Interdisciplinary Research in the

Current Era

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PREFACE

'Interdisciplinary Research in Current Era' is the buzz word of the 21st century. All the disciplines of the management, science and arts are seen as overlapping on number of fronts. No area is talked in isolation and without referencing the other areas. There seems to be no survival at all.

The researchers are having a clear focus of what they are talking about and where all this is leading to. There is an extraordinarily rich set of insights into ways of conducting educational research. Taking as its focus highly demanding research settings, both in the developing world as well as the developed worlds, the volume lucidly displays a creative range of research approaches. In so doing, it shows considerable sensitivity on the part of the authors in conducting their studies, both towards their subjects in schools in all manner of situations and towards the integrity of the research process itself. This highly accessible and fascinating volume will surely be of value to educational researchers, not only those who are relatively new to the role but also more experienced reflective researchers, who are facing the challenges of conducting fine-grained research in complex settings."

ACKNOWLEDGEMENT

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ANALYSIS QUALITY OF RAW MILK IN WEST GUJI ZONE, OROMIA REGIONAL STATE, ETHIOPIA

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ABSTRACT
The purpose of this study was to determine the compositional, physicochemical, and microbiological quality of raw milk in the West Guji zone of Oromia regional state, Ethiopia. Based on accessibility, proportionality, and target population, milk samples were obtained from thirty (30) lactating cows (9 cows in early lactation, 9 cows in mid-lactation, and 12 cows in late lactation). Soon after milking, approximately 300 lm of raw milk sample was collected from each milking cow and deposited into sterilized glass bottles. The obtained milk samples were preserved in an icebox and transported to the Ethiopian Meat and Dairy Institute's laboratory for analysis of raw milk's microbiological quality of raw milk. The collected milk samples were kept in an icebox and transported to Ethiopian meat and dairy institute laboratory to analyze microbial quality of raw milk. Each milk composition obtained from the laboratory result was analyzed using SAS software 9.4. Accordingly, the overall mean ±SE of chemical composition of raw milk in the three stage of lactation were; Moisture 87.99 ± 1.10 %, Fat 3.67 ± 0.41%, Protein 3.38 ± 0.04 %, Solid Not Fat 8.18 ± 0.09 %, Lactose 4.35 ± 0.08%, Total Solid 12.01 ± 0.39% and Ash 0.67 ± 0.01 %. Whereas, the overall mean ±SE of the physicochemical quality of raw milk in the study areas were; Specific gravity 1.023+0.002 (g/cm3), titratable acidity 0.20 ± 0.00(%) and Freezing point -0.50 ± 0.03(%). On another hand, the overall mean ±SE for coliform count was 4.51±0.15 (log10cfu/ml) and Total Bacterial Counts 6.06±0.20 (log10cfu/ml) in the three stage of lactation in the study area. In general, it can be concluded that the chemical composition and microbiological quality of raw milk produced by farmers in the study areas were found to be within Ethiopian quality standards. The milk was tested and found to be safe for human consumption as well as further processing. The sampled milk is safe for human consumption as well as for further processing. Thus, the channel of the milk from producers to consumers was within quality standard and wholesale in the study area.

Keywords: Analysis, quality, raw, cow and milk

1. INTRODUCTION

Milk quality refers to a mix of chemical, physical, bacteriological, and cosmetic features that improve the acceptability of the milk product, whereas milk protection refers to the absence of pathogenic organisms and other contaminants that could be harmful to the consumer's health. The specific gravity, chemical makeup, and microbiological condition of milk determine its consistency and protection. The microbiological content and chemical composition of milk products are critical variables in influencing their quality and protection (Merwan et al., 2018)

Milk hygiene handling practices such as cleaning the udder with clean water, keeping the milking barn clean, drying the udder with individual towels, washing the milker's hands and milking utensils, using low-quality, non-boiled water for udder cleaning, and insufficient post-handling practices such as poor hygiene of milk equipment and storage containers, transportation, and retailing practices predispose the milk to microbial contamination (Abunna et al., 2018).Due to limited pre-milking and post-harvest handling standards, milk hygiene practices in Ethiopia are substandard. Milk quality is a combination of qualities (chemical, physical, and microbiological quality) that contribute to the milk product's acceptability. Total Bacterial Count (TBC) or Standard Plate Count (SPC), Coliform Count (CC), Yeast and Mould Counts, and Somatic Cell Counts are some of the most often used microbiological quality tests

for milk and milk products (SCC). In general, the microbiological content of milk and milk products is a good indicator of hygienic conditions during milking, utensil cleansing, storage, and transportation (Getabalew et al., 2020)

The Ethiopian standard authority has established criteria for domestic and imported dairy products; however they have yet to be applied to ensure the safety and quality of dairy products. Furthermore, throughout the previous half-century, research has mostly focused on boosting milk output rather than on the safety and quality of dairy products (Gemechu, 2017).

Some of the most important quality parameters in milk are its chemical composition and microbiological quality. The microbiological load of milk reveals the level of hygiene practiced from milking to consumption, such as cleanliness of milking utensils, storage conditions, and mode of travel at each node of milk actors. Milk from healthy animals produced under sanitary circumstances should not contain more than 5×10^5 bacteria/ml (O'Connor, 1994).

Consumers demand clean, healthy, and nutritious food that has been produced and prepared in a safe, sanitary, and pathogen-free environment. It is vital to produce high-quality milk in order to meet consumer demand. Milk that is devoid of pathogenic bacteria and hazardous poisonous compounds, free of silt and extraneous elements, of good flavor, with normal composition, appropriate in maintaining quality, and low in bacterial counts is considered to be of high quality (Ahmed et al., 2004).

Normal cow's milk comprises roughly 87.8% water and 12.2 percent milk solids, 3.3 percent fat, 3.3 percent protein, 4.7 percent lactose, and 0.7 percent minerals, vitamins, and nitrogen, all of which have an impact on milk quality. However, across the same and different breeds, milk composition varies significantly but within acceptable ranges. Human milk is higher in protein and minerals, particularly calcium and phosphorus, than cow milk. The majority of milk today has a standardized fat level of roughly 3.5g/100g (FAO, 2013).

To be effective, initiatives to boost smallholder dairy productivity and increase market orientation must be backed up and informed by a thorough understanding of the current and changing conditions of milk and dairy product production, marketing, processing, and consumption (Asfaw, 2009). As a result, the southern part of the country, in general, and the West Guji Zone in particular, are well suited to dairying because the area is a key asset with enormous cattle resources and strong indigenous knowledge for dairy cattle production, the society's socio-economic system is heavily reliant on crop-livestock production, and there is a high demand for dairy and dairy products.

The current state of chemical composition and microbiological quality of raw milk, on the other hand, has not been thoroughly investigated and documented. As a result, the current research is being carried out to determine the chemical composition and microbiological quality of milk in a number of districts in the west Guji zone.

OBJECTIVE
❖ To evaluate chemical composition and microbial quality of raw milk in the study area

MATERIALS AND METHODS

Description of the Study Areas
The study was conducted in west Guji zone of Oromia regional state, Ethiopia. Bule Hora is located 467km from capital city of Ethiopia Addis Ababa. West Guji Zone is also found in southern part of the Oromia Regional State and south eastern part of the country. West Guji zone has a total population of 141,579 of which 78,030 are males and 63, 549 are females. The zone was located between 38°_40° East longitude and latitude 4°_5° on the North and the altitude ranges from 500m up to 3500m above sea level. The climatic condition of West Guji

zone is characterized by three agro-climatic zones, namely; Dega, Woina Dega and Kola. The coverage of each climatic zone is Dega 33%, Woina Dega 47% and kola 20%. The mean annual rain fall of the study area is about 900mm and the annual temperature of the district 25 ^{0}C (WGLEPO, 2012).

The nature of the rain fall is bi-modal: 59% of annual precipitation occurs during March to May (main rain season) and 27% from September to November (short rain season), while the period between June and August was termed as cold dry season and December to February was the long dry season.

Analysis of Quality of Raw Milk

For physicochemical composition and microbial quality analysis raw milk were collected from local cows having different lactation stages. The milk sample was collected from thirty (30) lactating cows having early, mid and late lactation stages. Accordingly, 9 lactating cows which have early lactation stages and again another 9 lactating cows which have mid-lactation stages and 12 lactating cows having late lactation stages was used. Totally, nine thousand milliliters of milk (three hundred milliliter of milk from each cow) was collected. The milk sample was collected in sterile glass bottles and transported to Ethiopian meat and dairy institute laboratory within 24hours of milking by placing in an icebox. From the sampled milk the following physiochemical composition and microbial quality of milk was analyzed.

Specific Gravity

Specific gravity is the relation between the mass of a given volume of any substance and that of an equal volume of water at the same temperature was used to evaluate adulteration. According to ILRI (1995), normal cows' milk should have a specific gravity between 1.028 and 1.032 g/cm3. Specific gravity = L/1000 +1 Where, L = corrected lactometer reading at a given temperature physical properties of milk samples.

Titratable Acidity of Milk

Titratable acidity of the milk samples was determined according to the method of the Association of Official Analytical Chemists (AOAC, 1990). Nine ml (9) of milk sample was pipetted into a beaker and 3 to 5 drops of 1 % phenolphthalein indicator was added to it. The milk sample was titrated with 0.1N NaOH solution until a faint pink color persisted. The titratable acidity, expressed as % lactic acid, was finally calculated using the following formula; Titratable acidity% = N/10 NaOH(ml) 0.009 x 100/ weight of milk sample

Total Solids (TS)

The milk samples were dried in a hot air oven at 102 ^{0}Cfor 3 hours. Finally, the dried samples were taken out of the oven and place in desiccators to cool at room temperature. Then, samples were weighed again and the total solids were calculated by the following formula according to (Richardson, 1985).TS= Crucible weight +Oven dry sample weight -Crucible weight x100 /Sample weight

Total Protein Determination

Formaldehyde titration method was used to determine the total protein. Ten ml of milk was added into a beaker. Then, 0.5 ml of 0.5 percent phenolphthalein indicator and 0.4 ml of 0.4 percent Potassium Oxalate was added into the milk and then, the sample was titrated with 0.1N NaOH. The titration was continued until pink color becomes intense. Finally, the burette reading was recorded and reading was multiplied by a factor 1.74 (O'Connor, 1994).

Milk Fat Determination

Gerber method was used to determine the milk fat. Milk samples were kept at 37 ^{0}C for 30 minutes in a water bath to maintain the milk to normal body temperature of cow. Ten ml of concentrated sulfuric acid was pipetted into butyrometer. Then, 11 ml of milk was added using

milk pipette into a butyrometer having the sulfuric acid and then 1ml of amyl alcohol was added. The samples were shaken and inverted several times until all the milk was absorb/digest by the acid. Finally, the sample was taken back to water bath for 5 minutes at 63 ^{0}C and fat percentage was read from the butyrometer (O'Connor, 1994).

Solids Not Fat

The solids not fat (SNF %) was determined by subtracting the percent fat from percent total solids (O'Connor, 1994). SNF (%) = (%TS - %fat)

Total Ash

The total ash was determined gravimetrically by igniting the dried milk samples in a muffle furnace in which the temperature is slowly raised to 550 ^{0}C. The sample was ignited until carbon (black color) disappears or until the ash residue becomes white. Percent **ash= (Weight of residue) x100 / (Weight of sample)**

Lactose

Percent lactose was determined by subtracting the fat, protein and total ash percentages from the total solids (O'Connor, 1994). Percent lactose = percent total solids - (% fat + %protein + %total ash).

Microbial Quality Tests

The microbial tests considered for determination of the bacterial load in raw milk samples. They are; Coliform Count (CC) and Total bacterial count was analyzed by using appropriate media. The estimated colony count per ml of milk was calculated by using the following formula;

$$N = \frac{\Sigma_i CN}{(1 \times n1) + (0.1 \times n2)} \times d$$

Where,

N = Number of colonies per ml of milk sample

ΣC = Sum of all colonies on plates counted

n1 = Number of plates used in lowest dilution counted

n2 = Number of plates used in highest dilution counted

d = dilution factor of the lowest dilution used.

DATA ANALYSIS

Chemical composition and microbial quality of raw milk was analyzed through General model of SAS software (SAS, 2014). The following model was employed for data analysis of chemical composition and microbial analysis;

Model: Yij = μ +Si + Eij

Yij = individual observation

μ= Overall mean

Si = effect of the ith milk source

Eij = random error

RESULTS AND DISCUSSIONS

Compositional, Physicochemical and Microbiological Quality of Milk

Compositional Quality of Milk

FAT CONTENT

The fat content of the milk in the study areas were presented in Table 1. The current finding revealed that, the fat contents of milk sample collected from a cow having early, mid and late lactation stages was 3.44+0.74, 3.06+0.74 and 4.52+0.64%, respectively. However, from overall the fat content of the sampled milk was 3.67 ± 0.41% in the study areas. In the current study, there were significance differences ($P < 0.05$) in fat contents of the sampled milk between lactation stages. The average fat percentages of raw cow's milk collected in the study districts was lower than the fat content given for zebu breeds which is 4.9%. The entire sampled milk collected from each of the stages of lactation was fit with the Ethiopian raw milk fat content standard. However, the Food and Drug Administration

(FDA) requires not less than 3.25% milk fat for fluid whole milk similarly to the U.S. Public Health Service (USPHS). Milk Ordinance and Code also recommended a minimum of 3.25% butterfat in farm milk (Raff, 2011). So, except the milk sample collected from mid-lactation stage, the fat content of milk collected from early and late lactation stages was fulfills the criteria set by FDA, USPHS and Milk Ordinance and Code. This variation might be due to breeds of milking cow or environmental factors like feed and parity.

Protein Content

The protein content of the milk in the study areas were presented in Table 1. As the analyzed milk sample revealed, the average percentages of protein contents of milk sample taken from the cows having early, mid and late lactation stages were 3.32 ± 0.07, 3.44 ± 0.07 and 3.37 ± 0.06%, respectively with the overall mean of 3.38 ± 0.04%. The protein contents of the current sampled cow milk were insignificantly ($P > 0.05$) different between lactation stages.

Therefore, the current finding was slightly in line with the value 3.12 % of protein contents reported by Dehinenet et al. (2013) while relatively in line with 3.67, 3.4 and 3.34% of protein contents reported by Derese et al. (2008), Haftu et al. (2013) and Ayisheshim et al. (2015) in cow milk of western Shewa, Southern Ethiopia and western Amhara region, respectively. Thus, the protein content of the sampled milk was within the quality standard of Ethiopia and minimum milk protein of 2.73% recommended by FDA (Raff et al., 2011). In general, the value of protein content obtained from the current study was fulfills the criteria developed by FDA for the consumers.

Total Solid

The total solid of the milk in the study areas were presented in Table 1. In the current study, there was significantly difference ($P < 0.05$) in total solid contents among lactation stages. Higher total solid of 12.58 ± 0.61 % was recorded in late lactation stages while lower total solid content (11.19 ± 0.70%) was analyzed from mid-lactation stages. From overall, 12.01 ± 0.39% of total solid was analyzed which was relatively related with the result of 13.4% and 12.575% total solid reported by Teshome et al. (2015) and Tecklemikael et al. (2015), respectively. The result of this study revealed that, the total solid content of the sampled milk was fall within the quality standard of Ethiopia (Table 12). However, according to European Union, the recognized quality standards for total solids content of cow milk should not be less than 12.5% (FAOSTAT, 2007). Therefore, the total solid content of the current sampled milk was not fit the standard set by European Union.

Solid Not Fat (SNF)

The SNF of the sampled milk was insignificantly ($P > 0.05$) difference among lactation stages. As result of the current finding revealed, the mean percentage of SNF analyzed in the whole cow milk sample was 8.26 ± 0.16, 8.25 ± 0.16 and 8.01 ± 0.14% on early, mid and late lactation stages, respectively. According to Food and Drug Administration (FDA) as well as European Union (EU) quality standards, a minimum solids-not fat (SNF) content of whole milk is 8.25%

(Raff, 2011). In view of that, except milk sample collected from late lactation, the result obtained in the present study areas was fulfills the range of quality standards given by FDA and EU.

Lactose

The average percentages of lactose contents of sampled whole cow milk was 4.80 ± 0.15, 4.16 ± 0.15 and 4.09 ± 0.13% in early, mid and late lactation stages, respectively. Statistically, there were insignificantly differences in terms of lactose content between lactation stages.

The current finding was slightly similar with the value of 4.47, 4.91 and 4.69% reported by Hamad et al. (2015), Legesse et al. (2015) and Gurmessa et al. (2015) in raw cow milk collected from producer and market, respectively. On the other hand, the present finding was in line with the value 3.6 to 5.5% of lactose content of milk reported by (O'Mahony, 1998). However, cow milk of lower fat content of 3.79% was reported by Estifanose et al. (2015) in Harar milk shade of Ethiopia. Therefore, the milk lactose content of the current study was fall within Ethiopian quality standard.

Mineral (Ash) Content

The total mineral content in the sampled milk was presented in Table 1. As the current result revealed, the mean percentages of ash contents of the sampled milk were 0.68 ± 0.02, 0.68 ± 0.02 and 0.66 ± 0.02% in early, mid and late lactation stages, respectively with overall mean of 0.67 ± 0.01%. The current finding indicated that, the percentage of mineral content obtained from the sampled raw milk was insignificantly differences among lactation stages. Therefore, in all lactation stages, the mineral contents of the sampled raw cow milk were within the Ethiopia quality standard. So, the current finding was slightly similar with the value of 0.69, 0.76 and 0.82% which was reported by Hamad et al. (2015), Teshome et al. (2015) and Gurmessa et al. (2015), respectively with the milk sample collected from producers and market. The ash content of the raw milk collected from household milk producers in West Guji zone for the current finding falls within the usual ranges of 0.6 to 0.9% (O'Mahony,1998).

PHYSICOCHEMICAL QUALITY OF RAW MILK

Titratable Acidity

Acidity was an important parameter for the indication of the development of acid- producing microbes from lactose fermentation in the milk as well as an indicator of freshness of milk. The acidity content of the sampled milk was presented in Table 1. As result of the analyzed milk sample indicates, the mean acidity percentages of the sampled whole cow milk were 0.21 ± 0.01, 0.20 ± 0.01 and 0.18 ± 0.01% in early, mid and late lactation stages, respectively with overall mean of 0.20 ± 0.00. The titratable acidity of the current milk sample was not in line with the value of 0.1 to 1.17% titratable acidity of Ethiopian standard for fresh milk. The current result indicated that, the analyzed milk was not fresh milk which might be due to inappropriate storage during transportation or mishandling in laboratory which causes the development of acidity due to growth of acid-producing microorganisms. The present finding was relatively in line with the result of 0.215, 0.29 and 0.22% which were reported by Legesse et al. (2017), Teshome et al. (2015) and Gurmessa et al. (2015) with cow milk collected from producers and market, respectively. Therefore, the higher titratable acidity of raw milk samples collected from the study area might be due to bacterial growth and multiplication during transportation of milk to laboratory for analysis.

Freezing Point

As indicated in Table 1, the average percentages of freezing point of the sampled raw cow milk was -0.57 ± 0.06, -0.56 ± 0.06 and -0.37 ± 0.05% in early, mid and late lactation stages, respectively with the overall mean -0.50 ± 0.03%. As noticed from the current result, the freezing point of the sampled milk was insignificantly different between lactation stages.

Therefore, the freezing points of milk sample collected from early and mid- lactation stages were fit with Ethiopian standard of -0.547 to-0.590% while the milk sample taken from late lactation stages was sub-standards of Ethiopian standards.

Specific Gravity
The specific gravity of the sampled milk was indicated in Table 1. Specific gravity is the relation between the mass of a given volume of any substance and that of an equal volume of water at the same temperature. Result of the current finding revealed, the specific gravity of the sampled raw cow milk collected from early, mid and late lactation stages were 1.029+0.001, 1.031+0.004 and 1.029+0.002g/cm^3, respectively. The statistical value of the current finding was fall within the ranges of 1.028 and 1.032 g/cm^3 value which was reported by ILRI (1995) for normal cows' milk. This value indicates as the sampled milk was free from any liquid or solid adulteration.

Microbial Quality of Raw Milk Analysis

Total Bacterial Count
The total bacterial count analyzed in the sampled milk was presented in Table 1. The total bacterial count analyzed from the current sampled milk was 5.60 ± 0.36 log10 cfu/ml, 5.57 ± 0.36 log10 cfu/ml and 7.00 ± 0.31 log_{10} cfu/ml in early, mid and late lactation stages, respectively. The overall total bacterial count analyzed in the study areas was 6.06 ± 0.20. The total bacterial count was significantly $P<0.05$ different between the three stage of lactation. The current finding of the total bacterial count was less than the value $3x10^5$/ml of the maximum limits given for Commingled milk (New York Ag and Markets, 2006). Sherikar et al. (2004) reported that milk samples were graded as very good when the bacterial count did not exceed $2x10^5$cfu/mL which is in line with the present finding. The result of the present study indicated that, the collected sampled milk had proper hygienic practices during milking and collected from health and hygienic cows.

Coliform Count (CC)
The total coliform count analyzed in the sampled milk was presented in Table 1. The total coliform count analyzed from the current sampled milk was 3.56±+0.12logcfu/ml 5.63±0.24 log cfu/ml and 4.36 ±0.11 log cfu/ml in early, mid and late lactation stages, respectively. The overall Mean ±SE of coliform count of milk produced in the study area was 4.51±0.15log cfu/ml. Coliform counts in the current study were higher when compared with the acceptable limit given by the American public health service < 2log cfu/ml for grade A milk and 2-2.3 log cfu /ml for Grade B milk (APHA,1992). The coliform count obtained in the present study is slightly similar with the value reported by Asmaninew and Eyassu (2011) who found coliform count of 4.49 log cfu/ml in Bahir Dar Zuria and Mecha Districts. Coliform count can indicate fecal contamination from equipment that has not been properly cleaned and sanitized (Bintsis et al., 2008). It is not practical to produce milk that is always free of coliform, even at high level of hygiene condition; their presence in raw milk to a certain extent may be tolerated. But their presence in large numbers in dairy products is an indication that the products are potentially hazardous to the consumer's health (Godefay and Molla, 2000).

CONCLUSION
The goal of this study was to determine the physicochemical quality, chemical composition, and microbiological quality of raw milk in the West Guji zone of Oromia regional state, Ethiopia. The chemical composition of the milk examined was within the acceptable range for Ethiopian raw milk quality. The microbial concentration of the sampled milk, on the other hand, was lower than the maximum bacterial limit set for a milliliter of raw milk. This low microbial concentration in the milk implies effective dairy cow management and hygienic methods during milking at the farm level. The chemical composition and microbiological content of the milk

analyzed were also within the recommended ranges set by the European Union, FAO, and the Food and Drug Administration (FDA). Finally, the chemical composition and microbial quality of raw milk in the West Guji zone at the farmer's level met Ethiopian quality standards and was safe for human consumption and subsequent processing. As a result, the milk supply chain from producers to consumers in the research area should meet quality standards and be wholesale. The following recommendation was made based on the above conclusion:

- ✓ Chemical composition and microbial quality of milk should always meet Ethiopian, FAO, FDA, and European Union (EU) quality standards at farm and market level.

- ✓ In the West Guji zone, the milk distribution channel from producers to consumers or processors should be wholesale or safe.

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Dependent Variable	Lactation Stage			Overall (N=30)		
	Early Lactation (N=9)	Mid-Lactation (N=9)	Late Lactation (N=12)			
	Mean ±SE	Mean ±SE	Mean ±SE	Mean ±SE	Sig.	ES
Chemical Composition of raw milk						
Moisture %	87.76 ± 0.07	88.81±0.64	87.42±0.36	87.99 ± 1.10	0.001	
Fat %	3.44 ± 0.74	3.06 ± 0.74	4.52 ± 0.64	3.67 ± 0.41	0.006	2.5-7
Protein %	3.32 ± 0.07	3.44 ± 0.07	3.37 ± 0.06	3.38 ± 0.04	0.301	2.9-5.0
Solid Not Fat %	8.26 ± 0.16	8.25 ± 0.16	8.01 ± 0.14	8.18 ± 0.09	0.516	>8.0
Lactose %	4.80 ± 0.15	4.16 ± 0.15	4.09 ± 0.13	4.35 ± 0.08	0.400	1-10
Total Solid %	12.24 ± 0.70	11.19 ± 0.70	12.58 ± 0.61	12.01 ± 0.39	0.003	10.5-14.50
Ash %	0.68 ± 0.02	0.68 ± 0.02	0.66 ± 0.02	0.67 ± 0.01	0.326	0.60-0.90
Physicochemical quality of milk						
Specific gravity (g/cm^3)	1.029+0.001	1.031+0.004	1.029+0.002	1.029+0.002	0.402	1.028-1.032
Titratable acidity (%)	0.21 ± 0.01	0.20 ± 0.01	0.18 ± 0.01	0.20 ± 0.00	0.020	0.1-0.17
Freezing point	-0.57 ± 0.06	-0.56 ± 0.06	-0.37 ± 0.05	-0.50 ± 0.03	0.615	-0.547 to -0.59
Microbial quality of raw milk						
Coliform count (log10 cfu/ml)	3.56±0.12	5.63±0.24	4.36 ±0.11	4.51±0.15	0.23	
Total Bacterial Counts (log10cfu/ml)	5.60 ± 0.36	5.57 ± 0.36	7.00 ± 0.31	6.06 ± 0.20	0.007	

Table 1. Physicochemical composition and Microbial quality of raw milk ES= Ethiopian Standard

CHALLENGES FACED BY THE CASHEW INDUSTRY AS A RESULT OF TRADE POLICIES

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ABSTRACT

In India, the cashew industries is a traditional agro-based sector. Cashew is one of the most important commercial crops, contributing significantly to foreign exchange earnings through the export of its kernels. Cashew production is one of our country's largest and most traditional industries, employing over a million people in fields and factories. The regulatory measures implemented by the Indian government in the cashew industry balance the interests of many stakeholders, including cashew growers, local and export-oriented processors, labour, and end-consumers. Numerous government incentives and regulations have had a significant influence on the cashew processing sector's fortunes. In the recent past, the imposition of a 5 percent import duty on RCN in FY2017 (subsequently reduced to 2.5 percent in FY2018), an increase in the minimum wage by the Government, a reduction in Merchandise Exports from India Scheme (MEIS) incentives to 2 percent in FY2016 (subsequently increased to 5 percent in FY2018), and delays in GST refunds all had a negative impact on processor profitability. The impact of trade policy on export and import behaviour, as well as trend analysis, is discussed here.

Keywords: Cashew; Export; Import; GST; FSSAI:SION; Trade.

INTRODUCTION

The cashew (Anacardium occidentale L.), a tree native to Eastern Brazil, was brought to India by the Portuguese some five centuries ago. Cashew was first brought to India in Goa, from whence it expanded across the nation. Initially, it was intended to minimise soil erosion by binding the soil. Cashew was commercially planted for the first time in the early 1960s, and it has since grown into a high-value crop with export potential, producing substantial foreign currency for the country. Global trade has expanded faster than global output, showing that the worldwide market is growing faster than local markets. Many Indian organisations are expanding their worldwide business at a faster rate than their domestic business. In reality, business is progressively becoming international or global in terms of competitive environment, direction, content, and strategic aim. However, the cashew business is facing several challenges as a result of India's new trade rules.

Cashew is a historically important and labor-intensive industry. Cashew farming is practised in 17 states across the country. It employs 10 lakh farm and manufacturing workers, the vast majority of whom are women from socioeconomically disadvantaged backgrounds. Many villages in rural and semi-urban India rely on this industry for a living. The sector brings in Rs.5200 crore in foreign currency to the country each year.

The total cultivation area is 10.41 lakh hectares, with an expected yield of 7.80 lakh MTs and a production average of 753 kg per ht, accounting for 25% of world production. India is the world's largest raw cashew nut producer (7.8 million MTs) and cashew processor (16 lakh MTs). Cashew kernel exports were Rs.5169 crores (US$771) in 2016-17, contributing for around 21% of total world cashew exports, compared to Vietnam's 62%.

According to CEPCI and other sources, the majority of the cashew processing sector in India is concentrated in the Kerala area. According to the CEPCI Handbook 2017, India has 337 legally

recognised cashew processing and exporting units, with Kerala accounting for 225 (64.8 percent). However, according to CEPCI statistics, around 824 industries are now operating in the State in both formal and informal settings, employing 3 lakh rural women directly and indirectly employing another 10 million. However, the cashew business in Kerala is now in a significant crisis, with most plants in the process of closing owing to rising input prices and greater competition from other Indian states and countries. Furthermore, numerous functioning units in the state are transferring to neighbouring Indian states such as Tamil Nadu, Maharashtra, and Karnataka. Unfortunately, this scenario has a negative impact on the livelihoods of thousands of disadvantaged female employees in the state, and many established businesspeople have gone bankrupt or committed suicide as a result of financial hardship and social marginalisation.

OBJECTIVES

❖ To present an outline of the cashew industry's trade policy

❖ To investigate the issues confronting the cashew business as a result of shifting trade policy.

LIMITATIONS OF THE STUDY

Analyze the present state of the cashew industry at the industrial level in this section. This chapter is entirely based on secondary data acquired from the Cashew Export Promotion Council of India (CEPCI) and other government organisations. The current study is designed from an industrial standpoint rather than a labour standpoint. The investigation here focused on identifying the required reasons of the current problem in Kerala's cashew processing sector.

CHALLENGES TO CASHEW INDUSTRY

I. Inadequate Export Incentives

Cashew kernels are eligible for a 5% Merchandise Export From India Scheme under the current Foreign Trade Policy 2015-2020. (MEIS). When the MEIS system was originally established by the government, the cashew kernel received just a 2% incentive; however, at the FTP 2015-2020 Midterm Review, incentives were increased by 3% from October 29, 2015 to December 5, 2017, and subsequently to 5% on December 5, 2017. Despite the fact that the present FTP prioritises (1) agricultural, (2) women-centric, (3) labor-oriented, and (4) export-oriented activities, cashew was excluded owing to insufficient export incentives. Competitors have used our uncompetitive pricing to acquire market penetration and expansion, thereby monopolising the cashew market.

II. The Effect of Import Duty on Raw Cashew Nuts

Cashew is one of our country's oldest industries, employing over 10 lakh people, the most of them are rural women. Domestic raw cashew nut production is less than half of what is required by cashew processing factories. For decades, the government has authorised the duty-free importation of raw cashew nuts in order to provide people with regular employment. The government has introduced a 5% import tax, which will go into force on March 1, 2016. This was a significant blow for the cashew industry, which runs on razor-thin profit margins of less than 1%. (N.P). A lot of exporters had gone bankrupt because they had all engaged into one-year forward contracts at pricing that did not reflect the unexpected tariff applied.

III. Unattainable Standard Input Output Norms (Sion)

The FTP enables duty-free importation of raw cashew nuts for processing and export under the Advance Authorisation Scheme. However, the Standard Input and Output Norms (SION) prescribed a 1:4 ratio of finished goods to raw cashew nut imports. This ratio proved almost hard to acquire, and a consistent ratio for raw nuts from multiple suppliers with widely disparate results cannot be established. The SION was founded much earlier, when India was the sole importer of high-quality cashew nuts from a specific market. Because of the high demand for

raw cashew nuts from all processing nations, importing graded quality raw nuts is no longer feasible; so, what is delivered is a platter of mixed quality raw cashew nuts. Apart from that, the SION had little impact on exporters because there was no import tax and hence no obligation for imports under an Advance Authorisation License. According to a survey conducted by the Cashew Export and Promotion Council of India, processors could produce a yield of 15-17 percent of exportable grades, needing an average SION adjustment to a 1:6 ratio. The SION has been modified to 1:5, which is once again impractical in accordance to CEPCI's request.

IV. Misuse of Cashew Kernels Imports

The FTP allows for the importation of cashew kernels by paying a 45 percent import duty against a minimum import price of Rs.400 per kg for "wholes" and Rs.288 per kg for "broken grades." These prices were established in 2013 based on the current market values of the respective grades. Today's market prices for 'Wholes' are Rs 700 per kg, while 'brokens' are Rs 600 per kg. Imports are increasing as a result of this difference, with just the minimum prices necessary under the Minimum Import Price being stated, which must be corrected to current levels.

Furthermore, in compared to the rest of the globe, India's domestic market is dominated by broken grades utilised as culinary components, and we have a significant home market. To some extent, the strong demand and favourable prices help to offset the non-parity pricing on exports.

Now, by exploiting the restrictions, an excessive number of cashew kernel imports into the country have been mislabeled as 'Whole Cashew Kernels,' when in fact, more than 80% are 'Broken grades.' Invoices would show the weighted average price of a mix of Wholes' and "Broken' grades of Cashew nuts.

Following importation, 'Broken grades' are sold in the local market for up to Rs.100 per kg profit, while 'Whole grade' kernels are obtained from the domestic market and exported at nearly the same price. Because only 'Whole' grades are re-exported, rather than a mix of 'Whole' and 'Broken' grades, a large amount of value addition is achieved. Domestic traders employ the same method, taking advantage of the low MIP available.

V. Stringent Factories & Labour Laws

Because of the minimum wages established by state governments, the industry's operation is utterly unviable. The states also set non-practical methods and rules for establishing and operating cashew processing facilities, such as the APMC (Agricultural Produce Marketing Cess). A national policy for the establishment and operation of cashew processing plants is required.

VI. Goods And Service Tax Issues

The cashew sector has been significantly impacted by the July 1, 2017 implementation of GST, which has interrupted the usual flow of business for exporters in general, and cashew exports in particular.

A. Blockage of Funds / Increased Working Capital Requirement

The IGST is collected in advance for raw cashew nut imports for processing, in accordance with GST standards, for imports against an Advance Authorisation License. Imports needing an Advance Authorisation Licence were formerly exempt from import duty as well as Special Additional Duty (SAD).

IGST is collected upfront on all sorts of imports, even if the importer has a high Input Tax Credit (ITC). Aside from the loss of cash and working capital, this results in a major financial burden in the form of interest payments to banks for funds that have been frozen in the system. Even if the importer has a substantial amount of ITC, a considerable amount of Rs. 80 lakhs in IGST must be paid for every 1000 M.T. imported. Given the cyclical nature of imports, the

amount of cash blocked is massive, with the typical cashew exporter left with blocked working capital ranging from Rs.1.5 crore to Rs.3 crore. Even if their fund is harmed as a result of exports, it will take an average of 6 months to reclaim it, resulting in a 6-month blockage of operational capital.

B. **Non-Refund of Goods and Service Tax Paid on Exports**
The GST Act allows for the repayment of GST paid on exported goods. So yet, no such action has been taken, leaving exporters with GST payments paid on various input purchases.

C. **High Gst for Job Works**
Previously, under the VAT/Service Tax regime, agricultural product jobworks were totally excluded from service tax. Because cashew is a traditional industry that comprises processing in tiny units on a job-by-job basis, the present level of 18 percent GST adds to the cost of processing, putting an additional burden on an already struggling sector.

D.**Interstate Branch Transfer Issues**
The cashew industry is spread over numerous states, and intermediate items are routinely carried from one unit in one state to another in another state while still belonging to the same corporation. Previously, such inter-branch transactions were permitted free of charge under the VAT regime; however, under the GST regime, this provision is limited to intra-state transfers exclusively. For inter-branch transfers between two states, materials must be sold from one branch to another, and IGST must be paid on such transactions. Furthermore, evaluating the worth of intermediary products is unnecessarily difficult, which occasionally leads to arguments and lawsuits.

VII. Food Safety and Standards Authority of India (Fssai)
The prohibition of imported rawcashew nuts by FSSAI inspectors has done irreparable harm to the industry. Based on CEPCI's recommendations and the fact that raw cashew nuts undergo a series of high pressure and heat treatments before being converted into edible nuts, FSSAI issued an order on October 27, 2017, directing customs not to detain imported raw cashew nut consignments, and that the same should not be considered a food product.

Separate Specification for Raw Cashew Nuts under FSSAI
In the absence of a particular Raw Cashew Nuts (RCN) specification, the peanut and pistachio requirements are sent to FSSAI for review. Raw cashew nuts (RCN) are not the same as peanuts or pistachios since, unlike these nuts, RCN undergoes a series of heat and high pressure operations before becoming edible. As a result, unique standards for raw cashew nuts should be defined in collaboration with CEPCI.

VIII. Customs Procedures
a. Penalty for late Clearance of Cargo

Current laws require that imported products be cleared within three days of their arrival in the port, otherwise a daily penalty will be imposed. Importers commonly experience difficulties in obtaining clearance documentation since the majority of raw cashew nut cargo is imported from Africa.

b. Benefits for Least Developed Countries (LDCs) for traded products are denied.

Imports of raw cashew nuts from LDCs are exempt from the basic customs duty. Because the Indian processor may not have a direct link with the LDCs' suppliers, Row Cashew Nuts from LDCs are often supplied through agents/traders in foreign countries. Despite providing necessary documentation pertaining to the source of origin, LDC advantages are not permitted for such transactions..

IX. BANKING POLICIES

A. Change in Npa Norms

Cashew processing is now financially unviable due to the high cost of manufacturing in the nation as a result of rising wages, a shortage and high cost of raw cashew nuts, and a lack of automation in the processing. All of this has resulted in various banks having past-due payment liabilities. Many accounts have been designated as non-performing assets (NPAs), and many more will be added in the near future. If banks in the countries strictly adhere to the regulations and no exceptions are made available to the cashew business, the country's entire cashew industry may collapse in a short period of time, with little chance of recovery. This might have a severe impact on the economy, culminating in the layoff of a million workers in the industry.

B. Support to Sick Units

The cashew business has been affected by a series of challenges that have resulted in a financial difficulty, disrupting the industry's usual operational rhythm. As a result, our country's dominance in the global cashew market has been surrendered to Vietnam, which has implemented a high level of automation in processing. Automation is still in its infancy in India, as it can only be implemented in phases due to the industry's traditional nature. The cashew sector is quickly recovering from the crisis, but the backlog in loan servicing during the crisis has resulted in tense relations with the country's banks, and real assistance from the banking circle is urgently required. The cashew industry will request that the government instruct banks to implement concrete steps to assist the cashew sector and pave the way for its revival.

SUGGESTIONS

- Export incentives should be increased to the greatest extent possible in order to safeguard and promote the cashew sector.

- Import duties on raw cashew nuts should be decreased. Following that, only industries can import cashew kernals from other nations..

- The standard input/output ratio should be modified to 1:6.

- The minimum import price for whole grade and broken grade cashews shall be determined by the market price.

- The current GST rate, i.e. 18 percent, should be decreased to the minimal slab rate, as should the obstruction of cash and the excessive GST for job activities.

- FSSAI standards should be liberalised so that only RCN imports are permitted.

CONCLUSION

The cashew business generates substantial foreign exchange, which is critical to the country's economic success. The impact of trade policy on export behaviour and trend analysis is critical from the standpoint of a country's economy. India is the world's leading producer and exporter of cashew kernels. New markets must also be explored and expanded, with a large potential in key importing nations of cashew kernel from India, for which a proper trade policy should be devised particularly for the cashew industry.

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IMPACT OF CLOUD COMPUTING USAGES ON COSTS OF IT COMPANIES IN INDIA

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ABSTRACT

Recently Cloud computing has become a big weapon in information technology domain. There is no any sphere which is untouched by its existence. Despite its popularity, there are many IT companies, utilizing and implementing it due to cost minimization and security risks. Thus it is touted as a big revolution in IT sphere that will bring many advantages like cost reduction, security risks, collaboration, reliability and scalability etc. It is reported that cost effectiveness is the main reason behind its attractiveness for IT companies. Here this study has tried to explore this issue of cloud computing impact. Thus a little endeavor has been focused at critically examining the cost impacts which cloud computing brings to IT companies.

- *Objective: The main objective of the study to examine the impact of cloud computing on IT companies. The Specific objectives of the study are; to examine the impact of cloud computing on hardware costs, software costs, administrative costs and operational costs of IT companies under study.*

- *Design/methodology/approach: Being descriptive study, survey sample research design was utilized in order to collect primary data from 30 respondents (IT professionals) from India. The data was raised on five point LIKERT SCALE (Strongly Agree (2), Agree (1) Neutral (0) = Disagree (-2), Strongly Disagree (-1).*

- *Tools of analysis: in order to analyze research data, CRONBACH's Alpha, Correlation and Regression have been utilized in SPSS-20 Version software.*

- *Findings: From this study it is revealed that cloud computing impacts hardware costs, software costs, administrative costs, operational costs and production costs*

- *Keywords : Cloud Computing, Impact, Costs, IT companies , Recommendations*

1 INTRODUCTION

World is dynamic and competitive. Thus new innovations have been taking place day by day. Cloud computing is one of them which is mostly discussing and promising in information technology. It is very attractive by all organizations by bringing more efficiency and cost savings. Cloud computing is a fundamental shift in the way of organizations by bringing economical resources (Greenwood at al., 2011). It has become a service activity instead of product service (Greenwood at al 2011). The shifting due to cloud computing is irreversible and inevitable (McAfee, 2011 p.126). This technology has been increased to large extent. It has been reported by IDC, that the income level from Cloud Computing has been increased from $21.5 billion to $72.9 billion during 2010 to 2015. Garnet estimates increment in cloud revenue by 23% in 2021($3322 billion U.S). There are some popular IT players like Google, Amazon, and Microsoft etc. which are developing and offering cloud services to many users at global level.

Actually cloud computing has brought very big change in the ways of companies which are using computers and internet. This change relates to ways of storing information and applications by these IT companies. While using cloud computing, users can store their information in the cloud instead of on desktop computers."Cloud computing is a nebulous assemble of computers and servers accessed via the internet" (Miller, 2009 p12). The main objective is to provide users with full access to their information, data and applications while using internet. The users do not need themselves to tie with their desktop computers. On the

contrary, they can collaborate from various places (Miller, 2009). In this way, companies can reduce their costs of buying more computers.

2 SIGNIFICANCE OF THE STUDY

This study would be of great beneficial to companies and organizations. In case of companies, this study will create more awareness among companies in order to use more cloud computing while on the other hand this study would also help companies and organizations to make different strategies in order to reduce their hardware costs, software costs, administrative costs, operational costs .Consequently companies will get more profits in the future.

3 Role and Benefit of Cloud Computing

Recently Cloud computing plays an important role. It is a strong weapon to reduce costs relating to various operations of companies. That is why various companies are using in their operations to maximum extent. There are many advantages of cloud computing. Thus its role cannot be ignored. It is beneficial to companies because of providing following benefits

- Cost reduction

- More storage

- Reliability

- Scalability

- Communication

- Collaboration

- 24/7 support

- Pay as you use
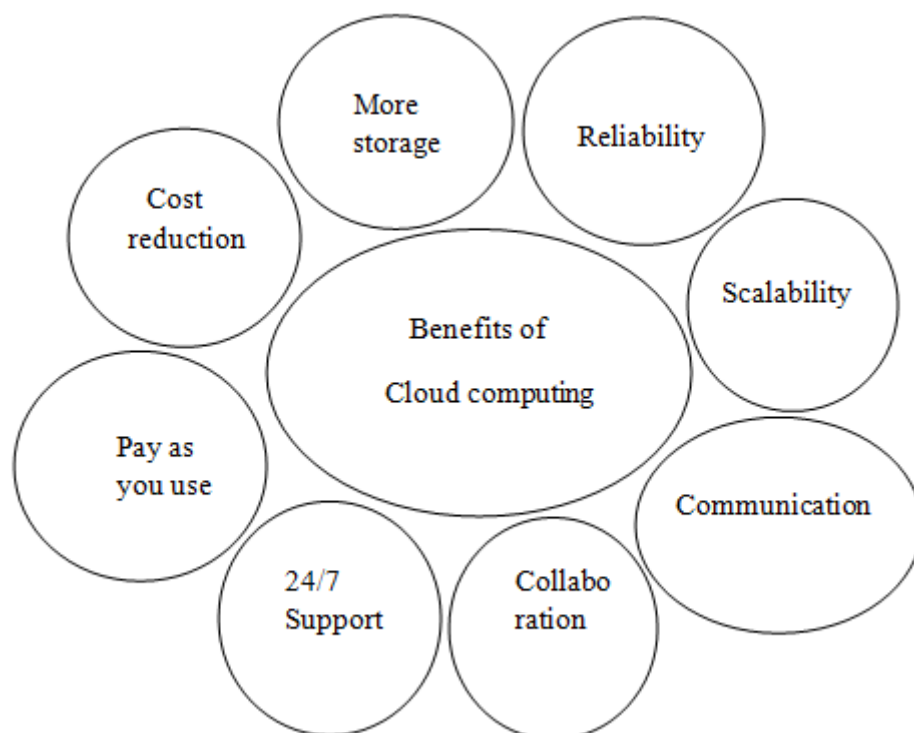
Fig.1 Role and Benefits of cloud computing

Model of Cloud Computing

The cloud computing is a system of storing or accessing data and programs over the internet rather than on hard drive. Actually cloud means spreading large area in order to serve large users. According to EDUREKA,". The cloud computing service has increased nearly 80% in the last two quarters". It has three models known as

- Saas. Software as a Service

- Paas. Platform as a Service

- Iaas. Infrastructure as a Service

The following figure depicts model of cloud computing covering different means of communication.
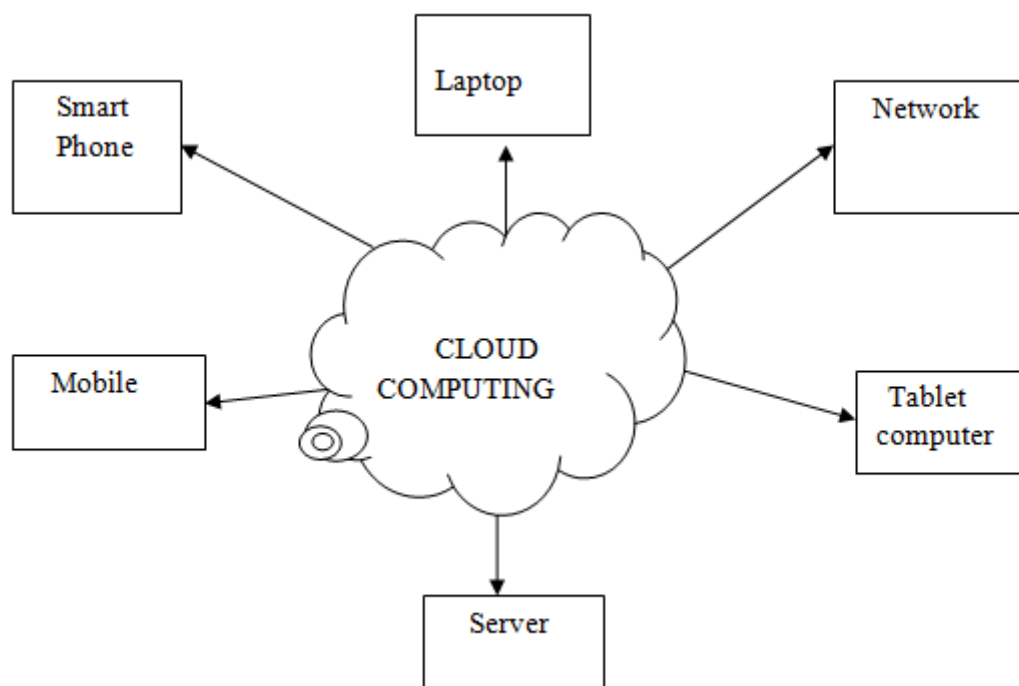
Fig.1 model of cloud computing

4 REVIEW OF LITERATURE

The purpose of review of literature is to know the salient aspects of previous studies and identify the research gap and build the framework of the present study. This review describes research related to cost impact on cloud computing. Review of some of the prominent researches on the subject has been given below

Dimitrov and Osman (2014) examined the impact of cloud computing on organizations in regard to cost and security. By using qualitative method, this study revealed that cloud computing is a good model to reduce cost and security risks. This study explained why organizations are using cloud computing day by day. Cost reduction and security benefits are the major reasons for utilization of cloud computing.

Weintraub and Yuval (2015) examined cost optimization of cloud computing services in a networked environment. This study used three pricing models in order to provide benefits to consumers. Finally it revealed that model of cloud computing provides more benefits to consumers as compare to traditional model.

Kawatra and Kumar (2017) studied on cost benefit analysis of cloud computing in education. In order to find research results, a specific lab was set up with a motive to report financial aspect. A comparison was done between cloud based hosting and conventional method in order to find cost variations. Finally study revealed that cloud based method of education is a better method as it reduces cost.

Khan and Jiong (2019) studied cloud computing effect on enterprises in terms of costs and revealed that cloud computing is a better strategy for small and medium sized businesses for reducing costs. Empirical data was gathered from chiefs of IT organization through meetings and telephones. Finally it reported that cloud computing has many advantages and disadvantages but about its real meaning, much more confusion can be observed among companies.

Gharpure and Ghodke (2021) studied effect of cloud computing technology adoption on reduction in costs: a critical review from the perspective of business. After doing study it revealed that cloud computing helps in cost minimization decisions.

5 OBJECTIVES OF THE STUDY

The main objective of the study is to examine the impact of cloud computing on costs of IT companies.. The Specific objectives of the study are;

1) To examine the impact of cloud computing on hardware costs of IT companies under study.

2) To examine the impact of cloud computing on software costs of IT companies under study.

3) To examine the impact of cloud computing on administrative costs of IT companies under study.

4) To examine the impact of cloud computing on operational costs of IT companies under study.

6 Conceptual Frame Work

It is expected that cloud computing is being influenced by costs of IT companies. Thus cloud computing has been considered as the dependent variable while hardware costs, software costs, administrative costs and operational costs are taken as independent variables
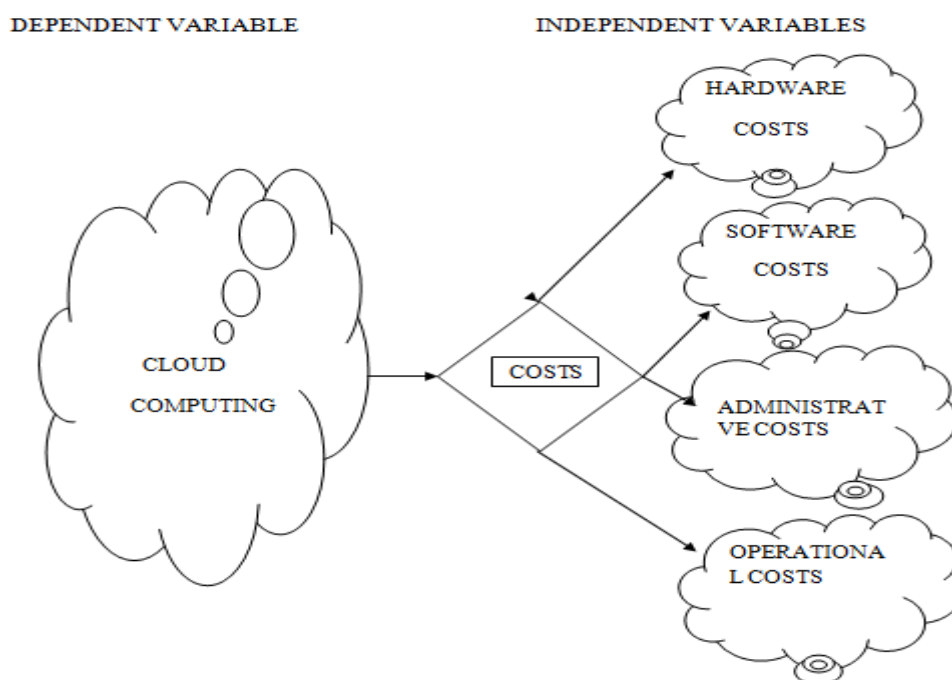
7 HYPOTHESES:

On the basis of upper stated objectives, the following hypotheses have been formulated

H01: There is no impact of cloud computing on hardware costs of IT companies under study

H02: There is no impact of cloud computing on software costs of IT companies under study

H03: There is no impact of cloud computing on administrative costs of IT companies under study

H04: There is no impact of cloud computing on operational costs of IT companies under study

8 RESEARCH METHOD

8.1 RESEARCH DESIGN: This study has adopted a survey research design through administration of Structured questionnaires raised on a five point Likert Scale pattern (SA=Strongly Agree (2), A=Agree (1), N=Neutral (0), D=Disagree (-1), Strongly Disagree (-2).

8.2 SCOPE OF THE STUDY

The study examined the impact of cloud computing on a sample of 22 IT companies in India. In order to collect primary data, structured questionnaires had been distributed among companies for filling it.

8.3RESEARCH DESIGN

This study utilized descriptive research design by describing data and its features relating to the population of phenomenon being studied; impact of cloud computing on IT companies. It was used in order to find out the impact of cloud computing on costs of IT companies.

8.4 Sample and Sampling Techniques

The sampling frame list includes IT professionals.

8.5 Instruments

8.5.1questionnaires

Structured questionnaires have been used in order to collect primary data from 30 IT professional. All the IT professionals were contacted and pursued and got the 30 questionnaires filled. Current study conducted reliability and validity test on questionnaires.

8.5.2 Data Processing and Analysis

Data was entered, edited and analyzed by using SPSS VERSION -20 through CRONBACH's Alpha, correlation and Regression.

8.5.3 Reliability and Validity

In order to check the internal reliability and validity, CRONBACH'S ALPHA Coefficient of a psychometric test score was run for study variables. The instrument has an acceptable level of reliability as CRONBACH's (CRONBACH, 1951) is greater than 0.80 for all the scales.

Table: Cronbach's Alpha for Reliability of Study Variables

Independent variables	CRONBACH's Alpha
Hardware cost	.86
Software cost	.87
Administrative cost	.88
Operational cost	.82.
Dependent variable	
Cloud computing	.89

8.5.4 CORRELATION

	Cloud computing (DV)	Hardware cost (IV-1)	Software cost (IV-2)	Administrative cost (IV-3)	Operational cost (IV-4)
Cloud computing Pearson Correlation Sig(2-tailed)	1	.67 .000	.71 .000	.73 .000	.70 .000
N	30	30	30	30	30

A correlation analysis was utilized to measure the inter-relationship between independent variables and dependent variable. This table depicts significant relationships. The correlation of hardware cost is .67 that shows that hardware cost has large impact on cloud computing. The correlation of software cost is .71 that shows strong relationship between cloud computing and software cost. This also shows that administrative cost has large impact on cloud computing. The correlation of operational cost is .70 that shows strong impact of it on cloud computing.

9 REGRESSION ANALYSES

TABLE-9

Regression analysis was conducted in order to evaluate and understand the relationships between the dependent and independent variables of the study. There are two basic types of regression ie linear regression and multiple regressions. Linear Regression includes one independent variable to explain and/or predict the outcome of Y, while Multiple Regression includes two or more independent variables to predict the outcome. The general form of each type of regression is:

Linear Regression: $Y = \beta_0 + \beta X + \varepsilon$ (1)

Multiple Regression: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$ (2)

Model Summary

Model	R	R Square	Adjusted R Square	Std Error of the estimate
1	.70a	.49	.44	.377

a. Predictors: (Constants) hardware cost, software cost, administrative cost, operational cost

b. Dependent variable: Cloud computing

Table 9.1shows the model summary in which value of R is .70.This shows that there is strong correlation between dependent variable and independent variables. Here the value of Adjusted R Square is .44 that shows that our model is good fit. Therefore our all alternative hypotheses are accepted having significance value less than 0.05. This shows that all independent variables have great impact on dependent variable cloud computing.

Table 9.2

ANNOVA

Model	Sum of square	DF	Mean Square	F	Sig
1 regression	381.49	1	381.49	28.40	.000
residual	325.94	26	12.53		
Total	707.43	27			

a.   Predictors: (Constant), hardware cost, software cost, administrative cost, operational cost

b.   Dependent Variable: Cloud computing

This table shows that significance value of F (.000) which is less than 0.05. This describes that all independent variables have done their good jobs in explaining dependent variable.

Table 9.4

a.   Coefficients table of impact of cloud computing against the independent variables (Hardware cost, Software cost, Administrative cost, Operational cost (coefficients)

Model	Un-Standardized coefficients		Std coefficients	Beta	T
	B	Std error			
Constants	3.376	.0132	--------	25.75	.000
Hardware cost					
	.87	.042			
Software cost			.095	1.68	.023
Administrative cost	.274	.034			
Operational cost			.033	6.808	.033
	.424	.0185			
			.0185	6.890	.043
	.134	.575			
			.075	2.73	.037

10 RESEARCH FINDINGS AND DISCUSSIONS

10.1response Rate
The study issued 30 questionnaires from which 30 were duly filled and returned. This brought the response rate to 100% for the targeted respondents. According to Babbie (1990), a response rate of 60% is good, 70% very good and 50% adequate for analysis and reporting from manual surveys. Therefore, the response rate was considered excellent for analysis.

11 .Impact of Cloud Computing on Costs of it Companies

11.2 Descriptive Statistics of Impact of Cloud Computing On Costs of it Companies
Majority of respondents (80%) strongly agreed that cloud computing impacts hardware cost.(90%) respondents agreed that software cost is impacted through cloud computing to maximum extent. All (100%) of respondents strongly agreed that cloud computing improves administrative cost. On the other hand majority (73.33%) of respondents opine that cloud computing impacts operational cost.

11.3 Impact of Cloud Computing on Hardware Cost of it Companies

Majority of the respondents (76.66%) strongly agreed that while using cloud computing no need to buy high powered computers while (80%) were also agreed that cloud computing created less need of capital.70% respondents agreed that cloud computing decreases paucity of funds.100% respondents agreed that cloud computing decreases installation expenditure. Thus it can be concluded that cloud computing impacts hardware cost to maximum extent.

11.4 Impact of Cloud Computing on Software Cost of It Companies

73.33% of the respondents strongly agreed that cloud computing decreases installation expenditure. Majority of the respondents (90%) strongly agreed that cloud computing decreases demand of separate software packages. (76.67%) respondents agreed that cloud computing reduces maintenance cost. 80% of respondents strongly agreed that cloud computing reduces staffing. Thus it can be concluded that cloud computing impacts hardware cost to maximum extent.

11.5 Impact of Cloud Computing on Administrative Cost of it Companies

Majority (86.67%) of the respondents strongly agreed that administrative cost plays an important role in the cloud computing. (93.34%) of the respondents strongly agreed that cloud computing offloads administration responsible for system. 80% of the respondents strongly agreed that cloud computing increases effectiveness of the IT companies. (100%) of respondents strongly agreed that cloud computing increases productivity that results in less chances of wrong products. Thus it can be concluded that cloud computing impacts administrative cost.

11.6 Impact Of Cloud Computing on Operational Cost of it Companies

Majority (90%) of the respondents strongly agreed that cloud computing reduces infrastructure. Only (73.34%) of the respondents strongly agreed right cloud computing increases reliability.66.66% of the respondents agreed that cloud computing eliminates redundancies. (100%) of respondents strongly agreed that cloud computing allows remote workforce and collaboration. Thus it can be concluded that cloud computing impacts operational cost.

12 ANALYSES OF HYPOTHESES

12.1 Impact of Cloud Computing On Hardware Costs of it Companies

Majority of the respondents (76.66%) strongly agreed that while using cloud computing no need to buy high powered computers while (80%) were also agreed that cloud computing created less need of capital.70% respondents agreed that cloud computing decreases paucity of funds.100% respondents agreed that cloud computing decreases installation expenditure. Thus it can be concluded that cloud computing impacts hardware cost to maximum extent.

Thus the Hypothesis (H01) that there is no significant impact of cloud computing on hardware costs of IT companies under study stands to be rejected

12.3 Impact of Cloud Computing On Software Costs of it Companies

73.33% of the respondents strongly agreed that cloud computing decreases installation expenditure. Majority of the respondents (90%) strongly agreed that cloud computing decreases demand of separate software packages. (76.67%) respondents agreed that cloud computing reduces maintenance cost. 80% of respondents strongly agreed that cloud computing reduces staffing. Thus it can be concluded that cloud computing impacts hardware cost to maximum extent.

Thus the Hypothesis (H02) that there is no impact of cloud computing on software costs of IT companies under study stands to be rejected

12.4 Impact of Cloud Computing on Administrative Costs of it Companies

Majority (86.67%) of the respondents strongly agreed that administrative cost plays an important role in the cloud computing. (93.34%) of the respondents strongly agreed that cloud computing offloads administration responsible for system. 80% of the respondents strongly agreed that cloud computing increases effectiveness of the IT companies. (100%) of respondents strongly agreed that cloud computing increases productivity that results in less chances of wrong products. Thus it can be concluded that cloud computing impacts administrative cost.

Thus the Hypothesis (H03) that there is no impact of cloud computing on administrative costs of IT companies under study stands to be rejected.

12.5 Impact of Cloud Computing On Operational Costs of It Companies

Majority (90%) of the respondents strongly agreed that cloud computing reduces infrastructure. Only (73.34%) of the respondents strongly agreed right cloud computing increases reliability.66.66% of the respondents agreed that cloud computing eliminates redundancies. (100%) of respondents strongly agreed that cloud computing allows remote workforce and collaboration. Thus it can be concluded that cloud computing impacts operational cost.

- Thus the Hypothesis (H04) that there is no impact of cloud computing on operational costs of IT companies under study stands to be rejected.

13 Summarization of the Results of the Hypothesis

	Hypotheses	**Results**
H01	There is no significant impact of cloud computing on hardware cost of IT companies under study	Rejected
H02	There is no significant impact of cloud computing on software cost of IT companies under study	Rejected
H03	There is no significant impact of cloud computing on Administrative cost of IT companies under study	Rejected
H04	There is no significant impact of cloud computing on operational cost of IT companies under study	Rejected

14 IMPLICATIONS OF THE STUDY

The current findings of this study bring home the fact that impact of cloud computing on costs if IT companies. This study will help IT companies to decrease their costs by formulating effective strategies to increases profits on the basis of the studied variables. The study revealed that there is an acceptance of impact of cloud computing on costs behavior including hardware costs, software costs, administrative costs and operational costs

Thus the findings of this research can help the IT companies in the formulation of policies and practices for decreasing costs in the future.

15 LIMITATIONS OF THE STUDY

The results of this study should be interpreted keeping in view the following limitations:

1 The sample size for the collection of primary data was limited to30 respondents only due to lukewarm response to filling up of the questionnaires by the respondents.

2 This study has covered only Indian IT companies

3. The findings and suggestions are drawn on the basis of the information collected through questionnaires .It is assumed that the collected information is absolutely correct

In spite of above limitations, this study is very relevant and timely since it provides valuable insight into the impact of cloud computing on costs of IT companies

16 SCOPE FOR FURTHER STUDY

The main objective of this study was to contribute to the existing pool of knowledge on impact of cloud computing on costs of IT companies The following list enumerates some dimensions of impact of cloud computing in respect of which further research in future can be undertaken.

1) The present study investigated impact of cloud computing on costs of IT companies. Further studies can be can be undertaken general public in other areas at global level.

2) Studies similar in nature and scope to the present one can be carried out in respect of other countries

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A STUDY OF COMPONENTS OF CENTRIFUGAL PUMP, ITS PERFORMANCE PROPERTIES AND VARIOUS APPLICATIONS

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ABSTRACT

Pumps are mechanical devices that infuse energy into liquids such as liquids and gases through mechanical action. This is a hydraulic machine, which converts mechanical energy into hydraulic energy. Mechanical pumps are widely reported as the second most common engine, the first being an electric motor. Centrifugal pump are often used in many applications to produce high pressure. Correspondingly, it develops a high pressure ratio in small axial distances associated with axial fans. They are usually used in heating, ventilation, air conditioning systems and various other applications. This paper summarizes the different theoretical and experimental investigations carried out by various researchers, and the results of their research regarding the pump impeller design, optimization, simulation and experimentation, based on where this work was proposed. The hydraulic design of the pump impeller is still relatively empirical in its approach. It is difficult to design a pump impeller that has very determined hydraulic performance in its full working range. An understanding of the field of flow over impellers requires knowledge of important variables and their effects on performance. Using Computational Fluid Dynamics (CFD)for the impeller blade design helps improve its performance without having to carry out actual experiments and experiments. Over the past few decades, CFDs for turbo engines have increased in complexity and accuracy because computing power is increasingly available and software has been further developed. This is very clear in the evolution of CFD on centrifugal pumps. Many previous studies focused on estimating two dimensions of flow through this pump

INTRODUCTION

Pumps are available in single or multiple entry settings, with several rotor stages and with various diffusion options ranging from diffuser to scroll volute. Efficiency of more than ninety percent is now a practical possibility even though the ability to achieve such high values often depends on the application. Centrifugal pumps are used in various applications and they can handle various liquids at relatively high pressures. The basic centrifugal pump consists of two main components, the rotor which energizes the fluid (often called an impeller) and the component that diffuses flow when moving around it (commonly called volute). However, this simple arrangement creates a very complex fluid condition. In general, flow is three dimensional, turbulent and unstable. In a centrifugal pump, it is important to transfer energy from the impeller to the fluid efficiently. High efficiency is achieved through the design of a propeller shape, but the complexity of well- designed propellers contributes to three dimensions of flow.**Gulich** argues that in the impeller there are only four main secondary flow mechanisms (i.e. components of normal velocity toward the main stream) which arise due to meridional curvature, rotational effects, blade force, blade force, and axial flow. The specific flow structure will obviously depend on the individual pump geometry, even though the same fluid dynamics phenomenon will exist to some degree. Flow in a dynamic towater pump generally has a high Reynolds number and is therefore considered turbulent. This results in turbulent mixing losses and consideration of turbulent boundary layers is required. Under section flow conditions, features such as recirculation and separation can occur. In addition, under certain conditions, steam bubbles can form leading to the development of cavitations.

