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Crossian Resonance strives to keep up the standard from the first issue and all the papers published in this issue were assessed by competent referee editors and were recommended for publication. This journal is committed to the development and regeneration of the nation with the scope of providing an open and common platform to launch a united vision and empowerment of innovative knowledge.

May this endeavour grow and remain evergreen like an olive tree to create renewed awareness, dimensional consciousness and enlightenment.

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Physico-Chemical, Structural, mechanical and thermal behaviour of raw and steamed *Borassus flabellifer* (Bf) fiber

M. Abisha, S. Anne Kavitha, K.R. Jaya Sheeba, J. Jisha Francy, D.P. Dona, A. Sahaya Soosanna, A.J. Aruthra, A. Hylynn Rowena, S. Prema and *R. Krishna Priya

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ABSTRACT

*Sustainable environment is an immediate require to safeguard the planet from being exposed to vulnerabilities. Bio composites can minimize synthetic acquisition since they are easily degradable. The reinforcement material deployed is a plant fiber according to which the entire behaviour of composites are decided. Raw and steam treated fibers of *Borassus flabellifer* (Bf) peels are characterised to see its efficiency as a reinforcement material. Lowered density of 0.91 g/cc is achieved after steam treatment. Chemical analysis computed the cellulose content to be 58.3%. Crystalline parameters are found from XRD analysis. SEM studies gave a clear discrimination between fiber surfaces before and after treatments. Steam has brought about 19% hike in the tensile values from 58 MPa to 70 MPa. FTIR spectroscopic studies found the vibrations associated with different functional groups. TG- DTA and DSC studies graphed the change in mass with rising temperatures as well as the heat flow rate on the fiber surface. Thermal stability upto 240 °C is registered during the degradation of cellulosic components with a maximum degradation peak at 410 °C and 440 °C for the raw and treated Bf. Elemental compositions of Carbon, Hydrogen, Nitrogen and Sulphur are calculated. All the above findings suggest that Bf fiber could serve as an effective reinforcement material for light weight composite applications.*

Keywords: Sustainability, fiber composites, low density, thermal behaviour

1. Introduction

Technological development fetches useful products along with waste which are mostly non biodegradable. Composite materials pairing natural fibers as reinforcement material could be the best solution to stabilize the production of synthetic waste. Lowered mass fraction and density are the key things that prioritise the role of natural fibers in reinforcements. Plant fibers contain crystalline and amorphous constituents. Cellulose which add up the crystallinity to the plant is responsible for tensile and thermal stability. Before considering it for any reinforcements, it is essential that the fiber must be properly brought out with lowered amorphous entity [1]. Various chemical treatments like alkalisation, benzoyl, carbonate, silane, permanganate treatments etc., can help on improvising the orderness of fibers [2]. They find applications in automotive parts, insulation equipment, shielding and construction materials. New bio-degradable material is a need of the hour for sustainability and the possibility to develop such material from waste is an added benefit to defend the resources that are scarcely

exist. The present work concerns on *Borassus flabellifer* (BP) to examine its Physical and chemical details along with characterisation studies such as X-ray diffraction analysis, morphological studies using SEM, Tensile testing, FTIR spectroscopic studies, thermogravimetric analysis and CHNS analysis.

2. Materials and methods

2.1 Steam treatment

Borassus flabellifer (BP) fiber locally called palmyra tuber are collected from Nagercoil, Kanniyakumari. The outer skin of BP tuber is generally treated as a waste and useful fibers can be separated from various layers. Selected fibers are washed in distilled water under room temperature and a part of it are subjected to steam treatment maintained at 110°C for 1 hour. Fibers separated using needle are kept in vacuum desiccation for 2 days. Steam treatment can improve the intimacy between the matrix and reinforced fiber when scrutinizing for composite making [3]. Figure 1. Shows the fibers extracted from palmyra sprout.

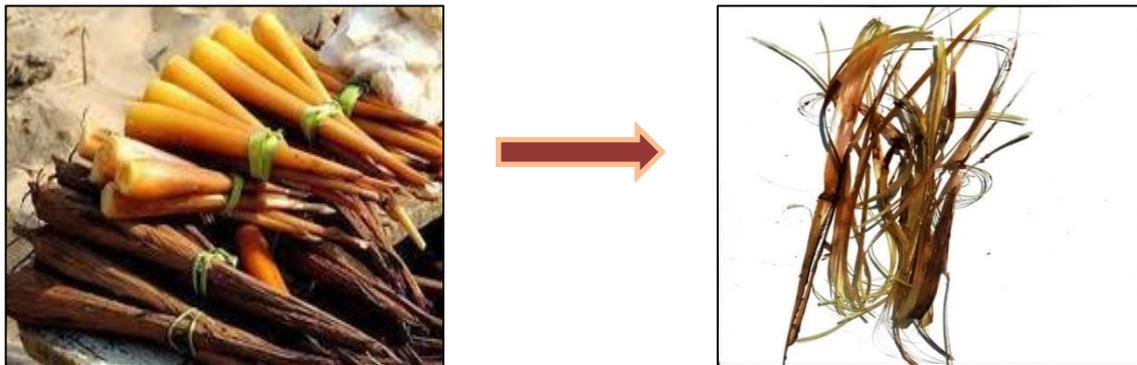


Fig. 1. Fibers from *Borassus flabellifer* (BF) tuber

2.2 Physical properties of *Borassus flabellifer* (Bf) fiber

A detailed study on the physical aspects of Bf fiber is essential in knowing and tapping the potentials of fiber to the fullest. Linear density is a measure of fineness of the fibre and density is analyzed with liquid Pycnometer method using the equation [4,5]

$$\rho_f = [(m_2 - m_1) / [(m_3 - m_1) - (m_4 - m_2)]] \times \rho_t \quad (1)$$

Where, m_1 is the mass of pycnometer (kg), m_2 is the mass of the pycnometer filled with fibers (kg), m_3 is the mass of the pycnometer filled with toluene (kg) and m_4 is the mass of pycnometer filled with fibers and toluene (kg). The density of Bf fibers are much lower than *Coccinia grandis* stem (1.517 g/cc), *Acacia leucophloea* (1.385 g/cc), *Thespesia populnea* (1.412 g/cc) [6]. Steam treatment has scaled down the density to 0.9 g/cc, which is lower than synthetic

fibers and it can have a good scope on light weight applications [7, 8]. An average of 30 fibers are chosen to measure its diameter using an air-wedge arrangement and the physical parameters are tabulated in Table.1

Table 1. Physical parameters of Bf fiber

Parameters	Untreated fibers	Steam treated fibers
Length (cm)	15.03	15.26
Diameter (μm)	225	219.5
Aspect Ratio	668	695.22
Linear density (tex)	52.63	50.46
Density (g/cc)	1.31	0.9

3. Characterisation studies

3.1. Determination of Chemical composition

Presence of cellulose, lignin, hemicellulose and wax content in the fiber sample is revealed through chemical analysis. Chemical analysis testing was done from Chemical Testing Laboratory, SITRA, Coimbatore.

3.2. X-Ray Diffraction (XRD) Analysis

Crystalline nature of BP fibres was measured using Powder X-ray diffraction analysis using a Bruker AXS–D8 Advance Model diffractometer. 2θ values are recorded between 3° and 80° under 40 kV and 35 mA. Crystallinity index is calculated using the Segal Empirical formula [9].

$$CI = \frac{I_{200} - I_{am}}{I_{200}} * 100 \quad (2)$$

Where, I_{200} -maximum intensity of the crystalline diffraction peak, I_{am} -minimum intensity of an amorphous peak

The crystallite size was calculated using the equation Scherrer's equation

$$CS = \frac{K\lambda}{\beta_{200} \cos\theta} \quad (3)$$

Where K is Scherrer's constant, λ is Wavelength of the X ray (0.154 nm), β_{200} is the peak's full width at half maximum, θ is the Bragg angle.

3.3 Single fiber tensile testing

Single fiber tensile testing and elongation was computed using (Zwick/Roell) from Physical testing laboratory, SITRA, Coimbatore. All the tests were carried out at a temperature of $21^\circ\text{C} \pm 1^\circ\text{C}$ with a relative humidity of about 65%.

3.4. Scanning Electron Microscopy (SEM)

Morphological features of fibers are studied using SEM studies. It was done by using a Jeal T220 scanning electron microscope, with the working voltage between of 5-20 kV.

3.5 FTIR Analysis

Vibrational bands of various functional groups of raw and steam treated fibres are found using the FTIR spectrometer (Model FTIR-8400S spectrum, SHIMADZU, Japan) in KBr matrix with a scan rate of 45 scans per minute.

3.6 Thermogravimetric analysis

Response of the fiber to a variety of reactions such as decomposition, degradation, adsorption, vaporization, oxidation, reduction etc., can be studied using thermogravimetric studies. Tg-dta and DSC analysis were taken using HITACHI-STA7300 in nitrogen atmosphere. A heating rate of 20°C /minute was monitored between 40-700°C.

3.7 CHNS Analyzer

Carbon Hydrogen Nitrogen Sulfur (CHNS) elemental analysis do a rapid determination of Carbon, hydrogen, nitrogen and sulphur quantities in the biofiber. The analysis is made using the model Elementer Vario EL III with the Precision >0.1% absorbance.

4. Results and Discussion

4.1 Chemical analysis

Presence of cellulosic and non-cellulosic constituents comprise the fibrillar arrangement. High cellulosic fraction with lower hemicellulose and lignin content enuciate a positive effect. The percent of wax is low around 0.35% which is a good impression since wax debonds fiber from matrix phase while making composites. Higher value of ash quantifies the improved cellulosic content in the fiber surface. Chemical constituents of Bf fiber is compared with other fibers [7, 10, 11] in Table 2.

Table 2. Chemical constituents in Bf fiber

Fibre	Cellulose (wt %)	Hemi cellulose (wt%)	Lignin (wt%)	Wax (wt %)	Pectin (wt%)	Moisture (wt%)	Ash (wt%)
Raw BP	58.35	25.83	19.90	0.35	7.62	9.33	3.90
<i>Acacia leucophloea</i>	68.09	13.6	17.73	0.55	-	8.83	0.08
<i>Prosopis juliflora</i>	61.65	16.14	17.11	0.61	-	9.48	5.2
<i>Arundo donax</i>	35.52	26.81	19.80	-	-	8.40	4.75

4.2 XRD Analysis

Natural fibers itself is considered to be semi-crystalline, due to the presence of cellulose, hemicellulose, pectin etc. These components are composed of various linkages of hydrogen and carbon [6]. A major crystalline peak was seen around 22 degrees in the steam treated Borassus fiber, along with the amorphous peak at around 18 degrees. In the case of untreated fibers, the CI value was found to be 54.48%. Unexpectedly, crystallinity index (CI) for the steam treated fiber is found to be 41%, which is less than the untreated fibre.

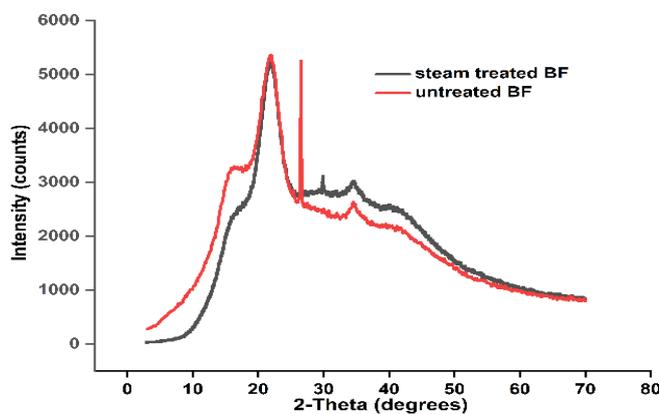


Fig. 2 XRD diffractogram of raw and treated BF fibers

The steam action might be strong enough to abandon the cellulosic components along with the amorphous material which resulted in a drop of cellulose after steam treatment. The values of CI and CS of the experimental fibers are comparable with other natural fibers like *Kigelia africana*, *Areca catechu* L, *Coccinia grandis* L, *Saharan aloevera* cactus leaves, *Furcraea foetida* etc., [12- 14]. Crystallite size of raw and steam bath treated Bf fibre was found to be 0.59 nm and 0.78 nm. XRD diffractogram and crystalline parameters of raw and steamed Bf fibers are shown in Figure 2 and Table 3.

Table 3. Crystalline, Tensile and CHNS values of raw and steam treated Bf fibers.

Sample	Crystallinity Index (%)	Crystallite size (nm)	Tensile strength (MPa)	N%	C%	S%	H%
Raw Bf	54.48	0.59	57.56	0.61	43.95	-	7.01
Steamed Bf	41	0.78	70.78	0.95	42.50	0.13	6.41

4.3 Single fiber Tensile Test

Fiber strength predominantly gears on number of things like maturity of the plant part, habitat, fibers chosen for testing and so on [15]. The tensile values of steam treated fiber show an increment of 70.78 MPa than the raw Bf fiber (57.56 MPa), without subjecting to any other chemical treatments. A better orientation of cellulose micro fibrils along the fiber axis play a role in the fiber strength. An upsurge of 19% was seen in the steamed fibers. Smaller size, enhanced mechanical strength and lowered amorphous impurities influence an advanced adhesion between the matrix and reinforced material [16]

4.4 Scanning Electron Microscopy

Surface morphologies are diligent while considering fibers to be paired with matrix phase. SEM photographs of raw and steam treated fibers are displayed in figure 3: a,b,c,d and figure 4: a,b,c,d. Fibrils are seen to be clouded with impurities, wax, hemicelluloses and lignin on the surface of untreated Bf fiber [17]. Also a number of pores opening into long ridge area is visible in figure 3a. Large vacuoles created by impurities are marked in figure. 3d. However, deformities are largely replaced with more ordered and regular arrangements after steam explosion.

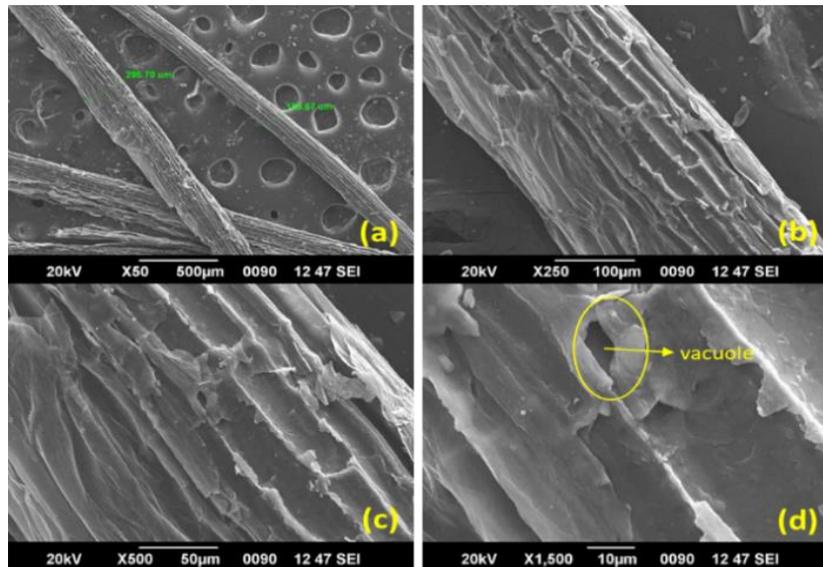


Fig. 3 a,b,c,d: SEM image of untreated BF fibers

It is predicted with the fact that steam treatment has broken the bonds between the cellular constituents of fiber and hence the disorganised hemicellulose might be cleaved off of the fiber surface with magnified, long fissures are visible and it might add up a hold on fiber towards the matrix arrangement [15].

