methodology is required to create a relationship between the attributes and the target set. The solutions that have been devised so far have been inefficient in establishing links between the target set and dataset attributes that perform well in some but not all aspects.

4. Proposed Framework

The goal of this study is to develop a hybrid classifier to predict credit card fraud. K-

Nearest Neighbour and Nave Bayes are used in this case. Therefore, to train the Naive Bayes model, the projected result of the KNN model was used in place of actual values. This enhances the accuracy rate since the chance of increasing the error rate of both primitive models is offset by the primitive model's error rate. Fraud transaction prediction is a two-stage approach. Pre-processing and categorization are the terms for these processes.

1. Pre-processing: The initial step of prediction analysis is pre-processing. The dataset collected from the UCI Machine Learning Repository database is used as input in this stage. The cleaned data refers to the removal of irrelevant columns from the dataset.

2. Classification: KNN feature extraction is supported by the knn function. It creates k * c new features (c is the number of class labels). The new features are computed from the distances between the observations and their k nearest neighbors.

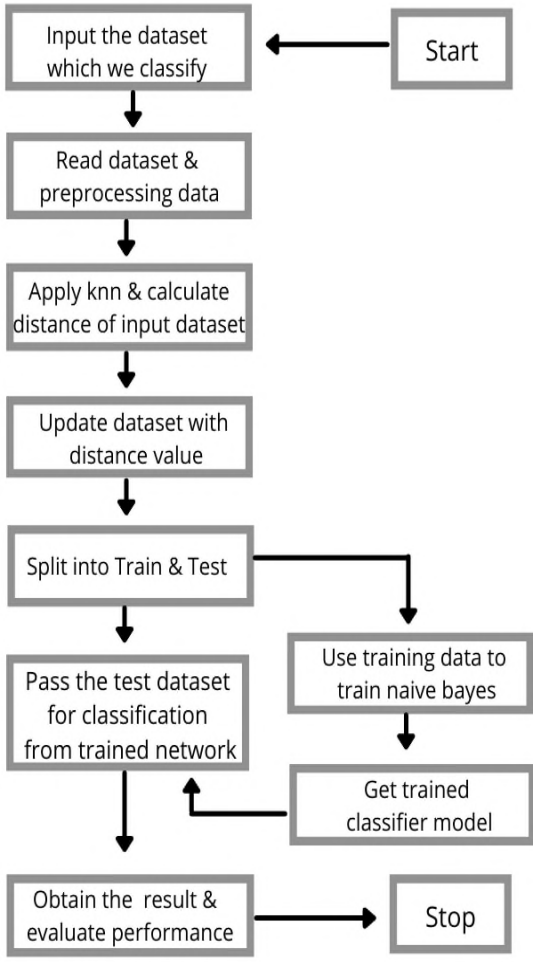


Figure 1 Block Diagram of Proposed System

5. Machine Learning Algorithms

5.1 K nearest neighbor:

K-nearest neighbor (KNN) is carried in the systems that are used to identify threats. With the use of supervised learning techniques, the KNN is shown to be effective in CCFD systems. [8]

5.2 Naive Bayes

The Basey rule is applied to categorical data to classify the performances of features. In contrast to previously existing categorization approaches, based on the NB algorithm's performance and implementation are known to be superior and simpler. The complexity of the intractable sample is reduced when the conditional «naive» assumption for a class is generated by a class. The class is chosen on the basis of the highest conditional probability. Since the Naive Bayes classifier provides highly simple and robust results, its popularity is growing with time.

6. Benchmark Data

The ULB Machine Learning Group was responsible for providing the dataset. Europeans in September 2013 had their credit card transactions included in the dataset. This dataset comprises around 284,000 transactions that took place over two days. The data is mostly positive and skewed in favor of the positive. A total of 30 different input qualities are used in this experiment. To protect the secrecy of this product, particular features and information may not be disclosed. Time measures elapsed seconds between each transaction and the dataset's initial transaction. The amount is an important characteristic of this transaction. The objective class for binary classification is called class and has a value of 1 for a positive occurrence (a case of fraud) and 0 for a negative one (fraud not being found) (nonfraud).

7. Experiments

A. Experimental setup

While credit card fraud is rare in comparison to all transactions, fraudulent transactions are rather rare when compared to all transactions. While the resultant accuracy does not accurately portray the system performance, with a skewed data set, it nonetheless presents an accurate picture of the system's actual

performance. To ensure the safety of their consumers and the financial institution, failure to correctly categorize valid transactions creates poor customer service, and not detecting fraudulent instances results in monetary loss for the financial institution and clients. Because of this data imbalance problem, machine learning algorithms suffer performance challenges. For various algorithms, there is a range of measurements that have been established to assess quite diverse things. As a result, it should serve as a criterion for evaluating different suggested methods. False Positive, False Negative, True Positive. True Negative and their relationship are terms used by credit card fraud detection researchers to assess the accuracy of various methods. The following are the definitions of the parameters mentioned:

- True Positive(TP): is the proportion of fraudulent transactions that are identified as fraudulent.

TP=TP/TP+FN [1]

- TrueNegative(TN): is the percentage of fraudulent transactions that are discovered to be fraudulent.

TN=TN/TN+FP [2]

- False Positive (FP):the proportion of non-fraudulent transactions that are wrongly marked as fraudulent, show the presence of fraud.

FP=FP/FP=TN [3]

- False Negative (FN)**:** is the proportion of non-fraudulent transactions that are identified as normal, when in fact they should have been considered fraudulent.

FN=FN/FN+TP [4]

- Confusion matrix: The confusion matrix reveals not just a predictive model's performance, but also which classes are successfully predicted, which are wrongly forecasted, and what types of mistakes are being produced. A two-class classification issue with negative and positive classes has the simplest confusion matrix. Each cell in this form of confusion matrix has a distinct and well-understood name.

Predicted	Positive	Negative
Positive	TP	FN
Negative	FP	TN

8 Algorithm of the proposed strategy

Step 1: KNN Feature Extraction

```
myList = np.array(X.astype(np.float32)
y = np.array(y).astype(np.float32)
knn = cv.ml.KNearest_create()
knn.train(myList, cv.ml.ROW_SAMPLE, y)
resultsList = [ ]
```

Step 2: Getting Features and Creating new feature list

```
for i in range(len(myList)):
Test = myList[i][0:28]
ret, results, neighbours,
dist = knn.findNearest(Test, 29)
resultsList.append(dist[0][1:29]
```

Step 3: Splitting train and test data

Step 4:Calssifier object initialization, training and predict

```
GaussObj = GaussianNB()
model = GaussObj.fit(X_train, y_train)
predicted = model.predict(X_test)
```

9. Results

K-nearest neighbor and naive Bayes methods are used to develop hybrid classifier models in this work. The training dataset makes up 70% of the data set, whilst the validation and testing data set is made up of 30% of the data set. A classifier is defined by its capacity to hit an accurate, sensitive, specific, and precise target. The hybrid model has a greater impact on binary classification performance in this study than it does on multiclass classification.

10. Performance Evaluation

The performance evaluation of the proposed system is done based on F1 score, precision, recall (sensitivity), andaccuracy. Figure 2 shows the proposed system output where we see that the accuracy of the system is 0.9943. This shows that the proposed strategy had shown better accuracy for detecting credit card fraud.

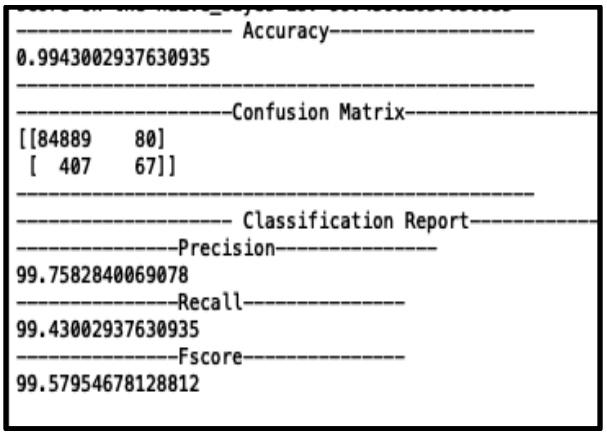


Figure 2 Performance Evaluation of Proposed system

10.1 Comparative Performance

The performance evaluation of the proposed system and majority voting is shown in figure 3. We can clearly see that our proposed system using KNN and Naive Bayes performed much better than majority voting

.

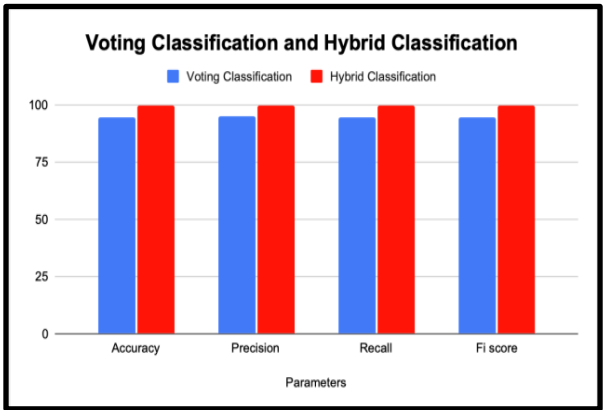


Figure 3 (a) Comparative Performance Evaluation of Proposed system

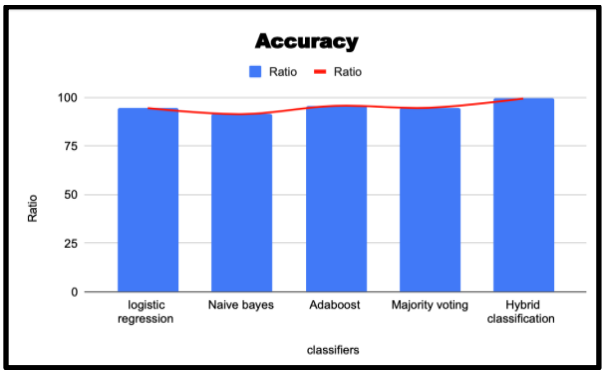


Figure 3 (b)Comparative Performance Evaluation based on Accuracy

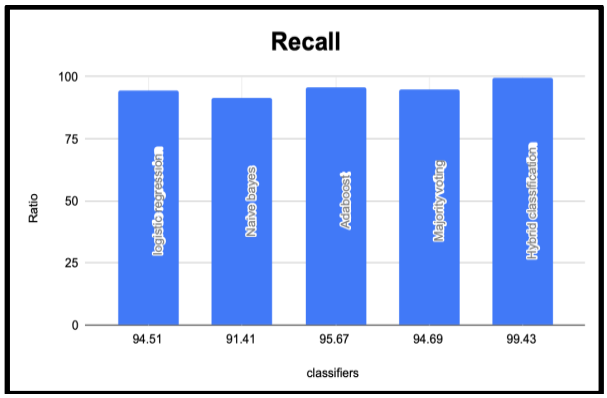
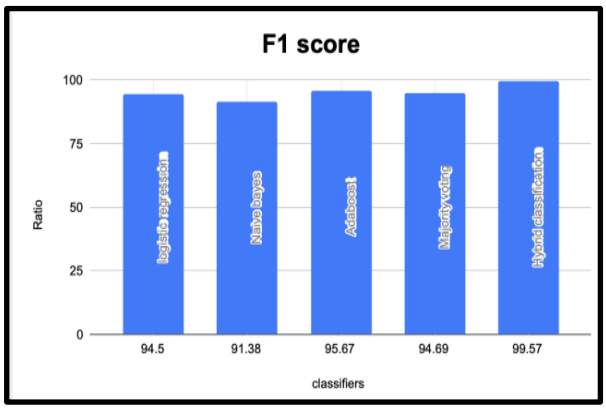


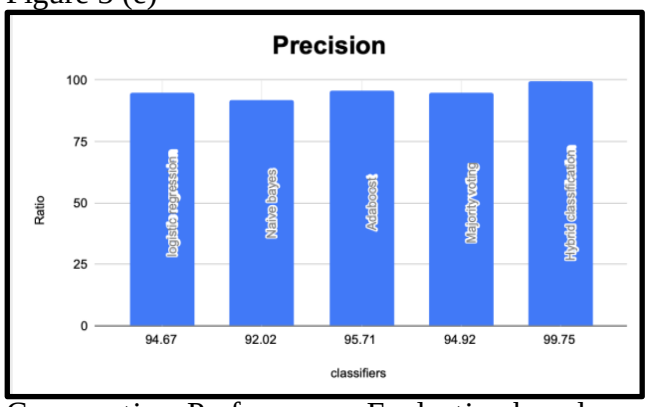
Figure 3 (c) Comparative Performance

Figure 3 (d) Comparative Performance



Evaluation based on precision

Figure 3 (e)



Comparative Performance Evaluation based on F1 score

Evaluation based on Recall

11. Future Scope

Simultaneously implementing these algorithms into a bank's credit card fraud detection system allows customers to forecast whether or not a fraudulent transaction will take place soon after it does. Fraud is also combated by several anti-fraud tactics, which help reduce the likelihood of major losses and minimize the chance of financial institutions incurring losses. A study that used our technique found that the majority voting technique was inferior.

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A STUDY ON WORKFORCE DIVERSITY AND WORK SATISFACTION IN TEXTILE INDUSTRY OF BHILWARA

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ABSTRACT

The main motive behind writing this research article is nothing but to gaze at the association amid worker view related to variety, The actual meaning of variety or diversity and its management along with the worth of variety practices utilized as well as observed performance of the organization. It additionally endeavours to inspect whether the impression of variety shift among workers from various diversity foundations, for instance across sexual characteristics and classifications in Bhilwara. Therefore, this exploration concentrates on how labour force variety impacts work fulfilment and what all variables impact the worker job or work fulfilment. In this regard, a sample investigation of hundred representatives has been done in Bhilwara, Rajasthan and performance were measured through a survey which is individually examined.

***Keywords**: Diversity; work satisfaction; Workforce; Productivity.*

1. Introduction

Talking in relation with the nations like India, which have diverse culture and religion, it is not possible to characterise variety or diversity in straightforward terms. This idea is more noteworthy than just contrasts, religion, organization or position. In certain organizations, variety strategies is chiefly centred on the sexual category, religion as well as handicap status. While, in some firms' variety is stretched out to monetary status, sexual direction, pay status, and so forth. Nonetheless, individuals plus supervisor's neglect to comprehend the centre idea which is nothing but the term variety or diversity. Organizations select representatives from everywhere in the world. Workers are fundamental resources of an association since individuals are novel and they are varying from one another. They come from various foundation, distinctive social, and various religions. They have numerous abilities, information, and so forth with this large number of various things they all take care of business for an equivalent authoritative objective in an equivalent way. Every single distinctive background and abilities make reason for workforce diversity. The workforces come from several areas therefore they need a solid and a positive workplace. Each and every worker in the organization makes efforts up to that level on which their desired and needs are fulfilled by their supervisors or managers. Consequently, it becomes a duty for the firm to offer them a healthy environment so that they are satisfied with their job. All associations have their attributes and workforce is being regarded by them as an important capital. The current literature will make effort to pay attention on the crucial as well as extensive issues being faced by the companies these days which is making unique employees adjust and amend in the organization. Furthermore, the current research paper will explore the manner workers oversee diversity of workers and the possible influence it will have on the satisfaction of jobs of the employees. Management of diversity is made from the mixture of two words i.e. diversity as well as management. In this, diversity is concerned with sexual characteristics, linguistic, race, creed, caste and age of the workers and on the other hand, management is work of arranging, sorting out, coordinating, organizing and controlling the functions of administration. In other words, variety management is a course of overseeing people with different characteristics at a shared spot. At the end of the day, it can likewise be characterized as the most common way of comprehending the dissimilarities in an organization for prosperous running of the business. In order to work effectively with differentiated workers, it is necessary for the managers to have knowledge not just with regards to the people with whom they communicate, yet additionally their character, personal conduct standards in struggle circumstances, socioeconomics and valuable encounters. The inquiry that actually stays

unanswered is the means by which representatives feel in regards with variety in their work spaces and whether or not working environment variety brings about disappointment or nervousness and regardless of whether that might bring about misfortunes of efficiency. Subsequently ,there are many researches and studies which are focusing on workforce diversity and are not touching the aspect that how workers feel in the work environment. Considering this, the present study will explore the work variety i.e. age, gender, religion, area, education, caste, and so forth and work fulfilment in coordinated and disorderly organizations in Bhilwara.

2. Statement of the Problem

Working environment today is comprised of various representatives with special attributes. Does the present circumstance influence the manner in which workers feel about their positions? Also, numerous associations in Bhilwara currently involve dissimilar labourers in their labour force in order to make improvement in their appearance in the market as and when they achieve development. Moreover, in order to work effectively with different kinds of people in the organization, managers are required to not only stick to observe people with whom they spend most of their time, however they must also observe other people and their demeanour, standards of conduct in struggle things, socio-economics and educational encounters. The inquiry that actually stays unanswered is the manner by which representatives feel about variety in their work spaces and whether or not work environment variety brings about disappointment or nervousness and regardless of whether that might bring about misfortunes of efficiency. As, most investigations have been paying attention on labour force variety rather than perceptions of representatives in the work environment, this review concentrated on representatives' wisdom of labour force variety and its impact on work fulfilment.

2.1 Objectives of The Study

1. To recognise the aspects of work satisfaction which might influence performance of the employees.
2. Understanding that superior and subordinates inter – personal association based on faith, inspiration and reinforcement.
3. To distinguish policies related to finance for assistants.
4. Studying the situation of the work, based on the factors such as strong work atmosphere, obtainability of capitals and so forth

3. Review of Literature

According to Singhand Jain (2013) Joyful staff are useful staff as well as they are without a doubt to be contented. Representative work fulfilment is unimaginably important to confront the dynamic and consistently expanding difficulties of keeping up with efficiency of the association by keeping their men unendingly drew in and incited. Countless investigations enormously affect the work fulfilment on the inspiration of staff, while the degree of inspiration has an impact on efficiency, and henceforth on business association's performance. Tragically, in our locale, work fulfilment has not as yet gotten the right consideration from neither understudies nor directors of different business associations.

As per Rajput, Marwah and Gupta, (2013) the contrast of work esteems for acquiring of information for the multi-Generation labour force's management for expanding inter-generational keen, spirit and further develop productivity. The word multi age labour force incorporates people brought into the world around a similar time who share unmistakable social or authentic life occasions during basic formative periods.

Kundu et al.(2018) explained that the contrasts between representatives across sexual orientation and classifications towards labour force fulfilment in community sector companies of India such as BSNL. At the completion of the review, the specialist discover the endeavours of workers to elevate variety to set out open doors to representatives were more by female representatives and esteemed least by broad classification representatives in contrasted and guys and different classifications individually.

According to Adhikary and Khuntia (2015) Instructors are reflective, helpful, order and

expressive. Talking about education, it is thriving once there's essence of a decent educator. A successful schedule and best educational program became inadequate ifa viable instructor is missing. Informing is not only dependent on the information of the instructor, but also on how the instructor is comfortable with the occupation. There are several factors to consider for the forlorn. Currently, the narrator of social and economic advancements doesn't seem to be satisfied, resulting in this occupation no longer running with a pool of abilities. This examination placed an emphasis on various elements of occupation fulfilment in addition to affecting this profession. As a part of this review, we utilized a measurable approach for data evaluation, such as the chi-square affiliation trial and the relapse study.

According to Sheth (2018) explained including 600 workers in Ahmedabad, Baroda, Surat and Rajkot in information technology, Telecom and quick buyer products industry in the territory of Gujarat. An exploratory just as clear assessment has been done in the review. Industry experts and academicians were contacted under exploratory analysis, and workers were examined under elucidating research. SPSS and AMOS were used to perform the analysis. Exploratory factor examination, confirmatory factor enquiry, structural equation modelling as well as frequency dispersion were utilized for accomplishing the goals of the review.

As per Rao and Bagali(2014) elaborate the acknowledgment of sexual category variety among representatives and how the effect of variety management projects and practices has taken by various information technology organizations, and furthermore examines impact of snags present in information technology industry. With the assistance of centre gathering meetings and conversations with HR chiefs of rumoured organizations, the analyst produced a survey composed of representatives of Information Technology firms in Bangalore. A review of hundred employees led to the verified device having Cranach's alpha qualities for the factors outlined in the survey.

4. Hypothesis Of Study

Hypothesis refers to a forecast that must be demonstrated or denied following a study. It lets us know predictions or suppositions about what could occur.

Ho: There is no significant effect of variety factors on representative execution.

H1: There is a significant effect of variety factors on representative execution.

5. Sample Design

By concentrating on the foundation of the review, an examining course of action has arranged. The principles on which testing would be directed are as per the following:The convenience sampling method has been used. The respondents were employees of the organization. The sample size was 100 and responses were collected through surveyin textile Industries of Bhilwara.

6. Non -Parametric Test

Single sample test

Table -1

Test Summary			
Null hypothesis	**Test**	**Sig.**	**Decision**
Income level (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Work experience (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Relationship between superior and sub-ordinate (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Superior's trusts on me (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Motivate for work (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Income received (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted

Methods of financial rewards (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Methods of non-financial rewards (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Difference between best and worst performance (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Availability of healthy environment (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Capacity of plants (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted
Freedom of work (Median)= 3.000	Single sample Wilcoxon Signed Rank Test	.000	Null hypothesis not accepted

Interpretation

If the value of **p < 0.05** than null hypothesis that is "There is no significant effect of variety factors on representative's execution." not accepted andalternate hypothesis that is "There is significant effect of variety factors on representative's execution." accepted.

6.1 Parametric Test

Single sample test

Table-2

Test value =3						
					95% confidence interval of the difference	
	T	Df	Sig.	Mean difference	Lower	Upper
Income level of employees	-16.371	99	.000	-1.550	-1.74	-1.36
Work experience of employees	-18.794	99	.000	-1.700	-1.88	-1.52
Superior's trust on employees	99.519	99	.000	1.960	1.92	2.00
Relationship between superior and subordinate (employees)	24.348	99	.000	1.560	1.43	1.69
Employees motivate for work	30.744	99	.000	1.540	1.44	1.64
Income received by employees	8.961	99	.000	.870	.68	1.06
Methods of financial rewards to employees	13.709	99	.000	1.170	1.00	1.34
Methods of non-financial rewards to employees	4.156	99	.000	.520	.27	.77
Difference between best and worst performance of employees	9.574	99	.000	1.000	.79	1.21
Availability of healthy environment at workplace	29.606	99	.000	1.650	1.54	1.76
Capacity of plant for work	18.580	99	.000	1.360	1.21	1.51
Freedom of work for employees	16.634	99	.000	1.270	1.12	1.42

Interpretation

Thus, from the above evaluation it can be said that the value of **p<0.05**, which implies that thus null hypothesis that is "There is no significant effect of variety factors on representative execution" not accepted and at the same time the alternative hypothesis thatis "There is a significant effect of variety factors on representative execution" is accepted.The variances are suggestively dissimilarwhich implies that diversity factors influence the performance level of the employees.

7. Conclusion

In this examination, "workforce diversity as well as work Satisfaction in textile industry of Bhilwara" we are familiar with the representative's circumstance in an association. This review centres on the boundaries experienced by representatives for tolerating labour force variety in textile industry in the

city of Bhilwara. Separation based on age, sex, race as well as religion was the most habitually noticed while obstructions experienced for tolerating labour force variety, was to a great extent because of shift trading and threatening workplace. Gathered the information through primary information investigation (survey) and auxiliary information examination (diaries, articles). Accordingly, this review sway on representatives from the labour force variety and work fulfilment in textile industry. This concentrates obviously accentuations that association should take some steps to oversee variety saddle and influence the capability of workers for upper hand. For whichever of this explanation that propel them, obviously the individuals who broaden their labour forces will enjoy an unmistakable serious benefit.

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THE SCENARIO OF ONLINE EDUCATION IN INDIA: THE NEW NORMAL

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ABSTRACT

This research study emphasizes the transformation of the education cycle due to COVID-19 pandemic. The entire world is facing a challenging situation due to the Novel Coronavirus attack. This virus comes under the Coronavirus family. Due to the COVID-19 pandemic many countries are facing lockdown since February. The infection is spreading rapidly. According to WHO, immediate relief is still a long way as the vaccine has not been discovered. The pandemic has created havoc in India as well and has deteriorated the condition further with an extended lockdown. Some say that this calls for a lifestyle change with "New Normal" in place. There is a dire need to inculcate a "New Normal" in the education sector as well.In India during this life-threatening period where social distancing and isolation are the key preventive measures, face to face interaction with students is not possible. Teachers can talk, can see the students through various meeting platform but cannot meet them.The attempt has been made in this paperto understand the New Normal in the education system. The complete cycle of higher education from admission to placementhas been covered in this paper. The University Grant Commission (UGC) and the Ministry of Human Resource Development (MHRD) have released various guidelines from time to- time to make the education system uninterruptedly during this precarious situation to save the future of students as well as to make them stress-free.

***Keywords**: Education cycle, New Normal, Higher education, COVID-19, Lockdown, Coronavirus.*

1. Introduction

The COVID -19 is the name of a deadly virus that has engulfed the entire world. Novel Coronavirus (**2019-nCoV**) is a novel strain that was not recognized as yet. Coronavirustransfersfrom animals to humans (zoonotic) (World Health Organization report). It knocked the Indian door in February and on 24th March nationwidelockdown was declared in India as a preventive measure against the virus. As per the researchers, **Gollwitzer et al. (2020)** the interest of the general public on lockdown extension and its intensity is important to take the right decision. The number of infected people is continuously increasing in India (as of 25th May 2020 the cases have crossed 1 lakh 35 thousand). Social distancing and Isolation are adopted as major preventive measures to be safe in this pandemic situation. According to **Chatterjee et al. (2020)** describe the way by which the economy can function safely through work from the home initiative. There would be a 360° shift in the way people have been interacting with fellow citizens. The mindset of people will be changed after this long lockdown. The phenomenon where people adapt themselves to the changing or changed situation is known as ***The New Normal***.