CLASSIFICATION OF PUMPS

Positive Displacement Pumps

Positive displacement pumps operate by alternating cavities and then moving a certain volume of liquid. A positive displacement pump produces a constant volume of fluid against various release pressures or head. Positive Transfer Pumps are classified into two general categories such as Single Rotor and Multiple Rotor. Pumps are classified as rotary, reciprocal, or centrifugal. Gear, propellers, lobes are used by rotary pumps to move fluids from the inlet to the outlet. Reciprocating pumps are pumps that use a pistonor diaphragm to put pressure on the liquid.Positive displacement pump can function by pushing a set fluid quantity from the pump's inlet pressure portion into the pump's discharge area. It can be categorized into two kinds: rotary-type positive displacement pump: internal gear pump Screw pump Reciprocating-type positive displacement pump: piston pump Diaphragm Pump Positive displacement pump Positive displacement rotary pump can move the fluid using rotating mechanism that generates a vacuum that captures and draws in the liquid. The rotary positive displacement pump can be categorized into two primary kinds: gear pumps-a straightforward rotary pump type where the liquid between two gears is pushed. Rotary vane pumps-comparable to scroll compressors, these pumps are equipped with a cylindrical rotor in a comparable housing. The vanes trap fluid between the rotor and the enclosure as the rotor moves, drawing the fluid through the pump. The reciprocating pump uses one or more oscillating pistons, plungers or membranes (diaphragms) to move the fluid while the valves limit the movement of the fluid to the direction required With one or more cylinder, pumping in this category is easy. They can either be single-acting with suction in one direction of piston movement and release in the other direction or double-acting in both directions with suction and release. Typical reciprocal pumps are: plunger pumps-a reciprocal plunger pushes the fluid through one or two open valves, closed on the mannerback by suction. Diaphragm pumps analogous to plunger pumps where hydraulic oil is pressurized by the plunger, which is used in the pumpingcylinder to extend a diaphragm.

Non–Positive Displacement Pump

With this pump, the quantity of fluid supplied for each cycle relies on the flow resistance. A pump generates a steady force on the fluid for each specific pump velocity. Resistance generates a force in the opposite direction in a discharge row. A liquid is in a state of equilibrium and does not flowwhen these forces are equivalent. If the outlet of a non-positive displacement pump is totally closed, for a pump working at full velocity, the discharge pressure will increase to maximum. A non-positive displacement pump can be categorized as follows: a centrifugal pump A is a roto-dynamic pump that utilizes a rotating impeller to raise a fluid's stress and flow rate (Friedrichs and Kosyn 2000; Gulich 2008).

Centrifugal pumps are the most prevalent form of pump used by a piping scheme to move liquids. The fluid enters the pump impeller along or near the rotating axis, and the impeller accelerates it, flowing radically outward or axially into a diffuser or volute chamber from which it exits into the downstream piping scheme. Centrifugal pump is typically used through lower heads for big discharges.

Centrifugal Pumps

Centrifugal pumps are devices where mechanical energy is converted into pressure energy through centrifugal force acting on the fluid. The centrifugal pump can be one or several stages depending on the number of impellers and the efficiency of the pump depending on the application. Centrifugal pumps are used for many applications and handle liquids and gases at relatively high pressures and temperatures. Rotor and volute are the two main components of a centrifugal pump. Centrifugal pumps are widely used in the industry, especially in the oil and gas sector for fluids transport. Classically, these are designed to transfer single phase fluids (e.g., water) at high flow rates and relatively low pressures when

compared with other pump types. As part of their constructive feature, centrifugal pumps rely on seals to prevent air entrapment into the rotor during its normal operation. Although this is a constructive feature, water should pass through the pump inlet even when the inlet manifold is damaged. Modern pumps are integrated in pumping units which consist of a drive (normally electric motor), a transmission (when needed), an electronic package (for monitoring and control), and the pump itself. The centrifugal pump rotating portion is called the "impeller." The impeller is a rotating disk with curved blades that stand out from the disk face vertically. Sometimes the tips of the blades in the impeller are coated with another flat disk to offer shrouded blades, otherwise the blade tips are left open and the pump casing itself is the strong exterior wall of the blade passage. The benefit of the shrouded blade is that flow from one passage to another is prevented from flowing across the tips of the blade. The impeller is installed on a shaft attached to an electric motor's shaft. The fluid drawn into the blade passages at the inlet of the impeller is accelerated as it is compelled radially outwards as the impeller rotates. This raises the fluid's static pressure. Centrifugal pumps have two main components, the part that energizes the fluid commonly known as an impeller is called a rotor and the part where the moving fluid is called a sheath. The efficiency of a centrifugal pump depends on the shape of the impeller. Certain flow structures depend on pump geometry. Recirculation and separation can occur in partial flow conditions and because of the formation of steam bubbles, cavitations occur.

The effect is not stable in the off design condition and with respect to time, it affects the variation of mass flow through the centrifugal pump. The design of the impeller and casing is very complex. To provide energy efficiently to the fluid, impeller features such as number of blades, angle of entry and exit, front and end edges, eye diameter must be considered carefully and specifically. Volute pumps can be circular or spiral shaped and the crossing area must be circular, trapezoidal or rectangular. Figure 1.1 shows the parts of a centrifugal pump. Centrifugal pump works on two kinds of hydraulic forces, such as radial thrust and axial thrust, conducted by the impeller. Due to the 3-D flow structure associated with turbulence, secondary glide, CAVITATION, and instability, flow analysis within the centrifugal pump is particularly complex. Using Computational Fluid Dynamics (CFD) methods, the accessibility of computational sources and growth within the precision of numerical techniques in latest years brought fast equipment to fix the issue. CFD simulation enables the flow situation within the centrifugal pump to be visualized. The reliability of rotating machinery, particularly centrifugal pumps, is described due to the component wear rate and durability of the bearings. The radial hydraulic charge is due to the fluid's unequal velocity flowing through the casing. The fluid speed and pressure distribution NON- UNIFORM influences the liquid movement and appears on the circumference of the impeller. The radial load is regarded when designing the pump casing. The volute casing has a uniform distribution of velocity and pressure across the exterior edge of the impeller in a theoretical scenario at Best Efficiency Point (BEP). There are demonstrated formulas to predict with reasonable quantity of precision the hydraulic radial thrust. Radial thrust can be minimized by double volute enclosure or enclosure of the diffuser type. Axial thrusts happen in centrifugal pumps owing to asymmetry. At a discharge pressure this pressure acts on the impeller shrouds, the gap between the protective cover of the case and the impeller back shroud, the case and the impeller front shroud is occupied with fluid. Compared to the front shroud, the highest ground region is accessible in the back shroud.
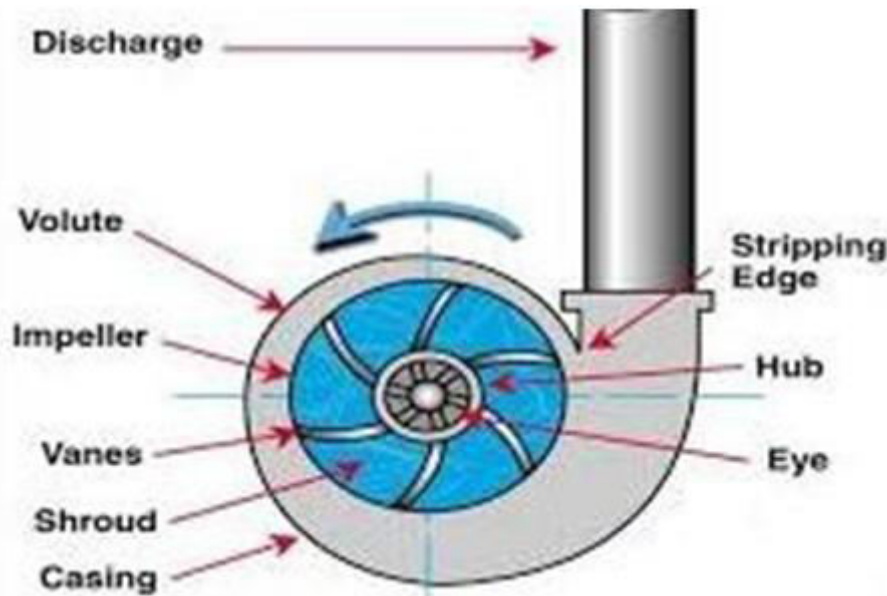
Figure: Parts of Centrifugal Pump

Centrifugal pumps can be classified based on the way the fluid flows through the pump. The way the liquid flows through the pump is determined by the design of the pump casing and the impeller. Radial flow, axial flow, and mixed flow are three kinds of flow through a centrifugal pump. Figure 1.1 shows parts of the centrifugal pump. As the impeller rotates, the fluid at the impeller eye, the centre of the impeller, is drawn into the blade passage. The inlet pipe is axial and therefore fluid with very little whirl or tangential velocity element enters the impeller and flows in the direction of the blades outwards. Figure 1.2 demonstrates the velocity triangles attached to the impeller at the inlet and outlet tips of the vane. The blades between the r1 inlet radius and the r2 outlet radius are curved. β1 is the angle of the blade at the base, measured from the curve to the radius of the reservoir, while β2 is the angle of the blade at the outlet. The fluid enters the blade passage with an absolute velocity V1 and the tangential velocity vector U1= r1 is inflected at an angle α1 to the impeller where the angular velocity of the impeller is equal. Vr1 at an angle β1 parallel to the inlet is the resulting comparative speed of the stream into the blade passage. Similarly, Vr2 is at an angle tangent to the blade at the outlet. By adding the impeller outlet tangential vector U2 and relative velocity vector, the absolute velocity vector V2 is acquired. Vw2 and V2 are set from the tangent to the blade at an angle α2. A centrifugal pump rarely has any type of inlet guide vanes. Therefore, the fluid approaches the impeller without any significant whirl and thus the blades ' inlet angle is intended to create a right-angled velocity triangle at the inlet (as shown in Fig. 1.2). The direction of comparative speed Vr does not coincide with that of a blade under circumstances other than those for which the impeller was intended. The fluid therefore suddenly shifts direction when entering the impeller. Moreover, the eddies offer rise to some flow back into the inlet pipe, causing fluid to whirl before entering the impeller. However, the inlet whirl speed and consequently the inlet angular momentum of the liquid entering the impeller are set to zero.

Radial Flow
In a radial flow pump, the liquid reaches the middle of the impeller and is aimed towards the right angle of the pump shaft along the impeller blade where the centrifugal force completely develops the pressure. The radial flow pump is preferred when the head requires more.

Axial Flow

In an axial flow pump, the impeller pushes the liquid in a direction parallel to the pump shaft where the pressure is developed by the act of driving or lifting the impeller propeller on the liquid. Axial flow pumps are sometimes called propeller pumps because they basically operate like ship propellers. When more flow rates are needed, axial flow pumps are preferred. In axial flow pump, flow is axial and axial velocity is constant through all radiuses. The blade angle will be varied through different cross section of radius, thus blade velocity varies at different section. Normally, the blade will be twisted one and guide vanes are located behind the impeller to direct the flow.

Mixed Flow

In a mixed flow pump, the flow direction is mixed. In this case the pressure is developed in part by the centrifugal force and in part by the removal of the impeller vanes on the liquid. This pump is used for medium head and medium flow applications.

Pump Performance Properties

The most important properties used to determine centrifugal pumps are capacity, head, BHP (Brake Horse Power) and BEP (Best Point of Efficiency). These properties can be compared and analysed in a graph called the pump performance curve.

Pump Capacity

Capacity often refers to the flow rate at which the operating fluid is pumped to a particular operating point. For example, to get the best efficiency, various types of pumps might require different flow rates (capacities) to achieve them. Capacity is usually measured in cubic meters per hour (m3 / hour). There are a number of factors that can affect capacity including fluid characteristics, impeller rotation speed and impeller size. For certain pumps, with certain impellers rotating at a fixed rotation speed, the only way to change the pump capacity is the pressure on the suction and the release of the pump.

Total Water Head (He)

The head of total water, also known as the pump's effective head, can be expressed as an increase in energy between the suction side and the pump discharge. This increase in energy includes an increase in the discharge head and an increase in suction head.

Brake Horse Power (Bhp) Pb

BHP is the actual horsepower input on the pump shaft coupling. In case the pump is connected directly to an electric motor, brake horsepower can be considered the same as the motor power output.

Effective Power (Pe)

The effective strength of the pump is the product of an effective water head, Qr discharge rate and specific weight.

Pump Efficiency

The total efficiency of the pump is the effective power ratio of shaft power. Pump efficiency is less than 1, which means there are several mechanical and hydraulic losses in the pump.

Best Efficiency Point (Bep)

The best point of efficiency is the capacity of a particular driving diameter where efficiency is the highest. BEP is very important for identifying optimal energy conversion. Because pump efficiency is related to changes in kinetic energy to pressure, BEP means the change in energy from kinetic energy to pressure energy at a given capacity is maximum. The pump operates in the most efficient conditions in BEP. If a pump operates outside the BEP, it may suffer from many conditions that are mechanically unstable such as increased vibration, excessive heat, and

unexpected impulses. These abnormal conditions can cause failure of bearings and mechanical seals. In addition, rising temperatures will be the main cause of pump cavitations.

Pump Performance Curve

Complete and comprehensive testing is carried out by the pump manufacturer to analyze the pump characteristics including efficiency, required input Brake Horse Power (BHP curve) and head (Figure 1.5). The capacity and pressure requirements of any system can be determined by the system curve. In addition, the relationship between variations in capacity and pressure for a particular pump can be shown as a pump curve. The intersection of these two curves determines the pump operating point and process. All these properties are plotted against the pump's capacity to cover the pump's performance curve. Other information such as the size and type of pump, impeller size and rotation speed are usually also expressed in this type of graph. This curve is often described at a certain rotational speed and for certain impeller diameters. For certain pumps, the performance curve shows all the characteristics of its operation. From the pump performance curve (Figure 1.5), the normal operating range can be determined. It can be observed that the curve starts at zero flow rates with the closing head. The curve then gradually decreases to a point called the run-out point which shows the maximum flow rate and minimum head. The pump cannot work beyond this point because cavitations will occur.

Components of Centrifugal Pump

The centrifugal pump consists of the following main components: Impeller, Casing, Suction Pipe and Delivery Pipe

Impeller

The impeller is mounted on a shaft that is attached to a drive unit which may be an electric motor or an IC engine. It has a rear arched propeller mounted in series.

Semi Open Impeller

In semi-open impellers; there is only one shroud that presents the front or rear of the impeller. This is used for thick liquids such as waste; pulp etc, the choice of material for impeller manufacturers is influenced by the liquid chemical properties to be handled.

Shrouded or Closed Impeller

In this type of impeller, the propeller is covered with a shroud on both sides. This is used to handle non-viscous liquids such as ordinary water, hot water, hot oil and chemicals such as acids etc.

Casing

This is an airtight channel that surrounds the impeller which consists of suction and discharge arrangements. In this case, the kinetic energy of water discharged at the outlet of the impeller is converted into pressure energy before entering the shipping pipe.

CENTRIFUGAL PUMP LOSSES

Mechanical Losses

Depending on the type of pump, the pump connection or drive comprises of bearings, shaft seals, and equipment. All of these parts cause loss of mechanical friction. The following deals with losses caused by desk friction in bearings and shaft seals and losses. Disk friction is the enhanced power consumption that happens on the impeller's shroud and hub as it rotates in a casing of a fluid-filled pump. Between the impeller and the pump casing, the fluid in the cavity begins to rotate and produces a main vortex. The velocity of rotation is equal to the velocity of the impeller on the impeller surface, while it is zero on the pump casing surface. Therefore, it is presumed that the average main vortex velocity is equivalent to one-half of the rotational velocity. Due to the distinction in rotation velocity between the fluid at the impeller's surfaces and the fluid at the pump case, the centrifugal force produces a secondary vortex motion. In

addition, the roughness of the impeller and pump housing surface has a crucial significance for the size of the disk friction. The friction of the disk is also improved if the impeller's exterior surface is lifted or dented.

Hydraulic Losses

Hydraulic losses occur through the pump on the fluid route. Losses happen because of friction or because the fluid on its route through the pump must alter direction and velocity. This is due to modifications in the cross- section and the rotating impeller passage. Flow friction happens when the fluid is in touch with the surfaces of the rotating impeller and the inner surfaces of the case of the pump. The friction of flow creates a loss of pressure that lowers the head. The magnitude of the loss of friction relies on the surface roughness and the comparative surface fluid velocity. At cross-sectional expansions in the pump, velocity energy is converted into static pressure energy. The conversion is connected with a loss of mixing because there are variations between the speeds and the cross-section. Loss of incidence happens when there is a distinction in the leading edges of the impeller or guide vane between the flow angle and blade angle. Usually this is the case with part load or pre-rotation. When there is a distinction between the flow angle and the blade angle, a re- circulation area happens on one side of the blade. After the leading edge of the blade, the recirculation area creates a fluid contraction. After the contraction, the flow must again decelerate to fill the entire blade channel and mixing loss occurs.

Volumetric Losses

Loss of leakage happens due to reduced circulation due to gaps between the pump's rotating and fixed components. The loss of leakage outcomes in a loss of effectiveness due to the enhanced flow in the impeller compared to the flow through the whole pump. The leakage at the impeller's eye between the impeller and the casing and by axial relief is typically the same size. In multi-stage pumps, the leakage flow between the guide vane and shaft is less essential due to the lower pressure difference and gap region. It is essential to create the gaps as small as possible to minimize the leakage flow. When there is a big pressure difference across the gap, it is especially crucial that there are tiny gaps.

Role of Computational Fluid Dynamics in Pump Design

.Computational Fluid Dynamics (CFD) has the ability to predict velocity, pressure and force distribution in the system, and it would be advantageous to use these results to conduct studies of Fluid Structure Interactions in structures containing fluid. Thus, the effect of fluid flow on structures containing it can be determined, by applying Computational Fluid Dynamics (CFD). Computational Fluid Dynamics (CFD) is a sophisticated computer-based design and analysis technique. The computational model is designed using CFD. CFD uses a numerical method to solve basic nonlinear differential equations. Computational Fluid Design has become a very popular approach to designing complex geometries. The design can be improved by analyzing the settings of several geometries using identical sets of simplifications. Better performance can be obtained by mathematical and computational errors and using these resources in different ways, accuracy can be increased by using a larger number of elements and because the results of this technique are obtained in a very short time CFD improves flow characteristics and hearing characteristics of turbo engines. Step-by-step calculations are performed to obtain analytical solutions. CFD analysis is important for pumps to improve pump characteristics with hydraulic efficiency. Hydraulic characteristics can be increased by applying proper boundary conditions, producing the highest quality elements and choosing the best turbulence model. There are many boundary conditions available that are applied to the pump inlet and outlet. The pump inlet and pump outlet are determined on the surface of the pump volume under boundary conditions. The number of elements produced by CFD software depends on computer memory used for analysis purposes. The elements generated for the solution domain affect the pump solution. Ideally,

Depth analysis can be done by CFD and understand the pulse source to reduce it during pump operation. Rough grids provide better similarity with experimental results in short periods of time and in tangential speed components, the biggest errors are found. CFD analysis produces results with better accuracy.

Applications of Cfd

Computational fluid dynamics is used to analyze fluid flow, heat transfer, and system chemical reactions with the help of computer based simulations. Some of the main CFD applications are as follows:

Fluid Transfer

For moving fluid from one receptacle to another, a pump is used. There are a broad range of apps where it may be essential to move this sort of fluid. For instance, transfer pumps are frequently used in small-scale private, commercial or agricultural applications where a fluid needs to be transferred from one tank to another, particularly oil or gasoline. They are also used in apps of much bigger scale such as mining and shipping or construction projects.

Petroleum Industry

At exceptionally elevated pressures and temperatures, the pumps are constructed to manage hydrocarbons, which will burn or explode if released accidentally. The first priority in design and manufacture is therefore the integrity of the pump casing to avoid hydrocarbon release. Furthermore, in terms of lost manufacturing, the implications of the failure of one of these pumps can be important for the proprietor. All this implies that when it comes to casing thickness, flange design, welding, permissible shaft deflection, bearing design, etc., these pumps are constructed very conservatively.

Chemical Industry

A pump is specifically intended for use in pumping chemicals. They should generally be resistant to corrosive materials, some of which are produced to manage easy, less corrosive chemicals such as oils or cosmetics, while others are intended to pump the kinds of hazardous and volatile chemicals that must be kept under very particular circumstances.

Textile Industry

The centrifugal pumps are used for moisturizing the air in the textile industry, as the cloth treatment must be carried out under constant air humidity. It is also used in the process of coloring.

Paper Industry

In a broad range of applications, the paper industry needs pumps. The paper industry's primary use of the centrifugal pump is to pump the paper pulp after blending it with the water in the paper machine's head box.

Sewage and Sump Service

A pump for moving strong and liquid waste to a treatment site. Most municipal systems depend on gravity to transfer waste to the local sewage treatment facility from home drains and other buildings. However, circumstances where the sewage has to be transferred to a higher elevation or over lengthy distances are prevalent and there is not enough gravity-based pressure to do so.

Irrigation, Drainage and Flood Control

A variety of pumps used to direct water, generally for agricultural purposes, from a water source to a portion of dry soil. Irrigation utilizes a wide range of distinct kinds of pumping processes, including rotary pumps, diaphragm pumps, piston pumps, and hand pumps. However, most of them fall into the centrifugal pump category. Most prevalent are end-suction pumps that draw water out of the top at the end of the casing. Some irrigation pumps, however, may be

submersible pumps that operate from the bottom of a water body, and there are booster pumps that provide additional pressure water from a source where the water is already flowing.

Boiler Feed

The centrifugal pump is used to regulate the quantity of water entering a boiler and how the water is supplied. In high-pressure boilers, such as water tube boilers used in industrial applications and those generating super hot steam, they are particularly helpful. In particular, these pumps do not need to be equipped to manage heavier or more volatile liquids because most boilers operate solely with water. They just need to be able to speed up the water and regulate the flow at specified rates.

Fluids Circulator

A pump intended to use a closed system to circulate a fluid. A closed system is one that operates in a loop, with the pump discharge line eventually returning to the suction of the pump, often without atmospheric pressure ever being exposed. They are usually regarded centrifugal pumps, although the use of positive displacement technology also includes a few kinds.

Fire Protection

A type of pump used in a business construction or manufacturing plant to move water through a fire sprinkler system or manual hose bibs. The intake of the pump is usually connected to the external water supply, although it may be connected in some cases to a local water source such as a well, tank, or water body.

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IMPACT OF CONSUMERS' SATISFACTION ON UNIFIED PAYMENT INTERFACE (UPI)

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ABSTRACT
The National Payment Corporation of India (NCPI) launched the Unified Payments Interface (UPI), that has some of the most excellent, modernized, and cost-effective innovations capable of leaving a lasting impression on the Indian economy, which has now made significant strides in the digitalization marathon. Since demonetization, India's payment technologies have enabled significant changes. The two most important ingredients of the whole phase are the introduction of smartphone and card payment solutions. This is a research project aimed at identifying consumer preferences for Unified Payment Interface (UPI) and determining the effect of UPI on customer loyalty. The objective of this study is to find out the actual psychological perceptions of the users of the UPI, whether UPI could reach the satisfaction of consumers, if the transactions are easy and secured, know whether UPI is acting as a base to next generation technology.

Keywords: Cost Effective, Modernized, Online Payment, Rapid, Unified Payment Interface (UPI).

1. INTRODUCION

In the realm of revival and globalization, innovation decides the advance of a nation. Premise of the online has introduced new plans of action and weird exchanges on the world economy. They brought together Unified Payment Interface (UPI) has started by National Payments Co-operation of India (NPCI), stage for all the advanced installment administrations. Nowadays the arrangement of versatile applications is moved up to a different degree of criteria with innovative highlights. The continuing development or the time of mobile phone applications with UPI and high infiltration and development of installment benefits through online installment administrations. This upgrades and instructs the paperless and cashless economy; the movement of computerized India is conveying sentience. Accordingly, this effect of versatile assistance installments framework is made within the most up-to-date decade, since individuals in Asian nations like India, are keen on inventive things to think. The electronic trade is that the term utilized during this day and age, by specifying business to the worldwide customers.

Presently again web based business is stretched their hands to portable trade, enormous information is currently changed to the cell phones broadened the administrations generally[1]. India has been called a cashless economy, yet due to nonexistence of foundation luxuries to create installments the means are heretofore being deferred. Yet, in spite everything being equal, enactment, and activities assuming a primary job has been taken by the legislature of India, the UPI came into the advanced world to roll out progressive improvements within the portable installment administration. The UPI may be a typical interface or a stage for each single advanced installment. NCPI has the system activities, helps the specialist co-ops. The bound together installment interface administrations has of course permitted the client to send or get cash utilizing virtual installment addresses without entering the bank data of other individuals. Through single versatile uses of any bank, various banks can represent installment administrations. To empower this administration, the client must tackle banks to acknowledge installments through UPI installment administration.

There have been some significant speculations that play a significance in tolerating new innovation and data framework before the passage of brought together installment interface

hypothesis of acknowledgment and utilization of innovation. Consequently, these hypotheses make a significant acknowledgment in the innovation based examinations. The previous research was utilized to inquire about the utilization conduct of innovation. A few models propose four developments, for example, execution anticipation, exertion hope, social affecting and encouraging conditions. What's more, alongside erasing directing variable intentionality from the model and leaving as same age, sexual orientation and experience. This model likewise improves the continuous association between encouraging condition and conduct goal and propensity is additionally straightforwardly connected to the social goal. The acknowledgment of data innovation is likewise influenced by the way of life and furthermore mental variables come into picture as detailed by numerous specialists and the specialists in the field of innovation as inquired about culture ought to be extra knowledge to analyze mechanical acknowledgment in any important field. In this way a large portion of the papers in the ongoing exploration situation excluded the way of life in deciding the client acknowledgment.

That is the new game round the depository financial institution of India advanced brought together UPI with phenomenally structured applications, smooth client experience, and implied for moment settlements. Moving cash starting with one ledger then onto the following never has been simpler. The numbers recommend Indians are grasping advanced exchanges quite ever. In 15 months, exchanges on UPI—among India's most up-todate computerized installment stages—hustled to 105 million in November from 92,000 in August 2016, information from the National Payments Corporation of India appear. UPI has differing types of computerized installments as far as development, anticipating a picture of India rapidly hopping from money to telephone based installments. Tez has become India's biggest UPI application by a large margin, by exchange volume inside eleven weeks of dispatch. the applying offers an oversized group of motivating forces to win clients—advanced scratch cards for welcoming others to hitch and execute on that, for sending and getting cash, for paying to the few shippers it's on the stage, even as every week by week draw[2].

One gathering trusts UPI is just pulling in bargain searchers who will switch back to traditional strategies for installments once the arrangements don't seem to be any further. Others state the cashbacks and prizes are fundamental to making new propensities and onboarding clients on to computerized installments during a nation where money despite everything rules. "UPI possesses a significant change peer to work out installments and a wonderful deal of repeating money exchanges have maybe moved to UPI. This could be a heavy positive for the installments biological system," said Sujatha Mohan, head of computerized and new activities at RBL Bank, which runs its own UPI application named BHIM RBL Pay. "Dealer reception on an interoperable way has started yet can't scale. On the off chance that scale is accomplished, at that point this installment strategy (UPI) are as omnipresent as a (credit or platinum card). UPI as an advanced installments instruments was propelled by previous depository institution Governor Raghu ram Rajan in April 2016, however it made its mark post demonetization in

November a year ago and so the administration's resulting accentuation on cashless exchanges. The Android variant of the applying has 20 million downloads. Exchange volumes expanded to eight.2 million in November from 7.6 million both in September and October, as indicated by information from National Payments Corporation of India, which deals with the BHIM application. Be that because it should, lots of the all-out UPI exchanges dropped to eight in November from 10% in October and about 25% in September. Tez, then again, represents 70% of the UPI advertise with 140 million exchanges since its dispatch. Flipkart's advanced installments stage Phone Pe, having made an infinite number of employments including charge installments, telephone revive and trader installments since its dispatch in October 2016, represents under 30% of the UPI advertise. It prepared 1 million day by day exchanges worth an absolute Rs 100 crore consistently in November.

Services Offered from UPI:

- Balance enquiry

- Transaction history

- Send /Pay money

- Virtual address

- Account number and IFSC code

- Mobile number and MMID

- Aadhaar number

- Add bank account

- Change/Set MPIN

- To receive notifications or messages

- Managing the account

Promoting digital payments by the government of India.

1.1. Citizens To Government and Business to Government Payments:
Divisions convey differing types of administrations to residents and organizations and gather installments against conveyed benefits through any a minimum of one in every of the accompanying modes that's money, paper based installments, Check to the office, Request draft, Challan, NEFT, RTGS, Net banking, IMPS.

1.2. Government to Government (G2G) Payments:
Local Government Offices utilize PFMS for creating installments against arranged and unarranged plans. PFMS is usually utilized for Focal Division and Focal supported plans and their interfaces with state treasury. For creating G2G installments, regime Divisions utilize created or obtained frameworks for creating installments.

1.3. Government to Businesses (G2B) Payments:
Under characterized consumption heads, Government Offices either obtain merchandise/items or subcontract ventures/administrations to outside offices/people and make installments for such acquirements and activities utilizing any of the accompanying modes they are, Electronic based (NEFT/RTGS) to organizations, Paper based (Cheque), Money along these lines actualizing offices register as Program division and issue endorse requests, drawing and dispensing official creates the bills and Pay and Records Official (PAO), favors the bills Rules for Reception of Electronic Installments and Receipts (EPR). Regime Offices utilize singular Frameworks for creating such payments.

1.4. Advantages of UPI

1.4.1.   Free Fund Transfer
There were days when you needed to part 5% of the sum for the reserve move. Visa MasterCard still charges 1-2% of the sum for making an installment to the trader. NEFT and IMPS are not expensive but rather one would absolutely feel if the exchange is little. Yet, The UPI is of less expense. The expenses are low to the point that Banks have made it free. The majority of the banks and installment applications don't charge a paisa.

1.4.2. Useful For Small Transaction

Prior to the UPI, you may have not paid ₹10 or 20 by utilizing the charge or MasterCard. The card exchanges are expensive and little retailers maintain a strategic distance from it. Be that as it may, UPI has changed the situation. Presently every retailer or road seller is prepared to acknowledge UPI installments. The smooth and minimal effort exchange had made it achievable for little businessperson and customer and furthermore purchaser goes without money. Once, you begin utilizing the UPI, you need less visits to the ATM. The UPI has made the dealer exchange incredibly simple.

1.4.3. Privacy of Bank Account

You would concur that the comfort of the online exchange accompanies the likelihood of extortion. That is the reason we deny to share our record subtleties and card subtleties with anybody. The UPI has tended to this issue. It had discovered the method for the store move without the revelation of ledger number or card subtleties. In the IMPS and NEFT, you need to share ledger detail to get the cash. In the UPI Framework, UPI ID is utilized instead of the ledger number or card number. Be that as it may, right now, don't require to share the record number for getting the cash. You need to just give the virtual installment address or UPI ID.

1.4.4. No Loss of Interest

In a versatile wallet, we for the most part store cash before close by to pay for the energize, charge installment, shopping and so forth. So when you put your cash in the versatile wallet it doesn't procure any premium. In the event that you store ₹100000 in a versatile wallet for a month, you would free ₹333 of the intrigue. This is the way it works. You would have earned this sum in the financial balance. In the UPI, you don't lose this enthusiasm as your cash doesn't leave the financial balance. The sum gets charged from the record at the hour of the genuine exchange. The wallet doesn't come in the center. The cash moves between various accounts.

Internet based payments are acknowledged as the powerful tools to gets the things done easily. Keeping a certain amount in the bank and linking the same to UPI is more than enough to carry out the transaction. Since the awareness level about UPI is less, people think twice and give more importance to the safer side option. It acts as a chain and also reflects the satisfaction among consumers about UPI. The Government of India aims at giving more importance to internet based transactions. Eventually satisfying the consumers and encouraging them to take up UPI.

This is a research study that conveys the importance of "Impact of consumer satisfaction on Unified Payment Interface". Since UPI is a new innovation, not everyone knows about UPI. Secondly people who are already using UPI it is important to know if they are really satisfied or if changes has to be made. Changes made is for a good cause and it has to be accepted by the consumers. It is found that UPI is not complex to understand and yet is not used which is a turn on to make India a digital India.

UPI is the one of the recent innovation introduced by national payment corporation of India (NPCI)[3]. After the implementation of UPI there are dramatic changes in the payment method. Hence it is important to know the benefits and drawback of UPI services and customer perception towards new innovation adopted by the national payment corporation. In this study the researcher aims to identify the customer preference towards UPI and to know the impact of UPI in customer satisfaction. Also the aim of our study is to build UPI and make everyone learn the importance of it.

This project has been prepared with the intention to know the about the satisfaction of consumers on using UPI and also to encourage them to use. This can make India the digital India. Also the project focuses on merits of UPI. There are applications available that can access UPI and hence can make transactions easier and also can have a track over it.

2. LITERATURE REVIEW

The Author mainly focused on the situation that was faced by India during demonetization and how UPI actually helped to overcome the challenge[4]. Meanwhile India was also focusing on building a cashless economy therefore in a way it was useful but the actual problem raised when the illiteracy rate was huge in number. The objective of his study was to support the growth of E-Commerce and also and another important objective was to meet the target of financial inclusion. The research methodology used in the above research is the primary data collected from employees, students, home makers and businessmen. He concludes by telling if UPI is followed cashless process will help in reduce of black money.

Whether UPI will be able to create the revolution towards which it is targeted is depended upon various factors. However, there are both positive and negative indicators speaking about the prospects UPI for the days to come[5]. Thus a robust Aadhar platform is one of India's superior achievements which will aid the country to digitalize its payment services through UPI. Every innovation brings with it several challenges and threats some of which are gradually treated over by time and forcing the user to make the adjustment and UPI is not an exception. The research study was upon statistics from government, financial regulators, articles from RBI, NPCI. This has acted as a huge opportunity for banks to leverage consumers.

The paper traces the evolution of payment systems in India and examines in detail the technology behind UPI focusing on its architecture and security systems through empirical study and also the theoretical literature review[6]. The research also says that RBI has played a vital role in bringing the concept of digital payments system to India. UPI has witnessed a rapid growth for both developing and developed countries towards low cost of digital payment. He also briefs up about the upcoming applications that support UPI like paytm, phonepe etc. [7].

This paper speaks about the history of NPCI through which there is the existence of UPI today[8]. They explain the process of installation of the UPI applications on phone and thereby how to use them. He also focuses on the advantages of UPI and its impact in the present economy. He does a comparative study on different applications of UPI as well. Anybody having any enquires about UPI can resolve their problem by going through his research paper, if they have any doubt can revert back through his email id. This research paper is for the beginners where he has explained every single detail. The data is mainly collected from websites of RBI, NPCI, and UPI etc. He concludes by telling that UPI acts as a system to multiple bank accounts through a single mobile application. Through this process the works gets easier, simpler, transparency with the transactions. In these days' people are so busy that they expect the work to be done in seconds which is again possible through UPI.

In this research, the researcher says that cashless India is a mission propelled by the Government of India driven by Prime Minister Narendra Modi to reduce the Indian economy on money and to bring crowds of reserved dark cash lying unused into the managing an account framework[9]. India is slowly transitioning from a money driven to cashless economy. "Vendors can select with banks to acknowledge installments utilizing UPI." This will help diminish money administration cost, track exchanges. This paper investigates the achievability of presenting cashless methods for business exchanges into our general public and the security dangers related with it. To conclude he says that demonetization was one such a situation that made India a cashless India.

It says that banking sectors have developed a lot from past one decade[10]. These days mobile banking are also growing day by day and making the work easier to the consumers. There has been high competition even between the banks, they have been trying their best to attract the customers, offering discounts as well. Trust is one of the important factor that the banks has to work upon.

3. METHODOLOGY

3.1. Sample

The further information shall be collected through primary data in form of questionnaires from students and adults from Bangalore city. The focus is mainly on youth and working professionals. Sample size-199 Sampling technique- Purposive sampling

3.2. Instruments

Chi-square, Factor analysis, Reliability test, Frequency analysis also some charts like pie charts and bar graphs Kind of data- Primary data

3.3. DATA COLLECTION

Primary data was used in form of questionnaire to analyze the impact of satisfaction among consumers towards UPI. Secondary data was also referred to understand certain concepts, to analyze tools. Secondary data also includes some of the journals, articles. The data was extracted from E-articles that is the secondary data.

3.4. Data Analysis:

Table 1: Demographic Factors of the Users of the UPI i.e. Age, Gender, Occupation

Data Attributes		Percentage
Age	15-20	12.6
	21-25	61.8
	26-30	14.1
	30 and above	11.1
Gender	Male	37.7
	Female	61.8
	Prefer not to say	0.5
Occupation	Student	48.2
	Working Professional	33.2
	Self employed	9.0
	Home maker	7.0
	Others	2.5

3.4.1. How Often Do You Use UPI?

Table 2: How Often Do You Use UPI - Respondents Questionnaire

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very often	100	50.3	50.3	50.3
	Often	62	31.2	31.2	81.4
	Rare	21	10.6	10.6	92.0
	I don't use	16	8.0	8.0	100.0
	Total	199	100.0	100.0	

How often do you use UPI
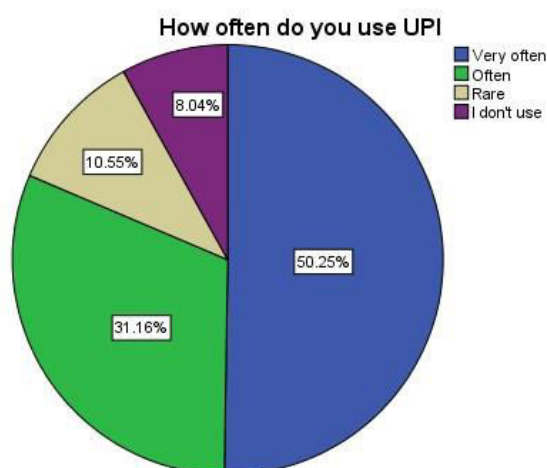
Figure 1: How often do you use UPI? - Respondents Questionnaire

The above Table 1, Table 2 and pie-chart in Figure 1 indicates the frequency of the people as to how often they use UPI.

From the above we can analyze that there are many people who use very often that is 50.25%. While again 31.16% of people use UPI often. But a very small percentage shows that they rarely use and some very some don't even use that is 10.55% and 8.04%. So we can conclude that many people use UPI.

3.4.2.　UPI has become a habit

Table 3: UPI Has Become a Habit of the Respondents With Frequency, Percentage, and Other Details.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	120	60.3	60.3	60.3
	No	21	10.6	10.6	70.9
	Maybe	58	29.1	29.1	100.0
	Total	199	100.0	100.0	

UPI has become a habit
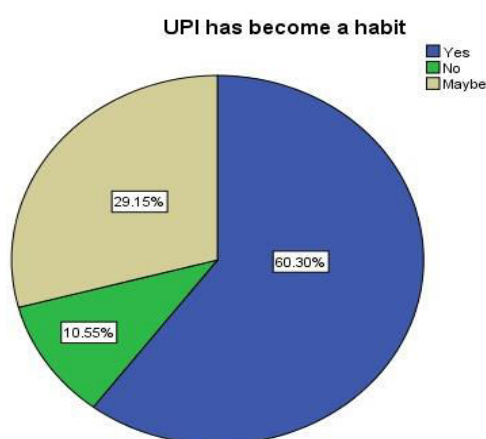
Figure 2: UPI has Become a habit of the Respondents Questionnaire

The above Table 3 and pie-chart in Figure 2 indicates that how exactly UPI has become a habit to the people. Therefore, we can analyze that there are many respondents who agree to this

saying yes, they do agree that usage of UPI has become a habit to them that is 60.30% agree to this. While 29.15%of the respondents say that UPI has not become a habit. And people who are in the dilemma are 10.55% which says may be but do not completely agree to the fact.

3.4.3. Are You Keen in Trying New Features?

Table 4: Keen to Try New Features Survey made by the Respondents Questionnaire

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	1	2	1.0	1.0	1.0
	2	5	2.5	2.5	3.5
	3	57	28.6	28.6	32.2
	4	76	38.2	38.2	70.4
	5	59	29.6	29.6	100.0
	Total	199	100.0	100.0	
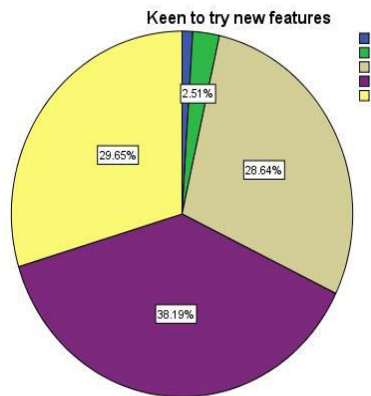
Figure 3: Are you keen in trying new features? As Asked by the Respondents Questionnaire

The above questionnaire is based on ranking perspective.

- 1 being the least

- 5 being the highest

Therefore, we get a clear cut picture that people are willing to try new features in Figure 3 and Table 4. 38.19% and 29.65% of respondents are willing for the new versions of UPI which makes work easier while 28.64% also fall into the same pace. Very few people are disagreeing upon this that is 2.51%.

Table 5: Rotated Component Matrix in Regards with the Users and the Opinion

Rotated Component Matrix	**Component**			
	1	2	3	4
It does not require much efforts	.861			
It makes my payments quicker	.852			
One can use it 24 hours	.823			
UPI makes my payments in a comfortable way	.800			
One can use it on public holidays	.799			
To achieve my tasks	.718			
Single mobile application for various bank accounts	.697			
Browsing page of UPI is user friendly	.694			
UPI does not work when there is an network issue		.521		

There are chances of hacking UPI account		.794		
There is a delay in payment		.769		
Many procedures to be followed		.743		
There are high chances of fictitious transactions		.741		
UPI is not trustworthy		.725		
There is a limit in transfer of money		.701		
Not everybody can use UPI		.653		
UPI does not work when mobile has hanging problem		.651		
UPI does not work when mobile has hanging problem		.626		
It keeps my data safe			.762	
It has bill sharing facility			.743	
UPI has adequate features that protects my security			.731	
It saves my travelling expenses			.567	
UPI is a Powerful tool for next generation				.850

Rotated component matrix in the Table 5 helps to determine what the components represent. Components are separated according to related factors. It contains estimates of the correlations between each of the variables and the estimated components. It all depends on the applicability. From the above correlation matrix all the variables have coefficient more than 0.3

Component 1- Satisfaction factors

Component 1 indicates all the factors of questions on a Likert scale which asks the respondent regarding the satisfaction upon using UPI. Features of UPI are highlighted.

Component 2- Challenging factors

Component 2 indicates all the factors of questions on a Likert scale which asks the respondent regarding, if usage of UPI is challenging for a customer. It has options such as Strongly disagree, Disagree, Neutral, Agree, strongly agree

Component 3- Security related factors

Component 3 indicates all the factors of questions on a Likert scale which asks the respondent regarding, security towards the transactions in UPI.

Component 4-Support factors

Component 4 indicates the factors of questions on a Likert scale which asks the respondent

Regarding powerful tool to the next generation and "help & support" option. Options are same as Component 2.

3.4.4. Chi-Square Test
H0- There is no significant difference between age and UPI being powerful tool for next generation.

H1- There is a significant difference between age and UPI being powerful tool for next generation.

Table 6: Chi-Square Tests between Age and UPI Being Powerful Tool for Next Generation

	Value	df	Asymptotic Significance (2sided)
Pearson Chi-Square	12.989[a]	12	.370
Likelihood Ratio	11.730	12	.468
Linear-by-Linear Association	.010	1	.920
N of Valid Cases	198		

From the above Table 6 hypothesis since the p=0.370 value is greater than significant value that is 0.05, we reject H1 and accept H0.

4. RESULTS

Pertaining to age factor age group belonging to 15-20 shows that 12.63% of people use UPI which is quite low, while age group belonging to 21-25 shows the maximum commitment towards investing strategy that is 62.12% people which is a very high score, 26-30 age group is quite less which is coming up to 14.14% and finally 30 and above is the least when compared to the other age categories, his is coming up to 11.11%.

Next comes the gender factor which portrays that 61.81% of females using UPI which is covering more than 50% and then the males summing up to 37.69% which is much less compared to females. But instead we can conclude saying that more of females have responded to the questionnaire therefore this result has been derived.

From the table and pie chart what we have analyzed we can say that students are the ones who is using maximum of UPI that is 48.24%, while working people are also doing well with UPI that is coming up to 33.17%, self-employed are using less that is 9.05%, home makers are the least that is 2.51%

Lastly chi-square test was used in the study. This test was basically passed to know if UPI is a powerful tool for next generation, it was not connected with the age factor because age factor does not play a very important role in this particular statement.

5. CONCLUSION

The study concludes by saying that the consumers are very much satisfied with UPI and also they are willing to accept the features for the applications they use. Many of them have even agreed there are quite a few technical glitches which delays the payment. They even agree to the fact that UPI if put into force properly they will even serve as a powerful tool for future generation. In the study, it would like to thank Prime Minister Mr. Narendra Modi for getting this UPI into force and thus making India a digital platform for the usage. In the regards to the study done, it can be believing that certain awareness programs need to be conducted for encouraging UPI. Also malls and big stores definitely have put forth an idea of UPI by availing many offers to the customers and thus encouraging them to buy. Similarly, it is very important even for the petty shops to accept mobile payments. Of course security plays a very important role in carrying out transactions.

UPI was that step taken up seriously during the time of demonetization and that was when actually people realized the importance of UPI. Any work is possible with hard cash, a mobile phone is more than enough with a single application and 'n' number of bank accounts attached with the same. One of the aim is also to make India a digital India. One of the other reason why people prefer UPI is that it saves time, be it even travelling time. Government has to invest by providing high speed internet for low cost.

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HUMAN IMMUNE PREDICTION USING MACHINE LEARNING

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ABSTRACT
Machine Learning appears as one of the key features to derive information from corporate operating datasets. Machine Learning in medical health care evolving as an enormous research field for delivering deeper understanding on medical data. Most methods of machine learning depend on several features defining the behavior of the algorithm, influencing the output, and thus the complexity of the resulting models either directly or indirectly. Many Machine Learning methods are utilized within the past to detect diseases. Prior detection of disease or low immune can help person to reinforce immune so on guard our body from harmful germs and viruses. Process is completed with the assistance of things like RBC counts, WBC, HB, MCV, MCH,MCHC, Neutrophils and platelet count.Observing and identifying of immune isn't an easy task to do manually because it takes a lot of time and effort. So it's easier to predict immune with an automatic processing and Machine Learning System. Different types of knowledge processing and Machine Learning algorithms are available to make best algorithm like rectilinear regression, Logistic regression and KNN algorithm. Various machine learning algorithm are often used to predict,so that the immune can often predicted easily and clearly because accuracy is vital in machine learning algorithm. This paper presents a study of various methods of predicting human immune.

Keywords: Machine learning, KNN, Immune, Logistic regression

INTRODUCTION
Immunity is resistance to disease, specifically communicable diseases. Human system is collection of cells, tissues, and molecules that mediate resistance to the infections, and therefore the coordinated reaction of those cells and molecules to infectious microbes comprises an immune reaction. Immunology is the study of the immune, including its responses to microbial pathogens and damaged tissues and its role in disease. The importance of the system for health is shown by the frequent observation that individuals with defective immune responses are too serious, often life-threatening infections. Predicting immune responses against through machine learning algorithm is the best method for shielding individuals against infections. After spread of diseases like aids and covid-19humans are conscious about their health. And now due to corona pandemic immunity is at the top most priority within the health sector as finding vaccine is difficult till that keeping immune can help people to live longer.The human immune contains multilayered mechanisms of responding to cellular stress and tissue damage to make sure defense from pathogens, maintenance of tissue homeostasis, and integrity of the holobiont. In body every cell plays different role, but some of the white blood cells are particularly more important for immunity.

Immunology might be a sophisticated subject to review for several reasons. There are many details, complicated study and usually these details get within the approach of understanding the ideas and it's difficult to know the deep detail convictions. As learning biological things for common people are often difficult task. This is often an enormous issue else immunologists love these exceptions; as a result they work on clues and furnish theme. Another issue is there associated with the new studies which are becoming out on the regular basis. Some fact which is stated correct today is often claimed false tomorrow which is challenging due to this continuous

updating is required. Something stated correct today are often wrong tomorrow that's why continue updations with perfect knowledge is must.

Prediction is important from medical aspect, that's why immune must be predicted. During approach, immune of the person is predicted using machine learning algorithm has been given.An scientist or hematologists might subdivide this further, there are some essential factors which we will beuse for classification. In physical body proteins are conduit through which cells interchange with one another. Receptors are proteins blind ligands which workas receptors for the opposite cells. Cells had differing types of receptors on other cells. They perform work like transporting glucose into the cells. The receptors associated with the system square measure usually are involved interrogating the atmosphere for proof of danger, infection, and abnormal death. Within the course of associate in nursing immune response, cells follow a way, overall outcome maximizes the probability of living and eliminating the infection. Complications arise once the system doesn't work properly.

Some problems arise unit smaller, like spore allergy, whereas others arise unit vital, like genetic disorders that wipe out the presence. This disorder is handled by analyzing the immune and dealing consequently.

II LITERATURE SURVEY

Lot of research is happening regarding system. Now as of due to corona pandemic it's important to know our immune and work consistent with that. There are some factors through which we will predict immune. We will use those factors and form machine learning module which may perfectly predict health system of person. By studying the various research papers we get some information about - three sorts of immune diseases: (a) allergies, (b) autoimmune diseases, and (c) infectious diseases. We compared the representative machine learning algorithms respectively from three different categories, namely decision tree learning, instance-based learning, and maximum margin learningmachine learning techniques to construct accurate classification models for 3 sorts of immune diseases, allergy, autoimmune disorder and communicable disease , caused by different protein antigens et al [1] ORTALLER is a web allergen classifier supported allergen family featured peptide (AFFP) dataset and normalized BLAST E-values, which establish the featured vectors for support vector machine (SVM)[2].After lot of research ready to we'll state that algorithms are laid out in different papers but there's need of actual implementation then only we will be able to use the web applications.

PROPOSED SYSTEM

Methodolies To Recognize Immune Prediction

Data Set Description:

Data is key concept in machine learning without data it's impossible to predict or implement any machine learning algorithm. Immune prediction datasets are also available. The Immune Detection Dataset(IDD) is the only public dataset to the best of our knowledge. The data set consist of RBC,WBC, HB,MCV,MCH. As for machine learning algorithm 75% of data from dataset is used for training purpose and rest of 25% of data is used for testing purpose.

BLOCK DIAGRAM METHODOLOGY

```
┌─────────────────────────────┐
│        Input Samples        │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│        Preprocessing        │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Dimensionality Reduction  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Training Using Machine Learning │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Immune Prediction      │
└─────────────────────────────┘
```
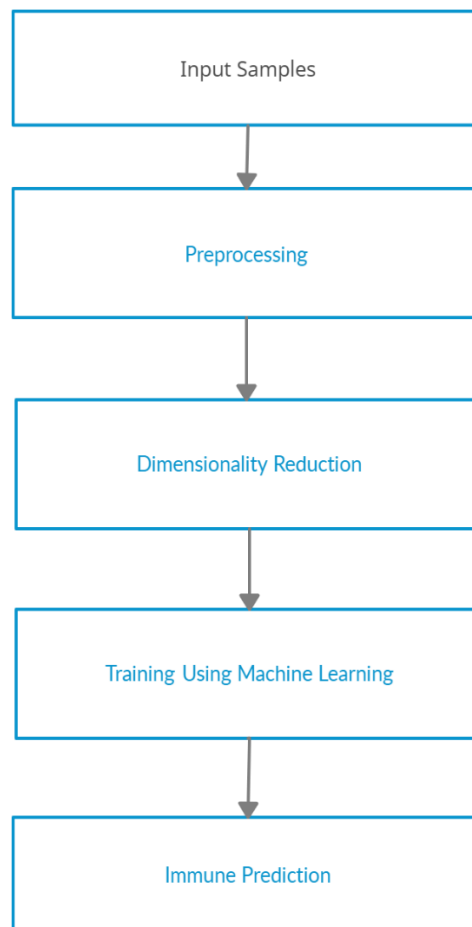
Fig 1. Block Diagram for Immunitizer (Application)

A. Input Samples

Parameter includes RBC count, WBC count, HB, MCV, MCH, MCHC, Neutrophils and platelet count which are given by user by anlysing blood report.

B.Preprocessing

Data preprocessing is one of the necessary steps in Machine learning as quality info and therefore the helpful information that may be derived from it directly affects the flexibility of our model to find out, we must tend to preprocess our knowledge before feeding it into our model. Preprocessing includes Handling Null Values, standardization, Handling construct variables, and multiple regressions. Universal dataset consists of some null values. It doesn't very matter whether or not it's regression, classification, or the other reasonably drawback, no model will handle these null values on its own thus we'd like to intervene.

Standardization is another integral preprocessing step. In standardization we tend our values such as average ought to be zero, and deviation ought to be one.

C.MACHINE LEARNING ALGORITHMS

1) Logistic Regression:

In terms of its name, logistic regression is not a regression model but a linear classification. Logistic regression is recognized in literature as logistical regression. In this model, a logistic

function is used to predict the probabilities that characterize the future consequence of a single test. The logistic regression in scientific learning can be approached from the Logistic Regression framework. For optional L2 or L1 regularization this design will work in a multi-class (one vs rest) logistic regression. In order to optimize the logistic regression penalized to binary class L2, the following risk functionminimizes:

$$\min_{\omega,c} \frac{1}{2}\omega^T\omega + C\sum_{i=1}^{n}\log(exp(-y_i(X_i\omega + c))) + 1$$

Likewise, the L1 regularized logistic regression addresses the following problem of optimization:

N minkωk$_1$ + C Xlog(exp($-y_i$(X$_i\omega$+ c)) + 1) ω,ci=1

2) K-Means Clustering:

In order to separate samples in n classes that have the same variance, the K- Means algorithm cluster results, minimizing the inertia criterion or using a square number. The number of clusters to be defined is needed for this algorithm. This applies well to a huge number of samples and is used in several different areas of use. The k-means algorithm partitions a set of observations N through K disjoint clusters C. Each is the average sample of $\mu_j$in the cluster. The mean square often referred to as" centroids;" usually they are not X points, although they reside in the same space. The K-means algorithm attempts to identify centers within a cluster sum that reduces inertia or squared criteria.

3) K-Nearest Neighbors (Knn):

kNNis used for classification and inference by a non-parametric approach of pattern recognition. The input is the closestexampleof k in the feature space in both cases. kNN implies an instance-based learning or lazy learning that only approximates the function locally and delays all calculations until classification is completed. Also for grouping as well as for estimation, weight can be assigned to the neighbors' inputs so that the near neighbors create a more reasonable contribution than the farther ones.

4) Support-Vector Machines:

In machine learning, support-vector machines unit supervised learning models with associated learning algorithms that analyze information for classification and statistical procedure. Developed at AT&T Bell Laboratories by Vladimir Vapnik with colleagues , SVMs unit one in every of the foremost robust prediction methods, being supported applied mathematics learning frameworks or VC theory projected. Given a set of work examples, each marked as happiness to one of two categories, Associate in Nursing SVM work formula builds a model that assigns new examples to one category or the alternative, making it a non-probabilistic binary linear classifier .prediction strategies, being supported applied math learning frameworks or VC theory projected.. SVM maps coaching examples to points in area thus on maximise the dimension of the gap between the 2 classes. New examples square measure then mapped into that very same area and foreseen to belong to a class supported that facet of the gap they fall.

In addition linear classification, SVMs will efficiently perform non-linear classification to victimization that is known as kernel trick, implicitly mapping their inputs into high-dimensional feature areas..

When knowledge square measure unlabeled , supervised learning isn't doable, Associate in Nursing an unsupervised learning approach is needed, that makes an attempt to search out natural cluster of the info to teams, and so map new knowledge to those fashioned teams. The support-vector clustering[2] algorithmic rule, created by HavaSiegelmann and Vladimir Vapnik, applies the statistics of support vectors, developed within the support vector machines

algorithmic rule, to reason unlabelled knowledge, and is one amongst the foremost wide used cluster algorithms in industrial applications.

D.Evaluation Metrics

The classifiers will produce the percentage of the immune type. The routine assessment of the result dependent on accuracy values.

E.Design and Implementsion of User Interface

After perfectly implementation of machine learning module. Next step can be creating a user interface so that user can use machine learning module without any technical knowledge for that various possibilities are there.

Developer can develop web based application or desktop application according to the requirement. For the web based application front end scripting knowledge is must. Further developer can use bootstrap to make it easier. Framework such as django and flask are also required for zipping all different modules. Various vendors are available for deployment of project in the final stage.

RESULT & DISCUSSION

Machine learning recognition systems are used to identify immune in patients and healthy people. In the present paper, we address briefly some popular classification algorithms and their theoretical context.

Here is comparison of Machine learning Modules with their prediction percentages as of dataset

Classifier	Accuracy
Kmean	13.13
svm_sigmoid	44.44
KNN_1	98.98
KNN_3	97.97
KNN_5	97.97
KNN_7	97.97
svm_rbf	67.67
Kmeans	27.27
SGD	67.67
MLP	67.67
svm_poly	81.81
svm_linear	97.97

Fig.2 Algorithm with Accuracy
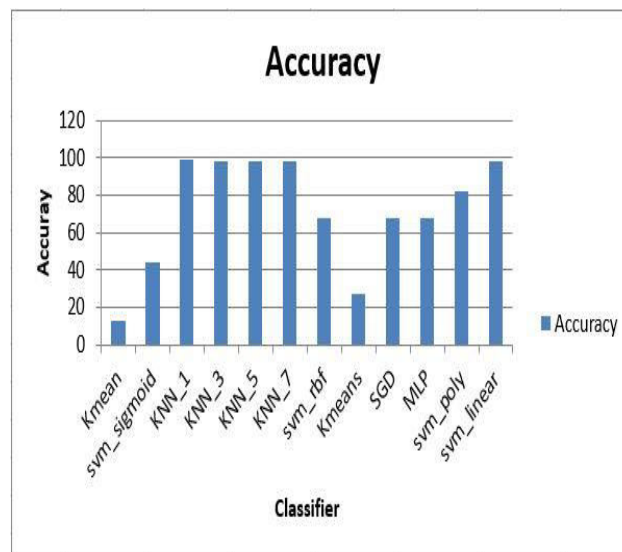
Fig.3 Algorithm with Graphical representation

CONCLUSION

In this paper, the machine learning algorithms for Immune prediction has been reviewed. It is observed that only one dataset i.e.Immune Detection Dataset is available publicly for research. There is plenty need for developing and updating immune based dataset.The most of the existing work were implemented using machine learning algorithms. Mostly implementation work is pending due to dataset sufficiency. Recently, it is observed that deep learning algorithms are used which are much more accurate.

In future, there is a scope for development of dataset for immune detection all around the globe. Also, there is need of implementation of highly accurate classifiers which can be invariant in term of predicting perfect immune.

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THE ECONOMICS OF RAMRAJYAM AND BROTHERHOOD POLICIES OF SRI RAMAN IN INDIA

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ABSTRACT

The Ramrajyam is based on a set of highly prescribed ethical rules and regulations regarding the rulers, people, families and governments. Every activity is based on ethics such as what one should do in a family, in a society, and in a country as a whole. It was applicable to all the people who reside in that kingdom from royal families at the top to the common people at the middle and bottom levels. It was not only talked about the land ownership of the people, but even "the ruling of a country" also should be based on certain regulations and principles. Nobody should violate it and nobody dared to do it also. Punishments were not so severe. At the same time people had the responsibility of how to behave in a society. Respects to parents, elders, elder brothers were clearly stated in Ramayana. The duties of the members in a family also clearly stated. Nobody should think of occupying or annexing or illegally takeover of the belongings of others including land, wealth and positions in the Kingdom. Illegally Occupying others is considered as not the right thing or not a good thing, and that is the violations of the regulations prescribed by the kingdom. The violations of the regulations are considered as "unethical" and not accepted by the society. The rules and regulations, based on principles of ethics, practiced by everyone during the Sri Raman period. This system is popularly known as "Ramrajyam" "the Governance of Ram" fully based on right things or Ethics.

Keywords: Ethics, brotherhood, kingdom, rules and regulations, and Universal peace.

INTRODUCTION:

Historians used to claim that the Asian Continent has a credit of being the birth place of all the major religions in the world. Islam, Christian, Hinduism, Budhism, Confucianism, Taoism and Jainism were born in this continent only. Within this Asian continent, India has one more credit of being the birth place of Hinduism and Buddhism. Buddhism is the major religion in most of the South East Asian countries including China though it born in India but has limited followers here. India has about 10, 140, 000 Buddhists with a share of 0.70 per cent of India's total population (worldpopulationewview.com). If we classify the religious groups in India according to their followers as per the 2011 census data, about 79.8 per cent of the people are Hindus and about 14.2 per cent are Muslims, about 2.3 per cent are Christianity and about 1.7 per cent are followers of Sikhism. India's population at present is estimated to be 1.4 billion. Approximately every sixth person in the world is an Indian. India is the home to about 94 per cent of the Hindus all over the world at present though India is the land of various of ethnicities and religions groups.

India's "Hindu Religious System" is basically based on two "Great Epics of India" known as "1. Ramayana and, 2. Mahabharata", written by Saint Valmiki and Saint Viyasar respectively some 7000 thousand and 5000 thousand years ago. The Ramayana is the biography of Sri Raman or Sri Ramachandran who ruled the Kingdom Ayodhya with "Ethical Rules and Regulations". He was a perfect King without any allegations about his characters, his affinity with his people and his policies towards neighbouring kings. His Kingdom was with full of moral and ethical principles of what one should do throughout one's life? And what one should not do throughout one's life? Sri Ram is considered as "the King of Ethics and Principles or a King of Perfectness"

Just opposite to Ramayana, on the other hand, the Epic Mahabharata revealed the story of the causes and the consequences of the "Great War - Mahabharata" fought by Cousin brothers, "Five Pandavas" and "One Hundred Kauvravas" in the place known as "Gurushetra" for property, for wealth, for women, with full of egoism and jealousy. The Hindus belief that this war was conducted by the Lord Krishna, through Arjunan who was the son of Devendran, one of the 10 Avatars (incarnations) of Lord Mahavishnu, to safeguard the human beings in this world. His discourse were in the form of a poem, popularly known as "Bhagavad Gita".

Hinduism has two major divisions, generally known as "Saivism (Shaivites) and Vaishnavism (Vaishnavites)". Those who follow and or worship "Vishnu and his Avatars (Incarnations) " like (1) Matsya (the Fish) Avatar, (2) Kurma (the Tortoise) Avatar, (3) Varaha (the Boar) Avatar, (4). Narasimha (Man-Lion) Avatar, (5) Vamana (dwarf) Avadhar, (6) Parashurama (the Angry Man) Avatar, (7) Sri Raman (the perfect King) Avatar (8) Balaraman (Elder brother of Krishna) Avatar (9) Krishna (The Divine Statesman) Avatar and (10) Kalki (the Mighty Warriyar coming on White horse) Avatar, yet to be held in this world are known as Vaishavism. According to a 2010 estimate by Johnson and Grim, Vaishnavites are the largest Hindu sect, constituting about 641 million or 67.6 per cent of Hindus. The Vaishnavishsm was highly popularised by 12 Alwars.

Those who worship and follow "Lord Shiva' is known as Saivism (Shaivites). Similarly the Saivism was popularised by 64 Nayanmars. Generally the people in northern part of India are the major followers of Vaishavites and the people in Southern India are considered as followers of Shaivism or Shaivites.

In this research paper an attempt has been made to bring out some of the salient features of the "brotherhood policies" adopted and practiced by Ayothya Ruler Sri Ram who ruled the country with very strict ethical rules and regulations or ruled with ethics. His system of administration or governance is popularly known as "Ramrajya or Kingdom of Ram. 'Ram Rajya' "envisages a society in which virtue, morality and justice are the core ideals around which day-to-day interactions between citizen and citizen and state and citizen occur". Since it is impossible to imagine such a perfect state of affairs, Ram Rajya, in the modern sense, is often thought of as an idealistic goal which governments should keep in mind and take inspiration from while implementing their governance agenda. Though Mahatma Gandhi may have coined the term in its modern avatar, the concept of 'Ram Rajya' has been a part of Indian thinking for centuries. The term has both a practical and a philosophical-cum-utopian aspect. Practically, it can be described as a means of putting the idea of good governance at the centre of all governmental activity. But there is a deeper philosophical and spiritual resonance to the concept, which idealises Lord Rama as a perfect ruler (Sumeet Kaul, 2019).