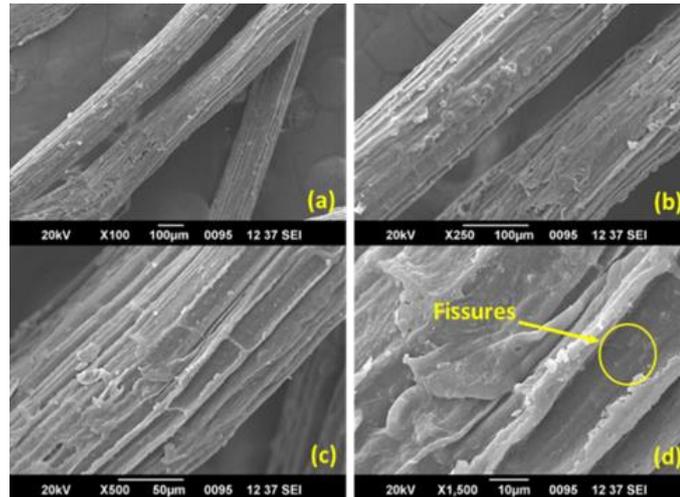


Fig. 4. a, b, c, d: SEM images of steam treated BF fibers

4.5 FTIR Spectroscopic studies

The use of Fourier transform infrared (FTIR) spectroscopy has been considered to be one of the most effective techniques to study the chemical and surface chemistry of biofibers. Wavenumbers at 3428 cm^{-1} and 3435 cm^{-1} in the raw and steam treated fibers indicated the presence of O-H stretching of hydrogen bonded hydroxyl groups in α -cellulose and /or in hemicelluloses. Strong peaks observed at 1643 cm^{-1} in both fibers attribute to C=O stretching vibration of keto carboxylic acid in lignin. Absorption peaks at 2920 cm^{-1} is due to the C-H stretching vibration of α -cellulose and hemicellulose [18]. Vibration of fibers at 1600 cm^{-1} is due to the stretching of C=C groups present in the lignin and medium absorption peaks visible around 1414.34 cm^{-1} is due to CH_2 wagging [19]. Streaming has not inculcated a wide vibrational variations in Bf fibers. FTIR graphs of raw and treated fibers are shown in Fig. 4.

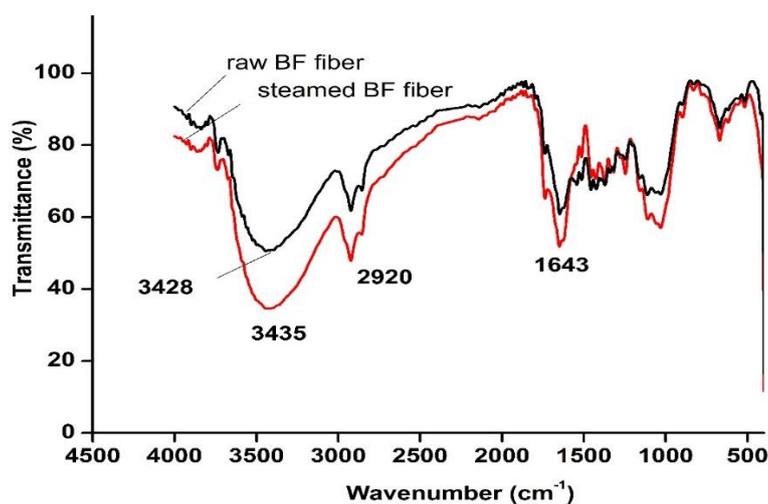


Fig. 4. FTIR spectrum of raw and steam treated Bf fiber

4.6 Thermogravimetric analysis

Heat resistance is very much needed for making composites [20]. TG plot shows that initial mass loss of 12% in the raw fiber at 110°C, is due to the removal of moisture. [21, 22]. Apparent loss of weight between 230°C- 360°C is recorded due to the degradation of cellulose. On rising the temperature to 325°C, huge degradation was initiated due to the decomposition of hemicelluloses and glycosidic linkages of celluloses. Nearly 51% of weight got reduced in this stage. Beyond 400°C, lignin mass has got out of the fiber. Steam treated fibers also follow the same pattern with a slight variation of 42% mass loss between 250°C- 320°C. Clinical degradation of raw fiber was noticed at 230°C and eventually it has manifested to 240°C during the steam treatment. Figure 5. explains the TG-dta and DSC curves for the raw and steam treated Bf fibers.

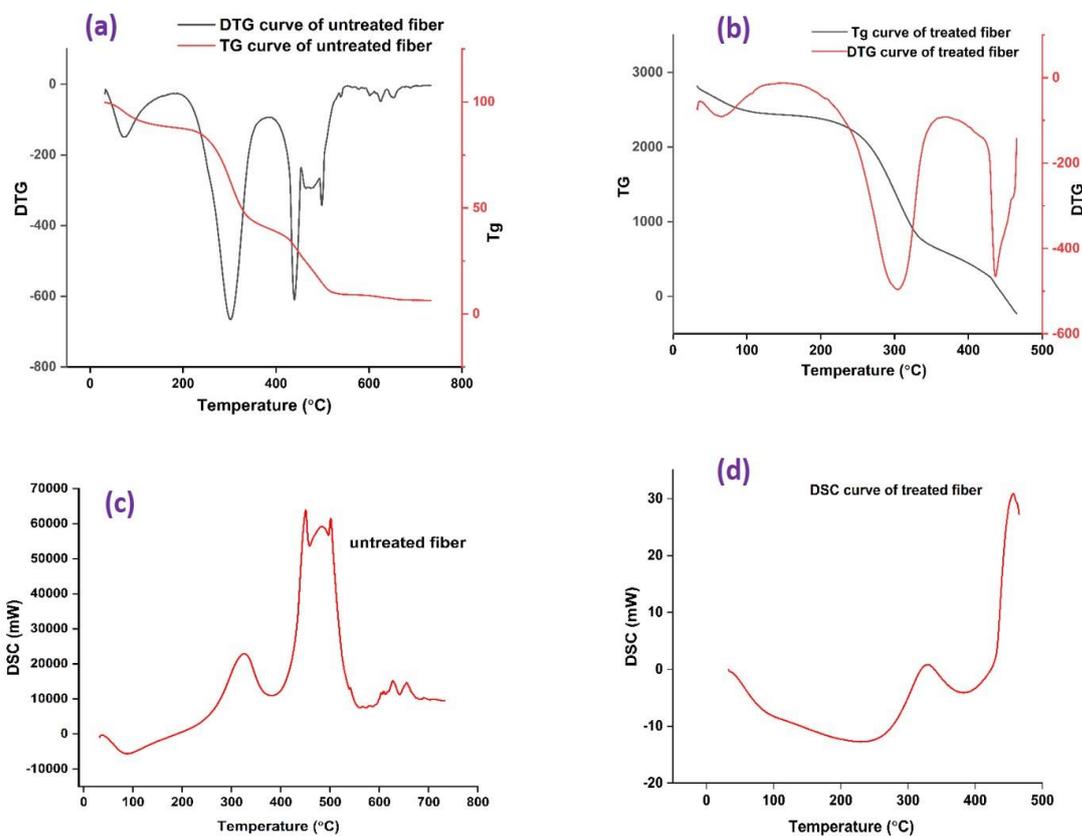


Fig. 5a. Tg-Dtg curve of untreated Bf 5b. Tg-Dtg curve of steam treated Bf

5c. DSC curve of untreated Bf 5d. DSC curve of steam treated Bf

DTG curves marks the maximum degradation temperature of raw and steam treated fibers at 302°C and 304°C, which is very much greater than most cellulosic fibers. Steam treatment has the capacity to bring variation and extend the thermal properties to a considerable level. Another degradation peaks at 420.8°C and 461.3°C in raw and steam treated fibers respectively, are possibly due to the disintegration of lignin and pectin. Similar peaks had

appeared in *Coccinia grandis* stem fibers [23] and pigeon pea plant fibers [24]. Enthalpy change connected with the fiber is enumerated in DSC curve. An endothermic peak appeared at 410°C in the raw fiber and preceded to 440°C in the treated fiber, clearly indicates a wide constructive discrepancy in the later one. TG data summarises that steam inclusioned Bf fibers can be opted for thermal applications considering the thermal standby temperature not more than 240°C.

4.7 CHNS Analyzer

Raw and steam treated Bf fiber samples are combusted to generate compound gases of Carbon, Hydrogen, Nitrogen and Sulfur. Purity is found along with this analysis. Presence of sulfur was detected in the steam treated sample. Table 3. shows the CHNS weight percent of fibre sample.

5. Conclusion

The suitability of *Borassus flabellifer* (Bf) fiber to be consumed for green composites were analyzed and the following conclusions were put forward. Density of steamed fiber show a massive change to 0.9 g/cc from 1.31 g/cc. Chemical composition of fibers witnessed a higher cellulose (58.35%) and ash (3.90%) content adjoined by lowered hemicelluloses (25.83%). Although the Crystallinity Index in the steam treated fiber has been declined, mechanical and thermal behaviour marked greater improvements. This is because the action of steam has cleaved the celluloses along with the amorphous entities. Fibrillar arrangement was more ordered in the steam treated fiber (70.78 MPa) which is 19% more than the raw Bf. FTIR spectroscopic assignments register a slight vibrational variation with the steamed fiber.

The SEM images neatly portray the presence and absence of components on the fiber surface. Tg-dta and DSC plot show the mass loss of cellulosic components and adds that the maximum temperature upto which the fibers can stay active was marked at 240°C, with a maximum degradation peak on the steamed Bf at 461°C. CHNS analysis quantified the present of the elements. The findings give a positive way to introduce the fiber as reinforcement material in composite making. Overall study on *Borassus flabellifer* (Bf) indicated an augmented results and there is no less probability that different chemical treatments could enhance the properties for optimised composite applications.

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Fabrication of Thin Films by Silar Process: A Review

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ABSTRACT

Thin films have gained significant attraction because of their outstanding unique property for device applications. Thin film deposition can be done using a variety of methods, including chemical bath deposition, chemical vapor deposition, dip coating, sputtering, etc. The present article reveals the Successive Ionic Layer Adsorption and Reaction (SILAR) deposition in detail. This method has the ability to regulate the morphology and optoelectrical properties of the films, its numerous benefits and drawbacks were explored. According to the experimental findings, the films have a lot of promise for use in optoelectronic applications, such as coatings and window materials for solar cells. This review paper aims to present up-to-date knowledge on the synthesis, characterization, and applications of thin films deposited by the SILAR method in light of their current interest.

Keywords: Thin Films, SILAR and Applications

1. Introduction:

The study of matter's physical properties has advanced so much over the past century that physics is now separated into a huge number of specialized fields that are frequently quite different from one another. The physics of thin films is a recently created separate and significant field. This article discusses ways for analyzing systems that may differ in terms of all other physical characteristics but only have the commonality that one of their dimensions is extremely small [1]. When the two surfaces are so close to one another, they can have a significant impact on the substance's physical properties and processes, which differ significantly from those of bulk materials. By interacting with one another and reducing the space between the surfaces, new phenomena may emerge [2]. These are some of the reasons thin films have caught the interest of physicists, led to the creation of a separate branch of physics devoted to them, and led to the development of associated technical branches. Since the turn of the century, researchers have been examining the electric characteristics of thin films, including their conductivity, superconductivity, and electron emission [3]. Recent years have seen incredibly quick advancements in this field of study. Research in the field of thin films is still active and undergoing rapid change. Atom-by-atom solids are formed as a result of this process. Despite the enormous complexity of the interaction mechanisms involved in film development, there is a lot of room for creating new, more usable materials [4]. Large area arrays, solar selective coatings, solar cells, photoconductors, sensors, antireflection coatings,

interference devices, polarizers, narrow band filters, IR detectors, waveguide coatings, temperature control of satellites, photothermal solar coatings, etc. are all applications for thin films that are of particular interest. There are many ways to create thin films. Physical and chemical procedures can be distinguished from one another. In physical approaches, some kind of energy is used to transfer the film material from a target source to the substrate [5].

The successive ionic layer adsorption and reaction (SILAR) approach has been used for the past three decades to a method for depositing a range of complex compounds in thin film form that has recently appeared [6]. Various methods are used for deposition include vacuum evaporation, sputtering, chemical vapor deposition, electrodeposition process, pulsed laser deposition, spray pyrolysis, sol-gel process, and chemical bath deposition (CBD), successive ionic layer adsorption and reaction (SILAR). The SILAR approach is affordable, straightforward, and practical for large-area deposition. Since the deposition is performed at or close to room temperature, insulators, semiconductors, metals, and substrates that are sensitive to temperature (like polyester) can all be employed [7]. The successive ionic layer adsorption and reaction (SILAR) method, often known as a modified variant of chemical bath deposition, is one of the most recent solutions for the deposition of thin films. It is possible to perform it in glass beakers. The initial supplies are readily available and affordable [8]. Since it's a chemical process, a wide range of substrate types can be coated. By performing the deposition at or near room temperature, metallic substrates are protected from oxidation and corrosion [9]. Deposit in stoichiometry is simple to obtain. Since ions rather than atoms serve as the fundamental building blocks, it is simple to regulate the preparative conditions, resulting in enhanced grain orientation [10].

2. Fundamentals and Theoretical Background of SILAR:

The SILAR method is based on the adsorption of a layer of ionic species onto a surface, followed by a reaction started by the subsequent adsorption of a different ionic species, as the acronym suggests [11]. The result of this reaction is the creation of an insoluble substance, which makes up the thin-film coating. To raise the thickness of the deposited layer, the operation is then repeated [12]. A SILAR setup uses a sequence of phases that are shown in Figure 1 in order to properly manage the deposition process.

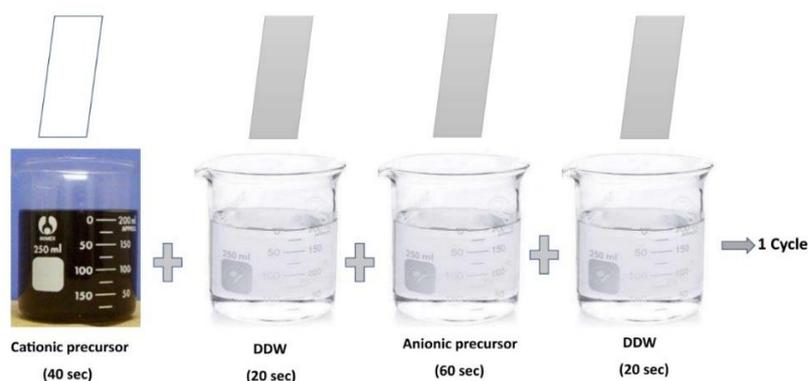


Fig. 1. Schematic representation of SILAR

Rinsing solutions (DDW) are optional, although they are used to get rid of extra material from the substrate after each precursor dip and make sure there is only one ionic layer left before the substrate is submerged in the next solution. We can anticipate faster but less manageable development without rinsing treatments. Without this phase of rinsing, uncontrolled material deposition may occur [13]. Furthermore, if too much precursor is trapped on the substrate's surface, it may be released into the solution containing the second precursor, resulting in the precipitation of the target molecule in the precursor solution [14].