The prosperity of any country is fully dependent on its sound education system. As the Indian education system has its own identity at all levels worldwide. Due to the pandemic, face to face interaction with students is not possible. The Internet is playing the lead role where education is possible only through an online meeting platform. Various meeting software such as Zoom, Meet, etc. provides the virtual classroom environment for students. The availability of virtual labs for practical subjects in Science, Engineering, Agriculture, Computer Science and Geo-informatics subjects is possible through various software. University Grant Commission (UGC) and the Ministry of Human Resource Development (MHRD) have released various guidelines from time to time to make the education system sustainable and uninterruptedly during this precarious situation to save the future of students as well as to make them stress-free.

An attempt has been made by the researchers in this article is to:

- Discuss the entire cycle of the education system.
- Discuss the Guidelines of MHRD and UGC for the smooth functioning of the education system in India during the lockdown.
- Discuss the challenges facingduring online education and examination.

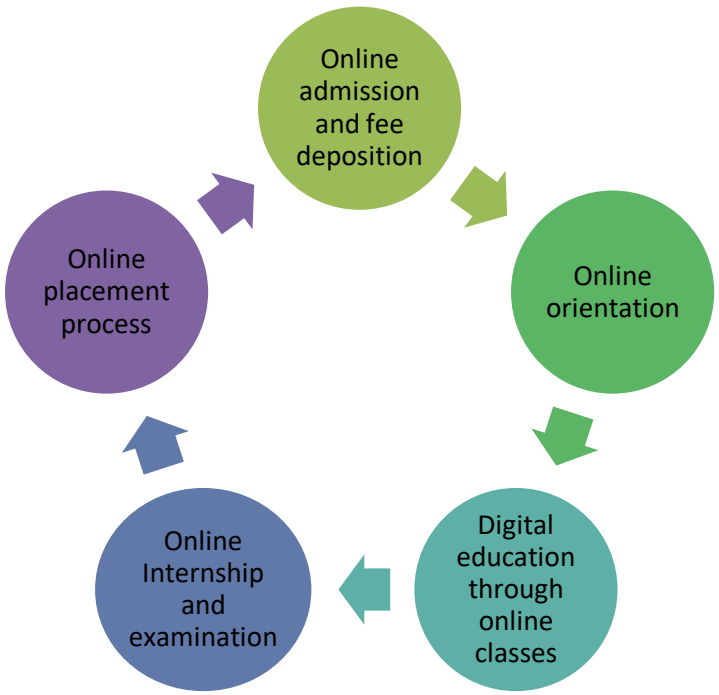
2. The New Normal Scenario Of Higher Education

The situation where people adapt themselves according to the current environment is known as New Normal. Life is not "Normal" like pre-COVID-19. After the COVID-19 pandemic, people will have to live in a different lifestyle where social distancing is a major lifestyle shift.

In all the sectors including education the online mode of working is the only remedy. The time has come to show the ability and creativity by ***Do It Yourself*** (DIY) concept where the students need to learn by working on their skills themselves. Although online education helps the students tolearn theoretical and practical aspects through classes and virtual labstudents should implement practically it on their own.Due to the increasing use of laptops and smartphones a new learner-centric concept, the Heutagogyhas developed where a learner can define their objectives, route, procedures, and outputs. In this method, the learner is in the center instead of the teacher and syllabus. Heutagogy is defining as self-determined learning that stresses on developing the learner's self-sufficiency, capacity, and capability. The main object of this method is lifelong learning (Retrievedfrom https://www.schoology.com/blog/heutagogy-explained-self-determined-learning-education)

Figure-1 is presenting the circular way of the entire education process.

Figure-1 Entire Education Cycle–The NewNormal way



Source: Researchers own creation

The above figure (1) exhibits the complete education process from Admission to Placement.

The description of the entire cycle of the education system about The New Normal scenario-

2.1 Online admission and fee deposition: In the present time where face to face interaction with students is not imaginable.Admission for new sessions can be made possible through online campaigning and advertising through social media, e-papers, and e-magazines. Conduct online counseling to solve students' queries regarding courses and career opportunities. Facilitate the students for fee deposition at the time of admission via various platforms such as PAYTM, NEFT, and Google Pay, etc.

2.2 Online orientation: Orientation is compulsoryfor all students to complete the process of enrollment.University must develop a robust website for the orientation

program. The blend of various videos andsoftware can also introduce into orientation and trainingprogram. A virtual tour of the campus also provides to the newcomers. Introduce the students about various online education apps such as Dragon Microphone, Sound Note,Simple Mind, Study Blue, etc. Universities also try to make the students familiar with the course and curriculum through the online portal.

2.3. Digital education through online classes:

India is facing a critical situation where the COVID-19 pandemic reaches its extreme level in the past few weeks. Since 24th March India is facing Lockdown. As the first corona infected case found in India, all state governments decided to lock the educational institutes to curb the infection. This situation is regularly affecting many areas including education. Among all sectors the education sector was highly affected. The entire academic planning has disturbed. Students were losing their precious time to study due to enforced lockdown as a preventive measure.

Following Table no. 1 is showing the various projects initiated by MHRD (Retrieved from https://mhrd.gov.in/ict-initiatives)

The prolonged lockdown forces the entire education system to evolve. Online education was the only way to conserve the continuity of education. According to **Raj (2020)** research study, online education is only remedy during lockdown to save the future of hundreds of universities and thousands of college-going students.So the thought "BHARAT PADHEGA ONLINE" means "India will study online", was implemented. Faculties are using various meeting apps for visual interaction with students such as ZOOM or Google hangouts, Meet, Cisco WebEx, etc. to conduct smooth online classes. Online platform for education facilitates social distancing among students. To save the student's future and help those to overcome stress the MHRD and UGC release their suitable guidelines from time to time.

2.3.1.ICT based platform for students by MHRD

The current situation is forcing the officials to frame some valuable guidelines MHRD started many projects which help teachers, students and researchers in their study.

Table 1: MHRD initiative for ICT based learning (Audio-Visual digital content)

S.No.	E- Resources	Guidelines for students and researchers	Guidelines for Institutions
1	SWAYAM:Enormous Open courses available online.	Able to receive credit through these courses	- Inspire the extra eligible faculty tocontribute to online course development - Give consent to receive the credits awarded under This course -Content avail from local chapters of SWAYAM
2	SWAYAMPRABHA: e-content of courses available on TV	Can watch rich-quality academic programstwenty-four hours all seven days.	Make arrangements for viewing these content available on TV
E- content: access for digital -journals and digital-books			
1	e-PG Pathshala: Gateway for e-books up to PG	Get free books and curriculum-based e-content	Host e-books
2	Shodhganga: A reservoir of Indian Theses	Access Research Theses of scholars of Indian Institutes	Get research theses of your scholars to get listed on Shodhganga
3	e-ShodhSindhu: e-journals	To open and access the complete e-text	To open and access the complete e-text
EnhancedPractical learning			
1	e-Yantra: E-content for future-oriented engineering.	Get practical knowledge on implanted systems	In association with IIT Bombay create e- Yantra Laboratories.
2	FOSSEE: Open Source and FreeEducation Software	- Easy accessibility and helperfor use of such software-A user becomes FOSSEE companion	Labs should be active in Open Source

3	Spoken Tutorial: Tutorial available for Information Technology courses.	Independent learning inInformation Technology courses.	Inspireprominentfaculty members to provide subject content for independent learning
4	Virtual Labs: Design Web-enabled tests or experiments Foronline practical.	Practice for syllabus based experiments.	Design experiments based on the curriculum for Virtual labs.

Source: https://mhrd.gov.in/ict-initiatives

Above all online platforms are helping students to gain knowledge. The students are availing the same quality of education at home with comfort and ease. The assignment, worksheets, videos, notes aregiven to students and evaluate by the faculties online.

Plenty of online courses and workshops are conducting by reputed organizations through an online platform to enrich the knowledge of students. In this line, the World Health Organization (WHO) also initiated an online coronavirus certificate course for everyone. Aim of this course to make aware everyone about the effect of coronavirus on health and economy.

It is a very positive sign that the entire scenario has changed and the traditional methods of teaching are easily replaced by online methods. The transformation of the education system took a new shape. Faculty members who were not familiar and equipped with online teaching methods also get acquainted with it. The prime purpose of education is to accessibility for all. Education helps to build the future of the students. If there is no internet connectivity then online teaching is not possible. Substitute the traditional teaching method with online teaching methods is not possible until people learn and use digital skills on their interest as well as proper internet access available throughout the country.

Every household has color television in rural areas so in the future there is a possibility to provide education most cheaply and efficiently through television instead of the internet. UGC also extended the six months for Ph.D. and M. Phil. Research scholars. A link provided by MHRD for a virtual laboratory to facilitate the engineering, Science, and any other technical from https://www.ugc.ac.in/pdfnews/4276446_UGC-Guidelines-on-Examinations-and-Academic-Calendar.pdf)

- Adopt simplified methods of examination including MCQ, exam through Open book pattern, Open choice assignments, and assessment based on presentation.
- Use innovative methods of examination including a reduction in exam time but quality should maintain. Universities should keep sound evaluation system.

courses students. Nirmala Sitharaman on 18th May 2020 said that online education has been taken up in a new way in India and that "The direct telecast mode used by schools would get 12 new channels for school students." Similar steps are being taken up by several universities in India too. There are various Open source courses in India and abroad, available free of cost for students. Another novel way of teaching interactive courses is by podcasts which is a big hit amongst urban higher education students.

2.4. Online Internship and Examination: As per the guidelines of AICTE and UGC (Retrieved from https://www.ugc.ac.in/pdfnews/9488252_Letter---Internships.pdf) the internship should be a strictly online basis and project-based. Due to the COVID-19 epidemic, it would not be possible for the students to go physically outside and take a normal internship. The internship could be completed through an online platform from home. Guidelines retrieve by

- Students can also continue running projects as internships so there is no need to search new data and the Internship Program can be clubbed with assignments.
- Students can postpone starting their internship and condensed the time of the internship.

2.4.1. Examination guidelines given by UGG on the recommendation of the expert committee- The examination will be conducted online for the smooth functioning of the academic calendar. UGC guidelines embrace flexible and easy methods to conduct a pending examination. Information (Retrieved

- University can conduct Terminal, Mid-semester and End semester examination as per their available facility, maintaining social distance and also retain the policy of equal opportunity available to all the students.
- If the situation becomes critical in the coming days then the pattern of evaluation is 50% marks of internal assessment and 50% marks based on previous semester performance of students. If there is no semester system only yearly pattern then 100% marks evaluation based on internal assessment
- Carry forward system for failure students remain as such, improvement in grades through special exams.
- All students and scholars should be treated as "deemed to be present" so there is no issue for a minimum requirement of attendance.
- Review and secondary data based projects should be accepted by universities.
- Practical examination and viva-voce may be conducted through meeting apps (Skype etc.) and in the case of PH.D. viva- voce proper record should be maintained.
- Every University should begin a cell where students' grievances should be handled properly. The grievance should be exam and academic-related.

2.5. Online placement process: It is an important process of the education cycle where students are ready to fulfill their dreams. Online placement training provides real-time experience to students. Pre-placement training such as personality development, technical training, MOOC interview training, Self-concept note, Group discussion among students Psychometric and self-assessment tests deliver online to prepare students well for the interview. Many software such asPrepBytes, PlacementReady (Provide video-based training, online access, self-assessment quiz, MOOC test based on a specific company, monitoring of students about their performance)and Placement Management Software have step by step process for placement training which facilitates the students for online placement.

- **Inappropriate ICT training:** All faculty members do not have basic computer and internet knowledge so they are not able to conduct online classes. Sending PPTs, videos, assignments Worksheets,

3.Major Challenges In Conducting The Online Education And Examination:

The following are some of the challenges which both the faculties and students have to encounter in the New Normal period of online education.

- **Improper accessibility and connectivity of internet:-**Many research reports showing that in rural areas less availability of computer devices (excluding smartphones), internet connection and lack of basic digital knowledge among people. Researcher **Raj (2020)**explained in his research about the unavailability of internet connection and students do not have computers and laptops. In India, a limited percentage (36%) of people can access the internet (the India Internet report, 2019 by IAMAI and Nielsen). Now it is clear that due to the unavailability of internet connectivity in the rural area as well as remote areas. Usually, there is an electricity problem also. Students are unable to get an education and appear in examination through online platforms. There is no restriction to complete a given task on time so no seriousness towards the completion of the task. The percentage of students in the virtual class is very less. Content delivery does not reach to all the students.
- **Non- existence of proper communication:-** Sometimes all students are unable to attend the online classes. A proper communication platform via a university web portal should be available to the students through which they can resolve their problems and maintain continuous communication with them.
- **Inadequate technical and digital knowledge:** It is a usual problem where inadequate digital knowledge of students and parents responsible for interruption.

  Questionnaires through the internet is not possible. The entire responsibility of the institute to prepare virtual classrooms and through video conferencing train all the faculty members for ICT.

- **Pedagogical issue:-**Although the online classes have many advantages but not all students are comfortable with English, written as well as spoken. During online content delivery, the educational material is not that much reachable. These issues were diminishing in offline teaching where teachers can use the bilingual method of communication. The students have different levels of understanding so one method of teaching is not fit for all through online teaching.
- **Improper technical setup:-** In some universities there is no proper technical equipment available to make the online classes and examination system smooth.
- **Lack of sound facilities for online exams:-** Not a single university has a perfect system by which they can watch student's unwanted activities during the examination. Even universities do not have the proper equipment to maintain a digital environment to perform all online activities.

  Universities and higher education institution should have an ERP system which can integrate all the above-discussed operations of online education.

4. Conclusion

To overcome this pandemic situation and maintain a continuity of education it is a precise initiative to go for online teaching. Many online education platforms and apps are available to make this dream come true. India has great potential for online education as it is already have power in the field of Internet and Communication Technology (ICT). Especially in the higher education system where students are near about to get placed, it is very necessary to provide them uninterrupted education. Many hurdles, difficulties and challenges are being faced by the teachers, students and parents in this New Normal period. The need of the hour is that these challenges should be surmounted to make the future of students bright.

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THE STUDY ON ICHTHYOFAUNAL DIVERSITY IN MINIMATA HASDEO BANGO RESERVOIR OF KORBA, CHHATTISGARH

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ABSTRACT

Aquatic biodiversity is of great importance for economy of any place. Ichthyofaunal diversity is also of great value not just aesthetically but also has important role in maintaining the overall environmental balance. Aquatic resources are very much used by humans for food along with medicinal application. Thus, because there are studies of loss of biodiversity, it is important that fresh water fauna be conserved. This further requires a complete and thorough assessment of the aquatic biodiversity, especially ichthyofaunal along with the understanding the potential of attempted exploitation of natural resources in recent times.In the current study, ichthyofaunal diversity in Minimata Hasdeo Bango reservoir of Korba district, Chhattisgarh. Minimata Hasdeo Bango reservoir is situated on the Hasdeo river. This water body is specially constructed for fishery improvement and irrigation purpose. The six sampling sites are based on and near the reservoir. The fishermen were interviewed and the fish communities were studies for over two months. The studies were carried out in July and August 2021. In the present study, families 12 and genera 22 totaling species 42 were observed. For fish collections, gillnets and fishing nets were used of several mesh sizes and standardized dimensions. In the said water body, many commonly seen fish varieties are used as food fishes, and there are other fish varieties on the verge of extinction. Similarly, one can find fish species which are on the verge of extinction.

Key words *Ichthyofaunal diversity, Minimata Hasdeo Bango reservoir, Korba, Aquatic ecosystem, Aquatic biodiversity, economic and aesthetic value*

1. Introduction

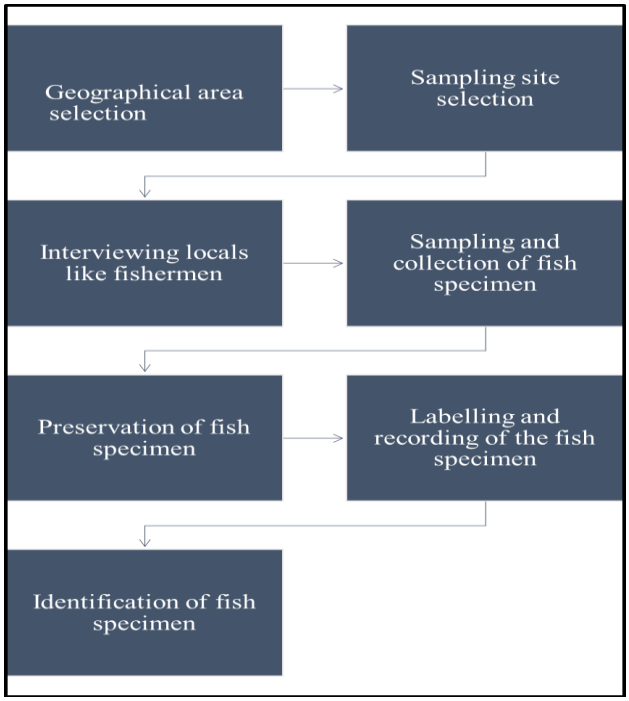
Biodiversity is defined as a term which will give many facts related to the life diversity. It refers to not just the species of plants and animals but also to the microorganisms belonging to different communities which forms the part of the bigger gene pool and impart diversity to this gene pool. Biodiversity would also mean all the natural biological processes occurring in the ecosystem or in any evolutionary time frames and thus giving rise to diverse gene pool. When we talk about concept of biodiversity it includes terrestrial environments and aquatic environments.

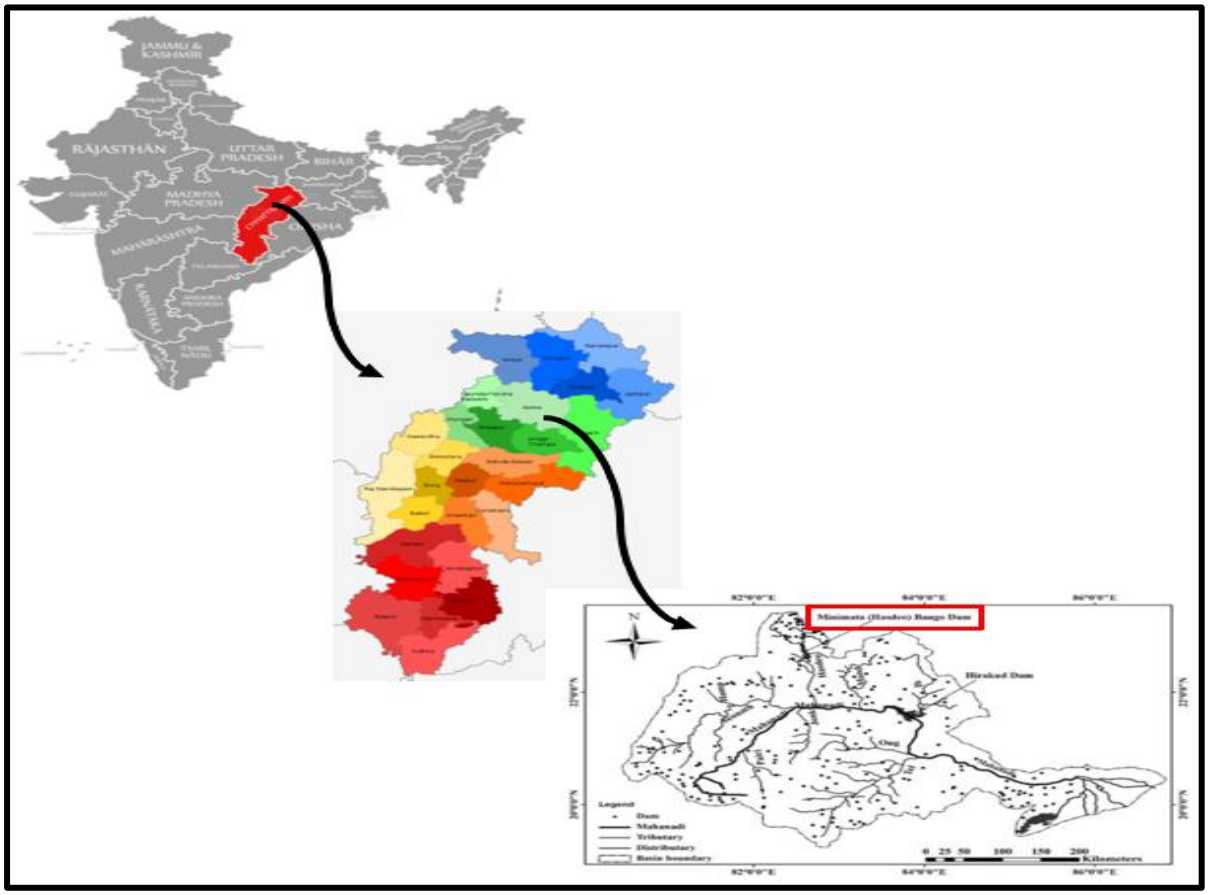
While studying aquatic ecosystem and ichthyo faunal diversity, it includes water bodies like lakes, rivers, ponds, groundwater, reservoir, wetlands and ponds. Worldwide almost 21,700 species of fishes are recorded. India is rich with water resources as it is covered with water on three sides. Of these species, about 12 % are found in India. So far for approximately 24,650living species of fishes have some or other form of valid descriptions. In this there are as many as 482 families and 54 orders (2006, Nelson). Although there is no proper documentation, there is very little information available from some of the well-studied locations. Hence, for taxonomist it becomes imperative to study more locations and to gather more information to describe a known species especially while studying the biodiversity of species rich areas.

While talking about the fish diversity, a concrete effort has been made to understand that changes in this diversity is because of the changes in water as well as the land and that there are substantial losses in the process where developmental projects are made, which may lead to certain species on the verge of extinction. Therefore, to understand how these different species live in variable conditions under extraordinary stress when a reservoir is formed, becomes important for determining the survival of the species. When it comes to adaptation to new environment, this study becomes the biodiversity study of fishes in artificial basins and in this case the biodiversity is not as humongous as those found in natural water bodies. This is because in natural water bodies the conditions are more stable giving chance for the fishes to evolve and distribute over time and space. Unless the diversity and the variation in time and space is known it would be difficult for planning any conservation for developmental projects related to water resource.

2. Materials and Methods

a. Geographical area selection: Minimata Bango reservoir, Chhatisgarh, Korba river (Latitude22°36'13.69" N&Longitude82°35'49.95"E)
b. Site selection: Six sites along Minimata Bango reservoir (Bango, Satrenga, Buka, Khairbhavna, Rampa, Golden Islands)
c. Interviewing locals like fishermen: Fishermen were interviewed for the collection of the primary data related to the water bodies, species of the fishes, abundance etc. at the sampling sites when it wasn't possible to fish sampling directly. A common questionnaire was used for the same.
d. Sampling and collection of the fish specimen: The collection was done every weekend between 10a.m and 3 p.m. Photographs were taken post sampling before preservation. Sampling was generally carried out in following ways:
(A) Using nets: - Specimens of the fishes for sampling were collected from their habitats by using fishermen's nets, castanet, gill net (10-100mm) and basket trap. The collection was done with the help of the fishermen.
(B) From Market: - The local fish market was visited and specimen procured from fish sellers.





Fish specimen preservation: Fish specimen preservation to confirm to identify the classification level (using taxonomy and literatures studies) of fish specimen. This was carried out using 10% formaldehyde solution for preservation on the site of sampling. The smaller fishes were preserved as mentioned. On the abdomen of the large fishes an incision was given before fixation. Fixing helps to evadeemesis or excretion of fishes because of stress. The plastic containers were used with labelling for preserving specimens.

f. recording of the labelled fish specimen: Each sample collected was entered in a note after proper labelling and against a serial number. The details included date and time of collection, locality, and other associated information of sample. All specimen were counted and their lengths and weights recorded. All specimens were separated according to their species. Photographs were taken before the preservation are also recorded.

g. Fish specimens identification: Fish specimens identification was done by noting the morphological characteristics like body form and pattern, color, size, shape, specific spots and meristic features such as the number of rays in a fin, position of fins, or the number of scales, the presence of scales in a specific series, the presence of distinctive organs such as barbless in a specific series, or the lateral line and various proportions such as the ratio of the length of the head to the total length of the body, gills position.

h. Total length and depth of the head and of the body, position of the eye, maximum girth, diameter of the eye, length ofsnout, and minimum girth, length of pre pectoral fin, length of the pre dorsal fin, length of the pre caudal fin and length of the pre anal fin along with descriptions. Characters included many aspects like the shape of the body, profile of the body, coloration and skin texture, shape and position ofthe lips and snout mouth, , barbels and jaws, lateral line system, scales, size, shape of the median, origin and type of median, fins paired or caudal, fin rays, tail, special marking and fin formula were also noted.

i. once the identification was done, species of fishes were compared against other sampling sites in river reservoir. There was significant difference in the frequency of occurrence. Calculations of the frequency distributions for different sampling sites on the river reservoir was done as follows: (Biradar, 2002).