ETHICS OF RAMARAJYAM:

The Ramrajyam is based on a set of highly prescribed ethical rules and regulations to be followed by the rulers, people, families and government. Every activity is based on ethics such as what one should do in a family, in a society, and in a country as a whole. It was applicable to all sections of the society or the people who reside in thae kingdom from royal families at the top to the common people at the middle and bottom levels. It was not only talked about the land ownership of the people, but even "the ruling of a country" also should be based on certain regulations and principles. Nobody should violate it and nobody dared to do it also. Punishments were not so severe. At the same time people had the responsibility of "how to behave in a society". Respects to parents, elders, elder brothers, younger brothers, relatives, friends, neighbours etc. were clearly stated in Ramayana. The duties of the members in a family also clearly stated. Nobody should think of occupying or annexing or illegally takeover of the belongings of others including land, wealth and positions in the Kingdom. Illegally Occupying others is considered as not the right thing or not a good thing, and that is the

violations of the regulations prescribed by the kingdom. The violations of the regulations are considered as "unethical" and not accepted by the society. The rules and regulations, based on principles of ethics, and practiced by everyone   during the Sri Raman period. This system is popularly known as "Ramrajyam" "the Governance of Ram" fully based on right things or Ethics.

Generally it is quite common to see in most of the families in India that brothers within a family itself used to fight for house, land, and wealth of their parents without giving respect to elders in the family. There are so many police complaints and court cases filed every day over the land dispute by the brothers over the property of their parents. Along with brothers even sisters also go to the court since women too have equal rights over the property at present. But in Ramayana the attitude of the Sri Raman and his brothers were entirely different. One can not imagine of the sacrifice Raman did for his brothers and similarly what Bharathan did for Sri Raman.

When Sri Ram went to forest for 14 years, as directed by his father Dasarathan, his younger brother Bharathan, who is supposed to sit on the Kings Chair of the Kingdom and ruled the country for next fourteen years. But Bharathan had declined to do so stating that "he has no right over that Chair and it is unjust to do like that or occupying the position of his elder brother Sri Ram. Sri Ram or Ramachandran, the eldest son of Dasarathan, had the right over it. Only Raman was supposed to sit on the Kings Chair and rule the country, not by any of his younger brothers (Ram had three younger brothers namely, Bharata, Lakshmana,   and Shatrughna). Bharathan simply kept Sri Raman's two "footwear's" on the chair for fourteen years until Sri Raman returned from exile. The brothers of Sri Ram were affectionate with one another and trusted with one another. Laksmanan, one of the younger brothers of Sri Raman was always with Sri Ram not only as a brother but also like his protector and care taker. Sri Raman considered the entire population of the Ayodhya Kingdom as his brothers and sisters. He had No dispute, no disagreement and no conflict with anyone in the kingdom. He was the king of righteousness or ethics.

In the human development history of the world some of the well known Kings and Rulers, in India as well as at International levels" are considered as "Great Rules or Emperors" and others are simply considered as "Rulers or Kings". Here the greatness is very much associated with certain rulers like the Mughal Ruler Akbar as "Akbar the Great, the Mourya King Ashoka known as   "Ashoka the Great", the former King of Macedonia Alexander as "Alexander the Geat",   and the King Raja Raja Cholan" of Tamil Chola dynasty as the "Raja Rajan the Great" etc are some examples for that. There are so many kings were referred to with "High Sound Titles" . Why they were considered as "great rulers", "Emperors", "King of Kings" because when they were ruling they had   involved in many wars, fought with many kings, they defeated many rulers, killed lakhs of soldiers, annexed enemies Kingdoms or became the ruler of the defeated Kingdoms. Their greatness was based on the size of their Kingdom, number of soldiers, horses and elephants they maintained to attach other kingdoms. The Great Britain is another example for "how they became great rules all over the world? Just by killing most of the rulers in their colonies, and even their own European counter parts like France, Duch, and German rulers in their respective colonies. Just opposite to these great rulers and fighters, Sri Raman never fought for conquering the land or kingdom of others. He had to fight with King Ravanan of Sri Lanka just to rescue his wife Sitha from Srilanka. Sri Ram had no other options than war because of the adamant attitude of Ravan. Other than this he did not involved in any major wars in any other kingdoms. He had no reasons to fight with others because he followed the policy of brotherhood.

Sri Raman had never fought with his neighbouring kingdoms. He never had the mind of conquering the land of others or occupying/annexing others properties in any form. He knows

very well about "what is right and what is not right". He never failed to recognize other leaders/kings and treated them   as his brothers whatever may be the size of their kingdoms.

In this paper an attempt has been made to bring out some of   the salient features of "Brotherhood Policies" adopted by Sri Ram.   The relevance and   implications of these brotherhood policies   on the socio economic conditions of the people in India at present as well as on the international communities at Global level. This work is mainly based on secondary information available on line and generally descriptive in nature.

Brotherhood Policy of Raman:
According to Merriam Webster dictionary, the term brotherhood is defined as a. "the quality or state of being brothers" b. an alliance c. an association (such as a labour union or monastic society) for a particular purpose, d. the whole body of persons engaged in a business or profession (Merriam-webster.com). According to Oxford Lexico UK dictionary the term brotherhood is defined as "The feeling of kinship with and closeness to a group of people or all people. An association or community of people linked by a common interest, religion, or trade" (lexico.com).

The significance of the Brotherhood policy is not something which is new to the world at present. Most of the major religions are teaching   "brotherhood as a basic issue of their religion". The religion Islam is giving a lot of importance to Brotherhood. In Islamic community, all Muslims are brothers and this message is revealed in the tenth verse of Al-Hujurat (the verse of brotherhoo^ The Bonds of Brotherhood The Bonds of Brotherhood, (Jump up to:a b "Al-Hujurat chapter".). The "Verse of Brotherhood" (Arabic: ةى la tayĀ :dezinamor ,الاخوة-Ukhuwah) is the tenth verse of the Quranic chapter "Al-Hujurat" (Q49:10). The verse is about the brotherhood of believers with each other; which says: "the believers are but brothers, so make settlement between your brothers. And fear Allah that you may receive mercy (49:10). (Jump up to:a b "Al-Hujurat chapter"., ^ Jump up to:a b "An Enlightening Commentary into the Light of the Holy Qur'an vol. 17", ^ Jump up to:a bSubhani, Ayatullah Mirza Ja'far.). The Islamic Moral System: Commentary of Surah al-Hujurat. Islamic Humanitarian Service (IHS). (^ Tafsire Ibn Arabi, Vol.2, P.276,) The Islamic prophet Muhammad instituted brotherhood between the emigrants and helpers and he chose Ali as his own brother. According to Shia this happened after the revelation of the verse of brotherhood. (^ Altahrir-Altanvir, Vol.26, P.20, Tafsire Noor, Vol. 9, P. 181, ^ "Al-Hujurat (49:10)". Quran Surah Al-Hujuraat (Verse 10).

The Christian religion also is also teaching the brotherhood in a precise manner. The Epistle to the Galatians, also called the Letter of Paul to the Galatians, or Galatians 3:28 ESV / 50," the concept brotherhood is clearly stated as "There is neither Jew nor Greek, there is neither slave nor free, there is no male and female, for you are all one in Christ Jesus".   John 4:20 ESV / 228, , "If anyone says, "I love God," and hates his brother, he is a liar; for he who does not love his brother whom he has seen cannot love God whom he has not seen". Peter 2:17 ESV / 156, " Honor everyone. Love the brotherhood. Fear God. Honor the emperor" (openbible.info).

From the above definitions about brotherhood from holy texts of different religions, it is crystal clear what brotherhood means is that, "it is not only a relationship with brothers alone, it may be with a group of people with similar characteristics, may be doing particular business or with common motivation or practicing a particular religion or followers of a particular philosophy with one ideology. The brotherhood ideology ensures that there is no difference between the rich and the poor, there is no difference between the ruler and the servant, there is no difference between different races, there is no difference between countries and there is no linguistic differences. All are equal.

Now a days it is quite common to see that every country has its own external affairs ministry to deal with the what type of policy strategies to be adopted with different countries particularly with their own neighbouring countries. Every country is spending very huge amount of money for defence to deal with the neighbouring countries. India is not exemption from this also. In the 2022-23 budget India has allotted about Rs. 5.25 lakh crore for defence considering the nature of thread coming from China and Pakistan. This is about 13 per cent of the total expenditure of the government. Similarly every country is doing like this. Though most of the western countries spend less for defene compared to India but indirectly they spend very huge amount of money for defence research and development activities. According to the Stockholm International Peace Research Institute (SIPRI), "Total global military expenditure rose to $1981 billion in 2020, an increase of 2.6 per cent in real terms from 2019. The five biggest spenders in 2020, which together accounted for 62 per cent of global military expenditure, were the United States, China, India, Russia and the United Kingdom. Military spending by China grew for the 26th consecutive year (sipri.org).

After Russia's invasion of Ukraine most of the countries lost their confidence with their neighbouring countries. Sometimes the neighbouring countries may be follow the same religion, may be from the same race, may speak the same language still there are problems with the boarders. There is insecurity. Saddam Hussein of Iraq invaded Kuwait in 1990 though they follow the same religion. Same is the case with Hitler also though a Christian who wanted to conquer most of the European countries and invaded them. Here once a country or King decided to conquer the neighbouring countries no consideration is given to race, language and religion. Conquering, defeating and annexing were their motives and policies. Just opposite to these policies Sri Raman had a policy of brotherhood among his neighbours and also with Kings from faraway lands. He maintained a friendly relationship with his neighbours and friends and also brothers. The following analysis mainly focused on the "brotherhood policies" adopted by Sri Raman with three different personalities though they were from three different geographical and socio economic conditions. They are 1. Guhan- A tribal leader, 2. Vanara Sugrivan and 3. Vibhishanan of Sri Lanka. Sri Raman was the Price of Mighty Ayodhya Kingdom. But Sri Raman never thought like that. He considered himself as a simple person or wanted to reveal as a simple person so that the common people could easily approach him for any help. The accessibility of the people with the King was very much ensured during his period.

Brotherhood with Guhan- A Tribal Chief
When Sri Raman went to the forest to fulfil the wishes of his father Dasaradhan with his wife Sitha Devi and Lakshman he was received by Guhan, a friend and the Tribal Chief of Sringiverapuram. Guhan was a childhood friend of Raman only and he helped their journey to Dhandakaranya as part of their Vanvasam (Exile). Though Guhan was living in the forest area he was a wealthy Chief of the forest area. He was so healthy as well as the protector of the forest wealth. The "Kampa Ramayanam" described about the relationship between Sri Rama and Guhan in such a way that they are not like friends but like brothers. The Tribal Chief Guhan along with his people received the Sri Raman, Lakshman and Seetha on the banks of River Ganga with a lot of wild fruits, flowers, vegetables and honey. Guhan asked Raman to stay with them in the forest and his people will take care of him. They are ready to construct a "Kudil" ("small thatched hut") for Sri Ram family. Nobody could imagine the affectionate relationship between Raman and Guhan in Ramayana. Raman considered Guhan as his brother only. While introducing Guhan to Seetha and Lakshman Raman refereeing Guhan, not as a friend, but as my "Fifth Brother". Similarly while introducing Sitha to Guhan, Raman was telling Sitha is your "sister- in- law" and Lakshman is your younger brother.

Sri Raman was a powerful Price of Ayodhya. Born and brought up in an urban culture with highly sophisticated wealthy environment with full of care and affection by the royal family. Guhan was simply a forest tribal man. Compared to Raman, an avatar of Mahavishnue, Guhan is nothing. But Raman never failed to recognise the dignity, culture and tradition of the tribal chief. Raman never treated or considered him as his subordinate though the forest is coming under the Ayodhya Kingdom.

Most of the tribal people, who are the owners and protectors of the forest, lost their forest wealth and culture only during the British period. The British only occupied the forest areas which were the home to about 705 tribal communities as recognised by the government of India at present. The British government gone for massive deforestation programme after establishing the control over the forest areas to plant tea, coffee, cardamom, and other commercial crops brought by them. They made the hill areas as their summer headquarters and residential areas.

Dietrich Brandis set up the Indian Forest Service in 1864 and helped formulate the Indian Forest Act of 1865. The Indian Forest Act of 1865 extended the British colonialism in India and claimed over forests in India The 1865 act was a precursor to the Forest Act of 1878, which truncated the centuries-old traditional use by communities of their forests and secured the colonial governments control over the forestry (the statesman). The act of 1865 empowered the British government to declare any land covered with trees as a government forest and make rules to manage it. The government mainly used the woods for railway sleeper's manufacture. This law also made teak wood a government property. The Indian Forest Act, 1927 was largely based on previous Indian Forest Acts implemented under the British. The most famous one was the Indian Forest Act of 1878. Both the 1878 act and the 1927 act sought to consolidate and reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest produce, and duty leviable on timber and other forest produce. It also defines the procedure to be followed for declaring an area to be a Reserved Forest, a Protected Forest or a Village Forest. It defines what is a forest offence, what are the acts prohibited inside a Reserved Forest, and penalties leviable on violation of the provisions of the Act (Menon, Jisha , 2013).

By bringing various forest acts and environmental protection acts the tribal people were restricted to stay inside the forest areas, use of the forest products freely, restricted them from hunting of wild animals and gathering of the forest wealth for their livelihood which they enjoyed from time immemorial. But during the Sri Raman period the people of the forest or the tribal people had full freedom of owning the forest land and they were equally wealthy in comparison with people who are living in the plain areas or then city areas. Kamba Ramayanam has described Guhana and his relatives as "healthy, handsome and wealthy people". Raman maintained the brotherhood relationship with all the tribal Chiefs though they were small in numbers and mainly living after hunting birds and animals in the forest areas. No kings and rulers have had ruled their countries with this type of brotherhood attitude in this world.

After the arrival of the British particularly after independence most of the tribal people became landless cooli workers, casual workers, and daily wage workers. In the name of protecting the forest areas the tribal people were forced to move out of the forest areas and compelled to live in five cents of land provided by the governments. Reservation for the Tribal people did not help every tribal community, only those who are already advanced or educated enjoying the reservation benefits repeatedly. In a case conscious society like India the tribal people were became highly marginalised except the North Eastern States of India. Poverty is quite common among the tribal people, both educated and illiterate unemployment is quite common among them, high infant mortality rate, high maternal mortality rate, high level of malnutrition, suffering from anaemia among the tribal people also quite common even after 75 years of

independence. So if Ramarajyam with brotherhood attitude is re-established the sufferings of these people will come to an end.

The advantages of brother hood policy of the Sri Ram are that it will create a peaceful and friendly environment within and outside the kingdom. Neighbours will be friendly with us. A cordial relationship with neighbouring countries will help a kingdom or country to concentrate on the developmental activities inside the country. Countries need not spent more money defence and spending a large amount of money for keeping a large army. Due to lack of brotherhood attitude with the neighbouring countries particularly countries having border problems, spend very high per cent of their budget for defence than spending that money for road development, train service development, airport development, port development, logistics development, waterways development, providing drinking water facility to the common people, good and quality educational facilities for the poor people, industrialising the country and agricultural development. At present most of the developing countries including India, spending a huge amount of money for defence by maintaining a large army, and purchasing expensive arms and ammunitions by allotting a large per cent age of money in the Budget. Developing countries could use this money for developmental activities if brotherhood policies were adopted by different countries. "World military expenditure in 2020 is estimated to have been $1981 billion, the highest level since 1988. World military expenditure in 2020 was 2.6 per cent higher in real terms than in 2019 and 9.3 per cent higher than in 2011. The global military burden—world military expenditure as a share of global gross domestic product (GDP)—rose by 0.2 percentage points in 2020, to 2.4 per cent. The military expenditure continued to rise overall even during the Covid 19 period (sipri.org).

Brotherhood with Sugriva:
Next important brotherhood attitude of Sri Raman is recorded with "Sugriva" the brother of "Vali" the king of Kishkindha. Rama considered Sugriva as his own brother and made him as the King of Kishkindha after killing Vali.

Shri Ram being the most compassionate lord, melts on even those who have never been in his service. Shri Ram knew about Vali and Sugriva both from different persons, While Vali was a powerful Vanara as well as the king of Kishkindha, Sugriva was ostracized and humiliated by Vali, and being scared of Vali, he was saving his life from Vali in caves of Rishyamuka mountains. Vali had even defeated once Ravana in combat and then to avoid further insult from mighty Vali, Ravana extended his hands of frienship to Vali. Therefore, if Shri Ram had approached Vali in spirit of friendship, Vali could have brought Sita for Sri Rama in a day from the clutches of Ravana. Still, Shri Ram approached Sugreeva, not Vali, in spirit of friendship and in return, both Sri Rama and Sugriva promised to help each other. But, did a personality like Shri Rama, who had eliminated 14000 thousands army of mighty demons of Khara and Dushana, killed Tadaka, Maricha and Subahu without any fear, who had punished even celestials like the son of Indra in the past really need the help of a monkey, Sugriva, the one living all time in fear of Vali for his own life? Obvious answer is No. Shri Ram, indeed, had no requirement of the help of Sugriva or even Vali, in fact Surgeeva acknowledged this fact in Valmiki Ramayana that Shri Rama does not need any help of others to get back his wife. If such a mighty personality Ram who has no match in whole cosmos in valor takes help of somebody, it is only for giving fame and glory to him out of love and his generosity, because supreme personality of godhead doesn't want anything for him as he is already master of supreme fame and glory. Sri Ram did friendship with Sugriva to make his fame spread, because Sri Rama is the lord who believes in giving glory to his lovers, friends, and servants. Though, a person whose wife has been stolen and wandering in forest would always wish to befriend with a king and mighty person to get his wife back. But, Shri Ram, being the most compassionate and truly great lord, did nothing sort of this, he did friendship with Sugriva to make him fearless, to

restore his wife Ruma, kingdom and pride lost to Vali, again to him. It was a pure Madhurya-Leela of Bhagavan Shri Rama that by befriending an afflicted one like Sugriva, he not only made Sugriva fearless against Vali but also bestowed his intimacy and touch to millions of monkeys and bears (lordrama.co)

In the Ramayana , Sugriva is fortunate to associate himself with Rama and this friendship became beneficial to both of them. When Sita was lost and Rama and Lakshmana were in search of her near the Pampa lake, circumstances favoured the flowering of friendship between Rama and Sugriva. At that time Sugriva was living in hiding from Vali in Rishyamuka hill. Seeing Rama and Lakshmana from a distance, he sends Hanuman to find out their identity. Hanuman assumes a human form as an ascetic and enquires about their whereabouts. Rama was openly impressed by the erudition, propriety, polished rendering and humility of Hanuman's interaction with them. Hanuman's enquiry of them, based on his observations, is thorough. He is able to assess their situation and frankly puts forth his questions to them. The brothers seem to be of royal lineage but are clad as hermits. Are they celestials in human form? What was the reason for them to be in the forest area? They deserve to be decorated with ornaments worthy of princes, yet they do not wear any. The bow they carry is their singular adornment. They evince effulgence and courage. Yet they look distressed and he would like to know the cause for their sorrow. When even such a lengthy address didn't evoke any response from them, Hanuman paused and decided to introduce himself instead. He admits that he is a monkey who had assumed this form at the behest of his master Sugriva whom he serves as a minister, and who wishes to seek to befriend Rama. Rama tells Lakshmana to reply suitably to Hanuman's address which He appreciates immensely. Hanuman's role in this situation is valuable. He leads them to Sugriva's presence and they pledge to remain as friends at all times in the presence of fire. Rama assures Sugriva that he will eliminate Vali. Mutual love and trust between two people blend to form lasting friendships. It is a precious relationship that brings out the noble traits in the individuals who act selflessly for each other's welfare. (www.thehindu.com).

Sri Rams Brotherhood with Vibhishan
The brotherhood relationship between Sri Ram and Vibhishanan is entirely different case from Guhan and Sukrivan. Raman considered them as his Fifth and Sixth Brothers in a friendly atmosphere. Guhan was known to Sri Ram when he was young. But extending the brotherhood to Visbhishanan, who is from an enemy's camp and also the brother of Ravana, revealed the greatness of Sri Raman. Ravana, the King of Srilanka had four brothers and a sister namely Vibhishana, Kumbhakarna and Ahiravana and a step brother Kubera, and Shoorpanakha.

Though they all brothers their characters were in sharp contrast to each other. Ravan was a powerful king, poet, singer and devotee of Shiva. At the same time he was an arrogant, and immoral in many regards despite his able kingship and master of several arts. One of his brothers Vibhishan, on the other hand, was compassionate, friendly with all, humble, pious and virtuous.

Vibhishanan used to advise Ravanan not to do any unethical things. Unethical things would bring only destruction to the entire Kingdom. But Ravanhad neverlistened to the advice of Vibhishan. Vibhishan strongly reacted against Ravan kidnapping Sita. He had tried to convince with great pains that Ravan acts could never be justified on any grounds because Seetha was the wife of Sri Raman. His efforts went on waste and he failed to convince the Ravanan over kidnapping of Sitha and also going a war with Sri Raman.

When it was time for the war to break between Rama and Ravan, Vibhishan tried to make Ravan understand that his act shall only bring ruin and despair to him and the kingdom, which

angered Ravan to throw him out of the kingdom. Helpless and hopeless, Vibhishanapproached Rama and prays him to accept him on his side.

None in the side of Rama was prepared to believe Vibhishan since they viewed Vibhishan coming to them as part of a conspiracy in order to supply the news about the plans of Rama to Ravan. However, the one person who gave a strong attestation of the virtuous quality of Vibhishan was Hanuman who said he had seen how good Vibhishan was when he visited Lanka in search of Sita. He said Vibhishan's apartment in the palace was filled with positive and divine vibrations due to his prayerful life. Rama was more than compassionate to Vibhishan and stated that once someone had approached him seeking shelter, it is but his dharma to accept them despite possible doubts regarding their motives. Thus, Vibhishan was accepted into Rama's fold. In the long run, Vibhishan'spresence on Rama's side helped Rama to a great extent to win the mighty war against Ravan (2indya.com). Raman declared Vibhishan as his "Seventh Brother" and made him King of Srilanka after killing Ravan.

Universal Brotherhood:
Sri Ram did not have an idea of occupying the land of Guhan who ruled the forest areas, and never had an idea of occupying the land of Sugrivan after killing his brother Vali and also had no idea to occupy the land of Sri Lanka after the death of Ravanan. Raman was a such a powerful King at that time and if he decided to annex these kingdoms with Ayothya he could have done it very easily. But he did not do so because it is not "right thing" or "dharma" as per "Shastras". That is what Raman practiced, that is why he is known as the "King of Righteousness".

Ramayana taught us one more righteousness or dharma that is if your enemy has no arms or protective cover or arrow or sword to fight with you, you should postpone the fight for next day. It is not a "Shatriya Dharma" to fight with an unarmed person/innocent person/those who have less capability/strength compared to you in the battle field". In one particular incident Ravanan lost his weapons while fighting with Raman. If Raman decided to kill Ravanan he could have done it then itself. But he did not. Raman asked Ravanan "no more fight today since you lost your weapon. You come tomorrow with required weapons then we could fight". This is the character of Sri Raman. He ruled the country with rules and regulations which are not harmful to the people. Nobody had a problem in his kingdom. Justice was done to all the people equally. He considered the tribal Chief Guhan, the Kishkinta king Sugriva and the Visbhishanan as his "Fifth, Sixth and Seventh Brothers respectively when he was ruling". He treated them as his brothers though they are from different regions, different countries and different races. He was the one who practiced real "brotherhood" in this world. That is why his rule was considered as "Ramrajyam or "The Righteous King of the World".

Mahatma Gandhi brought 'Ram Rajya' into contemporary discourse. Gandhi was greatly influenced by the teachings of the Ramayana. But what did Ram Rajya mean in the 20th century in the Gandhian sense? According to Mahatma Gandhi, (Young India in 1929) "By Ram Rajya I do not mean Hindu Raj. I mean Ram Raj, the kingdom of God. For me, Ram and Rahim are one and the same; I acknowledge no other God than the one God of Truth and righteousness,". "Whether Ram of my imagination ever lived on this earth, the ancient ideal of the Ramayana is undoubtedly one of true democracy in which the meanest citizen could be sure of swift justice without an elaborate and costly procedure (Sumeet Kaul, 2019).

Over and above all the discussion we had so far, the point to note here is that of brotherhood. Brotherhood is a unique relationship in the human society. Realized in the right way, it can achieve wonders and set ideals, contrived or adulterated for personal interests and unlawful ends, it will only end up bringing harm to both the partners. Down the times, puranas, epics, mythologies and histories are replete with several examples of brotherhood. While some

are ideal and trend setting, some are despicable in not realizing the true objectives of brotherhood. Literature is meant to guide men on the path of their life. Learning from epics and stories, we are guided on our attitudes, decisions and moves in life. While right approaches, values and decisions shall contribute to our success and enduring fame, wrong attitudes and short sighted selfish moves shall only bring us miseries and ill repute (2indya.com).

The brotherhood attitude of Sri Raman brought a lot of glory to Ayodhya Kingdom. Ramayan has a lot of relevance for the present generations, present political parties, politicians not only for India but people all over the world. Countries are divided based on languages, based on religions, based on beliefs, political ideologies, based on cultures and traditions. India has 28 states and 8 Union Territories divided based on languages. India has about 3,000 castes and 25,000 sub-castes all over the country and following different religious groups. We have to maintain a brotherhood attitude among all these religious and caste groups.

Sri Raman taught us how to maintain a friendly relationship or brotherhood relationship with different economic groups, different regional groups, different minority groups not only within India but also with another country Sri Lanka.

It is only through brotherhood attitude we can solve many economic problems like unemployment (7.6 per cent at present), regional disparity (Tamil Nadu, Karnataka, Maharashtra, Gujarat, Delhi, Haryana, Andhra Pradesh, Telangana, Punjab, are industrially advanced, at the same time Odisha, Bihar, Uttar Pradesh, Madhya Pradesh and all the North Easter States are industrially backward) , poverty (68.8% of the Indian population lives on less than $2 a day. Over 30% even have less than $1.25 per day available - they are considered extremely poor. This makes the Indian subcontinent one of the poorest countries in the world; women and children, the weakest members of Indian society, suffer most (soschildrensvillages.ca), malnutrition (about 35 per cent of the school going children are suffering from malnutrition. One out of five children are simply wasted in India with stunted growth, about 50 per cent of the mothers are suffering from anaemia and giving birth of low wait children. So infant mortality is still 28 at present in India. It is very high among the tribal's in India) The Global Hungry Index kept India 101 Rank out of 116 countries in 2021 with a score of 27.5 per cent)malnutrition, unequal distribution of wealth (The Global Inequality Report 2022 reported that in India 1 per cent of the population took away 22 per cent of the wealth, 10 per cent of the population took away 57 per cent of the wealth and about 50 per cent of the people at the bottom gets only 13 per cent of the wealth. It shows how unequally $3.25 trillion GDP of India is distributed among the population). The gap between the poor and the rich is keep on increasing. According to Prof. Ramesh Chand, the income gap between the rich and poor people in India was about Rs. 24500/- in 1994 and it increased to Rs. 1,42,000/- in 2014-15. The main reason for all these developments is that of lack of brotherhood attitude among the people from top to bottom.

The main reason for corruption is lack of patriotism and brotherhood. The corruption index of India is 85th. Still now the Ease of Doing Business is 63rd in India. If India is properly introduced all the Industrialisation policies implemented from 1948, 1956, 1977, 1988, 1991, 2005(SEZ), 2014 (Make in India Programme), and 2016 (Start-up Programme), India could have become an Industrialised country like China. In China about 45 per cent of their GDP is coming from manufacturing sector. But in India the contribution of manufacturing sector is only 15 per cent. Every year about 11.5 million students including 1.5 million engineering graduates are coming out of our 1026 Universities and 53 IITs, 50 IIMs and about 52000 Colleges. But both central and state governments are able to provide employment only to about 4 million graduates. The remaining graduates are unemployed and landed in unorganised sector where labour market is casual, contract basis and daily basis without any social security measures like job guarantee, without leave with salary, without pension, without provident fund, without

insurance, without injury and disability benefits. About 150 million inter-state migrant workers are there in India at present working in highly unorganised sector with full of exploitation. The is no labour union or workers movements.

Ramrajyam is not only taking about brotherhood but also taking about the welfare of the people and happiness of the people. Welfare of the people and happiness of the people can be ensured only through employment for all the eligible population. The present government has taken a lot of steps to create more employment opportunities through industrialisation and infrastructural development for the next 25 years known as "Atmanirbhar Bharat and Amrit Kaal". India decided to have 10 major industrial clusters and 100 industrial Parks at all India level to create more employment generation. Agricultural development also ensured through giving more importance to agri products exports, introduction of drone system for more production, and productivity and bring more areas under agricultural production, creating more storage facilities, investing more on food processing industries, creating more marketing facilities for agricultural products. The Allotment of about Rs. 5 lakh crore Emergency Credit Line Guarantee Programme (ECLGP) for Micro, Small and Medium Industries will also boost employment for the skilled and semi-skilled workers. It has been estimated that if every eligible person is employed in India our GDP will be about $40 trillion dollars. India started moving towards creating opportunities for full employment before 2047. So India started moving toward Ramrajaya with brotherhood.

Ramayana is excellent in all human relations. It describes very clearly how important the relationships are. Specifically, brotherhood. There will be any inequality, poverty, hungry, disparity in India if Ramayana Principles are fully accepted and implemented. Nobody go for hate speech, there will not any conflicts among different groups of people, there will not be any violence among the people, there will not be any corruption if one started following Ramayanam. Everybody will work for the country like everybody helped Raman to construct a bridge to Sri Lanka. That brings prosperity for the country. That is what we want also.

CONCLUSION

If Ramayana's brotherhood policies are properly followed and adopted by all the United Nations countries there won't be any border problems among the countries, there won't be any racial, linguistic and caste problems within the country, there won't be any exploitation of one group people by other groups, countries need not spent very large per cent age of money for arms and ammunitions and the people need not worry about the Third World War. There wont be any communal, caste and religious classes among the people within the country if the "brotherhood policies of the Sri Ram is scientifically understood by the people". The "Universal Peace" will prevail if Sri Raman Policies on brotherhood is adopted by different countries in the world. The prosperity of the entire world will be ensured. No more wars like "First World War and Second World War" will take place in this world. The invasion of small countries by large countries like Russia invasion of Ukraine also will not take place in the future. So establishment of Ramrajyam will put an end to all social and economic problems of India and countries all over the world.

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NEUROINFLAMMATION: NETWORK OF BRAIN CELLS, CYTOKINES AND THEIR ACTION

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ABSTRACT

Neuroinflammation has been concerned with the pathology of neuronal diseases for a long time. It is a protective response toward the central nervous system (CNS). With specific CNS functionality, microglial cells act as the phagocyte neuronal cells, whereas astrocytes render aliment to the nervous tissue and assist in sustaining the extracellular ionic counterbalance. On the entry of any foreign pathogen, astrocytes and microglial cells get activated and start producing inflammatory cytokines but over activation of these cells leads to neuroinflammation in the CNS. Neuroinflammation can be categorized as acute and chronic. Acute neuroinflammation is a short term such as stroke and injury while chronic neuroinflammation is long persistent, responsible for neurodegenerative diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), multiple sclerosis (MS), Huntington's diseases (HD), ischemia and many others. Main focus of this review is to study the function and nature of astrocytes and microglia, to identify their link with cytokines and their involvement in neuroinflammation.

Keywords: Astrocytes; Microglia; Neuroinflammation; Cytokines

1.1 INTRODUCTION

Inflammation, in a general term, refers to a host self-defense system responding to any trauma or pathogen lesion. An effective inflammation-induced response besides eliminating any insulting pathogens, also strongly encourages bruise healing. The central nervous system (CNS) is considered an immune appanage locus because it restricts the entry of blood-borne cells and proteins into the CNS, inflammatory reactions also occur in the CNS (Veerhuis et al., 2011). Astrocytes and other neural cells communicate through neurotransmitters which portrays a significant part in growth, development, and cell proliferation. On the entry of pathological insult, damaged cells release adenosine triphosphate (ATP) and act both as cytotoxic and proinflammatory mediators. Due to the excessive exit of ATP from damaged neural cells during pathology, the concentration of purine nucleotides increased. Thus, ATP may act as a chemoattractant of microglia (Franke et al., 2012).

Brain inflammation does not show characteristics like heat, pain, redness, and swelling so it is generally referred to as chronic inflammation instead of acute inflammation. The Central nervous system (CNS) mainly consists of two different types of neuronal cells: neurons and glial cells, glial cells include astrocytes, oligodendrocytes, and microglia. Microglia participates in innate immune responses and gets activated by cellular communication and secretion via cytokines, chemokines, and many other mediators (Monifa et al., 2010). Low-level neuroinflammation is protective whereas high-level chronic neuroinflammation is harmful. The key players in neuroinflammation including cellular and molecular immune constituents are phagocytic macrophages (Microglia), inducible cytokines, complement proteins, and pattern

recognition receptors as toll-like receptors (Shastri et al., 2013). When glial cells are activated, which is necessary for neurogenesis (a process by which neurons are originated from neural germline cells and progenitor cells), they produce cytokines, but overproduction of these cytokines causes different neuronal diseases. Excessive secretion of proinflammatory cytokines results in neuroinflammation. **(Table 1)**

Table 1. Difference between inflammation and neuroinflammation (Taupin and Philippe., 2008)

Inflammation	Neuroinflammation
It is characterized by four main signs tumor, rubor, color, and dolor (swelling, redness, heat, and pain).	In neuroinflammation, Glial cell activation increased proinflammatory cytokine concentration.
It is not specific to any body part.	Specific to the Central nervous system (CNS).
In this, leakage of blood cells from the bloodstream to tissues.	The over activation of glial cells leads to neurodegenerative diseases.
White blood cells are involved in inflammation.	Microglia involved in neuroinflammation is formed within the bone marrow.
Low level of inflammation.	High level inflammation.

Neuroinflammation is a basic control system which preliminary protects the brain by obstructing various pathogens/injury. The inflammatory response produced by pathogens/external stimuli can have various valuable effects via enhancing tissue repair and clearing of cellular trash. Continued inflammatory responses, though, are detrimental, and attenuates restoration (Kown and Koh, 2020). Inflammatory trigger can continue due to endogenous (protein aggregation, genetic mutation etc.) or environmental (infection, drugs and trauma) factors. Constant inflammatory actions engage microglia and astrocytes and lead to various neurodegenerative diseases (Stephenson et al., 2018).

Neuroinflammation like inflammation is a vital reaction of the brain to protect from harm, arising from both extrinsic and intrinsic sources. Neuroinflammation can be categorized into two types: Neuroprotective and neurodegenerative. Neuroinflammation is neuroprotective when the effect of injury/insult for a short period, whereas it is neurodegenerative when it becomes chronic for a long period with harmful effects in the CNS (Shastri et al., 2013). During brain development or any injury complement system components produce toll-like receptors (TLRs) and complement receptors. And these are also expressed by neuronal and glial cells. The hallmark of the complement system is characterized by the identification of danger and recognizing self from non-self. It is well known for recognizing and killing microbes (Veerhuis et al., 2011). In an inflammatory cascade, there is a series of immune receptors; TLRs, nucleotide-binding oligomerization domains (NODs), NOD-like receptors, microglia, and astrocytes can identify the harmful stimuli and responds by producing inflammatory cytokines, for instance, TNF-α, IL-6, IL-1β, Interferon-γ (IFN-γ) and several chemokines (Shastri et al., 2013).The connection between the immune system and CNS has explored wide research in neuropsychiatric diseases caused by neuroinflammation. There is a need to understand the mechanism of the immune system which affects the brain, to develop strategies for healing neuroinflammation, in turn, neuropsychiatric diseases such as anxiety (Salim et al., 2012).

1.2 Glial Cells: Microglia and Astrocytes
Glial cells play a crucial role in CNS depressants as they confine neurons and stick them in place, furnish nutrients as well as oxygen, to the neurons, isolates one neuron from each other, and clear debris of dead and damaged cells. They are supporting cells of the neuronal system. Toll-like receptors (TLRs) are the important glycoproteins present on the surface of glial cells or they are glycoproteins expressed by innate immune cells. They are activated at the onset of

injury or any pathological insult. Thirteen types of TLRs are known to be present in mammals out of which 1-9 equally expressed in both mice and humans, whereas 10-13 expressed in mice only (Trudler et al., 2010) **(Fig.1)**.

Studies suggested that the theory of an inflammatory-raft (i-raft), enlarged lipid rafts (increased cholesterol content) that activates receptors and adaptor molecules which serves to initiate inflammatory signaling by activating TLRs and its dimerization and the activation of other cellular response which leads to neuroinflammation.A targeting approach for inflammatory-rafts, without affecting the integral structure of lipid rafts in non-inflammatory cells, might lead to developing innovativemedications for neuroinflammatory processes (Miller and Yury et al., 2020).
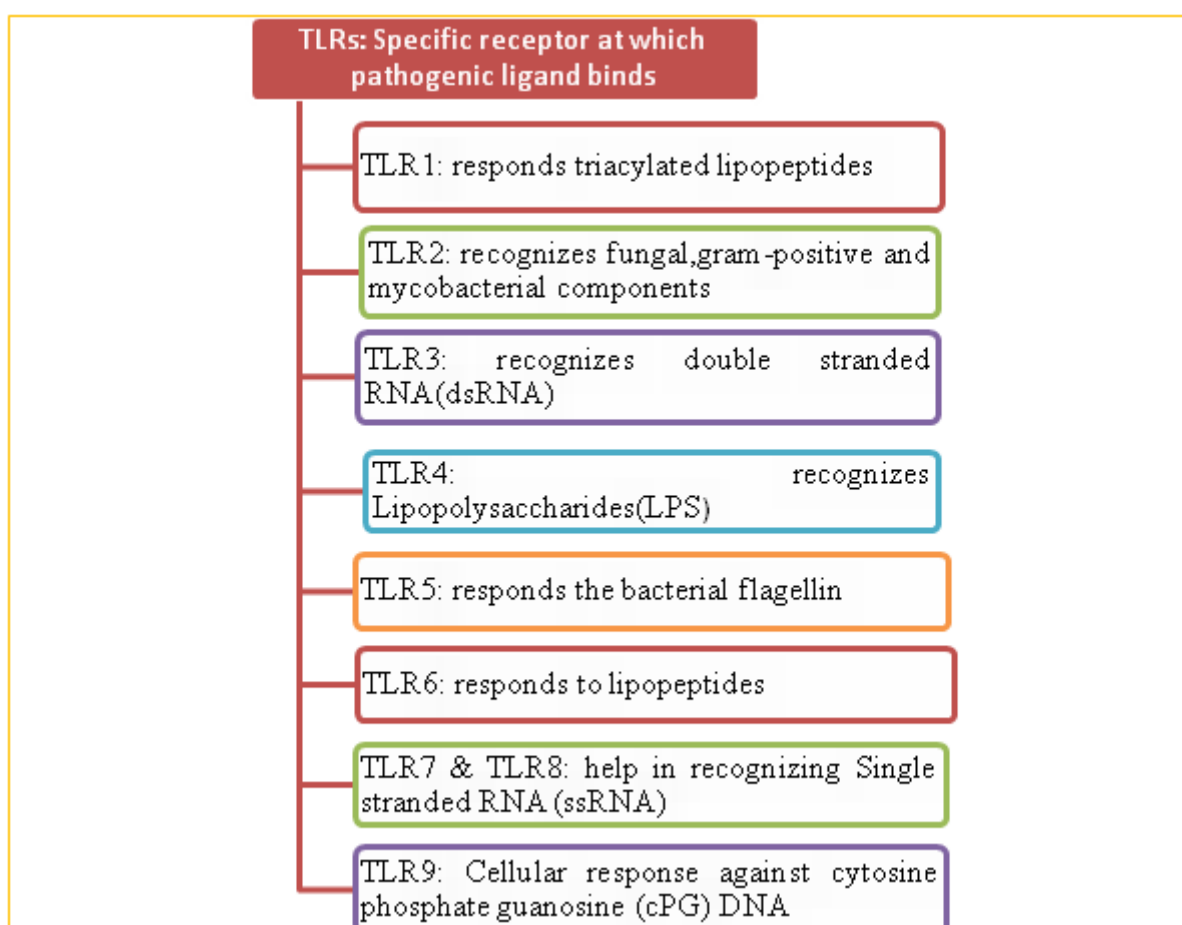
Fig 1. Functions of TLRs

1.2.1 Microglia

Microglia are phagocytes of the CNS. As microglia are derivative of neuroectoderm they are unique from neurons, oligodendrocytes, and astrocytes (Kwon and Koh, 2020). Microglia shows ramified (branch-like processes) appearance in a "resting state" and contributes to other functions of the CNS like neurogenesis and neuroprotection while in case of the onset of an injury or insult, microglia become "activated" and morphology changes from ramified to ameboid appearance. In ameboid morphology, they retract the ramification (Cherry et al., 2014). Microglia have shown synaptic stripping, a procedure of eliminating damaged synaptic arms from injured neuronal branches to support restoration and regenerative (Melinda et al., 2010). They protect the brain from invading microorganisms, surround the damaged cells and tissues to clean up the CNS. Microglia behaves as functionally activated macrophages to counter any

tissue wounding and rapidly stimulated in response to injury or infection and secrete inflammatory mediators. Microglia activation is necessary for host defense but excessive stimulation of these cells leads to the pathogenesis of several neurodegenerative diseases. Therefore, controlling microglial overactivation is a major challenge for curing neuronal diseases. Microglia are the main captive of cytokine production in the neuroinflammatory process (Shastri et al., 2013) **(Fig. 2).**

Fig 2. Functions of Microglia

1.2.2 Astrocytes

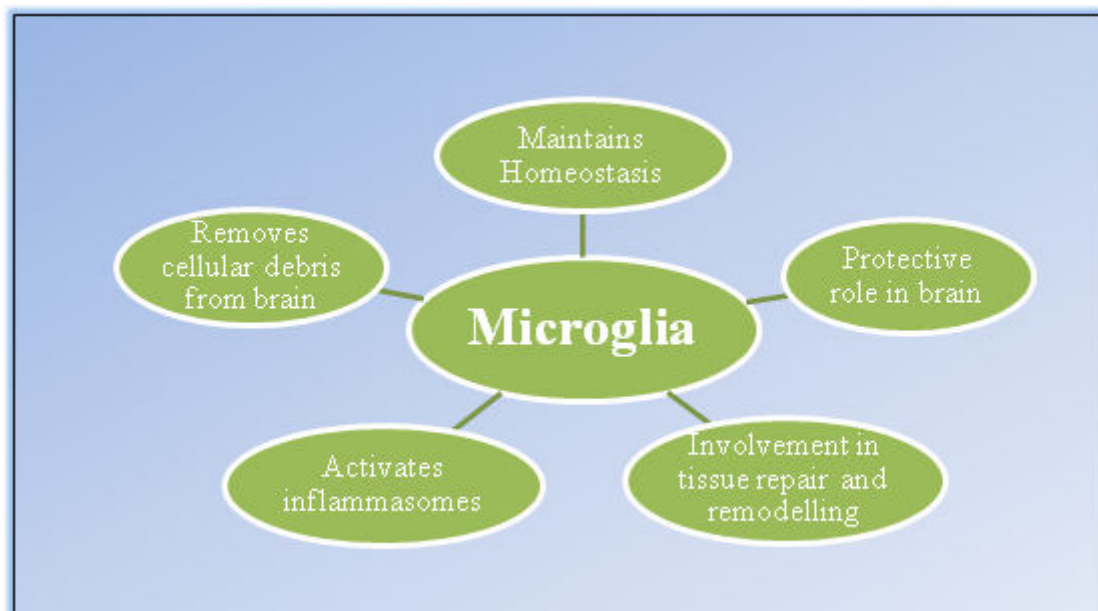Astrocytes mainly provide the maintenance of the hematoencephalic barrier (blood-brain barrier (BBB).The BBB maintains selective impediments that only enable oxygen, hormones, and some selected molecules to enter into the brain and shields the passage of harmful elements. BBB is the architecture of capillary endothelial cells, vascular endothelial pericytes, and the perivascular and peripheral terminal feet of Astrocytes (Ota et al., 2013). BBB limits and restrains the transportation of molecules between the peripheral circulation and brain extracellular and interstitial fluid to restrict the entry of any unwanted component. Astrocytes are fundamental for CNS and they maintain the plasticity of synapses. Astrocytes are specialized cells with two subtypes: a.) Protoplasmic (present in gray matter) b.) Fibrous (present in white matter). Protoplasmic astrocytes show identical processes, whereas fibroid astrocytes showcase distinct processes. The morphology of astrocytes resembles the star. In astrocytes during an attack of any pathological insult, there is the formation of scar and it is called reactive gliosis (Shastri et al., 2013). Astrocytes release glio-transmitters and reactive oxygen species (ROS) and also consume energy. The three main functions of astrocytes are to regulate: **(1)** glucose uptake and lactate extrusion **(2)** glutamate uptake and unleash glutamine and **(3)** glutathione precursor uptake and release (Fuller et al., 2009). Astrocytes effectively maintain homeostasis in brain neurotransmitters. Glutamate, a neurotransmitter, is released during synaptic transmission, but merely a very low proportion of glutamate (20%) stores in the postsynaptic neurons, and the rest of the major proportion (80%) of these neuromodulators are engrossed by perisynaptic astrocytes. This crucial activity of removing extracellular glutamate by astrocytes is very vital to avoid excitotoxicity (Verkhratsky and Kirchhoff, 2007).

As the glutamate is discharged into the synaptic cleft, it gets transformed into glutamine and removed by the astrocytes. This glutamine is discharged into the interstitial space for its uptake by neurons. The uptake of glutamate by astrocytes is the crucial step for protecting neurons from overactivation and cell death. Astrocytes are part of tripartite synapse, in which perisynaptic astrocytes are present with the standard presynaptic and postsynaptic neurons. Based onthe location and position of synapses, interaction occurs between presynaptic astrocytes and synaptic cleft. Almost 60% of synapses in the hippocampus region, perisynaptic astrocytes get interconnected at the synaptic cleft (Ota et al., 2013). In astrocytes, the cysteine-glutamate exchange is present, which accumulates cysteine for glutathione production. Glutathione is a cellular antioxidant molecule with a sulfide bond present in it that binds to different molecules/receptors so that it activates the site of synthesis in which mainly astrocytes are present. Glutathione plays a neuroprotective role in the CNS, but excessive dynamization of glutathione results in neuronal injury, NO synthase, oxidative stress, breakdown of the cell membrane, and apoptosis (Stephen D. Skaper et al. 2014) **(Fig. 3).**

Along with the gain of toxic function in reactive astrocytes, they also display neurotoxicity which results in loss of neuronal neurotrophic activity. Improper functioning of Astrocyte outcome with the elevated release of cytokine, inflammatory mediators, along with other associated conditions like degeneration of neurons, reduced glutamate uptake, loss of neuronal synapses, and eventually leading to other cognitive deformities as in AD (Darshpreet et al., 2019).

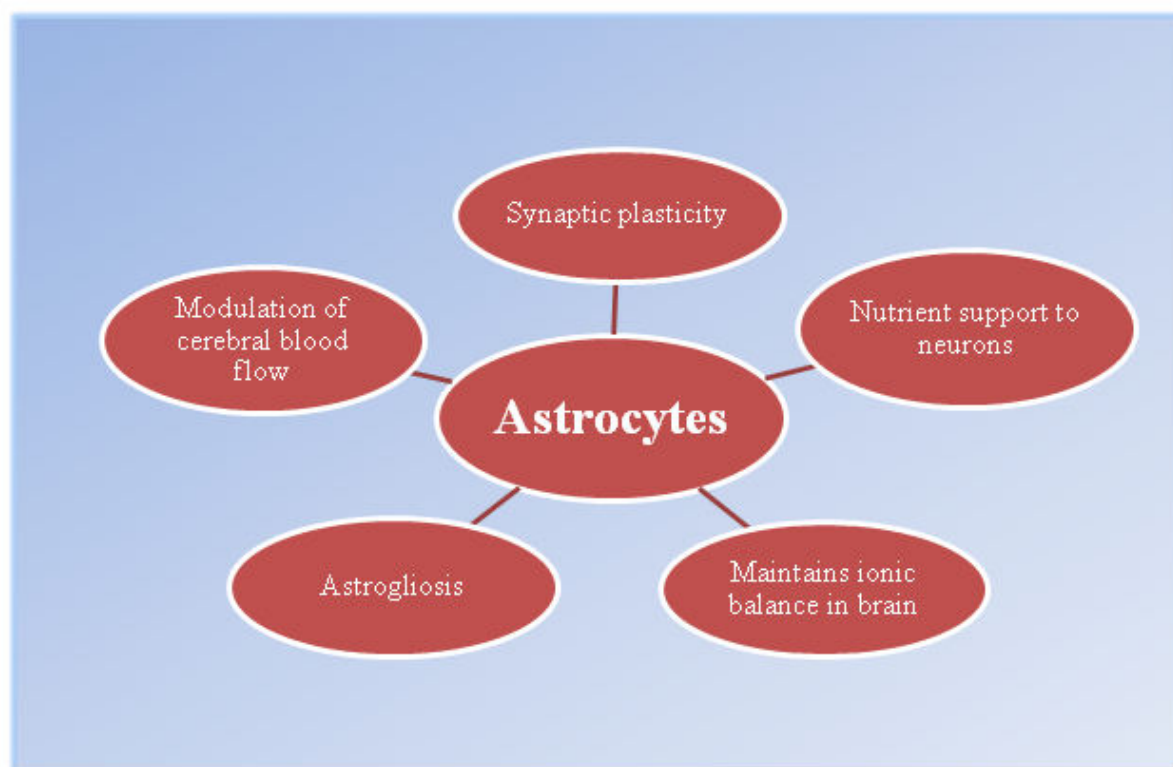**Fig 3.** Functions of Astrocytes

1.3 Cytokines

Cytokines in the CNS are produced by glial cells. During infection/injury microglia get activated and employed to the site of injury, where it surrounds the affected cells and gets transformed into rounded macrophages and those produce cytokines. When glial cells are activated, they produce proinflammatory and anti-inflammatory cytokines. Overproduction of

proinflammatory cytokines makes the infection/disease worse and anti-inflammatory cytokines restrain the action of proinflammatory cytokines. Cytokines are also important for the normal physiological functions of the CNS (Perez et al. 2012).

1.3.1 Proinflammatory Cytokines

Cytokines play an important role in neuroprotection as well as neurodegeneration (Ramesh et al., 2013). Proinflammatory genes such as phospholipase 2 (PL) A_2, Cyclooxygenase-2(COX) -2, and inducible NO synthase (iNOS) code for small mediators, are upregulated during inflammation. These genes encode for enzymes that accentuate the synthesis of platelet-derived activating factors, leukotrienes, prostanoids, and NO (Nitric oxide). Chemokines, an additional class of proinflammatory cytokines that brings the leukocytes from circulation to tissues (Charles et al., 2000) and are involved in leukocyte chemoattraction. Chemokines can be diversified into two categories based on their biological activity, specifically in maintaining homeostasis and in the elicitation of inflammation. Homeostatic chemokines perform immune inspection and routing of cells through hematopoiesis while inflammatory chemokines are produced during infections or an inflammatory stimulus. Chemokine provokes a cascade of signaling events due to activation of the receptor and regulates various cellular functions such as phagocytosis, cytokine secretion, cell survival, death, and proliferation. Cytokines and chemokines are essential for maintaining immune inspection, assist leukocyte traffic, and engage other inflammatory components in the CNS. Chemokines during microglia activation may lead to neuronal death directly or via activation of neuronal chemokine receptors. Furthermore, some chemokines have neuroprotective roles and function as pro- or anti-inflammatory mediators (Ramesh et al., 2013).

1.3.1.1 Il-1

IL-1 is one of the most effective proinflammatory cytokines with two forms: IL-1α and IL-1β. It plays an important role in immune response and inflammatory cascade. The IL-1β level is found to be increased during a neuronal injury in both humans and rodents. Also enhances acetylcholinesterase activity(Acetylcholinesterase, an enzyme that causes hydrolyses of the neurotransmitter acetylcholine into choline and acetic acid). IL-1 is one of the mostsignificant initiators in the immune response against any inflammatory cascade. Elevated levels of IL-1β has been observed in CF (cerebrospinal fluid) and brain parenchyma region in rodents and humans after a few hours of insult. In astrocytes, induction of IL-1 causes IL-6 associated production and triggers iNOS activity. IL-1 is one of the cytokines concerned with sleep, memory, and feeding (Yirmiya et al., 2010). IL-1 induces COX-2 transcription and in turn, increased the production of COX-1. Cells stimulated by the IL-1, generate an increased level of prostaglandin E_2 (PGE_2) during the elevated COX-2 production (Krueger, 2008). Experimental studies showed that persistent Interleukin-1β overexpression worsens tau proteindisease statedespite minimizing amyloid cargo in an Alzheimer's Mouse Model (Ghosh et al., 2013).

1.3.1.2 Il-6

Interleukin-6 (IL-6) is a proinflammatory cytokine synthesized during reactive astrogliosis due to neuronal injury and it protects CNS from damage, while the increase in IL-6 production leads to many neuronal diseases. So, IL-6 plays dual functionality in the CNS. Also plays an important role in host defense and significant regulative effects on the onset of injury/infection. It belongs to the neuropoietin family of cytokine. IL-6 has an important role in microglia activation, astrogliosis (anomalous rise in the count of astrocytes due to the obliteration of nearby neurons of CNS, wound, infection, ischemic stroke, and other neuronal disorders. It also changes the molecular expression pattern and structure of astrocytes with scratch formation) and the production of acute-phase proteins.

Studies show that IL-6 as a pleiotropic nature has two different neurotropic cell affecting signaling pathways for both anti-inflammatory(classical) and pro-inflammatory(alternative)

processes in which the anti-inflammatory signaling pathway deals with neuroprotective function and pro-inflammatory pathways for neurodegeneration (Michelle et al., 2016).

1.3.1.3 Tnf−α

Production of TNF-α in the CNS is due to microglia and astrocytes activation whichleads to some destructive as well as protective effects, meaning that it acts as proinflammatory in the acute phase while anti-inflammatory in the chronic phase during the inflammatory cascade. TNF-α plays an important function in the initialization and processing of the inflammatory cascade. During any inflammatory response TNF- α is synthesized by activated microglia. Glial cells release both TNF-α and IL-1, which alternately activates these cells and further stimulates cytokine production. TNF-α also has neuroprotective properties reported in the AD brain.

IL-1, IL-6, and TNF-α cytokines are related to each other as TNF-α is a stimulator for the constitutive expression of both IL-1 and IL-6. IL-1 can trigger both IL-6 and TNF-α expression. Therefore, during an injury to the brain initially, cytokines are upregulated and produce other inflammatory mediators, and then signaling is initiated (Lucas et al., 2006). Microglia activates the NFkB signaling pathway which results in the activation of more TNF-α, as a master modulator and regulator of neuroinflammatory cytokine production. Clinal studies show that TNF-α protein could be a candidate salubrious target, as the unusual regulation of this protein is strongly related to unrestricted glial cell activity that results in neuroinflammation (Frankola et al., 2011).

1.3.2 Anti-Inflammatory Cytokines

These cytokines suppress the effect of proinflammatory cytokines or it is in some way maintaining a balance between pro-inflammatory and anti-inflammatory cytokines that leads to cellular activation and cytotoxicity. High levels of proinflammatory cytokines and low levels of anti-inflammatory cytokines lead to CNS deregulation. Anti-inflammatory cytokines suppress the effects of pro-inflammatory cytokines involved in the inflammatory cascade. Cytokines such as IL-4, IL-10, and TGF-β repress the generation of IL-1 and TNF, chemokines (IL-8), and vascular adhesive components. So, the balance between pro-inflammatory and anti-inflammatory cytokines determines the outcome of the disease as acute or chronic. Decreased iNOS gene expression induced by anti-inflammatory cytokines like IL-1β (Kubiczkova et al., 2012). IL-1ra, IL-4, IL-10, and TGF-β are anti-inflammatory cytokines thatinhibit the effect of proinflammatory cytokines (Kubiczkovaet al., 2012).

1.3.2.1 IL-1ra

IL-1ra inhibits the action of IL-1α and IL-1β, which acts on IL-R (receptor). IL-1ra binds to the type-1 membrane-bound IL-1 receptor with greater affinity than IL-1α and IL-1β block the action of IL-1α and IL-1β by competitive inhibition (Perez and Ruiz, 2012).

1.3.2.2 Il-4

IL-4 has suppressing effects on the release of proinflammatory cytokines. It also provokes the formation of IL-1ra. IL-4 exhibits neuroprotective effects by the suppression of IFN-γ and by effectively reducing the concentration of TNF-α and Nitric oxide (NO) (Sultaniet al., 2012).

1.3.2.3 Il-10

Interleukin-10 (IL-10), also known as human cytokine synthesis inhibitory factor (CSIF), is an anti-inflammatory cytokine. In humans, IL-10 is encoded in the IL10 type code. IL-10 plays an important role in reducing infection and thus prevents injury to the host. Overall, interleukin (IL) -6 expression increases in the brain following immune activity or physical injury; on the other hand, IL-6 is also registered in normal aging and can serve as an important link in age-related neuroinflammation (Sparkman and Johnson, 2008; Sultani et al., 2012).

1.3.2.4 TGF- B

TGF- β has three isoforms-TGF-β1, TGF-β2, TGF-β3. TGF-β1 is the most generous isoform cloned from human term placenta mRNA. TGF-β2 is capable to suppress the IL-2 dependent growth of T lymphocytes. TGF-β3 plays a significant function in wound healing (Kubiczkova et al., 2012) **(Table 2)**

Table 2. Difference between proniflammatory and anti-inflammatory cytokines

Proinflammatory cytokines	Anti-inflammatory cytokines
IL-1, IL-6, TNF-α	IL-1ra,IL-10,IL-4, TGF-β
Cytokines Promote inflammation	cytokines suppress the effect of proinflammatory cytokines
Neuronal damage	TNF-α decreases
Secretion of inflammatory mediators; TNF-α, IL-1β, NO, and ROS	Increase in IL-10 level

1.4 BIOMARKERS IN NEUROINFLAMMATION

1.4.1 Cytokines

Cytokines are a large and diverse group of pro- or anti-inflammatory factors ordered into groups according to their structural homology. Cytokines are important markers of the neuroinflammatory cascade as their levels are increased during the over activation of glial cells, induced by LPS,or any pathogenic insult/injury (Ramesh et al. 2013). Cytokines such as IL-1β and TNF stimulate neurotoxicity through elevated glutamate production resulting in neuronal death. Clinical studies show that in patients diagnosed with recurrent MS there is a significant increase in cytokine levels in MS recurrence as well as an increased in heterodimer levels IL-12p70 and TNFβ when compared with the control group, and none of these cytokines were found to increase in patients diagnosed with a relapse. In the presence of IL-4 and IL-33 Th2 cells are isolated from naïve CD4 + T cells and continue to regulate GMCSF levels, IL-4, IL-5, IL-10, IL 13, and IL-25 / IL-17E. All of these cytokines other than IL-4 were found to be more elevated in MS returning to patients compared to controls (Cather et al., 2016).

1.4.2. Chemokines

Chemokines are related to a group of secretory proteins within the cytokine family that has a combined function of influencing cell migration. Chemokines can be divided into two categories according to their biological function, namely, household chemicals and inflammatory chemicals. Homeostatic chemicals are strongly involved in the detection of antibodies and cell tracking through hematopoiesis and are strongly expressed. Inflammatory chemicals are produced during infection or in any inflammatory cause and this facilitates the immune response by targeting cells of the innate and adaptive immune system. Chemokines were also drawn to the wound site to release several inflammatory mediators. Studies have shown that there is an increased rate of chemokine ligand 10 (CXCL10) in various neurodegenerative disorders including multiple sclerosis (MS), Parkinson's disease (PD), HIV-related dementia, and Alzheimer's disease (AD) (Ramesh et al., 2013).

1.4.3. Eicosanoids (Pgs-Prostaglandins)

Eicosanoids are derived from arachidonic acid and they perform a prominent involvement in the inflammatory process and are biologically active components. Eicosanoids play a crucial role in the CNS impairment caused by any pathogenic insult/injury (De vries et al, 1997). Epidemiological studies suggested that the medication of NSAIDs may prevent or hold up the worse features of AD. Findings also suggested that there is a constitutive expression of COX-2 and PGE2 in the brain and the cerebrospinal fluid respectively in AD (Zarghiand and Arfaei, **2011**).

1.4.4. Platelet-Activating Factor (PAF)

PAF is short life-span phospholipid molecules, one of the inflammatory mediators, and also participates in brain signaling, synaptic plasticity, memory, and learning. During JNK(c-jun N-terminal kinase) and p38 pathway, PAF is activated. There are various antagonists, which inhibit the effect of PAF. Therefore, PAF inhibition by different antagonists is a neuroprotective action (Hammond et al., 2015).

1.4.5. Inducible Nitric Oxide Synthase (Inos)

iNOS are an inducible form of Nitric Oxide (NO) in the inflammatory cascade. iNOS overproduction is vital in inflammation and its related processes. The study of biomarkers helps in directing targets towards neuroinflammatory diseases and the synthesis of novel drugs and therapies. Okadaic acid (OA) stimulates glial cells to release cytokines TNF-α and IL-1β and starts an inflammatory cascade. In OA administration, the strange results observed are drop-in nNOS (neural NOS) level and upregulation in iNOS (inducible NOS) level occurs. Therefore, iNOS is considered as a potential biomarker in neuroinflammation. High levels of NO are indicative bio-markers for the effective targeting of inflammatory disorders, and its prevention is a therapeutic target approach for the designing of new medication which acts on suppressing iNOS (Kamat et al., 2012).

1.4.6. Latent Transcription Factors as a Biomarker

During elevated inflammation, dormant transcription factors such as NF-κB, STAT 3, AP1, and SMAD 7, Toll-like receptors, and FAF 1 show a constitutive enhanced level in activated microglia. Toll-like receptors during the activated state promote NF-κB signaling thus fostering an atrocious cycle of neuroinflammation. These transcriptional factors via p53 and death domain receptor pathways lead dopaminergic neurons to the apoptosis pathway. Along with that many neuroprotective signaling pathways such as mTOR, SOCS, and TGF-β get down regulated during the development of PD. Also, the YY1 signaling pathway, with a crucial neuroprotective function against α-Synuclein toxicity, shows a significantly decreased expression in PD patients (Rishi et al., 2016).

1.5. STUDY MODELS OF NEUROINFLAMMATION

1.5.1. Cell Culture-Based Models

In previous studies, it has been explored that high extracellular K^+ concentration leads to neuronal toxicity stimulated by active glial cells in vitro, showed that a high concentration of extracellular K^+ modulates neuroinflammation. But there is no significant difference between the high and low concentrations of K^+ neuronal co-cultures.Sub-cultured neuronal microglia when pre-treated with IL-10, an anti-inflammatory cytokine, with continuous treatment of LPS/IFN-γ didn't show any satisfactory effect. It concludes that pre-treatments of neuron-microglia co-cultures with IL-10 inhibits LPS/IFN-γ induced TNF-α and IL-6 release, and COX-2 expression whereas, IL-10 pre-treated co-cultures not able to suppress LPS/IFN-γinduced neurotoxicity. It was found that COX-2 expression was also inhibited by the IL-10 pre-treatment in neuron-microglia co-cultures, but iNOS expression or NO production doesn't show any change by IL-10 pre-treatment followed by LPS/IFN-γ **.** LPS or IFN-γ, alone could not show any neurotoxic effect in this experimental model of neuroinflammation, but the combination of the two (LPS/IFN-γ) was required to stimulate the microglial cells to induce neurotoxicant (Arribas et al., 2012).

1.5.2. Animal Models

Amyloid precursor protein carrying the Swedish and London mutation(APP$_{SL}$) mouse model, successive increase in Amyloid-beta 40 (Aβ_{40}) and Amyloid-beta 42(Aβ_{42})levels, Aβ aggregates, lipid peroxidation, astrogliosis, and microgliosis in the hippocampus and neocortex till the age of 12 months, showed aconsiderableassociation between

neuroinflammation, Aβ and lipid peroxidation. It also indicates that high levels of $Aβ_{40}$ and $Aβ_{42}$led to dementia.Microglia activation decreased as there is an increase in lipid peroxidation between 6 and 9 months of age,in APP_{SL} mice. The study concludes that APP_{SL} mice, strongly stimulate the neuropathological behavior profile of AD patients. (Löffler et al., 2014).

1.5.3. GENE KNOCKOUT

I) Cellular
In a cellular model of gene knockdown, genetically engineered C6 cell line clones were used, which upon stimulation with LPS and TNF-α don't express iNOS (inducible NOS) activity. The growth rate of iNOS knockout cells was similar to normal cells after 4 days. By using these C6 clones, an in vivo implantation of glioma practice was done and a proper decrease of tumor mass was seen in the iNOS knockout clones, after28 days. Therefore, knockdown of iNOS or the use of iNOS inhibitors may be considered as a potential salubrious approach in the treatment of malignant glioma (Yamaguchi et al., 2002).