3. Preparation of thin films:

Mahima Ranjan Das et al reported a straightforward, inexpensive, and environmentally friendly SILAR approach was used to successfully synthesize thin films containing NiO nanoparticles on glass and steel substrates. A supercapacitor electrode was made directly from a film on a steel substrate [15]. The zincite (hexagonal) structure of ZnO thin films produced by the chemical deposition method SILAR (successive ion layer adsorption and reaction) are also photoconductive and transparent in the visible and infrared regions (90% optical transmittance) was reported by A. Jimenez-Gonzalez et al [16]. The method of fabrication applies successive ionic layer adsorption and reaction (SILAR) to deposit SnS thin films onto uncoated and ITO-coated glass substrates [17]. On glass substrates, thin films of CuS, Cu_{0.6}Zn_{0.4}S, and ZnS were produced using the SILAR technique at room temperature. Investigations have been done into how the annealing temperature affects the crystal structure and optical band gap of thin films. For thin films, a 3-minute annealing period has been determined to be ideal. After being annealed at 400°C, the films have degraded. As a result, we can say that the SILAR method is a suitable method to deposit CuS, Cu_{0.6}Zn_{0.4}S, and ZnS thin films which was reported by M. Ali Yildirim et al [18]. N.G. Deshpande et al reported Tin

disulfide (SnS_2) thin films have been created using the low-cost SILAR (successive ionic layer adsorption and reaction) approach. To produce high-quality films, deposition parameters including SILAR cycles (60), immersion duration (20 s), rinsing time (10 s), and deposition temperature (27°C) were optimized. To investigate the structural, optical, and electrical properties, physical experiments were conducted [19]. Abhishek P. et al. stated that chemically synthesized NiO thin films produced by the SILAR Method were found to be amorphous in character. After being subjected to heat treatment up to 500°C , the amorphous character remains unaltered [20].

A low-cost method was used to successfully create NiO thin films by altering the deposition period at 5, 10, 15, and 20 min. and non-evacuated chemical spray pyrolysis method at 450°C . M.M. Goma et al. revealed that films were examined and used to create an effective gas sensor for NO_2 detection [21]. The development of layer-by-layer assembly of reduced graphene oxide (RGO) and MnO_2 (MnO_2 -RGO SILAR) on a stainless steel current collector, for designing light-weight and small-size supercapacitor electrode, is demonstrated by Milan Jana et al. using the simple, affordable, and additive-free successive ionic layer adsorption and reaction (SILAR) technique [22]. Cu_2O thin films were created using the SILAR (successive ionic layer adsorption and reaction) procedure, according to Soumya Chatterjee et al. They completely characterized the thin films produced using a non-vacuum method and developed them in ambient conditions. CuO thin films have been formed as a result of post-deposition annealing in an oxygen atmosphere [23]. It was reported by Tapio Kanninen et al. that lead sulfide thin films were produced at room temperature using the sequential ionic layer adsorption and reaction (SILAR) approach on soda lime glass, ITO and A1203 coated glass, SO_2 , (100) Si, and (111) Si substrates. SILAR uses aqueous precursor solutions to sequentially treat the substrate. Triethanolamine (TEA) was also added to the lead precursor solution as a complexing agent, with a Pb: TEA mole ratio of 1:1. With 0.4 mol dm^{-3} thioacetamide solution and 0.2 mol dm^{-3} lead on glass, the growth rate was 0.12 nm each cycle. The films have a metallic aspect [24]. The traditional procedure of depositing Cadmium Sulphate (CdS) and Copper Zinc Tin Sulphate (CZTS) results in a Superstrate and Substrate configuration of a solar cell. The Successive Ionic Layer Adsorption and Reaction (SILAR) approach, which was disclosed by Kaza Jasmita et al., is modified to achieve the proposed method. For superstrate configuration, CdS thin film is coated on CdS deposited on FTO (Fluorine-doped Tin Oxide) substrate, while for substrate configuration, CdS thin film is coated on CZTS deposited on Mo (Molybdenum)/SLG (Soda Lime Glass) [25]. At room temperature and normal pressure, thin films of zinc peroxide, ZnO, were produced using the sequential ionic layer adsorption and

reaction (SILAR) method. Seppo Lindroos et al. stated that the thin films were formed on glass, quartz, silicon, poly(vinyl chloride), and polycarbonate substrates. Diluted aqueous solutions of ZnCl₂ complexed with H₂O for the anion and ethylenediamine for the cation H₂O₂ constituents of the film were utilized as the precursors for ZnO films. By annealing in air or in a vacuum, the zinc peroxide film could be converted to zinc oxide[26]. According to Ho Soonmin et al., two alternative deposition processes, spin coating and sequential ionic layer adsorption and reaction (SILAR), were employed to create nanostructured thin films. The merits and disadvantages of various strategies are briefly reviewed in this article. Finally, they review some experimental results in accordance with the literature review [27]. According to a paper by A.T. Ravichandran et al., successive ionic layers by adsorption and reaction (SILAR) were used to build copper oxide thin films onto a glass substrate over the course of 30 cycles [28].

According to J. Puiso et al., lead sulfide or PbS, thin films could be formed using the SILAR method on Si(100) and Si(111) substrates, and the shape and crystallinity of the films could be adjusted by altering the lead precursor. On both silicon substrates, PbS extremely thin films utilizing Pb(Ac)₂ as a precursor were very well w200x oriented. The PbS extremely thin films had minor carbon and oxygen impurities but were stoichiometric [29].

According to M.P. Suryawanshi et al., the SILAR process is used to synthesize Cu₂ZnSnS₄ (CZTS) by sulfurizing layers of stacked sulfide precursors. Cu₂SnS₃ and ZnS are stacked in different orders, and this has an impact. It is discovered that the CZTS thin films' PEC performance is significantly impacted by the stacking order of the precursor thin films, which has a significant impact on the CZTS thin films' characteristics. For a stacking order of Mo/ZnS/Cu₂SnS₃, the structural analyses demonstrated the creation of a notable kesterite CZTS phase, and for a stacking order of Mo/Cu₂SnS₃/ZnS, they demonstrated the formation of a secondary Cu₂-XS phase in addition to the prominent CZTS phase. The PEC device with the highest J_{sc} of 11.68 mA/cm², V_{oc} of 0.42 V, FF of 0.37, and power conversion efficiency of 1.81% was made utilizing the sample with the stacking order of Mo/ZnS/Cu₂SnS₃ [30].

Dongzhi Zhang et al. reported on a high-performance liquefied petroleum gas (LPG) sensor based on a layer-by-layer (LbL) self-assembly and successive ionic layer adsorption and reaction (SILAR) technique-fabricated zinc oxide/polypyrrole/lead sulfide quantum dots (ZnO/PPy/PbS QDs) nanocomposite film. The as-prepared ZnO/PPy/PbS QDs sample was examined using the following techniques: FT-IR, XPS, TEM, SEM, EDS, and XRD. In comparison to the ZnO/PPy film sensor, the ZnO/PPy/PbS QDs film sensor showed higher responsiveness, acceptable repeatability, and better selectivity for LPG sensing. The findings

show that the ZnO/PPy/PbS QDs film is a potential raw material for making LPG gas sensors [31]. Tuba Ayr Taşdemirci reported that nickel oxide (NiO) thin films were produced on glass substrates using the Successive Ionic Layer Adsorption and Reaction (SILAR) process at room temperature. Analysis was done on how the annealing temperature affected the structural, morphological, molecular, and optical properties. X-ray diffraction (XRD), scanning electron microscopy (SEM), atomic force microscopy (AFM), Fourier transform infrared spectrophotometer (FTIR), and UV-vis spectrophotometer were each used to analyze NiO thin films [32]. According to Yunus Akaltun et al., the Successive Ionic Layer Adsorption and Reaction (SILAR) approach was used to synthesize NiO thin films on glass substrates at room temperature. Investigations were done into how NiO thin films' structural, morphological, optical, and electrical properties are affected by the film's thickness [33]. Mahima Ranjan Das et al. stated that the successive ionic layer adsorption and reaction (SILAR) technology, a straightforward, affordable, and low-temperature wet chemical procedure, has effectively produced NiO thin films [34]. According to Vithoba L. Patil Sharadrao A et al., nanostructured thin films of ZnO were created using the quick and affordable sequential ion layer adsorption and reaction (SILAR) method. Investigations were conducted into how SILAR cycles affected the structural, optical, surface morphological, and electrical characteristics of nanostructured ZnO thin films. The physical and chemical characteristics of the synthesized films were investigated using characterization techniques as XRD, UV-Vis, PL, FESEM, and Hall measurement [35]. Metal chalcogenide thin films were deposited by H M PATHAN and C D LOKHANDE using the sequential ionic layer adsorption and reaction (SILAR) technique. He discussed how to develop metal (binary, ternary, composite, etc.) chalcogenide thin films using the successive ionic layer adsorption and reaction (SILAR) method. Conclusions: (i) Metal chalcogenide thin films can be prepared using the SILAR method; (ii) SILAR is a cheap method, making the process practical for commercial application; (iii) material waste is avoided because no precipitate is formed during this process; (iv) the materials are stoichiometric; and (v) semiconductor doping, desired type for device formation, etc., can be accomplished [36].

4. Structural Analysis:

The film's crystallinity rises with each deposition cycle up to 40, after which it begins to trend in the other direction [15]. ZnO's as-prepared stoichiometry and crystal structure, as well as its optical and electrical characteristics, are considerably altered by heat treatments. The gas environment used during the treatment affects the dark conductivity of ZnO thin films [16]. SnS was identified as the predominant phase in the film by XRD. The corresponding strain and

crystallite size was calculated from the FWHM of XRD spectra [17]. The hexagonal crystal structure of the formed SnS₂ thin films is demonstrated by X-ray diffraction (XRD) patterns [19]. A strong (200) orientation of the films was discovered by X-ray diffraction examinations [24]. To examine further impurities and perfect the crystalline structure of CZTS and CdS orientation, grazing incidence X-ray diffraction (GIXRD) is utilized [25]. According to X-ray diffraction (XRD), the nucleation process of the precursor solution (film immersion) increases as the crystallinity of the films does. The spherical grains gradually vanish and transform into nanorods with the film's dendrite structure. This is explained by the fact that the film becomes more crystalline with longer immersion times [28].

5. Morphological Analysis:

Surface morphology analyses demonstrated the formation of a highly porous nanoflakes-like network, with the 40-cycle deposited film exhibiting the highest levels of porosity. Additionally, a 40-cycle dipping NiO electrode exhibits the highest specific energies (64.38 Wh Kg⁻¹) and powers (2305 W Kg⁻¹) due to its ability to exploit quick electron transport and readily access electrolyte ions thanks to its porous nanostructure [15]. Nanometer-sized spherical grains were evenly scattered on the substrate's surface, as seen in SEM pictures [17]. SEM pictures of sprayed NiO layers at 5 and 10 min of deposition time reveal a porous structure with a randomly aligned honeycomb topology [21]. The MnO₂-RGO SILAR contains RGO and MnO₂ in a homogeneous distribution, as shown by pictures obtained using transmission and field emission scanning electron microscopy. Comparing the LbL (MnO₂- RGO SILAR) to the hydrothermally produced MnO₂- RGO (MnO₂- RGO Hydro), the latter exhibits superior physical and electrochemical properties [22]. The films seemed relatively rough and contained grains whose diameters roughly matched the film's thickness, according to photographs from a scanning electron microscope (SEM) [24]. Images taken using scanning electron microscopy showed that the films were homogeneous and uniform [26]. Studies using scanning electron microscopy (SEM) and X-ray diffraction (XRD) revealed that all of the films exhibit polycrystalline structures and are well covered by glass substrates. With increasing film thickness, the crystalline and surface characteristics of the films improved [33]. XRD and FESEM were used to evaluate how the deposition cycle affected structural and morphological properties. An analysis of the surface's morphology reveals the development of a highly porous network, which offers more active sites and a path for the deposition of electrolyte ions [34].

6. U-V Studies and Thickness Measurement:

As-prepared samples (of thickness 667) exhibit a dark conductivity of 1.50×10^{-6} [fI-cm]-I, whereas a maximum dark conductivity of 2.70×10^{-2} [fI-cm]-I was attained after

successive heat treatments in O_2 and H_2 at $350^\circ C$. After annealing, the optical bandgap of the as-prepared ZnO, 3.38 eV, drops by 0.125 eV [16]. The optical direct bandgap was calculated from UV-Vis spectrophotometry to be 1.43 eV. Near band-edge emission and higher energy deep-level transitions were seen in photoluminescence reported by Biswajit Ghosh et al [17]. UV-Vis-NIR Spectrophotometer is used to conduct individual optical research on CdS and CZTS. A 3A class solar simulator was used to assess the current-voltage (J V) investigations for V_{oc} , J_{sc} , and fill factor under a single sun's illumination (100 mW cm^{-2}) [25]. UV spectroscopy was used to characterize the films as well [26].

7. EDX and AFM Studies:

Tin disulfide (SnS (2.02)) was found to have elemental ratios that were similar to those found in energy dispersive X-ray analysis (EDAX). Atomic force microscopy (AFM) revealed that the film is homogeneous and that the substrate surface is completely covered with tiny, overlapping spherical grains. 2.22 eV of direct band gap was attained [19]. AFM surface morphology investigations show that heat treatment causes the surface of the films to become smoother, as seen in the 2-D AFM images. According to estimates, annealed films have a surface roughness of roughly 320nm and unannealed samples have a roughness of 1.11 μm . The optical transmittance in the visible region of the electromagnetic spectrum for the annealed films is found to be higher than for the unannealed sample [20].

8. Applications:

Because of this, the deposited NiO thin films' total capacitance performance makes it a potential contender for an advanced, highly effective energy storage system [15]. Measurements of photosensitivity have been conducted, and it has been discovered that while photosensitivity increases with light intensity, it decreases with increasing annealing temperature. These films are extremely light-sensitive. This is one of the first studies that led to the deposition of the CuZnS thin films by using the SILAR method and light effect (under 150, 300, and 500 W cm^{-2} light emission) on I-V measurements of CuS and CuZnS thin films. As a result, we can say that the SILAR method is a suitable method to deposit CuS, $Cu_{0.6}Zn_{0.4}S$, and ZnS thin films which was reported by M. Ali Yildirim et al [18]. Two distinct peaks of photoluminescence (PL), corresponding to red and green emission, were visible. Ag/SnS₂ junction had I-V characteristics akin to Schottky diodes. The predicted barrier height was 0.22 eV. Tin disulfide shows n-type conductivity, according to thermoelectric power (TEP) parameters [19]. Nitrogen dioxide (NO_2) detection performance was tested at various operating temperatures and NO_2 concentrations. It was discovered that the sprayed NiO thin film exhibits good selectivity and stability with a maximum sensitivity of 57.3% for 20

ppm NO₂ at 200°C after a 5-minute deposition time [21]. MnO₂-RGO SILAR is used as the positive electrode in an asymmetric supercapacitor device, while thermally reduced GO (TRGO) is used as the negative electrode. The developed cell displays a high power density of 23,200 W kg⁻¹, a high energy density of 88 Wh kg⁻¹, and 79% capacitance retention after 10,000 charge-discharge cycles [22]. With the help of scanning tunneling spectroscopy (STS) measurements, we were able to pinpoint the materials' band boundaries in relation to their Fermi energies. The heterojunction devices made of NiO, Cu₂O, ZnO, and SnO₂ had an energy level that resembled a staircase. This allowed for easy passage of electrons and holes to the opposing electrodes, operating as all-oxide thin-film solar cells with an energy conversion efficiency of more than 1% [23]. The films Cu-O vibrated in the range of 484 cm⁻¹, 499 cm⁻¹, and 511 cm⁻¹, according to FTIR results and confirmation [28]. The values of the energy band gap as a function of the film thickness were used to compute the values of the refractive index (n), optical static constant (ε₀), and high-frequency dielectric constant (ε₁). At normal temperatures, the films' resistivity ranged from 4.1 to 802.1 X cm as film thickness increased [33]. After 1000 cycles, the NiO electrode displayed long-term cycle stability with 90% capacitance retention. The produced electrode's appealing electrochemical performance is ideal for the production of high-quality supercapacitors for industrial use [34]. The gas sensing performance of the nanostructured ZnO thin films synthesized at 30 SILAR cycles is improved, and they show much greater responses (5% per ppm). The innovative nature of this study is demonstrated by the sensitive gas sensor employed to detect tiny levels of NO₂ [35].