Frequency distribution is important to let us know which species ispresent in wholly atsampling sites or in one/multiple sample collection sites. 100 percent incidenceconfirms that the specific types of the species is available at all sites of the sampling i.e., through the course of the river.

a. Dominant: Species occurring in more than 80 percent of sampling sites

b. Abundant: Species occurring in 60 –80 percent of sampling sites

c. Less abundant: Species occurring in 40 - 60 percent of sampling sites

d. Rare: Species occurring less than 40 percent of sampling sites

$$\text{Frequency distribution} = \frac{\text{Present number of fish specimen in different sites}}{\text{Total number of sites on Basin}} \times 100$$

Hence, on the basis of their percentage of incidence, species can be characterized into:

2.1 Physio-chemical analysis of the water sample and soil of sampling sites:

Water samples from surface regions were collected for physio-chemical analysis and sampling was done from different parts of the reservoir, between 9:30 a.m. to 6:30 p.m. for physio-chemical analysis. In the plastic canes, the surface water samples were collected directly or were collected in some clean plastic air tight containers from the six sites between 9:30 a.m. and 6:30 p.m.

a. Temperature: For measuring water temperature centigrade mercury thermometer was used. Temperature was measured by keeping in the water forone minute until the mercury column stabilized. The temperature was noted accordingly. For each site, the temperature was recorded thrice to maintain the reproducibility of the results.
b. Transparency/ Turbidity: Secchi disc was used to measure the transparency.
c. pH: Water analysis kit 1160 was used to measure the pH of water sample. For each site, the pH was recorded thrice to maintain the reproducibility of the results. Kit by Environmental & Scientific Instruments Co. (ESICO) Haryana, India
d. Dissolved Oxygen: (D.O.) D.O. electrode of water analysis kit (1160) was used to measure the dissolved oxygen of water sample.The result is expressed as mg/l. For each site, the dissolved oxygen was recorded thrice to maintain the reproducibility of the results. Kit by Environmental & Scientific Instruments Co. (ESICO) Haryana, India.
e. Alkalinity: Estimation of the total alkalinity of water sample was done after combining the values of carbon dioxide free form, (carbonate alkalinity) and bicarbonate alkalinity. The former was made use of phenolphthalein as an indicator and later made use of using methyl orange indicator. The titration was done against N/50 sulphuric acid. Expressed of the results in mg/l. For each site, the alkalinity was recorded thrice to maintain the reproducibility of the results. (APHA, 1998)
f. Total Hardness: for measuring the total hardness, titrimetric method, EDTA one with Eriochrome black-T indicator was used to measure the Total hardness of the water sample. The result is expressed as mg/l. For each site, the total hardness was recorded thrice to maintain the reproducibility of the results. (APHA, 1998)
g. Electrical Conductivity (E.C.): EC electrode of water analysis kit 1160 was used to measure the E.C. of water sample. The result is expressed as mS/cm. For each site, the electrical conductivity was recorded thrice to maintain the reproducibility of the results. Kit by Environmental & Scientific Instruments Co. (ESICO) Haryana, India
h. Total dissolved Solids (TDS): TDS electrode of water analysis kit1160 is used to measure the TDS of water sample. Expression of the results is in ppm or mg/l. For each site, the total dissolved solids readings were recorded thrice to maintain the reproducibility of the results. Kit by Environmental & Scientific Instruments Co. (ESICO) Haryana, India

2.2 Physio- chemical analysis of Soil of sampling sites:

a. pH: 1:2.5 soils - water suspension was made for Soil pH determination. Determination and measurement of the pH was by glass electrode. pH meter was used ofr measurement. This was after 30 minutes of stirring. Piper (1966).
b. Available nitrogen: Alkaline permanganate method was used to determine the Soil available nitrogen. Subbiah and Asija (1956).
c. Available phosphorus: Phosphorous extraction by NaHCO3 (pH 8.5) to determine the available phosphorus was carried out and the ascorbic acid method was used to determine the amount by using spectrophotometer (Olsen et al; 1954, Watnabe and Olsen; 1965).
d. Available potassium: neutral normal ammonium acetate was used for Soil potassium extraction. It's determined with the help of flame photometer was done (Muhr et al,1965).

3. Results and discussion

During the period of investigation (July 2021 to August 2021) 12 families and 22 genera, with 42 fish species belonging to them were

annotated. The observations of the present investigation concluded that, Minimata Hasdeo Bango Reservoiris a freshwater reservoir and hence has provision for a good and ichthyfaunal diversity (Table 1-4, Fig. 1).

Table 1. List of fish species (their descriptions and IUCN listings) found inMinimataHasdeo Bango reservoir of Korba district,Chhattisgarh, India (July 2021 to August 2021).

Sr. No.	Local Name	Common name/ Zoological name	Common habitat	Description	Comments: IUCN listing	Reference picture
1	Mrigal	Cirrhinuscirrhosus	Fresh water bodies like rivers and stream. Preferred substrates sandy or clayey.	60cm in length, 2 kgs	Vulnerable, threatened.	
2	Sirangi	Salmophasi bacali or Oxygaster bacailla or Large Razor belly Minnow	Slow running streams ponds and reservior, long with rivers	Benthopelagic and potamodromous, omnivorous surface feeder	Least concerned.	
3	Padhana	Wallago attu or catfish	Large rivers, tanks, lakes, stays at the bottom of water, thrives well in rivers and tanks, prefers muddy tanks subject to periodical flooding from naala or river	Sluggish, bottom feeder, voracious and predatory of local catfish	Nearly threatened	
4	Singhi	Heteropneustes fossils	Ponds, ditches, marshes	Omnivorous	Least concerned	
5	Khoksi	Channa punctatus or snakehead	Ponds, swamps, brackish water, ditches, beels, stagnant water, muddy streams.	Feeds on worms, insects and small fishes, spawning at night in shallow water with silty substrate	Least concerned	
6	Patola	Notopteruschitala	Freshwater rivers, lakes, beels, nalas in plain reservoirs, ponds, canals	Grow up to 75cm- 122cm, predator of molluscs and smaller fishes	Nearly threatened	
7	Tengna	*Mystusbleekeri*	River, Resrviorestuaries, backwater quiet eddies, main channels of large rivers, muddy water preferred	Eats insects, molluscs, smaller fishes and shrimps	Least concerned, however overfishing is a concern	

Table 2. Number and percent composition of families, genera and species under various orderPhysico-chemical parameters of water in selected Aquatic resources of MinimataHasdeo Bango reservoir of Korba district, Chhattisgarh, India (June 2021 to August 2021):

Sr. No.	Order	Families	Genera	Species	Families in the order (%)	Genera in the order (%)	Species in the order (%)
1	Perciformes	4	5	7	33.3	22.7	16.6
2	Anambatiformes	1	1	3	8.3	4.5	7.1
3	Cypriniformes	3	12	23	25	54.5	54.7
4	Perciformes	1	1	4	8.3	4.5	9.5
5	Mastacembeleformes	2	2	4	16.6	9.2	9.5
6	Osteoglossiformes	1	1	1	8.3	4.5	2.3
	Total	12	22	42	~100	~100	~100

Table 3. List of fishes'order, family, species wise found inMinimataHasdeo Bango reservoir of Korba district,Chhattisgarh, India (July 2021 to August 2021).

Sr. No.	Order	Family	Species
1	Anambatiformes(1)	Channidae	C. punctatus (Ham.)
2			C. gachua (Ham.)
3			C. striatus (Bl.)
4	Osteoglossiformes(2)	Notopteridae	N. chitala (Ham.)
5	Mastacembeleformes(3)	Mastacembelede	Macrognathusaculeatus (Bloch)
6			M. panaculus (Ham.)
7			M.armatus (Lacepede)
8			M.guntheri (Day.)
9	Cypriniformes(4)	Cyprinidae	Catlacatla (Ham.)
10			Amblypharayngdon mola (Ham.)
11			Ctenopharyngodonidela (Velenciennes)
12			A. microlepis (Bleeker)
13			Esomusdanricus(Ham.)
14			L. rohita (Ham.)
15			C. capio (Linnaeus.)
16			P. amphibius (Valenciennes)
17			P.conchonius (Ham.)
18			C. mrigala (Ham.)
19			L. gonius (Ham.)
20			P. chola (Hami.)
21			P.sarana (Ham.)
22			R. daniconius (Ham.)
23			L. calbasu (Ham.)
24			P.punctatus (Ham.)
25			Q. bacalica (Ham.)
26			P.ticto (Ham.)
27			R. elanga (Ham.)
28			P.sophor (Ham.)
29		Cobitidae	L. thermalis (Cuvier&Valenciennes)
30			L. guntea (Ham.)
31		Saccobranchidae	Heteropneustusfossilis (Bloch)
32	Siluriformes(5)	Bagridae	M. cavasius (Ham.)
33			M. tengara (Ham.)
34			M.bleekeri (Day)

35		Clariidae	Clariasbatrachus (Linn.)
36	Perciformes(6)	Cichlidae	Telapiamossambica (Peters)
37		Ambassidae	C. nama (Ham.)
38			C. ranga (Ham.)
39		Gobidae	G. giuris (Ham.)
40		Anabantidae	A. cobojius (Ham.)
41			C. fasciata(Bl.&Schn.)
42			A. testudinus (Bloch.)

Table 4. Distribution of the fishes order, family, species wise

Sr. No.	Orders	Families	Species (%)
1	Perciformes	4	16.7 (~17)
2	Amambatiformes	1	7.14 (~7)
3	Cypriniformes	3	54.7 (~55)
4	Mastacembeleformes	1	9.5 (~10)
5	Siluriformes	2	9.5 (~10)
6	Osteoglossiformes	1	2.38 (~2)
	Total	12	~100

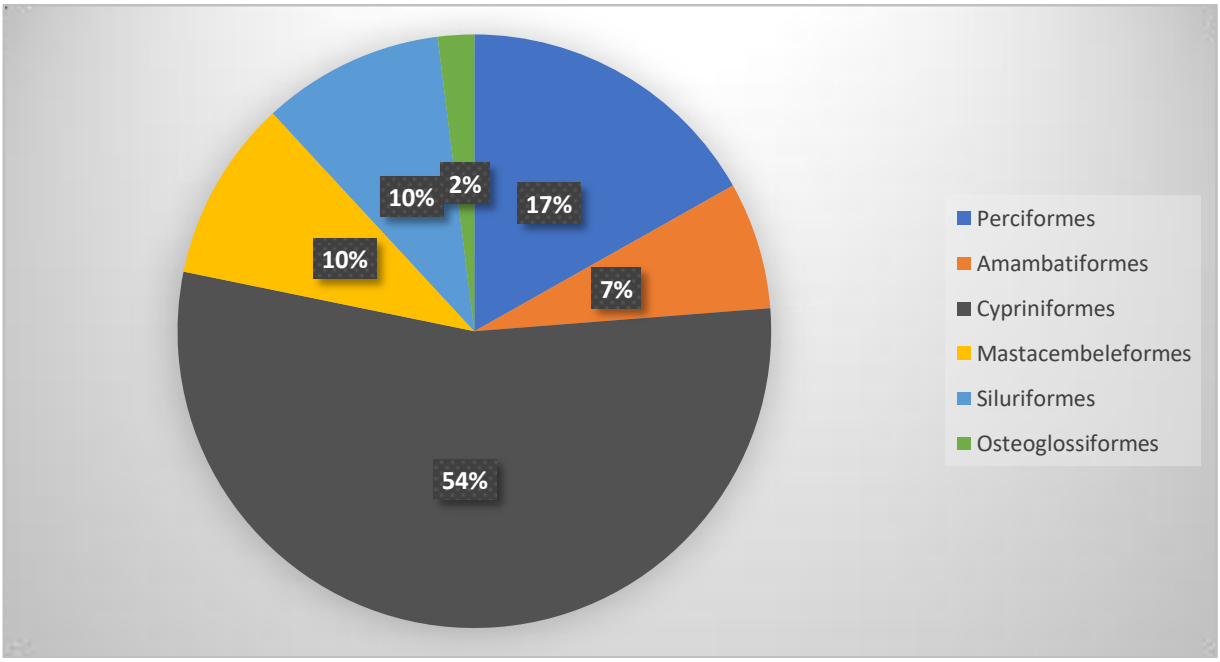


Fig 1: Percentage order wisedistribution of fishes found.

Shannon-Wiener index of diversitymeasure derived from information theories developed by Claude E. Shannon and Norbert Wiener and published in 1949 by Shannon and Warren Weaver, which is used by ecologists when a system contains too many individuals for each to be identified and examined.

$$H' = -\sum_{i=1}^{R} p_i \ln p_i$$

Table 5, shows **Shannon Weiner Index Observations and calculation for present work.**

Table 5: Shannon Weiner Index Observations and calculation:

No. of Order	No. of Species	Pi	ln (Pi)	Pi * ln (Pi)
1	3	0.03	-3.51	-0.11
2	1	0.01	-4.61	-0.05
3	4	0.04	-3.22	-0.13
4	23	0.23	-1.47	-0.34
5	4	0.04	-3.22	-0.13
6	7	0.07	-2.66	-0.19
	Total			-0.95

H=0.95, H_{max}=ln (s), where s is 6

So, H_{max}= ln(6) =1.79

E=H/ Hmax

=0.95/1.79

E =0.53 (The range for E lies between o and 1.

Explanation of Shannon Weinnerdiversity index- richness and evenness

- Shannon weinner index is the most widely index which used in marine/ aquatic diversity. If it varies between 1 to 5, 1 shows low diversity and 5 shows high diversity.
- Species evenness range from Zero to One with Zero signifying no evenness and one a complete evenness. Echthyofaunal diversity in Minimata Hasdeo Bango reservoir species are unequally distributed.

During the period of investigation (July 2021 to August 2021) 12 families and 22 genera, with 42 fish species belonging to them were logged. The observations of the current investigation concluded that, Minimata Hasdeo Bango Reservoir is a freshwater reservoir and hence has provision for a good and ichthyfaunal diversity.

There was a peak in fish diversity post monsoon, because the conditions were favourable. For example, ample food resources and sufficient water. Whereas the diversity was low in pre monsoon because there was shrinkage of water. Fisherman communities interview gave light to the information that there is a high decline in fish diversity. This could be because of the pollution, deforestation, introduction of exotic species, water scarcity, excessive fishing and sand mining. These are the biggest threats.

4. Suggestions and future work:

In the present study it was concluded that the Hasdeo reservoir is a hale and hearty water type body which provide a habitation for ichthyofaunal diversity. Nonetheless, a continuous hazard to fish populace prevails owing to continued unlawful fishing actions and eutrophication. This are major causes of decline of fish population along with other reasons like urbanization, pollution, shelter destruction, scarcity of food, and progressive eutrophication of the water body and habitat destructions.

Thus, for conservation, of these invaluable resources, including the idea of sustainable development along with conservational needs to be considered to provide a holistic approach. To avertdiminution of fish resources in fresh water, it is important to ban the illegal fishing activities. A comprehensive data on biodiversity in the selected site, conservation status of ichthyofauna is provided in the present investigation. In future, studies need to be carried to for gathering more detailed comprehension of seasonal production and ichthyofaunal diversity. For the conservation of fish biodiversity, in situ conservation is important and forms one of the many protuberant and indicative actions.

Conflict of interests:

There is no conflict of interest amongst the authors.

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REVIEW OF METHODS FOR DETECTING NITROGEN DEFICIENCY IN WHEAT CROP

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ABSTRACT

Specifically, the goal of this investigation is to get a better understanding of the current procedures, methodologies, and algorithms that are utilised to detect nutritional deficiency in wheat plants. To do this, survey and examine inconsistencies in present work, as well as assess existing approaches, can be carried out. The study addresses the many conceptual frameworks that are already in use, as well as how they may be extended in order to develop next-generation methods for identifying Nitrogen stress in wheat crop fields. In addition, the study analyses the many gaps and issues that must be addressed in this setting, as well as the implications of these findings.

Keywords: *Wheat, Nitrogen Stress, chlorophyll fluorescence, Imagine Processing*

I. Introduction

Determining the nutritional demands of plant crops is crucial for maximising their production and ensuring their quality. Nutritional insufficiency is the source of large economic losses in wheat crops in poor nations (Hussain and Dandachi, 2007). (Hussain and Dandachi, 2007). Although the losses due to nutritional deficiencies can be as high as 50–80 percent of the total wheat yield, However, most of the studies connected to wheat crops have concentrated on the improvement of the production methods and the technologies in the field. The literature assessment suggests that a major percentage of the research efforts are being dedicated towards producing superior varieties and kinds with high yield potential. However, little study work is being done in the area of plant nutrition (Hussain and Dandachi, 2007). (Hussain and Dandachi, 2007). Furthermore, certain issues impede further research in this area due to a lack of knowledge and methodologies. Information on the nutrition of wheat crops is still being recorded in traditional ways like laboratory analysis, which are hard and tedious and are not cost-effective (Hussain and Dandachi, 2007). (Hussain and Dandachi, 2007). In the case of nitrogen stress in wheat, studies that are accessible largely concern the influence of nitrogen deficit on the growth of wheat plants (Hussain and Dandachi, 2007). (Hussain and Dandachi, 2007). However, no attempt has been made to determine if the existing approaches are capable of diagnosing nitrogen stress in wheat plants under varied situations. Nitrogen deficiency in plants can be conceived of as a series of successive phases that occur in response to a lack of organic nitrogen. Numerous studies have established that plants' initial response to a nitrogen deficit is the activation of defence systems against insects and/or disease. Numerous genes encoding proteins involved in the defence response are active in signalling and regulatory networks. Additionally, multiple abiotic stress-inducible genes encoding chaperones and membrane-associated proteins are activated. These findings imply that these plants perceive nitrogen deficit as biotic stress and generate an immunological response to manage the pathogen. According to recent studies, wheat plants do trigger similar responses. On the other hand, when they are stressed, they do not induce such relaxation. Numerous experiments into nitrogen deprivation, however, have revealed that plants are capable of living in the absence of nitrogen. For example, numerous grasses, legumes, and certain C4 plants flourish in soils that contain nitrogen but at a lower concentration than normal ([@bib6]). N-deficient plants display increased cell wall thickness, decreased cell development, and altered cell wall structure ([@bib19]). These alterations are connected with the ability of plant cells to increase their osmolarity in the presence of nitrogen, thereby maintaining a balance between osmotic potential and cell turgor ([@bib6]). According to specific study, nitrogen deficit may also initiate the senescence process, resulting in greater plant survival. However, other researchers have

shown that plants' capacity to thrive in low-nitrogen settings is highly tied to the amount of nitrogen ([@bib9]; [@bib14]; [@bib1]; [@bib16]). [@bib17] has shown that the potential of plants to live in the absence of nitrogen is connected to their ability to maintain high N absorption rates under N-starved conditions. Along with the question of whether plants can survive and grow in the lack of nitrogen, the effect of nitrogen deprivation on plant growth and reproduction has been the focus of interest. For instance, [@bib17] has shown that low nitrogen content lowers organ size. According to [@bib7], N-deficient plants yield a greater quantity of seeds than control plants do. In example,[@bib10] demonstrated that wheat plants produced less blooms under N-deficient conditions. Tomato N shortage has been demonstrated to reduce blossom counts while enhancing fruit set. The authors of the final two tests indicated that N deficiency's influence on plant growth and development may be mediated by hormonal changes. For example, N deprivation reduces endogenous IAA and cytokinin levels in wheat ([@bib18]), whereas it raises endogenous cytokinin levels in rice ([@bib3]). Another major issue is how plants detect nitrogen deficiency. [@bib7] observed that in tomato plants, N deprivation stimulates the expression of genes involved in protein synthesis and cell growth. However, several metabolic pathways, including photosynthesis, were not triggered in N-deficient plants, and the expression of genes encoding enzymes involved in these pathways was lowered. Nitrogen-deficient and stressed plants may develop physiological and morphological abnormalities or may be compelled to slow their growth. At the molecular level, a chain of biochemical reactions happens that may be triggered by a number of genes and phenotype expressions. As a result, these stress signals and their accompanying modifications may be tracked at a variety of levels and checkpoints. A nitrogen deficit affects a range of processes, including photosynthetic activity, leaf growth, and leaf rolling, thereby limiting the size of the canopy. The third step seeks to overcome these hurdles by comprehending and prolonging the reactions obtained in the other phases. As a result, solutions to such difficulties are not just focused on improving crop yields, but also on enhancing the crop's resilience and equipping it with the potential to establish an internal mechanism that enhances its nitrogen stress tolerance capacity. When plants are nitrogen-deficient, they undertake a series of metabolic reactions to protect themselves from further harm. These responses have been observed in a range of plant species, and there is significant evidence that they occur often in a variety of plant species. The increase in glutamine synthetase (GS) activity in plants, which was addressed in the previous chapter, is one of the most significant nitrogen-deficiency reactions. This metabolic pathway is the major method for ammonia, a form of nitrogen, to be digested. Ammonia is formed from glutamate, which is synthesised from ketoglutarate via the activity of glutamate dehydrogenase. GS is the rate-limiting stage in plants' nitrogen uptake. Apart from boosting ammonia synthesis, it also influences other metabolic processes, such as energy production and amino acid metabolism. As the first line of defence, plants have evolved stress hormones to detect and respond to these nitrogen stress situations. Accumulation of plant hormones such as abscisic acid (ABA), jasmonate (JA), and ethylene is the earliest stage in a sequence of chemical reactions that have evolved in response to stress signals in plants. The processes by which crops respond to nitrogen stress have been identified in a series of tests done by researchers at the University of California, Berkeley. The study discovered that, similar to other plants' stress response mechanisms, the crop response to nitrogen stress consists of a variety of physiological, biochemical, and molecular responses. Technological breakthroughs in computer science and image processing have further allowed us to explore plant stress issues without utilising invasive approaches and even without knowing the underlying biological processes. Advances in image processing approaches supplemented with deep learning and machine learning algorithms are transforming the landscape of examining the biotic and abiotic stress of plants, notably in the context of the development and monitoring of wheat plants. This is because wheat is the main diet of the majority of the population worldwide. In summary, nitrogen deficiency

may influence plant growth, development, and reproduction, but the techniques by which plants detect nitrogen deficiency are poorly recognised. Therefore, in this work, the present research approach being followed for identifying nitrogen stress in wheat crops along with the different gaps that need attention are reviewed in this section. The part further adds that this knowledge base will help to evaluate the existing practises for recognising nitrogen stress in wheat crops. Furthermore, the study presents an insight of the various conceptual frameworks now in use and the approaches to extend them for constructing next-generation systems for detecting nitrogen stress in wheat crops along with these numerous gaps and concerns.

II. Contemporary Techniques

Wilting and yellowing of the plants is apparent and the colour and vigour of the plant go off. This can be observed with a visual inspection and by using computer vision methods. Yellowing of the old and new leaves in the progression is a clear indication of N-deficiency. Measurement of biomass that can be used as a hint for tracking the Nitrogen requirement of the plant. The statistical analysis of nitrogen content in terms of distribution in various parts of the plant can also help in the identification of N-deficiency. GPR Tomography has been used to track Nitrogen content levels in the body of the plant. Characteristics of the leaves and formation of fibrous roots are impacted by the reduced intake of the macronutrients. The morphological analysis of the leaves and shoots (root diameter, specific root length, specific root area, root angle, root length density and convex hull area) is quite helpful in the detection of N-deficiency. The disadvantage is that either the roots are required to be uprooted for inspection or deep penetration is required for inspection of the plant's health.

The study of phenology can help us further to get insights based on periodic events that are based on the life cycle of the wheat plant. The life of the wheat plant begins with the sprouting of the seeds, vegetative or the growth stage and the reproduction stage when the flowering and fruiting occurs. At the reproductions stage, the analysis of gains such as grain fill rate, maintenance of grains numbers, grain weight gives a lot of inferences as regards nitrogen status in the plant. Thousand seed weight (TSW) and many other computations can indicate the health of the plant during its life cycle. The grain-filling rate, under drought, decreases due to reduced photosynthesis, accelerated leaf senescence, and sink limitations. Helps to determine if the plant is under stress due to Nitrogen issues if the number of grains is less or the fill rate is low. Productivity metrics such as Harvest Index (HI) helps to identify correlations between the nitrogen levels and yield.

In all these stages different parts of the wheat can be analysed by using chloro fluorescence or some other image processing modalities such as IR imaging, tomographic imaging are useful for the identification of N-deficiency problems in the plants. The nutritional (Plant Nutritional Uptake& acquisition efficiency Analysis (PNUAE)) intake by the plant can be computed and analysis regarding the nitrogen stress can be derived. The size, the shape, the colours (Canopy Characteristics) and other properties such as the amount of emitted light, absorbed light and reflected light (hyperspectral reflectance) can give us a great deal of information regarding the levels of Nitrogen in the wheat canopy. The ability to stay fresh and green and resist senescence has been analysed using methods such as the Stress Tolerance Index (STI), stress susceptibility index(SI) from which the degree of nitrogen deficiency can be judged.

Analysis of Hormonal regulation (ABA, GA, Ethylene, Cytokinin, SaliSalicylicd) gives great bytes of information as regards the Nitrogen life cycle in the plant as it is a macro -element that is required for the working of many biochemical reactions in the plants. Observations of hormonal activity help to identify the stomatal behaviour of the plant. Done using leaf and root tissue by ultra-performance liquid chromatography-mass spectrometry. Further, it has been found that Phytohormone signature and correlations estimation between a key physiological parameter can give clear indications about Nitrogen stress in plants. It can be done with a non-invasive method such as Hyperspectral imaging.

It is clear from the above information, that a lot of associations can be derived from multiple fields and domains for developing drought-resistant and tolerant varieties of plants and crops. The question is, can we use these associations and linkages for building non-invasive solutions for the detection of Nitrogen scarcity stress in crops such as Wheat. In the next section, we discuss the various methods, algorithms, approaches, and strategies employed by contemporary authors and researchers for this purpose. In the context of this research work, we shall focus on the life cycle of the wheat crop for understanding the process of building systems of early detection of Nitrogen stress using emerging technologies such as computer vision, hyper-spectral imaging, infra-red imaging, and machine /deep learning modelling.

Literature Survey

A typical system that detects Nitrogen stress is designed in such a manner that it can predict results accurately enough to make early decisions on managing the crops. The steps involve the selection of modelling techniques that have good validity and reliability. Determination and mapping of appropriate variables or trait combinations that would provide irreproachable outcomes in terms of Nitrogen stress detection. This may involve experimentation with multiple kinds of features such as colour indices, texture indices, or spectral derivatives. It may also involve investigations on the theoretical and empirical transformations of images. This workflow is based on three phenomena namely reflectance, re-emittance, and absorption of plants with light. When a plant is exposed to light, it will manifest all these three phenomena, and by measuring the activities associated with each plant many signals about stress and internal working of the plant can be judged. This is generally done by capturing such signals in the form of an image. Researchers are using laser-induced fluorescence for monitoring nutritional patterns being expressed in the plants at a given time. Many authors are using hyper-spectral information to make decisions about declaring Nitrogen in an area. Ultrasonic and light detection and ranging (LiDAR) sensors are being extensively used for tracking agriculture and horticulture fields. Such sensors have led to the development of a high-throughput phenomics domain for tracking different aspects of plants including biotic and abiotic stress.