Ii) Animal:
To study gene knockout, the two mouse models of AD (Alzheimer's disease) were taken into account, one of the models was without the NOS2 (Nitric oxide synthase 2) gene or gene NOS2 knockout. These mice deliberate the AβPP (Amyloid beta-protein precursor) as found in humans and it generates Aβ in the mice of a knockout backdrop. Aβ is liable for the synthesis of many proinflammatory cytokines in the brain. The NOS2 gene deletion in the mouse model was done by replacing the position containing the calmodulin-binding domain by neomycin resistance gene PMC1Neopo1A. This model of NOS2 gene deletion is a therapeutic approach towards neuronal diseases, as it is responsible for the production of many inflammatory mediators (Colton et al. 2008).

1.6 Neuroinflammation in Neurodegenerative Diseases
Over activated microglial cells in the CNS after any injury or insult produce several cytokines and inflammatory mediators that disrupt brain function causing different types of neurodegenerative diseases (Amor et al., 2009).

1.6.1 Neurodegenerative Diseases
Neurons are the constructive networks of the neuronal system, which comprise the brain and spinal cord. When neurons get injured or dead, they are substituted or repaired to maintain brain homeostasis. But continuous damage to brain cells without repairing/healing results in the initiation and progression of neurodegenerative diseases. Some of these neurodegenerative diseases consist of Parkinson's, Alzheimer's, Huntington's, and numerous other diseases.

1. Alzheimer's disease

2. Parkinson's disease

3. Huntington's disease

4. Multiple Sclerosis

5. Brain ischemia

1.6.1.1 Alzheimer's Disease (AD)
Alzheimer's disease (AD) is a long-term (persistent) and age-related ailment in which neurofibrillary tangles are hallmarks. Neurofibrillary tangles are composed of β-amyloid plaques which are a type of anomalous protein fibers called paired helical filaments (PHFs). Aggregation of PHFs causes several cellular changes during AD, affecting cytokines and chemokines release also. A major component of PHFs is Tau protein, which is a microtubule-associated protein. During hyperphosphorylation, tau gets abbreviated, aggregated, and forms a

massive clump in the affected area of the brain. As a part of the inflammatory response, gliosis is a familiar aspect of AD. Activated astrocytes in addition to microglia are specifically found in excess near damaged neurons and plaques. Common symptoms of AD are forgetfulness, memory, and language problems. (Metcalfe et al., 2010)

1.6.1.2 Parkinson's Disease (PD)
Parkinson's Disease (PD) is a general neurodegenerative disorder caused by the loss of dopaminergic neurons and neuroinflammation in the midbrain. PD-activated microglia release some inflammatory mediators which result in neurotoxicity and neuroinflammation. PD is generally marked by the significantly reduced midbrainneuronal pigmentation in the Substantia nigrapars compacta (SNpc). These neurons, under ordinary conditions, produce dopamine in the striatum and other basal ganglia nuclei, however, at the onset of insults in PD up to 70% of dopaminergic neurons have been depleted. PD symptoms include resting quaver, bradykinesia (slow movement), inflexibility, and postural unsteadiness (Zinger et al., 2011).

1.6.1.3 Huntington's Disease (HD)
Huntington's disease (HD) is characterized by the aggregation of reactive microglia and nuclear inclusions in the direct vicinity of pyramidal neurons. There is an accumulation of huntingtin protein in neuronal atrophy due to which massive neurodegeneration occurs. HD is characterized by an uncontrolled motion of arms, legs, upper body along with the descent in thinking and justification skills which includes memory, concentration, judgment, and capability to arrange and coordinate.

1.6.1.4 Multiple Sclerosis (Ms)
Multiple sclerosis (MS) is pathologically marked by early axonal damage. Neuronal dysfunction, an increase in atrophy, and accumulation of axonal loss correlate with the disability of the brain system. T-cells present in the brain are auto activated and attacks the myelin sheath of nerve fibers, which starts demyelination and scar formation. It causes neurodegeneration which results in problems with vision, balance, muscle control, and other body function. Microglia are activated due to the presence of a soluble activating factor in cerebrospinal fluid (CSF) and they attack neurons in MS. MS is characterized by blurred vision, thinking problems, lack of coordination, numbness, and tingling (Kraft et al., 2011).

1.6.1.5 Brain Ischemia
Brain ischemia well known as cerebral ischemia is a condition in which there is an improper blood flow to the brain tissues to meet metabolic demand. This inadequate oxygen supply causes brain tissue death or ischemic stroke. Ischemia results in altered brain metabolism. There are two types of ischemia: Focal ischemia, which is restricted to a particular segment of the brain, and Global ischemia, which covers a comprehensive region of brain tissue. The primary manifestations of brain ischemia include blindness, coordination problems, body weakness, and unconsciousness. The dominant symptoms of brain ischemia are trouble in vision, body motion, and speechmaking.

1.6.2 Other Factors Involved in Neuroinflammation

1.6.2.1 Intrinsic Factors (Fig. 4)

A. Oxidative Stress
Free radicals cause biochemical and physiological stress called Oxidative stress and these free radicals can be counteracted by effective antioxidants treatment. These free radicals consist of unpaired electrons formed due to fractionally reduce oxygen molecule and hammer cell components. Free radicals form persistent damaging components starting from their site production. The free radical present in these toxic compounds is commonly called reactive oxygen species (ROS) and reactive nitrogen species (RNS) (Muneer et al., 2014).

B. Cytokines

In the central nervous system, cytokines and chemokines are secreted from multiple cell types, including microglia, astrocytes, microvascular endothelial cells, neurons, and peripheral immune cells, upon stimulation by pathogens, abnormal cells, or protein aggregates. The primary purpose of the initial inflammatory response is to remove the harmful stimulus, repair damaged tissue, and restore homeostasis. However, prolonged stimulation can lead to the uncontrolled and continual release of inflammatory factors, which causes a chronic neuroinflammatory state.

C. Aging

Aging describes as asystemic and progressive physiological process that includes direct impairment, gradual biological accumulation of cellular metabolic waste, undefined errors, and irreparable conditions which ultimately result in mounting the risk factors for the progressive elevation of various neurodegenerative diseases. With the increase in human life expectancy, the adverse consequences that aging can exhibit age-associated neurodegenerative diseases, neuronal inflammation, and cognitive deterioration have also enhanced. The major phenotypic peculiarity considered in the process of aging is the manifestation of chronic pro-inflammatory conditions which are genetically controlled with low-grade regulatory status. Aging is accompanied by increased inflammatory reactions and upregulated inflammatory changes that are common with numerous age-associated diseases (Vincenzo et al., 2011).

1.6.3. Epigenetic Changes (Differential Gene Expression)

Alteration in the gene expression pattern of neuronal based neurotransmitter receptors, ion channels receptors, and pro-inflammatory cytokines along with chemokines, shown to be related to epigenetic alterations of the damaged tissue. Studies show that epigenetic changes, including histone remodeling, methylation of DNA, intronic RNAs, and altered chromatin modifiers trigger the modification of (no ciception) no ciceptors after neural lesions along with it modulates the expression of pro-inflammatory neuromodulators which results in neuroinflammation. Studies have shown that several epigenetic modifiers like EZH2, JMJD3, MeCP2, several histone deacetylases (HDACs), and histone acetyl transferases (HATs), G9a, DNMT alters the stat of the promoter which induces the expression of a wide range of pro-inflammatory neuromodulator which results in neuroinflammation (Penas et al., 2018).

In recent studies, it was shown that an increased level of EZH2 (enhancer of zeste homolog 2) one of the epigenetic modulators plays a major role in neuroinflammation and neuropathic pain by exalting pro-inflammatory cytokines (IL-1β, TNF-α, and IL-6) production in vivo. By targeting the signaling pathway of EZH2 leads to inhibition of neuroinflammation (Lei et al., 2020).

1.6.4. Microorganisms (Bacteria, Fungus)

Many studies recommended that several environmental factors influence neurological activities under both physiological and pathological conditions. Many human-related contagious diseases result due to the manifestation of pathogenic bacteria, viruses, fungi, and protozoa. Studies have also proven that microorganisms-originated infections are generally involved in both acute as well as chronic inflammation in humans leading to neuroinflammatory and neurodegeneration diseases. By various mechanisms microorganisms can invade our CNS and able to induce dysfunction and neurodegeneration. Activation of the glial cell resultsinthe generation of cytokines and chemokines molecules that are associated with the inflammation-related responses. Research has shown that gut microbiota has both negative and positive and negative effects on CNS. Also, they define a major function in modulating the level of neurotransmitters by adjusting the concentration of the production of neurotransmitters. Scientific investigations have shown the manifestation of fungal infection inside the brain tissue of patients with Alzheimer's disease. In an experimental analysis using PCR amplification and slot-blot assay,

the fungal DNA and proteins in CSF have been detected Some experimental studies outcomes also indicated that there is disseminated fungal infection in the majority of AD patients (Alonso et al., 2014). Various stages of brain maturation and development, the extent, and release of neurotransmitters, the levels of the brain-derived neurotrophic factors, and the size of the amygdaloid body can be affected by the microorganism. Microorganisms infection can induce the unleash of multiple cells signaling proteins that provoke inflammation. When microorganisms traverse the blood-brain barrier, this generally terminates with hyper proliferative inflammation and irreparable neuronal degenerations with characteristics that are similar to assorted neuronal damaging disorders (Dehhaghi et al., 2018).

1.6.5 Metals (Bisphenol) and Other Compounds (Food and Water, Insecticides and Pesticides)

Bisphenols' are industry-based chemical compounds known to trigger neuronal inflammation by increasing oxidative stress, apoptosis, and other physiological abnormalities that lead to the impaired metabolic system. In today's world, approximately every needy material comprises bisphenol and unknowingly we are exposed to it. Epidemiological studies have demonstrated that when some small group of experimental populations was explored to bisphenol, it leads to escalating the chance of a physiological condition like cardiovascular conditions, neuronal-inflammation, neuro developmental disorders, and metabolic abnormalities, comprising obesity and diabetes. Also, exposure to bisphenols has shown pernicious effects on the reproduction-related system, age developmental conditions, and neural networks. Even a very low dose of bisphenols is noxious and persistent exposure affects nearly the entire metabolic activity (Kim et al., 2019).

Organochlorine pesticides, particularly dieldrin,in an experimental group showed selective neurotoxicity of dopaminergic neurons which may be the result of intracellular ROS production, which regulates NOX2 and microglial activation (Weisskopf et al., 2010). An organophosphate insecticide, known as Dichlorvos when injected as a dose-dependent concentration in rat manifest intense microglial proliferative activation along with the elicitation of NADPH oxidase with the un leash of pro-inflammatory cytokines (TNF-α, IL-1β, and IL-6). Microglial activation itself represents the onset of the neuroinflammatory process, thereby augmenting the sensitivity of dopaminergic cells to dichlorvos toxicological effect (Binukumar et al., 2011).
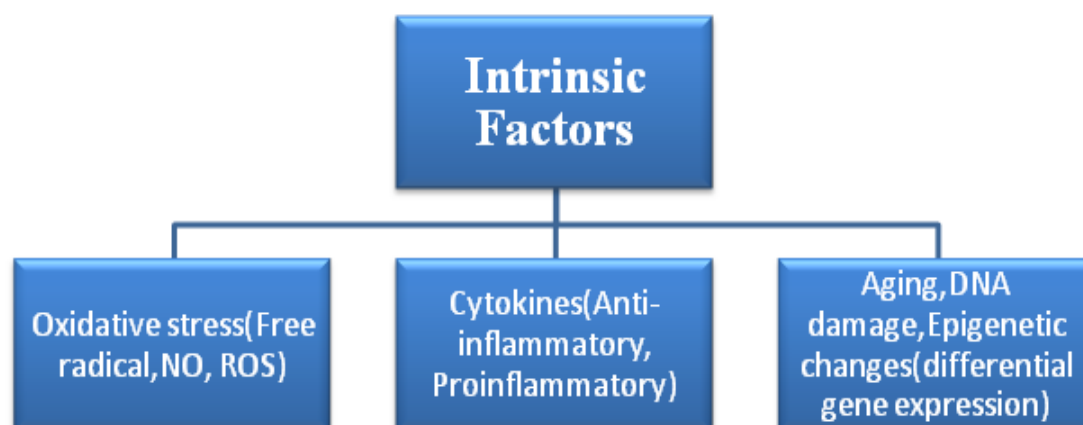

Fig 4. Intrinsic factors involved in neuroinflammation

1.6.2.2 Extrinsic Factors (Fig. 5)

A. Microorganisms

B. Metals and other compounds

C. Environmental factors

A) Manganese (Mn)

Manganese is a component released from mining and welding fumes, its exposure is linked with neuronal damage in the globus pallidus and other portions of the brain, which includes the mesencephalon region (substantia nigra) in PD (Parkinson's disease). Research has shown that when the midbrain gets exposed to the low quantity of Mn there is an insignificant change in the level of mRNA like CXCL2, TNF-α, and IL-6. But in the case of a high quantity of Mn exposed to the midbrain TNF-α level was found to be increased (Ozgur et al., 2019).

B) Diesel Exhaust Particles (Deps)

DEPs are the major pollutants present in the air released by automobiles and other sources and considered as one of the important components involved in the pathology of neuroinflammation. Examples of DEPs include NO (Nitric oxide), benzene, CO (Carbon monoxide), Zinc, Ozone, lead, LPS (Lipopolysaccharide), tobacco smoke, and gasoline exhaust (Kraft and Harry, 2011).
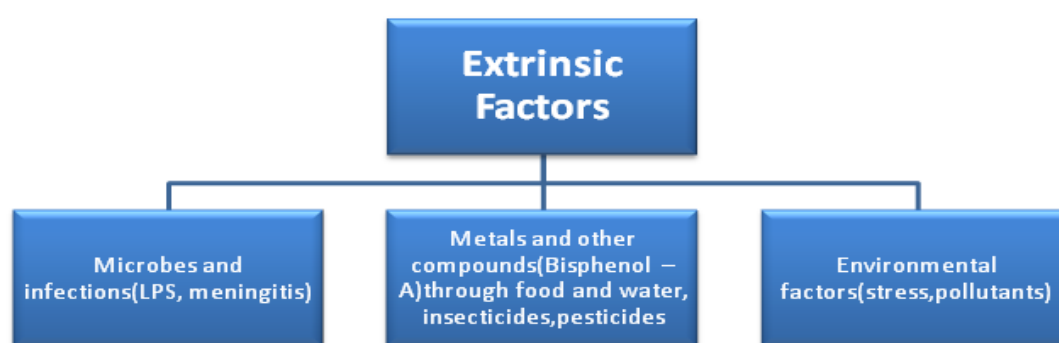
Fig 5. Extrinsic factors involved in neuroinflammation

1.7 Therapeutic Strategies Towards Neuroinflammatory Diseases

1.7.1　Monoclonal Antibodies

The use of monoclonal antibodies is one of the potential therapeutic strategies for NF diseases. Natalizumab is the first monoclonal antibody approved for the effective medicaments of for neurological disorders with selective treatment for multiple sclerosis (Klotz and Wiendl, 2013)

1.7.2 Blood-Brain Barriers (Bbb)

Blood-Brain Barrier (BBB) is a complete shield of the CNS, which forms tight junctions at different barrier sites. (i) Inside cerebral capillaries, BBB is formed by complex tight attachment of endothelial cells (ii) Arachnoid multi-layered epithelium forms an arachnoid barrier. (iii) The third barrier, the blood – Cerebrospinal fluid barrier formed by the linking of tight junction and CSF secreting choroid plexus epithelium.

In BBB, the associated cells present are pericyte (known as Rouget cells) and astrocytes (neurogliacyte). These barriers implement crucial functions such as preventing infiltration of immune cells that includes B and T lymphocytes. Also reduces the influx of plasma proteins, neurotoxic and neuroexcitatory compounds from the blood. The difference between self and non-self is supported by macrophages, neutrophils, dendritic cells, and natural killer cells (NKs) in the periphery and the CNS, it is counter balanced by microglia, astrocytes, oligodendrocytes NG2 chondroitin sulfate, and platelet-derived growth factor-α-receptor (PGDF α) (Veerhuis et al., 2011).

1.8. Non-Steroidal Anti-Inflammatory Drugs (NSAIDS)

NSAIDs are chemical compounds that have a strong potential to inhibit the action of COX-1 and COX-2.These COX isoforms are the prostaglandin biosynthesis enzymes. Prostaglandins are the selective players of NSAIDs, they are produced by arachidonic acid by COX isoforms. NSAIDs inhibit the action of COX isoforms and reduce the level of brain inflammation (Maria

et al., 2010). In some cases, there is a side effect of NSAIDs like a gastrointestinal injury for which another class of NSAIDs is available which is NSAID-NO(NSAIDS-Nitric oxide). It inhibits the side effects of NSAIDs by reducing free radical generation, mucus secretion, and neutrophil adherence.

Another class of NSAIDs is S-NSAIDS which includes S-diclofenac and S-aspirin, H_2S releasing compounds produced by combination with ADT-OH(5-(4-hydroxyphenyl)-3H-1,2-dithiole-3-thione)). H_2S is generated inside the brain by various functions and LPS activated microglia, which produce proinflammatory cytokines and are inhibited by H_2S as confirmed in this context. S- NSAIDS (S-diclofenac and S-aspirin) have shown a promising inhibitory effect towards proinflammatory cytokines, which in turn reduce disease impact. To prevent NSAIDs from side effects carboxylesterases metabolized them so that H_2S is generated gradually. Also, NSAIDs predominately modify and enhances the phagocytic ability of microglial (like amyloid-β phagocytosis in AD) and also in suppressing potentially harmful pro-inflammatory responses (James and Grossberg, 2017). (**Fig.6**)
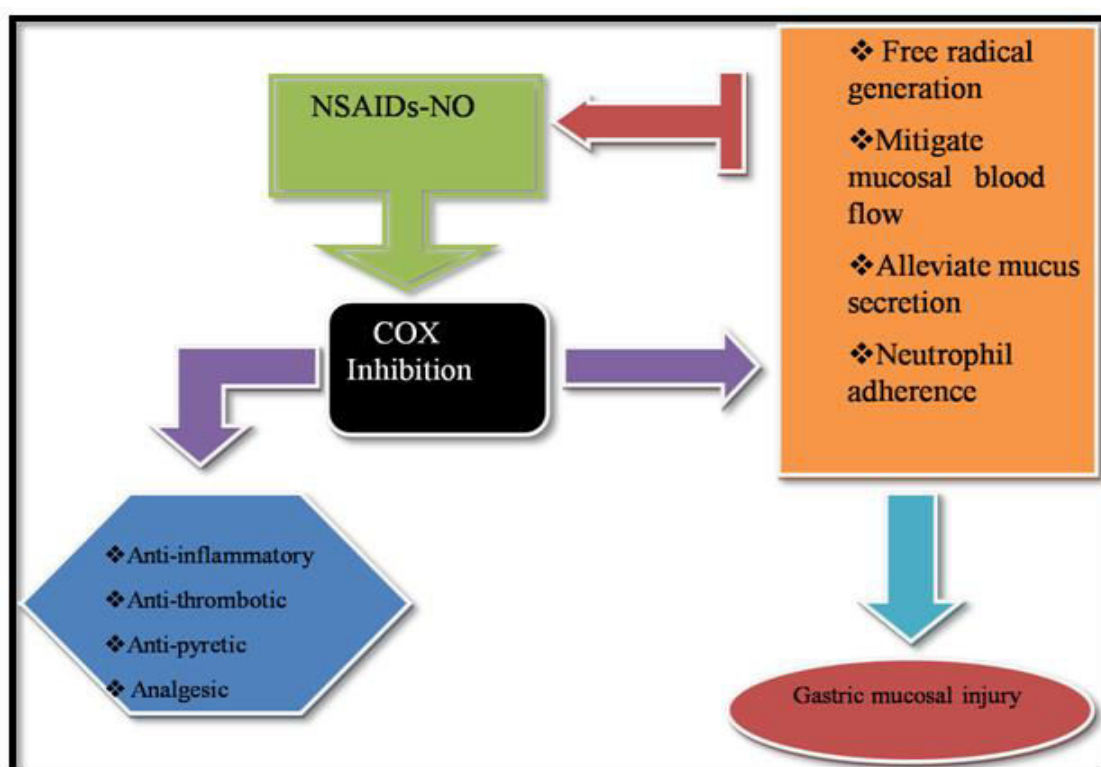
Fig 6. NSAIDs-Nitic Oxide (NO) Prevents gastric mucosal injury

1.9 Toll-Like Receptors (Tlrs)

As TLRs have shown both neuroprotective and neurotoxic properties apart from this neurotrophic factor increased in TLR signaling in glial cells, targeting the TLR pathway, it may be a therapeutic approach in a neuronal disease like amyotrophic lateral sclerosis (ALS**)** (Leitner et al., 2019).

1.10   Neutraceuticals

Neutraceuticals, principally the components present in our daily diet, supports health, prevention, and treatment of disease. The daily diet contains many healthy products and some of which are valuable in the health context denoted by the term neutraceuticals. They include dietary supplements such as minerals, vitamins, amino acids, and herbal components in any form. They accelerate immunomodulatory systems, lowering the body toxins, increase the

antioxidant potential, and minimize stress. In autistic patients, omega-3-fatty acids are deficient. They do not have the catabolizing potential and so the casein (milk protein) and gluten(wheat protein) form toxic peptide-like products that cross the blood-brain barrier(BBB) and contribute to the development of autism and other brain-related illness. Clinical experimental findings showed that anti-inflammatory nutraceuticals like alpha-lipoic acid (ALA), niacin, and nicotinamide (NA) have the potential effect in targeting and inducing multiple neuroprotective pathways and can be a future therapeutic target against many BBB disturbances, neuroinflammatory and neurodegenerative diseases (Takechi et al., 2013).

Probiotics are also considered a promising therapeutic strategy in autistic patients. Probiotic contains Lactobacilli and Bifidobacteria which exhibit the ability to convert toxic mercury compounds into metabolitesthat are excretablein feces. So, playing a vital role in autism treatment. Experimental studies suggest that regular administration and consumption of probiotics have the potential effect of reducing the possibility of neuroinflammatory and neurodegenerative diseases like AD and MS (Leitner et al., 2019).

1.11   Flavonoids : Most of the recent studies showed that dietary intake of flavonoid-rich foods and supplements remarkably enhances cognitive capabilities, hampers age-related, neuroinflammatory along with neurodegenerative diseases by inhibiting muchneuroinflammatory apoptosis signaling pathways (Mohammad et al., 2019). Also, its consumption plays a remarkable role in the reduction of dementiaand also increases memory and learning. Flavonoids are capable to traverse the BBB. The potentialof flavonoids to cross the BBB depends upon the lipophilicity of the compound and its interaction with P glycoprotein (transporter expressed in BBB) (Latif , 2015).

1.12 Neuroprotective and Adjuvant Therapies

1. Patients with bacterial meningitis, having a hopeful therapeutic approach through adjuvant therapy with anti-C5 antibodies-role (Peterson and Toborek, 2003).

2. Experimental studies showed that Compounds-C1(2-chloro-N6-cyclopentyl-20-deoxyadenosine) and C2(8-substituted 9-ethyl-2-phenethoxyadenines) are the potential candidates for therapy as these compounds can prevent the inflammatory effect of cytokines and the post inflammation process. Also, adenosine receptors A1AR partial agonists and A2AAR antagonists are among the therapeutic application for patients with the condition of oxidative stress and age-related disease (Aleix et al., 2020).

3. Neuroprotective result of adjuvant therapy with the parallel CoQ10 and α-Toc supplementation together can be a potential medication than either antioxidant alone in dwindling neuroinflammation and, can also be an effective therapeutic strategy to diminish oxidative stress-related seizures (Nagib et al., 2018).

4. Gene knockout: COX-1 (Cyclooxygenase-1) silencing: Deletion of COX-1 leads to a decrease in the inflammatory response towards $A\beta_{1-42}$ and this alters the effect of prostaglandin (PG) production. And it is reported that $A\beta_{1-42}$ induced inflammatory response i.e., oxidative damage, glial cell activation is less observed in COX-1$^{-/-}$ mice when correlated to wild type(WT) mice. It means COX-1 triggers the activation of glial cells and starts an inflammatory cascade.COX-1 deletion blocks the inflammatory pathway in response to $A\beta_{1-42}$. Thus, becomes a new therapeutic approach in neuroinflammation (choi, 2009). In vivo experiment studies explore the wide idea of utilizing RNA-induced interference for targeted inhibition ofCOX-2 gene expression along with reversible gene inactivation (Zaiss et al., 2014).

CONCLUSION

All of these investigations conclude that not a single, but several factors are responsible for interrupting the functioning of the brain during any type of pathological insult.

Neuroinflammation plays a key factor in several neurodegenerative diseases. The neuroinflammatory process occurs due to the over activation of glial cells present in the CNS. Glial cells; Astrocytes and microglia function normally in the brain, but due to the onset of injury/insult, they get activated and release different inflammatory mediators such as cytokines, chemokines, prostaglandins(PGs), NO, free radicals, and many others. Proinflammatory mediators lead to neuronal loss during neuroinflammation and anti-inflammatory mediators suppress the effect of pro-inflammatory mediators. Activation of microglial cells results in the release of many components that show dual properties; they behave as both neuroprotective as well as neurotoxic and may contribute to the long-term recovery process. Thus, it's clear now that regulation of neuroglial activation may provide an effective intervention to control the pathophysiology of neuroinflammation. Different therapeutic approaches are very convenient in the treatment of various neuronal diseases like NSAIDS, monoclonal antibodies, neutraceuticals, gene knockout, and many others. These all can be a valuable approach towards other effective therapeutic strategies. Now there is a need to determine novel approaches and strategies for control treatment that especially target neuro-inflammatory mediators thereby suppress neuronal related-inflammation pathways.

ABBREVIATIONS

BBB-Blood brain barrier; CNS-Central nervous system; ATP-adenosine triphosphate; GDNF-Glia derived neurotrophic factor; ROS- Reactive oxygen species; $(PL)A_2$ phospholipase A_2; COX-1-Cyclooxygenase-1; COX-2- Cyclooxygenase-2; iNOS- inducible NO synthase; TGF-β-Transforming growth factor- β; PGE_2-Prostaglandin E_2; CF-Cerebrospinal fluid; IL-Interleukin; TNF-Tumor necrosis factor; AD-Alzheimer's disease; PD- Parkinson's disease; HD-Huntington's disease; MS- Multiple Sclerosis, NODs- nucleotide-binding oligomerization domains, TLRs- Toll-like receptors, NOS2-Nitric oxide synthase 2, APP_{SL}-amyloid precursor protein carrying the Swedish and London mutation, $Aβ_{42}$-Amyloid beta$_{42}$

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TEACHING STUDENTS WITH MIXED ABILITY: A PERSPECTIVE AND TEACHING PROCEDURES WITH THE HELP OF AI

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ABSTRACT

The world of English language teaching (ELT) literature presents a great numbers of ideas and concepts, expounding a vast assortment of styles, models and techniques, but often makes a general assumption on the make-up of such classes in which such teaching materials can be employed. In an ideal teaching environment, we might wish for energetic, highly motivated and able students with required time supply and resources, but the reality is far from the ideal situation. India being a multi-cultural society we have many students coming from diverse backgrounds. In addition to that, the social and the economic condition of the people add to creating a disparity among the students in terms of their learning abilities and efficiencies. The colleges and institutions have to have admissions and as Indian Education System is based on marks, many such students with diversified background with different and mixed abilities join the institution. Such limitations are faced by the faculty members in teaching students with the mixed ability and the problems that it can pose for a successive language teaching. This is the common problem faced by the teachers in most of the academic institutions. The teacher becomes the key factor in reaching out to each and every student in a class and disparity among the students pose a challenge to their teaching ability. With the help of booming Artificial Intelligence, even in the field of Education, it can really prove to be boon for the students as well as the teachers. The sole aim of this paper is to present procedural remedies to facilitate the faculty members to deal with such students, particularly the use of AI tools and technologies and handle situation in an effective manner. The paper will also pave the way for future researchers to work on the similar platform and give an insight to the institutions for better academic environment.

Keywords: Mixed Ability, Artificial Intelligence, Diversified Background, Learning Disabilities, Procedural Remedies

INTRODUCTION

Individuals growing and living in the given societies require new languages after they have learnt their first language. The reason to acquire and learn the new language which is often considered as the Second Language is quite obvious. The principle question is what provision must be made by the society to help these individuals to learn the second languages needed. The answer to these question is what meant by language teaching.

"Language teaching can be defined as the activities which are intended to bring about language learning."(Stern, 1981)

'Language teaching' is more widely interpreted than 'instructing a language classes. Formal instructions or methods of training are included; but so is individualized instruction, self-study, computer assisted instructions, and the use of media, such as radio or television. Apart from these, the supporting activities, such as the preparation of teaching materials, teaching grammars, or dictionaries or the training of the teachers, as well as making the necessary administrative provision inside or outside an educational system- they all fall under the concept of teaching. Sometimes it is argued that informal methods of 'deschooling' (Illich,1971), using the language in unplanned situations, 'teach' languages more effectively than formal classroom instructions.

Students with English as a second language (ESL) constitute a significant percentage of the population of our nation's schools, which poses a challenge in front of our teachers to help the students in learning English language. One of the most difficult situations for the Language teacher is a group with students of different aptitude level. It is really hard and rather tough to handle students with **mixed levels, of mixed learning Ability,** or even both. The teacher has to find a balance between boring the faster, or higher level students, and losing the rest.

Artificial intelligence (AI) brings the promise of important benefits for education, such as learning that is personalized to the preferences of each student, helping her/him to adapt the pace and control iterations to improve the mastery of the topic. In a survey being conducted with Times Higher Education, University leaders replied that a benefit from AI will be that "AI will be able to assess students, provide feedback and generate and test scientific hypotheses at least as well as humans can".

Today's colleges and universities face a wide range of challenges, including disengaged students, high dropout rates, and the ineffectiveness of a traditional "one-size-fits-all" approach to education. But when big data analytics and artificial intelligence are used correctly, personalized learning experiences can be created, which may in turn help to resolve some of these challenges. The tools and the technologies used will also help to resolve some of these posed challenges and benefit the students in manifold ways.

Every student has a different way of learning; they learn and progress in different ways and with different speeds. Thus, while some students may find the learning task very easy to deal with, others may find it difficult to understand. Besides, learning also depends on what students have brought with them into the class. Since each student comes from a different family, a different environment and cultural background, the multi-cultural population of the classroom may be an obstacle for the teachers in reaching the students, which eventually leads to an ineffective teaching and learning process. Though it is not possible for any teacher to go to each and every student and check how the student is performing in the class, in such a situation all the responsibilities fall on the shoulder of a teacher to monitor each student and to reach their needs in a variety of ways to achieve effective teaching. The most important step is to develop the teaching materials in such a way so that it can be influential for all the students.

The teachers are often finding complaining that they have problems dealing with the classes of students with mixed ability. The characteristics of such classes are:

- While some students follow the lesson and are able to answer questions and do well in tests, others fall behind, don't seem to understand and do badly in tests.

- While some students pay attention and are cooperative, others 'misbehave' and seem disinterested.

- Teachers feel concerned that they are not challenging the high-achievers enough and at the same time are not giving enough help to those who are not doing as well.

- Teachers find it hard to 'pitch' their lessons at a level where all students can be engaged.

Our students are indeed mixed in many ways. They are different in terms of their levels of:

- Attention

- Interest

- Motivation

- Learning styles

- Types of intelligences

- Physiological needs

- Psychological needs

- Speed

- Maturity

- World knowledge

- Knowledge of and about English

And you can probably think of other areas in which they differ e.g. girls and boys who in their class may be of the same age, but may behave and respond very differently, because girls generally mature more quickly than boys. In order to give all students the chance to benefit from their lessons it is vital to take into account their differences and plan lessons or activities within the lesson accordingly.

The question, therefore, is: What strategies are available to teachers to help them to find a more accommodating middle ground? First of all a teacher has to understand that

- He/she needs to address all the students in the class.

- To understand that students are at different levels of English and hence to be dealt accordingly.

- Have to adopt strategies and techniques for dealing with mixed ability students.

- Students have different learning styles.

Hence the tasks have to be designed keeping these observations in mind. The class has to be organized so that no-one needs to feel that they wasting their time waiting for the others or alternatively that they are out of their depth in comparison to other members of the group.

The world of English language teaching (ELT) literature presents a great number of ideas and concepts, expounding a vast assortment of styles, models and techniques, but often makes a general assumption on the make-up of actual classes in which such teaching methods are to be employed. In an ideal teaching environment, we might all wish for energetic, highly-motivated and able students coupled with a limitless supply of time and resources, but the reality that many of us have to face is far from ideal. For a variety of restrictive reasons there is a need for teachers to make the best use of what is available and to do so in the most productive way that one's personal teaching methodology might allow.

Artificial intelligence can contribute to changing education via the automation of administrative teaching tasks, software programs that favour personalized education, the detection of topics that need reinforcement in class, the guidance and support of students outside the classroom, and the use of data in an intelligent way to teach and support the students.

When developed and applied in education, these systems and techniques can be powerful resources for improving the teaching–learning process, since they are able to generate a kind of virtual teacher who is fully trained and has human characteristics, yet is able to interact ubiquitously.

One such limitation is that of teaching in a mixed level class and the problems that this can pose for successful language teaching though, as Richards (1998, p. 1), remarks: "Every class we ever teach is mixed ability", and Rinvolucri states, "We do not teach a group, but thirty separate

people. Because of this, the problem of mixed abilities in the same room seems absolutely natural, and it is the idea of teaching a unitary lesson that seems odd" (1986, p. 17).

When faced with an acute range of abilities within the same group, an obvious approach to the predicament would be to create separate classes based on learners' levels but, when this is not feasible, the teacher is faced with a well-known dilemma: should one address the less able students at the risk of boring the more advanced learners, or risk alienating the lower level students by focusing on their more able peers?

In this paper, a plan is being proposed that advanced learners are a valuable resource who may actively serve as teaching assistants, rather than remain largely overlooked or ignored, in a mixed level group. Also how Artificial intelligence (AI) brings the promise of important benefits for education, such as learning that is personalized to the preferences of each student, helping her/him to adapt the pace and control iterations to improve the mastery of the topic. In a survey we conducted with Times Higher Education, University leaders replied that a benefit from AI will be that "AI will be able to assess students, provide feedback and generate and test scientific hypotheses at least as well as humans can".

Since no two students can be the same in terms of language background, learning speed, learning ability and motivation, it is a utopian view to think that our classes could be homogeneous in terms of these aspects; no matter where we live in the world or at which school we teach. Therefore, the language teachers should be aware of the problems of mixed ability classes and their solutions to identify the source of troubles in their classes and to cure them.

In order to solve the problems of mixed ability, teaching should **appeal to all senses**, all learning styles and all intelligences. Moreover, it should be based on a meaningful context for all learners. To exemplify, visuals are always useful for all age and proficiency levels, so even using coloured chalk or board markers attracts learners' attention to the teaching point. Hence, teachers can make use of visuals to grab students' attention and to motivate them because even the most passive learners are often interested in regalia and/or colourful and interesting posters.

2. It is advisable to have **contingency plans** for the early finishers in case they finish the tasks earlier. This contingency plan might be an extra exercise, a handout or a reading passage. Recently, some of the textbooks have been prepared considering the mixed ability classes and include contingency activities in teacher's books. Nevertheless, teachers are the ones who should/could know which contingency plan works better after which activity in their class.

3. All students do not need to carry out an entire **in-class activity**. While every student should do certain parts, only some of the students (weak ones or early finishers) do all of it (Ur 1996, 306). In relation to that, the tests could include optional questions: While every student completes some parts of the test, some other parts may have options from which the students choose. Furthermore, different tasks can be given to different learners according to their language progress or interest, or optional tasks can be prepared from which students choose.

4. **Open-Ended Tasks** or questions (such as writing a letter, an ending of a story/book/film, or a response to a picture) have a variety of possible correct answers instead of a single answer. These tasks allow each learner to perform at his/her own level. Some of the students may be good at understanding but might be weak in expressing themselves orally or in written work; thus, open-ended tasks give them the chance to express themselves without trying to find the one and the only method.
5. It is important for teachers to give students the opportunity to express their ideas, feelings and experiences, though they may lack confidence or enough language knowledge. By **personalising the tasks**, all students can participate voluntarily. Knowing students' personalities helps the teacher to prepare and adapt materials easily in order to make them

interesting or relevant to students, which adds variety to the classroom environment and establishes a positive atmosphere.

Group/Pair Work Activities are useful not only for the teacher to observe students but also for the students to cooperate and to learn from each other. When a strong student works with weaker students, the student can be a source of language/knowledge in the group. The teacher, on the other hand, may form groups of weaker and stronger students separated from each other, and she can give different tasks to these groups. So the stronger and quicker students work with more complicated tasks, whereas the weaker students deal with a simpler task or work with the teacher as a group member.

Portfolios are another efficient way of dealing with mixed ability groups. Teachers may ask students to keep all the things they have done during the term including the extra work depending on their ability or needs. As a result, not only the teacher but also each student has a record of his/her progress during the term. This record also shows the needs of the student for further progress.

The students must be given different homework tasks –easier tasks for weaker students and more challenging tasks for the brighter students. A set of same homework task must be designed –an easy version, a more difficult and the most difficult version. The tasks can be made more difficult by reducing the help from the side of the teacher.

With a personalized learning experience, every student would enjoy a completely unique educational approach that's fully tailored to his or her individual abilities and needs. This could directly increase students' motivation and reduce their likelihood of dropping out. It could also offer professors a better understanding of each student's learning process, which could enable them to teach more effectively. Here's what this might look like: AI-based learning systems would be able to give professors useful information about their students' learning styles, abilities, and progress, and provide suggestions for how to customize their teaching methods to students' individual needs. For example, some students might be experiencing learning difficulties or challenges that require extra attention or tutoring to keep up. Others might be advancing so rapidly that they are not being intellectually challenged and would benefit from additional study materials or assignments. In both of these hypothetical scenarios, AI learning systems would be helping students to reach their full potential, quite possibly preventing them from dropping out by identifying problems early enough to allow the appropriate corrective measures to be taken.

According to Tomlison "teachers need to envision their classroom as an 'escalator' going higher and higher, not as a 'stairwell' that takes students to a certain grade-level landing where they stop. Tasks have to be respectful, engaging and thought provoking"

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HYBRID APPROACH TO LIVER DISEASE DIAGNOSIS USING A SUPPORT VECTOR MACHINE AND K-NEAREST NEIGHBOR

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ABSTRACT

Machine-learning approaches have become greatly applicable in disease diagnosis and prediction processes. This is because of the accuracy and better precision of the machine learning models in disease prediction. In this study, we have proposed a machine learning model for liver disease prediction using Support Vector Machine (SVM) and K-Nearest Neighbors (KNN) learning algorithms and we have evaluated the accuracy and precision of the models on liver disease prediction using the Indian liver disease data repository. The analysis of the result showed 82.90% accuracy for SVM and 72.64% accuracy for the KNN algorithm. Based on the accuracy score of SVM and KNN on experimental test results, the SVM is better in performance on the liver disease prediction than the KNN algorithm.

Keywords: Correlation analysis, K-nearest neighbor, liver disease, liver disease prediction, support vector machine learning

INTRODUCTION

Liver disease is one of the most life-threatening diseases in the world. In some cases, the disease can be treated but, if left untreated [1-6] and when the treatment is not in the early stages of the disease event the liver disease causes death. This disease is a cause of death in most developing countries. The reason behind this is the lack of proper treatment and diagnosis and the severity of the disease. In some cases, the disease can be treated if detected early. The detection or identification of the disease requires a specialist who has a thorough understanding or experience of treating the disease and at the same time the patient's capacity in paying the amount that is required for getting treatment. In most cases, the physician faces complexity in identifying the disease precisely due to the overlapping symptoms with other diseases. The decision-making process during the identification of the disease can be aided with machine learning models.

The use of machine learning algorithms such as SVM and KNN in the prediction of liver disease is prevalent in reducing the consequence of the disease. Machine learning is gaining greater importance in object recognition, recommendation systems, handwritten digits recognition [1, 2, 3, 5, 6], and disease prediction and diagnosis due to the improved accuracy and precision results. Nowadays, machines are playing a greater role in assisting physicians to make the right decision in the identification and diagnosis of diseases. Different machine learning algorithms namely, Artificial Neural Network (ANN), Support Vector Machine (SVM), Naïve Bayes (NB) Convolutional Neural Network (CNN), Decision Tree algorithms, and K-Nearest Neighbor (KNN) [2-12] are used in building the models that are being used in prediction of liver disease. The most important concern of the prediction models is to minimize the death rate due to liver disease hereby, providing better results in disease prediction. The machine learning models assist in the early identification of the disease. The problems in liver disease diagnosis are the following:

Difficulty in identifying the liver disease patient accurately due to the overlapping symptoms of the liver disease with other diseases. 2) The severity of the disease increases if not identified

early and leads to complications and even deaths. 3) The time taken to identify the liver disease using laboratory tests manually is more and the patient may suffer in the meantime. To solve the problems stated in 1), 2) and 3) this paper proposes a machine-learning model to simplify the liver disease identification and treatment process. Hence, this study explores the answer to the following questions:

1) To develop a liver disease prediction model based on SVM and KNN learning algorithms for early detection of liver disease and assist the physicians in the decision-making process.

2) To evaluate and validate the performance and the accuracy of the proposed liver disease prediction model.

3) To compare the performance of SVM and KNN using accuracy, precision, and confusion matrix as performance metrics?

4) To explore the behavior of cross-validation and training scores for varying samples of training sets.

LITERATURE REVIEW

This section will focus on the literature related to machine learning algorithms for liver disease prediction. In [3] the authors proposed a machine-learning model for predicting liver disease by using SVM classification. In their study, the authors considered texture attributes as the primary attribute contributing to the occurrence of liver disease. The SVM classification algorithm has provided better accuracy for the prediction of liver disease with 68.75% accuracy.

In another study [4], an artificial neural network (ANN) is applied to build a machine-learning model for the diagnosis of liver disease. The SVM classification algorithm provided an accuracy of 71% in the prediction of liver disease.

In [5] a liver diagnosis model is proposed using the decision tree classification algorithm. The authors used the random forest algorithm to build the proposed liver disease prediction or classification model. The UCI machine learning data repository is used in building the model. Liver disease attributes like age, gender, total bilirubin, direct bilirubin, and total bilirubin of the liver disease patients are used in training and testing. The proposed liver disease prediction model based on the decision tree classification-learning algorithm provided an accuracy of 69.30% in predicting liver disease.

A comparative study conducted on various classification algorithms used to build liver disease prediction model in [6] showcased that, SVM provided better accuracy in the classification of liver disease when compared to Naïve Bayes (NB), K-Nearest Neighbor (KNN), and the Artificial Neural Network (ANN) algorithms. Based on the literature review we have selected the SVM for building our proposed liver disease prediction model.

In [7] a Multi-layer perception (MLP) based liver disease prediction model is proposed. The MLP algorithm is applied to the 239 samples manually collected from clinical data repositories. The experimental result of this study showed that the MLP provided better performance compared to the NB algorithm.

A deep learning algorithm can be used to build a learning model for the prediction of liver disease. In [8] deep neural network is applied to build a model for predicting liver disease. In the study, 157 samples are used to build the prediction model. The experimental result shows that the accuracy of the proposed approach is satisfactory for the prediction of liver disease using the Convolutional Neural Network (CNN) model in the classification process.

g the Convolutional Neural Network (CNN) model in the classification process. In another study on liver disease prediction using machine-learning algorithms, logistic regression, the

KNN and SVM are used to build the proposed liver disease, prediction model. And the performance of the three classification algorithms namely, logistic regression, KNN, and SVM on liver disease prediction is compared [9]. The accuracy score and confusion matrix is used to analyze the performance of each classification algorithm and the result of the comparative analysis showed that three of the algorithms provided a good prediction result with an accuracy falling in the range of 71%-73%.

d prediction result with an accuracy falling in the range of 71%-73%. In [10] SVM and backpropagation algorithms are applied to develop a learning model for the prediction of liver disease. The comparative analysis result on the accuracy score of the prediction models showed that the backpropagation model provided better performance than SVM with an accuracy score of 73.2% and SVM scored an accuracy of 71%.

The literature reveals that many different attributes contribute to the occurrence of liver disease. Among the contributing factors to liver disease, are personal habits, such as smoking, consumption of alcohol, and family history. To reduce the mortality rate caused by liver disease, the SVM and NB-based model for the prediction of liver disease is proposed in [11-18] for assisting physicians in the diagnosis of liver disease. Various metrics such as accuracy score, precision, and f-score measures are used to compare the performance of SVM and NB and the experimental analysis result showed that SVM provided a better result in the prediction of liver disease.

In [12] SVM algorithm is used to develop a machine-learning model for liver disease diagnosis. In the study, the performance of the algorithm is shown to be 73 %. The authors used the Indian liver disease data repository. The performance of the model varies for the different number of features applied in training the SVM learning algorithm. The support vector machine algorithm is also proved to be a powerful machine-learning model for building liver disease prediction model as the model has reasonable accuracy.

An artificial neural network-based liver disease prediction model is proposed in [13-14]. The authors have also compared the proposed ANN-based model with the existing models developed using learning algorithms such as SVM and NB. The result of the comparative analysis showed that ANN provided an accuracy score of 70%.

In [20], the authors proposed a classification model for liver disease prediction with Naive Bayes and a support vector machine. The authors evaluated the performance of the Naïve Bayes and support vector machine with prediction accuracy. An experimental test reveals that the support vector machine performed better compared to the Naïve Bayes for liver disease classification. However, the support vector machine has a slower execution time compared to the Naïve Bayes.

In [21], the authors compared the performance of three classification algorithms, namely logistic regression, support vector machine, and K-nearest neighbor. The experimental result of the study revealed that logistic regression has better performance in terms of accuracy. However, the study used only accuracy as a performance metric in the evaluation and other metrics such as receiver operating characteristics curve, (ROC curve) confusion matrix are not used.

In [22], a logistic regression-based liver disease classification model is proposed. The authors evaluated the performance of the model on the liver disease test set and the result shows that the model has 74% accuracy in liver disease classification. In their study, the authors also compared the logistic regression accuracy with other machine learning algorithms, namely the support vector machine and artificial neural network. Comparative analysis of the performance of these models reveals that the logistic regression has better accuracy in the classification of liver disease as compared to the support vector machine and the artificial neural network. The

artificial neural network has an accuracy of 71% and the support vector machine has 58.26% as showcased by the authors.

In [23], the authors compared the support vector machine and K-nearest neighbor-based model on liver disease dataset classification. The authors suggested that the support vector machine and K-nearest neighbor have acceptable performance for liver disease classification. Based on the literature survey [1-26], we chose the support vector machine and K-nearest neighbor for liver disease prediction in this study.

In [27], the authors compared six machine learning algorithms namely, Naïve Bayes, KNN, SVM, decision tree, random forest, and logistic regression for liver disease prediction. The experimental analysis of the result of the accuracy shows that the highest accuracy achieved by these algorithms is 75% with logistic regression.

RESEARCH METHOD

In this section, the data repository is used in training and testing a liver disease prediction model, and the machine-learning algorithm, as well as the programming language used in experimental tests and training the model, are discussed. The data repository used in training and testing the proposed liver disease prediction model is the Indian liver disease data repository available online. The machine learning methodology used in building the proposed model for solving the liver disease classification problem is the SVM and KNN. To implement the proposed machine-learning model for the prediction of liver disease and perform an experimental analysis of the performance of the SVM and KNN algorithms, a python programming language is used. The logical steps for liver disease prediction using a support vector machine and KNN are shown in figure 1.
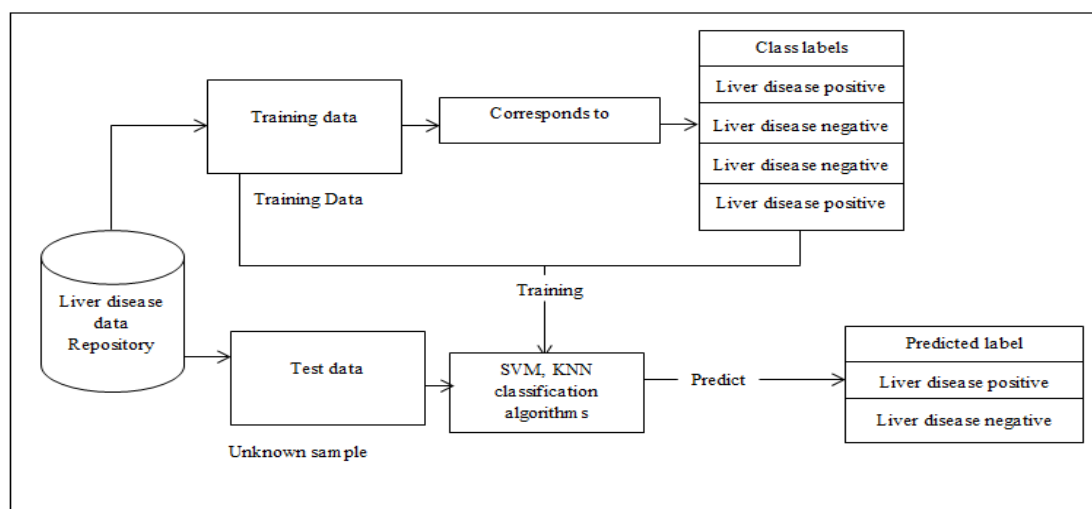

Figure 1. SVM and KNN based liver disease prediction process

DATASET DESCRIPTION

The detail of the liver disease data repository used in building the liver disease prediction model is described in this section. The actual Indian liver disease data repository is available online and the description of this data repository is summarized in table 1. The data repository consists of 583 data instances with 11 attributes and has two classes or labels, the liver disease positive (liver disease patients represented by 1) and liver disease negative (represented by 2). The attributes of liver disease are age (in years), sex (Male/Female), Albumin, and so on described in table 2. In the data repository, 416 samples are liver disease patient instances and 167 liver disease positive or liver disease patient records. Form the total of 583 samples in the data

repository, 20% (roughly 117 samples) are used in testing and 80% (466 samples) of the samples are used in training the model in the data repository. The dataset features are demonstrated in figure 2.

age	gender	TB	DB	alkphos	sgpt	sgot	TP	ALB	A_G	liver_label
65	0	0.7	0.1	187	16	18	6.8	3.3	0.9	1
62	1	10.9	5.5	699	64	100	7.5	3.2	0.74	1
62	1	7.3	4.1	490	60	68	7	3.3	0.89	1
58	1	1	0.4	182	14	20	6.8	3.4	1	1
72	1	3.9	2	195	27	59	7.3	2.4	0.4	1
46	1	1.8	0.7	208	19	14	7.6	4.4	1.3	1
26	0	0.9	0.2	154	16	12	7	3.5	1	1
29	0	0.9	0.3	202	14	11	6.7	3.6	1.1	1
17	1	0.9	0.3	202	22	19	7.4	4.1	1.2	2
55	1	0.7	0.2	290	53	58	6.8	3.4	1	1
57	1	0.6	0.1	210	51	59	5.9	2.7	0.8	1
72	1	2.7	1.3	260	31	56	7.4	3	0.6	1
64	1	0.9	0.3	310	61	58	7	3.4	0.9	2
74	0	1.1	0.4	214	22	30	8.1	4.1	1	1
61	1	0.7	0.2	145	53	41	5.8	2.7	0.87	1
25	1	0.6	0.1	183	91	53	5.5	2.3	0.7	2
38	1	1.8	0.8	342	168	441	7.6	4.4	1.3	1
33	1	1.6	0.5	165	15	23	7.3	3.5	0.92	2
40	0	0.9	0.3	293	232	245	6.8	3.1	0.8	1
40	0	0.9	0.3	293	232	245	6.8	3.1	0.8	1

Figure 2. Liver disease dataset features used for classification

Table 1. Liver Disease Dataset Features.

Observation ID	Feature	Deception
1	Age	The age of patient in years
2	Gender	Patients gender (male or female)
3	TB	Total Bilirubin
4	DB	Direct Bilirubin
5	alkphos	Alkaline Phosphatase
7	sgpt	Alamine Amino trans phosphate
8	TP	total Proteins
9	ALB	Albumin
10	A_G	Ratio of Albumin and Globulin
11	Class	Predictor Class: 1 if the patient has Liver Disease and 2 if they do not

The SVM and KNN classifier is applied to build a model that predicts the value of a target class (the liver disease patients and liver disease negative classes) for unknown test instance based on the input features shown in table 2 and the output futures given to the SVM and KNN learning algorithm during the training phase. The input features are the ones given in table 2 in column attribute (except the class attribute) and the output class is either the liver disease positive (liver disease patient=2) or liver disease, negative class. The relationship between the attributes of liver disease is visualized in figure 2.
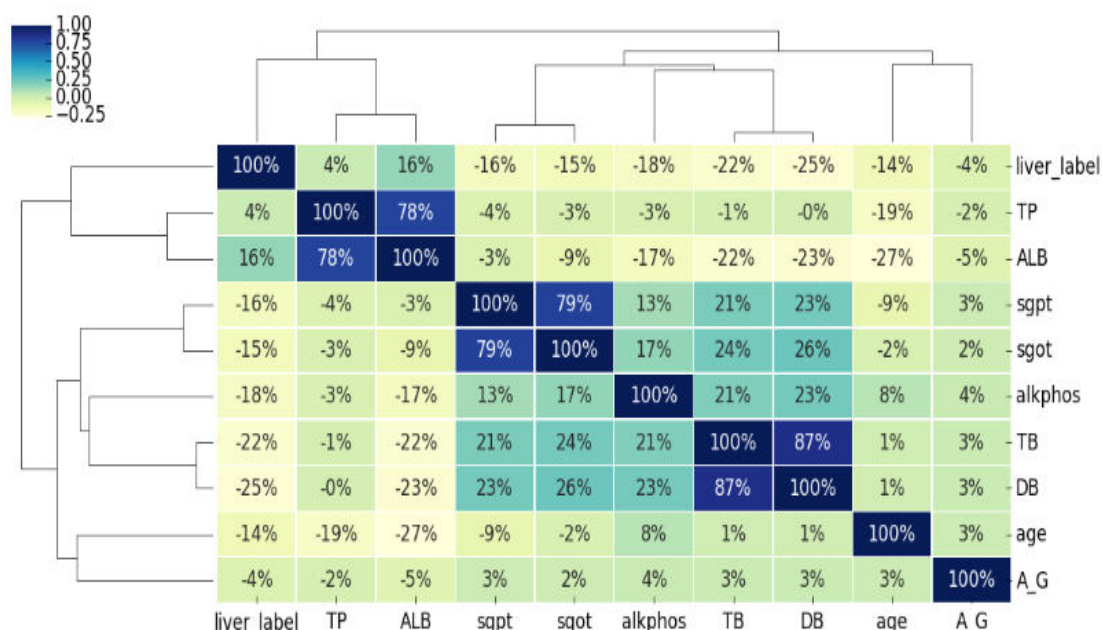
Figure 3. The correlation among liver disease dataset features.

As shown in figure 3, the most important attribute contributing to liver disease is the age attribute. This attribute has the value (-0.14) which is the same as the liver_label or the class label. We can also deduce from a correlation matrix plot that the total Aspartate Amino trans_phosphate (sgot) is also highly correlated to the class label with a value of -0.15.
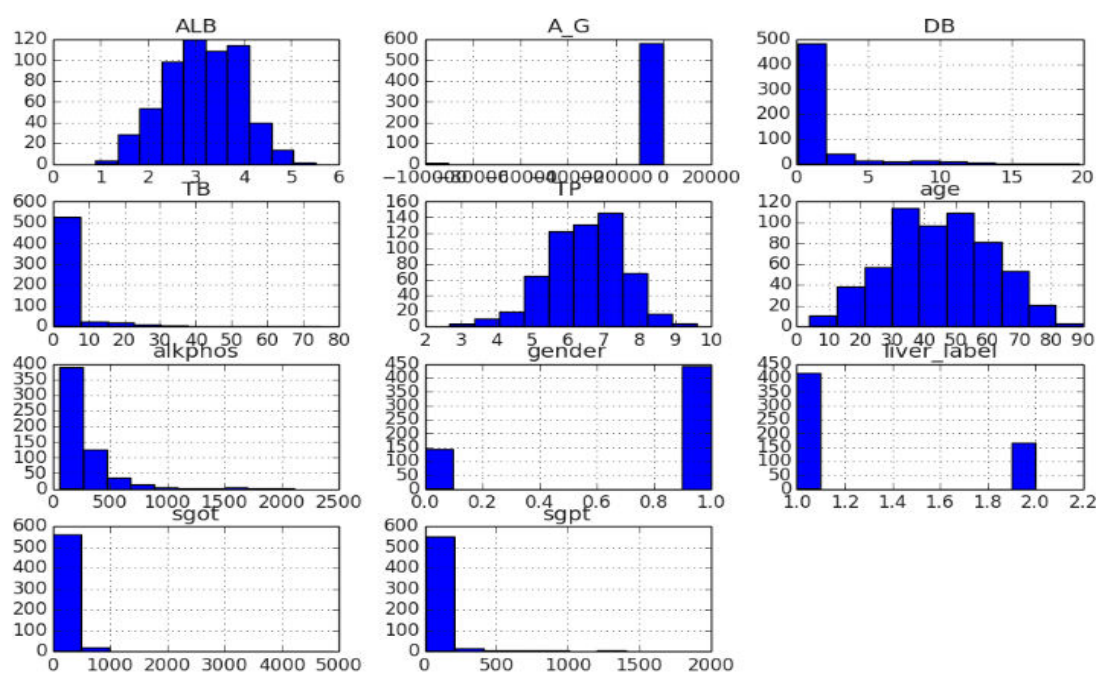

Figure 4 Liver dataset features

.Figure 4, illustrates the feature of the liver dataset. As shown in figure 4, there are 11 features in the liver dataset. The liver label feature is the class label. The class label feature is the output of the predictive model and is not used in training. All other features except the class label, are used as an input to train the support vector machine and k-nearest neighbor.
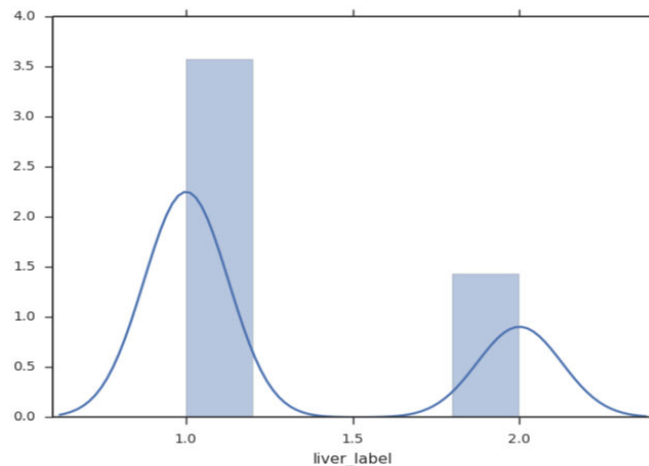
Figure 5. Liver dataset class distribution.

In figure 5, the class distribution for the liver dataset is demonstrated. As demonstrated in figure 4, the dataset class is highly imbalanced meaning the liver disease positive class is almost double the negative class.

RESULTS AND DISCUSSIONS

In the experimental analysis, we have considered three performance metrics to compare the support vector machine and the K-nearest neighbor, and the trained model is tested on the liver disease test set. The performance metrics used in the experimental test include accuracy score, confusion matrix, and receiver operating characteristic curve (ROC) curve. Overall, the result shows that the support vector machine performed well as compared to the K-nearest neighbor.

ACCURACY OF THE MODELS

The accuracy score is the most important metric to evaluate the performance of learning models. This metric is a measure of how a model fits unknown class labels based on the known class labels given to the model in the training set. The performance of the SVM and KNN learning algorithms based liver disease prediction model was evaluated using accuracy metrics. The model is tested randomly on unknown samples and the analysis result showed an average accuracy of 74.52% on five random tests performed on the model using SVM and an average accuracy of 70.93% for the KNN algorithm. The accuracy plot of the two models on random test is illustrated in figure 3. As shown in figure 3 the Support Vector Machine (SVM) has better performance than the K-nearest Neighbor (KNN) algorithm on the random tests on the models. The accuracy for the SVM falls in the range of 70% to 82% whereas that of the KNN falls in the range of 68% to 74%.
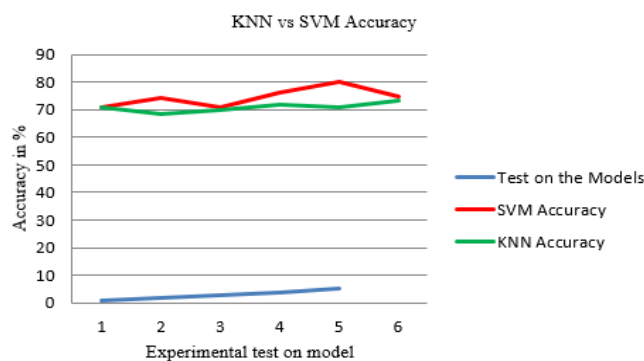

Figure 6. SVM vs KNN accuracy for liver disease prediction.

True liver disease observations: [1 1 1 1 1 2 1 1 1 2]
Prediction by the SVM   model: [1 1 1 1 1 1 1 1 1 1]

True liver disease observations: [1 1 1 1 1 2 1 1 1 2]
Prediction by the KNN   model: [1 1 2 1 1 1 1 1 1 2]

Figure 7. Real observation vs prediction by SVM and KNN model

Figure 7 shows that the number of misclassifications or incorrect predictions is high for the K-Nearest neighbor compared to the incorrect classifications made by the support vector machine. As shown in figure 4. When we look at the output of the support vector machine and the K-nearest neighbor model on liver disease prediction, the support vector machine has only two incorrect classifications for the first ten tests on the model, whereas the K-nearest neighbor has also incorrectly predicted two observations. However, the false positive (FP) for the K-nearest neighbor are two classifications and the support vector machine is sensitive to false negative (FN)
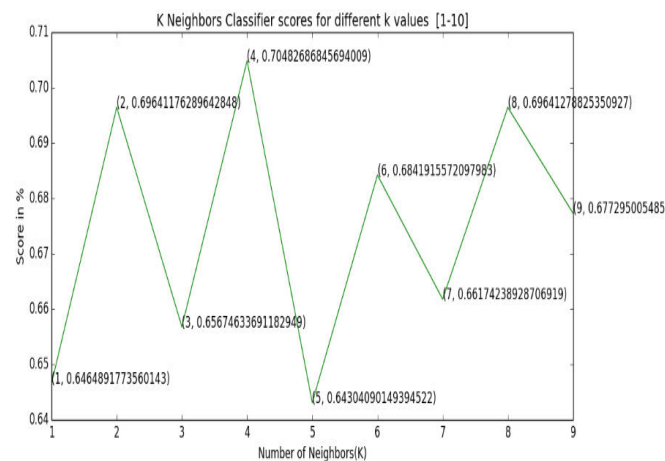

Figure 8. KNN accuracy for K values in the range [1-10].

As demonstrated in figure 8, the K-Nearest Neighbor has better performance for a K value equal to 4 when KNN is trained on the liver disease dataset. The best accuracy score is achieved with K being equal to 4 as compared to the other K values 1 through 10.
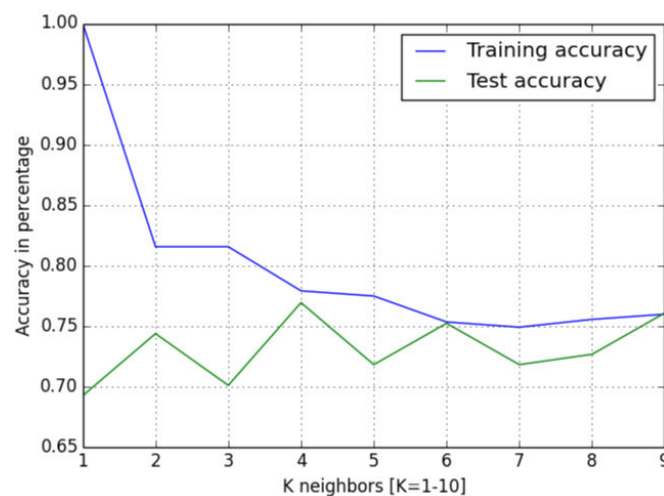

Figure 9. Train test accuracy vs K values in the range [1-10].

The train test accuracy demonstrated in figure 9, shows that the K-nearest neighbor model performed better when the K value is equal to 4. The test accuracy is nearly 80% when the K value is equal to4 and the test accuracy drops with larger values of K as demonstrated in figure 9. This shows that better accuracy can be achieved by using a K value equal to 4 when the KNN is trained on the liver dataset observations.