Table 1. Experimental parameters of selected SILAR-deposited binary metal oxides.

Cationic precursor	Anionic precursor	Number of Cycles	Rinsing	Annealing [°C]	Dipping time (cationic, anionic)	Comment/outcomes
CuO						
0.05–0.15 m CuSO ₄ + NH ₃	Water, 90 °C	–	No	–	15 s, 20 s	Optical properties are affected by precursor concentration [5].
0.1 m CuSO ₄	0.1 m NaOH	–	water	400 °C	20 s each	Nanoflower-type morphology [6].
0.05 m CuSO ₄	0.02 m NaOH, 45–85 °C	80	water	–	10 s each	Morphology is dependent on precursor temperature [9].

0.1 m CuSO ₄ + NH ₃	Water, 80 °C	10, 20, 30, 40.	Water only at the end	–	10 s, 15 s	Grain size is dependent on number of cycles [13].
0.1 m Na ₂ S ₂ O ₃ 0.1 m CuSO ₄	0.1 m NaOH, 70 °C	90, 100, 110, 120.	No	350 °C	5 s each	Thickness and grain size are dependent on the number of cycles [17].
Cu ₂ O						
0.1 m Na ₂ S ₂ O ₃ 0.1 m CuSO ₄	0.2 m NaOH, 40–80 °C	–	No	–	10 s each	Crystal quality and density of nanowires are dependent on bath temperature [12].
1 m Na ₂ S ₂ O ₃ 1 m CuSO ₄	1 m NaOH, 70 °C	10, 15, 20, 25, 30.	No		5 s each	Bandgap is dependent on cycle number [14].
ZnO						
0.01 m Zn (NO ₃) ₂	0.02 m N ₂ H ₄ ·H ₂ O, 75 °C	60, 120, 180	water	350 °C	10 s each	Crystal orientation is dependent on cycle number [15].
0.05–0.15 m [Zn (NH ₃) ₄] ²⁺	1% H ₂ O ₂ , 80 °C	50, 100, 150, 200	water	400 °C	20 s, 5 s	Nanorod morphology. Diameter and thickness related to Zn concentration [16].
0.025 m Zn (CH ₃ CO ₂) ₂ + NH ₃	1% H ₂ O ₂	10, 20, 30, 40	water	300 °C	25 s, 30 s	Particle size is related to cycle number [18].
0.1 m ZnSO ₄ + NH ₃	Water, ≈100 °C	100	No	200 °C	2 s each	Crystal size and orientation are dependent on the type of substrate [19].

9. Conclusion and Future Outlooks

Thin films play a significant role in numerous technologies, and the processes and procedures used to create them are themselves an expansive area of scientific inquiry and

technical advancement. There are two categories in this area: both physical and chemical depositions. The current review is concentrated on a particular chemical technique called SILAR, or Successive Ionic Layer Adsorption and Reaction, which has attracted attention recently due to the benefits it provides over other chemical techniques. The advantages of atomic layer deposition are combined.

SILAR is appropriate for the deposition of complex multicomponent nanostructures with advanced functions as well as thin films of oxides, peroxides, hydroxides, sulfides, tellurides, and selenides. In this review, emphasis is placed on oxide systems and their applications as well as the impact of experimental parameters on the composition and characteristics of deposited films. More specifically, the use of oxide films created by SILAR for solar cells, photoelectrochemical water splitting, and energy storage devices (supercapacitors) is detailed in depth. For a device to be engineered precisely and intelligently, a thorough grasp of the links between processing, structure, characteristics, and performances is essential. One goal of a review is to gather sufficient data from the literature and attempt to correlate it in order to provide the clearest, most complete picture of these correlations. This review makes an attempt to do so, and while it can provide a persuasive scientific analysis for some elements, there are many others that require more in-depth research.

We think that this work will help to shape future research on this technique, which is extremely intriguing and encouraging for the straightforward, affordable production of nanomaterials of excellent quality and with highly controllable functional characteristics.

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Bilimbi Fruit Extract Mediated Synthesis of Aldimine from Vanillin and Para Nitroaniline and Its Antimicrobial Activity

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ABSTRACT

Aldimines constitute a class of pharmaceutical and medicinally important molecules. The conventional methods for the synthesis of aldimines require long reaction times and use of organic solvents. The aim of the present studies to synthesise an aldimine from vanillin and p-nitroaniline using bilimbi fruit extract. The aldimine synthesised from bilimbi fruit extract is characterized by UV-Visible and FT-IR spectral techniques. The antibacterial activity of the synthesised aldimine is tested against three bacteria and it shows slight activity on Escherichia coli, Bacillus subtilis and Pseudomonas aeruginosa. Compared with traditional methods, this method is simple, more convenient, eco-friendly and shows maximum efficiency with reduced reaction time.

Keywords: Green synthesis, Bilimbi fruit extract, Aldimine, Antimicrobial activity

1. Introduction

Green chemistry approach is an eco-friendly approach and has tremendous application for the synthesis of various organic compounds and key intermediates in recent past. This technique involves as an alternative reaction media to replace hazardous and expensive solvents routinely used in organic synthesis [1]. Organic reactions under solvent-free conditions have gained in popularity in recent years, since the majority of solvents are either toxic or flammable and add considerably to the cost of an overall synthesis. These solvent-free reactions usually need shorter reaction time, simpler and more efficient work up procedures, more improved selectivities and easier separations and purifications than conventional solvents [2]. Recently fruit juice is known to be potential organic solvents for the synthesis of compounds of pharmaceutical interest [3]. Fruit juice is being used on regular basis in various organic transformation reactions [4]. The widespread applications of different fruit juices are due to their non-toxic, safe, inexpensive and environmentally benign nature.

Aldimines are important intermediates for the synthesis of various bioactive products and they are used as fundamental materials for the synthesis of various Schiff base ligands which are used as chiral auxiliaries in asymmetric synthesis [5]. Aldimines have been reported to show a variety of biological actions by virtue of the azomethine linkage, which is responsible for various antibacterial, antifungal, herbicidal and clinical activities [6,7]. Based on the

literature survey, the present work focusses on the solvent free synthesis of aldimine from vanillin and *p*-nitroaniline using bilimbi fruit extract. Bilimbi extract contains several chemical constituents like vitamins, tannins, alkaloids, terpenoids and polyphenols. The aldimine synthesised from bilimbi fruit extract is characterized by UV-Visible and FT-IR spectral techniques. The synthesised aldimine shows slight activity on selected bacteria *Escherichia coli*, *Bacillus subtilis* and *Pseudomonas aeruginosa*.

2. Materials and Methods

Fresh and ripened bilimbi fruit were obtained from the local market. Vanillin and *p*-nitroaniline used for the synthesis of aldimine were procured from Merck. Double-distilled deionized water was used for the preparation of the bilimbi fruit extract.

2.1. Preparation of bilimbi fruit extract

Ripened bilimbi was used for the preparation of the extract. 25 g of this ripened fruit was thoroughly washed with distilled water, dried and cut into small pieces. Grind the pieces by a pestle and mortar and the resulting extract was filtered using Whatmann filter paper. The filtrate was collected and then centrifuged for about 8,000 rpm for about 10 minutes. The supernatant extract was collected and used for the synthesis of aldimine.

2.2 Synthesis of aldimine from bilimbi extract

The equimolar amount of vanillin (0.1 mol) and *p*-nitroaniline (0.1 mol) was taken in a beaker. Add 1 mL of bilimbi extract to the mixture and stirred at room temperature. The pale-yellow product was formed immediately after the addition of the extract. The product aldimine was washed with distilled water and purified by recrystallization with minimum amount of ethanol. The recrystallized sample was characterized by UV-Visible and FT-IR spectral techniques.

2.3 Antimicrobial Activity

Antimicrobial activities of synthesized aldimine against three bacteria *Escherichia coli*, *Bacillus subtilis* and *Pseudomonas aeruginosa* were assayed by Kirby-Bauer diffusion method. These antimicrobials were grown in LB broth for 24 h. Approximately 20 mL of molten and cooled Muller Hinton agar was poured into the Petri dishes. The tested organisms were swapped over the agar medium and the aldimine containing disks were kept over the medium using sterile forceps. Antimicrobial activity was evaluated by measuring the zone of inhibition for the test organisms. The diameters of zones were measured to the nearest millimetre with vernier calipers.

3. Results and Discussion

The role of bilimbi extract in the synthesis of biologically active aldimine from vanillin and *p*-nitroaniline is reported in this section. The synthesised aldimine is characterized by UV-Visible and FT-IR spectral analysis. The reaction for the formation of aldimine is shown in **Scheme 1**. This solvent-free approach is non-polluting and does not employ any toxic materials, quantifying it as a green approach for the synthesis of aldimines.



Scheme 1 Synthesis of aldimine from vanillin and *p*-nitroaniline

3.1 Absorption Spectral Analysis

The formation of aldimine from vanillin and *p*-nitroaniline using bilimbi fruit extract is preliminary confirmed by UV-Visible spectrophotometric analysis. The absorption spectrum of aldimine is carried out in ethanol. The aldimine synthesised from vanillin and *p*-nitroaniline shows absorption bands at 232, 278, 308 and 392 due to π - π^* and n - π^* transitions (**Fig. 1**). The higher energy band appearing at 278 nm is attributed to π - π^* transition of the azomethine group [8].

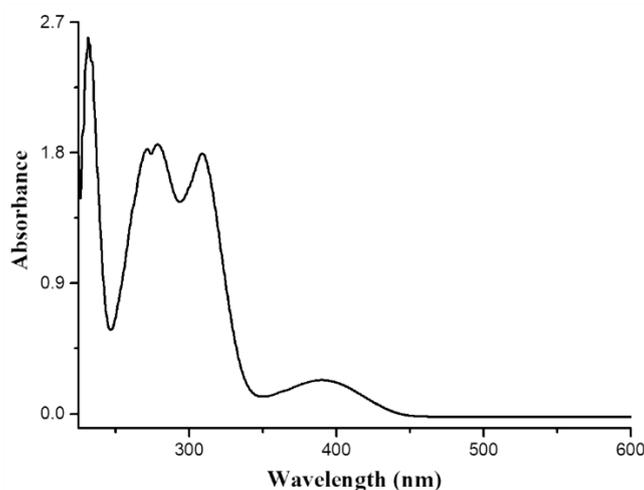


Fig. 1 UV spectrum of aldimine from vanillin and *p*-nitroaniline

3.2 FT-IR Spectral Analysis

The FT-IR spectrum of aldimine synthesised from vanillin and *p*-nitroaniline using bilimbi extract shows absorption bands at 3213, 3091, 2921, 2843, 2360, 1610, 1509, 1417, 1284, 1155, 1036, 961, 869, 759, 696, 548 and 474 cm^{-1} respectively (**Fig. 2**). The band at 3213 cm^{-1} is due to the O-H stretching of the hydroxyl group. Weak band at 3091 cm^{-1} is due to the stretching vibration of aromatic C-H group. The presence of weak bands at 2921 and 2843 cm^{-1} correspond to the C-H stretching of alkene and the aromatic system. The weak absorption

band at 2360 cm^{-1} is due to the presence of atmospheric carbon dioxide. The IR band at 1610 cm^{-1} is due to the presence of azomethine group, this confirms the formation of aldimine. The band at 1509 cm^{-1} represents the N-O stretching frequency of the nitro group. IR spectrum exhibits weak band at 1422 cm^{-1} due to the stretching vibration of aromatic C=C bond. The bands at 1284 and 1155 cm^{-1} indicate the C-O stretching of methoxy group. The band at 1036 cm^{-1} is due to ring stretching. Aromatic C=C and aliphatic C-H bending vibrations occur at 961 , 869 , 759 , 696 , 548 and 474 cm^{-1} respectively. The absorption spectral data and FT-IR analysis thus confirms the formation of aldimine.

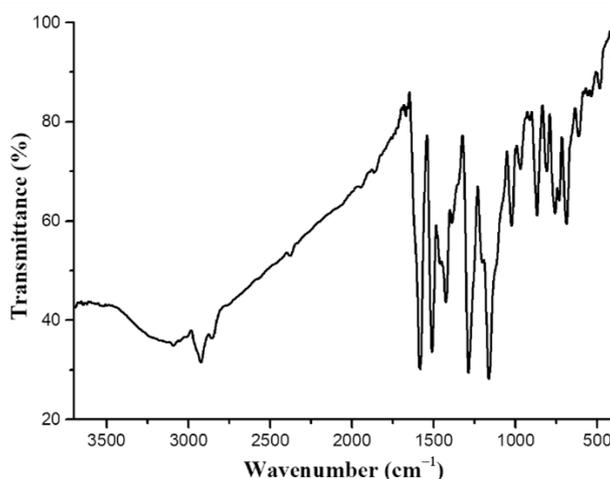


Fig. 2 FT-IR spectrum of aldimine synthesised from vanillin and *p*-nitroaniline

3.3 Antimicrobial activity of Synthesised Aldimines

Antimicrobial activity of the synthesized aldimine is tested against *Escherichia coli*, *Bacillus subtilis* and *Pseudomonas aeruginosa*. It shows slight activity on the selected microorganisms (**Table 1**). Standard antibiotic disc streptomycin is used as the reference drug for the evaluation of antibacterial activity. Thus, the synthesised aldimine from vanillin and *p*-nitroaniline using bilimbi fruit extract may have a potential use in the biomedical applications due to its antimicrobial activity.

Table 1 Antimicrobial activity of aldimine synthesised from vanillin and *p*-nitroaniline

Microbes	Zone of Inhibition (mm)	
	Control	Activity
<i>Escherichia coli</i>	27	8
<i>Bacillus subtilis</i>	30	10
<i>Pseudomonas aeruginosa</i>	20	7

Conclusion

An eco-friendly route for the synthesis of aldimine from vanillin and *p*-nitroaniline using bilimbi fruit extract has been investigated. The role of natural catalyst like bilimbi fruit extract in the synthesis of biologically active molecules has been well demonstrated. The synthesised aldimine shows an absorption maximum at 278 nm. The IR band at 1610 cm⁻¹ is due to the presence of azomethine group, this confirms the formation of aldimine. This solvent-free approach is non-polluting and does not employ any toxic materials, quantifying it as a green approach for the synthesis of aldimine. The synthesised compound shows slight antibacterial activity. The biological activity of this compound will trigger more interest in the synthesis of such compounds from the easily available starting materials.

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Augmentation of the Antioxidant Activity of Stigmasterol on Inclusion with Alpha-Cyclodextrin

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ABSTRACT

Cyclodextrins aid in enhancing solubility, stability and bioavailability of various bioactive hydrophobic compounds by complex formation. The aim of this work is to analyse the anti-inflammatory activity of stigmasterol inclusion complex with α -cyclodextrin. The newly synthesised inclusion complex exhibit higher activity compared to pure stigmasterol. Absorption, NMR and DSC studies confirm the presence of inclusion. This is a suitable method for designing a novel drug.