But, one of the prerequisites for processing the information from crop images is pre-processing of the images. Practical work from multiple sources shows that the images may require colour model transformation, aspect ratio corrections, contrast enhancement, and segmentation of the region of interest. It can be inferred from the current literature that five types of features are most likely to be used from building detection frameworks. The first one is colour: As mentioned in Table 1, the colour gives a clear indication of the health of the crop. Hence, the analysis of colour characteristics of plants is an essential ingredient of systems of Nitrogen detections. The second one is Texture: Metrics such as maximum probability, mean, variance, correlation, angular second moment, entropy, dissimilarity, contrast, and inverse difference moment aid to be useful informative measures regarding the health status of the plant at a deeper level. Research shows that texture alone can provide enough information for getting reliable systems of Nitrogen detection. The third one is Spectral profiling: Light has many frequencies and wavelengths. Many authors are using multiple characteristics i.e spectral properties of light passing through the plant material. This is done to measure the reflectance, re-emittance, and absorption phenomena. The fourth type of feature is Statistical analysis based such as Descriptive Statistics, Correlation Analysis, Factor Analysis. Few authors are using first-order derivative values of the spectrum, first-derivative fluorescence spectrum (FDFS) for solving the problem of computing nitrogen stress.

When it comes to different variable combinations i.e using combinations of different attributes or features it can be found deeper levels of information can be gathered about the internal workings of the plant under stress. Authors are combining colour and texture features and trying many combinations for building systems of detection. Descriptive statistics i.e computations of mean, mode,

median, skewness, etc are essential for this field. For the selection of the best features and attributes methods such as factor analysis, correlation matrix, t-test, p-test, chi-square is most commonly used by authors. A great deal of time has been devoted by authors to building prediction models that involve using regression methods such as OLS regression etc. These regression models (ANOVA) help to predict the trend that a variable may follow when it is under stress or is responding to some kind of stimuli. The focus of most researchers these days is to build systems of detection that are non-intrusive and non-destructive hence, the use of image processing has become a norm. Some authors dig deep into the kind of Nitrogen that a plant needs to have or what is already available in their bodies. These authors are interested in tracking the blue and green Nitrogen quantities associated with crops. By doing such research the authors can make Nitrogen requirement models (hydro-economic modelling) for the crops and take stomatal activities of plants. For such research, authors are using descriptive and cross-tabulation statistics to demonstrate their theories and findings.

Depending on the features and attributes of the image of the crop we want to build with a particular segmentation approach may be used. In the context of computing vegetation indexes and other activities primarily there are three broad approaches with which systems of detections are built around. Techniques that visually help to find the health of the plant are typically based on colour properties. Hence, the colour based segmentation involves using or extracting particular regions based on the pixel intensity in respective bands to find the status of health of the crop. This way a specific mathematical expression such as Excess Green, Red, etc., helps to define the region of interest for extraction and segmentation. Region Growing and merging is another strategy that has been used for segmenting plant parts. Graph cut based segmentation is also being applied in this context. In the second method, the health of the plant is known by separating or grouping the pixels by using static or dynamic thresholding algorithms such as Ostu that work on the difference of variance between the pixels. The third type of segmentation process includes the use of statistical methods and machine learning methods. In this approach, the pixels are grouped using algorithms such as K-mean, fuzzy- c, ISO data, mean shift are normally used for segmenting different parts of the plant and crop. With the help of supervised learning algorithms such as Neural networks, SVM the segmentation process is made more reliable and workable. Some authors are also using optimization methods such as particle swam for segmenting different regions of the plants and crops. Each technique has its advantages and disadvantages. Hence, it is important to evaluate many existing methods so that an appropriate method can be formulated. Research shows that sometimes a combinational approach or using a pipeline of image processing methods may be useful e.g Combination of Global static thresholding with K-means algorithms might have a greater advantage as compared to using a single algorithm. The global static algorithm will first remove a set of pixels with a particular range and then k-means clusters the rest of the pixels to form a useful segmentation area. In the next section, we discuss the various algorithms that are commonly used for building automated systems for detecting Nitrogen stress in context to wheat crops. For the sake of simplicity, the information is provided in a tabular form [Table] by considering parts of the wheat plant, so that the scope of investigations and further research becomes apparent.

III. Wheat Plant Analysis for Identification

There are a variety of techniques for detecting stress in plants. One approach that is common sense is a visual inspection of the plant body itself, which does not require the use of specialised equipment or processes. The inspection of the many sections of the wheat plant may disclose a great deal of information about the presence or absence of nitrogen in the crop if done with expertise and initiative. For research into the difficulties of growth in the wheat plant, however, it is necessary to use equipment and standards that are consistent with a methodical and scientific approach. Throughout this part, we'll go through the

numerous techniques and strategies that are currently being used to accomplish this goal.

Full or Partial Part Plant Phenotyping Analysis (FPP): In these methods, simultaneous analysis of multiple parts of the wheat plant is done so that a reliable state of the plant' health can be constructed. Images of the different parts of the wheat plant are processed and various parameters that suggest abnormal growth are identified for building a comprehensive report on the health of the plant. For example, the root and shoot phenotype measurements help us to understand crop yield stability and the factors such as shoot-to-root ratio, root morphology, biomass, stomatal attributes give estimates of the nitrogen embodied in the plant. The total green and yellow area calculations give a good indication of the plant ability to process the available Nitrogen. Indeed, root system analysis is extremely beneficial for determining N insufficiency. The fine root diameter, specific root length, specific root area, root angle, and root length density are all critical characteristics, as are the fine root diameter, convex hull area, morphological plasticity, and rhizosphere. The fundamental image processing techniques include RGB to HCI colour conversion, local thresholding, chromatic discolouration detection, and local fuzzy c-means clustering of an HCI intensity picture inside the binary root mask. Thinning and skeleton sampling of root mask images, identification and removal of partial volume effect pixels using the Sobel filter, thresholded root system using median and erosion filters, bi-level thresholding, DeepLabv3+ is a convolutional neural network (CNN) for training deep learning models. Phenotyping in-depth, k-means clustering, decision trees, and MLP X-ray microtomography, magnetic resonance imaging (MRI), X-ray computed tomography (CT), x-ray micro-computed tomography (CT), and Wheat are all techniques for image processing.

Imaging methods that are used in such include visible light, infra-red light and chlorophyll fluorescence spectrums. However, the images may require image noise reduction filters, vegetation segmentation of wheat plant images using the decision tree, a 3D model of the plant canopy using an automated platform that analyses various characteristics of the plant parts shape etc.

Examination of the Wheat Plant Canopy: The examination of the wheat plant canopy provides valuable information about the many stressors that are occurring in the plant. It is necessary to identify picture-based attributes if the study is carried out using image processing techniques, and it is necessary to associate these attributes with the plant's real-time state. Many researchers have examined the morphology of the wheat plant in an attempt to get solid information about the nitrogen stress that the plant is experiencing at any given time. In a similar vein, conclusions may be drawn from the temperature curves of the wheat canopy, which can be measured. Authors have used high order statistical metrics to analyse colour and texture to determine nutritional problems in the wheat plant many times to determine nutritional problems in the wheat plant. In the absence of nitrogen, the amount of chlorophyll maintained in the plant at any given moment is reduced, which is especially important for tracking the PS-II process. Researchers have the opportunity to examine the N-deficiency using image processing technologies that undertake pixel analysis in relation to photosynthetic activity. Various other methods, such as carbon isotope discrimination, measurements of shoot waxiness, tally of some tillers, leaf senescence, grain filling rate, overall plant height with time, leaf wilting, leaf area reduction, and increase in yellowness indicators, have been employed by researchers for the same purpose.

Control Image of Wheat Canopy

Nitrogen Stressed Image of Wheat Canopy

Figure 1: CF Sample Wheat Images

Methods such as cropping, contrast improvement, image binarization, smoothing, and application of a filter to detect edges, threshold segmentation, Otsu's method, watershed segmentation, histogram-based colour intensity analysis, local texture analysis, and the use of image noise reduction filters are useful for developing systems that can detect N-deficiency. Another approach for detecting N shortage in wheat is the measurement of hyperspectral reflectance in the canopy of the crop. SOM and Bayes Classifier, decision tree, 3D segmentation based on Voxel Cloud Connectivity Segmentation, Learned Invariant Feature Transform (LIFT), Scale-Invariant Feature Transform (SIFT), and Correlation Analysis are some of the techniques used. Hyperspectral, infrared/near-infrared, fluoresce, multi-temporal images, thermal, RGB, visible, X-ray computed tomography (CT), Positron emission tomography (PET), short-wave infrared (SWIR), and Deep Neural Network are some of the image modalities available.

4. Analysis of the Transport System: Because of the limited availability of nitrogen, the workings of the wheat plant's transport system are subject to fluctuation in their operation. The vessel examination of the Xylem and Phloem Xylem plasticity helps to enhance nitrogen use in the body. The area of xylem vessels in the rhizosphere helps to regulate nitrogen absorption, which is essential when plants are subjected to nitrogen stress. Bhattacharya distance, Otsu thresholding, and Contrast Limited Adaptive Histogram Equalisation are all terms that are used in data analysis (CLAHE) It is possible to use the general linear model (GLM), the siVM method, the clustering approach, the principal component analysis (PCA), the fuzzy k-means, Non-negative Matrix Factorisation (NMF), and fuzzy k-means to analyse data. Images were taken in cross-section and at a microscopic level. To measure leaf area (LA) and stomatal conductance (gs), the leaf tip was measured, as well as intercellular CO2 concentration (Ci), transpiration rate (E) and the leaf membrane stability index (LMSI). Other measurements included leaf relative nitrogen content (LRWC), relative dry weight (RDW), chlorophyll content, leaf surface area (LSA), leaf succulence (LS), canopy temperature depression (CTD), and leaf osmotic potential. Several words are used to characterise the size of flag leaves, including the length of the leaf (FLL), the area of the leaf (FLA), the length of the peduncle (PL), the length of the spike (SL), the area of the spike (SA), and the size of the green leaf (GLA).

The study of transportation networks necessitates the processing of xylem and phloem image data. According to the authors of XXX, approaches such as the watershed segmentation algorithm and Graph-cut are particularly beneficial in such situations. In addition to measuring leaf shape and colour intensity, it also measures local texture and past information of the plant, which is included in the model using Gaussian mixture models that have been previously segmented, When it comes to spatially directed methods, they take into account not just the colour or intensity of pixels, but also their placement and arrangement in an image. Spatially blind methods, such as K-means clustering and Gaussian Mixture Models (GMM), segmentation by multidimensional histogram thresholding in RGB and HSV colour space, ignore the location of pixels and seek to group or cluster them only based on their colour or intensity. Multivariate analysis using machine learning, ANOVA, PCA, genotypic-phenotypic correlation, and spectroscopic methods are all used in this study.

IV. Analysis at Reproduction Stage

Wheat flour analysis evaluates the shape of the flowers by assessing the size, several spikelets, and many ears that have been taken from the

bloom. If plants are nitrogen deficient, factors such as grain yield per plant (GYP), total seed weight per ear, seed quantity per ear (more than 2.0 mm), and seed weight all play a part in assessing whether or not they are. Grain size, grain colour, grain texture, the morphology of the seeds (including grove characteristics), total seed weight per ear (greater than 2.0 mm), seed weight in conjunction with the ear, and single seed characteristics including single seed weight, single seed size (volume), seed shape (spherical ratio), seed surface area (including circularity extraction, and elongation) are all measured in wheat grains/seeds.

Individual gains are segmented using the wheat ear image segmentation approach, which is described in detail below. By employing this approach, the 3D volume of an ear may be triangulated, and inferences can be drawn about the growth of the wheat plant's ear or seed, for example, to identify if there is any irregularity in the growth of the ear or seed. Image processing employs a variety of approaches, including grayscale conversion mathematics, contrast enhancement, noise suppression, and smoothing (denoising) techniques such as median filters. During the operation, binarization and skeletonization may be necessary. Otsu's segmentation technique is a commonly used approach in many fields. Aside from that, SIFT is used to locate landmarks inside the wheat canopy. Additionally, these landmarks are used to create datasets for machine learning models, which are then used to train the algorithms. Aside from that, image segmentation techniques such as Fuzzy Min-Max Clustering, adaptive image segmentation algorithms, and the use of filters are also accessible to users. Using regression techniques such as OLS, Lasso, and ridge to determine the relationship between yield and stress is far too prevalent in this setting, particularly when evaluating the relationship between yield and stress. It is critical to have equalisation of histograms and binarization of histograms, as well as bespoke masking and custom grain and leaf edge detectors while working in this field.

It is common to practise in this setting to employ edge operators such as sobel, laplacian mean shift, and static thresholding methods. For individuals who work in this field, the removal of noise, particularly Gaussian noise, is essential to their success. Also given importance in this context are close-up and dilation operations, contour identification, and texture analysis utilising LBP (Local Binary Pattern). ANN, MLP, multivariate analytic classifiers such as Naive Bayes, Lazy Bayes, Meta, Decision trees, and Discriminatory analysis, KNN, Deep Learning, Machine Learning, Random Forest, Support Vector Machines (SVM), and AdaBoost are some of the applications that are currently being used.

V. Wheat Plant Growth Analysis

As previously stated in this study, testing for nitrogen deficiency can be done at any stage of the plant's life cycle, including pre-establishment, vegetative, reproductive, and post-anthesis. Nevertheless, in this section, we will talk about the reproduction of stages to have a better understanding of the landscape of technology and techniques that are used to detect N-deficiency in humans. A wheat pollen study is also essential for identifying nutritional deficits, as proven by studies. Modern scientists use a variety of measurements to investigate issues of growth retardation caused by nitrogen deficiency, including pollen size, colour and texture, area, boundary box and centroid, as well as major axis length and minor axis length, convex area and equiv diameter, solidity, perimeter, extent, eccentricity, and weighted centroid. Principal component analysis and other dimension reduction techniques, as well as other statistical approaches, are essential in the investigation of agricultural-related information.

Many wheat plants and crop traits have been covered in this area, including those that are currently being used by many researchers to build detection systems. According to the findings of this study, image-based analysis is the most promising approach for creating non-invasive algorithms and techniques for analysing nutritional deficiencies in plants going ahead. When determining plant characteristics such as ear counts and nitrogen content, different colours of green and yellow are used, but the most important method is a visual assessment of various areas of the wheat plant, including the root systems. To be successful in the field of computer science, it is

essential to have a thorough grasp of k-means, otsu, global thresholding, convolution gradient filters (including mean shift), fuzzy-C, Laplacian filters, and Fourier transforms. Several words are used interchangeably in the field of machine learning. Deep learning, classification, regression, correlation, and factor analysis are some examples. In this field, hyperspectral, infrared/near-infrared, fluoresce, multi-temporal pictures, thermal, RGB, visible, and X-ray images are all often utilised, as well as other imaging modalities.

As demonstrated in the prior chapter, almost every component of the wheat plant may be used to detect nitrogen deficiency in the plant. When it comes to some regions, such as roots, an invasive technique is required; but, when it comes to other areas, a non-invasive approach is sufficient. Other types of image instrumentation, on the other hand, will be required for these types of applications. The new research indicates that instruments that monitor the spectrum and fluorescence states of plants are highly accurate and effective when it comes to identifying the internals of the wheat plant while it's under pressure. Several studies have concluded and emphasised that there is significant potential for utilising image processing technology to examine several aspects of nitrogen stress in wheat plants. This conclusion and emphasis are supported by the literature. However, there has only been a small amount of study published on the features of wheat plants that are impacted by nitrogen shortage, and this research is still ongoing. It should also be noted that, in the context of Indian wheat varieties, the availability of chlorophyll fluorescence-based datasets for the wheat crop is uncommon; aside from one or two references that contain small sets of CF images, there are only a few datasets available to our knowledge. The paucity of publicly accessible datasets and resources has resulted in this. There is a lot of opportunity for new dataset curation and the use of next-generation approaches based on machine learning and deep learning to improve the accuracy of predictions. There are several references and citations in the current literature that are related to the investigation of Nitrogen leaf (Leaf nitrogen concentration (LNC)) in crops other than wheat, including wheat. The number of studies that are conducted to monitor the condition of nitrogen scarcity is, however, limited and negligible in the context of Indian wheat.

VI. Conclusion

Finally, it should be noted that modern researchers are primarily focused on developing detection technologies that do not require the destruction of plant material to detect Nitrogen stress in the wheat crop. As a result, physio-biochemical features, metabolic behaviour and traits relating to the crop's architecture are now the primary focus of research. A good stress detection system can be developed by tracking and mapping such properties. This should be kept in mind as well: The images used to collect the majority of these features are produced in several ways. Evaluation of a wheat plant's health can be done quickly and easily using chlorophyll fluorescence (CF). It can be used on a single leaf or the entire canopy. As a result, the estimation of plant photosynthetic activity can be done at two different levels. In this way, a viable method for enhancing crop management can be developed. And the CF approach applies to both nutrition and water analyses. Researchers have shown that plants respond to a wide range of environmental variables at any given time, some of which may be beneficial. A variety of technologies and approaches can be used to determine how the plant responds to stress and stimuli on the inside. The employment of various stacks of technologies and a pipeline method may be necessary to automate wheat crop stress signals owing to Nitrogen conditions. As a result of this method, nitrogen detection systems will be more reliable and generalised.

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AN EFFICIENT COLLEGIAL FILTERING METHOD FOR DENOISING AND ARTIFACT REMOVAL

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ABSTRACT

An automated artifacts removal algorithm is proposed for removal of stripes, scratches, blotches and random valued impulse noise. The proposed method is a two-step process; in first step corrupted pixels are identified using ROAD (Rank Ordered Absolute Difference)and the distorted pixels are reinstated by the median of the uncorrupted pixels in the chosen window. If all of the pixels in the chosen window are corrupted, a trimmed global mean filter (TGM) is used. In the second step, PDA based interpolation process is used to fill the remaining pixels that were not filled in the previous stage. The proposed algorithm has the advantage of being able to replace many independent techniques for the removal of various artifacts with a single algorithm andelimination of these artifacts is achieved without crippling edges details.

Keywords*: stripes, scratches, blotches, random valued impulse noise, image restoration.*

I. Introduction

Image restoration is the process of reconstructing or repairing the defects that produce a damaged image.Strip lines, drop lines, blotches, and band missing are all common artifacts in remote sensing, as well as impulsive noise. Strip lines are formed when elements of a detector array react in several ways to an equivalent amount of incoming electromagnetic energy [1].As a result of these phenomena, the total brightness of adjacent lines varies. When a detector does not perform correctly for a brief period of time, it is called a drop line [2]. When disruptive microwave energy is present or the sensor/detector is deteriorated, impulse noise arises. Band missing [3] is a major issue produced by the ongoing degradation of two or more drop/strip lines. Old film and photographic footage is often damaged by random scratches and dirt. Old movies and photographs are often valuable historical records, but their graphic content deteriorates with time, making them less usable. Damage to the film surface or dirt covering a tiny region of the surface might generate these artifacts[4][5][6]. While digitalization, this kind of film it is possible to have patches with grey level values that are not related to the pixels around them. Dust, which attaches to the film createscratches on the thin emulsion layer, is the most noticeable visual defect. In most cases, there are two forms of distortion. Scratches are the first; they occur as a thin line of pixels with almost identical grey level values in arbitrary shape. These are caused by foreign bodies found in the camera or projector. Blotches are the second type; they are a block or a small coherent area with identical grey level values [4][7]. Every pixel in blotches or scratches is an instance of impulse noise distortion, but they have two distinguishing characteristics. First, these distortions create a discontinuity in the image sequence when they appear at random. Second, these distortions are well-defined regions with similar or nearly identical grey levels [6][7]. In addition to these distortions, digital images can contain other artifacts, such as stripes. Stripes are a type of line interaction with an image that appears as bright and dark thin lines in the image. Line scratches are another name for it, and it's typically seen in old movies. Any series of pixels that has had a random value replaced by it can be considered an image streak [7][8]. For deportation of these artifacts, generally separate procedures are applied. Overall, it is clear that image restoration has a very real and significant role in today's world. Our current challenge is to assess what types of applications might emerge in the future and demand more innovation in this area[9][10][11].This section provides an overview of the work done in the areas of noise suppression and automated artifacts identification. In recent years, a variety of median filters for reducing impulsive noise have been presented. Median filter (MF) [12], Centre weighted median filter (CWMF)[13], Decision Based Median Filter (DBMF) [14],

Adaptive Median Filter (AMF) [15] are well-known median filter versions.These filters are effective until the impulse noise density is low, and they act on the entire image regardless of whether or not the pixels arenoisy.This resultant the image to be unfiltered for higher noise densities and takes a long time to process [15]. Better noise removal filters using various types of noise detectors have been proposed throughout the years. Multi-state Medianfilter (MSM) [16], Switching Medianfilter (SMF) [17], Signal Dependent Rank Order Mean(SD-ROM) [18], Adaptive Center Weighted Median filter (ACWM) [19], The Pixel-wise MAD filter (PWMAD) [20], Conditional Signal-Adaptive Median filter (CSAM) [21], The peak-and-valley filter [22], Jarque-Bera test based median filter [23], TSM (Tri-State Median Filter) [24], two-output non-linear filter [25], Adaptive Median Filter (AMF) [26][27][28], Progressive Switching Median (PSM) filter [29], Decision Based Algorithm(DBA) [30], and Standard Median (SM) filter [31]. These filters, when combined with the noise detector, they will examine every pixel to see if it is corrupted or not, allowing only noisy pixels to be modified. The fundamental issue of these filters is that they only employ median values or variants of them to restore noisy pixels, which means that even when the images are moderately distorted, they typically cannot maintain image details. Many noise reduction approaches based on fuzzy approaches have been developed in recent years [32].A fuzzy technique is well-suited to simulate when the complexity is emerges and noise reduction and detail preservation are required. Finding the rule base structure gets more challenging when the pictures are significantly degraded. When it comes to removing impulsive noise, the size of the window is critical. Smaller windows would not give enough information for impulse noise reduction, while larger windows would make the image blur.As a result, an appropriate window size must be selected.These issues were solved using a decision-based system that only works on the damaged pixels [30].Non linear filters that are based on decision, switched, iterative, or cascaded are generally adaptive and time demanding (due to variable window size). Progressive switched median filter [29][34][35] has good noise reduction properties for low and medium density impulsive noise. The window size varies between 3 and 5, and the technique is iterative in nature. At higher noise densities, the image quality of the decision-based modified algorithm [33][36]degrades. Because the neighborhood value is used in place of the computed median, it is noisy, resulting in streaks.An automatic scratch detection and noise removal methodology is presented in this research, with the goal of improving automatic scratch identification and removal without the need for human participation

$$\mathbf{ROAD_m}(x) = \sum_{i=1}^{m} \mathbf{ri(x)}$$

The current pixel's ROAD value is compared to a specified threshold value. The current pixel is considered as damaged or uncontaminated based on the threshold value. For best results, the threshold value for all images is set at 40.The foregoing processes are repeated for the complete image, resulting in a binary image (I) of size MxN.

II. Materials and methodology

Noise Detection and Filtering

A 5x5 detection window (W) centered at I(i, j) is implemented to the damaged image. Then Equation 1 is used to calculate the absolute difference (D)of all pixel values with the centre pixel.

D = |W(i+k,j+l)-W(i,j)|,- LD ≤k,l≤ LD

The sum of the twelve lowest absolute differences is computed after sorting the array D.As mentioned in equation 2, this produces the ROAD value for the current pixel.

$$A = \begin{matrix} 1 & For\ ROAD(i,j) < T1 \\ 0 & For\ ROAD(i,j) > T1 \end{matrix}$$

The noiseless pixels in the specified window are used to replace the deteriorated pixels. If the chosen window contains all of the pixels as noise impacted pixels, a trimmed global mean filter is used. The TGM is then computed once the noise has been removed. To replace the value with noisy pixel, pixels from the window and the mean of the uncorrupted pixels are acquired.

Interpolation

Image interpolation is a technique for estimating values at unknown regions based on the values at neighboring pixels.The procedure entails propagating higher order difference of pixels on the lost area's edge. These intensity data are continually transferred from the boundary side to the interior side of the image's missing area. Region fill smoothly interpolates inward into the region.

The filling technique replaces values in the area with background-blending values. Create a mask image to designate the area of interest (ROI) you'd like to fill for this.

For simulation we use different images sourced from USC (University of southern California) https://sipi.usc.edu/database/database.php?volume=misc and https://ccia.ugr.es/cvg/CG/base.htm dataset of standard grayscale images as shown in figure 1. All images size is 512*512 and in tiff format, with intentionally added noise and artifacts.