Receiver Operating Characteristic Curve (Roc) Curve

The receiver operating characteristic curve is used to compare the KNN and SVM model on specific classes namely the true positive (TP) or the liver disease patient class. the ROC metric is important to compare how the SVM and KNN models perform in predicting the true positive class or liver disease patient as this is the important class in which we require the model to perform well.
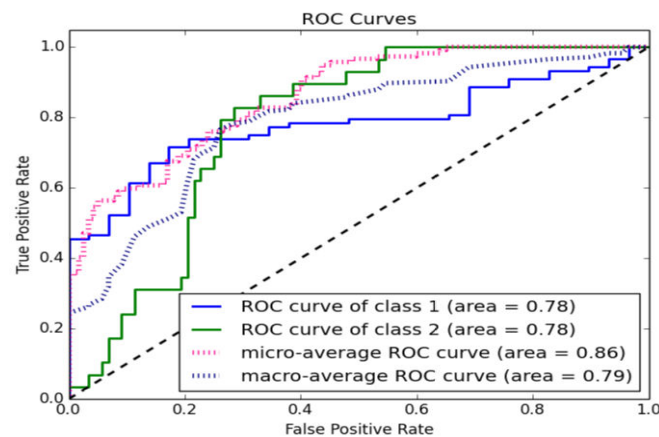

Figure 10. ROC curve for SVM.

The receiver operating characteristics or ROC curve for the support vector machine is demonstrated in figure 10. The ROC curve metric is used to evaluate the output quality or the performance of the support vector machine with cross-validation. These metrics validate the performance of the support vector machine using true positive rate (TPR) and false-positive rate (FPR). As demonstrated in figure 4, the TPR is the y-axis and the FPR is the x-axis, which means the more the ROC, curve area the better the performance of the model. The area under the curve is 0.66 for liver disease patients and non-patient classes. This value is higher than the ROC curve area for the K-Nearest Neighbor model demonstrated in figure 5. Hence, we can conclude that the support vector machine is better in predicting liver disease TP cases meaning the observations where the class is liver disease patient as compared to the K-Nearest Neighbor model.
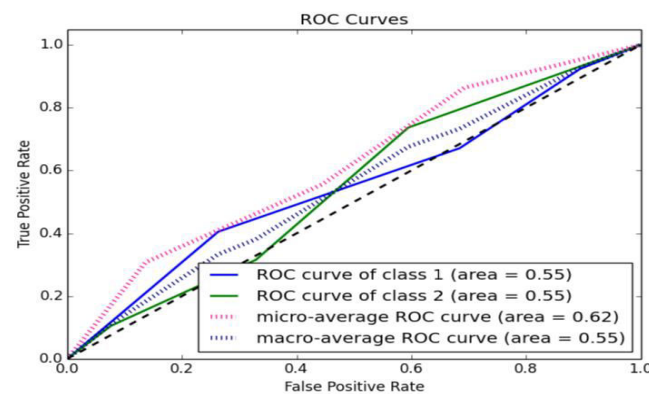

Figure 11. ROC curve for KNN.

In figure 11, the receiver operating characteristics curve (ROC) curve of the K-Nearest Neighbor (KNN) is illustrated. As illustrated in figure 6, the ROC curve is steep as compared to the support vector machine (ROC curve) which is vertical as compared to the KNN ROC curve. Moreover, the area under the curve for the KNN model is less compared to the SVM. Hence, the KNN model performs less in predicting the True Positive (TP) or liver disease patient class compared to the SVM model.

Learning Curve

The learning curve for the proposed SVM and KNN is demonstrated in Figures 6 and 7 respectively. The learning curve is employed to validate the performance of the models on different training sets.
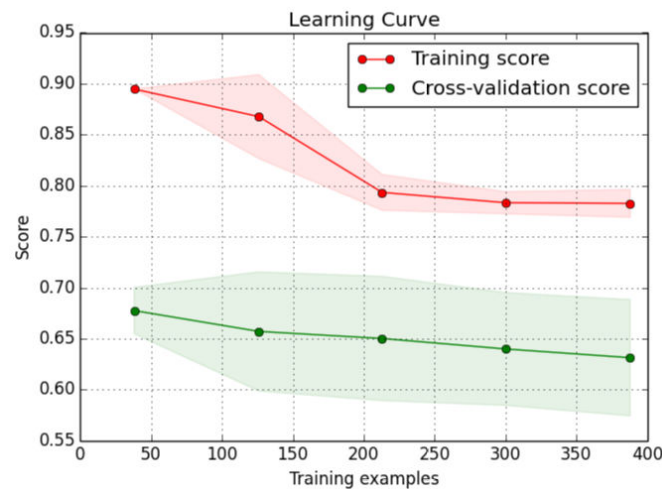
Figure 12. The learning curve for SVM.

The learning curve demonstrated in figure 12 shows the validation and training score of the support vector machine for varying numbers of training samples 0 through 400 samples of liver disease observations. the learning curve reveals that more training samples of liver disease resulted in the divergence of validation and training scores for the support vector machine. The training curve and validation score diverge when more data samples are used for training and this shows that the model will not improve much from more training data.

Figure 13. The learning curve for KNN.

The learning curve of the K-Nearest Neighbor is demonstrated in figure 13. As demonstrated in figure 6, both training and cross-validation scores dropped with more training samples. This

shows that the model's performance will not improve when more data samples are used for training. The more the training set is the less the cross-validation and training score. In both cases, SVM and KNN, the smaller the number of training samples implies better training and cross-validation score.

Confusion Matrix

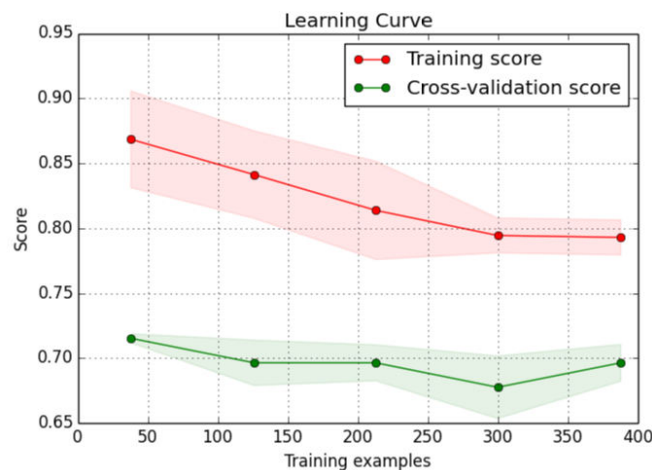The confusion matrix of a model describes the number of samples correctly and incorrectly classified by a classification model. This value indicates, the number of true positive (TN) predicted as the true class label or liver disease patients and true negative (TN) predicted as liver disease negative. Both the TN and TP are correct predictions. The false positive (FP) is a model prediction where liver disease negatives are classified as liver disease patients whereas the false negative (FN) is the number of predictions where the model classified liver disease patients as liver disease positive and this implies that both FP and FN are incorrect classifications. The TN, TP, FN, and FP of the SVM algorithm are shown in figure 14.

Figure 14. Confusion matrix for SVM for liver disease prediction.

As shown in figure 4 TN=86, FP=0, TP=3, and FN=30. This shows that most of the data is classified into liver disease negative class. The total number of correct classifications is calculated as TN+TP= (86+3) =89 and the number of incorrect classifications is calculated as FN+FP= (30+0) =30. The accuracy score of the SVM classifier for this particular test case is calculated as (89)/119)*100=74.78%. Therefore the accuracy score of a classification algorithm is given by the formula:

$$Accuracy\ Score\ = \frac{(TP + TN)}{(TP + TN + FN + FP)} * 100 \dots (1)$$

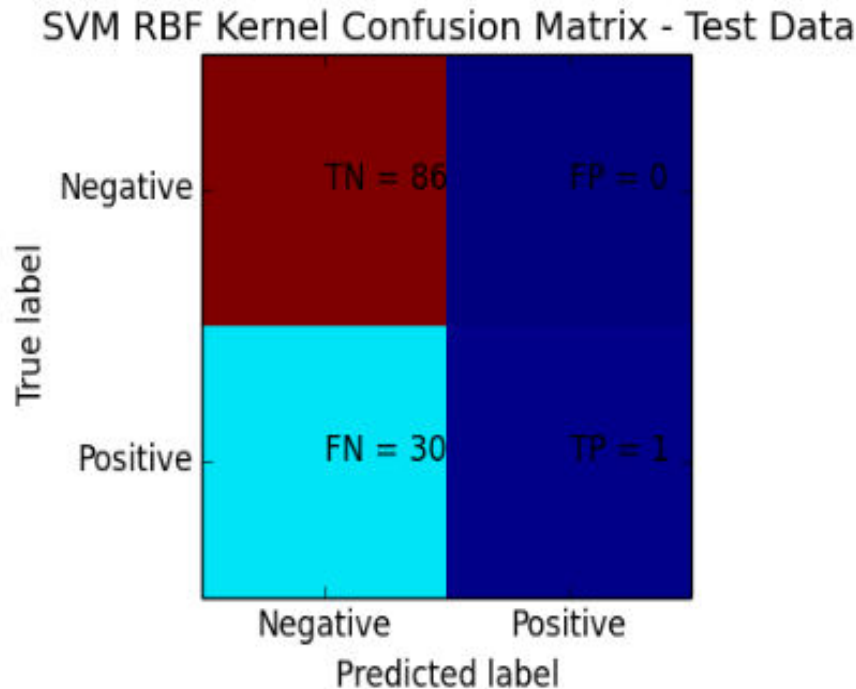Where TN=True Positive

TN=True Negative
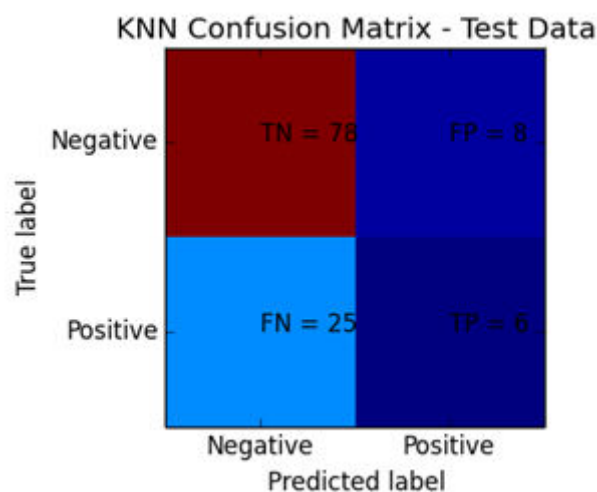
Figure 15. Confusion matrix for KNN for liver disease prediction.

As shown in figure 15 TN=78, FP=8, TP=6, and FN=25. This shows that most of the data is classified into liver disease negative class. The total number of the correct true label is calculated as TN+TP= (78+6) =84 and the number of incorrect classifications is calculated as FN+FP= (8+25) =33. The accuracy score of the KNN classifier for this particular test case is calculated as (84)/117)*100=71.79%.

Comparative Analysis

In this section, the previous works on the liver disease prediction model are compared using the accuracy score on the liver disease prediction. Researchers have used different machine learning algorithms to propose a learning model for the prediction of liver disease. The comparison of existing models in terms of their accuracy score on classification is summarized in table 2.

Table 2. Comparative Analysis Of Existing Works.

Research	Algorithm	Accuracy score
[3]	SVM	68.75%
[4]	SVM	71%
[5]	Decision tree	69.30%
[9]	KNN	71%
[12]	Naïve Bayes(NB)	70%
[22]	Logistic regression (LR), SVM, artificial neural network(ANN)	SVM, 58.26%, ANN, 71.59%, LR, 74%
[27]	LR, RF, NB, SVM, DT and KNN	Highest accuracy 57% using LR
Proposed model	SVM, KNN	SVM, 82.20%, KNN, 72.64%

CONCLUSION

This study compared two machine learning algorithms namely, support vector machine (SVM) and K-nearest neighbor (KNN) for liver disease prediction. We have compared them with the

accuracy and confusion matrix and ROC curve on the test dataset. The result shows that the accuracy of the models for the prediction of liver disease is 75.21% for SVM and 70.93% for KNN. Overall, the SVM algorithm is better for predicting liver disease compared to KNN. The comparative result between SVM and KNN with confusion matrix shows that the number of true labels is greater for SVM than the number of true labels for KNN. An experimental result analysis with a ROC curve reveals that SVM is better in predicting the liver patient class as compared to the KNN. Overall, SVM is a better algorithm for heart disease classification as compared to the KNN algorithm.

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IMPACT OF SOCIAL MEDIA ON CONTEMPORARY TELEVISION JOURNALISM: A STUDY WITH SPECIAL REFERENCE TO TWITTER AND FACE BOOK.

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ABSTRACT

We are living in the age of digitalization. Social Media is making remarkable presence in the contemporary society. Various platforms of social media are used by journalism industry. Social Media plays an important role in the flow of information. Social Media has changed the world and revolutionized the media industry in such a way that how the information is stored, shared, published and consumed.

The various plate forms of Social Media are very popular, influential and have the potential to raise the voice of voiceless people. Common People especially Youth have strong presence in social media. They read, write, and react on various issues through their social media plate forms. This is good for democracy. On one side social media promotes good governance so other side fake news is created and shared by social media. So TV news channels are producing social media based programs.

TV viewers can actively participate while watching a TV program by posting comments online. In the 2020's, many television producers and broadcasters encourage active social media participation by viewers by posting "hash tags" on the TV screen during shows; these "hash tags" enable viewers to post online comments about the show, which may either be read by other social media users, or even, in some cases, displayed on the screen during the show.

What makes Social Media of particular interest to journalism is how it has become influential as a tool of breaking news. The pace and reach of digital coverage of major news stories over the past decade such as the 2004 Indian Ocean tsunami, Hudson River plane crash in January 2009 and the raid on Osama bin Laden's compound in Abbottabad, Pakistan, in 2011 demonstrate the growing power of social media.

This research paper explains how social media revolution has changed or changing the TV news programming? The research is focusing on the current state of TV news media and social media. The popular social media tools and there use by TV news channels are also discussed through this paper.

Keywords: Social Media, Journalism, Digitization, Facebook, Twitter, Media

OBJECTIVE
- The broad objective of the research is to study the emerging trends of TV news programming with special reference to "Facebook and Twitter".

- The related objective is to find out how the Facebook and Twitter affect the ways; news is gathered, reported and presented?

SIGNIFICANCE OF THE STUDY

Social Media has become the important part of society. Citizen has become "Netizen". Information related to personal or professional is shared on social media by its user. Some information may base on facts and some may be fiction, similarly some social media user shared verified information and some unverified information. So this is the responsibility of mainstream media to research and present the factual news from the social media plate forms.

Social media tools help journalists perform their job more effectively. Andreas and Michal Heinlein define social media as 'a group of Internet based application that allows the creation

and exchange of user generated content. Today's audiences expect to be able to choose what they read, and most believe they should be able to contribute content and opinions, too. This study is significant to know how the Facebook and Twitter has changed the nature of the newsgathering process.

The popularity, reach and access of social media is growing rapidly so research regarding the impact of social media on TV news industry as a whole and on the citizens as individuals is the need of the hour. So this study is significant to understand the TV news programming based on social media platforms. This study analyses the emerging trends of gathering, production and presentation of news on TV channels. Through this research, we will know the relationship between TV News media and social media.

REVIEW OF LITERATURE

Facebook and Twitter are becoming more important than ever, and part of the tools' popularity stems from the ability to easily create one's own applications, as Gordon's class did. The class made a tool called News Mixer for Facebook (Gordon). Twitter is a social media platform that launched in March of 2006. The site allows 140-character messages, called "tweets," to be sent out to followers (Dijck, 2011) in a micro blogging style. Twitter has become a platform where news is "reported, disseminated and shared online in short, fast and frequent messages" (Hermida, 2010, p. 301). Furthermore, Hermida determined that "Twitter users tend to be the people who are interested in and engaged in the news" (2010, p. 298) and news sharing of headlines is a major part of users' activity (Dijck, 339). Media Researchers have evaluated the news media and determined social media has not only benefited journalists but has also helped give individuals a way to speak up to the world.

N. Newman (2009) has done a study on the impact of social media on journalism. The findings of the study suggest that social media, blogs and User Generated Content had made a great impact on journalism. Social Media has become important source of information and diverse opinion. Journalists are using various social media tools like Twitter and Facebook to get first-hand information.

Ruth A. Harper (Harper, 2010), said that journalists consider twitter as the most popular tool for information rather than other social media tools, but according to Adam Ostrow, Facebook dominates social media landscape. William Dutton, associated with Oxford Internet Institute considers social media as the "Fifth Pillar" of democracy. In the changed media landscape journalists need to be multi skilled and multi-tasker. Almost every newsroom has social media desk. The study has found that newsrooms use social media primarily for: branding and making a presence in the social media sphere, driving traffic to the company's news website and for breaking news.

Gillis & Johnson (2015) has done a national level survey of social media use by working journalists; he found that most of the journalists have got basic news sources/story ideas from social media. They actually use social media to disseminate news stories. E.C. Tandoc Jr. and T.P. Vos (2016) have pointed out that social media is engaging journalists to its audience. According to this study, there are three ways of social media use in newsrooms - monitoring, interacting and promoting.

RESEARCH QUESTIONS:

Based on the objective and review of literature, the following research questions are formulated:

- How Facebook and Twitter are becoming the source of news for TV channels?

- What issues are raised by social media and how it is covered and presented by TV media?

- What kind of TV programs based on social media (like Viral Sach of ABP News, Aaj Ka Viral of India TV and Social Connection of DD News) are produced and presented by news channels?

- How social media affect the way journalist receives, gather and distribute the news?

- Which social media tool is most popular among the professionals, citizens and youngsters?

RESEARCH METHOD:

A survey has been done with the selected Indian journalists who use various plate forms of social media in the news gathering, production and presentation process. The random sample has been selected from Delhi/NCR region. Sample includes those media professional who have the working experience in traditional and digital media.

A structured questionnaire has been prepared which includes 10 questions related to social media use by journalists. The study also focuses on a content analysis of those stories which is originally taken from Twitter and facebook. We have shortlisted some stories through Twitter Hash tag of a certain time period and then critically observe these stories how it is break in twitter and how it goes on mainstream TV media. Content Analysis is followed by an opinion survey among selected respondents. Qualitative content analysis of selected stories has been conducted to understand the '**Twitter effect'** on TV news channels.

The formula of Twitter effect can be original tweets* followers+ retweet*followers of retweet+retweet of retweet* followers of those and so on.

The major stories break by Twitter as following:

- Arab Spring

- Killing of Osama Bin Laden

- Mumbai 26/11 terror attack

- Death of Pop Star Michael Jackson.

Similarly we have focused on some Facebook posts where the news come first then it grab the attention of mainstream media.

The recent stories posted by face book first and then covered by news channels are:

- A video posted by BSF Jawan accusing officials for bad food given to soldiers.

- The death of UP based journalist Jagendra Singh by a leader.

Questionnaire Design and Interview Method:

Survey research uses scientific sampling and questionnaire design to measure face book and twitter effect on news channels. A survey has been conducted in which around 300 respondents which includes from all across of Delhi/NCR region.

- To conduct interviews of editors/reporters/producers/anchors of major news channels on the impact of Face book and twitter on news channels.

- To conduct interviews of social media users to know their media consumption habits.

SAMPLE SIZE

The sample size for the research is 300. Respondents in the age group of 18-50 years from Delhi/NCR have been selected.

- The sample includes 150 social media users, which include students (50), professionals (50), Housewives (25), Retired Person (25).

- The remaining 150 respondents include TV reporter (30), Editors of News channels (30), Media Teachers (30), Media Critics (30) and website editors (30).

DATA ANALYSIS AND FINDINGS:

Various platforms like Facebook, Twitter, are used by Journalist and common people. The use of YouTube is more common among TV Journalists compared to Print and Web Journalists. The study says that Web Journalists are more frequently use the social media services in comparison to print and electronic media. It empowers audiences to share their news and views; whereas the user generated content (UGCs) offers journalists an important news source for their news stories. Various social media platforms provide an important feature – the hash tag (#), which helps journalists to find out what is being talked about by people on a particular topic. It also shows the daily trends of news being discussed all over the world, which helps the journalists in decision making about stories to be covered. Social media sites especially Twitter and Facebook, indeed, have revolutionized journalism by changing the way news is gathered and stories are presented. The finding story leads, verifying facts, sharing stories, and driving interest. There the following major findings of the study:

➢ Nearly 7 in 10 Twitter users in the study (70%) say they use Twitter for news. Similarly 6 in 10 face book users (60%) said that they get news and contemporary issues related information from it.

➢ Around 8 in 10 news producers consider Twitter for breaking news alert. Similarly 5 out of 10 producers consider face book for the first hand information about any news/issues.

➢ 80% respondents said that face book and twitter post help the editorial team to decide their news programming in prime time of a news channel.

➢ 90% of Twitter news users get their news either through scrolling their timelines or browsing tweets of those they follow.

➢ 65% of Twitter news users say they get news from trending topics.

➢ 82% of Twitter users access the platform on their phones and many access Twitter across multiple devices.

➢ 80% respondent said that Social Media has opened the door for Digital Journalism.

➢ 85% respondents from media 'critics' category said that Programs like Viral Sach of ABP News are the need of the hour so all TV news channels should produce and present social media based programs where the truth of viral videos should be shown on the basis of fact check.

➢ 70% respondents from Media Experts category said that TV news channels should examine the trending topics on social media and make a program on these topics.

➢ 75% respondents consider emerging trends of Journalism is in Digital Medium like YouTube, news application, news websites.

➢ 85% respondents said that going Live on Face book and Instagram page of the news channels is the emerging trends of Journalism.

➢ 75% respondents said that there is positive impact of Social Media on Journalism as it has strengthened the freedom of speech and expression for all and it has become the great source of news/information for the journalist. If a journalist responsibly use social media as a tool for news distribution, as well as fact check everything, it can be very beneficial to them and their media organization. Social media has become a more efficient way to distribute and gather news.

➢ 80% respondents said that there is negative impact of social media on journalism as it has become the tools for spreading fake news/baseless rumors. There is a lot of fake news; the media should cross check the fake news and present the fact news but sometimes even mainstream media involves in spreading the fake news which is very dangerous for the society and country.

➢ 85% respondents said that social media companies should focus to resolve the issue of fake information/news so that no one can misuse their platforms. Mainstream media should also not trust blindly on social media and they have to crosscheck the viral audio/video/information and then present the factual and truthful news to their audience.

➢ 70% respondents consider social media as a helpful tool, Journalists can instantly report just by using their smartphones and that is a huge impact social media has on journalism. Since news is so easy to share and almost all social media users have become as a citizen journalist.

CONCLUSION

The new technologies of mobile and social media have revolutionized the entire media.

The internet is powerful, and mobiles have the greatest reach, so there is big scope of Mobile Journalism in India. Convergence of mobile, computer, laptop and tele-communication has brought a new media system. Mobile has helped the journalist to cover any breaking stories. Smart Phones have helped in the production, distribution and consumption of content. Journalism is changing around the globe. Mobile Journalism has huge potential in a country like India. Among other things, it has enhanced the storytelling process. Social Media is making remarkable impression on the youth.

This study discusses the use of social media tools for journalism and mobile tools, as the past decade use television to broadcast any news. Smart phones have become more productive in news recording from even in hand or pocket. To capture young audience we use mobile journalism, for this social media, internet and web contributes much more to collect information. This is also the age of "Infodemic". So we should not trust simply what information we are getting from social media. Mainstream media should be more responsible than social media. At present it seems that Journalism has become more vulnerable to manipulation, disinformation, and a consequent lack of public trust.

Journalist should tell the real information to the public. Today's audiences expect to be able to choose what they read, and most believe they should be able to contribute content and opinions, too. Social media has make revolution in the journalism sector and it should not be considered as the death of Good Journalism. In fact it should be considered as the birth of New Journalism movement that emphasizes on basic key factors of journalism: transparency, unbiased, honesty, and giving the voice to the voiceless.

Social media users have a fairly wide curiosity about news. When given a list of some 28 possible news topics, a majority of respondents in the nationally representative sample of social media users named seven that they recalled following in the news in the last week. Non-Twitter users also cited seven. And Twitter users, as we saw in several other questions, seem even more news-oriented. On average, Twitter users followed 14 different topics last week.

Twitter users are less likely to be TV news viewers, more likely to use search, mobile apps and websites and social networks. There were not substantial differences in use of newspapers or radio. Non-Twitter users, by contrast, are less likely than social media users in general to use various online tools, including search and mobile apps. The rise of internet and mobile apps as popular gateways of news consumption has profoundly changed what constitute journalism.

People using social media as a news source can design their own news agenda, identifying the sources and topics they want to follow. This has led to speculation that people will become narrow in their interests without the agenda-setting influence of news organizations. The survey probed this notion in various ways, including by asking people what sources they followed and whether it was more likely a news organization, a friend, an individual journalist or a sub-section of a news organization.

The major issues are more highlighted in the New Media rather than Traditional Media. Social Media has become emerging platforms of diverse opinion. This helps in the TV news production and presentation. The Changes in news presentation identified in this paper is relevant to individual viewer's decisions about which media organizations to use and which to trust. Social Media has emerged as the catalyst of transparency, innovation, expression and togetherness, mobile journalism brought some fresh air in the creation and dissemination of news and information. It is free, fair and fast. It is truly democratic, accessible and interactive as smart phones provide a platform to every citizen to express themselves.

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GENETICS AND STRUCTURE OF AUTOANTIGENS INVOLVED IN TYPE 1 DIABETES: A DETAILED REVIEW

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ABSTRACT

Type 1 diabetes mellitus is a chronic disorder also known as autoimmune diabetes and is characterized by the identification of one or more β cell proteins as an autoantigen (also known as self-antigen) by the immune system of the patient with the same disorder, i.e., CD4+ and CD8+ T cells and/or autoantibodies (self-reactive B cell products). Depending on β-cell-specificity, these autoantigens (AAs) are categorized into two groups. The list of target autoantigen in this autoimmune disorder is continuously rising and remains to be developed. Many autoantigens which are related to this disorder are well studied and play important role in the prognosis, diagnosis, and immunotherapy of Type 1 diabetes mellitus. Its identification helps in understanding pathogenesis and the clinical aspects of the same disorder. Since numerous splendid reviews have completed previously confirmed autoantigens which are associated with Type 1 diabetes mellitus, here we will discuss some newly identified Type 1 diabetes mellitus associated autoantigens that are islet amyloid polypeptide (IAPP), chromogranin A (CgA), pancreatic duodenal homeobox factor 1 (PDX1), and zinc transporter 8 (ZnT8). This review will discuss their identity, structure, genetics, biology, and its relation to diabetes.

GRAPHICAL ABSTRACT
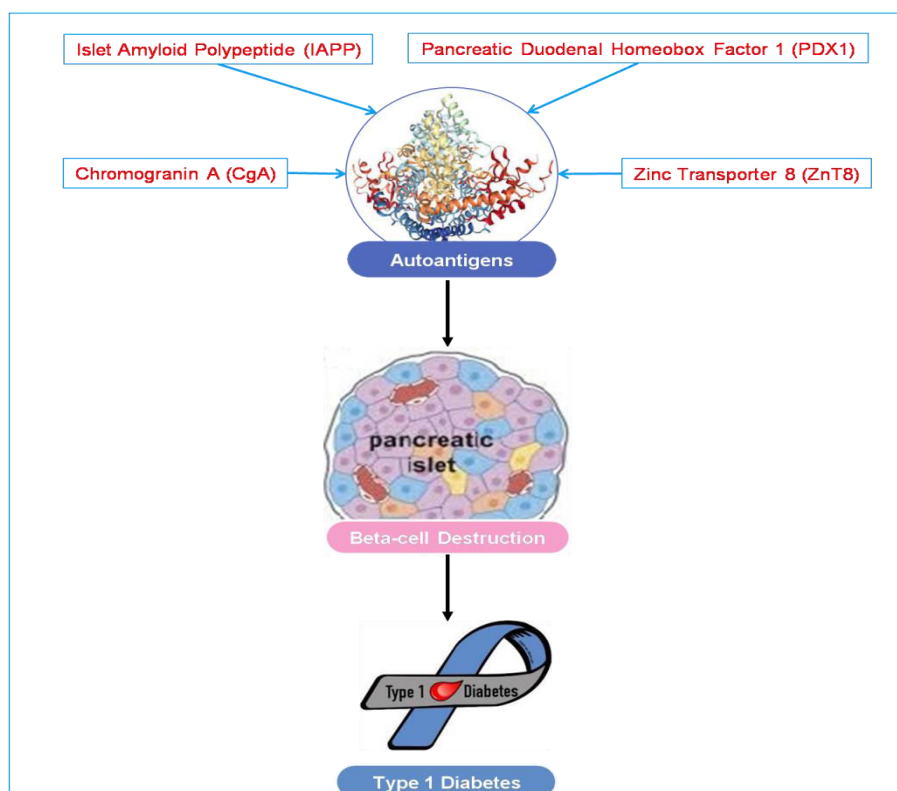
Keywords: Type 1 diabetes, Autoantigens, Structure, B cells, Immunogenicity

INTRODUCTION

Diabetes mellitus is a group of metabolic autoimmune disorders [1] in which hyperglycemic condition occurs i.e., blood sugar level increases due to defects in insulin secretion and insulin action or both [2]. It is a non-communicable heterogeneous disorder and is diagnosed with a large population worldwide. Its prevalence has increased 4 times since 1980. According to WHO, in 2014 the number was 422 million and estimated to be up to 590 million by 2035 [3]. There are many types of diabetes mellitus and they have similar signs and symptoms (polyuria, polyphagia, polydipsia, ketoacidosis, and hyperosmolar coma) as well as complications (cardiovascular diseases, neuropathy, retinopathy, nephropathy, foot damage, and skin conditions) but different etiology [4].

Type 1 Diabetes Mellitus (T1dm)

Type 1 diabetes mellitus or juvenile-onset diabetes is the gene responsible (HLA-DQA1*0301, HLA-DQA1*0302, HLA-DQB-1*0602, and HLA-DQW1.2) progressive autoimmune disorder which mostly affects the children that are below 20 years but now diagnosed at any stage of age with a high mortality rate [4,5] and it is caused by the destruction of β cells of islets of Langerhans of pancreas and loss of insulin secretion that mediated by T cells [2]. The destruction of β cells is due to the markers that are islet cell autoantibodies, antibodies to insulin, antibodies to glutamic acid decarboxylase-65 (GAD65), antibodies to tyrosine phosphatase Insulinoma antigen-2A (IA-2A), and Insulinoma antigen-2B (IA-2B). These markers are used to diagnose the disorder [2]. The children diagnosed with this disorder may have the risk of development of other autoimmune diseases such as hypothyroidism, hypoadrenalism, pernicious anemia, alopecia areata, vitiligo, and other thyro-gastric complex diseases [4]. The existence of autoantibodies and autoreactive T cells point out that certain islet antigens are erroneously identified as foreign which initiates immune response leading to conditions involving type 1 diabetes mellitus [6]. Autoantigen (AA) is a normal protein or protein complex (sometimes it is DNA or RNA) that is identified by the patient's immune system who is suffering from a specific autoimmune disease including type 1 diabetes mellitus [7]. These autoantigens (AAs) are produced due to mutations, the formation of neoantigen (formed by gene-producing self-protein that can mutate and form new immunogenic protein i.e., neoantigen), or exposure of previously hidden self-antigens [8]. The major AAs that are diagnosed in patients with type 1 diabetes mellitus are non-specific islet cell AAs (ICA), insulin, glutamic acid decarboxylase 65 (GAD65), insulinoma antigen-2 (IA-2), zinc transporter (ZnT8). Additional AAs are islet-specific glucose-6-phosphatase catalytic subunit related protein (IGRP), chromogranin A (CgA), islet amyloid polypeptide (IAPP), Imogen-38, heat shock protein (HSP), and others that are recently identified are peripherin, tetraspanin-7, prolyl-4-hydroxylase β (P4Hb), glucose-regulated protein 78 (GRP78), urocortin-3, insulin gene enhancer protein islet-1 and pancreatic duodenal homeobox factor I (PDX1) [6]. In this review we will target only four AAs, viz., IAPP, PDX1, CgA, and ZnT8 and will describe their basic biology and other features along with relation to type 1 diabetes mellitus.

Role of Autoantigens in Type 1 Diabetes Mellitus:

Type 1 diabetes mellitus occurs due to the destruction of insulin-producing β cells. However, its initiation and progression mechanism is not fully understood but it is believed that the AAs against β cells, macrophages, dendritic cells, B lymphocytes, and T lymphocytes are involved in this process [9]. The events that are involved in destruction are shown in fig. 1.
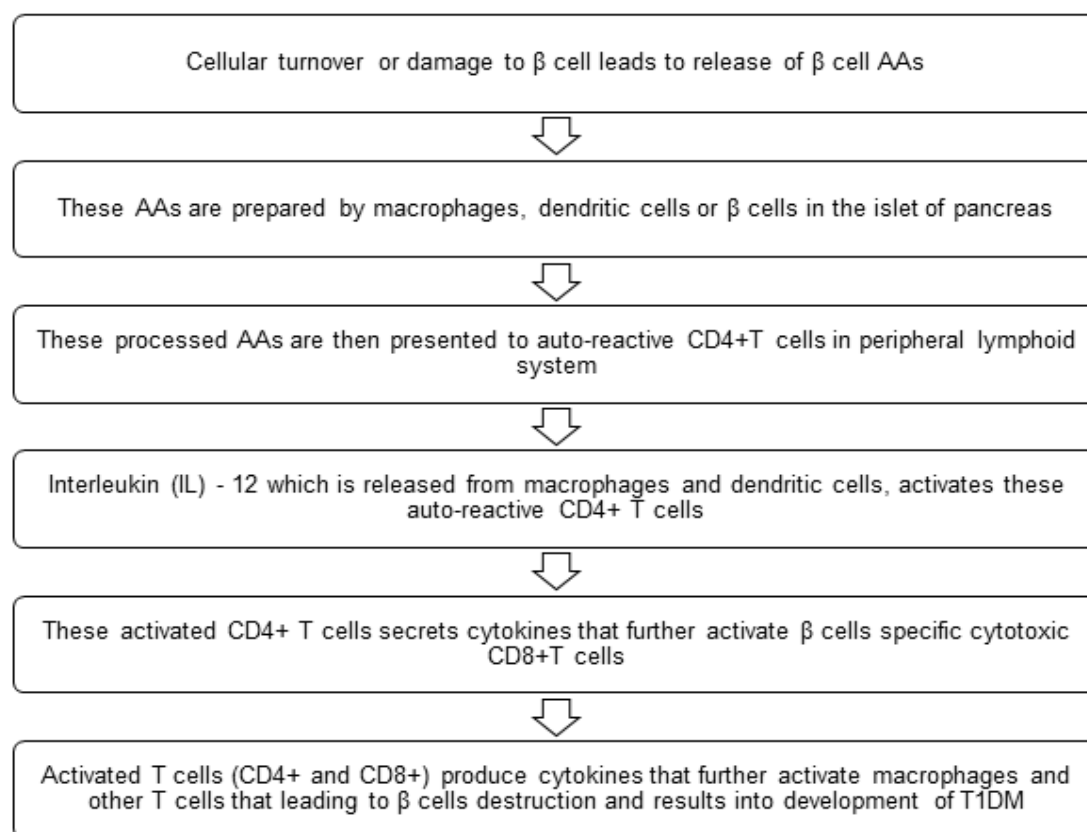
Figure 1: The events involved in the destruction of β cells [9]

Detail Study of Some Important Autoantigens in Type 1 Diabetes Mellitus:

Islet Amyloid Polypeptide (IAPP)

Islet amyloid polypeptide (IAPP) or amylin is a putative hormone found in β cells of the pancreatic islet in 90% of patients with diabetes mellitus [10]. The name was given because it has the unique property to aggregate into insoluble amyloid fibrils [11] that show cytotoxic effects on β cells and possess pro-inflammatory properties [12]. This aggregated IAPP is found in the pancreatic islet of patients with type 2 diabetes and the pancreatic islet transplanted patients with type 1 diabetes mellitus [6,13]. The difference between rodent IAPP and human IAPP (hIAPP) is that rodent IAPP does not aggregate like hIAPP because they possess three proline amyloidogenic regions of the peptide [12]. It is the main constituent of islet amyloid and was firstly identified in 1987 in the pancreatic extract of the patient with diabetes and insulinoma [10]. The IAPP is co-secreted in parallel to insulin in response to glucose stimulation [13] and thus insulin-dependent patients with diabetes and patients with insulin deficiency encounter IAPP deficiency also [14]. People with glucose tolerance and hyperinsulinemic condition experience high levels of IAPP which indicates that amylin level varies with insulin [14].

Structure and Physicochemical Properties of Islet Amyloid Polypeptide:

It is a peptide hormone and was initially identified as insulinoma amyloid peptide, later named as diabetes-associated peptide (DAP), and now known as islet amyloid peptide or amylin [11]. It is a larger, originally purified, and most abundant constituent of the congophilic amyloid deposits which contains 37 amino acid proteins produced by β cells and shows a close similarity with calcitonin-gene-related peptide i.e., CGRP [10,15]. The gene of IAPP is located on the

short arm of chromosome 12 [15] and the polypeptide is amidated at C- terminus [16]. The amino acid sequence of IAPP is 43% homologous with αCGRP and 46% homology with the second β from CGRP. Near to the N-terminus, it contains an intermolecular disulfide bridge between Cysteine-2 and Cysteine-7 [16].

It is a hydrophobic polypeptide hormone that contains positively charged residues such as Lysin-1, Arginine-11, and Histidine-18 (based on pH). The acidic residue is absent in IAPP. The isoelectric point (pI) of Tyrosine and Lysine residue is above the pKa. Depending on pKa's of N-terminus, Histidine-18, and the pH, the polypeptide possesses a positive charge at and below the physiological pH with a net charge of 2-4. For the interaction with sulfated proteoglycans of extracellular matrix and with negatively charged non-physiological model membranes, the net positive charge on the molecule is important. The hIAPP sequence contains many residues of Asparagine and Selenocysteine/Threonine for its size, 6 and 10 respectively. Three aromatic residues are also present that are conserved C-terminal Tyrosine and conserved Phenylalanine at 15th position and 23rd position [16].

Synthesis and Storage of Islet Amyloid Polypeptide:

The process for the synthesis of IAPP is like that of insulin, both genes contain similar promoter elements and transcription factor PDX1 that regulates both genes in glucose response [11]. Its synthesis is carried out by inactive pro-hormones and involves the number of protease cleavages and post-translational modifications [17]. It is translated as a preprohormone precursor, i.e., preproIAPP which is in an immature form. The Preprohormone gene contains three exons, of them last two encode the full prepromolecule [11]. The preproIAPP (containing 89 amino acid residues out of which 22 are amino acid signal peptide and 2 are short flanking peptides, i.e., C- and N- terminal which later breaks at double basic amino acid residues) [11] is converted to produce proform, i.e., proIAPP (containing 67 residues) by deleting the signal peptide (hproIAPP$_{1-67}$ in human and mproIAPP$_{1-70}$ in mice) [12]. In the β cells of mice, proIAPP$_{1-67}$ is cleaved by prohormone convertase enzyme (PC) 1/3 at its C- terminus to produce an N-terminally extended intermediate form, i.e., proIAPP$_{1-48}$. Produced proIAPP$_{1-48}$ is then cleaved by PC2 in secretory granules to generate a mature form of IAPP [17] which contains 37 amino acids (hIAPP$_{1-37}$ or mIAPP$_{1-37}$) [7]. The cleavage of human IAPP is done by using PC2 and not by PC3 or by furin (Clark et al., 1996). The breakdown of proIAPP by PC2 is done at Lysine-10 Arginine-11 position and by PC 1/3 at Lysine-50 Arginine-51 position [11]. This whole process of production of IAPP from proIAPP is shown in fig. 2 [12,16].
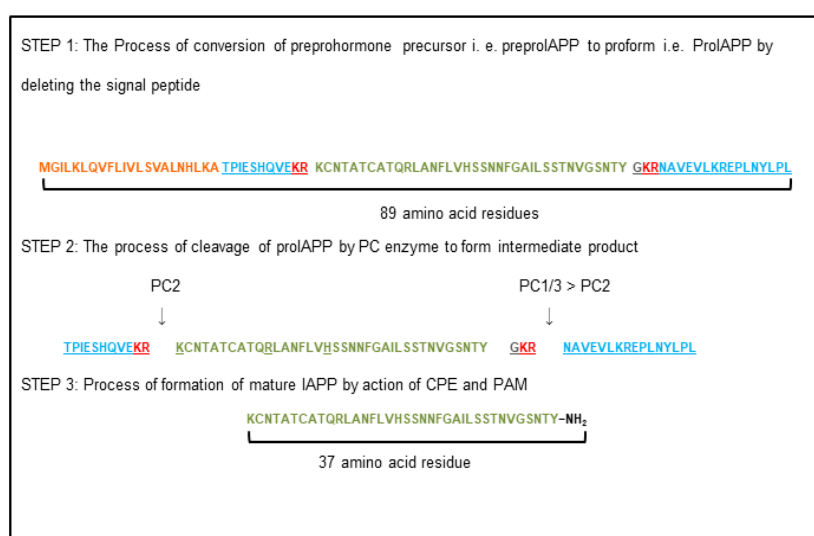

Figure 2: Formation of mature IAPP from preproIAPP.

The primary sequence in step 1 with orange color is the 22-residue signal sequence. The underlined regions are 2 short flanking peptides i. e. C- and N – terminals. The preform of IAPP i. e., proIAPP is cleaved by the action of PC1/3 and PC2 at two conserved dibasic sites that are indicated by arrows in step 2. In the last step, mature IAPP is formed by the action of CPE (deleted basic residues that are indicated by red color) and PAM (deleted glycine residue that indicated by dark grey color) [12, 16]

Role of islet amyloid polypeptide in putative functions [10,14,16]:

1. Metabolism and glucose homeostasis regulation

2. Regulation of insulin action and its secretion

3. Gastric emptying inhibition

4. Vasodilatation and modulation of calcium (Ca^{2+}) metabolism

5. Inhibition of glycogen synthesis and increasing its breakdown

Relation of Islet Amyloid Polypeptide and Type 1 Diabetes Mellitus:

As IAPP is co-located into granules of β cells and co-secreted in the blood in parallel to insulin in response to glucose stimulation, the hyposecretion of IAPP has been observed in type 1 diabetes mellitus. It was found that with the injection of synthetic IAPP and insulin, the glycemic control was improved by the suppression of glucagon secretion [6].

Chromogranin A
Chromogranin A (CgA) is a member of the granin family which is a highly acidic protein and contains 439 amino acid residues processed by 18 signal peptide residues. It has a molecular weight of 48kDa, and it was the first discovered granin glycoprotein [18,19].

Structure and Biochemical Properties of Chromogranin A:
A pre-chromogranin A molecule contains 457 amino acids while, as mentioned above, chromogranin A contains 439 amino acids which are set into one-chain peptide and processed by NH-2 terminal 18 amino acid signal peptide [19]. The gene of CgA, i.e., CHGA is a single copy gene present on the 14th chromosome with base pairs 12,194 at q32.12 locus and 8 axons [18]. Its primary structure derived from the sequence of cDNA is shown in fig. 3 [20].
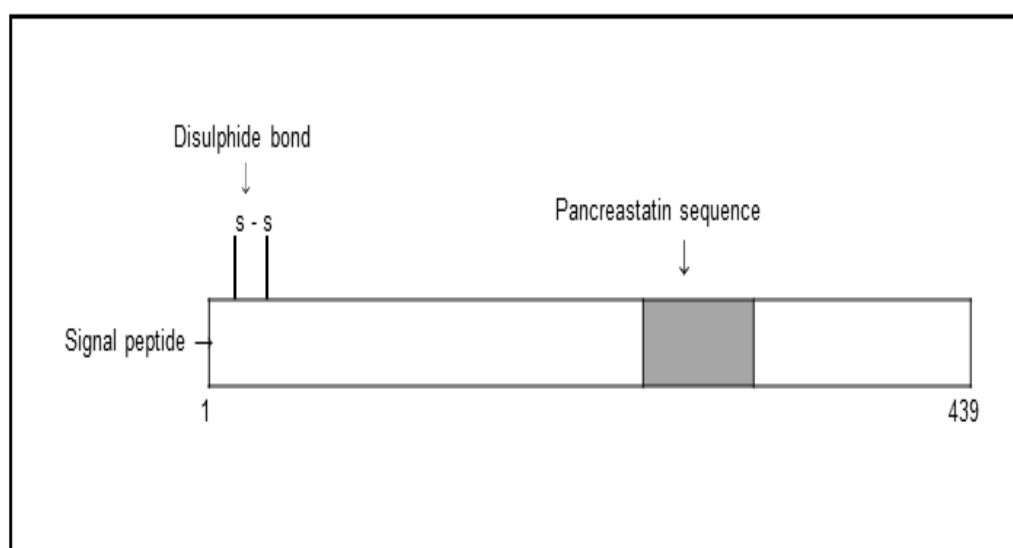

Figure 3

Primary structure of human chromogranin A (hCgA) with dibasic amino acid sites where proteolytic processing may occur, signal peptide. S-S indicates disulfide bond while grey color indicates pancreastatin sequence [20]

A high amount of charge, mostly acidic amino acids, are present in their structure, while multiple sites involve two or more adjacent basic amino acids. In all mammalian species of CgA, there are 7 of these dibasic residues conserved [20]. It forms bioactive post-translational fragments shown in fig. 4 [21] by the action of prohormone convertase enzyme PC1/3 and PC2 (Table-I) [18].
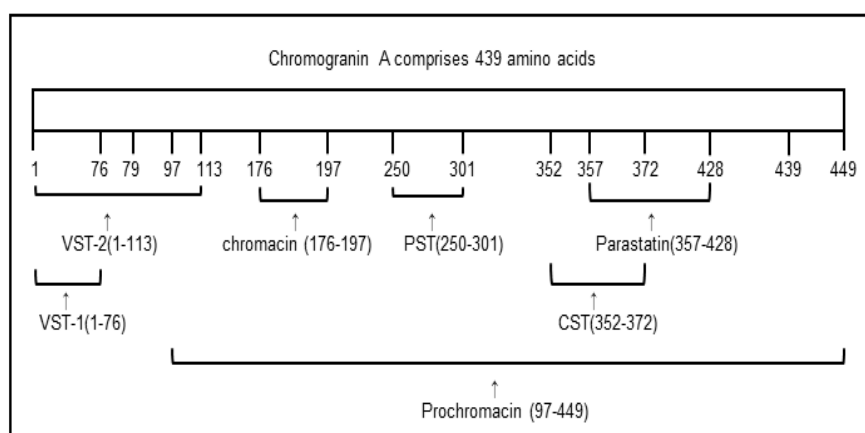

Figure 4: Diagrammatic presentation of chromogranin A containing 439 amino acids and its derived peptides from the stress-activated, diffuse neuroendocrine system [18, 19, 21]

Table 1:

Name of peptide	Some features
Pancreastatin ($CgA_{250-301}$)	• It is a dysglycemic hormone and plays the role in Glucose-stimulated and unstimulated insulin secretion inhibition. • It inhibits the glucose uptake and suppresses insulin signaling. • Lipid synthesis and leptin secretion in adipocytes are decreased by pancreastatin.
Vasostatin-1 (CgA_{1-76}) and Vasostatin-2 (CgA_{1-115})	It shows anti-inflammatory, anti-microbial, cardioprotective, and anti-adrenergic effects.
Parastatin ($CgA_{357-428}$)	It plays the role in the inhibition of low Ca^{2+}-stimulated parathyroid secretion in vivo.
Chromacin ($CgA_{173-194}$)	Gram-positive as well as Gram-negative bacteria inhibited by the Chromacin.
Catestatin ($CgA_{352-372}$)	It is a catecholamine release inhibitory and anti-hypertensive peptide and shows the opposite effects to the parastatin on glucose metabolism and lipogenesis process. It also plays a significant role in cardiac function and blood pressure regulation.
Serpinin ($CgA_{417-442}$)	The newly discovered fragment has an anti-apoptotic effect, and it also promotes cell survival and myocardial contractility and relaxation

Table- I: Post-translational fragments and their roles [18]

Due to the presence of excessive negative charges and property of aggregation in presence of cation, CgA binds to calcium with a moderate affinity at multiple sites. As all the granin family members contain multiple dibasic residues and binding sites for calcium in their structure they show similarities in their functions. CgA is more like CgB. In both molecules, at their amino termini, a disulfide-bonded loop structure is present with a highly correspondent amino acid sequence demonstrated in fig. 3 [20].

The Role of Chromogranin A in Type 1 Diabetes Mellitus:
The comparative results of wild-type non-obese diabetic (NOD) mice and CgA-deficient knockout NOD mice (NOD.CgA$^{-/-}$) show that there is no development of type 1 diabetes in NOD.CgA$^{-/-}$ or it occurs in a very small portion of its population. This shows that CgA causes type 1 diabetes mellitus. The observative results for 12 months show that type 1 diabetes mellitus is developed in > 90% female wild type NOD mice and only 3% symptoms are observed in NOD.CgA$^{-/-}$ female mice. The signs of type 1 diabetes mellitus were not observed in male NOD.CgA$^{-/-}$ mice. After 12 months observational period, pathological examinations were carried out for the insulitis and inflammation of the islet of the pancreas. The obtained results indicated the insulitis in all the wild-type NOD mice in males as well as females but only 20% was developed in NOD.CgA$^{-/-}$ mice and the amount of CD4^{+} and CD8^{+} T-cells were found in its pancreatic tissues [18].

Uses of chromogranin A [21]:

- It is a neuroendocrine biomarker and used as a diagnostic marker of the tumor and used to monitor the tumor progression as well as regulation during its treatment.

- Used even as a biomarker in neurodegenerative and neuropsychiatric diseases.

- Used as a biomarker in hypertension, cardiovascular diseases with addition of heart, renal, and liver failure conditions.

- It could be a potential diabetic biomarker.

Pancreatic Duodenal Homeobox-1(Pdx1)
Pancreatic duodenal homeobox-1 protein (PDX1) is a β cell-specific novel autoantigen which is also called insulin promoter factor 1 or IDX-1/STF-1/IPF1. It is a homeodomain transcription factor which is a β cell identity and function regulator. It is a protein containing its antennapedia-like homeodomain in its structure. It contributes to pancreatic development and in the transcription process of the insulin gene [22].

Structure of Pancreatic Duodenal Homeobox-1:
The human PDX1 gene is detected on chromosome 13q12.1 and contains 2 axons, 1 intron, and 6 kb spans. The human PDX1 contains 283 amino acids accompanied by 31K molecular weight. The PDX1 gene of the mouse is detected at the distal end of chromosome 5 while the PDX1 gene of the rat is located on chromosome 12 [23,24]. The human PDX1 contains highly conserved protein, and the sequence of protein has higher homology with other species such as 90% with the hamster, 88% with rat, 87% with the mouse, and 68% with Xenopus [6,25].

In the structure of PDX1, the antennapedia-like homeodomain (which has the same amino acid sequence except for one amino acid towards the NH2-terminal) is present in the middle region. This antennapedia like homeodomain is flanked by a proline-rich region on both sides [22,25]. Homeodomain is involved in the DNA binding process and protein-protein interaction by the transcriptional activation mechanism. For DNA binding, highly conserved histidine residue at 189th position and KIWFQN motif which is present in helix 3 of homeodomain is required. The NH2- terminal region contains a transactivation domain. This transactivation domain is divided into 3 evolutionarily conserved subdomains namely, subdomain A (13-22amino acids),

subdomain B (32-38 amino acids), and subdomain C (60-73 amino acids) [25-27]. The COOH-terminal has the inhibition action [6]. The structure is illustrated in fig.5.
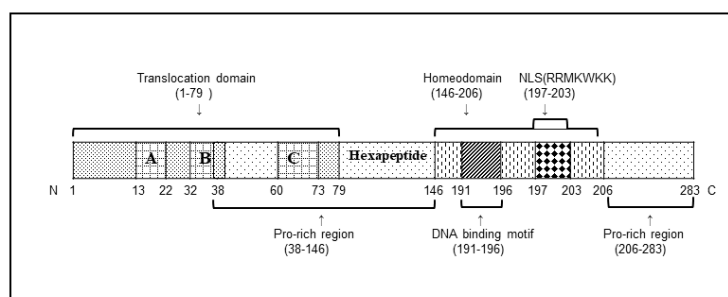

Figure 5: Protein structure of PDX1 gene. The transactivation domain which consists of 1-79 amino acids is indicated by ☐ , subdomains A, B, and C are indicated by ☐ , the pro-rich region indicated by ☐. The antenna type hexapeptide which contains PFPWMK amino acid is present in the pro-rich region which is located before the homeobox. The homeodomain region which contains 146-206 amino acid indicated by ☐. Amino acid 191-196 is DNA binding motif shown ☐ . The nuclear localization signal i.e. NLS containing 7 amino acids such as RRMKRKK indicated by ☐ [25,26]

Regulation of Pancreatic Duodenal Homeobox-1 Gene Expression:
It is a complex process contain up to 6 kb sequence from the start site of transcription. A proximal E box binds the ubiquitous bHLH protein USF-1 at around 104. Several sites are also present that bind HNF3β which is a forkhead winged-helix transcription factor. For the expression of the PDX1 gene, the HNF3β transcription factor could prime the PDX1 gene by other factors of transcription. PDX1 binds to the TAAT core sequence that contains the site of HNF3β. This shows that the autoregulatory feedback mechanism, but the expression of PDX1 is inhibited by glucocorticoids by interfering with HNF3β. Other factors such as HNF1α and SP1/3 are also involved in the PDX1 gene regulation process [26].

Role of Pancreatic Duodenal Homeobox-1:
It plays a role in early embryonic pancreatic development, differentiation of endocrine lineages, and β cell maturation. In the early development of the pancreas, its expression is detected at the somite stage in mice and the 4-week gestational stage in humans. According to a human case report study, 5 years old female Caucasian had pancreatic agenesis because of the presence of homozygous, a single nucleotide in the PDX1 gene. PDX1 is also important for pancreatic lineage differentiation. In pregnant mice, when PDX1 expression is stopped or blocked via parturition then pancreas development is arrested. Another role of PDX1 is in maintaining the function of β cells as it induces glucose intolerance when PDX1 reduction takes place in mature β cells [28].

Relation of Pancreatic Duodenal Homeobox-1 and Diabetes:
Several molecular events are involved in the development of diabetes which affects the ability of β cells to secrete insulin. These events also affect the ability of other cells such as muscle, fat, and liver cells to respond to the actions of insulin. [25] Monogenic form of diabetes, i.e., **M**aturity **O**nset **D**iabetes of the **Y**oung (MODY) is marked by autosomal dominant inheritance, pancreatic β cell dysfunction as well as flaws in insulin secretion leading to the development of early-onset diabetes. The six genes responsible for diabetes are MODY1, MODY2, MODY3, MODY4, MODY5, and MODY6. One of them encodes the glycolytic enzyme GK, i.e., glucokinase (MODY2), and the remaining five encodes the transcription factor. The transcription factor encoding gene contains three genes from **H**epatocyte **N**uclear **F**amily (HNF). These are HNF-4α in MODY1, HNF-1α in MODY3, and HNF-1β in MODY5. MODY4

and MODY6 are the results of mutation in the PDX1 gene and NeuroD/B2 gene, respectively. Mutation in any one of these six genes results in MODY. The frameshift mutation and missense mutation in PDX1 lead to decreased binding activity of PDX1 to the insulin promoter and this is accompanied by reduced insulin transcription in response to hyperglycemia (in-vitro) [25,29-31].

Zinc Transporter Protein 8 (Znt8)

Zinc transporter protein 8 (ZnT8) is a novel islet autoantigen in both type 1 and type 2 diabetes mellitus. It is a product of the SLC30A8 gene and present in pancreatic β cells where zinc is present in high amounts [32]. Zinc is required to crystalize the insulin, storage as well as exocytosis of insulin secretory vesicles [33]. ZnT8 transports the zinc from the cytoplasm to intracellular vesicles and extracellular space [34] and it is an important constituent required for the insulin maturation process [35]. It regulates the zinc concentration in β cells and acts as a zinc sensor [34].

Structure of Zinc Transporter Protein 8:

Human ZnT8 shown in fig. 6 has 2 homodimer isoform which is differentiated by the length difference of 49 amino acid at N-terminal end [36,37]. One form (A) contains 369 amino acids while another form (B) contains 320 amino acids according to N-terminal extension [34,38]. Its exact structure is not yet clear, but it is believing that according to bacterial Yiip X-ray structure it has a "Y" shaped structure like immunoglobulin architecture [34,39]. This dimer is encoded by SLC30A8 located at chromosome 8q14.11 and each monomer contain six transmembrane domains (TMDs), cytoplasmic amino- and carboxy-terminal tails with histidine-rich loop [34,40]. This transmembrane protein act as a Zn^{2+}/H^+ exchanger [40] and transport the zinc ions from cytosol to intracellular vesicles as well as to intracellular space as mentioned above [38]. The conformational changes in protein structure result in the induction of antiport mechanism [34].
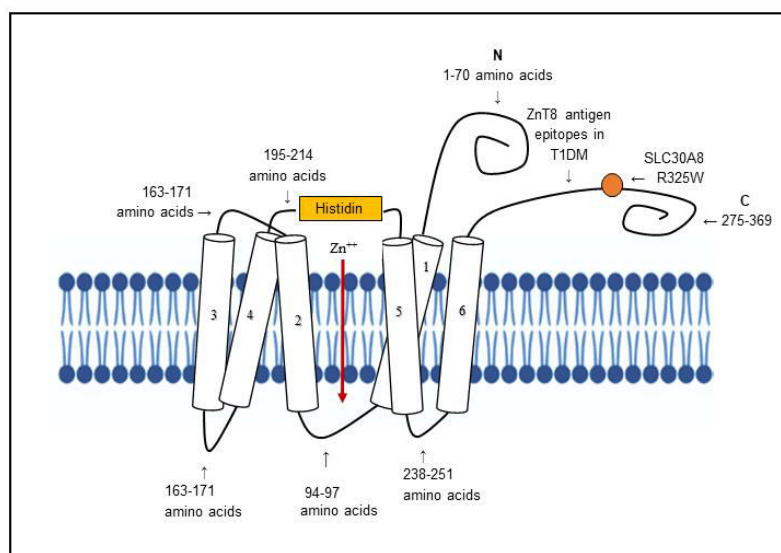
Figure 6: Schematic diagram of zinc transporter protein 8 which is present in insulin secretory granule. The C- and N-terminals are cytosolic and 1-6 numbered transmembrane domains are extracellular [42]

ZnT8 has 4 binding sites on each promoter. The primary active site A located in the center of TMDs while cytoplasmic binding sites B are located on the surface of the membrane [34] and C on the dimer interface of the C-terminal domain (CTD). The C-terminal domain plays a role in protein-protein interaction and as a zinc sensor [34]. The amino acid of ZnT8 at 320 position

could be arginine (R), tryptophan (W), or glutamine (Q) due to single-nucleotide polymorphism within SLC30A8, that are rs13266634 and rs16889462. According to previous research, rs13266634 has a relation with type 2 diabetes mellitus but not with type 1 diabetes mellitus [41] which indicates that it can stratify the risk of type 1 diabetes mellitus in children with positive autoantibodies to ZnT8 (ZnT8A). The 12 rare mutations in SLC30A8 could reduce 65% risk of T2DM and these mutations are p.Arg138*, p.Lys34Serfs*50, c.71+2T>A, p.Met50Ile, c.271+G>A, c.419-1G>C, p.Trp152*, p.Gln174*, c.572+1G>A, p.Tyr284*, p.Ile291Phefs*2, and p.Ser327Thrs*55. This suggests that the SLC30A8 genotype may be a common genetic cause of type 1 diabetes mellitus as well as type 2 diabetes mellitus [41].

Functions/ Role of Zinc Transporter Protein 8:

- The basic role of ZnT8 is to maintain the intracellular zinc homeostasis process with other zinc transporters as it is required for the structural stability, storage, and secretion of insulin but it does not affect the content of insulin, size of the islet, and composition of the cell [32,41].

- According to previous reports, some researchers noticed that ZnT8 could impair the Glucose Stimulated Insulin Secretion (GSIS) while others reported increased or unchanged GSIS. This indicates that ZnT8 has a conflicting effect on GSIS, insulin sensitivity, and glucose tolerance tests [32,41].

- It plays an indeterminate function in the survival of β cells [41].

These contradictory results might be due to interaction between ZnT8 and other influencing factors such as an environmental factor, genetic history, age, sex, and subcellular localization of ZnT8 [32,41].

Zinc Transporter Protein 8 as an Autoantigen:

In serum of a patient with type 1 diabetes mellitus, autoantibodies are detected by utilizing the different fragments of human ZnT8, there are only C-terminal fragments that produce higher sensitivity and specificity (50.4 and 98%). 18.6% autoantibodies are detected against the ZnT8-COOH (ZnT8A-COOH) in patients with type 1 diabetes mellitus but ZnT8-NH$_2$ was rare. Some studies suggest that the ZnT8 dominant epitope/s may be present at 268-369 amino acid of ZnT8, and which is conformational instead of the linear epitope. Researchers reported that, by using site-directed mutagenesis in the C-terminal of ZnT8, its epitopes are critically dependent on the polymorphism at 325 amino acid by using site-directed mutagenesis in C-terminal ZnT8. It has indicated that there is approximately 50% prevalence of ZnT8A-325R among the patient with new-onset type 1 diabetes which is a bit more than ZnT8A-325W while nearly 30% positive rate of ZnT8A-325Q in type 1 diabetes mellitus but ZnT8A-325Q is not applicable epitope for the same disorder diagnosis because receiver operating characteristic curve of this epitope shows that it cannot significantly differentiate the patients with type 1 diabetes from controls. Hence, the polymorphism of ZnT8 C-terminal at amino acid 325, mainly ZnT8325-R and/or ZnT8-325W, consult an antigenicity and epitope specificity of ZnT8. Moreover, linear epitope R_{325}, R_{332}, E_{333}, K_{336}, and K_{340} participate in another region of antigenicity [41].

The key epitope of the ZnT8-reactive T cell was studied previously. ZnT8 is a protein that is bound to the HLA-DQ8 molecule, mainly 166-179 amino acid of ZnT8 is firstly identified by Chang and Unanue. In the NOD mouse, after the protein immunization by islet antigen-containing cells, $ZnT8_{330-344}$ and $ZnT8_{345-359}$ were present but the latter were diabetogenic epitopes. Dang et al. noticed that some epitopes are bound to HLC-DR4. These are $ZnT8_{8-22}$, $ZnT8_{15-29}$, $ZnT8_{120-134}$, $ZnT8_{134-148}$, $ZnT8_{260-274}$, $ZnT8_{267-281}$, and $ZnT8_{295-309}$, while $ZnT8_{155-169}$ and $ZnT8_{323-337}$ are HLA-DR3 restricted epitopes in human. Albeit in type 1 diabetes mellitus, ZnT8186-194 is the predominant epitope for CD8+ T cells. In type 1 diabetes mellitus, HLA-A*0201-restricted CD8$^+$ T cells epitopes are also identified, and these are $ZnT8_{153-161}$, $ZnT8_{107-}$

$_{115}$, ZnT8$_{115\text{-}123}$, and ZnT8$_{145\text{-}153}$. In type 2 diabetes mellitus, ZnT8$_{253\text{-}261}$ is the most frequently detected epitope than type 1 diabetes mellitus. Most T cell epitopes were mapped against the ZnT8 in the transmembrane region or the C-terminal region, there is no overlapping with the polymorphic region of ZnT8 at amino acid 325 [41].

CONCLUSION

Since autoantigens have important theoretical and practical applications in type 1 diabetes mellitus, there has been appreciable work is done to identify and characterize autoantigens that are involved in type 1 diabetes mellitus. In this review, we generally discuss the recently discovered 4 autoantigens namely IAPP, CgA, PDX1, and ZnT8. Numerous autoantigens which are related to type 1 diabetes mellitus are previously recognized, promoting the purpose that immune response to multiple autoantigens participates in the pathogenesis of the same disorder. Identification of CD4$^+$ and CD8$^+$ T cell autoantigens may be the beginning step in the autoimmune cascade. Finding the epitopes of β cell-specific CD4$^+$ and the CD8$^+$ T cell is a key principle of type 1 diabetes mellitus exploration. This assists in cognizance of the pathogenesis of type 1 diabetes mellitus and the new strategy for the development and progression of disorder monitoring. It also helps in the development of therapeutic interventions. It is also believed that additional autoantigens and T cell epitopes associated with type 1 diabetes mellitus will be advanced hereafter.

CONFLICT OF INTEREST: The authors do not have any conflict of interest

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BARRIERS IN USING SOCIAL MEDIA AMONG FACULTY MEMBERS AND RESEARCH SCHOLARS OF AGRICULTURAL INSTITUTIONS AT TAMIL NADU: A STUDY

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ABSTRACT

The present research study focuses on the barriers in using Social Media among the Faculty Members and Research Scholars from Tamil Nadu Agricultural Institutions. The pre-designed data collecting sheet was circulated among the Faculty Members and Research Scholarsto collect the information. About 1200 questionnaires were circulated, out of which 965 filled in questionnaires received back. As a result, it is found from the study that Lack of Awareness on Social Media forms a major problem, which faced by 79% of the respondents. It is further resulted that 73% of the respondents have stated that "Lack of Infrastructural facilities" is a major barrier in using Social Media.

Keywords: Barriers of SM, Social Media, Agricultural Institutions, Tamil Nadu,Usage of SM.