Keywords: Cyclodextrin, Stigmasterol, Inclusion complex and Anti-inflammatory

1. Introduction

Stigmasterol is an unsaturated 6-6-6-5 tetracyclic phytosterol [1] with a polar hydroxyl group at one end and a large non polar lipophilic planar and rigid 6-6-6-5 skeleton at the other end. It has a flexible C₁₀ branched-chain which makes it an interesting amphiphile. To augment the aqueous solubility of lipophilic moieties such as stigmasterol, researchers have developed traditional and novel approaches. A well recognised strategy in practice for more than a century is the formation of cyclodextrin inclusion complexes. It has been shown to be a promising technique for enhancing solubility, improving stability and bioavailability of poorly water-soluble drugs.

Cyclodextrins are cyclic organic compounds obtained by enzymatic transformation of starch. Among the class of host molecules, the α -CD is one of the most abundant natural oligomers with 6 glucose units [2]. The inner cavity is hydrophobic [3] whereas the exterior is strongly hydrophilic [4]. This unique structure allows various substrates to be included in the cavity through non covalent bonds to form inclusion complexes.

2. Materials and Methods

2.2 Reagents

Analytical grade of stigmasterol and α -CD were purchased from Sigma Aldrich. Ethanol was purchased from Himedia. The chemicals were used as purchased. The solvents used were of analytical grade.

2.3 Preparation of solid inclusion complex of stigmaterol and α -CD

About 0.1238g of stigmaterol was accurately weighed and dissolved in 30mL ethanol. About 0.2919g of α -CD was dissolved separately in 30mL double distilled water. Both the solutions were mixed together in the beaker and put over electromagnetic stirrer to stir continuously for 48hrs at room temperature. The precipitate obtained after evaporation was dried and used for characterisation.

2.4 Characterisation Techniques

2.5 UV – VIS spectroscopy

Absorbance values were recorded for the liquid inclusion complex of stigmaterol with α -CD using UV-1800, (Shimadzu) spectrophotometer.

2.6 Nuclear Magnetic Resonance (NMR) spectroscopy

^1H NMR spectroscopy studies of the solid inclusion complex was recorded in Bruker 400MHz FT-NMR spectrometer. For the samples CDCl_3 was used as solvent and Tetramethylsilane (TMS) as internal reference. The chemical shifts (δ) were reported in ppm relative to TMS at 298K.

2.7 Differential Scanning Calorimetry (DSC)

DSC analysis of the solid inclusion complex was carried out on NETZCH DSC 204 calorimeter. A sample of approximately 1.4mg was weighed in aluminium pans. These samples were heated over a range of 25°C - 300°C at a constant rate of 10°C/mins in a nitrogen purge of 50 mL/minutes. An empty aluminium pan was used as reference.

2.8 Anti-inflammatory Assay

Inhibition of protein denaturation was evaluated by the method of Mizushima and Kobayashi (1968) and Sakat *et al.* (2010) [4] with slight modifications. 500 μL of 1% bovine serum albumin was added to the test samples with varied concentration (100, 90, 70, 50, 30, 15, 10, 5, 1 and 0.5 $\mu\text{g}/\text{mL}$). This mixture was kept at room temperature for 10 minutes, followed by heating at 51°C for 20 minutes. The resulting solution was cooled down to room temperature and absorbance was recorded at 660 nm. The experiment was carried out in triplicates and percentage of inhibition for protein denaturation was calculated using the following formula

$$\% \text{ Inhibition} = 100 \frac{(A_1 - A_2)}{A_0} \times 100$$

Where A_1 is the absorbance of the sample, A_2 is the absorbance of the negative control and A_0 is the absorbance of the positive control.

3. Results and Discussion

3.1 Absorption studies on α -CD: stigmaterol inclusion complex

The absorption maxima of stigmaterol in varying the concentrations of α -CD are shown in figure 1. The λ_{\max} and the absorbances are listed in table 1. From the figure and table, it is clear that the absorption maxima shift towards higher wavelength and the intensity of the peaks rises on increasing the concentration of α -CD. The absorption maxima exhibit a red shift in stigmaterol from $\lambda_{\max} \sim 262$ to $\lambda_{\max} \sim 268$ nm. The shifting of absorption peak position is due to the complex formation between stigmaterol and α -CD and the complex is stabilized within the cavity of α -CD, through weak intermolecular forces.

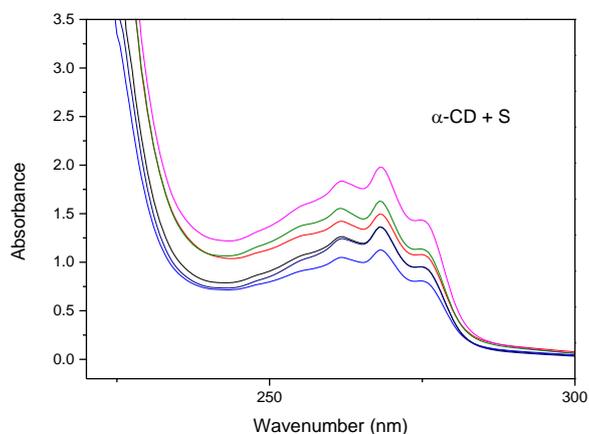


Fig. 1 Absorption spectra of stigmaterol at various concentration of α -CD

Table . 1 Absorption spectral data of stigmaterol with α -CD

S.No	[α -CD]	λ_{abs}	Absorbance	$\frac{1}{A - A_0}$	Log ϵ	$\frac{1}{[\alpha - \text{CD}]}$
1	0	262	1.0494	-	-	-
2	0.002	263.5	1.2430	5.16	4.427	500
3	0.004	264	1.2633	4.67	4.501	250
4	0.006	265	1.4208	2.69	4.508	166.6
5	0.008	266	1.5547	1.97	4.559	125
6	0.010	268	1.8363	1.27	4.670	100

3.2 Nuclear Magnetic Resonance (NMR) Spectroscopic Studies

Proton NMR is an important technique in analysing inclusion complexes of cyclodextrins in solid and liquid state [3]. The encapsulation of a guest molecule into the cavity of cyclodextrin is indicated by the changes in chemical shift of both guest and host NMR

spectrum (Panda *et al.*, 2016). As shown in figure 2. H₃, H₅ and H₆ protons are located near the wider and narrow rim of the CD cavity respectively. H₁, H₂ and H₄ are located on the exterior of the cavity. Upfield shifts that are noted for H₃, H₅ and H₆ internal protons of CD are due to the substitution of water molecules by the hydrophobic guest molecule [5]. When $\delta H_3 \leq \delta H_5$ complete inclusion of the guest into CD cavity occurs and $\delta H_3 > \delta H_5$ denotes partial inclusion [6].

Table 2 Chemical shifts of stigmasterol, α -CD:S inclusion complex

Position of Hydrogen (Stigmasterol)	δ of stigmasterol S	δ of the complex α -CD :S	$\Delta\delta$ (δ S - δ α -CD : S)
C ₃ -OH	2.285	2.285	0
C ₆ -H	5.027	5.027	0
C ₁₈	0.839	0.839	0
C ₁₉	0.788	0.788	0
C ₂₁	0.855	0.840	-0.015
C ₂₂	5.127	5.027	-0.100
C ₂₄	2.271	2.263	-0.008
C ₂₅	2.009	2.008	-0.001
C _{26, 27}	1.495	1.490	-0.005
C ₂₈	1.998	1.984	-0.014
C ₂₉	1.823	1.731	-0.092

Table 3 Chemical shifts of α -CD and the α -CD:S inclusion complex

H	$\delta\alpha$ -CD	$\delta\alpha$ -CD : S	$\Delta\delta$
1	4.00	4.00	0
2	3.517	3.515	-0.002
3	3.936	3.926	-0.010
4	3.563	3.563	0
5	3.605	3.600	-0.005
6	3.914	3.914	0

3.3 DSC Analysis

DSC thermograms of stigmasterol and α -CD the inclusion complex is shown in figure 2(a-c). The DSC thermogram of α -CD shows three exothermic peaks at 69.6°C, 102.6°C, 108.6°C which correspond to the dehydration of α -CD.

DSC thermogram of stigmasterol exhibits a sharp exothermic peak at 169.6°C corresponding to its melting point, but in the case of stigmasterol: α -CD inclusion complex, a shift in the exothermic peak to the left at 167.2°C occur.

These visible shifts in the thermograms of the complex serve as evidence for the partial encapsulation of stigmasterol in the CD cavity. The significant thermal peak of stigmasterol appeared at low temperature but intensity is reduced considerably in the complex. This could be attributed to the presence of inclusion complex in amorphous state. Thus, DSC analysis measures the existence of an interaction between guest and host in the inclusion complex.

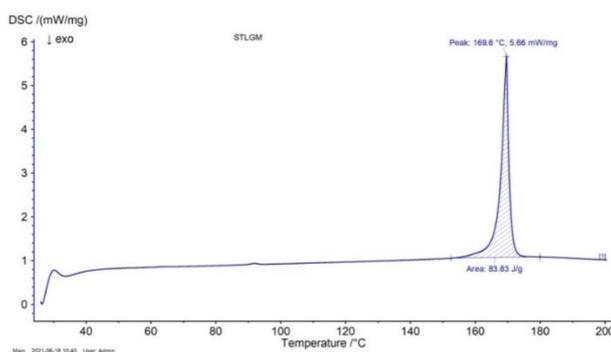


Fig. 2.a. Differential scanning calorimetric thermogram of stigmasterol

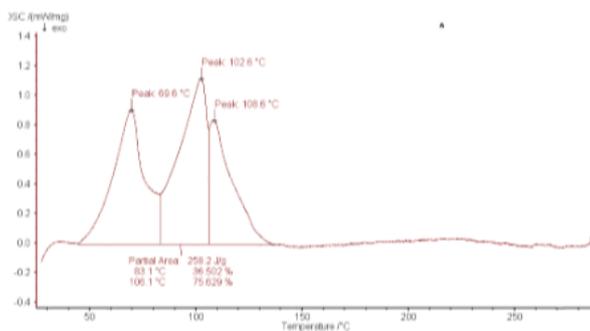


Fig. 2.b. Differential scanning calorimetric thermogram of α -CD

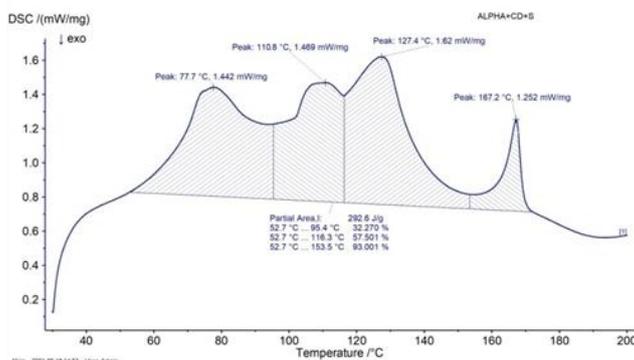


Fig. 2.c. Differential scanning calorimetric thermogram of stigmasterol: α -CD complex

3.4 Anti-inflammatory studies

Table: 4 denote the IC_{50} values of the analyzed samples. Stigmasterol is effective in inhibiting heat induced albumin denaturation with the IC_{50} value 25.60 $\mu\text{g/ml}$. While $\alpha\text{-CD+S}$ demonstrated lower activity with IC_{50} 14.73 $\mu\text{g/mL}$. The dose response for the anti-inflammatory activity of the samples is displayed in figure 3a,b From the results obtained it is visible that the complex demonstrated good anti-inflammatory potential suggesting the possibility that it can be used to control pain and inflammation.

Table .4 Anti-inflammatory property of stigmasterol and its inclusion complex

Sample	IC_{50} ($\mu\text{g/ml}$)
	Albumin denaturation assay
Stigmasterol	25.60
$\alpha\text{-CD +S}$	14.73

Table. 5 Percentage of albumin denaturation by stigmasterol and its inclusion complex

S. No	Concentration ($\mu\text{g/mL}$)	Albumin denaturation (%)	
		S	$\alpha\text{-CD +S}$
1.	Control (10)	100 \pm 0	100 \pm 0
2.	100	63.36 \pm 1.41	40.84 \pm 3.56
3.	90	59.05 \pm 1.17	27.52 \pm 2.41
4.	70	55.74 \pm 0.62	26.21 \pm 0.82
5.	50	53.84 \pm 0.51	20.89 \pm 2.40
6.	30	51.94 \pm 0.19	19.87 \pm 1.09
7.	15	50.33 \pm 1.24	15.31 \pm 0.78
8.	10	48.68 \pm 0.69	13.16 \pm 0.74
9.	5	45.25 \pm 2.09	12.14 \pm 2.09
10.	1	41.28 \pm 2.09	8.45 \pm 0.66
11.	0.5	38.36 \pm 0.59	3.28 \pm 3.22

Results are mean \pm SD of three observation. S-stigmasterol; $\alpha\text{-CD+S}$ -stigmasterol: alpha cyclodextrin complex; The percentage of denaturation was calculated as a ratio of the OD of stigmasterol and $\alpha\text{-CD+S}$ treated cells and control cells ($P \leq 0.001$).

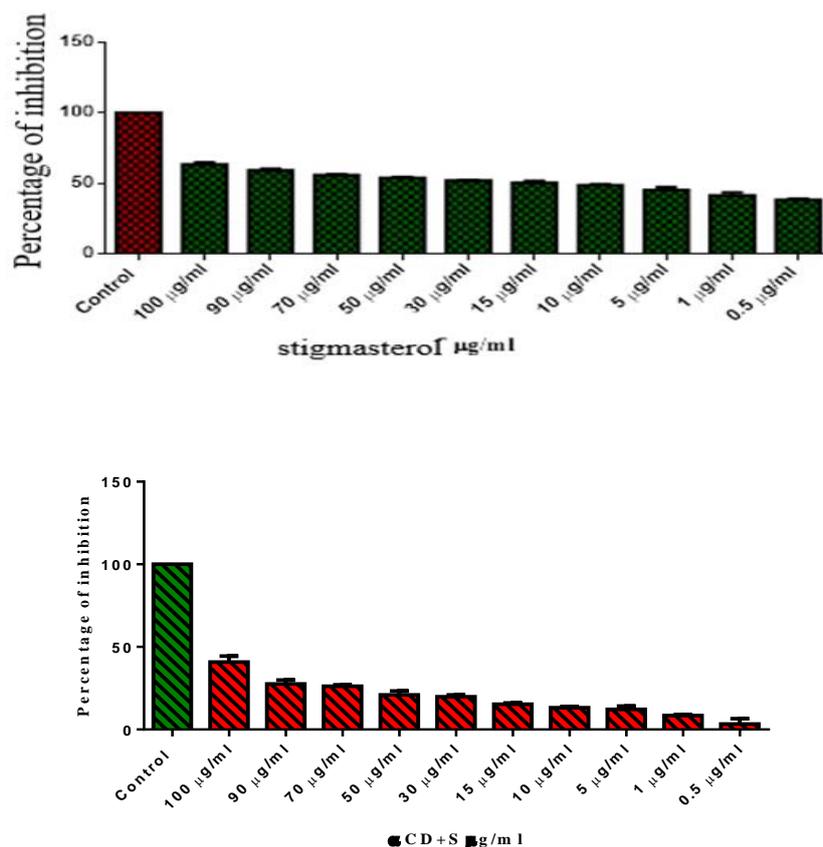


Fig. 3 (a,b) Percentage of albumin denaturation by (a) Stigmasterol (b) α -CD+S

Conclusion

The need to find alternate therapies has witnessed the revolutionary boom in the phytochemical market over the last decade as well as the increase in the amount of research done on them. Phytochemicals from the medicinal plants have found applications as pharmacologically active agent in curing diseases. Stigmasterol is effective in inhibiting heat induced albumin denaturation with the IC_{50} value $25.60 \mu\text{g/ml}$. while α -CD+S demonstrated better activity with an IC_{50} $14.73 \mu\text{g/ml}$. Thus cyclodextrin inclusion complex can be used as effective agent in pharmaceutical industry.