Fig 1: Original Dataset (a) Zelda image (b) Boat image (c) Couple image (d) Bridge image(e)

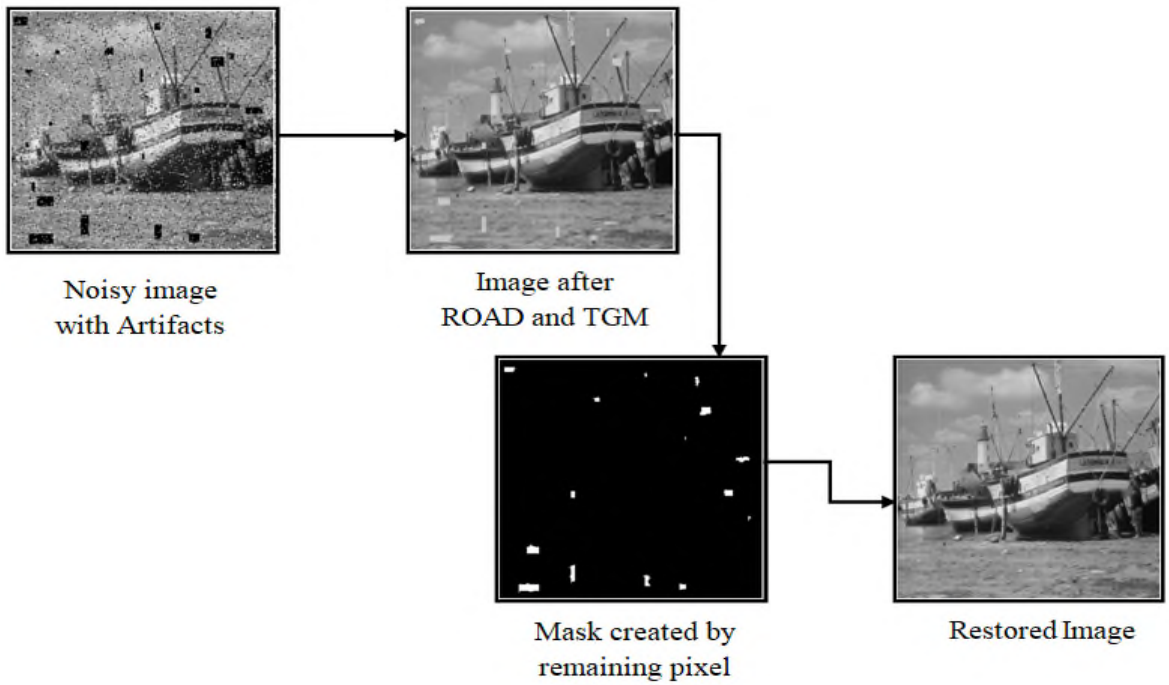

Fig 2: Flow diagram of artifacts and noise removal process

Pirate image

In the proposed technique, first we use ROAD and TGM method to identify damaged pixels, after applying ROAD and Trimmed global filter; we used interpolation method to fill the remaining pixel which are not captured by ROAD-TGM. Then we calculate the location of those remaining pixels and create a mask with them. By using this mask interpolation method is used to fill the remaining pixel. Figure 2 is represented the flow diagram of restoration process.

III. Experimental Results And Discussion

The tests have been developed out on a collection of standard grey scale images using MATLAB R2007b.Image Quality Assessment Metrics such as MSE (Mean Square Error),

PSNR (Peak Signal to Noise Ratio) areused to evaluate the image denoising algorithmsperformanceby measuring the quality of the processed image in contrast to the original image.The PSNR is expressed in decibels (dB), and it is calculated as the ratio of a signal's maximum achievable power to the disruptive noise power.The higher the PSNR number, the greater the performance, and the lower the PSNR value, the worse the performance of a denoising method. Equation 4 and 5 is used to compute the PSNR.

$$PSNR\ (dB) = 10*log10\ ((255\times255)/MSE)$$

Where, MSE stands for mean square error, and the original image is denoted by a parenthesis.

$$MSE = \frac{1}{P \times Q}\sum_{i=1}^{p}\sum_{j=1}^{q}(I_d(i,j)-)I_o(i,j))^2$$

$I_O(i, j)$ with size P×Q.
I_d (i, j) represents the denoised image created by the denoising algorithm.

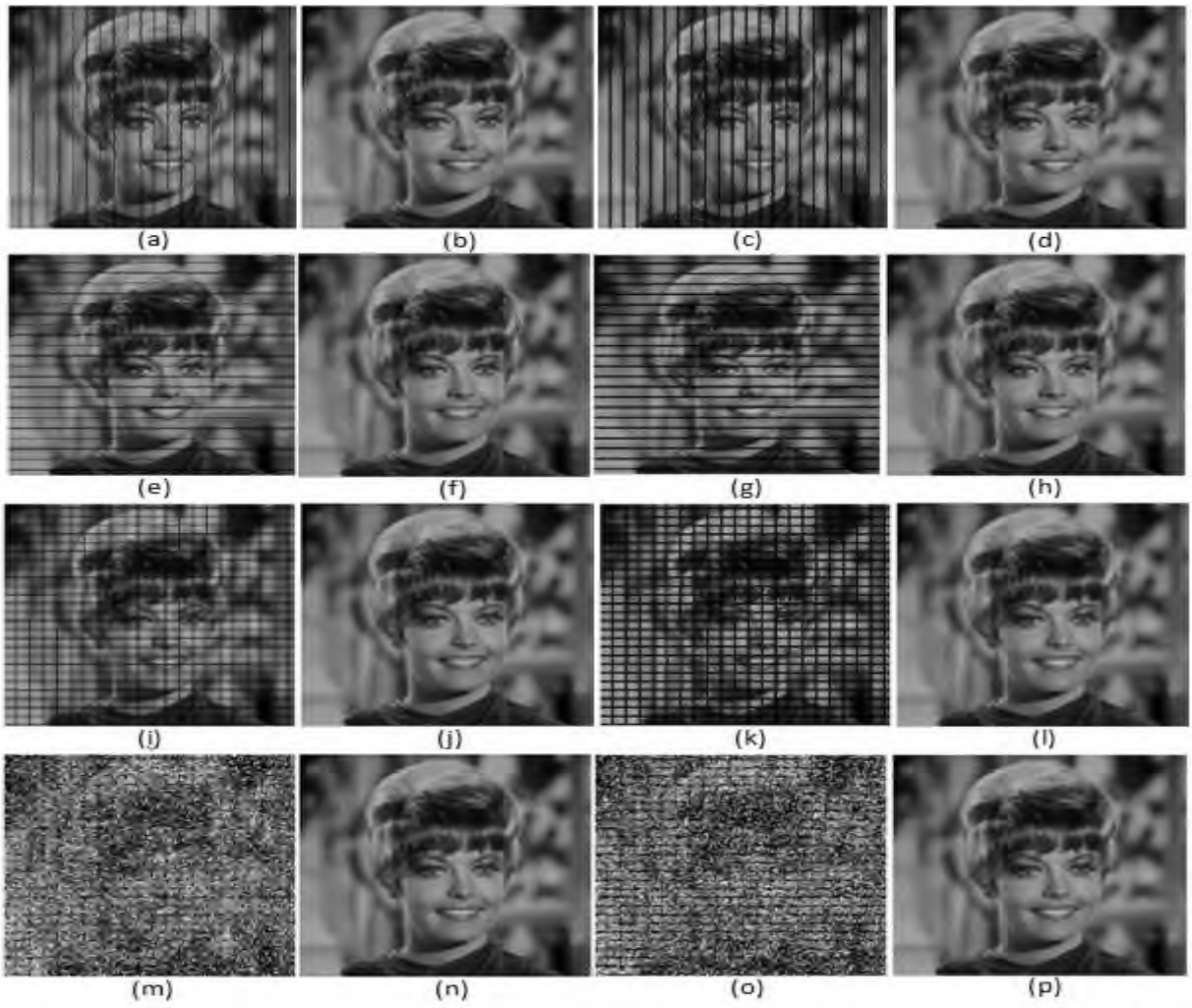

Fig 3: Zelda Images with black Stripes

We intentionally added stripes, blotches, scratches, and impulsive noise to the original image dataset. **Stripes**: In the Zelda image shown in Figs. 3 and 4, we added white and black stripes that were 1 and 2 pixels wide. In Figures 3(a), 3(e), 4(a) and 4(e), we inserted a 1 pixel wide horizontal and vertical stripe of white and black pixels. The restored images are demonstrate in 3(b), 3(d), 4(b) and 4(d), respectively after implement the proposed algorithm. In Figures 3(c), 3(g), 4(c) and 4(g), we inserted a 2 pixel wide horizontal and vertical stripe of white and black pixels.The resultant images are shown in 3(d), 3(h), 4(d) and 4(h), respectively. Then in Figures 3(i), 3(k), 4(i) and 4(k)we add both horizontal and vertical stripes (lines) of 1 pixel and 2 pixels wide and the restored images are shown in

Figures 3(j), 3(l), 4(j) and 4(l). After adding these stripes, the proposed algorithm successfully retrieved the image. The proposed algorithm worked well on images with stripes as well as random valued impulse noise. Figures 3(m), 3(o), 4(m) and 4(o) show the Zelda [41] image, which has been contaminated by horizontal and vertical lines, as well as 40% random impulse noise.

Figures 3(n), 3(p), 4(n) and 4(p) show the recovered images after implement the proposed algorithm.Our algorithm can also remove stripes from distorted photos, as seen by these results.

In Figures 3(a)Zelda imageis damaged with black vertical linesof 1 pixel width. 3(b) recovered image from 3(a). 3(c)Zelda imageis damaged with black vertical linesof 2 pixel width. 3(d) recovered image from 3(c).3(e) Zelda image is damaged with black horizontal lines of 1 pixel width.3(f) recovered image from 3(e).3(g) Zelda image is damaged with black horizontal lines of 2 pixel width. 3(h) recovered image from 3(g).3(i) Zelda image is damaged with both vertical and horizontal lines of 1 pixel width. 3(j) recovered image from 3(i).3(k) Zelda imageis damaged with both vertical and horizontal linesof 2 pixel width. 3(l) recoveredimage from 3(k).3(m) Zelda imageis damaged with both vertical and horizontal linesby 1 pixel with 40% noise. 3(n) recovered image from 3(m).3(o) Zelda imageis damaged with both vertical and horizontal linesof 2 pixels with 40% noise. 3(p) recovered image from 3(o).

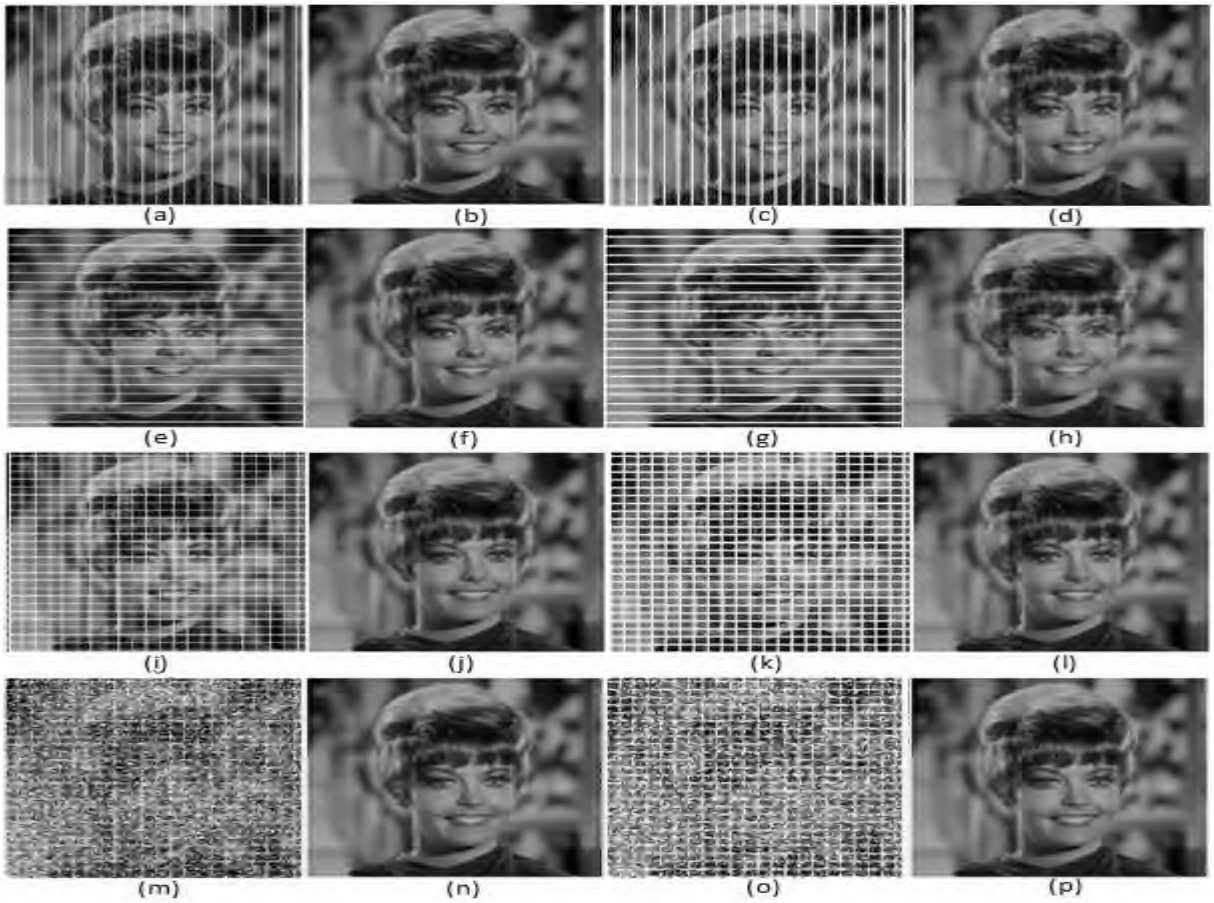

Fig 4: Zelda Images with white Stripes

In Figures 4(a) Zelda imageis damaged with white vertical linesof 1 pixel width. 4(b) recovered image from 4(a). 4(c) Zelda imageis damaged with white vertical linesof 2 pixel width. 4(d) recovered image from 4(c).4(e) Zelda imageis damaged with white horizontal linesof 1 pixel width.4(f) recovered image from 4(e).4(g) Zelda imageis damaged with white horizontal linesof 2 pixel width. 4(h) recovered image from 4(g).4(i) Zelda imageis damaged with both vertical and horizontal linesof 1 pixel width. 4(j) recovered image from 4(i).4(k) Zelda imageis damaged with both vertical and horizontal linesof 2 pixel width. 4(l) recovered

image from 4(k).4(m) Zelda imageis damaged with both vertical and horizontal linesof 1 pixel with 40% noise. 4(n) recovered image from 4(m).4(o) Zelda imageis damaged with both vertical and horizontal linesof 2 pixels with 40% noise. 4(p) recovered image from 4(o).

Blotches: When combined with impulse noise, the algorithm can eliminate both black and white blotches. The image couplehas been damaged by white and black blotches in Figures 5(a) and 5(e).The outcomes of employing the suggested algorithm to the damaged images are shown in Figures 5(b) and 5(f).When the image is damaged by blotches and random valued impulse noise, the suggested algorithm successfully recovers the image.The images in Figures 5(c) and 5(g) have been distorted by impulse noise and black and white blotches.Figures 5(d) and 5(h) demonstrate the results of using the proposed algorithm.

Fig 5: Couple Image with Black and white Blotches

Figure 5(a) Couple image damaged by black blotches. 5(b) Recovered imagefrom 5(a). 5(c)

Couple image damaged by black blotches and with 40% noise. 5(d) Recovered imagefrom 5(c).5(e) Couple image damaged by white blotches. 5(f) Recovered imagefrom 5(e).5(g) Couple image damaged by white blotches and with 40% noise. 5(h) Recovered imagefrom 5(g).

Scratches: We also put the proposed algorithm to the test against scratches and impulse noise, demonstrating that it performs well on images with scratches and impulse noise. In Figure 6(a), we added white and black scratches to the male image with intensities of 1 pixel to 2 pixels. Figure 6(e) depicts a scratched image with random-valued impulse noise at a noise level of 40%.Those that have been restored are displayed alongside images that have been corrupted

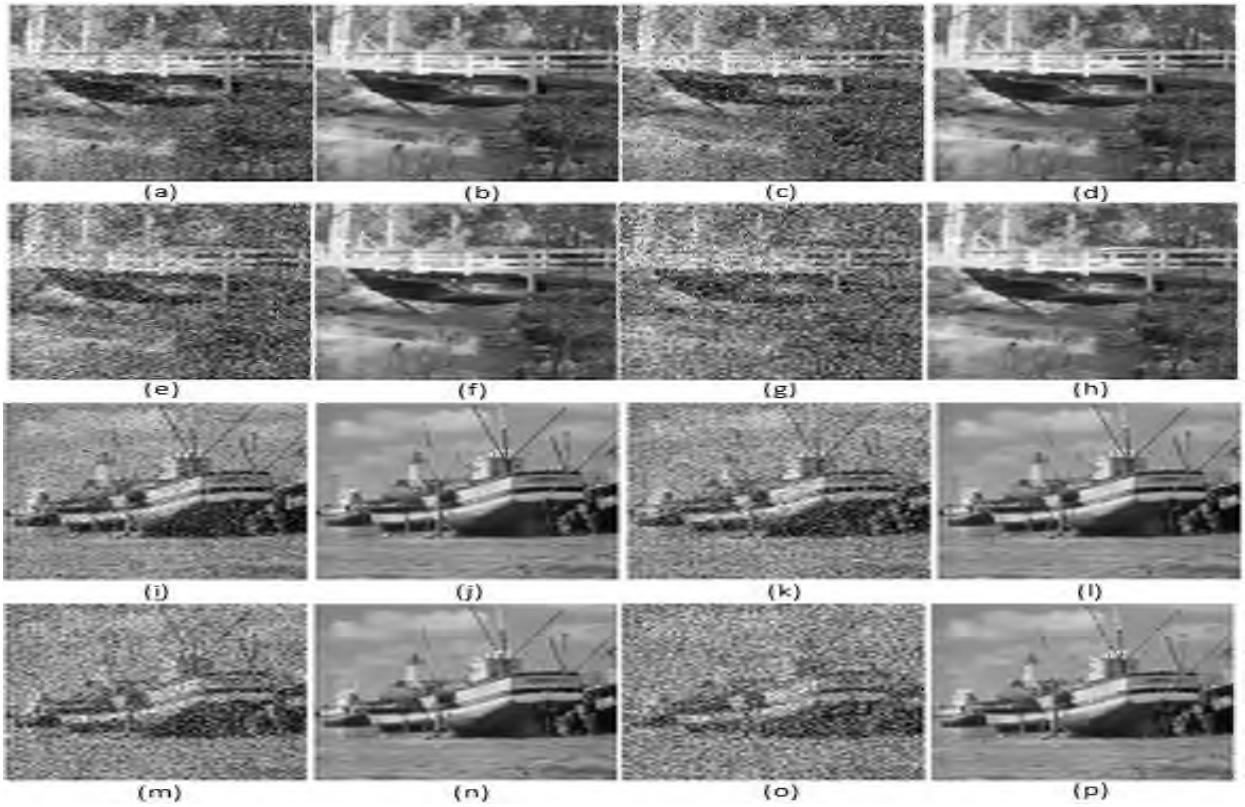

Fig 6: PirateImage with Black and white scratches

Figure 6(a) Pirate image damaged by black scratches. 6(b) recovered image from 6(a).6(c) Pirate image damaged by white scratches. 6(d) recovered image from 6(c).6(e) Pirate image damaged by black scratches and with 40% noise. 6(f) recovered image from 6(e).6(g) Pirate image damaged by white scratches and with 40% noise. 6(h) recovered image from 6(g).

Table 1 Comparison of restoration results in PSNR (db) for images corrupted with random-valued impulse noise and additive degradations.

images	noise	MF[12]	CWMF[13]	ROAD-TGM[5]	proposed
Bridge	10%	27.41	26.17	33.38	36.07
	20%	25.52	24.91	29.80	34.21
	30%	21.23	23.65	28.02	31.66
	40%	17.58	22.69	24.61	29.32
Boat	10%	26.61	27.17	32.38	35.17
	20%	24.62	25.10	30.02	33.61
	30%	21.53	23.95	29.52	31.96
	40%	16.78	23.09	24.11	29.72

Noise: To demonstrate the proposed algorithm effectiveness on noise we added

random impulse noise ranging from 10% to 40% as shown in figure 6 and comparative analysis is shown in table 1 with PSNR values.

Fig 6: (a) bridge image with 10% noise. (b) Recovered image from (a). (c) Bridge image with 20% noise. (d) Recovered image from (c). (e) Bridge image with 30% noise. (f) Recovered image from (e). (g) Bridge image with 40% noise. (h) Recovered image from (g). (i) Boat image with 10% noise (j) recovered image from (i). (k) Boat image with 20% noise (l) recovered image from (k). (m) Boat image with 30% noise (n) recovered image from (m). (o) Boat image with 40% noise (p) recovered image from (o).

IV. Conclusion

The proposed technique is applied to still images damaged by artificially added scratches, strips, and blotches with and without random-valued impulse noise. The visual quality of the results show that the proposed algorithm performs very effectively in removing artifacts such as scratches, stripes and blotches with and without random impulse noise. The proposed algorithm automatically identifies and removes artifacts without the need for human interaction. This method may be enhanced and used to restore ancient photographs and films.

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व्यसनरत किशोरों के मानसिक क्षमता, भावनात्मक योग्यता और सामाजिक व्यवहार पर आशा व्यसन मुक्ति कार्यक्रम का प्रभाव

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अमूर्त

नए युग के उदय के लिए विज्ञान और प्रौद्योगिकी की प्रगति जिम्मेदार है। जीवन के विभिन्न क्षेत्रों में इलेक्ट्रोनिक गैजेट के अनुप्रयोग ने लोगों को और अधिक तकनीकी पर निर्भर बना दिया है। खासकर छोटे बच्चों और किशोरों में उनके उत्साह, उत्सुकता और नई दुनिया की खोज करने की जिज्ञासा के कारण इलेक्ट्रॉनिक गैजेट्स का उपयोग करना शुरू कर दिया। इसके अलावा, इसके कारण किशोरों पर कुछ मजबूत मनो-शारीरिक प्रभाव भी पड़े हैं। वर्तमान अध्ययन को दो मुख्य उद्देश्यों के साथ लिया गया हैः *(1)* किशोर के मानसिक क्षमता, भावात्मक योग्यता और सामाजिक व्यवहार पर इलेक्ट्रॉनिक गैजेट्स के उपयोग के प्रभाव का अध्ययन करने के लिए, और *(2)* आशा व्यसन मुक्ति कार्यक्रम कारकों के प्रभाव का अध्ययन करने के लिए। किशोर को इलेक्ट्रॉनिक गैजेट्स के उपयोग, मानसिक क्षमता, भावात्मक योग्यता और सामाजिक व्यवहार के बारे में। इन उद्देश्यों के आधार पर परिकल्पनाएँ और परीक्षण तैयार की गई हैं। वर्तमान अध्ययन के नमूने में अध्ययन की आबादी बिहार के जिला पटना में बिहार स्कूल शिक्षा बोर्ड, खगौल और लेखा नगर से संम्बध दो स्कूलों में नौवीं कक्षा में पढ़ने वाले *13-14* वर्ष की आयु के किशोर थे। इन विद्यालयों में अध्ययन के लिए कुल मिलाकर *282* किशोर उपलब्ध थे। इन *282* किशोरों में से *112* किशोर आशा व्यसन मुक्ति कार्यक्रम में भाग लेने के लिए तैयार थे। इन *112* किशोरों में से *100* विद्यार्थियों का मिलान कर नियंत्रण एवं प्रयोगात्मक समूह को यादृच्छिक रूप से सौंपा गया। अंत में, विश्लेषण के लिए केवल *82* किशोरों के आंकड़े उपलब्ध थे। अध्ययन के लिए उपयोग किए जाने वाले उपकरण ई-गैजेट यूसेज स्केल हैं जिन्हें ममता एस.एल. द्वारा विकसित किया गया है। और विजयलक्ष्मी ए. अमीनाभवी *(2017),* मानसिक क्षमता परीक्षण जलोटा *(1972)* द्वारा निर्मित है। यह उपकरण सामान्य मानसिक क्षमता का मापनकरता है। डॉ. हरीश शर्मा और डॉ. राजीव लोचन भारद्वाज *(2007)* द्वारा विकसित भावनात्मक योग्यता स्केल का उपयोग किशोरों की भावनात्मक योग्यता का आकलन करने के लिए किया गया था, और सामाजिक व्यवहार स्कोरे का रिकॉर्ड स्कूल से लिया गया । आशा व्यसन मुक्ति कार्यक्रम फीडबैक फॉर्म स्वयं अन्वेषक द्वारा तैयार किया गया था। इसका उपयोग आशा व्यसन मुक्ति कार्यक्रम के बारे में किशोरों की प्रतिक्रिया प्राप्त करने के लिए किया गया था। परिकल्पना का परीक्षण करने के लिए माध्य, मानक विचलन, प्रतिशत, टी-परीक्षण, एनोवा और एएनसीओवीए की सांख्यिकीय तकनीकों का उपयोग करके डेटा का विश्लेषण किया गया था। जैसा कि अध्ययन से स्पष्ट रूप से पता चला है, ई-गैजेट्स के अधिक उपयोग से मानसिक क्षमता, मानसिक क्षमता और सामाजिक व्यवहार के साथ-साथ समग्र मनोसामाजिक क्षमता कम हो रही है। यह माता-पिता, शिक्षकों और स्कूल के प्रशासकों से तत्काल ध्यान देने की आवश्यकता है ताकि किशोरों की मानसिकता को ई-गैजेट्स से अन्य हानिरहित और स्वस्थ प्रथाओं की ओर मोड़ने के लिए निवारक उपाय किए जा सकें। अध्ययन के निष्कर्ष ई-गैजेट्स के अधिक उपयोग के कारण किशोरों की मानसिक क्षमता समस्याओं को रोकने के लिए स्कूल स्तर पर परामर्शदाताओं को नियुक्त करने की तत्काल आवश्यकता पर भी बल देते हैं।

मुख्य शब्द: किशोरों, मानसिक क्षमता, भावनात्मक योग्यता और सामाजिक व्यवहार और आशा व्यसन मुक्ति कार्यक्रम