1. INTRODUCTION

The modern internet world offers many beneficial things to the scientist, academicians and students to explore their knowledge sharing process. Scientists from all over the world are eagerly participating in Social media (SM) for sharing their suggestions, knowledge and thoughts. Though it is expensive one it also provides easy communication, endlesslearning process, effective in teaching andpost updates about the meetings. SM is wonderful tool which offers a wide range of opportunity to the users with various age and qualification category. It is a precious platform for all the youngsters to understand the things that happened in any part of the world.In this study, we found the important barriers faced by the faculty members and research scholars of agricultural institutes in using Social Media.

1.1 Common Barriers in Using Social Media

SM has providing a fruitful opportunity to its users and consumers, but also many people from all part of the world are highly pretentious because of lack of awareness in computer and internet usage and inability in knowledge upgrading process.

Even though SMoffers many, it also creates some problems/difficult to its users such as loss of time, money and health. Hence, the safety and security to the users are questionable**(Newbury, E., Humphreys, L., &Fuess, L. (2014).**

1.2 Recognizing the Barriers to Digital Engagement

The online/digital engagement process is highly blocked/ due to some technical reasons like, poor internet signal or irregular maintenance of system hardware's. These trivialreasons may result in negative development in knowledge sharing and upgrading. But also people are still having awareness and usefulness of internet andSocial Media. And the effective usage of the SM and internet resources in a bright way is UN questionable **(socialmediatoday.com).**

The barriers of these digital knowledge sharing is not entirely dependent on a community or organization but also it include the personal career development thinking. The five common barriers of Digital engagement are as follows

➢ Not Taking Digital Seriously

➢　Lack of knowledge and understanding of Digital Era realities

➢　Framing alternatives in a way that leads to risk aversion

➢　Poor/no roadmaps for effective digital engagement and transformation

➢　No, inadequate or inappropriate resource allocation

2. REVIEW OF LITERATURES

Dekker et al. (2020) revealed that the most of the Pubic organization are facing numerous troubles in communicating with their wider audience through the platform so called Social Media.Also he stated that the addressing the issues faced by both Public organization and consumers across the globe is essential. The Socio-technical change can be only possible through the newly launched approach called 'perpetual beta' which can bring interaction among the consumers. **Sivakumaren, K. S. (2019)**has studied the applications of an Academic Social Networking Sites (ASNS) amid the research scholars of various Universities of Tamil Nadu. His study has revealed that consciousness of the ASNS among the Research scholars who participated in the study has found to be very less and immediate action is required in this problem. The author has also recommended that the frequent organization of hands on workshops and awareness lectures on ANSN will bring better improvement.**Beier, M., & Wagner, K. (2016)**have involved in an interesting study about the various factors/determinants of Social Media adoption by SME. Their study has resulted that about thirty five percentage of SMEs are adopted the SM for the purpose of occupational activities. The reason for this low level usage by the SMEs is also assumed that the low returns of the investment in SM and association of high risk factor. In addition to this the usage of SM is highly secure and easy to use and immediate publication of advertisement to the wider audience. Also the researchers have endorsed that the insinuations of SM in on small business management, Social Media Marketing and technology adoption will bring much growth promoting investments. **Au, M., & Lam, J. (2015)**have explained the various factors that influencing the usage of SM in the local region of Hong Kong.He also stated that the few flaw in the following factors are the major issues related to the usage of SM such as, technological perspective, user's perspective and institutional perspective. In addition he also concluded that the proper explanation of the importance of the Social Media usage in front of the consumers will explore the SM usage among the institutions and students.**Evans, C., Hackney, R., & Ray, D. (2014)**have concentrated on the various blockades that block the gateway of Knowledge management (KM) including socio-technical, various national and cultural and also suggested that the SM will be the finest tool to enrich the KM among its users across the world.His study has revealed that the every individual nation has its own cultural dimensions and it greatly affects the KM with in organizational level. Hence, he also stated that the SM is the only tool can overcome these dimensional variations and bring the KM into possible one. The cultural traits can be immediately rectified via the choosing of particular SM tool with its selective parameter.**Lampe et al. (2011)**concentrated the importance of SM and suggested that the SM has the advanced degree of solicitation to the Policy maker's business professionals and Government officials. Also the Social Media has its deepest root in the field of software design as the SM is highly useful to spread the newly launched software's and it act as a good platform for the recommendation.Since the previous researches have not focused much on finding the barriers in using social Media of agricultural institutions and thus this study would be aunique attempt to identify and assess the perceived barriers in using Social Media from both faculty members and research scholars in agricultural Institutions in Tamil Nadu.

3. OBJECTIVES AND HYPOTHESIS OF THE STUDY

3.1. OBJECTIVE

➢ To find out the barriers in using social media among the faculty members and research scholar of Tamil Nadu Agricultural Institutions.

➢ To compare barriers of Social Media with respect to gender, age and designation of faculty members and research scholars of Tamil Nadu Agricultural Institutions.

3.1. HYPOTHESIS

There is a significant difference in the barriers in using Social Media among the respondents based on gender, designation and age.

4. METHODOLOGY

The questionnaire method was used to collect the data from the faculty members and research scholars of various disciplines in Agriculture Educational Institutions in Tamil Nadu which includes 15 constitution colleges and research institutes of Tamil Nadu Agricultural University. A total number of 965 filled in questionnaire were received back out of 1200 questionnaires. The response rate is 80.41%. SPSS (version 11.5) was used for data analysis.

The analysis includes the Percentage, Mean and Standard Deviation, Ranking with tables and Cluster Analysis, Proximity Matrix, T-Test and One-Way ANOVA.

5. DATA ANALYSIS

5.1 Barriers in Using Social Media

The study analyzed the various barriers faced by the respondents in Social Media. Ten barriers were identified and ascertained on Likert's five point scale such as "Strongly disagree", "Disagree", "Undecided", "Agree" and "Strongly agree". The statistical analysis was performed weremean and standard deviation are calculated, and ranks are assigned based on the above. The same is shown in Table 1 and Figure 1.

Table 1: Barriers in Using Social Media

S. No.	Description	SD	DA	UD	A	SA	M	Std.	R
1	Lack of Awareness on Social Media	20 2.1%	115 11.9%	68 7%	443 45.9%	319 33.1%	3.96	1.03	1
2	Lack of Infrastructural facilities	22 2.3%	109 11.3%	130 13.5%	512 53.1%	192 19.9%	3.77	.96	3
3	Lack of Time	35 3.6%	147 15.2%	167 17.3%	396 41.0%	220 22.8%	3.64	1.10	6
4	Lack of Management Support	20 2.1%	163 16.9%	182 18.9%	380 39.4%	220 22.8%	3.64	1.07	6
5	Lack of High Security	44 4.6%	134 13.9%	159 16.5%	373 38.7%	255 26.4%	3.68	1.13	4
6	Lack of user friendly systems	68 7.0%	223 23.1%	203 21.0%	302 31.3%	169 17.5%	3.29	1.20	10
7	Lack of Training in using of Social Media	30 3.1%	169 17.5%	200 20.7%	376 39.0%	190 19.7%	3.55	1.08	9
8	Lack of authenticity of content	38 3.9%	147 15.2%	212 22.0%	370 38.3%	198 20.5%	3.56	1.09	8
9	Lack of Power Supply	45 4.7%	138 14.3%	169 17.5%	351 36.4%	262 27.2%	3.67	1.15	5
10	Lack of Network System	27 2.8%	111 11.5%	145 15.0%	425 44%	257 26.6%	3.80	1.04	2

(SA=Strongly agree; A=Agree; UD=Undecided; DA=Disagree; SD=Strongly Disagree; M=Mean; std=Standard Deviation; R=Rank)
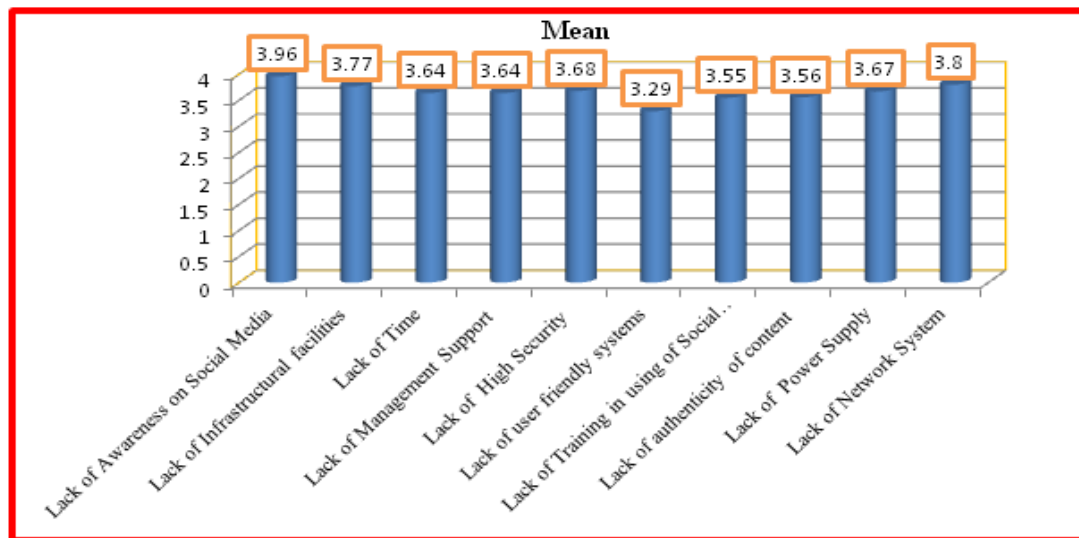
Figure 1: Barriers in using Social Media

Table 1 and Figure 1shows that the barriers faced by the respondents in using of Social Media. It is found that "Lack of Awareness on Social Media forms a majority problem, which faced by 79% of the respondents. It further shows that 73% of the respondents have informed that "Lack of Infrastructural facilities" is also formed as a major barrier, which is followed by "Lack of Network System" (70.6%), "Lack of high security system" (65.1%) and "Lack of Power supply" (63.6%).It is only few respondents have mentioned that "Lack of user friendly systems", "Lack of Network System" and "Lack of High Security"

5.2 Cluster Analysis

The statistical analysis so called Clustering is an advanced tool that forms a grouping of data or clustering of data into classes. So, the object within the same group will be considered as relative but the object that found in different groups is in no relation. Hence, it is considered as a useful tool for the selection of variant from the group of data. Cluster Analysis is used for barriers in using Social Media and the same is shown in Figure 2.

Figure 2: Dendrogram for the Barriersinusing Social Media

From Dendrogram, it can be seen that two clusters are formed at 90% level. Cluster one consists of three variables such as "Lack of Awareness on Social Media", "Lack of Infrast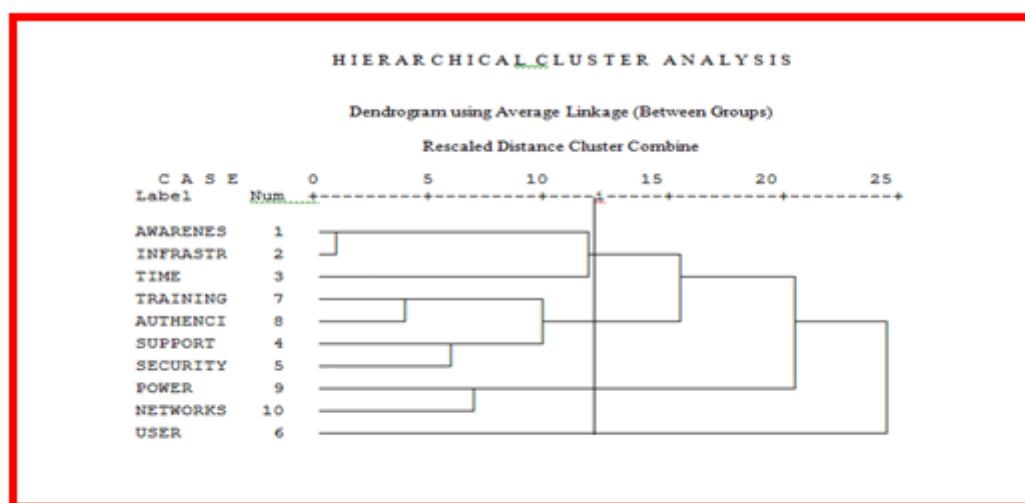ructural facilities", and "Lack of Time" and it can be named as "**Personal Barriers".** Cluster two consists of four variables such as "Lack of Training in using of Social Media", "Lack of authenticity of content", "Lack of Management Support" and "Lack of High Security" and it can be named as **"Institutional Barriers".** Cluster three consists of three variables such as **"**Lack of Power Supply", "Lack of Network System" and "Lack of user friendly system", it can be named as **"Environmental Barriers".**

5.3 Proximity Matrix

A square matrix in which the entry in cell (j, k) is some measure of the similarity (or distance) between the items to which row j and column kcorrespond.A simple example would be a standard mileage chart - the smaller the entry, the closer together are the two items. Proximity matrices form the data for multidimensional scaling.Proximity Matrix has been carried out for barriers using Social Media and the same is given in Table 2.

Table 2: Proximity Matrix

S. No.	Description	1	2	3	4	5	6	7	8	9	10
1	Lack of Awareness on Social Media	.000									
2	Lack of Infrastructural facilities	1001	.000								
3	Lack of Time	1441	1292	.000							
4	Lack of Management Support	1477	1154	1396	.000						
5	Lack of High Security	1749	1598	1540	1196	.000					
6	Lack of user friendly systems	2179	1932	1844	1548	1802	.000				
7	Lack of Training in using of Social Media	1667	1428	1482	1216	1382	1530	.000			
8	Lack of authenticity of content	1747	1542	1554	1318	1330	1594	1112	.000		
9	Lack of Power Supply	1819	1562	1718	1680	1918	1884	1560	1696	.000	
10	Lack of Network System	1774	1393	1669	1661	1871	2149	1575	1731	1213	.000

From the Table 2, it can be seen that the following pairs are closely associated

- Lack of Infrastructural facilities and Lack of Awareness on Social Media

- Lack of authenticity of content and Lack of Training in using of Social Media

- Lack of Management Support and Lack of Infrastructural facilities

- Lack of High Security and Lack of Management Support

- Lack of Network System and Lack of Power Supply

From the Table 2, it can be seen that the Following Pairs Are Not Closely Associated.

- Lack of user friendly systems and Lack of Time

- Lack of Power Supply and Lack of user friendly systems

- Lack of Power Supply and Lack of High Security

- Lack of Network System and Lack of user friendly systems

- Lack of user friendly systems and Lack of Awareness on Social Media

Further, T-test was also administered to test the significant difference in the barriers in using Social Media based on gender, designationand the same is shown in Table 3.

Table 3: T-Test Results for Barriers in using Social Media Vs Gender and Designation

Designation		N	Mean	Std. Deviation	T value	df	P value
Gender	Male	476	32.31	6.80	2.340	963	.020
	Female	489	33.27	5.94			
	Total	**965**	65.58	12.74			
Designation	Faculty Members	404	32.16	6.81	2.624	963	.009
	Research Scholars	561	33.25	6.03			
	Total	**965**	**65.41**	12.84			

(df=degrees of freedom)

Table 3 shows the mean score of the barriers in using Social Media for the Male (32.31), the Female (33.27), respondents with Faculty Members (32.16) and Research Scholars (33.25). It is found that the T-value of 2.340is statistically significant as the p-value is 0.020 (p<0.05). Therefore, the difference in the mean score of the barriers in using Social Media by gender is statistically significant. Hence the hypothesis is proved. It is further found that T-value of 2.624 is not statistically significant as the p-value is 0.009 (p>0.05).Therefore, the difference in the mean score of the barriers in using Social Media by designation is not statistically significant. Hence the hypothesis is not proved.

One way ANOVA test was also used to test the significant difference in the barriers of using Social Media based on age and the same is shown in Tables 4 and 5.

Table 4: One-Way ANOVA Test Results for Barriers in using Social Media Vs Age

Description	Age	N	Mean	Std. Deviation	F value	T value
Barriers in using Social Media	20-30	421	33.11	6.01	4.173	.016
	31-40	192	33.48	6.11		
	41 & Above	352	32.03	6.90		
	Total	**965**	**98.62**	**19.02**		

Table 5: Summary of ANOVA Results

Description	Source of Variation	Sum of Squares	df	Mean Square	F value	P Value
Barriers in using Social Media	Between Groups	339.03	2	169.51	4.173	.016
	Within Groups	39078.56	962	40.62		
	Total	**39417.59**	**964**	**210.13**		

(df=degrees of freedom)

From Tables 4 and 5 the One-way ANOVA test can be seen. It is found that mean score of the barriers in using Social Media is high among the respondents in the age group of 31-40 (33.48), low among the respondents in the age group of below 30 (32.03).The F value is 4.173 and the p-value is 0.016 ($p<0.05$), which denotes it is significant. Therefore, it is inferred that there is significant difference in barriers in using Social Media among the various age groups of the respondents, where, F=4.173 and $p<0.05$ as the p value is less than 0.05. Hence the hypothesis is proved.

6. CONCLUSION AND RECOMMENDATION

The Social Media are the most important tools to collect, store, retrieve and share the research activities among the academicians and research scholars. The tools also facilitate to discuss with the peer research scholars, and also to get expert's opinions, advices and suggestions to support and improve the research activities. Generally, these tools are facilitates the research scholars to do their research works in a systematic way, complete the research works on time and also to improve the research outputs. It is found that "Lack of Awareness on Social Media is the major problem, which faced by 79% of the respondents. It further shows that 73% of the respondents have informed that "Lack of Infrastructural facilities" is also a major barrier, which is followed by "Lack of Network System" (70.6%). Since the usage on SM is less among the faculty members and research scholars, it is recommended to organize the innovative programmes such as workshops and hands on trainings to improve the awareness on Social media and also recommended that the infrastructure facilities to be improved for the enhancement of using Social Media.

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PERFORMANCE EVALUATION OF BAGASSE FOR REMOVAL OF CADMIUM

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ABSTRACT

This research is mainly focused on test the ability of sugarcane bagasse coming from the sugar industry as a waste material for removal of cadmium heavy metal using one parameter model. Cadmium is a most toxic metal causing environmental pollution. The effect of various process parameters such as agitation time, dose, concentration and pH on biosorption were studied. The experimental data well followed the Freundlich isotherm than Langmuir model. The kinetic data could be best suited to pseudo second order kinetics. The maximum removal percentage of cadmium using low cost biosorbent bagasse is 91%. The results showed that bagasse is a favourable biosorbent for removal of cadmium.

Keywords: Cadmium; biosorption; bagasse; isotherm; kinetics

INTRODUCTION

Today toxic heavy metal pollution is an important issue to address the problem. This problem is increasing with increase in industrial development. The development of industry gives benefit to the society in one way and damaging the environment in other way by introducing harmful metals like mercury, cadmium, copper and nickel etc. Even at low concentrations of heavy metals cause serious problem to man and environment. In the list of toxic and poisonous metals cadmium is the most dangerous metal to human health and environment.

The heavy toxic metal cadmium has been identified as one among which are entered into the water bodies and causing water and environment pollution. The heavy metal cadmium is comes mainly from batteries, paint, pigment, fertilizer and refinery industries. The metal cadmium leads to cancer and kidney problems to human beings.

Several methods are available for removal of toxic metals is precipitation, ultrafiltration; Phytoremediation and electro dialysis are being in use. The mentioned techniques are suffering with partial separation, high cost and sludge formation problems. In order to address the issues a new technology came into force i.e biosorption. Biosorption is a less expensive, easy, no side effects and eco-friendly process.

Many researchers are done the work onto the adsorbents of waste materials coming from agriculture for removal of cadmium such as waste tea leaves, apple waste, maize cob and wheat born. The present investigation focused on contact time, dosage, concentration and pH effects on removal of cadmium using sugarcane bagasse. Also investigated the equilibrium and kinetic analysis.

MATERIALS AND METHODS

Preparation of Bagasse Biosorbent:

The agricultural waste Bagasses were collected from local market of Guntur village of Andhra Pradesh. The bagasse were washed with deionized water, after that the biosorbent is dried in a hot air oven at 60^0c for about 24 hours. The dried biomaterial was powdered by using crusher and then followed by sieved. The biomass of required size was stored in a air tight bottle for future use.

Preparation of Cadmium Standard Solution

The standard solution was prepared by adding Cadmium Nitrate Tetrahydrate of required amount in deionised water**.** The solution was diluted to make the concentration from 5-80mg/l. All chemicals are analytical grade and from Merck company. The solution pH was adjusted with 1N HCl or 1N NaOH.

Experimental Procedure:

The experiments were performed in a batch mode at a temperature of $30^{o}C$. Sample of 30ml is taken in 250ml bottle to this 0.5gm of biosorbent was added and was agitated using orbital shaker for a period of 1 minute with 160 rpm. After agitation, sample was filtered and filtrate was analyzed using spectrophotometer. The cadmium removal percentage was calculated with the following equation.

% Removal of cadmium = C_O - C_i / C_O X 100

The same procedure is followed to find the effect of various other process parameters on percentage removal of cadmium.

RESULTS AND DISCUSSION:

Agitation Time:
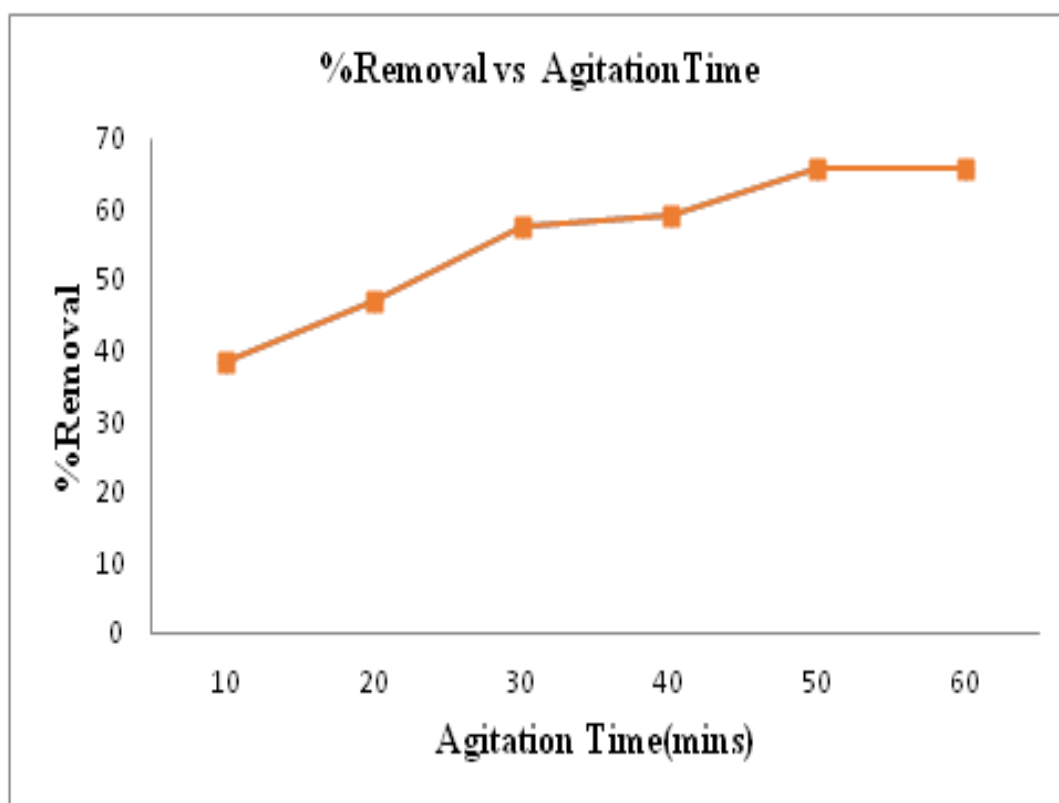
Fig .1   Removal of cadmium with agitation time

With increase in agitation time, the percentage removal of cadmium increased continuously till time reaches to 50 minutes. After 50minutes, the rate of removal was slowdown and gone to the saturation at a time of 60 minutes, which was taken as a optimum time to get maximum percentage removal of cadmium (Fig.1).This indicates that the removal of heavy metal cadmium was fast at initial time, as a result of active sites available for biosorption are more. So, optimal agitation time is considered as 60 minutes.

Effect of Initial Ion Concentration:
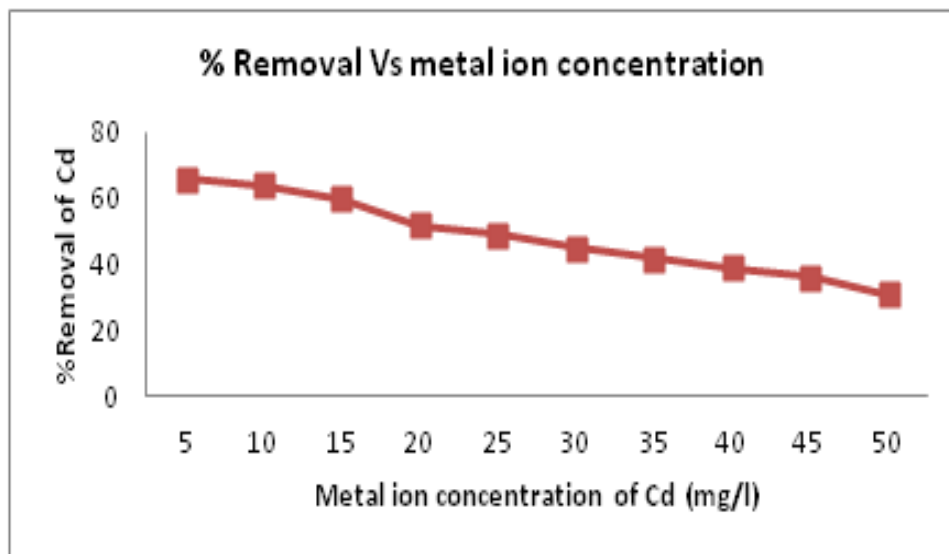
Fig .2 Removal of cadmium with initial metal ion concentration

From Fig.2, it was observed that as initial metal ion concentration increases from 5-50mg/l, there was a decrease in percentage removal of cadmium from 66% to 31%. This is due to more amounts of adsorptive sites available at low concentration for biosorption, as concentration increases the number of active sites available for sorption become less. So, the removal rate is more at low concentration compare to high concentration.

Effect of Dosage:
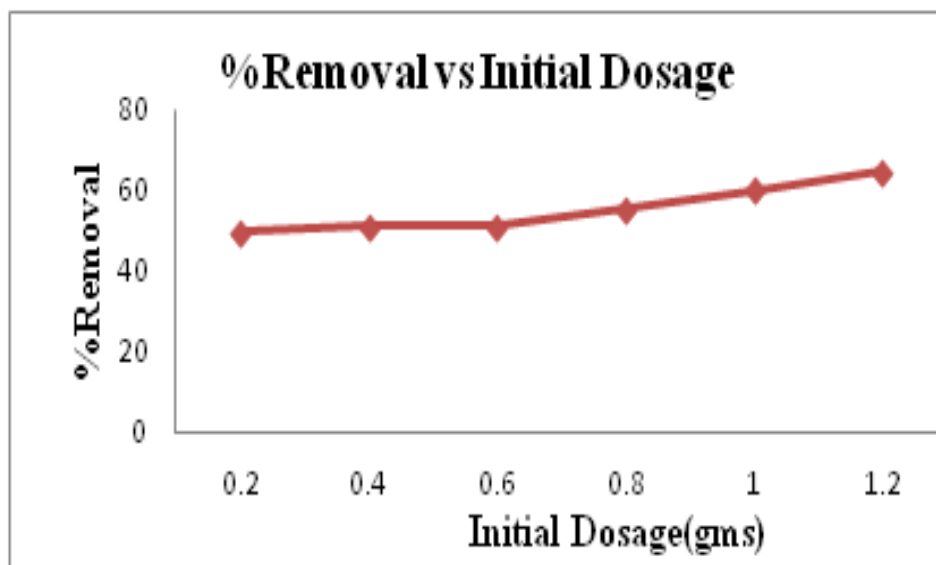
Fig. 3 Removal of cadmium with Dosage

Fig.3 shows the variation of percentage removal of cadmium with increasing adsorbent dosage. It was noticed that cadmium % removal was increased from 50% to 65% with biosorbent dose increasing from 0.2 gm dose to 1.2 gm. The % removal of cadmium was increased owing to large number of active sites/surface area available for biosorption of cadmium at high dosage. So, the optimum dosage was 1.2gm.

Effect of pH
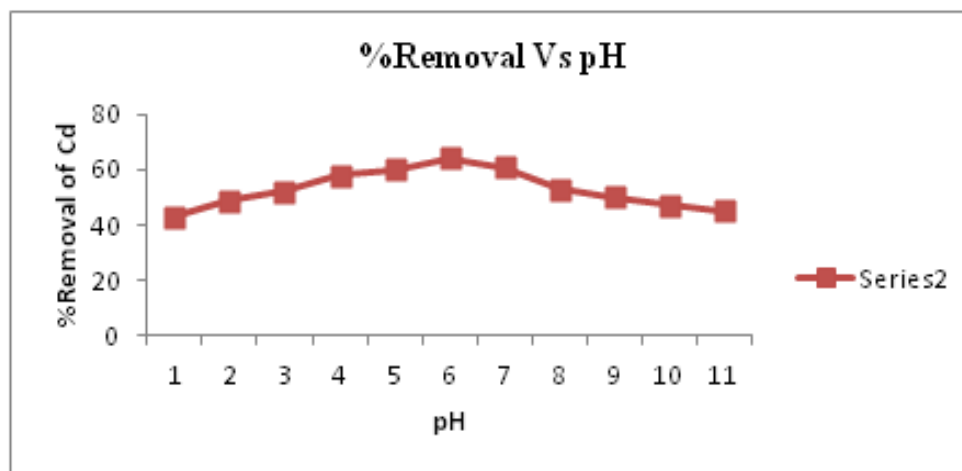
Fig. 4 Removal of cadmium with p^H

The solution pH greatly influences the biosorption of Cd due to hydrogen ions. From Fig.4, it was stated that at initial pH, the % removal of cadmium was less because of protons on the surface of biosorbent. As pH increases, percentage removal was increased and gone to 65% at a pH of 6 as a result of protons on surface and decrease in repulsion. After the pH of 6 the removal rate was decreased because of precipitation of metal ions. So, optimum pH was 6. (**Torab-Mostaedi, H. Ghassabzadeh**)

Freundlich Isotherm
In this work Freundlich and Langmuir isotherms were applied to evaluate the equilibrium relationship between sorbate and sorbent. Freundlich isotherm was based on multilayer and heterogeneous adsorption onto the biosorbent.

Freundlich isotherm is given by the formula: $Q_e = K_f * C_e^n$

The metal uptake Qe is given by:

$$Q_e = \frac{(V*(Ci-Ce))}{(1000*W)}$$

V – Sample volume, C_i - initial concentration, Ce – concentration after adsorption, W - amount of biosorbent.
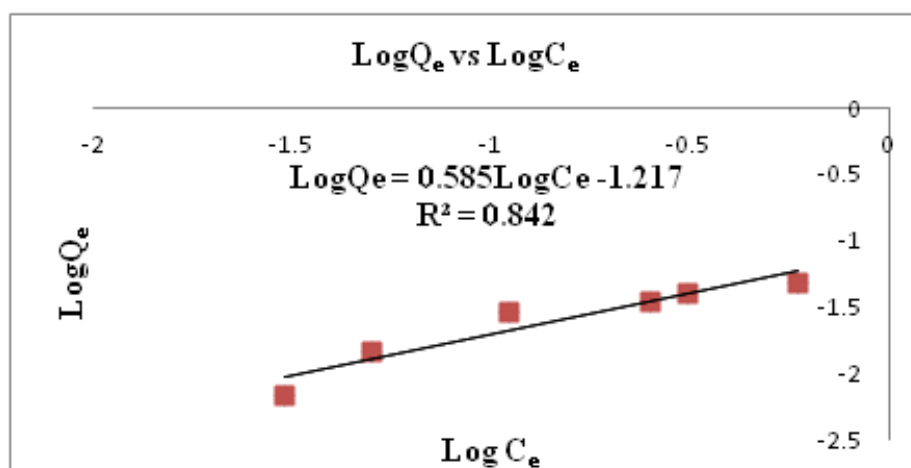
Fig. 5 Freundlich isotherm

From the above graph n=0.585,R^2 = 0.842,it was concluded that Freundlich isotherm does not fit the experimental data.

Langmuir Isotherm

Langmuir isotherm was based on homogeneous and monolayer adsorption onto the surface of the biosorbent with same energy distribution.

Langmuir isotherm is given by the formula: $C_e/Q_e = C_e/Q_m + 1/(b*Q_m)$

The metal uptake Qe is given by:

$$Q_e = \frac{(V*(Ci-Ce))}{(1000*W)}$$
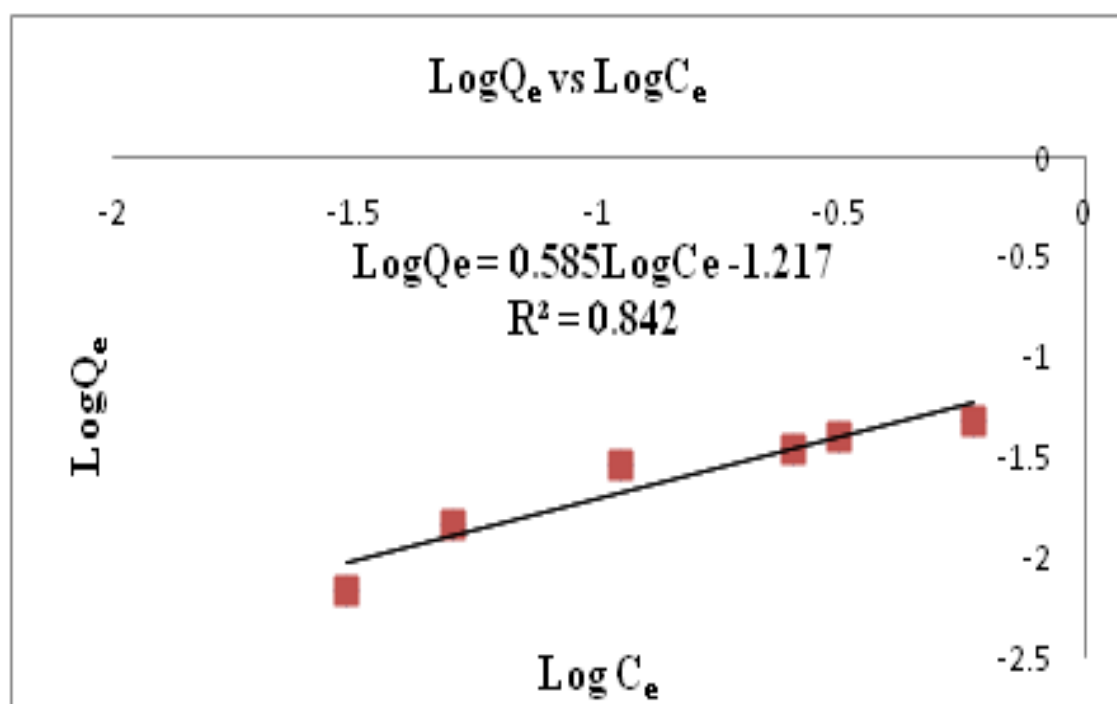
Fig .6 Langmuir isotherm

The expression obtain was $C_e/Q_e = 18.46C_e + 4.610$.

From the above graph R^2 = 0.981 and 1/n<1. Langmuir isotherm best fits the experimental data. So,the equilibrium data were followed to langmuir model.

Kinetic Study:

The kinetic study was most important to evaluate the efficiency of the biosorbent and know the uptake rate**.** Inorder to interprete the kinetic data,two kinetic models such as pseudo first order and pseudo second order were tested.

The first order kinetic expression was given as

$\log(q_e - q_t) = \log q_e - (k_1 / 2.303) \times t$

Here q_e = amount of Cd sorbed at equilibrium; q_t= amount of Cd sorbed at time t; k_1 (min^{-1}) = pseudo-first order rate constant.

A graph of $\log(q_e - q_t)$ vs t provides the slope of k_1 and intercept $\log q_e$.

The kinetic parameters for biosorption of cadmium evaluated are k_1-0.034 , q_e-0.526 and R^2-0.952.
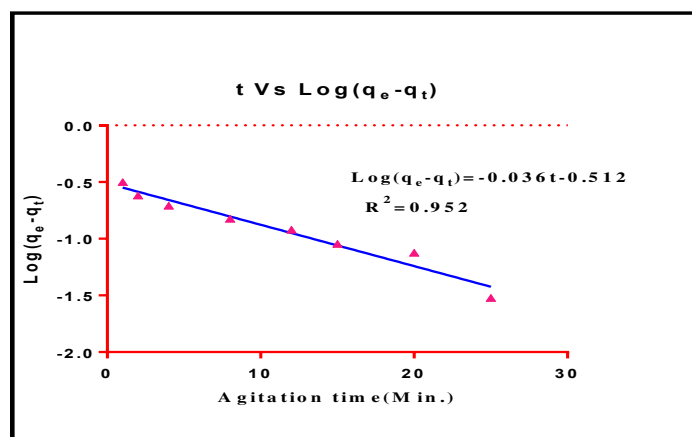
Fig .7 Pseudo first order

Second Order Kinetics

The second order kinetic equation was expressed as

$$(t/q_t) = (1/k_2 q_t^2) + (1/q_e)\ t$$

Here q_t - the quantity of Cadmium biosorbed at time t and k_2- second order rate constant. The constants calculated are k_2-0.651, q_e-0.531 and R^2-0.982.
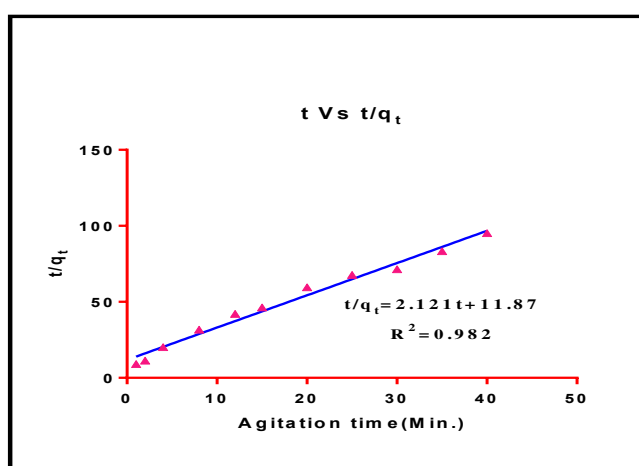
Fig .8 Pseudo second order

From the above results, it was cleared that kinetic data were best suited to pseudo second order kinetics.

CONCLUSION:

The investigation was conducted to evaluate the potential of bagasse for removal of cadmium from waste water. The results revealed that the optimum agitation time for biosorption of cadmium is 60 minutes, optimum dosage is 0.5gm, initial metal ion concentration is 5mg/l and pH is 6. The data well correlated to Langmuir isotherm and biosorption process followed pseudo second order kinetics. In conclusion, the cheapest, eco-friendly and agricultural waste bagasse was favourable for removal of heavy metal cadmium.

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Conflict of Interest: No conflict of interest.

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CURRENT STATUS OF WOMEN ENTREPRENEURSHIP IN HARYANA

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ABSTRACT

With the initiative of Atmanirbhar Bhart by Indian Government, the focus on entrepreneurship has been emerged in India. In the past year also government has been motivating self employment through its initiatives like skill India and Make in India. Since the decade of globalisation, liberalisation and privatisation in the 1990s, India has pushed the reforms to develop the potential of entrepreneurship in the country. Since from the last two or three decades, the contribution of women has been considerably increased and the potential of entrepreneurship has been increased. However it is fact that the true potential of women entrepreneur has not been still tapped due to the stereotype thinking that women may not able to undertake certain tasks essential for a successful entrepreneur. With this stereotype mindset, women are often unable to think of entrepreneurship and take initiatives towards starting a business.

Keyword: Women Entrepreneur, SHGs, Development

1. INTRODUCTION

Entrepreneurship Development
For understanding the concept of entrepreneurship development it is essential to understand its dimensions such as Entrepreneurship, Entrepreneur and Enterprise.

Meaning of Entrepreneur
An individual who undertake the risk of a new enterprise is called as Entrepreneur. As per J.B Say, "Entrepreneur is a person who searches for change, responds to it and exploits opportunities. Innovation is the specific tool of an entrepreneur".

Meaning of Enterprise
Enterprises are the organisations which produce goods and services to satisfy the needs of the different sections of the society using all types of the resources. So an enterprise is a business organisation directed by individual or group of people that contribute to achieve certain commercial goals. Some enterprises are formed to generate income and profit called profit organisation and some are formed for society benefits called non profit organisation.

As per MSME Act, 2006, Enterprises are classified in two sectors namely manufacturing and service. As per the level of investment the enterprises are further categorised in three as below:

Table 1.1: Types of Enterprise

Types	Manufacturing Enterprise	Service Enterprises
Micro	Rs. 25 Lakh	Rs 10 Lakh
Small	Rs. 25 lakh to Rs.5crore	Rs.10 lakh to Rs.2 crore
Medium	Rs.5croreto Rs.10 crore	Rs.2 crore to 5 crore

Source: Government of India report on MSME

Women Entrepreneurship
The inconsistent place of women in India reflects in the gender-based imbalance which is established in absence of admittance to and command over assets, support in decision making or self-actualisation. Additionally, their financial, social and natural commitments frequently go unrealised. However, it is shown presently women are availing expertise advancement, skill

development and joining the workforce at various levels, which has meant improving their societal position and dynamic jobs. In this evolving situation, women are additionally taking on business venture as a profession. Entrepreneurship is "the method involved with revealing or fostering a potential chance to make esteem through advancement." Research shows that the driving variables for women to be a business visionary are confidence, acknowledgment, self-assurance and vocation goals, but these could be relevant to the nation, race and culture. In specific cases, ominous monetary circumstances, joblessness in the family or separation might induce women to take on innovative exercises. Credited to pull and push factors, women go into the ambit of the market framework and continuously gain financial freedom.

In India, it has been seen that a woman entrepreneur likes to bargain in business, for which there exists an interest in the market like that for purchaser products. They bargain in middle merchandise which are utilized in the development of different items and generally are fabricated to the sets of enormous organizations for example ancillaries. There are extensively three sorts of undertakings that ladies bargain in - (a) fabricating an item for direct deal on the lookout (b) producing an item or its part to address the issue of an enormous modern organization; and (c) being a sub-worker for hire of unrefined substances provided by the client.

REVIEW OF LITERATURE

Bharadwaj et al. (2011) analysed the challenges and opportunities related to women entrepreneurship in India. The study found the different aspects relating to the awareness, technology advancement, literacy level of women entrepreneur. The study d that dependence on the service sector has opened many work opportunities for women 57 entrepreneurs with skills, education, competencies, and potential. The study stated lack of financial opportunities, inadequate support from family, over the burden of responsibilities, and gender discrimination as the prominent challenges faced by them. Hence, it is suggested that family members must understand the feelings and emotions of women as well as provide them adequate psychological support. Government must strengthen the infrastructural facilities for them.

Singh and Raghuvanshi (2012) found that the participation of women is considered as important source in economic activities for increasing the social status of women. Further it was found that the economic status of women is the key indicator for the a society and government should encourage the different schemes associated for the empowerment of women.

Singh et al., (2013) analysed that for social and economic development Micro Finance is an effective tool. The study shows that it is the key solution for removing the problems relating to unemployment for the rural women so that they can be financially independent and socially empowered. Further the study also explores the different role of micro finance in starting the enterprise for women.

Chanchan (2013) showed the different factors associated with the growth of entrepreneurship in Manipur. The study explores the different challenges faced by women entreperner such financial instability, low education level, lack of family support.

Rahul Raj (2013) elaborated the role of Women entrepreneurs in the economic development. The study further explored the contribution of women in economic growth, making women economically independent and uplift the status of women in the society.

OBJECTIVE OF THE STUDY

* To study the demographic profile of the Women Entrepreneur in Haryana

RESEARCH METHODOLOGY

The study is Descriptive cum Exploratory. Total sample size of 400 women entrepreneur is taken from Haryana. Descriptive Statistics (Frequency, Percentage) is used for the analysis.

Data Analysis and Interpretation

Profile Demographic of Women Entrepreneurship:

Table 4.1: Age Distribution of Respondents

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	26 – 35	89	22.3	22.3	22.3
	36– 45	110	27.5	27.5	49.8
	Above 45	103	25.8	25.8	75.5
	Below 25	98	24.5	24.5	100.0
	Total	400	100.0	100.0	

Source: Field Survey

Figure 4.1: Percentage Distribution of Respondents as per Age
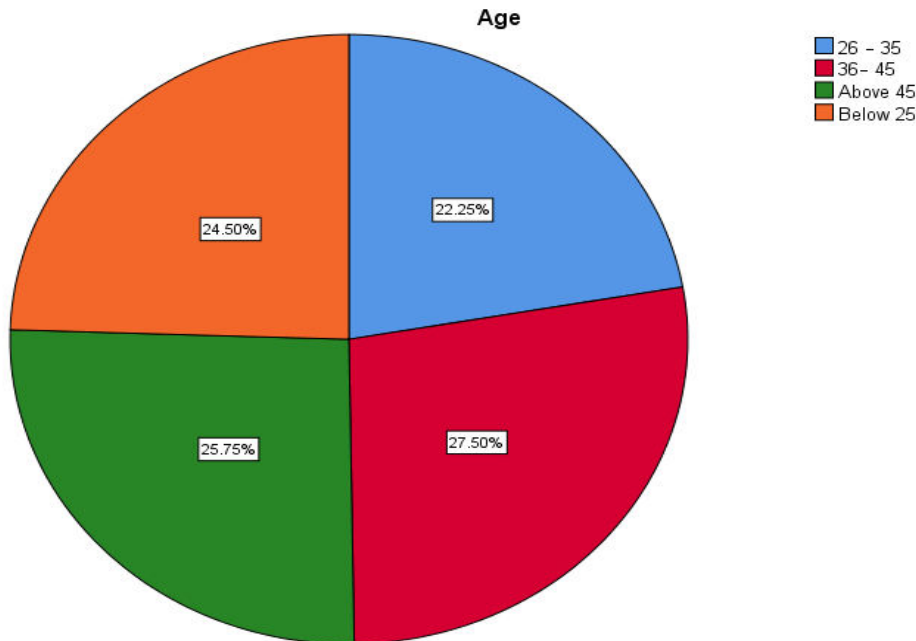
As per the above table 4.1 and figure 4.1 in concerns with the age of the respondents , it is found that out of total 400 respondents, maximum respondents are belongs to age (36-45) having frequency 110 (27.5 %) followed by group (above 45) with frequency 103 (25.8%) , below 25 with frequency 98 (24.5%) and 26-35 with frequency 89 (22.3%).

It is clear from the above table that higher percent of women taking the responsibly of enterprise in the age group 36-45. Its the age which is high demand on as on this stage lots of challenges among women entrepreneur with the growing of the children.

Marital Status
The important problem arise among the women is that they have to face several family responsibility as campared to men such taking of children, parents etc. So, its essential to know the marital status of the women entrepreneur managing their enterprise. Table 4.2 shows the marital status of women entrepreneur.

Table 4.2: Marital Status of Women Entrepreneur

		Frequency	Percent	Valid Percent	Cumulative Percent
	Marital status				
Valid	Divorced	60	15.0	15.0	15.0
	Married	100	25.0	25.0	40.0
	Separated	74	18.5	18.5	58.5
	Unmarried	90	22.5	22.5	81.0
	Widow	76	19.0	19.0	100.0
	Total	400	100.0	100.0	

Source: Field Survey

Figure 4.2: Percentage Distribution of Respondents as per Marital Status
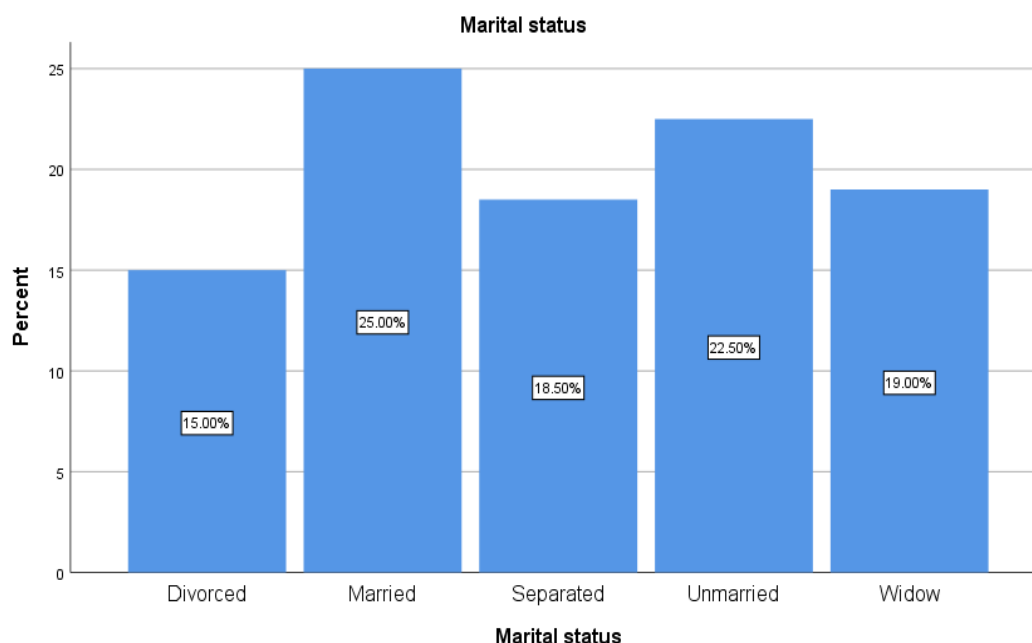
The above table 4.2 and figure 4.2 depict the distribution of respondents as per their marital status. It shows that out of total 400 respondents, maximum respondents are belongs to married category having frequency 100 (25 %) followed by category Unmarried with frequency 90 (22.50%), widow with frequency 76 (19%), Separated with frequency 74 (18.5%) and divorce with frequency 60 (15%).

So, from the above table it is found that majority of women start their business after marriage in Haryana. For the unmarried entrepreneur there is problem arises in Haryana that most of them does not get their prospective groom for their marriages. So the parents of such women entrepreneur give the priority of her marriage instead of motivate them to develop their enterprise.

Educational Background
Education plays a vital role for the development of any society. For the women entrepreneurs, its very necessary for evaluating the formal education as it is an important asset to every women for building her career. Education not only develop the knowledge of women but also develop the skills for ascertain different entrepreneurship opportunities. So it is very important to know the status of women entrepreneur in Haryana. The distribution of women entrepreneur has been presented in table 4.3.

Table 4.3: Education Wise Distribution of Respondents

	Education	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below Matriculation	48	12.0	12.0	28.7
	Graduate	67	16.8	16.8	16.8
	Illiterate	52	13.0	13.0	41.8
	Intermediate	53	13.3	13.3	55.0
	Matriculate	52	13.0	13.0	68.0
	Others	79	19.8	19.8	87.8
	Post Graduate	49	12.3	12.3	100.0
	Total	**400**	**100.0**	**100.0**	

Source: Field Survey

Figure 4.3: Percentage Distribution of Respondents as per Education
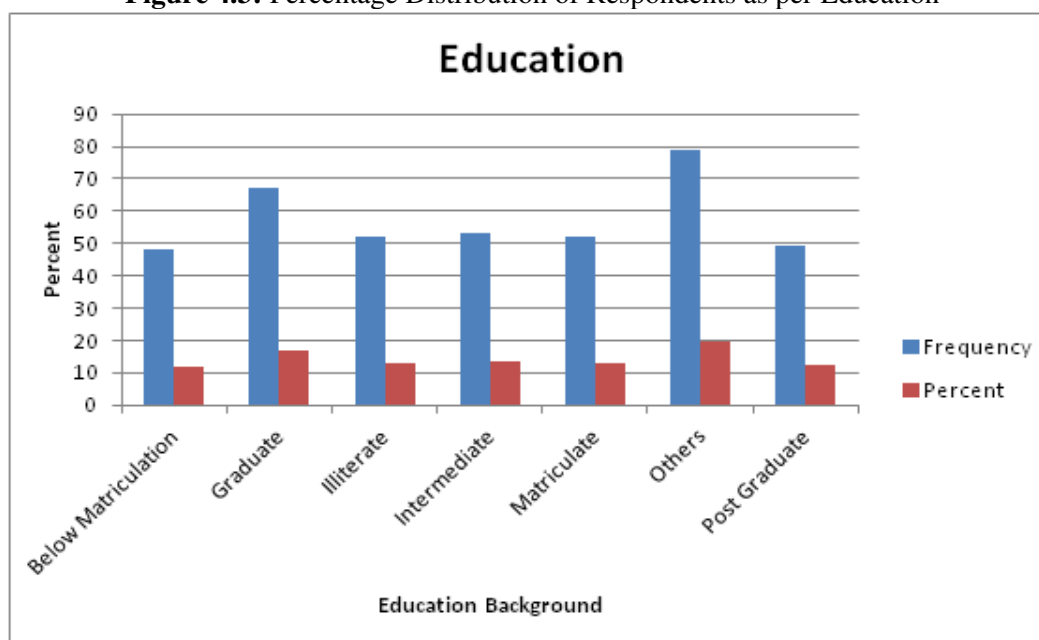
The above table 4.3 and figure 4.3 explores the distribution of respondents as per their education. It shows that out of total 400 respondents, maximum respondents are belongs to other category containing frequency 79 (19.75%) followed by category graduate with frequency 67 (16.8%), Intermediate with frequency 53 (13.3%), matriculate with frequency 52 (13 %), post graduate with frequency 49 (12.3) and below matriculation with frequency 48 (12%). It is fact that education is not much necessary for the entrepreneurship but it may become a powerful tool for those women who are socially pressured, education may break these barrier and make them successful entrepreneur. Our data also shows good educational background with multiple disciplines. So good educational background may play a vital role in the overall development of women entrepreneur where she lives in a male dominated society.

FINDINGS AND CONCLUSION

FINDINGS

- It is found that higher percent of women taking the responsibly of enterprise in the age group 36-45.

- It is found that majority of women start their business after marriage in Haryana.

- Our data also shows good educational background with multiple disciplines

- Majority of the women entrepreneur had nuclear family.

- Maximum respondents are having family size below 2.

CONCLUSION

Since women entrepreneur is on the growing stage but still are some challenges among the women in term of educational background, financial support, lack of implementation of government schemes etc. But still there are various opportunities for the women as various SHGs are promoting women entrepreneur and Government is also promoting different schemes. So we can say there is bright future of women entrepreneur in Haryana.

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SENSORY ACCEPTABILITY ON CREAM OF MALLARD DUCK (ANAS PLATYRHYNCHOS L.)

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ABSTRACT

Value-addition technology is an alternative for the diversification of products as one of the alternatives in income generation. Mallard duck (Anas platyrhynchos L) used in this study for the formulation of cream aimed to investigate its acceptability. Five different flavored creams were prepared: salt, salt and pepper, chili, spicy, and adobo. Ten laboratory panels evaluated the product In terms of its color, odor, taste, texture, and overall acceptability following 7-scale and 9-point hedonic scale. Considering its acceptability, the observation on odor and taste revealed to have a significant change at 5% level of significance with a descriptive rating of much better concerning spicy and adobo flavor. Moreover, chili, spicy, and adobo flavored cream was most accepted in terms of its overall acceptability which were rated as "like very much" by panel members. Furthermore, the Return on Investment (ROI) ranges from 29.39-30.48, with a slight difference imposing a faster payback period. These results could be a great significance in developing and marketing new products from mallard duck.

Keywords: Acceptability, Cream, Mallard duck (Anas platyrhynchos L)

INTRODUCTION

The Philippine mallard duck (Anas platyrhynchos L.) known as Pateros duck, or commonly called itik is the most popularly raised locally. Although smaller than imported breeds, they are good layers and non-sitters. Their eggs are large. Its predominant colors are black and gray. Some are barred (bulek), others are brown or have white feathers mixed with black/green. Males have coarser heads and heavier bodies than females. Males emit shrill high-pitched sounds and also have curly feathers on top of their tales. Females emit low-pitched quaking sounds. Their tail feathers lie flat or close to the bodies (Santiago, 2016).

Raising duck for commercial purposes is a lucrative livestock industry in the Philippines, mainly because of its egg (pinoynegosyo.net). As a result, duck production is the second-largest poultry industry in the country (rfo02.da.gov.ph).

With recent increases in household income, meat consumption is increasing rapidly and consumers' preferences for meats are changing to higher-quality products. Thus, there exists a growing interest in improving the meat quality of duck. As poultry meat is a low-fat, low cholesterol, low-calorie, and high-protein food, consumers have begun to prefer poultry to red meat (Ahn et al., 1997). Despite these recent increases in the preference for and consumption of poultry meat, traditionally raised poultry has not been produced in sufficient numbers, because large amounts of much cheaper commercial broilers have been produced.

Smallholder farmers make their living from raising poultry as additional income alongside rice farming. It has been a practice time immemorial of raising poultry and sold as a live weight basis. It could have been better if raisers are knowledgeable in value-addition as it attracts a wider scope of the market.

Value-addition technology has been part and parcel of national thrust to assure food security and reduce poverty incidence. Its chain effects are additional income, employment, malnutrition reduction, and revenue generation worthwhile as a contribution to national economic

development. Thus, the development of the product is grounded on the fact that there are no existing markets of said based products, it is locally produced by farmers and potential livelihood businesses. Specifically, the study aimed to, 1) develop a novel mallard duck-based product;2) evaluate the cream through sensory evaluation in terms of color, odor, taste, consistency, and overall acceptability; 3) determine the profitability of the developed novel product in terms of its ROI.

MATERIALS AND METHODS

Materials

The present study was carried out at the Food Processing Center at the College of Agriculture at the Abra State Institute of Sciences and Technology. 50 mallard duck brought to the processing laboratory and was slaughtered, eviscerated, washed until free from the blood then parboiled. The bones and skin were separated from the flesh. The flesh was further boiled to facilitate easy flaking. The other materials such as soy sauce, salt, pepper, garlic, and spices were bought from the department store. Different flavors were subjected as experimental subjects. Table 1 shows the distribution of variables.

Table: Distribution of variable ingredients.

Treatments	Flavor
T_1	Salt
T_2	Salt and Pepper
T_3	Chili
T_4	Spicy
T_5	Adobo

Sample Preparation. The preparations of cream were carried out using the method of Tiburcio (2014). Each formulation consists of a constant 1000 grams flaked meat of mallard duck. Other ingredients (flavoring ingredients) were held as the experimental subjects. The formulations were mixed by hand and stand for 1 hour then pressurized for 30 minutes. Figure 1 shows the schematic diagram of the preparation of the sample.
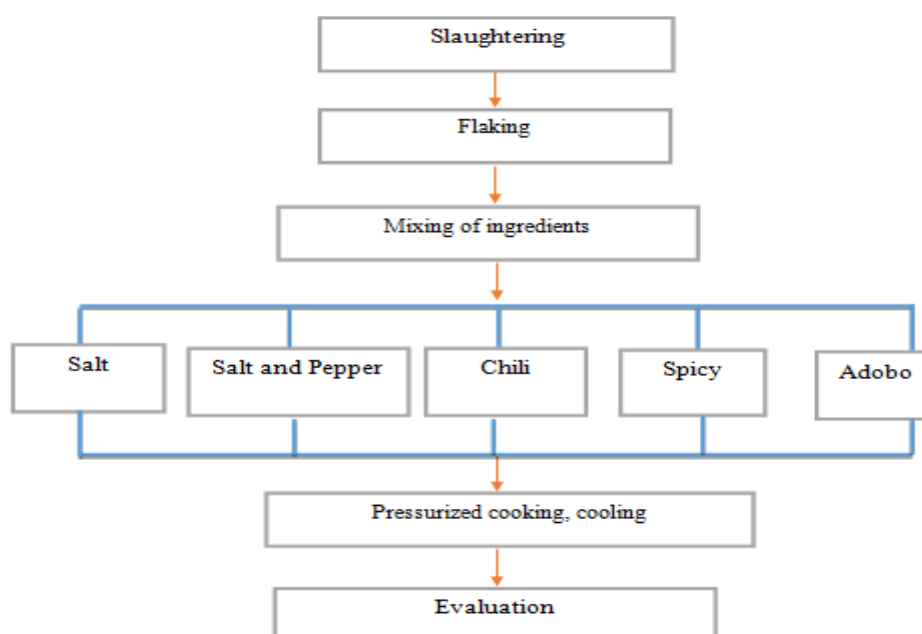

Figure 1: Schematic Diagram for the preparation of Mallard Duck Cream

Sensory Analysis

The Cream was evaluated organoleptically by 10 members of 30- 40 years of age from the Abra State Institute of Science and Technology faculty and staff. Each treatment was randomly coded and was presented to them for evaluation. Before the panel session, panel members were instructed to drink or rinse their mouths with water before and after evaluating each sample. The sensory evaluation was performed from 2:30-3:30 in the afternoon for the 3 batches. Cream characteristics such as color, odor, taste, texture, and overall acceptability were measured using different structured scales.

Statistical Analysis

Data gathered was analyzed using a One-way Analysis of variance (ANOVA). Scheffe's test was used to point out the significant differences among treatment groups. A Completely Randomized Design was followed in the experiment.

RESULTS AND DISCUSSION

Sensory characteristics such as color, odor, taste, and texture are measured quantitatively to determine a product's acceptance or rejection. The following table discusses the results of the study.

Table 2: Sensory Descriptive Rating of Color

Treatments	Values obtained	Descriptive Rating
Salt	3.36	Slightly dark
Salt and Pepper	3.45	Slightly dark
Chili	3.64	Slightly dark
Spicy	4.09	Moderately dark
Adobo	4.09	Moderately dark
	ns	

Ns: not significant

Color. Table 2 shows the statistical analysis and descriptive rating of the cream in terms of color. The experimental cream of duck was found to have no significant change in terms of color, thus, all the texture of all the treatments are comparable with each other. However, in a descriptive rating of color, the result showed that from T_1 to T_5, it showed color characteristics of slightly dark to moderately dark respectively. Nevertheless, the different flavors were acceptable to the panel members.

Table 3: Sensory Descriptive Rating of Odor

Treatments	Values obtained	Descriptive Rating
Salt	3.64[c]	Ideal odor
Salt and Pepper	4.09[c]	Slightly strong
Chili	4.36[b]	Slightly strong
Spicy	5.73[a]	Very strong
Adobo	5.73[a]	Very strong
	**	

** Highly significant at 5% level of significance

Flavor Characterization. The flavor is a sensory impression of food and is determined by taste and odor. The flavor of the food, as such, can be altered with natural or artificial flavor enhancers, which affect these senses. A food's flavor, therefore, can be easily altered by changing its smell while keeping its taste similar. Table 3 and 4 show the result of the sensory characteristics in terms of odor and taste.

Odor. Statistically, there was a highly significant difference observed in the odor characteristics of the finished product. It is observed that salt flavor got the ideal odor while salt and pepper

flavor and chili were observed to have a slightly strong odor. Also, spicy and adobo were observed to have a very strong odor compared to the other flavors. The different observation among treatments is that, by nature, a duck has a distinct odor. Spices and soy sauce has also an off odor added to the cream that made it to have such odor characteristics volatile enough to be observed by the panel members. Nevertheless, the different flavors have a distinct effect on the cream developed as a by-product of a mallard duck.

Table 4: Sensory Descriptive Rating of Taste

Treatments	Values obtained	Descriptive Rating
Salt	4.27^c	No Difference
Salt and Pepper	5.18^b	Slightly better
Chili	5.09^b	Slightly better
Spicy	5.55^a	Much better
Adobo	5.73^a	Much better
	*	

* Significant at 5% level of significance

Taste. Taste is a sensation of flavor perceived in the mouth and throat in contact with the substance. It is observed that salt flavor revealed no difference in terms of taste. Chili, Salt and pepper flavors were ranked descriptively as slightly better while spicy and adobo were ranked as much better in terms of taste. Statistically, there was a significant difference observed in the odor characteristics of the finished product. This means that there was a hint of acceptance from panel members on creamed duck flavored with spicy ad adobo. This is to say that there is an alteration of taste in the processed cream of duck evidenced in the descriptive rating of the different flavors.

It was observed above that the odor from salt flavor was the ideal odor but was rebutted in the taste characteristics that there was no difference. The reason might be that, in odor evaluation, a substance must be volatile enough to be determined by evaluators. And by nature, a duck has an obnoxious smell so that it was immediately smelled by the evaluators. On the other hand, the observation on taste characteristics of salt flavor has no difference and the other flavors were observed to have a better observation. This means that the finished product was camouflaged and it was acceptable.

Table 5: Sensory Descriptive Rating of Texture

Treatments	Values obtained	Descriptive Rating
Salt	5.64	Very tender
Salt and Pepper	5.55	Very tender
Chili	5.64	Very tender
Spicy	5.55	Very tender
Adobo	5.73	Very tender
	ns	

Ns: not significant

Texture. Table 5 shows the statistical analysis and descriptive rating of the cream in terms of texture. The experimental cream of duck was found to have no significant change in terms of texture. This means that all the treatments are comparable with each other. It was also seen in the descriptive rating that all were judged as very tender meaning, all were acceptable to the panel members.