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The Forcing Steiner Chromatic Number of a Graph

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ABSTRACT

Let $W \subseteq V(G)$ be a χ_s -set of G and let $G = (V, E)$ be a connected graph. If W is the only χ_s -set that contains T , then a subset $T \subseteq W$ is said to be a forcing subset of W . A minimum forcing subset of W is a forcing subset for W of minimum cardinality. The cardinality of a minimum forcing subset of W is represented by the forcing Steiner chromatic number of W , indicated by $f_{\chi_s}(W)$. The forcing Steiner chromatic number of G is represented by the symbol $f_{\chi_s}(G)$, and it is equal to $f_{\chi_s}(G) = \min\{f_{\chi_s}(W)\}$, where the minimum is calculated across all χ_s -sets of G . Several common graphs forcing Steiner chromatic numbers are identified. These notions are examined for certain general properties. We characterise connected graphs with the forcing Steiner chromatic number of 0 or 1. It is demonstrated that there exists a connected graph G such that $f_{\chi_s}(G) = a$ and $\chi_s(G) = b$, where $\chi_s(G)$ is the Steiner chromatic number of G . This is true for all numbers a, b with $0 \leq a \leq b$, $b \geq 2$, and $b \geq a + 2$.

Keywords: chromatic number, Steiner number, Steiner chromatic number, forcing Steiner chromatic number.

AMS Subject Classification: 05C12, 05C15.

1. Introduction

Let $G = (V, E)$ be a graph having a vertex set $V(G)$ and an edge set $E(G)$ ($V(G)$ or $E(G)$ correspondingly). In addition, we state that a graph G has size $m = |E(G)|$ and order $n = |V(G)|$. We refer to [1] for the fundamental terms used in graph theory. If and only if an edge $e = uv \in E(G)$ exists, a vertex v is next to a vertex u . If $e = uv \in E(G)$, then u is neighbour, and the set of v is neighbours is denoted by $N_G(v)$. The degree of a vertex $v \in V$ is $\deg_G(v) = |N_G(v)|$. If $\deg_G(v) = n - 1$, a vertex v is said to be a universal vertex. The induced subgraph $G[S]$ is the largest subgraph of G with the given vertex set S for any set S of vertices of G . If the subgraph induced by vertex v is finished, then vertex v is said to be an extreme vertex.

The length of the shortest $u - v$ path in a connected graph G is given by the distance $d(u, v)$ between two vertices u and v . With a nonempty set W of vertices in a connected graph G , the Steiner distance $d(W)$ of W is the minimum size of a connected subgraph of G containing W . In [2], the Steiner distance was investigated. Let $S(W)$ be the collection of all

Steiner W - tree vertices. A set $W \subseteq V(G)$ is referred to as a *Steiner set* of G if $S(W) = V(G)$. The lowest cardinality for a Steiner set, commonly referred to as a *minimum Steiner set* or simply an s - set, is the Steiner number $s(G)$ of G . The *Steiner number* $s(G)$ of G determines the minimal cardinality of a Steiner set, which is also known as an s - set. In the event where $G[W]$ is connected, $d(W) = |W| - 1$ and $S(W) = W$. The Steiner number concept was covered in [3-16].

A k -coloring of G is a function with the form $c: V(G) \rightarrow \{1, 2, \dots, k\}$, where $c(u) \neq c(v)$ for any two adjacent vertices u and v in G . The vertices of G are given p colours, $1, 2, \dots, p$, and the colouring is considered to be correct if no two clearly neighbouring vertices share the same colour. The *chromatic number* of G , represented by, $\chi(G)$ is the bare minimum of colours required to colour the vertices of G . G is said to as being p - chromatic if $\chi(G) = p$, where $p \leq k$. If C contains each of the unique colour vertices in G , then the set $C \subseteq V(G)$ is referred to as a *chromatic set*. The lowest cardinality among all the chromatic sets of G is the chromatic number. That is, $\chi(G) = \min\{|C_i|/C_i \text{ is a chromatic set of } G\}$ denotes a chromatic set of G . In [17, 18], the chromatic number notion was explored.

If W is both a Steiner set and a chromatic set of G , it is referred to $W \subseteq V(G)$ as a Steiner chromatic set of G . The Steiner chromatic number of G , which is represented by the symbol $\chi_s(G)$, is the minimal cardinality of a Steiner chromatic set of G . [19] investigated the Steiner chromatic number theory.

In [20], the forcing notion was first discussed and introduced. Further research is found in [21, 22, 23, 24, 25]. Several authors have investigated the forcing notion in relation to various factors, including geodetic, Steiner, hull, diversion, monophonic, etc. The forcing idea in relation to minimum Steiner chromatic sets is examined in this article. The sequel makes use of the following theorems.

Theorem:1.1[19]. Every Steiner chromatic set of a connected graph G contains an extreme vertex that belongs to that set.

Theorem:1.2[19]. The Steiner chromatic set of G includes each universal vertex in the connected graph G .

Theorem:1.3[19]. For the graph $G = K_{1,a}$ ($a \geq 2$), $\chi_s(G) = a$

2. The Forcing Steiner Chromatic Number of a Graph

Definition:2.1. Let $W \subseteq V(G)$ be a $\chi_s(G)$ set of G and let $G = (V, E)$ be a connected graph. If W is the only χ_s - set that contains T , then a subset $T \subseteq W$ is said to be a forcing subset of W . A minimum forcing subset of W is a forcing subset for W of minimum cardinality. The

cardinality of a minimum forcing subset of W is represented by the forcing Steiner chromatic number of W , indicated by $f_{\chi_s}(W)$. The forcing Steiner chromatic number of G is denoted by $f_{\chi_s}(G)$, and it is equal to $f_{\chi_s}(G) = \min\{f_{\chi_s}(W)\}$, where the minimum is calculated across all χ_s -sets of G .

Example:2.2. For the graph G given in Figure. 2.1, assign the colors as follows:

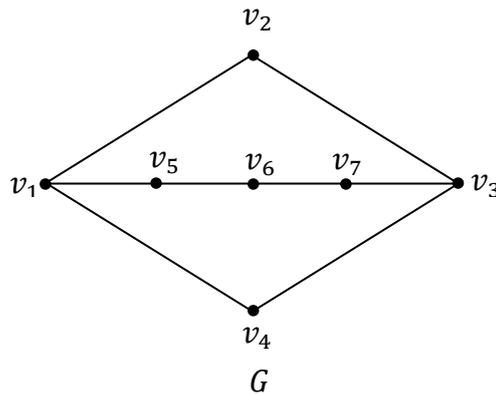


Figure: 2.1

Let $c(v_1) = 1, c(v_3) = c(v_5) = 2, c(v_2) = c(v_6) = 3,$ and $c(v_4) = c(v_7) = 4$.

Then $W_1 = \{v_1, v_3, v_6, v_7\}$ and $W_2 = \{v_1, v_2, v_4, v_6\}$ are the only two χ_s -sets of G such that $f_{\chi_s}(W_1) = f_{\chi_s}(W_2) = 1$ so that $f_{\chi_s}(G) = 1$.

Definition:2.3. A vertex v is said to be a *Steiner chromatic vertex* of G if v belongs to every χ_s -sets of G .

Remark:2.4. For the graph G given in Figure. 2.1, $\{v_1, v_6\}$ is the set of all Steiner chromatic vertices of G .

Observation:2.5. Let G be a connected graph. Then

- (a) for any connected graph $G, 0 \leq f_{\chi_s}(G) \leq \chi_s(G)$.
- (b) $f_{\chi_s}(G) = 0$ if and only if G has a distinct Steiner chromatic set with a minimum.
- (c) $f_{\chi_s}(G) = 1$ if and only if G has at least two minimal Steiner chromatic sets, at least one of which is a special minimum Steiner chromatic set containing one of its components.
- (d) If and only if no minimum Steiner chromatic set of G is the only minimum Steiner chromatic set that contains any of its appropriate subsets, then $f_{\chi_s}(G) = \chi_s(G)$.
- (e) The set of all the Steiner chromatic vertices of G is represented by the expression $f_{\chi_s}(G) \leq \chi_s(G) - |\chi|$.

3. Some Results on Forcing Steiner Chromatic Number of G .

The forcing chromatic number of a few common graphs is determined in the section that follows.

Theorem:3.1. For a complete graph $G = K_n$ ($n \geq 2$), $f_{\chi_s} = 0$.

Proof: By Theorem 1.1, $W = V(G)$ is the only set of χ_s for G . The conclusion then arises from Observation 2.5(b).

Theorem:3.2. $f_{\chi_s} = 0$ if G is a connected graph with at least one universal vertex.

Proof: This follows from Theorem 1.2 and Observation 2.5(b).

Corollary:3.3. Let G to be either a fan graph F_n or a wheel graph W_n . Therefore $f_{\chi_s}(G) = 0$.

Corollary:3.4 For the graph $G = K_n - e$ ($n \geq 4$), $f_{\chi_s}(G) = 0$.

Corollary:3.5 For the graph $G = K_1 + \cup m_j k_j$ where $\sum m_j \geq 2$, $f_{\chi_s}(G) = 0$.

Theorem:3.6 For the path $G = P_n$, ($n \geq 4$), $f_{\chi_s}(G) = \begin{cases} 0 & \text{if } n \text{ is even} \\ 1 & \text{if } n \text{ is odd} \end{cases}$.

Proof: Let $V(P_n) = \{v_1, v_2, \dots, v_n\}$. We have the following two cases.

Case (i): n is even. Let $n = 2k$ ($k \geq 2$). Assign the coloring as follows $c(v_{2i-1}) = c_1$ and $c(v_{2i}) = c_2$, $1 \leq i \leq k$. Then $W = \{v_1, v_n\}$ is the unique χ_s - set of G so that $f_{\chi_s}(G) = 0$.

Case (ii): n is odd. Let $n = 2k + 1$ ($k \geq 2$). Assign the coloring as follows

$$c(v_{2i-1}) = 1, \text{ for } 1 \leq i \leq k - 1,$$

$$c(v_{2k+1}) = c_3,$$

$$c(v_{2i}) = 2, \text{ for } 1 \leq i \leq k.$$

Then χ_s - set is not unique. Therefore $f_{\chi_s}(G) \geq 1$. Since $W = \{v_1, v_2, v_n\}$ is the unique χ_s - set containing v_2 , $f_{\chi_s}(W) = 1$. Hence it follows that $f_{\chi_s}(G) = 1$.

Theorem:3.7. For the cycle $G = C_n$ ($n \geq 4$), $f_{\chi_s}(G) = \begin{cases} 0 & \text{if } n = 5 \\ 1 & \text{otherwise} \end{cases}$.

Proof: Let $V(C_n) = \{v_1, v_2, \dots, v_n\}$, we have the following cases.

Case (i): n is even. Let $n = 2k$ ($k \geq 2$), we assign coloring for each vertex as follows

$$c(v_1) = c(v_3) = \dots = c(v_{2k-1}) = c_1 \text{ and}$$

$$c(v_2) = c(v_4) = \dots = c(v_{2k}) = c_2.$$

Then $W = \{v_1, v_{k+1}\}$ is a χ_s - set of G so that $\chi_s(G) = 2$. Since $n \geq 4$, the χ_s - set is not unique, and as a result, $f_{\chi_s}(G) \geq 1$. We have $f_{\chi_s}(G) = 1$ since W is the only χ_s - set of G that contains the value v_1 .

Case (ii): n is odd. Let $n = 2k + 1$ ($k \geq 2$). It is easily verified that no two element subset of G is not a Steiner chromatic set of G and so $\chi_s \geq 3$. Let $k = 2$. Then we assign the follows colors

$$\begin{aligned}c(v_1) &= c(v_3) = c_1, \\c(v_2) &= c(v_5) = c_2 \text{ and} \\c(v_4) &= c_3.\end{aligned}$$

Then $W = \{v_1, v_2, v_4\}$ is the unique χ_s - set of G so that $\chi_s(G) = 3$ and $f_{\chi_s}(G) = 0$.

So, let $k \geq 3$. Then we assign the following colors

$$\begin{aligned}c(v_1) &= c(v_3) = \dots \dots \dots = c(v_k) = c(v_{k+3}) = c(v_{k+5}) = \dots \dots \dots = c(v_{2k}) = 9, \\c(v_2) &= c(v_4) = \dots \dots \dots = c(v_{k+1}) = c(v_{k+4}) = c(v_{k+6}) = \dots \dots \dots = c(v_{2k+1}) = 5 \text{ and} \\c(v_{k+2}) &= c_3.\end{aligned}$$

Then $W_1 = \{v_1, v_4, v_{k+2}\}$ and $W_2 = \{v_1, v_2, v_{k+2}\}$ are the only two χ_s - sets of G so that $\chi_s = 3$ and $f_{\chi_s}(G) = 1$.

Theorem:3.8. For the complete bipartite graph $G = K_{r,s}$ ($1 \leq r \leq s$), $f_{\chi_s}(G) = 0$.

Proof: For $r = 1, s \geq 1$, by Theorem: 3.1, $f_{\chi_s}(G) = 0$. So let $2 \leq r \leq s$. Let X and Y be two bipartite sets of G . Then either X and Y is a Steiner set of G . Since for $x \in X$ and $y \in Y, xy \in E(G)$, each vertex of G is assigned by distinct colors. Then it follows that $W = V(G)$ is the unique χ_s - set of G so that $\chi_s(G) = r + s$ and $f_{\chi_s}(G) = 0$.

Theorem:3.9. For the ladder $G = K_2 \times P_n$ ($n \geq 3$), $f_{\chi_s}(G) = \begin{cases} 1 & \text{if } n \text{ is odd} \\ 0 & \text{if } n \text{ is even} \end{cases}$

Proof: Let $x_1, x_2, \dots \dots, x_n$ and $y_1, y_2, \dots \dots, y_n$ be the vertices on the path P_n of the laph from the top to bottom on the left side and right side respectively. We have the following cases

Case (i): n is odd. Let $n = 2k - 1; k \geq 2$. Then assign the colors for each vertex as follows $c(x_{2i-1}) = c(y_{2i}) = 1$ for $1 \leq i \leq k$ and $c(x_{2i}) = c(y_{2i-1}) = 2$ for $1 \leq i \leq k$. Then $W_1 = \{x_1, y_{2k-1}\}$ and $W_2 = \{y_1, x_{2k-1}\}$ are the only χ_s - sets of G such that $f_{\chi_s}(W_1) = f_{\chi_s}(W_2) = 1$ so that $f_{\chi_s}(G) = 1$.

Case (ii): n is even. Let $n = 2k; k \geq 4$. Then we assign the colors for each vertex as follows.

$$\begin{aligned}\text{Let } c(x_{2i-1}) &= 1 \text{ (} 1 \leq i \leq k - 1 \text{),} \\c(y_{2i}) &= 1 \text{ (} 1 \leq i \leq k - 1 \text{),} \\c(x_{2i}) &= 2 \text{ (} 1 \leq i \leq k - 1 \text{),} \\c(y_{2i-1}) &= 2 \text{ (} 1 \leq i \leq k \text{),} \\c(x_{2k}) &= 3 \text{ and } c(y_{2k}) = 4.\end{aligned}$$

Then $W = \{x_1, x_{2k}, y_1, y_{2k}\}$ is the unique χ_s - set of G so that $f_{\chi_s}(G) = 0$.