प्रस्तावना

आधुनिक इलेक्ट्रॉनिक गैजेट्स व्यसन प्रणाली से अनुशासन हीनता, धमकाने, परीक्षाओं में अनुचित साधनों का उपयोग, तनाव, चिंता, अवसाद, मादक द्रव्यों के सेवन, हिंसा और आक्रामकता और कई अन्य समस्याओं के द्वारा किशोरों इस का सामना कर रहा है। कई शोधकर्ताओं और विशेषज्ञों ने अपने ज्ञान, अनुभव और पृष्ठभूमि के अनुसार इन समस्याओं का अनूठा समाधान प्रस्तुत किया है। इलेक्ट्रॉनिक गैजेट्स की प्रगति के साथ, ज्ञान और आर्थिक विकास; संबंधों, व्यक्तिगत समझ, व्यक्तिगत संवारने और काम के तनाव से जुड़ी कई जटिल समस्याएं हल हो गई हैं। इनमें से कुछ समाधान उन क्षेत्रों से आते हैं, जो अब तक अज्ञात या महत्वहीन माने जाते थे; जैसे योग, व्याम, प्रकृतिक कार्य। जिसे व्यसनरत किशोरों को योग, व्याम, प्रकृतिक कार्य और अ नय कार्य में उनका साकारात्मक प्रभाव दिन प्रति दिन किशोरें के व्यवहार में विकसित हो रहा हैं(नक़ियाह नाहर, सहरुनिज़ाम सांगी और अब्दुल हाफिज अब्दुल्ला,2017)। "ई-गैजेट्स नए युग का मंत्र हैं। भारतीयों के भरोसेमंद साथी बन गए हैं। हाइटेक ई-गैजेट्स दर्जनों लोगों द्वारा खिल रहे हैं क्योंकि कंपनियां एक-दूसरे के खिलाफ प्रतिस्पर्धा करते हैं

ताकि समय पर ग्राहकों या हेडसेट की आंखों को पकड़ा जा सके। " बहुत से ऐसे व्यक्ति हैं जो अपने ई-गैजेट्स का इस्तेमाल काम की ज़िंदगी को आसान बनाने के लिए करते हैं, वहीं कई लोग ऐसे भी हैं जो उन्हें मज़े के लिए इस्तेमाल करते हैं। हालांकि ई-गैजेट और डिवाइस जीवन को आसान बना सकते हैं, लेकिन वे हमारे शरीर (वेलनेस मेडिनेज, 2015) के लिए हानिकारक हो सकते हैं। विभिन्न सरकारी निकाय, एनजीओ, शैक्षणिक संगठन तलाशने की कोशिश कर रहे हैं; शैक्षिक संस्थानों में समग्र शिक्षा साधन के रूप में इलेक्ट्रॉनिक गैजेट्स की व्यसनरत उपयोगिता कैसे प्रदान की जा सकती है। (वाॅयके,2012) द्वारा प्रतिपादित एकीकृत (व्यसनरत) ई-शिक्षा प्रदान करने के लिए एक खाका तैयार करने के लिए कई सेमिनार, संगोष्ठी, कार्यशालाओं का आयोजन किया गया है। तरह-तरह की रणनीतियां बनाई और परखी जा रही हैं। लेकिन, समकालीन विकट चुनौती के लिए और अधिक प्रयास और नए क्षेत्रों की खोज की आवश्यकता है। व्यसनरत) ई-शिक्षा ऐसे क्षेत्रों में से एक है, जिसे इस संदर्भ में किशोरों को और अधिक प्रयास की जाना चाहिए। व्यसन एक पुरानी प्रथा है, योग-व्यायाम द्वारा उन समाधानों को एक प्रतीत के रूप लिया है, जिन्हें इसके मजबूत सामाजिक-सांस्कृतिक आधार के कारण योगिकगुण प्राप्त हैं। इस लिए इसके अभ्यास में किसी भी जटिलता के बिना अपनाया जा सकता है। विविध निर्माणों पर आशा व्यसन मुक्ति के प्रभाव पर बढ़ती दिलचस्पी की वर्तमान स्थिति के बावजूद; अधिक अध्ययन की तत्काल जरूरत है। इसके अलावा कई तरह के आशा व्यसन मुक्ति कार्यक्रम के द्वारा योग-व्यायाम कार्य भी प्रभावी होते हैं। प्रत्येक प्रकार के आशा व्यसन मुक्ति कार्यक्रम का दृष्टिकोण, तकनीक और प्रभाव भिन्न होता है। इस संदर्भ में (कार्लान, 2010) का मत है, "यह स्पष्ट है कि ये सभी उपागम समान नहीं हैं। तदनुसार, विभिन्न प्रकार के व्यसन मुक्ति कार्यक्रम का अभ्यास करने से समान परिणाम की अपेक्षा की जा सकती है।" आशा व्यसन मुक्ति कार्यक्रम पर अनुसंधाकरती ने इस क्षेत्र में सभी सीमाओं और विषयों को पार कर लिया है। स्वास्थ्य, मनोविज्ञान, प्रबंधन, शारीरिक शिक्षा और शिक्षा जैसे विषयों में आशा व्यसन मुक्ति कार्यक्रम उपयोगी सिद्ध हुआ है। यह तनाव, चिंनता और व्यक्तित्व की विशेषताओं में सुधार जैसी चिकित्सा समस्याओं को हल करने में बहुत प्रभावी साबित हुआ है; प्रबंधकीय दक्षता को बढ़ाना, खिलाड़ियों की शारीरिक दक्षता को बढ़ाना और मानसिक स्वास्थ्य से संबंधित विभिन्न समस्याओं को हल करना। लेकिन शैक्षिक क्षेत्र से और शैक्षिक सेटिंग्स में महत्वपूर्ण निर्माणों से संबंधित बहुत कम अध्ययनों की सूचना मिली है। किशोरों मानसिक क्षमता के क्षेत्र ज्ञानात्मक विधियों को सीखने के लिए एक प्रमुख विधियों मानता है। अच्छा मानसिक क्षमता कौशल, मानसिक क्षमता नियंत्रण और मानसिक क्षमताएं सीखने की सुविधा प्रदान करती हैं। मार्क जुकर बर्ग (2011) ने रिपोर्ट किया, "विचार, और भावना का मानसिक नियंत्रण एक चुनौतीपूर्ण समस्या है"। भावात्मक योग्यता वह उपलब्धि है जिस पर किशोरों का करियर निर्भर करता है। स्मृति जैसी मानसिक क्षमताएं, सूचना प्रसंस्करण, कार्यकारी कार्य, मौखिक क्षमता, तर्क करने की क्षमता और समस्या सुलझाने की क्षमता सामाजिक व्यवहार के महत्वपूर्ण निर्धारक हैं। इसके अलावा, भावनात्मक योग्यता भी अच्छे या खराब मानसिक स्तर और स्कूलों, घर और समाज में समायोजन के लिए जिम्मेदार एक महत्वपूर्ण चर है। लेकिन जैसा कि सिथलेट (2013) ने प्रतिपादित किया, " व्यसन मुक्ति कार्यक्रम पर अनुसंधान अभी भी अपनी प्रारंभिक अवस्था में है"। शोधकर्ती को परिणामों को सामान्य बनाने के लिए अपर्याप्त शोध मिले। इसके अलावा, "विभिन्न प्रकार के व्यसन मुक्ति कार्यक्रम का अलग-अलग प्रभाव होता है" (सूजेन और अन्य, 2007)। व्यसन मुक्ति कार्यक्रम के बारे में स्पष्ट सिद्धांत तक पहुंचने के लिए; व्यवहारिक-अधिगम स्थितियों में प्रमुख महत्व की संरचनाओं पर विभिन्न प्रकार के व्यसन मुक्ति कार्यक्रम के प्रभावों का पता लगाया जाना चाहिए। साहित्य समीक्षा इंगित करती है कि व्यसन मुक्ति कार्यक्रम जीवन की चुनौतियों का सामना करने में मदद करता है। लेकिन सवाल उठता है। लगभग कितने प्रकार के व्यसन मुक्ति कार्यक्रम में से; किसका अभ्यास किया जाना चाहिए? वांछित परिणाम प्राप्त करने के लिए कितना समय चाहिए? इस अभ्यास की आवृत्ति क्या होनी चाहिए? क्या व्यसन मुक्ति कार्यक्रम को मानसिक क्षमताओं, भावनात्मक योगयता और अंत में सामाजिक व्यवहार के संदर्भ में किशोरों की दक्षता बढ़ाने के साधन के रूप में इस्तेमाल किया जा सकता है? क्या सामाजिक व्यवहार सेटिंग में व्यसन मुक्ति कार्यक्रम

का उपयोग किया जा सकता है? मानसिक क्षमताओं के विभिन्न आयामों पर व्यसन मुक्ति कार्यक्रम के प्रभाव क्या हैं?विभिन्न जनसांख्यिकीय चरों वाले किशोरों पर व्यसन मुक्ति कार्यक्रम के क्या प्रभाव हैं? क्या यह निम्न स्तर के तनाव वाले छात्रों के स्कोर को बेहतर बनाने में मदद करता है? क्या यह उच्च स्तर के तनाव वाले किशोरों के स्कोर को बेहतर बनाने में मदद करता है? ये कुछ ऐसे सवाल हैं जिन पर अभी तक गौर नहीं किया गया है। यही कारण है कि शोधकर्ती ने इस शोध को करने की इच्छुक हैं। यह किशोरों के व्यवहार में अत्यधिक एवं आवश्यक परिवर्तन लाने में लाभकारी सिद्ध हो सकता है।

हालाँकि, अन्वेषक के सर्वोत्तम ज्ञान के अनुसार, भारत में आशा व्यसन मुक्ति कार्यक्रम के प्रभाव पर मानसिक क्षमताओं, भावनात्मक योगयता और किशोरों की सामाजिक व्यवहार पर बहुत अधिक काम नहीं किया गया है। इसलिए प्रस्तुत अध्ययन किशोरों की मानसिक क्षमताओं, भावनात्मक योगयता और सामाजिक व्यवहार पर राजयोग ध्यान के प्रभाव की जांच करने का प्रयास है।

6.1.2 समस्या का बयान

व्यसनरत किशोरों के मानसिक क्षमता, भावनात्मक योग्यता और सामाजिक व्यवहार पर आशा व्यसन मुक्ति कार्यक्रम का प्रभाव

6.1.3 कार्यात्मक पारिभाषा

अध्ययन के तहत चर में से प्रत्येक के लिए निम्नलिखित परिचालित परिभाषाएॅ प्रदान की गई हैं प्रभाव किसी भी तरह के व्यवहार जो अपने आप को या किसी अन्य व्यक्ति के मौखिक या गैर–मौखिक कार्यों के माध्यम से नुकसान पहुंचाने के लिए प्रेरित करता है, या तो मनसिक क्षमता, भावनात्मक योगयता और समाजिक व्यवहार का ही प्रभाव है।

1) किशोर

विश्व स्ववस्थ्य संगठन,(डब्ल्यूएचओ) के अनुसार ''किशोरावस्था बचपन और वयस्कता के बीच वृद्धि और विकास का संक्रमणकालीन चरण है।'' डब्ल्यूएचओ (2015), ''एक किशोर को 10 और 19 साल की उम्र के बीच किसी भी व्यक्ति के रूप में परिभाषि करता है।'' किशोरावस्था एक तूफान और तनाव की अवधि है, इस अवधि के दौरान एक किशोर मानसिक क्षमता,भावनात्मक योगयता और सामाजिक जैसे कई परिवर्तनों का अनुभव करता हैं और वे अपने परिवार में अपनी भूमिकाओं बौर जिम्मेदारियों के बारे में स्पष्टता पाने के लिए संघर्ष करते हैं और वे अपने परिवार पर कम निर्भर होना चाहते हैं। इलेक्ट्रोनिक गैजेट्स पर अधिक निर्भर करने वाले किशोर मानसिक चिंताओं और परेशानियों से बचने के इरादे से हो सकते हैं जो इस अवधि के दौरान स्वाभाविक रूप से होते हैं।

2) व्यसन मुक्ति कार्यक्रम

व्यसन कार्यक्रम इलेक्ट्रॉनिक गैजेट्स की व्यसन और इसकी रोकथाम के परिणामों के बारे में स्वास्थ्य प्रचार गतिविधियों को संदर्भित करता है, जिसका प्राथमिक उद्देश्य सूचना गाइड शीट का प्रशासन करके किशोरों के ज्ञान को बढ़ाना है।

3) इलेक्ट्रॉनिक गैजेट्स

इलेक्ट्रिक करंट से चलने वाला कोई भी इलेक्ट्रोनिक गैजेट्स जो इंसान को अपना काम तेजी से और आसानी से करने में मदद करता है और मानव जीवन को आसान बनाता हैं, इलेक्ट्रॉनिक गैजेट्स ।

4) मानसिक क्षमता

मानसिक क्षमता से तात्पर्य व्यक्ति की संतुलित मनोदशा, तर्क बुद्धि, सामाजिक रूप, समान व्यवयहार तथा व्यक्ति को आनन्दमय व प्रभावशाली बनाए रखने की क्षमता से है। मानसिक क्षमता शरीर और मन का समांजस्यपूर्ण कार्य है। मानसिक रूप से स्वास्थ्य व्यक्ति के विचार, भावनाएं और कार्य सभी मिलकर लक्ष्य की प्राप्ति के लिए सामांजस्यपूर्ण रूप से कार्य करते है। यह भावनात्मक रूप से परिपक्व और स्थिर होने के लिए समाजिक रूप से अनुकूल होने के लिए एक व्यक्ति की क्षमता है, जिसके पास जीवन के प्रति तार्किक सोच और वैज्ञानिक दृष्टिकोण हैं, जो कुल मिलाकर व्यक्ति के संज्ञानात्मक, स्नेहपूर्वक और शंक्राकार क्रियाओं के बीच जो अपने और दुसरों के लिए संतुलन प्राप्त करने योग्य लक्ष्य को निर्धारित करता है।

5) भावनात्मक योग्यता

मनोभाव अथवा भवना चेतना का वह पक्ष जिसमें व्यक्ति हर्ष ,विषाद, डर, घृणा आदि महसूस रहता है।परन्तु मनोभाव चेतना के भावनात्मक पक्ष को ही मुख्य रूप से प्रदर्शित करता है जिसमें व्यक्ति सुख–दुख आदि महसू करता है। वैसे चेतना के अन्य पक्ष भी है जिसमें ज्ञानात्मकता तथा संकल्प–शक्ति जैसे तत्व भी शामिल होते हैं। भावना में चेतना के

भावनात्मक पक्ष को इस रूप में परिभाषित किया जा सकता है कि चेतना की इस अवस्था में व्यक्ति के मन में मुख्य रूप से कुछ सुखद या दुखद अनुभव ही व्याप्त रहते हैं। इसी आधार पर भावना को चेतना की अन्य अनुभूतियों से अलग किया जा सकता है।

6) सामाजिक व्यवहार

किसी व्यक्ति की बुनियादी क्षमताओं या गुणों को खुशहाल और संतुष्ट जीवन जीने की आवश्यकता होती है जैसे कि कार्य करने में सक्षम होना, और कौशल के अच्छे पारस्परिक संबंधो, समस्याओं को कुशलतापूर्वक हल करने में, आलोचनात्मक और विश्लेषणात्मक रूप से सोचने में, रचनात्मक, भावनात्मक रूप से स्थिर और सहानुभूतिपूर्ण होने के नाते संवेदनशील संचार होना।

6.1.4 उद्देश्य

यह अध्ययन निम्नलिखित उद्देश्यों को आगे बढ़ाने के लिए तैयार किया गया था:

1. व्यसन मुक्ति कार्यक्रम पर आधारित किशोरों के लिए आशा व्यसन मुक्ति कार्यक्रम विकसित करना।
2. स्मृति, ध्यान, कार्यकारी कार्य और रचनात्मकता के आयामों को मापने वाले किशोरों के लिए मानसिक क्षमता परीक्षण विकसित करना।
3. आशा व्यसन मुक्ति कार्यक्रम के बारे में किशोरों की प्रतिक्रियाओं के आकलन के लिए एक आशा व्यसन मुक्ति कार्यक्रम प्रतिक्रिया प्रपत्र विकसित करना।

6.1.5 परिकल्पना

H_1 किशोरों के प्रयोगात्मक और नियंत्रण समूह के मानसिक क्षमताओं के स्कोर के लिए पूर्व-परीक्षण, तत्काल बाद के परीक्षण और समायोजित माध्य की तुलना है।

H_2किशोरों के प्रयोगात्मक और नियंत्रण समूह के भावनात्मक योग्यता के स्कोर के लिए तत्काल परीक्षण के बाद और विलंबित परीक्षण के बाद और समायोजित माध्य की तुलना है।

H_3किशोरों के प्रयोगात्मक और नियंत्रण समूह के सामाजिक व्यवहार स्कोर के लिए पूर्व परीक्षण, तत्काल बाद के परीक्षण और समायोजित माध्य की तुलना है।

प्रदत्तों का सांख्यिकीविष्लेषण एवं व्याख्या-

अनुसंधान कार्य में शोधपरीक्षणों एवं अंकन के पश्चात् प्रदत्तों का संकलन एवं व्यवस्थापन किया जाता है तथा संकलित प्रदत्त प्राप्त प्रदत्त के रूप में जाने जाते हैं। प्राप्त प्रदत्त जब तक अर्थपूर्ण होते हैं तब तक उनकों कोई सांख्यिकीय विश्लेषण नहीं दिया जाता है। प्रदत्तों के विश्लेषण का अर्थ प्राप्त प्रदत्तों को अर्थपूर्ण बनाना या उपयुक्त सांख्यिकीय विश्लेषण के द्वारा परिणाम प्राप्त करना है। सार्थक परिणामों को प्राप्त करने के लिए प्राप्त प्रदत्तों के विश्लेषण की सहायता से परिकल्पना का परीक्षण किया जाता है। इस कार्य में सांख्यिकी प्रविधियों का अपना विशेष महत्व है क्योंकि सांख्यिकी प्रविधियों के द्वारा ही आंकड़ों का विश्लेषण किया जाता है। प्रस्तुत अध्याय में प्राप्त प्रदत्तों का संख्यिकी विश्लेषण एवं व्याख्या की गयी है, जिससे उनके अन्तर्निहित अर्थ को पूर्ण रूप से स्पष्ट किया जा सकें। सांख्यिकीय विश्लेषण में विशेष रूप में मध्यमान प्रमाणित विचलन के मान व क्रान्तिक अनुपात की गणना की गयी है। प्रस्तुत लघुशोध कार्य का उद्देश्य ''व्यसनरत किशोरों के मानसिक क्षमता, भावनात्मक योग्यता और सामाजिक व्यवहार पर आशा व्यसन मुक्ति कार्यक्रम का प्रभाव'' प्रयोगात्मक अध्ययन करना है।

सारणी-

तालिका 5.33 प्रायोगिक और नियंत्रण समूहों की सर्जनशीलता और नवाचार के तत्काल बाद के परीक्षण और विलंबित परीक्षण के बाद के स्कोर के साधन है।

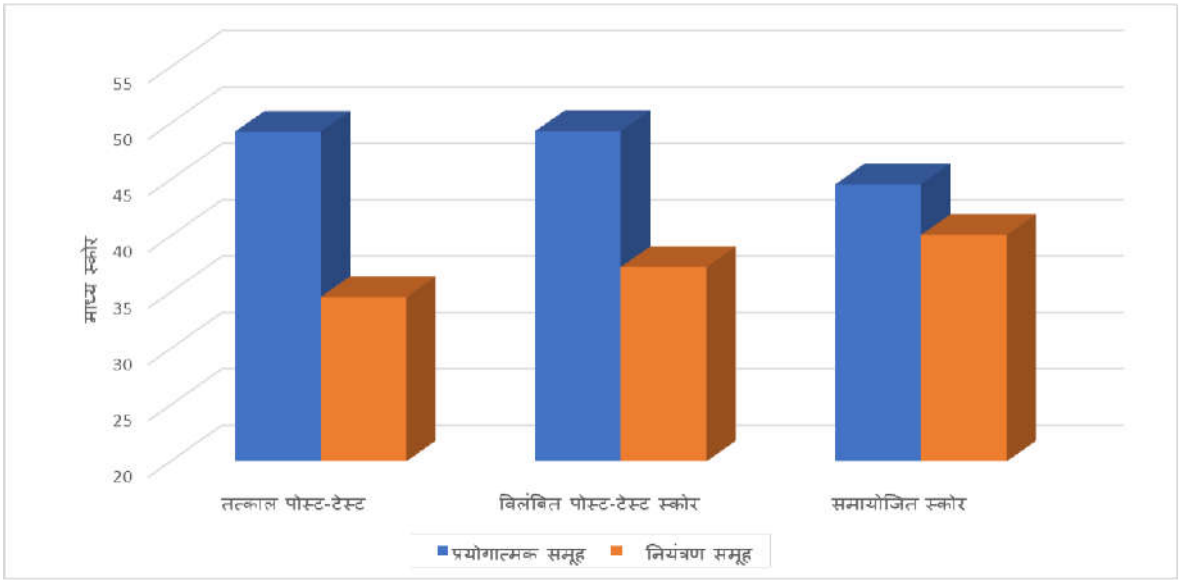
समूहों	N	MX	MY	M (Y.X)	t-value
प्रयोगात्मक समूह	41	49.20	49.17	44.08	
नियंत्रण समूह	41	34.44	34.98	40.07	
सामान्य साधन	41	41.82	42.075	42.075	3.13**

**0.01 स्तर पर महत्वपूर्ण है।

तालिका 5.33 से यह स्पष्ट है कि किशोरों के दो समूहों के समायोजित सर्जनशीलता और नवाचार स्कोर में औसत अंतर क्रमशः 44.08 और 40.07 प्रयोगात्मक और नियंत्रण समूह के लिए है। तालिका 5.33 से यह भी पता चलता है कि प्रयोगात्मक समूह के किशोरों के सर्जनशीलता और नवाचार पर उच्च अंक हैं और

नियंत्रण समूह (t= 3.13, p<0.01) से काफी भिन्न हैं। इसे चित्र 5.12 में दंड आरेख द्वारा दर्शाया गया है।

आरेख5.12:किशोरों के प्रयोगात्मक और नियंत्रण समूह के मानसिक क्षमताओं के स्कोर के लिए पूर्व-परीक्षण, तत्काल बाद के परीक्षण और समायोजित माध्य की तुलना है।



मानसिक क्षमताओं के लिए सह-प्रसरण का विश्लेषण तीन भागों में किया गया था। सबसे पहले, प्री-टेस्ट और तत्काल पोस्ट-टेस्ट के बीच अंतर के महत्व का परीक्षण किया गया, इसके बाद प्री-टेस्ट और विलंबित पोस्ट-टेस्ट के बीच अंतर का महत्व और अंत में तत्काल पोस्ट-टेस्ट और विलंबित पोस्ट टेस्ट के प्रभाव के बीच अंतर का महत्व मानसिक क्षमताओं पर आशा व्यसन मुक्ति कार्यक्रम का विवरण विश्लेषण नीचे प्रस्तुत किया गया है

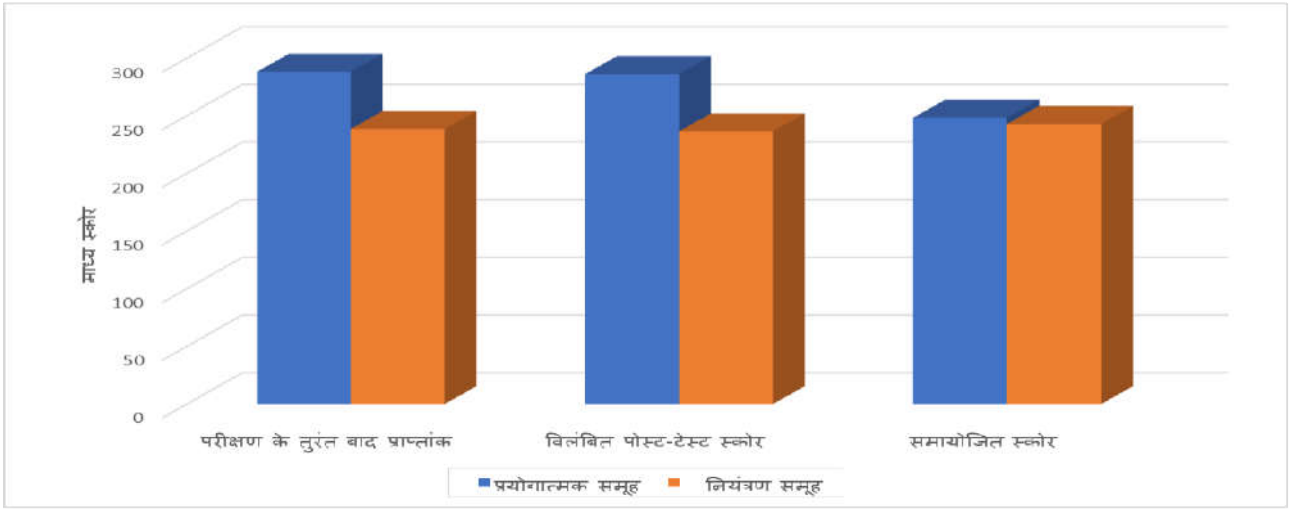
तालिका 5.39: प्रायोगिक और नियंत्रण समूहों की भावनात्मक योग्यता के तत्काल परीक्षण के बाद और विलंबित परीक्षण के बाद के स्कोर के साधन है।

समूहों	N	MX	MY	M (Y.X)	t-value
प्रयोगात्मक समूह	41	270.54	245.99	2470.85	1.04
नियंत्रण समूह	41	223.63	225.17	242.06	
सामान्य साधन	41	247.085	244.03	244.03	

नोटः t-0.05 के स्तर पर सार्थक नहीं है।

तालिका 5.39 से यह स्पष्ट है कि किशोरों के दो समूहों के समायोजित भावनात्मक योग्यता में औसत अंतर क्रमशः 247,085 और 242.06 प्रयोगात्मक और नियंत्रण समूह के लिए है। तालिका 5.39 से यह भी पता चलता है कि प्रयोगात्मक समूह के किशोरों का मानसिक क्षमताओं पर थोड़ा अधिक अंक होता है और नियंत्रण समूह (t = 1.04) से महत्वपूर्ण रूप से भिन्न नहीं होता है जिसे चित्र 5.15 में बार आरेख के माध्यम से दर्शाया गया है।