Overall Acceptability. The graph below shows the visual result of the overall acceptability of the different flavored creams of duck. Statistically, there was a significant change in the acceptability of the product at a 5% level of significance. In overall acceptability, it is shown on

the graph that salt/pepper and salt flavor has lesser acceptability (6.90), which was rated as like moderately,   than the chili, spicy and adobo flavor, which was rated as 7.54, 7.90, and 8.0 (like very much) respectively. It could be recalled that, in the flavor profiling, spicy and adobo flavors were rated as much better in terms of taste. This could mean that taste characteristics were correlated to the acceptance of duck cream. Thus, this could be a basis for declaring that cream as a by-product of duck is acceptable.
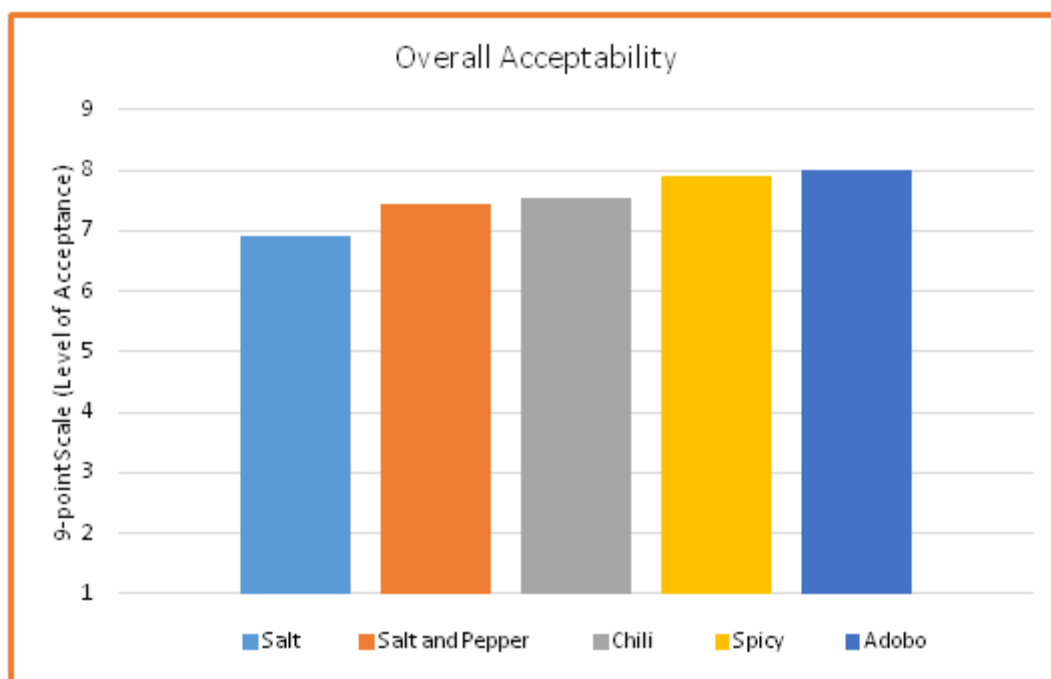
Fig. 2: Overall Acceptability graph

Profitability

Table 6: Return of Investment of the different flavored cream of duck

Treatments	Return Of Investment
Salt	30.48
Salt and Pepper	30.14
Chili	29.92
Spicy	29.60
Adobo	29.39

Table 6 shows the Return on Investment (ROI) of the different flavored cream of duck. It is seen on the table that there is a slight difference among all the treatments with salt flavor as the highest and adobo as the least. The difference was due to that they differ in quantity and prices of ingredients used. Furthermore, this indicates that in every peso invested, a profit of 30.48 centavo comes in for salt, 30.14 centavo for salt and pepper, 29.92 centavos for chili, 29.60 centavo for spicy, and 29.39 for adobo. This further means salt and pepper, salt flavored cream that shall have a faster payback period than for the other three flavors.

CONCLUSION AND RECOMMENDATION

The cream formulated from mallard duck was well accepted by the panel members. Generally, the most preferred flavor was spicy and adobo mostly due to camouflaging the natural off and distinct odor and taste of the duck to which was descriptively rated as much better.

It is concluded that, for conditions of this experiment, the use of spicy and adobo flavor was observed to be efficient in developing a novel by-product based on its sensory evaluations. It was revealed to have an effect in terms of its odor and taste parameters. In addition to representing an innovation of a novel product from mallard duck, the use of these flavors is perfectly recommended, for opportunities for small business and to add a value to mallard duck.

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REVIEWFOR NEED OF BLOCKCHAIN TECHNOLOGY IN HEALTHCARE APPLICATIONS

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ABSTRACT

To study in detail about the blockchain technology, a framework based on healthcare is proposed in this research work. In addition, the need for using the blockchain technology, advantages and some of the consequences of blockchain technology are listed out. Finally,these consequences are sorted out by using some proper methods namely consensus algorithm,blockchain architecture etc., Hence, this research proves that blockchain technology can reshape the way of each and every sector.

INTRODUCTION

Blockchain is a decentralized system which records the information in the sense that it is impossible to change or hack. Blockchain is a chain of blocks which stores the information in it.This blockchain technology stores the information in digital format. In general, this blockchain technology is used in healthcare systems for preventing data breaches, to eliminate centralized banks, to track medical histories and records, promotes direct communication. The creation of blockchain peaked a lot of people's interest. The benefits of using the blockchain in healthcare system are as follows: 1) of fers data security and integrity. 2) Helps in eliminating series of validation. 3) Simplifies the billing process. 4) Increases the data transparency.

The major challenges in blockchain technology are security, privacy, public perception, integration with legacy systems and etc. The main reasonswhy blockchain technology is needed are reliability, time reduction, Fraud prevention, etc. The opportunities for the blockchain technology in healthcare system are that it promotes accurate data sharing, allows to manage the patient's data efficiently.

1. Combination of Blockchain with Internet of Things in Healthcare Systems

IOT is one of the recent innovations in Information Technology which plays an immersive role for the communication between objects and humans through the internet. In Today's world, IOT technology is implemented in every sector like agriculture, healthcare, smart cities etc. As the IOT eases communication between doctors and patients in emergency scenariosBut this can lead to violation of privacy of patients. Hence it can be solved by integrating IOT's with blockchain. This blockchain is a decentralized technology which can be used to enhance security of system. Drug traceability, remote patient monitoring and medical record management are the three major applications of medical sector which are explored through IOT technology. The possible ways with IOT technology with blockchain can be integrated to improve the overall performance and to strengthen the current healthcare system. This paper aims to improve functionality of healthcare systems using IOT's with blockchain [1]

The fundamental technology behind the development of bitcoin id Blockchain Technology which has drawn a considerable recognition ever since its origin. Its potential has gained significant interest in various applications like IOT's, healthcare etc. This paper aims to provide an extensive literature review which includes the different prospects of using blockchain in healthcare. This review investigates the work done to enable the amalgamation of IOT and blockchain technology based on SWOT (Strength,Weakness, Opportunityand threat) analysis and challenges linked in healthcare systems are discussed. The successful application of

blockchain technology in clinical healthcare environment can open up new biomedical research development opportunities. It may be significant contribution path for those who want to follow the blockchain in the time to come. Hence, in the near future, the blockchain technology can reshape the way the healthcare industry works.[2]

2. A Comprehensive Analysis on Blockchain with Healthcare Systems

The blockchain technology has a huge potential to make healthcare system as a horizontal technology which has changed many fields of industry. A secured and smart framework can be developed by this blockchain. This paper mainly focuses to find the answers for the three main following questions. Firstly, what are the emerging trends of blockchain application development in healthcare from a technical perspective? Secondly, in what ways will the systematic analysis presented here contribute to a better understanding of the potential for incorporating blockchain-based technologies into healthcare domain? Thirdly, what are the important challenges in adopting blockchain as a solution in healthcare domain? This descriptive analysis contains in the article shows the statistical statistics on the blockchain and also addresses possible emerging trends of blockchain application. This blockchain application includes blockchain integration with artificial intelligence, cloud-based solution etc. The primary aim of this study is to inform the recent developments in healthcare based on the blockchain technology. Hence this shows the greater emphasis on data sharing, electronic health reports and health records for patients. However, this blockchain potentials are untapped with a wider range. Hence, it is used exponentially and used in situations that are considered to be rational and necessary. [3]

The reason for the increasing health and wellness data is due to the increased longevity and people's concern about aging with quality. As the existing standards are complex and lack the adherence of agents, much of the data is not interoperable. A consensus algorithm is offered by the blockchain technology as an alternative to unify the standards and their applications. This consensus algorithm considers the violation and secrecy in the insertion of blocks of transactions in the chain. A Blockchain architecture is proposed which considers the collected data in health and wellness ecosystem. Hence this architecture can be able to answer the questions and to establish the concepts for full and secured sharing of data.[4]

Blockchain is an emerging technology being applied for creating innovative solutions in various sectors including healthcare. The blockchain technology is used to preserve and exchange the patient's data through the hospitals, diagnosis laboratories, doctors etc. This blockchain plays a decisive part in handling deception in clinical trials and it can help to avoid the fear of data manipulation in healthcare and supports a unique data storage pattern at the highest level of security.Finally, the paper identifies and debates some significant applications of blockchain for healthcare.Overall, this technology would significantly enhance and eventually revolutionize how patients and physicians treat and use clinical records and improve healthcare services. This blockchain helps for the decentralized protection of data in healthcare and avoids specific threats.[5]

Blockchain technology has gained a lot of interests from several sectors such as finance,government,energy, health etc. This paper particularly gives the survey on the blockchain technology of healthcare system which is used for sharing medical records, for remote patient monitoring etc. Even though the blockchain technology offers the promising features, there are still a few more consequences like scalability, security and privacy. Other investigations should also be considered by the blockchain researchers in domains such as biomedical research, pharmaceutical supply chain, insurance etc. Hence proper solutions should be provided for the identified limitations.[6]

3. Applications of Blockchain System in Healthcare

The current research in the area of smart healthcare focuses on single information technologies such as IOT's in healthcare. This study mainly aims to construct a development application system of the smart healthcare under the blockchain based on stakeholder theory. This theoretical hierarchical framework is intended to guide smart healthcare towards blockchain applications and stakeholder are suggested to participate in the development application systems. Few studies consider multiple-agent cooperative development and lack the application system of smart healthcare development under blockchain. But this study explores the multilevel development path of blockchain in the field of smart healthcare based on stakeholder perspective.However, the study still has a few limitations such as they cannot contain all possible attributes, though it uses fuzzy set theory to eliminate the subjective bias of experts, it is not deep enough. Hence further research can explore a more perfect and diversified blockchain intelligent medical governance framework based on different cultural and technical backgrounds. [7]

The cross institutional healthcare predictive modeling an accelerate research and facilitate quality improvement initiatives and thus is important for national healthcare delivery priorities. This article describes a new framework, model-chain, to adopt blockchain technology for privacy-preserving machine learning. This is to increase the interoperability between institutions. The importation of the security and robustness of distributed privacy-preserving is discussed. The capability to securely and robustly construct primary-preserving is essential to achieve stated objectives. [8]

Diabetes, a metabolic disorder that leads to high blood sugar levels and many others' problems such as stroke, kidney failure, heart and nerve problems. For the prediction of this disease, a big data analytics and machine learning based methods should be used. As Machine learning technique is considered as valuable in diagnosing the disease. It is proposed in this study that a unique intelligent diabetes mellitus prediction framework is developed using machine learning. This was developed after conducting a rigorous review of existing prediction models in the literature and examining their applicability to diabetes. The drawback of the study is that we have selected structured data set, and the unstructured data will be considered in the future. The future scope of the research is to consider other attributes such as family history of diabetes, smoking habit, drinking habit and physical inactivity for the prediction of the disease. [9]

4. Crime Scene Analysis Based on ACP Approach

The foundation of criminal investigation and providing solution for criminal cases is managed by the crime scene analysis process which has three features namely uncertainity , diversity and complexity. This process will be based on ACP approach in which artificial crime scene is used to describe function of criminals, computational is used to compute the crime scene and parallel is used to guide the evolution of crime process.

Firstly, the parallel crime scene is introduced from perspective of complex system theory and then on this basis, the temporal and spatial interaction models are verified. Then software - defined crime scene introduces systematically. ThisACP approach helps for controlling of crime scene analysis.

The ACP approach is an efficient way to overview the new techniques in addressing crime scene analysis problems. Amongthis artificial,computational, physical crime scenes, the parallel crime scene is more significant for criminal investigation in following aspects.

1. In crime scene analysis, the two factors (human and social) should be noticed more. Inthis factor the human is the most important factor in criminal activities as it possesses the characteristics of initiative, individuation and differentiation. But now social and human

dynamics must be contemplated as integral part. The agent modeling method is used to setup artificial scene which can predict, evaluate and guides the direction of criminal investigation.

2. The more usage of virtual community to commit criminal activities relates to the cyberspace which can be exploited by ACP approach. As by the more usage of open-source intelligence analysis leads to the bid forensic in future.

3. By comparing with past, it is not required for policemen to pay more attention to visible the evidences in crime. As the ACP approach provides the techniques to find evidence and also mental traces which are expected to be uncovered. Hence more valuable information can be accessible by the help of pre-established database.[10]

5. A General Cognitive Architecture in Artificial Societies

The artificial society is an analytical foundation which is usually implemented through some multiagent approach. However, there are no particular consensuses regarding agent's decision-makingprocess. To overcome that, a general cognitive architecture process is proposed. Through this process, all the aspects can be included in artificial society. During implementation two simulations namely emergent evacuation and population evolution should be focused. At the end, the possible strategies will be found for every consequence. Agent – Based Artificial System (ABAS) is one of the main components in complex social system analysis which is applied in computational demography and many other domains. Here general Cognitive architecture is proposed to overcome the current problems of agent – modeling and to provide proper solution. The ABAS will be practical in the factors namely calibration via statistical distribution and collaborations among various fields. [11]

6. Backup and Recovery Schemes for Blockchain

Blockchain s a recent technology used for recording ledgers in a proper manner. This provides services such as traceability, integrity and no-repudiation for transactions in ledgers in a decentralized way which proves the blockchain have a great application potentiality in the field of healthcare, fintech etc. Using of blockchain technology may leads to violation of privacy as the blocks in blockchain are open in which the data can be leaked.Thus, to prevent this, a security mechanism must be built as these mechanisms are appropriate key management scheme.Hence,the health blockchain is a good solution to address the problem of monopoly of physiological data. The body sensors network with blockchain are used to design a lightweight backup and efficiency recovery scheme for keys as it has high security and good performance.[12]

CONCLUSION

After reviewing several articles and research conducted, we conclude that the blockchain technology has a huge potential in various sectors such as Healthcare but there are still some limitations to be cleared. For example, in healthcare systems, there are some particular challenges like security issues, privacy etc. As these challenges can be solved through some proper methods like integrating IOT's with blockchain, blockchain architecture etc. Likewise, all the other consequences in various sectors can be provided with proper solutions. Hence, to improve the healthcare sector, there is a considerable need for some clinical and Information Technology.

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DEVELOPMENT OF ECONOMIC STUDENTS THINKING IN TEACHING THEORY OF PROBABILITY AND ELEMENTS OF MATHEMATICAL STATISTICS WITH "PRACTICAL-PROFESSIONAL ORIENTATION"

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ABSTRACT

The training of economists and the development of their professional competence are directly related to the study of economics as well as mathematics, in particular, the study of probabilistic-statistical methods. Because the outcome of many economic processes depends on many random factors and uncertainties. Analytical conclusions are evaluated with a certain degree of probability, which means that the results of a particular test can be considered reliable. Therefore, probability theory and mathematical statistics play an important role in the development of students' economic thinking. The teaching of this science also has its own problems. This article is based on the relevance of teaching probability theory and mathematical statistics based on the concept of "practical-professional orientation", and the mechanisms for implementing this process are presented with enough examples and problems.

INTRODUCTION

The training of economists in higher education institutions and the development of their professional competence are directly related to the study of economics as well as mathematics, in particular, the study of probabilistic and statistical methods. Because the outcome of many economic processes depends on many random factors and uncertainties. For example, in production, the relationship between product quality, the consumption of raw materials and labor productivity, daily sales revenue and income are modeled on the basis of probabilistic-statistical analysis and methods. Internal and external variables in each economic process, that is, variations, are studied on the basis of the variational characteristics of these socio-economic phenomena, the laws of their development are determined by probability theory and mathematical statistical methods. The analytical conclusions are evaluated with a certain degree of probability, which means that the results of certain tests can be considered reliable [1], [12].

In the observation of socio-economic phenomena, the mathematical probability of an event is expressed in the form of a statistical law with a stable relative repetition rate. This is the result of the application of probability theory and the law of large numbers of mathematical statistics for socio-economic events under certain conditions. In probability theory, a mathematical model of an economic process is designed, while in mathematical statistics, we construct a mathematical model of economic processes based on the influence of some random factor and analyze its aspects of interest. In this sense, mathematical statistics aims to construct a theoretical probabilistic model of the economic process being studied using its inference methods.

Probability theory and the content of mathematical statistics, which are aimed at training future economists, and the issues of training are not without some problems. In particular, the impact of the principle of "practical-professional orientation of teaching" on the development of professional competence has been little studied. The content of education and the availability of existing teaching aids are not adequate. Probabilistic-statistical models and practical-professional issues are not systematically reflected in the content of mathematics education. Students who have mastered the pure mathematical content face difficulties in analyzing economic processes and solving and modeling professional-practical problems.

Theoretical and methodological bases of teaching and studying probability theory and mathematical statistics in the Republic of Uzbekistan, the issues of improving teaching methods have been studied by I.M. Gaysinskaya, H. Ochilova, J. Qudratov, D.V. Manevich, U.X. Khonkulov [7], [11], [12], [16], [17].

H. Ochilova's research is aimed at developing probabilistic-statistical thinking of students in grades 4-8. The researcher argued that students' probabilistic-statistical thinking depends on their ability to predict and evaluate.

The research of I.M. Gaysinskaya, D.V. Manevich, J. Kudratov is aimed at the selection of probabilistic and statistical materials at school, the organization of optional classes.

U.X. Khonkulov's research promotes the idea of teaching the elements of the stochastic direction of mathematics on the basis of an approach based on interdisciplinary connections and the internal integration of the subject. The content of a special course "Elements of combinatorics, probability theory and mathematical statistics" for academic lyceums "Exact sciences" and "Natural sciences" was developed and put into practice. A set of methods based on internal integration in solving problems related to probability theory and mathematical statistics is proposed.

N.V. Panina, A.G. Elenkin, E. Alexandrova, I.N. Konovalova, S.O. Dolgopolova, R.Sh. Khusnutdinov, Y. Abdullaev, N.M. Soatov and others have conducted a number of studies [9], [18], [19].

N.V. Panina's work examines the practical orientation of probability theory and mathematics statistics as a means of developing the economic thinking of students majoring in economics. The scientific and pedagogical basis of teaching has been improved.

S.O. Dolgopolova's research identifies the theoretical requirements and practical basis for designing a system for the formation of statistical thinking of students majoring in economics.

N.M. Soatov, Y. Abdullaev, Sh.K. Formanov, A. Abdushukurov studied the issues of quantitative analytical aspects of socio-economic phenomena and the description of their close connection with the qualitative side by means of mathematical statistical methods. Recommended as a textbook for students of higher education institutions that train economists, "Theory of Statistics" allows you to study the thinking and ideology of the nation, linking them to the textbook topics.

MAIN BODY
Mathematics education begins with specific practical experiences, exercises, and moves to abstract concepts. Professional experience is formed in practice. In this sense, the "practical-professional orientation of teaching" is of particular importance in the study of probability theory and mathematical statistics.

In pedagogical research, the term "practical orientation of teaching" is defined as "the formation of knowledge, skills and competencies in the use of mathematical apparatus in solving specific practical problems through the implementation of appropriate content and methodological connections of mathematical education" [3], [9], [12].

In most scientific sources, the terms "practical orientation of teaching" and "professional orientation of teaching" are used in parallel, and they are the same concepts that complement each other. Authors such as G.V. Dorofeev, L.V. Kuznetsova, V.V. Firsov say that "the professional orientation of teaching is the content, form and methods of teaching mathematics in a particular professional activity; and the practical orientation of teaching is the production of practical exercises, the solution of professional problems."

The analysis and generalization of different views led us to the following definition:

Practical-professional orientation of teaching - the type of educational activity, the content, form and means of education, including practical training for the formation of professional competence. As a result, a well-developed personality of a specialist ready to dynamically solve professional problems is formed [5], [6].

Probability theory and mathematical statistics in the professional training of future economists can be seen to be directly and indirectly related to the "practical-professional orientation of teaching" to practical-professional issues.

We believe that the content and structure of practical issues for economists should meet the following didactic and methodological requirements:

- Probability-statistical problem corresponds to the subject of mathematics, the relevance of the current dynamics of production, to include professional information;

- The text of the issue should be as short and clear as possible, aimed at the formation of systematic and consistent practical tasks and on this basis to solve real-life problems;

-compliance with the trend of formation of knowledge, skills and abilities of professional importance, to promote the development of professional competencies of future economists;

- The emergence of technical capabilities in the performance of calculations to obtain digital results, the use of special programs Excel, MathCad, Statistics and similar programs technical calculation tools.

Practical-professional issues should serve not to study a large amount of educational material, but to deepen the understanding of probabilistic-statistical terms and facts, to develop the ability to apply theoretical knowledge in professional activities.

We have divided problems related to probability theory and mathematical statistics for economists into the following three types depending on the method of presentation.

1. Pure mathematical issues. Pure mathematical content that can be solved using mathematical formulas and concepts based on rigid algorithmsi issues.

We can say that the methods of solving such problems are ready and in practice not professional.

Here are some examples [4], [10], [14].

Example. There are 10 red and 6 blue balls in the box. Take 2 balls per plate. Find the probability that both balls are the same color.

Solution: Let the event A be red of both balls and let the event B be blue of both balls. Apparently, events A and B are not co-occurring events. So,

$$P(A + B) = P(A) + P(B)$$

The C_{10}^2 result allows the event A to occur. As a C_6^2 result allows event B to occur. The total number of possible outcomes is C_{16}^2 .

In that case:

$$P(A + B) = \frac{C_{10}^2 + C_6^2}{C_{16}^2} = \frac{\frac{10 \cdot 9}{2} + \frac{6 \cdot 5}{2}}{\frac{16 \cdot 15}{2}} = \frac{60}{120} = \frac{1}{2}$$

Example. Two hunters fired one at the wolf. The probability of the first hunter hitting the wolf is 0.7, and that of the second is 0.8. Find the probability that at least one arrow hits the wolf.

Solution: Let the event A shoot the first hunter's wolf, and let the event B shoot the second hunter's wolf. Apparently, events A and B are co-occurring but not related to each other. In that case

$P(A + B) = P(A) + P(B) - P(AB) = P(A) + P(B) - P(A) \cdot P(B) = 0,7 + 0,8 - 0,7 \cdot 0,8 = 0,94.$

Example. Probability of each shot hitting the target $p = \dfrac{2}{3}$. Find the probability that three of the 10 shots fired hit the target.

Solution: In that case, according to Bernoulli's formula: $n = 10;\ k = 3;\ p = \dfrac{2}{3};\ q = \dfrac{1}{3}.$

$$P_{10}(3) = C_{10}^3 \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^7$$

Example. The probability of hitting a target when one bullet is fired is 0.8. Find the probability that exactly 75 bullets hit the target when 100 bullets are fired.

Solution: $n = 100;\ k = 75;\ p = 0,8;\ q = 0,2$

In that case,

$$\frac{k - np}{\sqrt{npq}} = \frac{75 - 100 \cdot 0,8}{\sqrt{100 \cdot 0,8 \cdot 0,2}} = -1,25$$

from the table

$$\varphi\,(-1,25) = 0,1826$$

So,

$$P_{100}(75) = \frac{0,1826}{4} = 0,04565$$

2. Practical and Professional Issues. Mathematical Problems Related to Professional Activity.

The method of solving for practical-professional problems is formed, and the comparison of the values required to solve it requires only a little mental effort. As a result of solving this problem, professional competence is developed to a certain extent through the use of appropriate calculation formulas, that is, automatism is formed.

Here are some examples [10], [13], [15].

Example. In a large advertising firm, 21% of employees earn high salaries. 40% of the company's employees are women. At the same time, 6.4% of workers are high-paid women. Is there any reason to say that there is discrimination in the payment of women's labor in the company?

Solution: From the point of view of probability theory, the question can be asked: "How likely is it that a randomly selected female worker will receive a higher salary?" If we consider A the phenomenon of "randomly selected worker receives a high salary", B - the phenomenon of "randomly selected female worker", then:

$$P_B(A) = \frac{P(AB)}{P(B)} = \frac{0,064}{0,40} = 0,16$$

Since the number 0.16 here is less than the number 0.21, it can be concluded that women are less likely than men to earn higher wages in an advertising firm.

Example. The probability that a consumer will see an advertisement for a particular product on television is 0.04, and the probability of seeing an advertisement for the same product in a special advertising exhibition is 0.06. If these two events are independent, what is the probability that the consumer will see both types of advertising?

Solution: Let event A-consumer have seen an advertisement for a product on television and let event B-consumer have seen an advertisement for a product in a special advertising exhibition. These events are independent. In this case:

$$P(AB) = P(A)P(B) = 0,04 \cdot 0,06 = 0,0024$$

Example. If it is known that 4% of all products are of poor quality and 75% of quality products meet the first grade requirement, find the probability that the product obtained by chance is first grade.

Solution: Let event A- "selected product quality" and let event B- "selected product 1st grade". According to the terms of the case $P(A) = 1 - 0,04 = 0,96$ and $P_A(B) = 0,75$. In this case:

$$P(AB) = P(A)P_A(B) = 0,96 \cdot 0,75 = 0,72$$

Example. 5% of the products of a particular enterprise are of poor quality. Find the probability that two of the 5 products randomly selected are of poor quality.

Solution: Probability of randomly selected product is poor quality $p = 0,05$. In that case, according to Bernoulli's formula

$$P_5(2) = C_5^2 (0,05)^2 (0,95)^{5-2} = \frac{5!}{2!\,3!} (0,05)^2 (0,95)^3 = 0,02$$

Example. 1% of the bulk of the product is of poor quality. What should be the size of a random sample so that the probability of encountering at least one poor quality product is not less than 0.95?

Solution: It is known that $n \geq \frac{ln(1-P)}{ln(1-p)}$. Depending on the condition $P = 0,95, p = 0,01$.

So, $n \geq \frac{ln\,0,05}{ln\,0,99} \approx 296$. That is, if the sample size is at least 296, the probability of encountering at least one poor quality product during the inspection is not less than 0.95.

Example. The number of visitors to the bank is subject to the Poisson distribution. On average, one customer enters the bank every 3 minutes.

a) Find the probability that one customer will enter the bank in the next minute.

b) Find the probability that at least three people enter the bank within the next minute.

Solution: According to the terms of the issue, on average, one customer enters the bank every 3 minutes. Mathematical expectation for Poisson distribution assuming that the parameter is equal to λ, we obtain that $\lambda = \frac{1}{3}$.

a) We find the probability that one customer will enter the bank in the next minute:

$$P\,(X = 1) = \frac{\lambda^1}{1!}e^{-\lambda} = \frac{e^{-1/3}}{3} = 0{,}2388$$

b) To find the probability that at least three people will enter the bank in the next minute, we find the inverse event, that is, the probability that at most two people will enter:

$$P(X \le 2) = P(X = 0) + P(X = 1) + P(X = 2) = e^{-\lambda}\left(1 + \frac{\lambda^1}{1!} + \frac{\lambda^2}{2!}\right) = e^{-\frac{1}{3}}\left(1 + \frac{1}{3} + \frac{1}{18}\right)$$

$$= 0{,}9952$$

In this case: $P(X \ge 3) = 1 - P(X \le 2) = 1 - 0{,}9952 = 0{,}0048;$

3. Problematic practical-professional issues. The problem is not stated in mathematical language, but is presented in the form of a problem. In this case, it is necessary to solve the required task, which is carried out through a practical activity, and as a result, a mathematical form of the problem is formed.

A number of questions need to be answered in problematic practical-professional issues. How to collect initial data, what to analyze when processing them, what mathematical formulas to use, etc.? Undoubtedly, such issues are most useful in terms of the formation of professional competence, from which begins to understand and solve the problematic situation.

Here are some examples.

Problem. Have each student form a series of events and determine the content of those event combinations.

Sample issue. Avicenna's Lab Company advertises Laktovita products in 3 different ways: on TV, through advertising banners and on websites. Let's mark the fact that when one of the customers who came to buy the company's product was selected at risk and let event A- the selected customer saw the product advertisement on TV, let event B- the selected customer saw the product advertisement on advertising banner and let event C the selected customer saw the product advertisement on websites. Explain the following events:

a) AB; 　　　 b) AB + C; 　　　 c) $\overline{A}$B; 　　　 d) $\overline{BC}$.

Solution:
a) AB - the selected customer saw the product advertisement on TV and advertising banners;

b) AB + C - the selected customer saw the product advertisement on TV and advertising banners or websites;

c) $\overline{A}$B - the selected customer sawn't the product advertisement on advertising banners but saw it on TV;

d) $\overline{BC}$- the selected customer sawn't the product advertisement on advertising banners and websites.

Problem. Have each student form a series of events and determine the interrelationships of those events.

Sample issue. One of the customers who visited the "Ishonch" chain of stores was selected at risk. Let event A- he came to buy a TV set, B- he came to buy vacuum cleaner, C- he came to buy Artel TV set, D- he came to buy Artel vacuum cleaner, E- he came to buy Artel products. Determine the relationship between these events.

Solution:

All of these events come together in pairs. For example, a customer may have received a Samsung TV and an Artel vacuum cleaner, events A and D may be observed at the same time, or a customer may have received a vacuum cleaner and an Artel washing machine, events B and E may be monitored at the same time.

All of these events may be joint. It is possible that the customer came at the same time to buy an Artel TV, an Artel vacuum cleaner and an Artel washing machine. It is also possible to add that it would be wrong to say that only events A, B, C, D or E are observed for a randomly selected client.

The event C favors the event A. Because the fact that the customer is came to buy Artel TV means that he came to buy a TV.

The event C favors the event E. Because the fact that the customer is came to buy Artel vacuum cleaner means that he came to buy a Artel product.

The event D favors the event B. Because the fact that the customer is came to buy Artel vacuum cleaner means that he came to buy a vacuum cleaner.

The event D favors the event E. Because the fact that the customer is came to buy Artel vacuum cleaner means that he came to buy a Artel product.

Problem. An entrepreneur can bet on one or more businesses. Which choice do you prefer?

Sample Issue. The entrepreneur wants to invest his available funds in the business. There are 2 different types of businesses that are recommended. These businesses are not related to each other and the probability that the money invested in both types of business will not pay off is the same 0.1. The entrepreneur is thinking about betting all his money on one business or splitting his money on two businesses. Which event is more likely: does money justify itself when betting on one type of business, or does money justify itself when betting on at least one type of business?

Solution:

A- The event that the money invested in the 1st business justifies itself;

B- The event that the money invested in the 2nd business justifies itself;

C-the phenomenon of money justifying itself in at least one when betting money on both businessesget

In that case it will be $C = AB + \overline{A}B + A\overline{B}$ and $P(C) = P(AB + \overline{A}B + A\overline{B}) = P(AB) + P(\overline{A}B) + P(A\overline{B}) = P(A)P(B) + P(\overline{A})P(B) + P(A)P(\overline{B})$.

As you know, $P(A) = P(B) = 1 - 0,1 = 0,9$ and $P(\overline{A}) = P(\overline{B}) = 0,1$. That is why $P(C) = 0,9 \cdot 0,9 + 0,1 \cdot 0,9 + 0,9 \cdot 0,1 = 0,99$. That is, $P(C) > P(A)$.

So, entrepreneurwhen betting money on both businesses, the probability that the money will justify itself in at least one is the samethe money invested in the business is more likely to justify itself. In short, it is better to invest money in both businesses.

Problem. The entrepreneur buys a variety of products from several firms and sells them in his stores. In order to reduce transportation costs, it intends to buy and sell with only one firm and terminate the contract with the rest. Develop a strategy to determine which firm is best suited to maintain relationships with.

Sample Issue. The businessman has set up mini-markets in two places. Sausage products are sold in the 1st mini-market from "Tokhtaniyaz ota" company. Sausage products from Sharshara

will be sold in the 2nd mini-market. The entrepreneur calculated that transportation costs would be reduced by 1,200,000 soums per month if the products were imported from one company rather than from two companies. In the last month, the daily profit from the sale of sausage products was recorded in table 1:

Table 1

Data	Profit in the 1st mini-market (thousand soums)	Profit in the 2nd mini-market (thousand soums)	Data	Profit in the 1st mini-market (thousand soums)	Profit in the 2nd mini-market (thousand soums)
1	150	120	**16**	185	152
2	152	130	**17**	140	154
3	154	154	**18**	160	150
4	150	150	**19**	170	260
5	160	160	**20**	180	300
6	190	230	**21**	130	20
7	125	80	**22**	180	30
8	148	140	**23**	160	150
9	140	152	**24**	155	250
10	154	154	**25**	150	400
11	155	72	**26**	170	60
12	170	260	**27**	185	20
13	202	230	**28**	130	220
14	130	120	**29**	160	150
15	170	150	**30**	165	152

Based on this information, which firm's products would the entrepreneur prefer to continue trading?

Solution: First of all, let's calculate the daily average profit (sample average) in each mini-market:

$$\bar{x}_T = \frac{150 + 152 + 154 + \cdots + 165}{30} = 159$$

$$\bar{y}_T = \frac{120 + 130 + 154 + \cdots + 152}{30} = 159$$

The average benefit is the same. Now we calculate the standard deviation. For this, we first calculate the sample variances:

$$D_x = \frac{(150 - 159)^2 + (152 - 159)^2 + \cdots + (165 - 159)^2}{30} = 348{,}8$$

$$D_y = \frac{(120 - 159)^2 + (130 - 159)^2 + \cdots + (152 - 159)^2}{30} = 6807{,}1$$

$$\sigma_x = \sqrt{D_x} = 18{,}7$$

$$\sigma_y = \sqrt{D_y} = 82{,}5$$

We can also calculate the coefficient of variation:

$$v_x = \frac{\sigma_x}{\overline{x}_T} \cdot 100\% = 11{,}76\%$$

$$v_y = \frac{\sigma_y}{\overline{y}_T} \cdot 100\% = 51{,}89\%$$

This means that the products of Tokhtaniyaz ota are more stable than the products of Sharshara. Therefore, it is good that Tokhtaniyaz ota continues to sell its products.

Along with these and similar problematic practical-professional issues, it will be useful to cite the economic meanings of popular problems of probability theory and mathematical statistics.

Monty Hall Problem
This problem is named in honor of the host of the TV show "Let's Make a Deal" Monty Hall. In this show, participants could win by playing a game. At the end of the game, a conditional selection was made as follows: the participant was given the opportunity to choose one of three doors. One of them had a new car, and the other two had embarrassing prizes (e.g., a pumpkin in one and a baby pacifier in the other). The participant does not know which prize is behind which door and randomly selects one door. The starter can simply show the prize behind the door chosen by the participant. However, Monty Hall behaves as follows: he opens one of the doors (without a prize) that the participant did not choose. Because the beginner knew what prize was behind each door. He then tells the participant that he can choose another unopened door instead of the one he had previously chosen. This is where the difficult question arises: if a participant changes their choice, will the probability of winning a car increase, decrease, or not change?

Can this solution be used in the economy? Yes. In the context of economic uncertainty that analysts often encounter, the following conclusion should be borne in mind when solving a problem: it is not necessary to know exactly the only correct solution. If you know exactly what will not happen, the chances of a successful prediction are always high. For example, when the world is on the brink of a financial crisis, politicians are always trying to predict the right course of action to minimize the effects of the crisis. The role of the Monti Hall paradox in the field of economics can be described as follows: There are three doors for heads of state. One leads to hyperinflation, the other to deflation, and the third to the desired moderate economic growth. But the mountain How do you find the answer? Politicians say some of their actions will lead to more jobs and economic growth. But leading economists, experienced people, including Nobel Prize winners, also make it clear to them that one of these options will not necessarily lead to the desired result. Will politicians change their choices after that? It's okay to change. zgartiradimi? It's okay to change. zgartiradimi? It's okay to change.

St. Petersburg Paradox
The game is offered as follows: before the start of each game, the player pays (bets) a unit amount, and then one coin is taken and tossed until it first lands with the side of the coat of arms. If the first time falls 1 unit, the second time falls 2 units, the third time falls 4 units, etc. Each time the amount is doubled, the player is given as a prize. How much of the down payment can this game be considered fair?

Can this solution be used in the economy? Yes. In the second half of the 20th century, alternatives to the application of the St. Petersburg paradox in financial markets were discovered and developed. The mathematician K. Menger was the first to propose the use of the St. Petersburg paradox in the economic field, focusing on finding a descriptive model of behavior in conditions of uncertainty rather than setting a "fair price" for a particular gambling game. The application of this problem in economics is found in ideas such as the principle of marginal utility reduction, expected utility as a criterion for decision-making in conditions of uncertainty,

fundamentals of insurance microeconomics, risk management and game theory. Besides, they tried to use the St. Petersburg paradox as proof of some modern approaches to financial modeling. It was proposed to apply as one of the most popular alternatives to modern financial theory as the founder of economophysics.

The First Digit Problem
Find the probability that the randomly selected natural number entry begins with the digit 3.

This issue will help you determine if the financial statements are fake or not.

We believe that the solution of problematic practical issues can be done in three stages:

Stage 1. At this stage, the condition and conclusion of the given issue are separated, the content and essence are clarified. What needs to be found is determined, and when the condition and conclusion of the issue are separated, a clear practical action is identified. Then the problem is reduced to a mathematical form.

Stage 2. At this stage focuses on planning and the choice of solution. What additional information is needed to apply it, a solution plan is identified, and implemented step-by-step. At this stage, if the information provided is sufficient to solve the problem, the method of solving it will be selected. If there is not enough information, it will be determined what additional information is needed and then a solution plan will be developed. On this basis, they gradually approach the right solution.

Stage 3. At this stage, the problem is solved according to the plan, errors are identified and corrected, and the solution is checked directly. At this stage, students understand the importance of professional issues on the basis of experience, practice, the importance of probabilistic-statistical methods. Of course, in solving all types of problems, students will need to be able to apply certain properties, theorems and their results, to use different methods.

When solving problems, it is necessary to pay attention to the following:

-know and remember the basic concepts, definitions, properties and formulas of probability theory and mathematical statistics;

- be able to plan their activities in solving problems and determine what mathematical concepts can be used to solve the problem;

-understand the essence of the problem.

The above methodological recommendations should be applied at all stages of the process of solving practical professional problems: understanding the essence of the problem and taking the necessary practical actions, planning, problem solving and investigation.

CONCLUSION
Explaining the course of probability theory and mathematical statistics for students majoring in economics with the help of problematic practical-professional issues will help them to develop their economic thinking, to solve problems in their work, to plan, forecast future activities in the field of economics. Helps to draw conclusions.

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THE PARTICIPATION OF SOCIAL ENVIRONMENTS ON STUDENTS' LEARNING OF PHILIPPINE CULTURE

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ABSTRACT

The study focused on determining the specific social environments that affect mostly the students' learning of Philippine culture and up to what extent do the family, peers, community and school affect on it. The respondents were chosen using non-probability convenience sampling where the researcher took 20 students as participants. The researcher described the profile of the respondents in terms of gender, age, course and year level. The social environment was described in terms of family, peers, community and school. The researcher gathered, determined and analyzed the results of the students' responses using a survey questionnaire as the instrument of the study. This research proves and ponders that social environments are great factors that can affect on a student's learning of Philippine culture.

INTRODUCTION

Culture is one of the basic fields of Social Sciences that are included as a part in the curriculum to be taken by students in different academic levels (Imperial et al., 2013). According to Tylor (as cited in Spencer, 2012), this phase of Social Science referred to as a quality possessed by all people in all social groups who nevertheless could be arrayed on a development. Dallo (2013) stated that to learn culture is a great task in fact that it gives wide understanding of our ancestors and it will give people an opportunity to learn things that surrounds in the society.

There is so called, "Social Environments" in Sociology that can be attached to the process of learning of the second language that refers to the immediate physical and social setting in which people live or in which something happens or develops (Barnett, 2011). They can be considered as the factors that can affect to the learning process of culture. Social environments like family, school, peers and community have big roles to the eagerness of every individual in discovering different disciplines like culture of a country (Durrschmidt, 2012). With social environments, man can absorb the culture virtue to the fact that these factors are the shelter of everyone's intellect since birth.

Firstly, in terms of closeness in everyday lives of students, they are much related with their family, peers and to the community which they are belong. According to Building (2010) the family, peers and community have important role in guiding and educating every individual in terms of social capacity because the length of time an individual has interacted with their family as well as their peers and the duration of time a student lived in a community influences the extent to which they engage with the manner of cultivating and exposing themselves in cultures of the society.

A student spends so much time for family and peers because these environments are the common ambiance that a student interacts. Building (2010) added that the children and parents who have strong and supportive social relationship develop positive rapport. As children learned the culture of specific country which they belong, they were more likely to develop if they have a strong, positive, and supportive social relationship. In learning process (particularly in the learning Social science dimension like culture), peers may have a pleasant interaction by the mores and values that a typical Filipino setting achieves. For example there is a member of a peer that is fond of watching cultural events, everyone may imitate the manner of admiring that

perspective then the possibility to learn the love for the country's culture may increase the ability of every member of the peer to come-up with that perspective.

It is common that the school including the teachers were one of the main instruments for a student to become knowledgeable in fact that their goal is to educate an individual. Many researches proclaimed that teachers and schools are the greatest factor for students to become learned in different disciplines. Schools in the Provincial and Federal government are experiencing problems like insufficiencies of materials of instruction such as audio-visual aids for teaching Social sciences in part of culture, the type of school system is overcrowded (Ahmad, Khan,&Munir, 2013). Related to the teachers, schools also affect on it as said in the study. The part of school also influences the learning process of a student, according to Bandura (as cited by Hapi, 2014), classroom is a place where a formal learning occurs. The physical and social climate appears to the output of students after an academic year.

Due to technological blast, students nowadays became more doted and affectionate of different gadgets and latest inventions; the essence of the country's culture can be affected because the new era of students are here and a more contemporary world is coming. Building (2010) believes that learning is greatly influenced by one's physical surroundings and the present time's modernization. With his theory, it can be proven that the social environment in the present era affects the learning of students particularly in terms of culture.

With these problems, the researcher decided to conduct a study of the role of social environment on students' learning of Philippine culture. As the researcher find different information and references about the topic, the researcher became more interested of it because of the curiosity on what are the roles of social environment when it comes to students as they learn culture of the country.

As this research's prediction that among the four specific social environments mentioned, there would be a result in high level of effectiveness in terms of students' learning of Philippine culture but also the researcher surmised that there are some in the low and average level depending on the responses of the students. Researcher feels that it can affect the learning of a student and can lead to different results and outcomes. The purpose of this study is not only to find the roles and levels of social environment's effect on that learning perspective among students but also to thrust the value of culture to the mind of everyone who will see this research.

Statement of the Problem
Specifically, the study will seek to answer the following questions:

1. What are the types of Social environment that mostly affect the students' learning of Philippine culture?

2. Up to what extent do the following types of Social environment affect the students' learning of Philippine culture?:

2.1 family

2.2 peers

2.3 community

2.4 school

Theoretical Framework
This research used two "Theories of Learning" in the principle of Education that had been formulated by their great proponents who are scientist and philosophers. These two learning theories ponder the learning strategies and manners in order for students to learn different areas of studies but we focused on the field of culture. The theories' principles were bind together as

one because they trace a single path which is the manner on how and up to what level these different types of social environment affects the certain learning of students which focuses on the learning of Philippine culture.

Social Learning Theory. Bandura (as cited in Hapi et al., 2014) developed a social learning theory of human functioning, meaning that people are self-organizing, pro-active, self-reflecting and self-regulating, not merely reactive to social environment or inner cognitive affective forces. The concept on how a social environment affects on the learning of Philippine culture is a focal point of Bandura's theory. In this learning theory, it explains that for a student to learn, it is better to come-up with the process of "imitation" to learn other knowledge that a student wants to be possessed. For example, students want to become knowledgeable about Filipino folklore, they must apply the essence of that field of culture in different subjects like literature and civics.

Operant Conditioning Theory. Skinner (as cited in Hapi et al., 2014) developed the theory that attempts to modify behavior through the principle of "reinforcement" that uses either positive or negative reinforcement to students learning process. Through the essence of the theory, an individual makes an association between a particular behavior and a consequence. For example, in the family, there are so called "forced culture" that every member of the family must adopt. These members will be forced to follow and to adhere those policies in order to cope with that culture.

METHODOLOGY
At this part of the paper, it describes the methodological process and the things that are related on how this research paper was done. The researcher used the four major subsections of method namely: Participants, Research Design, Measures and Procedures.

PARTICIPANTS
The researcher decided to acquire 20 students as the respondents of the study. Eighty percent of the participants were female and the remaining 20% were represented by male participants. In terms of age, majority (60%) of the respondents belong to the 17-18 age range. Respondents with 19-20 years of age come next which comprises 40% of the total respondents. Otherwise, out of the 20 respondents, 30% were BS Psychology students, another 30% were represented by BS Social Work students, AB Communication, BS Math and AB Political Science students occupied 10%. But the two courses, AB History and AB Economics embody only 5% of the total population. On the other hand, 70% of the respondents are third year students and the other 30% was represented by second year students.

RESEARCH DESIGN
This research followed a quantitative approach for the study which Burns and Grove described (as cited in Shilubane, 2009) as a subjective and systematic process to describe and test relationships of the variables used. A Research Journal Article design of research paper with an American Psychological Association (APA) style was used as the format of the entire paper. The study might involve the social environment as the independent variable of it which was described in terms of family, peers, community and school. The researcher thought that learning of Philippine culture as the dependent variable for the study that would be the basis for specific types Social environment's extent of affects.

MEASURES
The research instrument used in the study was a form of survey questionnaire that consists of questions that we had created. The research instrument was composed of two parts, the first part was a one item kind of multiple choices wherein the respondents will choose the best type social environment that could affect the second language learning of the students and the researcher expected to explain why they choose it. The second part of the instrument would be a 5-point

Likert Scale test wherein the four category (four type of social environment: family, peers, community and school) was composed of three statements which a respondent must have chosen his or her answer from the scale ranging from N (never) to A (always).

PROCEDURE

Participants were gathered by means of Non-probability convenience sampling wherein the respondents were gathered in a process that does not give all the individuals in the population equal chances of being selected because only 20 students were participated in the data-gathering scenario. They gathered in terms of groups but before the day of distribution of survey questionnaire, they were informed about the data-collection procedures for the research who they will stand as the participants. The researcher distributed the questionnaires because the students have different courses, therefore their classes were in different areas of the school and also to achieve our tasks in a shorter period of time. The researcher chose the time wherein the participants were free and have the time to answer it in order for their class not to be interrupted. The researcher administered the respondents to become aware on the instructions of the survey and to answer them if they had questions regarding the survey questionnaire.

This research used the formulas for computation of percentages of the results in relation of Ymas (2008), the principle of Rate, Base and Percentage. To get the percentage, divide the number to the base and multiply it to 100. In the part of computation of the Likert scale, in every item, just multiply the number of respondents who answered in different choices (e.g. N for never and so on) to the value of every choices (e.g. N is equivalent into one, R is equivalent into two and so on) and divided it with five to get the mean. After the researcher got the mean of every item, then add these three means and divided into three to get the general mean. The researcher analyze the findings by means of the possibilities that might cause the respondents to answer these and its possible conclusion that we could came up with the effectiveness of these social environments. The researcher also compared the relation of the answers to come up with the results and to determine what social environments got the highest and lowest means.

RESULTS AND DISCUSSION

The researcher got the percentages of respondents' choices on specific Social environments that they think could affect their learning of second language. After the computation and analysis, peers got 35%, school earned 30%, community took 20% which got the top three highest percentages of respondent's choices. Family was given 15% which were in lower percentage. We considered these results as preliminary opinions of the respondents.

Table 1: Family.

Item	Mean
1.1When I was a child, I had been taught by my parents about Philippine Culture	2.2
1.2 Through my parents, I learned the culture of Filipinos.	2.5
1.3 My family taught me some indigenous plays like sungka	2.1
General Mean	2.27

Item 1.2 got the highest mean of 2.5 while Item 1.3 got the lowest mean of 2.1. Family, as one of the social environments as a factor in learning Philippine culture gained a general mean of 2.27

Table 2: Peers.

Item	Mean
2.1 My friends and I have a time to read Filipino literary pieces in the library.	2.12
2.2 I, together with my friends, watch Filipino culture-based movies.	2.5
2.3 We use to speak our mother tongue for fun, bonding and learning.	3.3
General Mean	2.64

This section, Peers, came up in a general mean of 2.64. The highest mean 3.3 went to Item 2.3 while Item 2.1 got a mean of 2.12 which was the lowest mean.

Table 3: Community.

Mean	Mean
3.1 I am willing to listen to seminars (related with Philippine heritage) in our community.	2.8
3.2 I am willing to communicate with indigenous people in our community (if necessary).	3
3.3 I give my attention to watch cultural performances.	2.8
General Mean	2.9

Item 3.2 got the highest mean of 3 while both the item 3.3 and 3.1 have mean of 2.8 while. Community, as one of the social environments as factors in learning Philippine culture of students gained a general mean of 2.9.

Table 4: School.

Item	Mean
4.1 I study my lessons well in Social Sciences subjects intending Philippine culture.	4.8
4.2 I nurture the culture and heritage that my my school is preserving.	2.9
4.3 I am willing to join cultural events in school.	2.3
General Mean	3.33

This section, School came up in a general mean of 3.33. The highest mean 4.8 went to Item 4.1 while Item 4.3 got a mean of 2.3 which was the lowest mean.

In terms of ranking of general mean, school got the highest rank with 3.33, followed by community with 2.9 general mean, the third one was the peers with 2.64 general mean. Family placed in the lower part of the rank which got the general mean of 2.27.

DISCUSSION
In view of the fact which the researcher predicted that there are types of social environment which would be resulted into high, low and average level of effectiveness, it had been matched in the findings. Inasmuch as these four types are in different fields, it was expected that it had different circumstances that were inclined with it.

According to the respondents' preliminary opinion as presented in the results, peers, school and community are the top three social environments which they think mostly affect their learning of culture while family is in the lower rank. The researcher concluded that it had consistent results because after the computation in the likert scale type of questions, school, peers and community were also the top three that inferred to be most influential social environments. The researcher surmised that all social environments that had high means were the mostly affects the student's learning of Philippine culture.

Based on the reasons of the respondents, majority of their answers were related and tracing a single path. They chose school/peers or community because these were the social environments which their times were allotted in a day. Other answers were: in school in view of it was the place where they acquire their academic knowledge, in peers by reason of they were you interact mostly wherever they are and in community in that you always interact with the persons mostly in the outside of house. Family is at the lower rank even though these two had been answered but majority of the respondents did not choose these in fact that they were not having a close family ties.

As stated in Table 1which depicted by the family, item 1.2 (Through my parents, I learned the culture of Filipinos) got the highest mean. There may be a possibility that naturally, parents

teach their children to learn culture inside the family that a common Filipino family follows. Item 1.3 (My family taught me some indigenous plays like sungka) that got the lowest mean. Not all household has their own cultural materials. But the general mean comprise only in low level of effectiveness which was matched with the statement of Building (2010) that family could contribute a lot in the learning of a student but it would not be present if there are circumstances which lead it to the failure to achieve parent-children learning relationship such as lack of knowledge and materials that will support the process of learning.

In terms of peers, in item 2.3 (We use to speak our mother tongue for fun, bonding and learning.) from Table 2 got the highest mean of 3.3 while the lowest mean, 2.5, went to Item 2.2 (I, together with my friends, watch Filipino culture-based movies.).This section gained a general mean of 2.64 which lead to come up with average level of effectiveness. As Bandura (as cited in Hapi et al., 2014) explained that the effectiveness of peer relation in terms of learning method was great especially on their favorite field or topic was being studied since in a group of students have different interest which every student wants to push through but it was better to have a single and combined activities for them to be done with enjoyment.

The community came-up with an average level of effectiveness after acquiring 2.9 general mean as stated in table 3. Item 3.2 (I am willing to communicate with indigenous people in our community) got the highest mean that may be concluded that the majority of the students were open to communicate to indigenous people in their community. Both Items 3.1 (I am willing to listen to seminars related with Philippine heritage in our community) and 3.3 (I give my attention to watch cultural performances) gained mean of 2.8. In other words the majority of the students were having other sources to acquire their knowledge in learning Philippine culture. It reflects on the explanation of Kwarteng (2014) which presents that "lack of self-awareness" in community is the greatest hindrance for students to learn.

Table 4 in the school section, Item 4.1 (I study my lessons well in Social Sciences subjects intending Philippine culture) got the highest mean. This social environment also got the highest general mean that can obviously be concluded that peers had the highest influence to students' learning. Therefore, the majority of the students learned the Philippine culture by studying their lessons in school in fact that there are subjects that are inclined with it. In Item 4.3 (I am willing to join cultural events in school) got the lowest mean, majority of the students did not want to join cultural events in school because of the lack of self-confidence to perform in different fields of events based on culture. The school grabbed a high level of effectiveness when the general mean only comprise 3.33 which was proven by Ahmad et al. (2013) that even school was the place where the formal learning happens, there were so called, "destructive factors" which were present in the time of discussion that could be barrier for students to learn such as the poor capacity of a teacher teach, low-quality physical climate inside the classroom and others hence the teaching-learning process was not so good.

This paper prove that family, peers, community and school were deserving to be the major types of social environment that could affect on the students' learning of culture according to the findings despite being in a different level of extent on how they affect aside from being common environments where a student interacts in a day. The results in the first question (What are the types of Social environment that mostly affect the students' learning of Philippine culture?) of the questionnaire and in the second question (Up to what extent do the following types of Social environment affect the students' learning of Philippine culture?) were connected and not merely in far responses. Because the results in the first part (in terms of ranking) will be school, community, peers and family while in the second part resulted into peers, school, community and family. The top three type of Social environment of both were the same but not in the same position but it concluded as the same results. The researcher considers this research as a study

with accurate findings which could be added to the literature as basis for future researches that would be conducted.

Since, it was established in the study according to students, family, peers, school and community were mostly the four common social environments that affect their learning in terms of Philippine culture. It was advisable for the future researchers who would be conducting other researches which were related with our study to improve it and take a chance to enlarge its extent not to stick in a single university. In accordance with this study's scope and limitation, it was focused with the locality of a university in Bulacan which had the said students who became the respondents of this research.

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FLIPPED CLASSROOM APPROACHED IN LEARNING TAXONOMY AND CLASSIFICATION: ASSESSINGLEARNING PERFORMANCE OF GRADE 11 STUDENTS OF NOTRE DAME OF MIDSAYAP COLLEGE

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ABSTRACT

Before employing the flipped classroom approach, pupils' pre-test results were much lowerthan they were after using it. The preferences of both the male and female control and experimental groups were influenced by the flipped classroom and lecture content, respectively. When it came to assessing evolutionary relationships, there were substantial differences between the experimental and control groups. Phylogeny evaluation was performed on the post-test, and the females in the experimental group fared much better than the females in the control group. In terms of systematic differences, there was a statistically significant difference in post-test findings between the experimental and control groups for both males and females. On the other hand, the overall evaluation of Females in the experimental group outperformed males in the post-test. Whenthe post-test data were compared between males and females, it was discovered that there was a significant variation in phylogeny between the experimental and control groups. On the post-test, males in the experimental group outperformed women in the control group, indicating that the study was successful. The responses to the Motivation to Learn Survey Questionnaire from both the experimental and control groups were compared. The control group had a higher mean score in motivation than the experimental group, but the extrinsic goal-oriented group had a mean score that was close to that of the control and experimental groups, as shown in Table 1. The intrinsic- goal orientation, control of learning beliefs, and self-efficacy of the control group were all shownto be significantly different from the experimental group. The relationship between intrinsic goal orientation and task value was not statistically significant.

Keywords: assessment, flipped classroom, lecture method, performance, motivation, learning

Chapter I

INTRODUCTION

Education has been under pressure to adopt more adaptable, effective, active, and student-centered teaching practices that address the shortcomings of traditional transmittal models of education. Recently, the flipped classroom concept has been proposed to help with this shift. However, because the research is still in its early stages, little is known about how students learn in a flipped classroom.

The flipped classroom is gaining popularity in a growing number of educational institutions worldwide (Gundlach et al., 2015a). The flipped classroom approach is based on the principle of pre-delivering teacher lectures via online videos, freeing up in-class time for active learning and problem-solving tasks (Lo and Hew 2017).

The flipped classroom encouraged students to use technology in the classroom by exposingthem to pre-recorded content (through the internet, films, or audio-visual recordings) outside of the typical educational environment (at home, in the library, or anywhere instructional material can be accessed) (Bergmann & Sams, 2012). After seeing the video, students are expected to returnto class—typically during the following class meeting—and collaborate on the issue with their peers and teacher. Students may use this time to address any misconceptions regarding the subject.Where pupils can design their own learning (Okit, 2019).

In the flipped classroom approach, the teacher is the focal point of the lesson and the primary disseminator of knowledge during the class session. While the teacher responds to student inquiries, students look to the teacher for guidance and feedback. Individual instruction in a classroom setting employing a typical teaching style may also emphasize the rationalization of material information through the use of a lecture style. Student involvement may be limited in a

traditional approach to activities in which students work independently or in small groups on a teacher-defined application task (Okit, 2019a). It is the obligation of the institution to equip learners with quality education to prepare them to tackle the challenges of change across the world. In light of the present challenges in science education, the formation of highly qualified science teachers is critical. These include problems for students to understand scientific concepts and recognize the utility of science in general (van Driel & Abell, 210 C.E.).

Recent study in science education reveals the systematic and intricate structure of science teaching and learning. Collaboration between classroom teachers, science educators, and technologists is fostering the development of a more robust perspective on science teaching and learning by designing innovative instruction, constantly refining it based on classroom studies, and fostering the development of a more robust perspective on science teaching and learning. Rather than absorbing information from the science subject, most scientists agree that science students engage in a process of knowledge integration in which they make sense of disparate pieces of information such as personal experiences, classroom instruction, and related concepts. Frameworks for science instruction assist students in integrating their knowledge by requiring materials and activities that are simple to grasp, make thinking visible, allow for peer learning, and promote self-monitoring (Linn, 2001a).

Lifelong science learners reflect actively on their views, seek novel viewpoints on scientific problems, and endeavor to continually improve their scientific knowledge. Allowing for independence requires designing instruction in such a way that students take ownership of science learning frameworks, standards, texts, and even recipe-driven hands-on experiences. However, the curriculum cannot possibly contain all of the necessary scientific information; rather, students

require supervised practice analyzing their own development in order to take charge of their own education (Linn, 2001b).

Scientific knowledge is humanity's collective legacy. It is the only humankind's treasure that can provide a feasible remedy for overcoming inequality and bringing about an adequate quality of life and a sense of purpose for the vast majority of the world's people (Kaptan & Timurlenk, 2012).

To meet the difficulties of the twenty-first century in science and technology, students must be prepared with 21st-century abilities in order to compete in the globalization era. Students are required to acquire 21st-century talents in addition to achieving academically. As a result, including 21st-century skills in science education is critical. Digital age literacy, imaginative thinking, effective communication, and high productivity are the four primary domains of 21st-century abilities. One of the abilities required for digital age literacy is scientific literacy. It entails knowledge and comprehension of scientific concepts and processes necessary for personal decision-making, as well as engagement in civic and cultural issues. Basic science process abilities include seeing, categorizing, measuring, and manipulating numbers; forming inferences; and predicting, conveying, and using space and time relationships (Turiman et al., 2012).

There is a clear link between their gender, biological self-efficacy, learning style, and overall performance as a result of their biology research.

Previous reviews imply that a flipped-classroom method can improve student performance or, at worst, do no harm to student learning when compared to traditional instruction. Only a few studies (Gundlach et al.2015b) found that students in traditional classrooms did significantly better than students in flipped classrooms in published research on flipped classrooms.

Statement of the Problem

1. What is the difference in taxonomy and classification performance between students taught in a flipped classroom versus those taught in a lecture method?

2. Is there a discernible difference in student ability in taxonomy and classification between students taught in a flipped classroom and those taught in a lecture classroom?

3. How motivated are senior high school pupils who are taught using a flipped-classroom approach and lecture method to master taxonomy and classification?

Learning Performance of Senior High School Students

Social cognitive theorists recognize the importance of individual cognition in learning and performance, in contrast to behaviorists, who concentrated exclusively on stimulus or response conditioning. The triadic reciprocity model is used by social cognitive theorists to give a framework for the disentanglement of learning and performance, demonstrating that learned behavior may be disentangled from performance. Bandura and colleagues (Groenedijk, Rijlaarsdam, and van der Berg, 2013) proved that learning can occur without the production of actions, implying that learning and those behaviors will not occur unless the individual is driven to do so by the consequences of not doing so (Bandura & Jeffrey, 1973; Schunk & Usher, 2012).

Self-Determination Theory in Flipped Classroom Approached

Edward L. Deci and Richard M. Ryan pioneered self-determination theory, a subset of motivational theory. Self-determination theory, like social cognitive theory, recognizes the importance of the relationship between individual agency and environmental context in the construction and functioning of human psychology. The core premise of the theory is that human motivation is driven by three psychological needs: autonomy, competence, and relatedness (or belonging) (Ryan & Deci, 2000). According to proponents of self-determination theory, these three demands are fundamental to human psychology and transcend other social biological factors such as age, gender, and cultural background (Chirkov, Ryan, Kim & Kaplan, 2003). The extent to which these requirements are met is contingent upon an individual's motivation. By contrast, settings that undercut or defy these expectations result in either motivation or disaffection in those impacted (Deci & Ryan 2008).

TEACHER FACTOR IN LECTURE METHOD

The modern classroom is built on the relationship between students and instructors. The instructor conveys knowledge to pupils through conversation and demonstration, which serves as the framework for the classroom. Students who are assisted by their teachers have a larger chance of success. According to self-determination theory, the instructor can either support or block motivation by creating an environment that simultaneously influences all three essential psychological demands. Instructors can help students feel more autonomous by engaging in autonomy-promoting actions such as providing alternate assignments and adapting classes or assignments to students' interests. Students who are taught in this manner are more likely to reject manipulative or controlled feedback, place a higher premium on effort than performance, and receive rewards that encourage an internal locus of causality over an external locus of causality, among other behaviors. Encouraging students to inquire providing feedback on

assignments, and appraising student's efforts while responding to queries are all good strategies for influencing students' views of competence. Teachers can help students feel more connected to one another by connecting with them in the classroom. In the classroom, relatedness refers not only to the instructor's relationships with the students but also to the environment that the teacher creates for the students (Furrer & Skinner, 2003). They discovered that teacher-related parameters significantly influenced classroom engagement (both self-reported and instructor-reported), especially among boys. Furrer and Skinner discovered that relatedness was a more powerful predictor of engagement than self-control in the same study.

Participation has a huge impact on the relationship between the instructor and the student (Reeve 2012). a model that elucidates the link between classroom participation and motivation In the context of a learning environment, this model explores the relationship between motivation and classroom involvement. This paradigm encourages teachers to act in ways that add to student motivation. After that, participation occurs as a result of the inducement. When teachers and students acknowledge and accept engagement cues, motivation and, as a result, engagement increase. When teachers or peers disregard students' engagement, it erodes their motivation by eroding their sense of connectedness. Engaged students, according to Reeve (2012), fully explain and mediate the motivation-to-achievement mismatch. When students are actively involved in the learning process, teachers receive drive-feedback that they may utilize to alter the dynamics and character of a lesson. Teachers can use the information provided in this feedback to help maintain student engagement and ensure they get the best potential results. These signs of involvement are well-established in the traditional classroom setting. Teachers look for indicators of student attendance in the classroom, such as an attentive gaze, posture, tone of voice, and active questioning.

These metrics of student engagement are uncommon in an online classroom. The teacher is frequently compared to a singer performing in front of an empty room. The instructional support provided in online vs. traditional classes has the potential to have a substantial effect on students' motivation and academic success. Jaggars (2014) discovered that students in higher education prefer traditional over online courses.

CHAPTER II METHOD RESEARCH DESIGN

The study used the quasi-experimental design to examine the significant difference between the Flipped Classroom Approached against the Lecture Method. There were two groups purposely selected as the participants of the study and a total of 48 students from Science, Technology, Engineering, and Mathematics from Grade-11 in Notre Dame of Midsayap College for the school year 2019-2020. The selected topic in the TAXONOMY and CLASSIFICATION were Evolutionary relationships, Systematics, and Phylogeny. To assess the Flipped Classroom Approached the researcher measured the students' academic performance by obtaining the test scores pre-test and post-test. While the Lecture Method in the control group assessed the performance based on the result of pretest and post-test scores compared to Flipped Classroom Approached.