Theorem:3.10. Let G be the graph formed by connecting the two complete graphs $K_{r,r}$ and $K_{r,r}$ ($r \geq 2$) along a path of any length r . Therefore $f_{\chi_s}(G) = 0$.

Proof: Let X and Y be the bipartite sets of first complete graph $K_{r,r}$ and, U and V be the bipartite sets of the second complete graph. Let $X = \{x_1, x_2, \dots, x_r\}, Y = \{y_1, y_2, \dots, y_r\}, U = \{u_1, u_2, \dots, u_r\}$ and $V = \{v_1, v_2, \dots, v_r\}$. Let $P_r : z_1, z_2, \dots, z_r$. Let G be the graph obtained from $K_{r,r}, K_{r,r}$ and P_r ($r \geq 2$) by introducing the edges z_1y_r and z_rv_1 . We assign the colors for each vertex as follows.

$$c(x_i) = c(v_i) = c_i \quad (i \leq i \leq r),$$

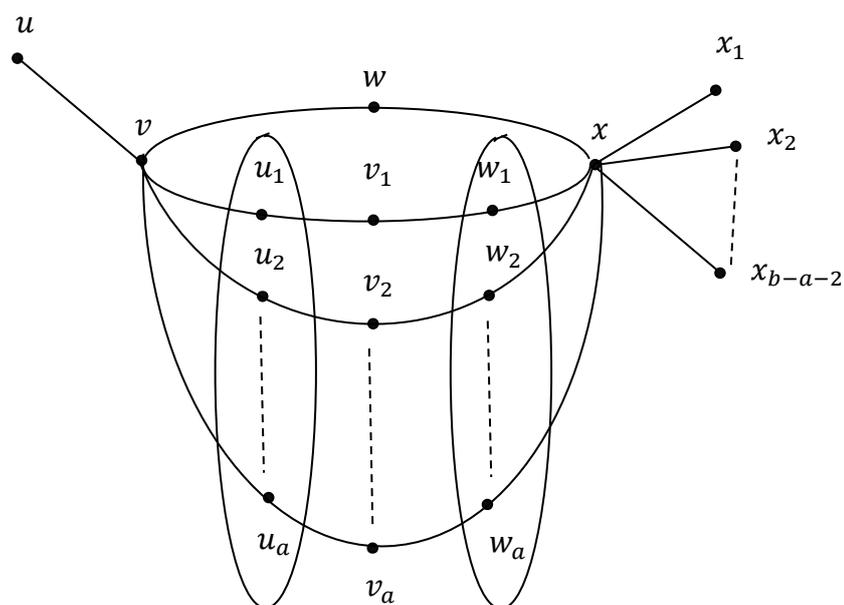
$$c(y_i) = c(u_i) = d_i \quad (i \leq i \leq r),$$

$$c(z_1) = c_1, c(z_r) = d_1, c(z_i) = c_i \quad (2 \leq i \leq r - 1).$$

Then it follows that $W = \{y_1, y_2, \dots, y_r\} \cup \{v_1, v_2, \dots, v_r\}$ is the unique χ_s - set of G so that $f_{\chi_s}(G) = 0$.

Theorem:3.11. There is a connected graph G such that $f_{\chi_s}(G) = a$ and $\chi_s(G) = b$ for every pair of integers a, b with $0 < a < b, b \geq 2$ and $b > a + 2$.

Proof: For $a = 0$, let $G = K_{1,a}$. Then by Corollary 3.5 and Theorem 1.3, $f_{\chi_s}(G) = 0$ and $\chi_s(G) = b$. So let $a \geq 1$. Let $P: u, v, w, x$ be a path of order 4. Let $P_i: u_i, v_i, w_i$ ($1 \leq i \leq a$) be a copy of path of order 3. Let H be the graph obtained from P and P_i ($1 \leq i \leq a$) by the introducing the edges vu_i, xw_i, u_iu_j ($i \neq j$) and w_iw_j ($i \neq j$), ($1 \leq i, j \leq a$). Let G be the graph obtained from H by adding the new vertices $x_1, x_2, \dots, x_{b-a-2}$ and introducing the edge xx_i ($1 \leq i \leq b - a - 2$). The graph G is shown in figure.



G Figure 3.1

A graph G with $f_{\chi_s}(G) = a$ and $\chi_s(G) = b$

First we prove that $\chi_s(G) = b$. Let $X = \{u, x_1, x_2, \dots, x_{b-a-2}\}$ the set of all end vertices of G by Theorem 1.1, Z is a subset of every Steiner chromatic set of G . Let $H_i = \{u_i, w_i\}$ ($1 \leq i \leq a$). Then it is easily seen that every Steiner chromatic set of G contains exactly are vertex from each H_i ($1 \leq i \leq a$). Let us assign colors for each vertex as follows.

$$c(u) = c(x) = c, c(v_i) = c \ (1 \leq i \leq a),$$

$$c(x_i) = c_i \ (1 \leq i \leq b - a - 2),$$

$$c(u_i) = c(v_i) = d_i \ (1 \leq i \leq a),$$

$$c(v) = c_1 \text{ and}$$

$$c(w) = d_1.$$

Let $Z = X \cup \{x\}$. Then Z is a subset of every Steiner chromatic set of G and so $\chi_s(G) \geq b - a + a = b$. Let $W = \{u_1, u_2, \dots, u_a\}$. Then W is Steiner chromatic set of G so that $\chi_s(G) = b$.

Next we prove that $f_{\chi_s}(G) = a$. By Observation 2.5 (e), $f_{\chi_s}(G) \leq b - (b - a) = a$. Since Z is a subset of every Steiner chromatic set of G and every chromatic set of G contains exactly one vertex from each H_i ($1 \leq i \leq a$), every χ_s - set is of the form $W = Z \cup \{c_1, c_2, \dots, c_a\}$, where $C_i \in H_i$ ($1 \leq i \leq a$). Let T be a proper subset of W with $|T| < a$. Then for some i , $H_i \cap T = \emptyset$. This shows that $f_{\chi_s}(G) = a$.

Conclusion:

In this paper the concept of forcing Steiner chromatic number of some standard graphs some general properties satisfied by this concept are studied. In future studies, the same concept will be applied for the other graph operations.

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The Forcing Edge Chromatic Number of Some Standard Graphs

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ABSTRACT

Let S be a χ' -set of G . A subset $T \subseteq S$ is said to be a forcing subset for S if S is the unique χ' -set containing T . The forcing edge chromatic number $f_{\chi'}(S)$ of S in G is the minimum cardinality of a forcing subset for S . The forcing edge chromatic number $f_{\chi'}(G)$ of G is the smallest forcing number of all χ' -sets of G . In this article, some general properties satisfied by this concept are studied and the forcing edge chromatic number of some standard graphs are determined. Also, connected graphs of order $n \geq 2$ edge chromatic number 0 or 1 or $\chi'(G)$ are characterized. It is shown that for a positive integer $a \geq 2$, there exists a connected graph G such that $f_{\chi'}(G) = \chi'(G) = a$.

Keywords: Forcing edge chromatic number, Edge chromatic number, Chromatic number.

AMS Subject Classification: 05C15.

1. Introduction

By a graph $G = (V, E)$, we mean a finite, undirected connected graph without loops or multiple edges. The order and size of G are denoted by n and m respectively. For basic graph theoretic terminology, we refer to [1]. Two vertices u and v are said to be adjacent if uv is an edge of G . Two edges of G are said to be adjacent if they have a common vertex.

A k -coloring of G is a function $c : V(G) \rightarrow \{1, 2, \dots, k\}$, where $c(u) \neq c(v)$ for any two adjacent vertices u and v in G . A p -vertex coloring of G is an assignment of p colors, $1, 2, \dots, p$ to the vertices of G , the coloring is proper if no two distinct adjacent vertices have the same color. The minimum colours needed to colour the vertices of G is called *chromatic number* of G , denoted by $\chi(G)$. If $\chi(G) = p$, G is said to be p -chromatic, where $p \leq k$. A set $C \subseteq V(G)$ is called *chromatic set* if C contains all vertices of distinct colors in G . The chromatic number of G is the minimum cardinality among all the chromatic sets of G . That is $\chi(G) = \min\{|C_i| / C_i \text{ is a chromatic set of } G\}$. The concept of the chromatic number was studied in [2,3,4]. A k -edge coloring of G is a function $c' : E(G) \rightarrow \{1, 2, \dots, k\}$, where $c'(e) \neq c'(f)$ for any two adjacent edges e and f in G . A p -edge coloring of G is an assignment of p colors, $1, 2, \dots, p$ to the edges of G , the coloring is proper if no two distinct adjacent edges have the same color. The minimum colours needed to colour the edges of G is called *edge chromatic number* of G , denoted by $\chi'(G)$. If $\chi'(G) = p$, G is said to be p -edge chromatic, where $p \leq k$. A set $C' \subseteq E(G)$ is called *edge chromatic set* if C' contains all

edges of distinct colors in G . The *edge chromatic number* of G is the minimum cardinality among all the edge chromatic sets of G . That is $\chi'(G) = \min\{|C'_i| \mid C'_i \text{ is a edge chromatic set of } G\}$. An edge chromatic set of cardinality $\chi'(G)$ is called a χ' -set of G . The edge-chromatic number $\chi'(G)$ of G is defined to be the least number of colours needed to colour the edges of G in such a way that no two adjacent edges have the same colour. The concept of the edge chromatic number was studied in [5,6,7]. The chromatic number has application in Time Table Scheduling, Map coloring, channel assignment problem in radio technology, town planning, GSM mobile phone networks etc.[8,9].

2. The forcing edge chromatic number of some standard graphs

Definition 2.1. Let S be a χ' -set of G . A subset $T \subseteq S$ is said to be a forcing subset for S if S is the unique χ' -set containing T . The *forcing edge chromatic number* $f_{\chi'}(S)$ of S in G is the minimum cardinality of a forcing subset for S . The forcing edge chromatic number $f_{\chi'}(G)$ of G is the smallest forcing number of all χ' -sets of G .

Example 2.2. For the graph G given in Figure 2.1, $S_1 = \{e_1, e_2, e_3, e_4\}, S_2 = \{e_6, e_2, e_3, e_4\}, S_3 = \{e_1, e_5, e_3, e_4\}, S_4 = \{e_6, e_5, e_3, e_4\}$ are the only two χ' -sets of G such that $\chi'(G) = 3, f_{\chi'}(S_1) = f_{\chi'}(S_2) = f_{\chi'}(S_3) = f_{\chi'}(S_4) = 2$ so that $f_{\chi'}(G) = 2$.

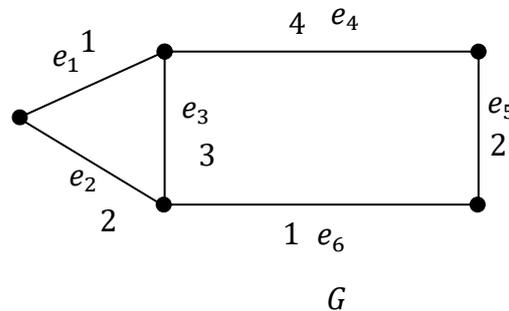


Figure 2.1

The following result follows immediately from the definitions of the edge chromatic number and the forcing edge chromatic number of a connected graph G .

Observation 2.3. For every connected graph $G, 0 \leq f_{\chi'}(G) \leq \chi'(G)$.

Remark 2.4. The bounds in the Observation 2.3 are sharp. For the complete graph $G = K_3, S = E(G)$ is the unique χ' -set of G so that $f_{\chi'}(G) = 0$. For the graph G given in Figure 2.2, $S_1 = \{e_1, e_2, e_3\}, S_2 = \{e_1, e_4, e_5\}, S_3 = \{e_1, e_2, e_6\}, S_4 = \{e_1, e_4, e_6\}, S_5 = \{e_3, e_2, e_5\}, S_6 = \{e_3, e_4, e_5\}, S_7 = \{e_3, e_2, e_6\}, S_8 = \{e_3, e_4, e_6\}$ such that $f_{\chi'}(S_i) = 3$ for $i = 1$

to 8 and $\chi'(G) = 3$ so that $f_{\chi'}(G) = \chi'(G) = 3$. Also the bounds are strict. For the graph in Figure 2.1, $\chi'(G) = 4, f_{\chi'}(G) = 2$. Thus $0 < f_{\chi'}(G) < \chi'(G)$.

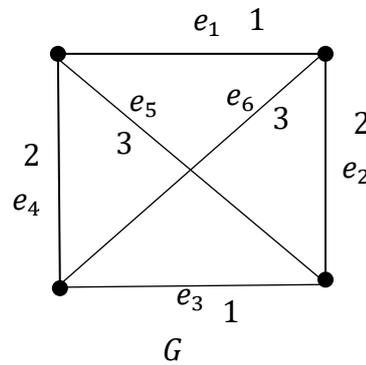


Figure 2.2

Definition: 2.5. An edge e of a graph G is said to be an *edge chromatic edge* of G if e belongs to every χ' -set of G .

Example 2.6. For the graph G given in Figure 2.3, $S_1 = \{e_1, e_2, e_3\}, S_2 = \{e_1, e_2, e_4\}, S_3 = \{e_5, e_2, e_3\}, S_4 = \{e_5, e_2, e_4\}$ are the only χ' -sets of G such that e_2 is a chromatic edge of G .

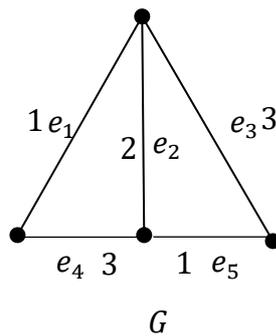


Figure 2.3

Theorem 2.7. Let G be a connected graph of order $n \geq 2$ with $\Delta(G) = n - 1$. Let x be a universal vertex of G and e be an edge incident with x . Then e is a chromatic edge of G .

Proof. On the contrary, suppose that e is not a chromatic edge of G . Then there exists a χ' -set S of G such that $e = uv$. Let $c(e) = c_1$. Since $e \notin S$, there exists $f = yz \in E(G)$ such that $c(f) = c_1$ and $y \neq x, v$ and $z \neq x, v$. Hence it follows that x is not a universal vertex of G , which is a contradiction. Therefore e is a chromatic edge of G .

Theorem 2.8. Let G be a connected graph. Then

- (a) $f_{\chi'}(G) = 0$ if and only if G has a unique χ' -set.
- (b) $f_{\chi'}(G) = 1$ if and only if G has at least two χ' -sets, one of which is a

unique χ' -set containing one of its elements, and

(c) $f_{\chi'}(G) = \chi'(G)$ if and only if no χ' -set of G is the unique χ' -set

containing any of its proper subsets.

Proof. (a) Let $f_{\chi'}(G) = 0$. Then, by definition, $f_{\chi'}(S) = 0$ for some χ' -set S of G so that the empty set \emptyset is the minimum forcing subset for S . Since the empty set \emptyset is a subset of every set, it follows that S is the unique χ' -set of G . The converse is clear.

(b) Let $f_{\chi'}(G) = 1$. Then by Theorem 2.8(a), G has at least two χ' -sets. Also, since $f_{\chi'}(G) = 1$, there is a singleton subset T of a χ' -set S of G such that T is not a subset of any other χ' -set of G . Thus S is the unique χ' -set containing one of its elements. The converse is clear.