आरेख 5.15: किशोरों के प्रयोगात्मक और नियंत्रण समूह के भावनात्मक योग्यता के स्कोर के लिए तत्काल परीक्षण के बाद और विलंबित परीक्षण के बाद और समायोजित माध्य की तुलना है।



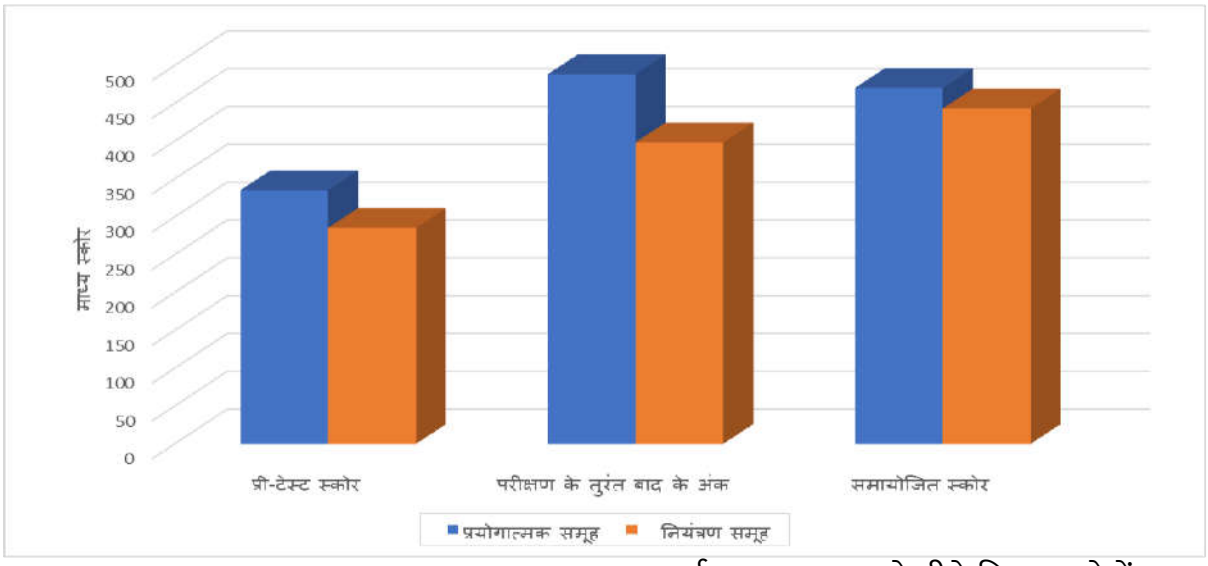
तालिका 5.47: प्रायोगिक और नियंत्रण समूहों की सामाजिक व्यवहार के पूर्व-परीक्षण और तत्काल परीक्षण के बाद के अंकों के साधन है।

समूहों	N	MX	MY	M(Y.X)	t.value
प्रयोगात्मक समूह	41	303.85	471.63	449.89	
नियंत्रण समूह	41	262.05	382.27	404.01	
सामान्य साधन	41	282.95	426.95	42695	9.12**

**0.01 स्तर पर महत्वपूर्ण है।

तालिका 5.47 से स्पष्ट है कि किशोरों के दो समूहों के समायोजित सामाजिक व्यवहार स्कोर में औसत अंतर क्रमशः प्रयोगात्मक और नियंत्रण समूह के लिए 449.89 और 404.01 है। तालिका 5.47 से यह भी पता चलता है कि प्रयोगात्मक समूह के किशोरों का सामाजिक व्यवहार पर उच्च अंक है और नियंत्रण समूह ($t = 9.12$, $p<.01$) से महत्वपूर्ण रूप से भिन्न है। इसे चित्र 5.19 में दंड आरेख द्वारा दर्शाया गया है।

आरेख 5.19: किशोरों के प्रयोगात्मक और नियंत्रण समूह के सामाजिक व्यवहार स्कोर के लिए पूर्व परीक्षण, तत्काल बाद के परीक्षण और समायोजित माध्य की तुलना है।



6.1.6 अध्ययन की सीमाएँ

वर्तमान अध्ययन को नीचे दिए गए क्षेत्रों तक सीमित कर दिया गया है:

1. वर्तमान अध्ययन बिहार के पटना जिले में स्थित बिहार स्कूल शिक्षा बोर्ड, पटना से संबद्ध विद्यालयों में पढ़ने वाले किशोरों तक सीमित था।
2. वर्तमान अध्ययन शहरी क्षेत्र के दो विद्यालयों तक सीमित था; जिसमें एक सरकारी स्कूल और दूसरा निजी स्कूल था।
3. वर्तमान अध्ययन केवल 13-14 वर्ष की आयु के लड़के और लड़कियों तक ही सीमित था।
4. इस अध्ययन को केवल एक प्रकार के हस्तक्षेप, आशा व्यसन मुक्ति कार्यक्रम तक सीमित कर दिया गया।

6.1.7 कार्यप्रणाली

यह अध्ययन अनुसंधान की प्रयोगात्मक पद्धति को नियोजित करके किया गया था। इस अध्ययन का उद्देश्य पूर्व-परीक्षण, परीक्षण-पश्चात अर्ध प्रयोगात्मक डिजाइन के माध्यम से मानसिक क्षमताओं, भावनात्मक योग्यता और सामाजिक व्यवहार पर आशा व्यसन मुक्ति कार्यक्रम के प्रभाव का पता लगाना था। प्रयोगात्मक समूह और नियंत्रण समूह को यादृच्छिक रूप से विषय सौंपे गए थे। इस अध्ययन में, राजयोग ध्यान को उपचार चर के रूप में लिया गया था, जबकि मानसिक क्षमताओं, भावनात्मक योगयता और सामाजिक व्यवहार को आश्रित चर के रूप में लिया गया था।

6.1.8 प्रयोगात्मक अध्ययन

(क) नमूनाकरण।

वर्तमान अध्ययन में अध्ययन का नमूना दो स्तरों पर तैयार किया गया थाः

1. विद्यालय का नमूना
2. विद्यार्थी का नमूना

विद्यालय का नमूना

यह नमूना बिहार के पटना जिले में स्थित बिहार स्कूल शिक्षा बोर्ड, पटना से संबद्ध जिला पटना के दो स्कूलों से लिया गया था। अन्वेषक ने उद्देश्यपूर्ण प्रतिचयन तकनीक के प्रयोग द्वारा दो विद्यालयों का चयन किया। इन दो विद्यालयों में से एक सरकारी विद्यालय और दूसरा निजी विद्यालय था। दोनों स्कूलों में यह प्रयोग किया गया। तालिका 6.1 में चयनित विद्यालयों की सूची दी गई हैः

तालिका 6.1: आशा व्यसन मुक्ति कार्यक्रम के लिए चयनित विद्यालयों की सूची

क्रमांक	विद्यालय का नाम
1.	घनश्याम बालिका उच्च माध्यमिक विद्यालय, खगौल
2.	प्रेंसिडेनसी ग्लोबल स्कूल, लेखा नगर

विद्यार्थी का नमूना

अध्ययन की आबादी बिहार के जिला पटना में बिहार स्कूल शिक्षा बोर्ड, खगौल और लेखा नगर से संम्बध दो स्कूलों में नौवीं कक्षा में पढ़ने वाले 13-14 वर्ष की आयु के किशोर थे। इन विद्यालयों में अध्ययन के लिए कुल मिलाकर 282 किशोर उपलब्ध थे। इन 282 किशोरों में से 112 किशोर आशा व्यसन मुक्ति कार्यक्रम में भाग लेने के लिए तैयार थे। इन 112 किशोरों में से 100 विद्यार्थियों का मिलान कर नियंत्रण एवं प्रयोगात्मक समूह को यादृच्छिक रूप से सौंपा गया। अंत में, विश्लेषण के लिए केवल 82 किशोरों के आंकड़े उपलब्ध थे। अंतिम प्रतिदर्श का विद्यालयवार विवरण तालिका 6.2 में दिया गया है।

तालिका 6.2: नमूने का स्कूलवार चयन

क्रमांक	स्कूल का नाम	किशोरों की कुल संख्या	समूह	
			प्रयोगात्मक	नियंत्रण
1.	घानश्याम बालिका उच्च माध्यमिक विद्यालय, खगौल	40	20	20
2.	प्रेंसिडेनसी ग्लोबल स्कूल, लेखा नगर	42	21	21

(ख) डिजाइन

यह अध्ययन एक प्रयोगात्मक अध्ययन था जो पूर्व-परीक्षण पश्च परीक्षण नियंत्रण समूह डिजाइन पर

आधारित था। आशा व्यसन मुक्ति कार्यक्रम में प्रयोगात्मक समूह ने भाग लियाय जबकि कंट्रोल ग्रुप खेल गतिविधियों में व्यस्त था। उपचार चर (आशा व्यसन मुक्ति कार्यक्रम) के प्रभाव का अध्ययन आश्रित चरों पर किया गया (मानसिक क्षमताओं क्षमताएं, भावनात्मक योगयता और सामाजिक व्यवहार)। वर्तमान अध्ययन प्रकृति में मुख्यतः मात्रात्मक था।

तालिका 6.2 परीक्षण के बाद परीक्षण नियंत्रण समूह डिजाइन पूर्व परीक्षण

समूह	जुलाई8 (2021) से जुलाइ 19 (2021) तक	अगस्त 11(2021) से नवंबर 8 (2021) तक	जुलाई 10 (2021) से जुलाई 21(2021) तक	जुलाई 22 (2021) से अगस्त 6 तक (2021)
प्रयोगात्मक समूह	पूर्व- परीक्षण	उपचार	तत्काल पोस्ट - परीक्षण	विलंबित-पोस्ट परीक्षण
नियंत्रण समूह	पूर्व- परीक्षण	खेल गतिविधियों में व्यस्त	तत्काल- पोस्ट टेस्ट	विलंबित -पोस्ट टेस्ट

ग) प्रक्रियाः

अध्ययन तीन चरणों में पूरा किया गया था। इनका उल्लेख नीचे विस्तार से किया गया हैः

चरण - I

(01) दो समान समूहों का निर्माण

इस नमूने में दो स्कूलों से जानबूझकर चुने गए 112 किशोरों को शामिल किया गया था। इन किशोरों में से 100 का मिलान किया गया था। समूहों का मिलान नजम, हुसैन और खान (2015) द्वारा आध्यात्मिक मूल्य पैमाने में प्राप्त अंकों के आधार पर किया गया था। बाद में, किशोरों को बाद में बेतरतीब ढंग से प्रायोगिक समूह और नियंत्रण समूह में विभाजित किया गया। एक समूह को प्रयोगात्मक समूह तथा दूसरे समूह को नियंत्रण समूह का नाम दिया गया। प्रायोगिक समूह को राजयोग ध्यान कार्यक्रम से अवगत कराया गया, जबकि नियंत्रण समूह खेल गतिविधियों में भाग लेता था।

(02) पूर्व परीक्षण पर उपकरणों का प्रशासन

समूहों के मिलान के बाद, दोनों समूहों के किशोरों का मानसिक क्षमताओं के चरों पर मूल्यांकन किया गया, और मानसिक क्षमता परीक्षण और भावनात्मक योग्यता स्केल को पूर्व-परीक्षण के रूप में प्रशासित करके भावनात्मक योग्यता का मूल्यांकन किया गया। दूसरे व्यवहारिक परीक्षा के द्वारा सामाजिक व्यवहार अंको का सामाजिक गतिविधियों और स्कूल रिकॉर्ड से नीचे दर्ज किए गए थे।

चरण-द्वितीयः प्रायोगिक चरण (आशा व्यसन मुक्ति कार्यक्रम)

उपचार चर की प्रभावकारिता का पता लगाने के लिए प्रयोगात्मक समूह को प्रत्येक स्कूल के लिए 88 दिनों के लिए आशा व्यसन मुक्ति कार्यक्रम के चार चरणों के रूप में उपचार दिया गया और नियंत्रण समूह ने खेल गतिविधि में भाग लिया। 30 दिनों के बाद, प्रायोगिक समूह के किशोरों को कार्यक्रम के बारे में प्रतिक्रिया जानने के लिए आशा व्यसन मुक्ति कार्यक्रम कार्यक्रम प्रतिक्रिया प्रपत्र दिया गया। पुनः, 30 दिनों की अवधि के बाद, प्रायोगिक समूह के किशोरों को कार्यक्रम के बारे में प्रतिक्रिया जानने के लिए एक परीक्षण दिया गया।

चरण- II:

(ए) तत्काल परीक्षण के बाद उपकरणों का प्रशासन

उपचार समाप्त होने के तुरंत बाद, उपचार के प्रभाव को जानने के लिए मानसिक क्षमताओं और भावनात्मक योग्यता के चरों पर विषयों का मूल्यांकन किया गया। अंतिम परीक्षा की सामाजिक व्यवहार के स्कोर स्कूल के रिकॉर्ड से लिए गए थे।

(बी) विलंबित परीक्षण के बाद उपकरणों का प्रशासन

परीक्षण के तुरंत बाद, छात्रों को आशा व्यसन मुक्ति कार्यक्रम को जारी रखने के लिए किसी भी तरह का निर्देश नहीं दिया गया। 90 दिनों के अंतराल के बाद, एक बार फिर से छात्रों को आशा व्यसन मुक्ति कार्यक्रम की जांच करने के लिए सभी उपकरण दिए गए, जिसे विलंबित पोस्ट-टेस्ट कहा जाता है। उपचार के प्रभाव को जानने के लिए विषयों का मूल्यांकन मानसिक क्षमताओं और भावनात्मक योग्यता के चरों पर किया गया था। पुनः सामाजिक

व्यवहार हेतु प्रथम अंतिम परीक्षा के अंक विद्यालय अभिलेखों से लिए गए। प्रक्रिया का सारांश तालिका 6.4 में प्रस्तुत किया गया है।

तालिका 6.4 डिजाइन का योजनाबद्ध लेआउट

अनु क्रमांक	चरण	अनुसूची	गतिविधि
1.	पूर्व–प्रयोगात्मक चरण		
	(1) उपकरणों का विकास	जुलाई 8 (2021) से जुलाइ 19 (2021) तक	इलेक्ट्रानिक गैजेट्स परीक्षण का विकास, ईजेपी फीडबैक फॉर्म।
	(2) दो समरूप समूहों का निर्माण	अगस्त 3 (2021) से अगस्त 10 (2021) तक	किशोरी ने ज्ञानात्मक क्षमताओं के लिए परीक्षण किया।
	(3) पूर्व परीक्षण का प्रशासन	अगस्त 3 (2021) से अगस्त 10 (2021) तक	किशोरों पर अंतिम परीक्षा, मानसिक क्षमता परीक्षण और भावनात्मक योग्यता पैमाना प्रशासित किया गया था।
2.	प्रयोगात्मक चरण (उपचार)	अगस्त 23(2021) से सितम्बर 3 (2021) तक	प्रयोगात्मक समूह के किशोरों को आशा व्यसन मुक्ति कार्यक्रम से अवगत कराया गया।
3.	पोस्ट प्रायोगिक चरण	जुलाई 10 (2021) से जुलाई 21(2021) तक	अंतिम परीक्षा, मानसिक क्षमताओं और भावनात्मक योग्यता परीक्षण प्रशासित किया गया था
	1) तत्काल पोस्ट–टेस्ट का प्रशासन	जुलाई 10 (2021) से जुलाई 21(2021) तक	अंतिम परीक्षा, मानसिक क्षमताओं और भावनात्मक योग्यता परीक्षण प्रशासित किया गया था
	(2) विलंबित तत्काल पोस्ट–टेस्ट का प्रशासन	जुलाई 22 (2021) से अगस्त 6 तक (2021)	पहली टर्मिनल परीक्षा, मानसिक क्षमताओं और भावनात्मक योग्यता परीक्षण प्रशासित किया गया था।

4.) प्रयुक्त उपकरण

अनुसंधानकर्ता को परीक्षण के लिए विभिन्न प्रकार के उपकरणों की आवश्यकता होती है। उपयोग किए गए उपकरणों का विवरण नीचे दिया गया है:

1. ई–गैजेट्स यूसेज स्केल

नियंत्रण और प्रायोगिक समूह के लिए किशोरों का चयन करने के लिए, विजयलक्ष्मी ए. अमीनाभवी (2017) द्वारा विकसित ई–गैजेट्स के उपयोग पैमाने का उपयोग किया गया था।

2. मानसिक क्षमता परीक्षण

यह परीक्षण सामान्य मानसिक क्षमता परीक्षण जलोटा (1972) द्वारा निर्मित है। यह उपकरण सामान्य मानसिक क्षमता का मापनकरता है। इस परीक्षण का चयन मानसिक क्षमता के हेतु किया गया है।

3. आशा व्यसन मुक्ति कार्यक्रम फीडबैक फॉर्म

आशा व्यसन मुक्ति कार्यक्रम फीडबैक फॉर्म स्वयं अन्वेषक द्वारा तैयार किया गया था। इसका उपयोग आशा व्यसन मुक्ति कार्यक्रम के बारे में किशोरों की प्रतिक्रिया प्राप्त करने के लिए किया गया था।

4. भावनात्मक योग्यता पैमाना

डॉ.हरीश शर्मा और डॉ.राजीव लोचन भारद्वाज (2007) द्वारा विकसित भावनात्मक योग्यता स्केल का उपयोग किशोरों की भावनात्मक योग्यता का आकलन करने के लिए किया गया था।

5. सामाजिक व्यवहार

सामाजिक परिस्थितियों में अपने व्यवहार और भावनाओं का सामाजिक परिस्थितियों में बेहद शर्मीले किशोरों के सामाजिक व्यवहार स्कोरे का

रिकॉर्ड स्कूल से लिया गया और क्रमशः प्री-टेस्ट, तत्काल पोस्ट-टेस्ट और विलंबित पोस्ट-टेस्ट के लिए इस्तेमाल किया गया।

6.1.9 सांख्यिकीय तकनीकों का प्रयोग किया गया

माध्य, मानक विचलन, प्रतिशत, टी-परीक्षण, एनोवा और एएनसीओवीए की सांख्यिकीय तकनीकों का उपयोग करके डेटा का विश्लेषण किया गया था। एकत्रित डेटा का उद्देश्यवार विश्लेषण किया गया था। जिसका विवरण तालिका 6.5 में दिया गया है।

क्रमांक	उद्देश्य संख्या	सांख्यिकीय तकनीक
1.	व्यसन मुक्ति कार्यक्रम के आधार पर किशोरों के लिए आशा व्यसन मुक्ति कार्यक्रम विकसित करना।	.....
2.	स्मृति, अभ्यास कार्य, कार्यकारी कार्य और रचनात्मकता के आयामों को मापने वाले किशोरों के लिए मानसिक क्षमता परीक्षण विकसित करने के लिए।	.....
3.	आशा व्यसन मुक्ति कार्यक्रम के बारे में किशोरों की प्रतिक्रियाओं के मूल्यांकन के लिए एक आशा व्यसन मुक्ति कार्यक्रम फीडबैक फॉर्म विकसित करना।	.....
4.	किशोरों की मानसिक क्षमताओं पर आशा व्यसन मुक्ति कार्यक्रम के प्रभाव का अध्ययन निम्नलिखित आयामों के संदर्भ में करनाः (1) स्मृति (2) अभ्यास कार्य (3) कार्यकारी कार्य (4) रचनात्मकता	एन्कोवा
5.	किशोरों की भावनात्मक योग्यता पर आशा व्यसन मुक्ति कार्यक्रम के प्रभाव का अध्ययन करना।	एन्कोवा
6.	किशोरों की सामाजिक व्यवहार पर आशा व्यसन मुक्ति कार्यक्रम के प्रभाव का अध्ययन करना।	एन्कोवा
7.	किशोरों की मानसिक क्षमताओं पर उपचार और स्कूल के प्रकार के बीच पारस्परिक क्रिया का अध्ययन करना।	एनोवा
8.	किशोरों की भावनात्मक योग्यता पर उपचार और स्कूल के प्रकार के बीच परस्पर क्रिया का अध्ययन करना।	एनोवा
9.	किशोरों की सामाजिक व्यवहार पर उपचार और स्कूल के प्रकार के बीच परस्पर क्रिया का अध्ययन करना।	एनोवा
10.	आशा व्यसन मुक्ति कार्यक्रम के प्रति प्रायोगिक समूह के किशोरों के मत का अध्ययन करना।	प्रतिशत

6.2 जाँच - परिणाम

1. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के स्मृति आयाम के पूर्व-परीक्षण और तत्काल परीक्षण के बाद के औसत स्कोर में एक महत्वपूर्ण अंतर मौजूद है।

2. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के स्मृति आयाम के पूर्व-परीक्षण और विलंबित परीक्षण के बाद के औसत अंकों में कोई महत्वपूर्ण अंतर नहीं है।

3. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के तत्काल बाद परीक्षण और विलंबित परीक्षण के बाद के औसत स्कोर में कोई महत्वपूर्ण अंतर नहीं है।

4. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के प्री-टेस्ट और तत्काल पोस्ट-टेस्ट माध्य ज्ञानात्मक आयाम में एक महत्वपूर्ण अंतर मौजूद है।
5. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के ज्ञानात्मक आयाम के पूर्व-परीक्षण और विलंबित परीक्षण के बाद के औसत अंकों में कोई महत्वपूर्ण अंतर नहीं है।
6. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के तत्काल परीक्षण के बाद और परीक्षण के बाद विलंबित औसत ध्यान आयाम में कोई महत्वपूर्ण अंतर नहीं है।
7. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के कार्यकारी कार्य आयाम के प्री-टेस्ट और तत्काल पोस्ट-टेस्ट माध्य स्कोर में महत्वपूर्ण अंतर मौजूद है।
8. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के प्री-टेस्ट और विलंबित पोस्ट-टेस्ट माध्य स्कोर कार्यकारी कार्य में एक महत्वपूर्ण अंतर मौजूद है।
9. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के कार्यकारी कार्य आयाम के तत्काल पोस्ट-टेस्ट और विलंबित पोस्ट-टेस्ट माध्य स्कोर में एक महत्वपूर्ण अंतर मौजूद है।
10. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के रचनात्मकता आयाम के पूर्व-परीक्षण और तत्काल परीक्षण के बाद के औसत स्कोर में महत्वपूर्ण अंतर मौजूद है।
11. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के रचनात्मकता आयाम के प्री-टेस्ट और विलंबित पोस्ट-टेस्ट माध्य स्कोर में महत्वपूर्ण अंतर मौजूद है।
12. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के तत्काल पोस्ट-टेस्ट और विलंबित पोस्ट-टेस्ट माध्य स्कोर रचनात्मकता आयाम में एक महत्वपूर्ण अंतर मौजूद है।
13. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के पूर्व-परीक्षण और तत्काल परीक्षण के बाद के औसत स्कोर में महत्वपूर्ण अंतर मौजूद है।
14. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की मानसिक क्षमताओं के प्री-टेस्ट और विलंबित पोस्ट-टेस्ट माध्य स्कोर में महत्वपूर्ण अंतर मौजूद है।
15. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की तत्काल परीक्षण के बाद और परीक्षण के बाद देरी से मानसिक क्षमताओं के औसत स्कोर में कोई महत्वपूर्ण अंतर नहीं है।
16. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की भावनात्मक योग्यता के पूर्व-परीक्षण और तत्काल परीक्षण के बाद के औसत स्कोर में महत्वपूर्ण अंतर मौजूद है।

17. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की भावनात्मक योग्यता के पूर्व-परीक्षण और विलंबित परीक्षण के बाद के औसत स्कोर में महत्वपूर्ण अंतर मौजूद है।
18. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की तत्काल परीक्षण के बाद और परीक्षण के बाद देरी से भावनात्मक योग्यता के औसत स्कोर में कोई महत्वपूर्ण अंतर नहीं है।
19. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की सामाजिक व्यवहार के पूर्व-परीक्षण और तत्काल बाद के परीक्षण के औसत अंकों में महत्वपूर्ण अंतर मौजूद है।
20. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की सामाजिक व्यवहार के पूर्व-परीक्षण और विलंबित परीक्षण के बाद के औसत अंकों में महत्वपूर्ण अंतर मौजूद है।
21. आशा व्यसन मुक्ति कार्यक्रम के माध्यम से उपचार किए गए किशोरों की सामाजिक व्यवहार के तत्काल बाद परीक्षण और विलंबित परीक्षण के बाद के औसत स्कोर में एक महत्वपूर्ण अंतर मौजूद है।
22. किशोरों की मानसिक क्षमताओं पर उपचार और स्कूल के प्रकार के बीच कोई महत्वपूर्ण अंतःक्रिया नहीं है।

23. किशोरों की भावनात्मक योग्यता पर उपचार और स्कूल के प्रकार के बीच कोई महत्वपूर्ण बातचीत नहीं है।
24. किशोरों की सामाजिक व्यवहार पर उपचार और स्कूल के प्रकार के बीच कोई महत्वपूर्ण अंतःक्रिया नहीं है।
25. प्रायोगिक समूह के किशोर आशा व्यसन मुक्ति कार्यक्रम शुरू होने के एक महीने बाद आशा व्यसन मुक्ति कार्यक्रम के पक्ष में हैं।