DATA ANALYSIS

There were several methods of analysis used in the study. Each research hypothesis was treated accordingly to the proper data analysis. To ensure the learning ability of the experiment group and control group the pretest scores were administered. To determine the differences between the performance of the test score. The researcher used analyzed the paired t-test of the experimental and control group. In the comparison of the performance of the Flipped Classroom Approached on the three learning topics for comparison, the study employed the ANOVA (Analysis of Variance).

Instrument

The study used research made a 30 items multiple-choice questionnaire to align the instrument and the topics of Evolutionary Relationships, Systematics, and Phylogeny. Using Google Classroom the research questionnaire was made available. The primary goal is to test the learning performance using the research questionnaire for the experimental and control groups.

The research survey questionnaire the Motivation to Learn Online Questionnaire (Fowler, 2007) was used to assess the motivation to learn Taxonomy and Classification of the students who are taught with Flipped Classroom Approached.

Data Gathering Procedure

Permission was sought before the study was conducted. Afterward, the researcher secured a grant from the school President and the school principal for Senior High School of Notre Dame of Midsayap College. After the approval letters, the researcher conducted the study and administered the test questionnaires to the students for the pre-test of the two groups, lecture method was done in the control group while Flipped Classroom Approached was done in the experimental group. A post-test questionnaire was administered to seek differences between the experimental and control groups, followed by a modified questionnaire for the Motivation to Learn Questionnaire. The researcher instructed the students with a clear explanation of the purpose and the objective of the study. Besides, confidentiality and anonymity are emphasized to assure the cooperation of the respondents. The collected data was submitted to the statistician for statistical treatment using the appropriate statistical tools.

CHAPTER III RESULTS AND DISCUSSION

This chapter examined the results of the statistical data and tested the research hypotheses. The tables were arranged accordingly to the set of data that gives responses to the research problems and the other the hypotheses of the study.

Table 1: t-test results in comparison between the pre-test scores of the control and experimental group.

Group	N	Mean	SD	t-value	p-value
Control	24	11.42	3.61	0.74^{ns}	0.05
Experimental	24	11.50	0.74		
Total	48				

The table showed no significant difference in the paired sample of the pretest scores between the experimental (M = 11.50, SD = 0.74) and control group (M = 11.42, SD = 3.61). Based on the result (t = 0.74, P > 0.05), the null hypothesis needs to be accepted. No significant difference in the students' scores in the experimental and control group. The result showed that the two groups were on equal footing prior to the intervention given.

Table 2: t-test results in comparison between the post-test scores of the control and Experimental group.

Group	N	Mean	SD	t-value	p-value
Control	24	25.00	2.28	3.06^{*}	0.00
Experimental	24	26.83	1.84		
Total	48				

The table showed a significant difference in the paired sample of the post-test scores between the experimental (M = 26.83, SD = 1.84) and the control group (M = 25.00, SD = 1.84). Based on the result (t = 3.06, P < 0.05), the null hypothesis needs to be rejected. There was a significant difference in the students' scores in the experimental and control group.

Table 3: ANOVA results in comparison between the scores of males (experimental group) and females (control group).				
Group	**N**	**Mean**	**SD**	**Std. Error**
Male (Experimental)	10	24.60	1.34	0.46
Female(Experimental)	14	28.57	1.22	0.32
Male (Control)	6	26.00	0.00	0.00
Female (control)	18	24.72	1.99	0.47
Total	48			

The result showed a comparison between male and female post-test results with a significant difference between the experimental and control group. The female in the experimentalgroup had significantly higher post-test scores (M = 28.57, SD = 1.22). While males in the experimental group had a low significant post-test score (M = 24.60, SD = 1.34).

Table 4: ANOVA test results in comparison to the post-test scores between experimental and control groups.				
Sources	**DF**	**SS**	**MS**	**F-Stat**	**p-value**
Between Groups	3	141.53	47.17	3.06[*]	0.00
Within Groups	44	103.44	2.35		
Total	47	244.98			

The table showed that there was a significant difference between groups (MS = 47.17) post-test scores of the students in the experimental group and the control group. The f-ratio valueis 3.06, p-value is 0.00. Thus, the results needed to reject.

Table 5: ANOVA results in comparison between the scores of males (experimental group) and females (control group) in Evolutionary Relationships.				
Group	**N**	**Mean**	**SD**	**Std. Error**
Male (Experimental)	10	7.30	0.67	0.21
Female(Experimental)	14	9.28	0.61	0.16
Male (Control)	6	8.00	0.00	0.00
Female (control)	18	7.94	0.87	0.20
Total	48			

The result showed a comparison between male and female post-test results with a significant difference between the experimental and control group on the topic of Evolutionary relationships. The female in the experimental group had significantly higher post-test scores (M =9.28, SD = 0.67). While females in the control group had a low significant post-test score (M = 24.60, SD = 0.87).

Table 6: ANOVA test results in comparison to the post-test scores between experimental and control groups in Evolutionary Relationships.				
Sources	**DF**	**SS**	**MS**	**F-Stat**	**p-value**
Between Groups	3	26.01	8.67	17.42[*]	0.00
Within Groups	44	21.90	0.49		
Total	47	47.91			

The table showed that there was a significant difference between groups (MS = 47.17) post-test scores of the students in the experimental group and the control group. The f-ratio valueis 17.42, p-value is 0.00. Thus, the null hypothesis needed to reject.

Table 7: ANOVA results in comparison between the scores of males (experimental group) and females (control group) Systematics.				
Group	**N**	**Mean**	**SD**	**Std. Error**

Male (Experimental)	10	7.30	0.67	0.21
Female(Experimental)	14	10.00	0.00	0.00
Male (Control)	6	8.00	0.00	0.00
Female (control)	18	7.94	0.87	0.20
Total	48			

The result showed a comparison between male and female post-test results with a significant difference between the experimental and control group on the topic of Systematic. The female in the experimental group had significantly higher post-test scores (M = 10.00, SD = 0.00). While males in the experimental group had a low significant post-test score (M = 7.30, SD = 0.67).

Table 8: ANOVA test results in comparison to the post-test scores between experimental and control groups in Systematics.

Sources	DF	SS	MS	F-Stat	p-value
Between Groups	3	26.01	17.54	45.28[*]	0.00
Within Groups	44	21.90	0.38		
Total	47	47.91			

The table showed that there was a significant difference between groups (MS = 17.54) and within groups (MS = 0.38) post-test scores of the students in the experimental group and the control group. The f-ratio value is 45.28, p-value is 0.00. Thus, the null hypothesis needed to be rejected.

Table 9: ANOVA results in comparison between the scores of males (experimental group) and females (control group) Phylogeny.

Group	N	Mean	SD	Std. Error
Male (Experimental)	10	10.00	0.00	0.00
Female(Experimental)	14	9.28	0.61	0.16
Male (Control)	6	10.00	0.00	0.00
Female (control)	18	8.83	0.85	0.20
Total	48			

The result showed a comparison between male and female post-test results with a significant difference between the experimental and control group on the topic of Phylogeny. The male in the experimental group had significantly higher post-test scores (M = 10.00, SD = 0.00). While females in the control group had a low significant post-test score (M = 8.83, SD = 0.85).

Table 10: ANOVA test results in comparison to the post-test scores between experimental and control groups in Phylogeny.

Sources	DF	SS	MS	F-Stat	p-value
Between Groups	3	11.62	3.67	9.82[*]	0.00
Within Groups	44	17.35	0.49		
Total	47	28.97			

The table showed that there was a significant difference between groups (MS = 3.67) and within groups (MS = 0.38) post-test scores of the students in the experimental group and the control group. The f-ratio value is 9.82, the p-value is 0.00. Thus, the null hypothesis needed to be rejected.

Table 11: scaled item mean and standard deviation between the experimental and control groups.

	Mean		SD	
Scale	**ExperimentalGroup**	**Control**	**ExperimentalGroup**	**Control**
Intrinsic Goal Orientation	19.20	22.40	2.39	1.82

Extrinsic Goal Orientation	19.75	20.75	1.71	0.96
Control of Learning Beliefs	1.50	20.75	0.58	0.50
Self-Efficacy	11.71	16.57	7.16	2.64
Task Value	19.86	21.29	4.60	2.56
Instructor Support	24.00	23.67	0.00	0.82

The result showed a comparison between the experimental and control group in their responses to the Motivation to Learn Questionnaire. The intrinsic goal-oriented had a higher mean in the controlled group (M = 22.40, SD = 1.82); the extrinsic goal-orientation had a close mean score among the control (M = 20.75, SD = 0.96) and experimental (M = 19.75, SD = 1.71) groups; a high mean score of control group (M = 20.75, SD = 0.50) compared to experimental (M = 1.50, SD = 0.58) in control of learning Beliefs; with the high efficacy in motivation a high mean score in control (M = 16.57; SD = 2.64) than the experimental group (M = 11.71; SD = 2.64); while the close mean scores between the control (M = 21.29, SD = 2.56) and experimental group (M = 19.86, SD = 4.60) in task value; and close mean scores of the control (M = 23.67; SD = 0.82) and experimental (M = 24.00, SD = 0.00) in the instructional support.

Table 12: paired sample t-test between the experimental and control group in the Motivation to Learn Questionnaire.

Test	t	p	Effect Size
Intrinsic Goal Orientation	3.69	2.77*	1.9
Extrinsic Goal Orientation	2.83	3.18[ns]	0.7
Control of Learning Beliefs	46.43	3.18*	0.83
Self-Efficacy	2.48	2.44*	5.16
Task Value	1.25	2.45[ns]	3.02
Instructor Support	1.1	2.57[ns]	0.76

The table showed a highly significant difference between the control group in intrinsic- goal orientation (t =3.69 > p = 2.77), control of learning beliefs (t = 46.43 > p =3.18), and self-efficacy (t = 2.48 >2.44). It also showed a no significant difference in terms on the extrinsic goal-orientation (t = 2.83 < p = 3.18), task value (t = 1.25 < p = 2.45).

CHAPTER 1VSUMMARY

A substantial difference was seen when pre-test scores of students taught using the flipped classroom approach were compared. The preferences of male and female control and experimental groups varied based on the topic used in the flipped classroom and in the lecture approach.

On the topic of evolutionary relationships, the comparison of male and female post-test results revealed a substantial difference between the experimental and control groups. Females in the experimental group scored significantly higher on the post-test than females in the control group, who scored significantly worse on the post-test. On the topic of systematic, the comparison of male and female post-test results revealed a significant difference between the experimental and control groups. Females in the experimental group scored significantly higher on the post-test than males in the experimental group, who scored significantly lower on the post-test. The comparison of male and female post-test results, on the other hand, revealed a substantial difference between the experimental and control groups on the topic of the phylogeny. Males in the experimental group had significantly higher post-test scores than women in the control group, who had significantly lower post-test scores.

The difference in responses to the Motivation to Learn Survey Questionnaire between the experimental and control groups. The intrinsic goal-oriented had a higher mean in the controlled group, while the extrinsic goal-oriented had a close mean score between the control and

experimental groups, a high mean score of the control group compared to the experimental in control of learning beliefs, with high efficacy in motivation, a higher mean score in control than

the experimental group, and close mean scores between the control and experimental groups in task value, and close mean scores between the control and experimental groups in task value.

The difference between the control group and the intrinsic-goal orientation, control of learning beliefs, and self-efficacy was highly significant. It also revealed no statistically significant differences in extrinsic goal orientation of task value.

CONCLUSION

Learning can occur without resulting in behaviors that represent the acquired knowledge, and those behaviors will not occur unless the individual is driven to do so by the consequences. Females in the experimental group outperformed females in the control group on the post-test. There was a significant difference in male and female post-test findings between the experimental and control groups on a systematic level. Females did better on the post-test than males in the experimental group. However, when male and female post-test results were compared, a significant difference in phylogeny was observed between the experimental and control groups. Males in the experimental group outperformed females in the control group on the post-test.

The intrinsic-goal orientation, control of learning beliefs, and self-efficacy of the control group were all statistically significant. No statistically significant changes in task value were observed. According to the theory, human motivation is driven by three psychological needs: autonomy, competence, and relatedness. These three conditions, according to self-determination theorists, transcend age, gender, and culture. Individual motivation determines whether these requirements will be reached or not. Individuals who are impacted by circumstances that do not fit these requirements are more driven or unhappy. Teacher-student relationship was found to be a major predictor of classroom engagement (both self-reported and teacher-reported), especially among males. Relatedness outperformed self-control as a predictor of trial participation.

In the classroom, relatedness encompasses both teacher-student interaction and the teacher-created environment. Teacher-student relationships were found to have an effect on classroom involvement (both self-reported and teacher-reported), especially in males. Relatedness outperformed self-control as a predictor of the conducted experiment. Participation in the instructor-student relationship is critical and explains the relationship between motivation and classroom participation. This strategy explains why students are motivated and participate in class. Teachers employ this technique to assist students in developing motivation. The engagement follows motivation. When teachers and students notice indicators of interest, motivation, and, consequently, involvement increase. Engaging in activities that are not deemed socially valuable by teachers or classmates demotivates students because they lack a sense of belonging.

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COGNITIVE RADIO RECIEVER USING COOPERATIVE SPECTRUM SENSING

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ABSTRACT

Over the past few years, Cognitive Radio has become an important research area in the field of wireless communications. It can play an important role in dynamic spectrum management and interference identification. There are many spectrum sensing techniques proposed in literature for cognitive radio, but all those techniques detect only presence or absence of the primary user in the designated band and do not give any information about the used modulation scheme. In certain applications, in cognitive radio receiver, it is necessary to identify the modulation type of the signal so that the receiver parameters can be adjusted accordingly. Most of the modulated signals exhibit the property of Cyclostationarity that can be used for the purpose of correct detection of primary user and the modulation type. In this paper, we have proposed an enhanced signal detection algorithm for cognitive radio receiver which makes use of cyclostationarity property of the modulated signal to exactly detect, the modulation type of the received signal using a trained neural network. The algorithm gives better accuracy of signal detection evenin low SNR conditions. The use of a trained neural network makes it more flexible and extendible for future applications

1. INTRODUCTION

The existing wireless communication systems and networks are operating based on fixed spectrum assignment policy laid down by regulatory authorities. The exclusive radio frequency spectrum assignment, which is licensed by government regulatory bodies, is an efficient way for interference mitigation. However, the fixed spectrum assignment policies lead to inefficient use of spectrum since most of the channels actively transmit the information only for short duration while the certain portion of the spectrum remains idle for most of the time when the licensed primary users are not transmitting any data [1]. This indicates that the inefficient radio spectrum usage has been a serious bottleneck for deployment of upcoming wireless systems. From this discussion it can be noted that the scarcity of RF spectrum is not a result of lack of spectrum but a result of static spectrum allocations and thereby inefficient usage of the available spectrum. In order to overcome the spectrum scarcity problem, recently Cognitive Radio (CR) system has been proposed to facilitate the spectrum sharing so that the upcoming wireless radio systems can be accommodated without assigning a new spectrum band. The popularity of Software Defined Radio and Cognitive Radio technologies is increasing over past few years. The tremendous growth in the wireless communications has led to a huge demand on the implementation of new wireless services in both licensed and unlicensed frequency spectrum. Recent studies show that the fixed spectrum assignment policy results in poor spectrum utilization [1], [2]. Cognitive Radio (CR) is a promising technology to enable access to unoccupied spectrum bands, called white spaces or spectrum holes, thereby achieving efficient spectrum utilization.

There are many spectrum sensing algorithms proposed for spectrum sensing in cognitive radio. In [2] and [3], various spectrum sensing techniques are discussed. The basic three spectrum sensing methods that are usually used are Match filter detection (MFD), Energy Detection (ED) and Cyclostationary Feature Detection (CFD). But most of these methods mainly help to detect the presence or absence of Primary User (PU) by detecting the energy of the sensed signal or by detecting cyclic feature. They do not give any information about the modulation scheme used. Sometimes for a cognitive radio receiver it is not only sufficient to just detect the presence of the signal but also to detect its modulation type and then demodulate

that signal to get back the original information signal. In CR receiver, identification of correct modulation scheme of Primary User (PU) is often a critical issue when there is no prior knowledge about signal power, carrier frequency etc. [4].

This work presents an enhanced spectrum sensing algorithm to addres the above discussed problem. The main purpose of the proposed Enhanced Signal Detection (ESD) algorithm for a cognitive radio receiver is not only to identify the existence of a signal in a given frequency band, at a given location, at a given time but also to correctly identify the modulation scheme used to modulate that signal. As we know, modulation is the process of varying a periodic waveform in order to use that signal to convey a message, the algorithm makes use of this periodic signal to confirm the presensce primary user signal. This is because, noise signal do not contains any kind of periodicity, and it is totally random in nature. So, detection of periodicity or cyclostationary feature almost confirms the presence of a modulated carrier which might be carrying some information signal of the primary user. After detection of periodicity, the algorithms further facilitates for the detection of the modulation scheme of the detected signal. Thus, the proposed ESD algorithm using Trained Nueral Network (TNN) provides an intermediate step between signal detection and demodulation. It plays an important role in dynamic spectrum management and interference identification for civilian, commercial and military applications.

2.   LITERATURE REVIEW

A large number of automatic modulation classification methods have been developed as per the research of at least two decades. Some modulation classification algorithms are based on the use of signal cyclostationarity that falls under the category of feature based methods. In [1], the author has introduced a spectral correlation theory for cyclostationary time series.Second order periodicity of the signal is exploited using cyclostationary properties. A brief survey of the literature on cyclostationarity and the applications of cyclostationarity in communication, signal processing and many other research areas are described in [4]. The authors in [5] have used the Spectral Correlation Function (SCF) and Cyclic Domain Profile (CDP) for signal detection and hidden Markov model for signal classification to process extracted signal features due to its strong pattern-matching capability. The definitions of SCF and CDP are also mathematically explained in [5]. In [6] and [7], the authors have presented signal classification using cyclic spectral analysis and the simulation results of different modulation types under various noise conditions. In [8], the author has discussed how the cyclostationary features in the signals modulated using different schemes can be detected correctly. In [9] authors have suggested the Likelihood-Based Approach to Modulation Classification. In [10] and [11], the authors have discussed the basics of neural networks, their classification and applications in pattern recognition.The objective of paper [12] and [13] is to summarize the methods used in various stagesof a pattern recognition system and advantages of Back Propagation Algorithm over other techniques to recognize the complex patterns along with other real-life applications.

The authors have given the overview of Artificial Neural Network, its working principle and training in [14] and [15]. In [16], the authors have provided comprehensive fundamentals in detailed manner with examples and computer-oriented experiments. Moreover, the concepts associated with neural networks are explained. The mathematical treatment of layered neural networks is given in detail. In [17], the author has introduced supervised learning algorithm named Scaled Conjugate Gradient (SCG) and its performance is compared to that of standard Back-Propagation Algorithm. According to [18], the spectral correlation analysis can be preferably applied for signals that are produced by some periodic modification or modulation of stationary random noise. In [19], the author investigates the spectral features of several basic analog and digital modulated signals from point view of modulation recognition and parameter estimation. In [20] and [21], the spectral correlation function that is a generalization of the

power spectral density function is described. Explicit formulae for the spectral correlation function for various types of analog and digital modulated signals are also derived. In [22], authors have provided an experimental performance evaluation of the Energy Detector based sensing using NI USRP-2930, which is a Software Defined Radio (SDR) transceiver. In [23], problem of future wireless network has been examined and new learning scheme using artificial neural network is proposed.

The author of [24] has discussed a modulation classification method capable of classifying MFSK digital signals without a priori information using modified covariance method. In reference [25] cyclostationary based spectrum sensing method and a modified intrusion elimination (AIC) algorithm to mitigate the interference between the primary and cognitive users had been proposed. Thus from this literature review, it is clear that cognitive radio is apromising technology to overcome the problem of spectrum scarcity and spectrum sensing is an very important aspec t of cognitive radio receiver. There are various method of spectrum sensing and very few help in recognising parameters of primary signal which is of great importance in certain applications. The proposed algorithm in this paper helps to overcome the problem of correct detection of the primary user presence as well as modulation type. Thus it is not merely a spectrum sensing algorithm but going beyond that to give additional information about primary user, hence the named as enhanced spectrum sensing algorithm.

3. CYCLOSTATIONARITY, SCF AND CDP

A cyclostationary process has statistical properties that vary periodically over time. Cyclostationary feature detection method deals with the inherent cyclostationary properties or features of the signal. Such features have a periodic statistics and spectral correlation that cannot be found in any interference signal or stationary noise. This periodicity in the received primary signal is exploited to identifythe presence of primary users, and that is why the cyclostationary feature detection method possesses higher noise immunity than any other spectrum sensing method. In this method, the cyclic spectral correlation function is the parameter that is used for detecting the primary user signals.

Cyclostationary spectrum sensing method performs better than other detection schemes such as energy detection method in low SNR regions, because of its noise rejection capability. This occurs because noise is totally random and does not exhibit any periodic form of behaviour. When we have no prior knowledge about primary user's waveform, which is the scenario in real life, then best technique to be adopted is cyclostationary feature detection. As an advantage, the cyclostationary spectrum sensing method can be used to find out the type of modulation scheme used by the primary user signal.

Spectral correlation function (SCF) is a powerfultool to study cyclostationary signals. It can be used to analyze and extract information from modulated signals in noise according to their cyclostationarity [19]. The expression for SC can be derived as follows:

Signal x(t) satisfies second order periodicity with cyclic frequency $\alpha \neq 0$ if and only if

$$\hat{R}_x^a = \lim_{T\to\infty} \frac{1}{T} \int_{-T/2}^{T/2} x(t+\frac{\tau}{2})x(t-\frac{\tau}{2})e^{-i2\pi at}\, dt \tag{1}$$

Exists and is not identically zero as a function of τ. Above equation is known as the cyclic autocorrelation (also called limit cyclic autocorrelation). When $\alpha=0$, it reduces to conventional autocorrelation.

We know that, the Power Spectral Density (PSD) is obtained by taking the Fourier transform of theautocorrelation function. Mathematically,

$$S_x(f) = \int_{-\infty}^{\infty} R_x(\tau)e^{-i2\xi f\tau}d\tau \tag{2}$$

Similarly, the Spectral Correlation Density (SCD) is the Fourier transform of the cyclicautocorrelationfunction and is given by,

$$S_x^a(f) = \int_{-\infty}^{\infty} R_x^a(\tau)e^{-i2\xi f\tau}d\tau \tag{3}$$

(3)   reduces to (2).
When α=0,

Where X_T is the time-variant Fourier transform defined as follows:

$$X_T(t,f) \triangleq \int_{t-T/2}^{t+T/2} x(u)e^{-i2\xi f} \, du \tag{4}$$

The estimated SCF obtained by frequency smoothing of theCyclic Periodogram in (4) is,

$$S_{xT}^a(t,f)_{\Delta f} \triangleq \frac{1}{\Delta f}\int_{f-\Delta f/2}^{f+\Delta f/2} S_{xT}^a(t,v)dv \tag{5}$$

The SCF can be obtained by increasing observation lengthT and reducing the size of the smoothing windowΔf

$$S_x^a(f) = \lim_{\Delta f \to 0} \lim_{T \to \infty} S_{xT}^a(t,f)_{\Delta f} \tag{6}$$

The SCF is a cross-correlation function between frequency components separated by (f+α/2) and (f−α/2). If x(t) contains no spectral components at f=±α/2, then the SCF is actually the covariance of the two spectral components. We can define the correlation coefficient for the SCF, which is known commonly as spectral coherence (SC). Mathematically, the spectral coherence is defined as [2], [5], [6]

The magnitude of the SC ranges from 0 to 1. It allows us to measure thestrength of second-order periodicity contained within a timeseries in a simplified way. When SCF is plotted, the occupancy status of the spectrum can be found out. If a primary user signal is present in the operating frequency range, the SCF gives a peak at its centre. The peak will not be present in the case when there is no primary user signal present in the concerned frequency range [7].

However the use of SC requires large amounts of data and hence one of the solutionsis to use only the peak values in the SC. These peak values in the SC are called as cyclic frequency domain profile orsimply cyclic domain profile (CDP) or α-profile [5]. The cyclic frequency is inherently a discrete parameter. It is convenient to assess the cycle-frequency parameter by evaluating the maximum over spectral frequency f.

Neural networks trained using the cyclic domain profiles (CDP) can be used for signal classification due to their patternmatching capabilities. Training the neural network with different realizationsof the signal allows it to extract features such as carrierand keying-rate features of the signal. When the neuralnetwork is trained with a variety of signal realizations withdifferent SNRs, the network performs exceptionally, evenat low SNR levels.

4.   THE PRPOSED ALGORITHM

The proposed Enhanced Signal Detection (ESD) algorithm primarily aims at estimation of modulation scheme of the received PU signal**.** Most modulated signals exhibit the property of Cyclostationarity that can be exploited for the purpose of classification. A feature-based method called Cyclostationary Feature Detection is able to identify different modulation schemes. The Spectral Correlation Function obtained from the sensed signal is used as a cyclic feature. The Cyclic frequency Domain Profile (CDP) derived from Spectral Correlation Function is used as a

discriminator in the classification process since several modulation schemes have unique cyclic frequency domain profiles. The neural network approach based on the learning mechanism is employed for pattern matching. It is used for classification of data patterns and distinguishing them into predefined set of classes. The two layered neural network is trained using the Back Propagation Algorithm.

Enhanced Signal Detection (ESD) Algorithm using a Trained Neural Network (TNN)

Step 1: Detect the noisy modulated signal. Step 2: Estimate its Cyclic Periodogram. Step 3: Perform Time Smoothing.

Step 4: Perform Frequency Smoothing. Step 5: Calculate Spectral Coherence. Step 6: Calculate Cyclic Domain Profile.

Step 7: Train the Neural network with various Cyclic Domain Profile patterns. Step 8: Obtain Classification Confusion Matrix.

Step 9: Verify the results for different modulation schemes.

The main Design Considerations for the Enhanced Signal Detection (ESD) Algorithm using aTrained Neural Network (TNN) are as follows:

a.   Channel is assumed to be noisy with Additive White Gaussian Noise (AWGN) with varying values ofstandard deviation.

b.   Number of data symbols are 2000 and symbol rate is 3 GHz.

c.   Sampling frequency selected satisfied Nyquist criterion.

d.   FFT is used for time smoothing.

e.   Raised Cosine filter is used for frequency smoothing.

f.   400 CDPs of different modulation schemes are input to the neural network.

g.   Number of hidden neurons is 10.

5.   RESULTS AND DISCUSSIONS

The LabVIEW software from National Instruments is a powerful simulation tool which makes use of graphical programming language. The proposed algorithm is simulated with combined use of LabVIEW and MATLAB. Different types of synthetic signal realisaions are generated to prepare a database to train the ANN. For each of the case SCF and CDP signals are studied. After analysis of the CDP plot for the different synthetic signal realization, the modulation type of the received signal can be recognized. CDP plot is actually a two dimentinal view of the SCF plot which can represent the important characteristics of the signalof our interest with less data samples.

Training the neural networks with different realizations of the signal allowed them to extract and pick out the carrier and cyclostationary features of the signal from the background noise. Time constraints limited the amount of data we were able to generate to test and train the ANN, however considering its sufficient performance with a considerable observation window (on the order of 256 samples) we believe it is possible for this type of network to classify signals with low SNRs and fewer observed samples while preserving the levels of performance and computational complexity.

As of now, we have tested here some specific modulation types using the proposed algorithm, but other advanced modulation schemes can also be detected in future. Based on the some typical nature of SCF and CDP plots, different modulations schemes are discussed in following cases.

Case 1: Noisy Signal: If the received signal consists of only noise (assumed AWGN for simulation), then no signal peaks are observed in the SCF as well as CDP plots. This indicates the absence of signal in the sensed channel i.e. the primary user is absent. This is because noise signal do not contain any form of periodicity, it is totally random in nature.

Case 2: Binary Phase Shift Keying (BPSK) Signal: When a BPSK modulated signal is sensed, then three distinct peaks along α axis are observed, as shown in Figure 1. The pick signal at a perticular frequency represents the maximum signal content at that frequency. As there are only two frequencies, one is information signal and other is career signal in BPSK, the first peak corresponds to the symbol rate f_r, the second one corresponds to the carrier frequency f_c and the last one corresponds to $f_c + f_r$.
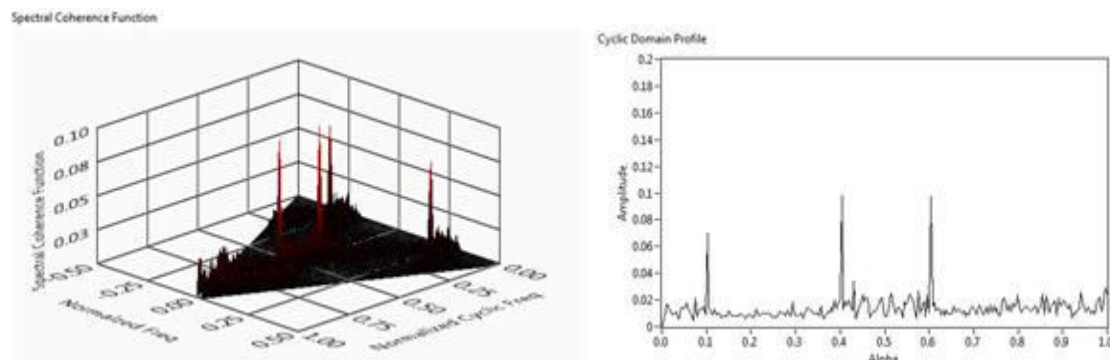

Figure 1. SCF and CDP for BPSK modulated signal showing presence of three peaks

Case 3: Quadrature Phase Shift Keying (QPSK) Signal: When the sensed signal is QPSK modulated, the CDP plot is very simplified with presence of only one peak along α axis, which corresponds to the symbol rate f_r as shown in Figure 2. The extra two peaks in BPSK are missing in QPSK, because, QPSK is a balanced modulation (has both, in phase and quadrature phase components) and hence peaks corresponding to the carrier frequency get cancelled out.
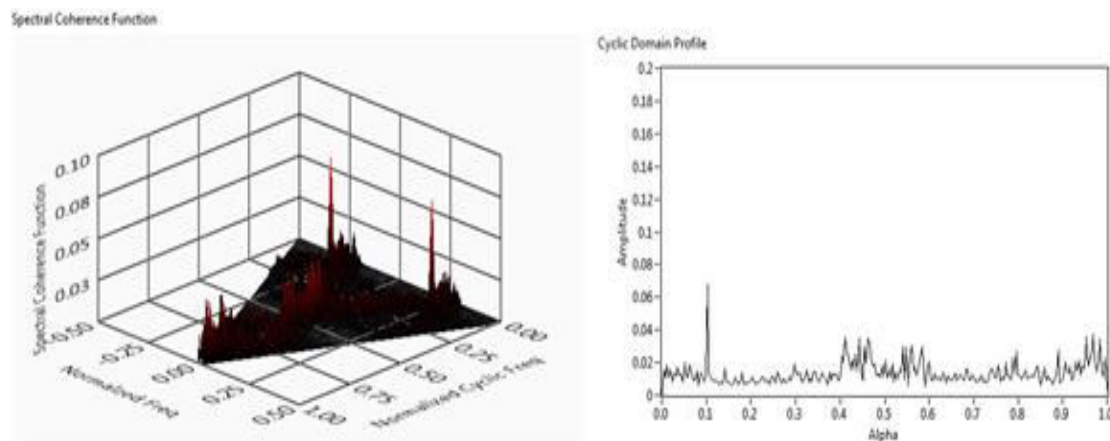

Figure 2. SCF and CDP for QPSK modulated signal showing presence of one peak

Case 4: Frequency Shift Keying (FSK) Signal: If the sensed signal is FSK modulated, there are two impulses of equal amplitude in the CDP as shown in Figure 3, which corresponds to two carrier frequencies involved, i.e. 'mark' frequency and 'space' frequency. Also, the two peaks that overlap the two impulses are observed. These two peaks along with the third one are analogous to the one observed in CDP of BPSK.
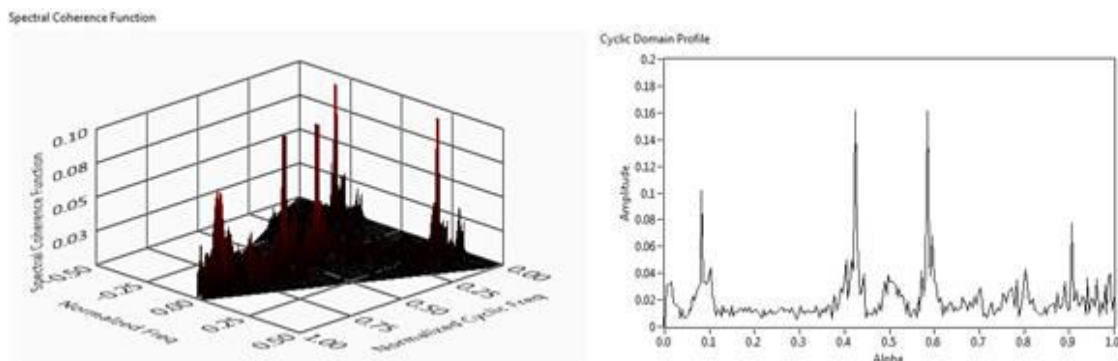
Figure 3. SCF and CDP for FSK modulated signal showing presence of two main peaks

Case 5: Minimum Shift Keying (MSK) Signal: When the received signal is MSK modulated, then the SCF and CDP shows only two peaks as shown in Figure 4. These peaks correspond to the two quadrature carrier $Sin2\pi$ and $Cos2\pi$. This enables easy identification of the MSK signal.
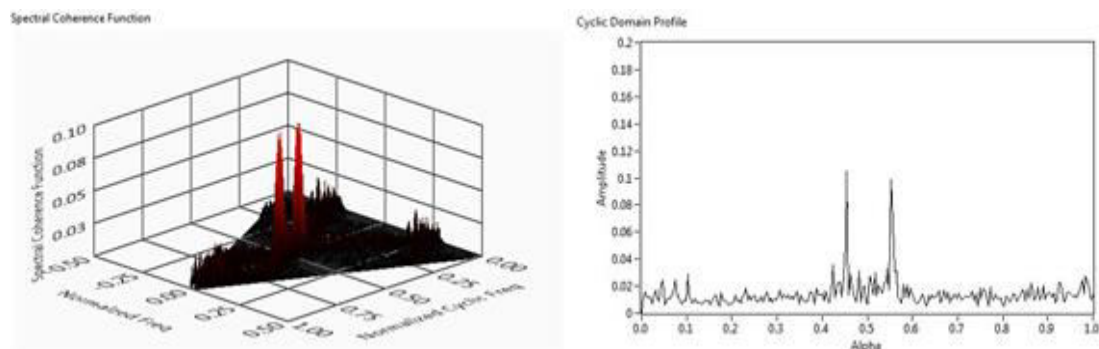

Figure 4. SCF and CDP for MSK modulated signal showing presence of only two peak

The generated CDPs from the synthetic modulated signals are then given to an artificial neural network. The use of ANN makes it simpler to classify the CDPs and then identify correctly the modulation scheme after training phase. Figure 5 shows the block diagram of the artificial neural network. It is trained with 256 point CDPs of various synthetic modulated signals. There is one hidden layer and one output layer.
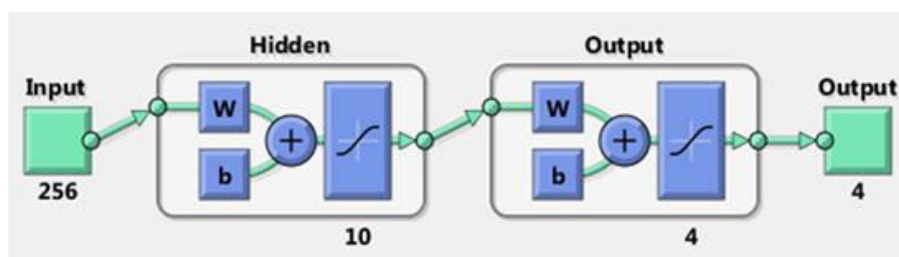

Figure 5. Neural network trained using 256 point CDPs

Figure 6 shows a plot of mean square error versus number of training iterations (epochs) according to which the best validation performance is 0.00026501 at epoch 36. It can be concluded from the plot that the mean square error decreases with increase in number of epochs and attains a stable value at some instant.

Figure 7 is called Classification Confusion Matrix for training, validation, testing as well as overall classification result. It shows the various types of errors that occurred for the final trained network. In other words, it represents the accuracy of classification.The diagonal cells

show the number of cases that were correctly classified (in green) and the off-diagonal cells show the misclassified cases (in red). The blue cell in the bottom right shows the total percentage of correctly classified cases and the total percent of misclassified cases. For training, the accuracy achieved is 98.9%, for training, it is 98.3% for testing and 100% for validation. The results show very good recognition since overall accuracy of all confusion matrix is 99%. Thus, the network performs exceptionally well, even at low SNR levels.

The proposed work over here is much different than [4] and [6], as they make use of Hidden Markov Model (HMM) and MAXNET based classifier. It is much different from the work proposed in [23] which focuses mainly on the spectrum sensing of predicted free channels using ANN. Instead, in this work we have proposed an enhanced algorithm for signal detection and classification using ANN which is implemented using LabVIEW and Matlab softwares. This approach firstly helps to fully automise the process of signal classification and secondly, provides flexibility for future enhancements for detection of advanced modulation schemes. The accuracy of classification achieved with this algorithm is almost 100% which was not achieved with any of the past research work mentioned in the references. These are the some noteworthy contributions of this work and will be proved useful for development of efficient cognitive radio systems in future.
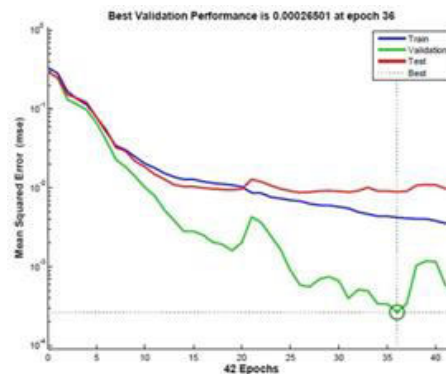

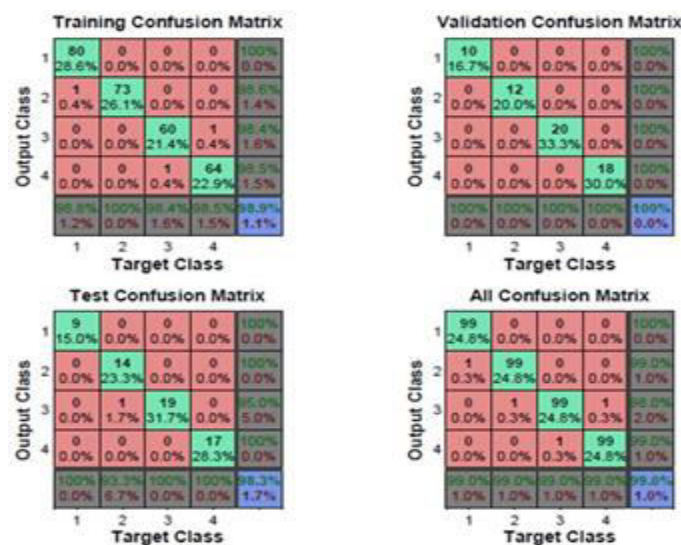Figure 6. Training, validation and test performance plot

Figure 7. Classification confusion matrix

6. CONCLUSION

The proposed Enhanced Signal Detection algorithm using Trained Neural Network not only helps to detect the signal but classifies it correctly and identifies the modulation scheme. Because of use of cyclostationarity feature of the PU signal, the algorithm can work well even in low SNR conditions and still gives more accurate results as compared to energy detection scheme whose performaaance degrades in noisy environment. The calculated SCF and then CDP of the received signal helps to correctly identify the type of the modulation scheme with the help of neural network. The results show very good recognition rate since overall accuracy of all confusion matrix is 99%. The classification accuracy of the algorithm is also 98.3% which is the highest among the other classification schemes discussed in literarture review. The use of LabVIEW software for implementation of ANN provides automization of signal classification process and gives the flexibility for future adaptations. It also reduces computational complexity. The proposed algorithm not only gives the assurance of the presence of signal by detecting its scheme of modulation but also helps to demodulate the signal by knowing its type. In this paper, the performance of the ESD algorithm is tested by making use of limited number of modulation schemes, but in future more modulation schemes can be considered. The neural network gives the flexibility for training with advanced modulation schemes such as OFDM, DVB using fading channel environment with noise uncertainty which can further extend the scope ofthis algorithm in future.

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BUSINESS AND HUMAN RIGHTS LAW

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INTRODUCTION OF HUMAN RIGHTS

All business enterprises are expected to respect human rights, meaning they should avoid infringing on the human rights of others, and should address adverse human rights impacts with which they are involved. When businesses respect human rights, they demonstrate their commitment to building sustainable and mutually beneficial relationships with those who influence or are impacted by their operations, including customers, communities, workers, and investors.

The Guiding Principles contain three pillars: protect, respect and remedy. Each defines concrete, actionable steps for governments and companies to meet their respective duties and responsibilities to prevent human rights abuses in company operations and provide remedies if such abuses take place. The actions of business enterprises can affect people's enjoyment of their human rights either positively or negatively. Indeed, experience shows that enterprises can and do infringe human rights where they are not paying sufficient attention to this risk.

BUSINESS SENSE

Aside from it being the right thing to, it also makes good business sense to respect human rights. Businesses can find themselves involved in lawsuits, suffering reputational harm and missing out on business opportunities and investments as well as the chance of recruiting the best new employees. Develop new standards that supplement hard law. This can be one of the most effective tactics that organizations practice. By working collectively with other companies or stakeholders, companies can create ethical frameworks that define corporate behavior in regard to human rights violations

States are obligated under international human rights law to protect against human rights abuse within their territory and/or jurisdiction by third parties, including business enterprises. Guiding principles are moral values that set a standard for behavior and attitude within a workplace. Companies establish guiding principles to shape the culture of their work environment and ensure that their employees understand what moral behavior they expect.

HUMAN RIGHTS INHERENT

Human rights are inalienable. This means that you cannot lose them, because they are linked to the very fact of human existence, they are inherent to all human beings. ...

Human rights are indivisible, interdependent and interrelated. ...

Human rights are universal,.

The United Nations' Guiding Principles for business and human rights sets out the responsibility of businesses to respect human rights. This means your business should avoid harming the human rights of others and should address adverse human rights impacts in which you are involved. In June 2014, the UN Human Rights Council took steps to elaborate an international legally binding instrument to regulate the activities of transnational corporations and other business enterprises.

FUNDAMENTAL UNDERSTANDING

A fundamental understanding of the connections between business conduct and human rights in a globalized world for an audience, who are generally interested in globalization and human rights and for individuals who are working at such interfaces in companies, civil society, intergovernmental. The rights support stable, predictable legal and regulatory environments. At the same time, they enable the free flow of information, investment and entrepreneurial innovation. When these civic freedoms are undermined, business and civil society alike are subject to the law of the jungle instead of the rule of law.

Companies to have a human rights strategy and proactively consider when and how to take the action needed to fulfill their moral obligations; meet shareholder, customer, and employee expectations; and keep other stakeholders satisfied. Influence through action with business peers: companies can work with their peers to develop joint solutions to shared human rights challenges, for example, they can agree standard requirements for suppliers or a joint public stance on human rights standards in discussion with a government.

DIFFERENT RIGHTS

Five human rights are civil, political, economic, social and cultural rights. Also important is the International Labour Organisation (ILO), a UN agency bringing together governments, employers and workers representatives from 187 member states. If you become aware of employment practices that breach human rights, speak out. Depending on the circumstances, you may be able to make a complaint, or speak with someone within your organisation. If not, contact the Equality or Human Rights Commission within your country for advice.

The rights ethical approach assumes that it is the moral and professional responsibility of the management and its company to consider the safety of workers and provide them with appropriate protection against any form of physical or psychological harm.

The actions of business enterprises can affect people's enjoyment of their human rights either positively or negatively. Indeed, experience shows that enterprises can and do infringe human rights where they are not paying sufficient attention to this risk.
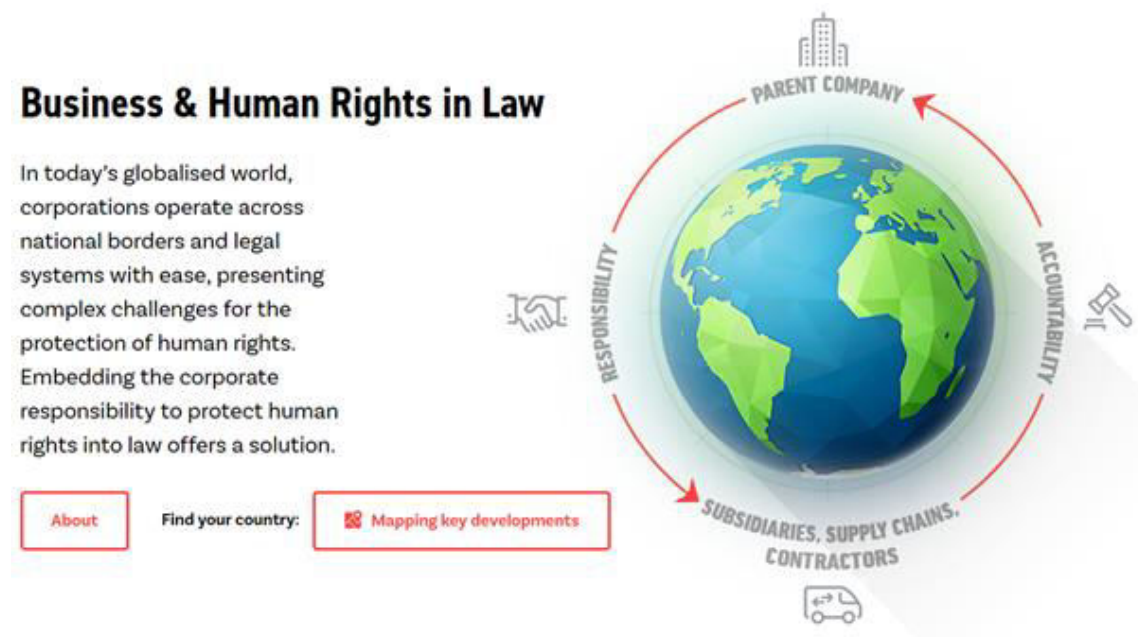

Figure 1. Business & Human Rights in Law

The Business & Human Rights in Law figure 1. website tracks legislative and case law developments related to the corporate responsibility to protect human rights, with a focus on mandatory human rights due diligence and parent company liability.

THE RIGHTS COVERED BY THE COVENANTS
Freedom from discrimination.

Right to equality between men and women.

Right to life.

Freedom from torture.

Freedom from slavery.

Right to liberty and security of person.

Right to be treated with humanity in detention.

Freedom of movement.

These include the right to life, the right to a fair trial, freedom from torture and other cruel and inhuman treatment, freedom of speech, freedom of religion, and the rights to health, education and an adequate standard of living.

KEY TO SUCCESS
Consistency is key to success in business. If you are selling products or offering services, make sure that you consistently offer high-quality products and services. This way, your customers will trust you. Once you have established trust with your customers, they are less likely to move to your competitors. The principles of management can be distilled down to four critical functions. These functions are planning, organizing, leading, and controlling.

Human rights include the right to life and liberty, freedom from slavery and torture, freedom of opinion and expression, the right to work and education, and many more. Everyone is entitled to these rights, without discrimination. To promote and protect the constitutional fundamental rights of common people. To get public help in solving social problems. To promote respect for all without discrimination. To promote social culture and character.

PRINCIPLES OF ITIL GUIDELINES
The seven ITIL guiding principles are:

Focus on value.

Start where you are.

Progress iteratively with feedback

Collaborate and promote visibility.

Think and work holistically.

Keep it simple and practical.

Optimize and automate.

United Nations Guiding Principles on Business and Human Rights (UNGPs)
The UNGPs are a voluntary international framework, which promotes: the duty of the State to protect human rights. the responsibility of businesses to respect human rights. Access to remedy for victims of abuses.

The prevention of adverse impacts on people is the main purpose of human rights due diligence. It concerns risks to people, not risks to business. Companies have the legal right to own, buy or

sell property, including trademarks comprising your company's logos, phrases, words or design. Corporate law prevents other competitors from using a business's registered trademark.

A legally-binding instrument

Despite the support from the public and private sectors, some stakeholders questioned whether the UNGPs set a sufficiently high standard for businesses, arguing that the private sector should have an "obligation" to realise rights, rather than simply a "responsibility". Others argued that the UNGPs needed an overarching accountability mechanism that could make the framework legally enforceable. Supporters, however, defend the UNGPs for creating far more consensus than any previous attempt at creating a global business-human rights standard.

The debate about the sufficiency of a voluntary soft-law approach that underlie the Guiding Principles, however, reopened in September 2013 when Ecuador, backed by 84 governments proposed a binding legal instrument for TNC operations in order "to provide appropriate protection, justice and remedy to the victims of human rights abuses directly resulting from or related to the activities of some transnational corporations and other business enterprises.

The call was backed by more than 530 civil society organisations (CSOs) and in June 2014 was backed by a majority of the UN Human Rights Council which agreed to establish an open-ended intergovernmental working group mandated to draft a binding instrument.

Relationship with Guiding Principles

The prospect of a legally-binding treaty raises questions as to the potential for tension between the proposed binding instrument and the UNGPs and ensuring the treaty-making process does not undermine the progress made under UNGPs. Sceptics of a comprehensive binding treaty stressed the need to recognise the risk associated with a bad treaty that would create issues from a civil society perspective such as having principles that may be widely agreed upon by states, but lack clarity in what they require in practice. Conversely, others have conveyed that a binding instrument in conjunction with other initiatives, such as the UNGPs, would further developing international law in this area as it would complement existing instruments. This perspective depicts a proposed treaty to be just one aspect within a developing comprehensive system aimed at regulating business and human rights.

Universal Declaration of Human Rights (UDHR)

The Universal Declaration of Human Rights (UDHR) is generally agreed to be the foundation of international human rights law. Adopted in 1948, the UDHR has inspired a rich body of legally binding international human rights treaties.

The UDHR is widely recognized as having inspired, and paved the way for, the adoption of more than seventy human rights treaties, applied today on a permanent basis at global and regional levels (all containing references to it in their preambles).

Corporate Human Rights Benchmark (CHRB)

The Corporate Human Rights Benchmark (CHRB) provides a comparative snapshot year-on-year of the largest companies on the planet, looking at the policies, processes, and practices they have in place to systematise their human rights approach and how they respond to serious allegations.

Research into how freedom affects business performance reveals that the right kind of freedom can indeed underpin competitive advantage, across different measures of financial performance, innovation and long-term success. At the centre of many conflicts around the world are human rights, making this one of the key issues in the world today. These rights include the freedom to vote, to assemble, to speak one's mind, to be treated fairly before the law, and to gain an education.

Human Rights Roadmap
Equality and Human Rights Roadmap

Prevent discrimination.

Provide reasonable accommodation for people with disabilities.

Accommodate diversity.

Promote equality.

Respect, protect and fulfil human rights.

Addressing human rights helps mitigate global risks. Businesses thrive in an environment where civic rights are respected. Promoting workers' rights increases productivity and profitability. Respect for human rights improves relations with local civil society.

Businesses can achieve inclusivity by promoting equality, respect and dignity in the workplace. Environmental issues relate to preserving a clean/safe/sustainable environment. Businesses should assess, control and address all the physical, chemical and biological factors in the environment.

When businesses respect human rights, they demonstrate their commitment to building sustainable and mutually beneficial relationships with those who influence or are impacted by their operations, including customers, communities, workers, and investors. Human rights legislation prevents the business people from unethical activities in the workplace such as discrimination, bias, child labour, or unsafe working conditions.

The responsibility to respect human rights is a global standard of expected conduct for all business enterprises wherever they operate. It exists independently of States' abilities and/or willingness to fulfil their own human rights obligations, and does not diminish those obligations.

Use company resources to provide and enhance human rights education, support the establishment or enforcement of well-ordered social and political institutions, encourage transparency, and safeguard a free press. This is an area in which partnering with other organizations can be particularly effective.

Threatening staff with physical punishment or tolerating severe harassment of some employees, for example, of trade union members or members of a minority ethnic group. A company whose supplier routinely allows sexual abuse of female workers to go unaddressed in their workplace.

Categories of employee rights
Seven categories of employee rights

The Minimum Wage.

Workplace Safety.

Health Coverage.

Social Security.

Unemployment Benefits.

Whistleblower Protections.

Family Leave.

Employment-Based Discrimination.

Employer isn't a public authority you can't make a claim against your employer for a breach of your human rights. However, human rights law has been incorporated into general employment law and applies to all employers, like the right not to be discriminated against because of your sexuality.

Denying services and information about health (the right to health) Discriminating at work based on traits like race, gender, and sexual orientation (The right to work) Failing to provide maternity leave (protection of and assistance to the family) Not paying a sufficient minimum wage (rights at work)

Human rights standards benefit business
Compliance with both Local and International Laws: Human rights principles are contained in national and international law. Ensuring that business operations are consistent with these legal principles helps companies avoid legal challenges to their global activities.

Business ethics:
An ethical company runs on principles such as

Honesty,

Integrity,

Fairness,

Trustworthiness,

Accountability, and

Respect for others.

What is new Human Rights Act?
The Bill of Rights Bill was introduced to parliament in June 2022. It would repeal and replace the Human Rights Act 1998, which incorporates and makes the rights contained in the European Convention on Human Rights (ECHR) domestically enforceable.

Basic Human Rights List | Universal Declaration of Human Rights
Human rights are moral principles or norms that describe certain standards of human behaviour, and are regularly protected as legal rights in municipal and international law. Everyone born in this world have human rights that must be protected by the law. According to United Nations, there are 30 basic human rights that recognized around the world. So what are the 30 human rights according to Universal Declaration of Human Rights by United Nations?

Basic human rights recognized around the world delacred by United Nations through Universal Declaration of Human Rights. These declaration held by United Nations General Assembly at the Palais de Chaillot in Paris, France on 10 December 1948. Of the then 58 members of the United Nations, 48 voted in favor, none against, eight abstained, and two did not vote.

This declaration consists of 30 articles affirming an individual's rights. Those 30 articles currently known as 30 universal declaration of human rights or 30 basic human rights, including rights to life, rights to education, rights to organize and rights to treated fair among others things. The 30 universal human rights also cover up freedom of opinion, expression, thought and religion.

Human Rights List
So what are the 30 basic human rights list? Here are full list of 30 human rights according to Universal Declaration of Human Rights (UDHR) by United Nations, signed in Paris on 10 December 1948.

1. All human beings are free and equal

All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

2. No discrimination

Everyone is entitled to all the rights and freedoms, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Furthermore, no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to which a person belongs.

3. Right to life

Everyone has the right to life, liberty and security of person.

4. No slavery

No one shall be held in slavery or servitude; slavery and the slave trade shall be prohibited in all their forms.

5. No torture and inhuman treatment

No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment.

6. Same right to use law

Everyone has the right to recognition everywhere as a person before the law.

7. Equal before the law

All are equal before the law and are entitled without any discrimination to equal protection of the law. All are entitled to equal protection against any discrimination in violation and against any incitement to such discrimination.

8. Right to treat fair by court

Everyone has the right to an effective remedy by the competent national tribunals for acts violating the fundamental rights granted him by the constitution or by law.

9. No unfair detainment

No one shall be subjected to arbitrary arrest, detention or exile.

10. Right to trial

Everyone is entitled in full equality to a fair and public hearing by an independent and impartial tribunal, in the determination of his rights and obligations and of any criminal charge against him.

11. Innocent until proved guilty

Everyone charged with a penal offence has the right to be presumed innocent until proved guilty according to law in a public trial at which he has had all the guarantees necessary for his defence. No one shall be held guilty of any penal offence on account of any act or omission which did not constitute a penal offence, under national or international law, at the time when it was committed.

12. Right to privacy

No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks.

13. Freedom to movement and residence

Everyone has the right to freedom of movement and residence within the borders of each state. Everyone has the right to leave any country, including his own, and to return to his country.

14. Right to asylum

Everyone has the right to seek and to enjoy in other countries asylum from persecution. This right may not be invoked in the case of prosecutions genuinely arising from non-political crimes or from acts contrary to the purposes and principles of the United Nations.

15. Right to nationality

Everyone has the right to a nationality. No one shall be arbitrarily deprived of his nationality nor denied the right to change his nationality

16. Rights to marry and have family

Men and women of full age, without any limitation due to race, nationality or religion, have the right to marry and to found a family. They are entitled to equal rights as to marriage, during marriage and at its dissolution. Marriage shall be entered into only with the free and full consent of the intending spouses. The family is the natural and fundamental group unit of society and is entitled to protection by society and the State.

17. Right to own things

Everyone has the right to own property alone as well as in association with others. No one shall be arbitrarily deprived of his property.

18. Freedom of thought and religion

Everyone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief, and freedom, either alone or in community with others and in public or private, to manifest his religion or belief in teaching, practice, worship and observance.

19. Freedom of opinion and expression

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers

20. Right to assemble

Everyone has the right to freedom of peaceful assembly and association. No one may be compelled to belong to an association.

21. Right to democracy

Everyone has the right to take part in the government of his country, directly or through freely chosen representatives. Everyone has the right of equal access to public service in his country.

22. Right to social security

Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.

23. Right to work

Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment. Everyone, without any discrimination, has the right to equal pay for equal work. Everyone has the right to form and to join trade unions for the protection of his interests.

24. Right to rest and holiday

Everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay.

25. Right of social service

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control. Motherhood and childhood are entitled to special care and assistance. All children shall enjoy the same social protection.

26. Right to education

Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.

27. Right of cultural and art

Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits. Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

28. Freedom around the world

Everyone is entitled to a social and international order in which the rights and freedoms set forth in this Declaration can be fully realized.

29. Subject to law

Everyone has duties to the community in which alone the free and full development of his personality is possible. In the exercise of his rights and freedoms, everyone shall be subject only to such limitations as are determined by law solely for the purpose of securing due recognition and respect for the rights and freedoms of others and of meeting the just requirements of morality, public order and the general welfare in a democratic society.

30. Human rights can't be taken away

Nothing in this Declaration may be interpreted as implying for any State, group or person any right to engage in any activity or to perform any act aimed at the destruction of any of the rights and freedoms set forth herein. So those are all Universal Declaration of Human Rights list by United Nations General Assembly. All universal human rights list above commonly known as 30 basic human rights that must be respected and protected by the law.

TABLE: INTERNATIONALLY RECOGNIZED HUMAN RIGHTS AND EXAMPLES OF HOW BUSINESS MIGHT IMPACT THEM

Relevant human right	Brief explanation of the right	Examples of how business might be involved with an impact on the right
Right of self-determination	• A right of peoples, rather than individuals. • Peoples are entitled to determine their political status and place in the international community. • It includes the rights to pursue economic, social and cultural development, to dispose of a land's natural resources and not to be deprived of the means of subsistence. • A particular right of indigenous peoples to self-determination has been specifically recognized by the international community.	• Engaging in business activities on land that has traditional significance to the peoples that inhabit an area when that land was acquired by Government without due consultation with the local population. • Any activity that might have impacts on indigenous peoples' lands, whether through acquisition, construction or operation, may give rise to impacts on their right to self-determination.
Right to life	• Right not to be deprived of life arbitrarily or unlawfully. • Right to have one's life protected, for example, from physical attacks or health and safety risks.	• The lethal use of force by security forces (State or private) to protect company resources, facilities or personnel. • Operations that pose life-threatening safety risks to workers or neighbouring communities through, for example, exposure to toxic chemicals. • The manufacture and sale of products with lethal flaws.
Right not to be subjected to torture, cruel, inhuman and/or degrading treatment or punishment	• An absolute right, which applies in all circumstances. • Torture has been held to involve a very high degree of pain or suffering that is intentionally inflicted for a specific purpose. • Cruel and/or inhuman treatment also entails severe suffering. • Degrading treatment has been held to involve extreme humiliation of the victim.	• Conducting business in countries where State security or police forces protecting company assets do not respect this right. • Failure to foster a workplace that is free from severe forms of harassment that cause serious mental distress. • Manufacture and sale of equipment misused by third parties for torture or cruel treatment or for medical or scientific experimentation without their consent.
Right not to be subjected to torture, cruel, inhuman and/or degrading treatment or punishment	• An absolute right, which applies in all circumstances. • Torture has been held to involve a very high degree of pain or suffering that is intentionally inflicted for a specific purpose. • Cruel and/or inhuman treatment also entails severe suffering. • Degrading treatment has been held to involve extreme humiliation of the victim.	• Conducting business in countries where State security or police forces protecting company assets do not respect this right. • Failure to foster a workplace that is free from severe forms of harassment that cause serious mental distress. • Manufacture and sale of equipment misused by third parties for torture or cruel treatment or for medical or scientific experimentation without their consent.
Right not to be subjected to slavery, servitude or forced labour	• Slavery exists when one human effectively owns another. • Freedom from servitude covers other forms of severe economic exploitation or degradation, such as in the trafficking of workers or debt bondage. • Rights to freedom from slavery and servitude are absolute rights. • Forced or compulsory labour is defined by the ILO as all work or service that is extracted under menace of any penalty and for which the person has not voluntarily offered themselves. • Providing payment does not mean that work is not forced labour if the other aspects of the definition are met.	• Businesses may unknowingly benefit through their supply chains from the labour of workers who have been trafficked and are forced to work as slaves, for example, on agricultural plantations. Women and children may be subject to particularly severe impacts in such situations. • A company may be involved in the transportation of people or goods that facilitates the trafficking of individuals. • Forced labour can arise in any sector where an employer puts workers in a position of debt bondage through company loans or the payment of fees to secure a job and/or where the company withholds workers' identity documents. This is a particular risk in the case of migrant workers, a recognized vulnerable group.

Expect for human rights improves relations with local civil society. A good human rights record enhances brand value and trust. Respecting human rights reduces regulatory risks. Human rights are key to responsible supply chain management.

ABOUT THE EDITOR

Dr Namita Dixit is a prolific academician and researcher. She completed her PhD (International Business) from Lucknow University in the year 2004. She has a rich experience of over 22 years in the industry, including four years in corporate – Xerox Corporation, USA, where she worked in strategy building for startups, NGOs, Institution Building, Accreditation Committee and Administration. She has presented research papers at various international and national conferences. She has published her research work in various journals, magazines and proceedings of repute. She has organized various International Conferences, Business Summits and Symposiums for various institutes.

Spearheading the International Business specialization, she collaborated with several universities and institutes in the US, Europe and the Middle East like IDRAC Business School, AISEC, Valparaiso University, GIIM and many more. She has also chaired technical sessions in various National & International Seminars/Conferences at various prestigious forums.

Her Major subject domains are International Business, Strategic Management, Business Environment and Managerial Economics

She is a Member of Editorial Advisory Board of:

1. International Journal of Advance & Innovative Research (2394-7780) Impact Factor: 7.36 (UGC Approved Journal No 63571) http://iaraedu.com/about-journal/

2. International Journal of Research in Management & Social Science (2322-0899) Impact Factor: 6.45 http://www.empyreal.co.in/journal-current-issue.html.

She has Conducted Number of Faculty Development Programme in the areas of Data Analysis using SPSS and Improving Teaching Pedagogy

She has published a book titled, 'Convergence of Social Innovation and Digital Transformation in Business' having an ISBN: 978 -81-928555-5-4 by Cengage Publishing House India Pvt ltd headquartered in Boston, MA with an office hub located in San Francisco, CA.

She has contributed a chapter titled 'A rational Analysis of Digital Intelligence in Boosting International Trade in the edited book "Digitalisation & Innovations in Business" having ISBN: 978-81-944813-1-7 by Empyreal Publishing House, and is available on publisher's website www.editedbook.in

About the Book

The aim of this book is many-folds. The author presents a practical application of multidisciplinary research based on the experience of editing a book comprised of multidisciplinary cases and focusing on linkages to all the areas of practical exposure. There are many theoretical accounts of how one may approach multidisciplinary research, but here the authors aim to offer a practical account of how the theoretical goal of multidisciplinary research can play out in the 'real world'. After addressing the current conceptual understanding of multidisciplinary versus interdisciplinary research, the authors will explain how useful these concepts, in fact, are when applied to the typical constraints that many academics face today in conducting joint research. The author will provide lessons for future multidisciplinary collaboration and suggestions for developing methods of multidisciplinary research.

The book offers multidisciplinary thinking to students and everyone else interested in understanding the world from a new perspective. This list helps researchers tucked away in their daily grind develop their next breakthrough idea. It also provides an original perspective on a range of controversial issues in educational and social research through case studies of multi-disciplinary and mixed-method research involving children, teachers, schools and communities in Europe and the developing world like India. The case studies from researchers "across continents" and "across disciplines" explore a range of interesting issues, including the relevance of research approaches to very different national settings, and to the kinds of questions being asked; the barriers of language and culture between researcher and researched; articulating the thinking and feelings of very young children; the challenges of dealing with "partiality" of data; issues of identity, subjectivity and reflexivity; and transferring research approaches from one national setting to the problems posed in another.

The book also talks about researches in the area of Tourism, Spacecraft electronics, cassava production technologies among farmers and the growing unicorns in India among other areas of interest. It is a compilation of number of thought process from several burning and growing areas of practical exposure.