6.2.1 निष्कर्ष

निष्कर्ष डेटा विश्लेषण और परिकल्पना के परीक्षण के आधार पर तैयार किए गए थे। अध्ययन के निष्कर्ष नीचे सूचीबद्ध हैंः
1. पूर्व-परीक्षण और तत्काल बाद की अवधि के दौरान, स्मृति, ध्यान, कार्यकारी कार्य और मानसिक क्षमताओं के रचनात्मकता आयामों, भावनात्मक योग्यता और प्रयोगात्मक समूह किशोरों की सामाजिक व्यवहार के समायोजित औसत स्कोर में महत्वपूर्ण सुधार का संकेत है।
2. पूर्व-परीक्षण और विलंबित परीक्षण के बाद की अवधि के दौरान, कार्यकारी कार्य के समायोजित औसत स्कोर और मानसिक क्षमताओं, भावनात्मक योग्यता और प्रयोगात्मक समूह किशोरों की सामाजिक व्यवहार के रचनात्मकता आयामों में महत्वपूर्ण सुधार का संकेत है।
3. तत्काल परीक्षण के बाद और परीक्षण के बाद की अवधि में देरी के दौरान, कार्यकारी कार्य के समायोजित औसत स्कोर और किशोरों की मानसिक क्षमताओं के रचनात्मकता आयामों और प्रयोगात्मक समूह के किशोरों की सामाजिक व्यवहार में महत्वपूर्ण अंतर का संकेत है।
4. मानसिक क्षमताओं, भावनात्मक योग्यता और सामाजिक व्यवहार पर किशोरों के उपचार और स्कूल के प्रकार के बीच कोई महत्वपूर्ण बातचीत की सूचना नहीं मिली।
5. प्रायोगिक समूह के किशोर आशा व्यसन मुक्ति कार्यक्रम शुरू होने के एक महीने बाद आशा व्यसन मुक्ति कार्यक्रम के पक्ष में थे।

6.3 शैक्षिक निहितार्थ

वर्तमान अध्ययन में आशा व्यसन मुक्ति कार्यक्रम के माध्यम से इलाज किए गए किशोरों ने किशोरों की मानसिक क्षमताओं, भावनात्मक योग्यता और सामाजिक व्यवहार के स्कोर में बेहतर लाभ दिखाया। वर्तमान अध्ययन के व्यवहारी निहितार्थ नीचे सूचीबद्ध हैंः
1. सरकार (व्यसन मुक्ति) कार्यक्रमों पर शोध को प्रोत्साहित करना चाहिए और यसन मुक्ति पर शोध के लिए अधिक धन उपलब्ध कराना चाहिए।
2. विश्वविद्यालयों को शैक्षिक व्यवस्थाओं में व्यसन मुक्ति कार्यक्रमों से संबंधित विभिन्न मुद्दों पर शोध को प्रोत्साहित करना चाहिए।
3. केंद्र और राज्य सरकारें सेवारत और सेवापूर्व शिक्षकों को प्रशिक्षण प्रदान करेंय ताकि वे व्यसन मुक्ति कार्यक्रमों के लाभों का दोहन कर सकें।
4. शिक्षक शिक्षकों, विश्वविद्यालय और कॉलेज के शिक्षकों, स्कूल शिक्षकों को यसन मुक्ति पर विभिन्न कार्यशालाएं, सेमिनार, संगोष्ठी और अल्पकालिक प्रशिक्षण प्रदान किया जाना चाहिए ताकि वे अपने किशोरों को कार्यक्रमों के लाभों को प्राप्त करने में मदद कर सकें।
5. शिक्षक प्रशिक्षण पाठ्यक्रमों जैसे विद्यालय के पाठ्यक्रम में व्यसन मुक्ति कार्यक्रमों को शामिल किया जाना चाहिए।
6. पाठ्यचर्या में विभिन्न स्तरों पर कॉलेजों और स्कूलों में व्यसन मुक्ति कार्यक्रम को शामिल किया जाना चाहिए। किशोरों के विभिन्न वर्गों और स्तरों के लिए व्यसन मुक्ति कार्यक्रमों के विभिन्न कार्यक्रम तैयार किए जाने चाहिए।
7. पूर्व-परीक्षण और तत्काल बाद के समूहों की मानसिक क्षमताओं, भावनात्मक योग्यता और सामाजिक व्यवहार के अंकों में महत्वपूर्ण अंतर बताया गया। ये परिणाम किशोरों, शिक्षकों, अभिभावकों, प्रशासकों और नीति निर्माताओं को अपनी भूमिका अधिक प्रभावी ढंग से निभाने में मदद करेंगे।

6.4 आगे के शोध के लिए सुझाव

1. वर्तमान अध्ययन किशोरों तक सीमित था, इसी प्रकार का अध्ययन कॉलेज के किशोरों, विश्वविद्यालय के किशोरों, किशोर-शिक्षकों, शिक्षकों और शिक्षक शिक्षकों पर भी किया जा सकता है।
2. वर्तमान अध्ययन केवल एक प्रकार के व्यसन मुक्ति कार्यक्रम के प्रभावों तक ही सीमित था। विभिन्न प्रकार के व्यसन मुक्ति कार्यक्रमों के प्रभावों का पता लगाने के लिए इस अध्ययन को दोहराया जा सकता है।
3. वर्तमान अध्ययन केवल एक प्रकार के व्यसन मुक्ति कार्यक्रमों के प्रभावों तक ही सीमित था।

विभिन्न प्रकार के ध्यानों के प्रभावों की तुलना करने के लिए इस अध्ययन को दोहराया जा सकता है।

4. यह व्यसन मुक्ति कार्यक्रम हस्तक्षेप 30 मिनट के लिए दिया गया था। व्यसन मुक्ति कार्यक्रमों के प्रभाव पर अलग–अलग समय जैसे 5 मिनट के लिए अध्ययन किए जा सकते हैं,

10 मिनट, 20 मिनट आदि। यह समय का अधिकतम उपयोग सुनिश्चित करेगा और व्यसन मुक्ति कार्यक्रम के अधिकतम लाभों को प्राप्त करेगा।

5. इस अध्ययन में प्रायोगिक समूह को प्रतिदिन व्यसन मुक्ति कार्यक्रम से अवगत कराया गया। इसे वैकल्पिक दिनों में या सप्ताह में एक या दो बार दिया जा सकता है।

6. वर्तमान अध्ययन मानसिक क्षमताओं, भावनात्मक योग्यता और सामाजिक व्यवहार पर किया गया था। इस अध्ययन को विभिन्न चरों पर दोहराया जा सकता है।

7. इसके अलावा, कक्षा–शिक्षक और विद्यालय के बाहर के शिक्षक द्वारा दिए गए कार्यक्रम की प्रभावशीलता में अंतर का पता लगाने के लिए इस अध्ययन को दोहराया जा सकता है।

8. यह अध्ययन बिहार स्कूल शिक्षा बोर्ड,पटना से संबद्ध सरकारी और निजी स्कूलों तक ही सीमित था। यह अध्ययन अन्य बोर्डों के छात्रों पर दोहराया जा सकता है।

9. यह अध्ययन बिहार स्कूल के एक जिले तक सीमित था। यह अध्ययन हिमाचल प्रदेश के अन्य जिलों पर दोहराया जा सकता है। इसके अलावा, इस प्रकार का अध्ययन भारत के अन्य राज्यों में भी किया जा सकता है।

संदर्भ

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उत्तर-प्रदेश में सरकारी और निजी विश्वविद्यालयों के विद्यार्थियों में रोजगार कौशल का तुलनात्मक अध्ययन

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सारांश (Abstract)

हर व्यक्ति में कुछ जन्मजात गुण और क्षमतायें होती है। इन गुणों और क्षमताओं को शिक्षा के माध्यम से विकसित किया जाता है। शिक्षा जन्म से लेकर मृत्यु तक एक सतत प्रक्रिया है। एक व्यक्ति का विकास सृजनात्मक और कार्यात्मक स्तर पर होता है। आधुनिक अवधारणा के अनुसार शिक्षा व्यक्ति का समग्र विकास है। शिक्षा सामाजिक नियंत्रण और सामाजिक परिवर्तन का एक उपकरण है। शिक्षा व्यक्ति और समाज के विभिन्न तत्वों की मानसिकता को बदलती हैं और उनके बीच वैचारिक क्रान्ति को निर्धारित करती है। प्रत्येक व्यक्ति जन्मजात रूप में कुछ गुण कौशल प्राप्त करता हैं इसे एक दिव्य उपहार के रूप में समझना होगा। मंगेशकर घराने ने संगीत क्षेत्र, बालगधर्व घराने ने संगीत नाट्य के क्षेत्र में योगदान दिया है। कौशल एक ऐसी चीज है जो दूसरों द्वारा अनुभव की जाती हैं यह ऐसी चीज नहीं है जिसे व्यक्ति से अलग किया जा सकता है। कौशल लाजिमी है। लेकिन जैसे ही घटना समाने आती है, घटना के सामने आने के साथ ही अव्यक्त कौशल का पता चलता है।

कुंजी शब्द (Key Word)— *विश्वविद्यालय, रोजगार, कौशल, सरकारी, प्राईवेट, विद्यार्थी, शिक्षा, अनुसंधान, बेरोजगारी, अध्ययन।*

प्रस्तावना (Introduction)

उच्च शिक्षित वर्ग में रोजगार प्राप्त करने के लिये आज बहुत ही कड़ी प्रतिस्पर्धा होती है। फिर भी मात्र कुछ लोगों को ही सरकारी नौकरी प्राप्त करने का अवसर मिल पाता है। रोजगार प्राप्त करना भी एक कौशल होता है। यदि इस कौशल का विकास शिक्षा के साथ–साथ किया जाये तो ये कौशल उच्च शिक्षित वर्ग में विकसित हो सकते है। शिक्षा एवं रोजगार के सम्बन्ध में महात्मा गांधी की अवधारण इस प्रकार थी कि शिक्षा इस प्रकार की होनी चाहिये जो उसको (विद्यार्थी) को स्ववावलंबी बनाये अर्थात उसको जीवन यापन करने लायक बनाये और वह समान पर किसी प्रकार का बोझ न बने। आत्मनिर्भर भारत रोजगार जैसी योजनाओं के माध्यम से लोगों को रोजगार के अवसर प्रदान किये जायें।

विश्वविद्यालयः

सामान्य रूप से विश्वविद्यालय शिक्षा का आंरभ स्कूली शिक्षा समाप्त होने पर होता है। यदि विश्वविद्यालय शिक्षा की बात की जाये, तो भारत में प्राचीन काल में भी विश्वविद्यालय शिक्षा दी जाती थी। जिनमें भारत के नालंदा एवं तक्षशिक्षा विश्वविद्यालय प्रमुख थे। सबसे पहले भारत में विश्वविद्यालय शिक्षा को विश्वविद्यालय शिक्षा अधिनियम 1904 के तहत अधिनियमित करने का प्रयास किया गया।

विश्वविद्यालय के प्रकारः

भारत में उच्च शिक्षा को हर वर्ग तक पहुँचाने एवं उसके प्रसार हेतु आज कई प्रकार के विश्वविद्यालय अस्तित्व में है।

जैसे– (1) केन्द्रीय विश्वविद्यालय
(2) राज्य विश्वविद्यालय
(3) डींम्ड विश्वविद्यालय
(4) खुला विश्वविद्यालय
(5) प्राइवेट विश्वविद्यालय

सरकारी विश्वविद्यालयः– यदि प्राइवेट विश्वविद्यालय के प्रारूप को छोड़ दिया जाये तो सभी विश्वविद्यालय सरकारी श्रेणी के अन्तर्गत आते है। जिनकी स्थापना अलग–अलग समय पर आवश्यक अधिनियम बनाकर की गई।

प्राइवेट विश्वविद्यालयः– प्राइवेट विश्वविद्यालय का चलन भारत में बहुत पुराना नहीं है। विश्वविद्यालय अनुदान आयोग द्वारा 2003 में इन्हें अधिनियमित किया गया।

Private University in India are regulated under the U.G.C. (Establishment and maintenance of Standard in Private Universities) 2003 as per the U.G.C. Act. जिनका संचालन व्यक्तिगत रूप से एवं सोसाइटी बनाकर किया जाता है। 1995 में सिक्किम मनीपाल विश्वविद्यालय के रूप में पहला प्राइवेट विश्वविद्यालय अस्तित्व में आया।

विद्यार्थीः

विद्यार्थी शब्द (विद्या+अर्थी) से मिलकर बना है। जिसका अर्थ है कि विद्या को ग्रहण करने वाला या कह सकते है कि हर वह व्यक्ति जो जानने के लिए जिज्ञासु है विद्यार्थी कहलाता है।

आदर्श विद्यार्थी के लक्षणः

एक आदर्श विद्यार्थी के पाँच लक्षण बताये गये है।

काक चेष्टा वको ध्यानम
स्वान निद्रा तथैव च।
अल्पहारी गृहत्यागी,
विद्यार्थी पंच लक्षण।।

अर्थात् एक विद्यार्थी में कौए की जैसी चेष्ठा होनी चाहिए अर्थात् लक्ष्य को पाने की लालसा बगुले जैसा ध्यान जब तक लक्ष्य प्राप्ति न हो। कुत्ते जैसी नींद जो हमेशा जागा सा रहता है। विद्यार्थी को भोजन भी जितना जरूरत हो उतना ही करना चाहिए और अध्ययन हमेशा एकांत में या घर से बाहर करना चाहिए।

रोजगार कौशलः– Employability

किसी भी क्षेत्र में आगे बढ़ना है तो कौशल विकास आवश्यक है जिस तरह शिक्षा को महत्व दिया गया है उसी तरह कौशल विकास को बढ़ावा दिया जाये तो बेरोजगारी की दर तेजी से गिरेगी और युवा वर्ग को रोजगार प्राप्त करने में मदद मिलेगी। कई विकासशील एवं विकसित देशों के मुकाबले में भारत में महज दो फीसदी हुनरमंद लोग है। जो एक विचाराणीय बिन्दु है। वर्तमान में चलाई जा रही प्रधानमंत्री कौशल विकास योजना (पी.एम.के.वी.वाई.) सरकार की योजनाओं में से एक है। जिसका उद्देश्य देश के युवाओं को उद्योगों से जुड़ी ट्रेनिंग देना है। जिससे उन्हें रोजगार में मदद मिल सके।
देश एवं प्रदेश के युवाओं में आत्मविश्वास को बढ़ाने देश में उद्यमशीलता को बढ़ाने हेतु युवाओं की अभिरूचि और अभिक्षमता के आधार पर उन्हें कौशल विकास के द्वारा हुनरमंद बनाया जा सकता है। जिससे रोजगार मिलने पर उनमें आत्मविश्वास बढ़ाया जा सके एवं उनकी उच्च शिक्षा को सार्थक बनाया जा सके।

सम्बन्धित साहित्य समीक्षा Review of Relative Literature

अनेको समाजशास्त्रीयों शिक्षाविदों ने रोजगार कौशलों पर अपना अनुभव एवं अध्ययन प्रस्तुत किया है। यहाँ शोध समस्या से संबंधित विभिन्न शिक्षाविदों एवं अनुसंधानकर्ताओं के साहित्य का अवलोकन कर उनके अध्ययन के निष्कर्षो का संक्षिप्त विश्लेषण प्रस्तुत किया गया है।

(1) डब्ल्यू0आर0बोर्ग0 के मतानुसार– किसी भी क्षेत्र का साहित्य उस आधारशिला के समान है जिस पर सम्पूर्ण भावी कार्य आधारिता होता है। यदि सम्बन्धित साहित्य के सर्वेक्षण द्वारा इस नींव को दृढ़ नहीं कर लेते तो हमारे कार्य के प्रभावहीन एवं महत्वहीन होने की सम्भावना है अथवा यह पुनरावृत भी हो सकता है।

(2) चार्टर वी0गुड के अनुसार– मुद्रित साहित्या के अपार भण्डार की कुंजी अर्थपूर्ण समस्या और विश्लेषणीय परिकल्पना के स्त्रोत का द्वार खेल देती हैं। तथा समस्या के परिभाषीकरण, अध्ययन की विधि के चुनाव तथा प्राप्त सामग्री के तुल्नात्मक विशेषण में सहायता करती है। वास्तव में रचनात्मक, मौलिकता तथा चिन्तन के विकास हेतु विस्तृत एवं गम्भीर अध्ययन आवश्यक है।

(3) बेस्ट के अनुसार– व्यावहारिक दृष्टि से सारा मानव ज्ञान पुस्तकों एवं पुस्तकालयों में प्राप्त किया जा सकता है। अन्य जीवों के अतिरिक्त जो प्रत्येक पीढ़ी में नये सिरे से प्रारम्भ करते है मानव समाज अपने प्राचीन अनुभवों को संग्रहीत एवं सुरक्षित रखता है, ज्ञान के अथाह भण्डार में मानव का निरन्तर योगदान सभी क्षेत्रों में उसके विकास का आधार है।

इस क्षेत्र में विभिन्न शोधार्थीयों द्वारा प्रस्तुत शोध समीक्षा

(1) सेन्थिल के नाथन (Senthil K. Nathan 2019):- ने निष्कर्ष दिया कि निजी क्षेत्र में विनिर्माण और सेवा उद्योगों के नियोक्ताओं द्वारा सामान किये गये महत्वपूर्ण मुद्दों को बढ़ाता है। नये स्नातकों में कौशल की शिक्षा और रोजगार के बीच एक अन्तर हे।

(2) सूफिया रहमान (Sufiya Rehman 2019):- इन्होनें अपने अध्ययन से निष्कर्ष दिया कि रोजगार कौशलों में यथासमय परिवर्तन होता रहता है। समय स्थान आवश्यकता के अनुसार कौशलों में तकनीकी का ज्ञान भी एक महत्वपूर्ण भूमिका निभाता है।

(3) निर्मला के0 (Nirmla K 2017):- ने अपने अध्ययन में पाया कि विभिन्न रोजगार कौशल और उपलब्ध साहित्य की मदद से स्नातक रोजगार के लिये महत्वपूर्ण कौशल और दक्षताओं की पहचान करना संभव है।

(4) रूचि और एकता (Ruchi Or Ekta 2016):- ने युवा प्रबंधन स्नातकों के लिए आवश्यक 9 कौशलों का पता लगवाया। सामाजिक ज्ञान, संचार, मौलिकता, नेतृत्व कौशल, विश्लेषणात्मक दृष्टिकोण, समूह व्यवहार, शारीरिक भाषा, प्रभाव, पहल

(5) गौशल्या और अन्य (Goshlya 2016):- तमिलनाडू में नामक्कल जिले के कला और विज्ञान स्नातकों की रोजगार योग्यता और उनके माता–पिता की शिक्षा के बीच संबंध पहचाने गये। ऐसे छात्रों के

कौशल स्तरों का अध्ययन किया गया। परिणामों से पता चला कि छात्र रोजगार प्राप्त करने के लिए रोजगार योग्य कौशलों से अन्जान थे।

अनुसंधान अंतराल (Research Gap):- पूर्व में किये गये अनुसंधानों का अवलोकन करने पर यह पता चलता है कि छात्राओं में केवल नौकरी प्राप्त करने की दृष्टि से कौशलों के विकास और विभिन्न उद्योगों में नियुक्ति की दृष्टि से कौशल विकास पर तो ध्यान दिया गया किन्तु यह अध्ययन सरकारी एवं निजी विश्वविद्यालय में कौशल विकास का एक तुलनात्मक शोध प्रस्तुत करने का एक प्रयास है। जहाँ विद्यार्थियों में प्राइवेट विश्वविद्यालय जैसे– कॉन्सेप्ट पर प्रशिक्षण एवं कौशल विकास को सार्थक रूप से प्रस्तुत किया गया है।

अध्ययन का महत्व Significance of the Study:- अध्ययन का महत्व प्रारम्भ से ही रहा है। कम शिक्षित या अशिक्षित व्यक्ति समाज में किसी भी प्रकार से अपनी आजीविका चला सकता है। लेकिन उच्च शिक्षित व्यक्ति अपनी शिक्षा एवं क्षमता के अनुसार अपनी आजीविका चलाना चाहता है। इसके लिये वह अपनी क्षमताओं के साथ संघर्ष करता है। लेकिन सफलता का प्रतिशत बहुत ही कम होता है। इसके लिये ये आवश्यक है कि विद्यार्थियों में माध्यमिक शिक्षा के स्तर से ही रोजगार कौशल के विकास के लिये प्रयास किये जाये। जिससे उच्च शिक्षा प्राप्त करते हुये अपने भविष्य के प्रति उनमें आत्मविश्वास उत्पन्न हो सके। रोजगार की क्षमताओं को बढ़ाने एवं विद्यार्थियों में रोजगार सम्बन्धी कौशल के विकास के लिये लगभग पूरे विश्व में ही बहुत कम काम हुआ है लेकिन हमारे देश और प्रदेश में इस क्षेत्र में विशेष काम करने की आवश्यकता है। जिससे उच्च शिक्षित बेरोजगारी को निम्न स्तर तक लाया जा सके। हमारी सरकार को अपनी विभिन्न योजनाओं का क्रियान्वयन करने के लिये इस तरह के अध्ययन की आवश्यकता पड़ती है। जिससे वह रोजगार एवं बेरोजगारी के प्रदत्त आंकड़ों (Data) के आधार पर अपनी योजनायें बना सके।

संचालनगत परिभाषा Operational Definition:- शोध एक ऐसी प्रक्रिया है जिसमें वैज्ञानिकता को होना आवश्यक है यह शोध सरकारी विश्वविद्यालयों एवं प्राइवेट विश्वविद्यालयों में उनमें रोजगार के प्रति जागरूकता एवं उसके प्रति होने वाले कौशलों के विकास को प्रेरित करता है। जिसमें उत्तर–प्रदेश राज्य में स्थापित सरकारी एवं प्राइवेट विश्वविद्यालय को अपने शोध का कार्यक्षेत्र लिया गया। उ0प्र0 राज्य में रोजगार सम्बन्धी समस्याओं के समाधान में यह शोध विशेष भूमिका निभा सकता है और रोजगार कौशल विकसित कर विद्यार्थियों में आत्मविश्वास के साथ–साथ समाज एवं शासन की मदद की जा सकती है।

शोध प्रश्न Research Questions:

1. सरकारी और निजी विश्वविद्यालयों में रोजगार कौशल की यथास्थिति क्या है ?
2. क्या सरकारी और निजी विश्वविद्यालयों में अध्ययनरत विद्यार्थियों के रोजगार कौशल में महत्वपूर्ण अंतर है ?
3. क्या सरकारी और निजी विश्वविद्यालयों में शिक्षा, प्रबंधन और अभियांत्रिकी संकाय के विद्यार्थियों के रोजगार कौशल में महत्वपूर्ण अंतर है ?

उदेश्य Objectives:

1. रोजगार कौशल की यथास्थिति का पता लगाना।
2. प्राइवेट एवं सरकारी विश्वविद्यालयों में शिक्षा प्राप्त कर रहे विद्यार्थियों के रोजगार कौशल का अध्ययन करना।
3. सरकारी और निजी विश्वविद्यालयों में शिक्षा, प्रबंधन और अभियांत्रिकी संकाय के विद्यार्थियों के रोजगार कौशल का पता लगाना।

परिकल्पना Hypothesis:

1. सरकारी एवं प्राइवेट विश्वविद्यालयों में अध्ययनरत विद्यार्थियों में उचित एवं आवश्यक कौशल है।
2. सरकारी एवं निजी विश्वविद्यालयों में अध्ययनरत विद्यार्थियों के रोजगार कौशल में कोई विशेष अंतर नहीं है।
3. सरकारी और निजी विश्वविद्यालयों में अध्ययनरत शिक्षा संकाय के विद्यार्थियों के रोजगार कौशल में कोई महत्वपूर्ण अंतर नहीं है।
4. सरकारी एवं निजी विश्वविद्यालयों में अध्ययनरत प्रबंधन संकाय के विद्यार्थियों के रोजगार कौशल में कोई महत्वपूर्ण अंतर नहीं है।
5. सरकारी एवं निजी विश्वविद्यालयों में अध्ययनरन अभियांत्रिकी संकाय के विद्यार्थियों के रोजगार कौशल में कोई महत्वपूर्ण अंतर नहीं है।

परिसीमन Delimitation:-

1. यह शोध विश्वविद्यालय के 1000 विद्यार्थियों तक ही सीमित है।
2. यह शोध सरकारी एवं प्राइवेट विश्वविद्यालयों तक ही सीमित है।

3. प्रस्तुत शोध उत्तर प्रदेश के केवल पाँच सरकारी एवं पाँच प्राइवेट विश्वविद्यालयों पर आधारित है।

शोध में प्रयुक्त विधियाँ Research Methodology:

1. प्रस्तुत शोध में सर्वेक्षण विधि एवम् अनुसंधान विधि का प्रयोग किया गया है। जिसमें प्रश्नावली और साक्षात्कार का प्रयोग किया है।
2. न्यादर्श Sampling शोध अध्ययन में उत्तर प्रदेश के सरकारी एवं निजी विश्वविद्यालयों के विद्यार्थियों को न्यादर्श हेतु लिया गया है।
3. उपकरण Tools साक्षात्कार, प्रश्नावली, सर्वेक्षण, Ratingscale आदि।
4. प्रक्रिया Procedure of the study
   उपकरण का विकास, विश्वविद्यालय सर्वेक्षण, डाटा संग्रहण, प्रश्नावली
5. संख्यकीय उपकरण Statical Tools
   प्रतिशत विश्लेषण, Percentage Analysis, T-test, Mean Analysis, Independent Sample, paired Sample, Anova, Chi Square Test.

निष्कर्ष Conclusion

विश्वविद्यालयच स्तर की शिक्षा ग्रहण करने के बाद भी बेरोजगारी एक जटिल समस्या के रूप में सामने आती है शिक्षित बेरोजगारी किस प्रकार से कम की जा सकती है इसका अध्ययन उच्च शिक्षा के प्रतिशत को बढ़ाकर एवं कौशलों का विकास कर रोजगार सृजन के उपाय करके इसका समाधान किया जा सकता है। सरकारी एवं प्राइवेट विश्वविद्यालय के विद्यार्थियों का अध्ययन करने के पश्चात ये ज्ञात होता है कि सभी प्रकार के विश्वविद्यालय में कौशल विकास पर जोर दिया जाता है। जिससे कि उच्च शिक्षित युवा रोजगार प्राप्त कर सके एवं पूर्ण आत्मविश्वास के साथ इस देश की सेवा में अग्रसर हो सके।

सन्दर्भित ग्रन्थ Reference

प्रस्तुत शोध को सार्थक एवं प्रमाणिक बनाने हेतु विभिन्न समाचार पत्रों, जर्नलों पत्रों, पत्रिकाओं एवं शोध पत्रों को सन्दर्भित किया गया है।

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