(c) Let $f_{\chi'}(G) = \chi'(G)$. Then $f_{\chi'}(S) = \chi'(G)$ for every χ' -set S in G . Also, by Observation 2.3, $\chi'(G) \geq 2$ and hence $f_{\chi'}(G) \geq 2$. Then by Theorem 2.8(a), G has at least two χ' -sets and so the empty set \emptyset is not a forcing subset for any χ' -set of G . Since $f_{\chi'}(S) = \chi'(G)$, no proper subset of S is a forcing subset of S . Thus no χ' -set of G is the unique χ' -set containing any of its proper subsets. Conversely, the data implies that G contains more than one χ' -set and no subset of any χ' -set S other than S is a forcing subset for S . Hence it follows that $f_{\chi'}(G) = \chi'(G)$.

Theorem 2.9. Let G be a connected graph and W be the set of all chromatic edges of G . Then $f_{\chi'}(G) \leq \chi'(G) - |W|$.

Proof. Let S be any χ' -set of G . Then $\chi'(G) = |S|$, $W \subseteq S$ and S is the unique χ' -set containing $S - W$. Thus $f_{\chi'}(G) \leq |S - W| = |S| - |W| = \chi'(G) - |W|$.

In the following we determine the forcing edge chromatic number of some standard graphs.

Theorem 2.10. For the complete graph $G = K_n (n \geq 2)$,

$$f_{\chi'}(G) = \begin{cases} 0 & \text{if } n = 2, 3 \\ 3 & \text{if } n = 4 \\ n - 1 & \text{if } n \geq 5 \end{cases}$$

Proof. For $n = 2$ and $n = 3$, $S = E(G)$ is the unique χ' -set of G , the result follows from Theorem 2.8 (a). For $n = 4$, let $e_{11} = v_1v_2$, $e_{12} = v_1v_3$, $e_{13} = v_1v_4$, $e_{21} = v_2v_3$, $e_{22} = v_2v_4$, $e_{31} = v_3v_4$. Assign $c'(e_{11}) = c'(e_{31}) = 1$, $c'(e_{12}) = c'(e_{22}) = 2$, $c'(e_{13}) = c'(e_{21}) = 3$. Then $S_1 = \{e_{11}, e_{12}, e_{13}\}$, $S_2 = \{e_{11}, e_{12}, e_{21}\}$, $S_3 = \{e_{11}, e_{22}, e_{13}\}$, $S_4 = \{e_{11}, e_{22}, e_{21}\}$, $S_5 = \{e_{31}, e_{12}, e_{13}\}$, $S_6 = \{e_{31}, e_{12}, e_{21}\}$, $S_7 = \{e_{31}, e_{22}, e_{13}\}$, $S_8 =$

$\{e_{31}, e_{22}, e_{21}\}$ are the χ' -set of G such that $f_{\chi'}(S_i) = 3$ for $i = 1$ to 8 so that $f_{\chi'}(G) = 3$. For $n \geq 5$, let $e_{1j} = v_1v_j(2 \leq j \leq n), e_{2j} = v_2v_j(3 \leq j \leq n), e_{3j} = v_3v_j(4 \leq j \leq n), \dots, e_{(n-1)j} = v_{n-1}v_n$. Assign $c'(e_{1j}) = c'_j, c'(e_{2j}) = c'_j - 1 (1 \leq j \leq n - 1), c'(e_{3j}) = c'_j - 2 (1 \leq j \leq n - 1), \dots, c'(e_{(n-1)j}) = c'_j - (n - 2) (1 \leq j \leq n - 1), c'(e_{(n-2)j}) = n$ so that $\chi'(G) = n$. Since $e_{(n-2)j}$ is a chromatic edge of G , by Theorem 2.9, $f_{\chi'}(G) \leq n - 1$. Let S be a chromatic edge set of G . We prove that $f_{\chi'}(G) = n - 1$. On the contrary, suppose that $f_{\chi'}(G) \leq n - 2$. Then there exists a forcing subset T of S such that $|T| \leq n - 2$. Let $e \in S$ such that $e \notin T$. Then e is not a chromatic edge of G . Without loss of generality, let us assume that $c'(e) = c'_1$. Since $n \geq 5$, there exists $f \in E(G)$ such that $c'(f) = c'_1$. Let $S' = [S - \{e\}] \cup \{f\}$. Then S' is a χ' -set of G . Hence T is a proper subset of a χ' -set S' of G , which is a contradiction. Therefore $f_{\chi'}(G) = n - 1$.

Theorem 2.11. For the star graph $G = K_{1,n-1} (n \geq 3), f_{\chi'}(G) = 1$.

Proof. Since $S = E(G)$ is the unique χ' -set of G , the result follows from Theorem 2.8(a)

Theorem 2.12. For the double star graph $G = K_{2,r,s}, f_{\chi'}(G) = 2$.

Proof. Let $V = \{x, v_1, v_2, \dots, v_r\} \cup \{y, u_1, u_2, \dots, u_s\}$ be the vertex set of G . Let $f_i = xv_i, e = xy, g_i = yu_j$ be the edge set of G for all $(1 \leq i \leq r)$ and $(1 \leq j \leq s)$ where $r + s = n - 2$. Then $S_1 = \{e, f_i\} (1 \leq i \leq r)$ and $S_2 = \{e, g_j\} (1 \leq j \leq s)$ are the only χ' -sets of G such that $f_{\chi'}(S_1) = f_{\chi'}(S_2) = 2$ so that $f_{\chi'}(G) = 2$.

Theorem 2.13. For the complete bipartite graph $G = K_{r,s} (1 \leq r \leq s),$

$$f_{\chi'}(G) = \begin{cases} 0 & \text{if } r = 1, s = 1 \\ 2 & \text{if } r = 2, s = 2 \\ s & \text{if } 2 \leq r \leq s \end{cases}$$

Proof. For $r = 1$ and $s \geq 2$, then the result follows from Theorem 2.11. For $r = 2$ and $s = 2$, $S_1 = \{e_{11}, e_{12}\}, S_2 = \{e_{11}, e_{21}\}, S_3 = \{e_{22}, e_{12}\}, S_4 = \{e_{22}, e_{21}\}$ are the χ' -sets of G such that $f_{\chi'}(S_i) = 2$ for $i = 1$ to 4 so that $f_{\chi'}(G) = 2$. So let $2 \leq r \leq s$. Let $X = \{x_1, x_2, \dots, x_r\}$ and $Y = \{y_1, y_2, \dots, y_s\}$ be the bipartite sets of G . Let $e_{1j} = x_1y_j(1 \leq j \leq s), e_{2j} = x_2y_j(1 \leq j \leq s), \dots, e_{ij} = x_iy_j(1 \leq i \leq r)(1 \leq j \leq s)$. Assign $c'(e_{1j}) = c'_j(1 \leq j \leq s), c'(e_{2j}) = c'_j, c'_1(2 \leq j \leq s), c'(e_{3j}) = c'_j, c'_1, c'_2(3 \leq j \leq s), \dots, c'(e_{ij}) = c'_s, c'_1, c'_2, \dots, c'_{s-1}(1 \leq i \leq r)(1 \leq j \leq s)$. Then $S_{ij} = \{e_{11}, e_{12}, e_{13}, \dots, e_{ks}\}$ is a χ' -set of G such that $\chi'(G) = s$. By Observation 2.3, $0 \leq f_{\chi'}(G) \leq s$. Since χ' -set of G is not unique $f_{\chi'}(G) \geq 1$. It is easily observed that no singleton subsets or two element subsets of

$S_{ij}(1 \leq i \leq r), (1 \leq j \leq s)$ is not a forcing subset of S_{ij} so that $f_{\chi'}(S_{ij}) = s$. Since this true for all χ' -set $S_{ij}(1 \leq i \leq r), (1 \leq j \leq s)$ so that $f_{\chi'}(G) = s$.

Theorem 2.14. For the path $G = P_n (n \geq 3)$, $f_{\chi'}(G) = \begin{cases} 0 & \text{if } n = 3 \\ 1 & \text{if } n = 4 \\ 2 & \text{if } n \geq 5 \end{cases}$

Proof. Let P_n be v_1, v_2, \dots, v_n and let $e_i = v_i v_{i+1} (1 \leq i \leq n-1)$. For $n = 3$, $S = E(G)$ is the unique χ' -set of G , the result follows from Theorem 2.8(a). For $n = 4$, $S_1 = \{e_1, e_2\}$ and $S_2 = \{e_2, e_3\}$ are the χ' -sets of G such that $f_{\chi'}(S_1) = f_{\chi'}(S_2) = 1$ so that $f_{\chi'}(G) = 1$. So let $n \geq 5$. Then $S_i = \{e_i, e_{i+1}\} (1 \leq i \leq n-1)$ and $S_{jk} = \{e_j, e_k\} (1 \leq j \leq k \leq n-1)$ and $|j-k|$ is odd are the only χ' -sets of G such that $f_{\chi'}(S_i) = 2$ for $(1 \leq i \leq n-1)$ and $f_{\chi'}(S_{jk}) = 2$ for $(1 \leq j \leq k \leq n-1)$ so that $f_{\chi'}(G) = 2$.

Theorem 2.15. For the cycle $G = C_n (n \geq 4)$, $f_{\chi'}(G) = 2$.

Proof. Let C_n be $v_1, v_2, \dots, v_n, v_1$ and let $e_i = v_i v_{i+1} (1 \leq i \leq n-1)$ and $e_n = v_n v_1$.

We consider the following two cases.

Case(1) n is even

$$c(e_i) = \begin{cases} 1, & \text{if } i \text{ is odd} \\ 2, & \text{if } i \text{ is even} \end{cases}$$

Then $S_i = \{e_i, e_{i+1}\} (1 \leq i \leq n-1)$ and $S_{ijk} = \{e_j, e_k\} (1 \leq j \leq k \leq n-1)$ and $|j-k|$ is odd are the only χ' -sets of G such that $f_{\chi'}(S_i) = 2$ and $f_{\chi'}(S_{jk}) = 2$ for $(1 \leq i \leq n-1)$ and $(1 \leq j \leq k \leq n-1)$ so that $f_{\chi'}(G) = 2$.

Case(2) n is odd

$$c(e_i) = \begin{cases} 1 & \text{if } n \text{ is odd} \\ 2 & \text{if } n \text{ is even} \\ 3 & \text{if } i = n \end{cases}$$

Since $E(v_n v_1)$ is the set of chromatic edges of G , $E(v_n v_1)$ is a subset of every χ' -set of G . It can be easily seen that any χ' -set of G is of the form $S = E(v_n v_1) \cup \{x, y\}$, where $x, y \in \{e_1, e_2, \dots, e_{n-1}\}$ so that $\chi'(G) = n + 2$. By Theorem 2.9, $f_{\chi'}(G) \leq n + 2 - n = 2$. Since χ' -set of G is not unique $f_{\chi'}(G) \geq 1$. It is easily observed that no singleton subsets of S is not a forcing subset of S so that $f_{\chi'}(S) = 2$. Since this is true for all χ' -set S of G , $f_{\chi'}(G) = 2$.

Theorem 2.16. For a positive integer $a \geq 2$, there exists a connected graph G such that $f_{\chi'}(G) = \chi'(G) = a$.

Proof. For $a = 2$, let $G = C_4$. Then by Theorem 2.15, $f_{\chi'}(G) = \chi'(G) = a$. So, let

$a \geq 3$. Let $G = K_{2,a}$. By Theorem 2.13, $f_{\chi'}(G) = \chi'(G) = a$.

3. Conclusion

In this article, we discuss about a new concept namely, forcing edge chromatic number of a graph. Also, the relation between edge chromatic number and forcing edge chromatic number is found. The above concept is examined by some standard graphs with examples.

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The Detour Vertex Covering Number of a Graph

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ABSTRACT

A vertex subset S of a connected graph G of order at least two is called a detour vertex cover if S is both a detour set and a vertex cover. The least cardinality of a detour vertex cover is the detour vertex covering number of G denoted as $dn_\alpha(G)$. Any detour vertex cover of cardinality $dn_\alpha(G)$ is a dn_α -set of G . Some general properties satisfied by detour vertex covering number of a graph are studied. The detour vertex covering number of some standard graphs are determined. Some bounds for $dn_\alpha(G)$ are obtained and the graphs attaining these bounds are characterized.

Keywords: Detour dominating set, Detour set, Detour vertex cover, Vertex cover

AMS Subject Classification (2010): 05C12

1. Introduction

We refer to Harary [1] for basic definitions. We consider finite, undirected, connected graphs without loops and multiple edges. The number of vertices and edges of a graph G are denoted as $n = V(G)$ and $m = E(G)$ respectively. A vertex v is a simplicial vertex or an extreme vertex of G if the subgraph induced by its neighbours is complete. A vertex of degree 1 is called an end vertex. [2]

For vertices u and v in a connected graph G , the *detour distance* $D(u, v)$ is the length of a longest $u - v$ path in G . A $u - v$ path of length $D(u, v)$ is called a $u - v$ detour. These concepts were studied by Chartrand [3,4]. A vertex x is said to lie on a $u - v$ detour P if x is a vertex of a $u - v$ detour path P including the vertices u and v . A set $S \subseteq V(G)$ is called a detour set if every vertex v in G lies on a detour joining a pair of vertices of S . The *detour number* $dn(G)$ is called a minimum order of a detour set and any detour set of order $dn(G)$ is called a minimum detour set of G . These concepts were studied by Chartrand [5].

A subset $S \subseteq V(G)$ is called a *vertex covering set* or *vertex cover* of G if every edge has at least one end vertex in S . A vertex covering set with minimum cardinality is a *minimum vertex covering set* of G . The *vertex covering number* of G is the cardinality of any minimum vertex covering set of G denoted as $\alpha(G)$. The vertex covering number of a graph was studied in [6].

A set of vertices in a graph G is *independent* if no two of the vertices are adjacent. A subset $S \subseteq V(G)$ is a dominating set if every vertex in $V(G) - S$ is adjacent to at least one

vertex in S . A *detour dominating set* of G is a subset S of vertices which is both a detour set and a dominating set. The minimum cardinality of a detour dominating set of a graph G is its *detour domination number*. The concept of detour dominating set was introduced by Chartrand [7] and further studied in [8].

In this paper, we define detour vertex covering number $g_\alpha(G)$ of a graph and initiate a study of this parameter. We investigate about some general properties satisfied and some bounds attained by this parameter. We need the following theorems.

Theorem 1.1 [9] Every end vertex of a connected graph G belongs to every detour set of G .

Theorem 1.2 [10] If G is a connected graph of order $n \geq 2$, then $g_\alpha(G) = 2$, if and only if G is either K_2 or $K_{2,n-2}$ ($n \geq 3$).

Theorem 1.3 [10] Let T be a tree of order $n \geq 2$. Then the following statements are equivalent.

- (i) $g_\alpha(T) = g(T)$
- (ii) T is a star.
- (iii) $\alpha(T) = 1$
- (iv) The set of all end vertices of T is a vertex cover of T .

Theorem 1.4. [10] Let T be a tree of order $n \geq 3$. Then $g_\alpha(T) = n - 1$ if and only if T is either a star or a double star.

2. Results and Discussion

Detour vertex covering number of a graph

Definition 2.1 A vertex subset S of a graph G is known as a detour vertex cover of G if it is both a detour set and a vertex cover of G . The least cardinality of a detour vertex cover is called the detour vertex covering number denoted as $dn_\alpha(G)$. Any detour vertex cover of G with cardinality $dn_\alpha(G)$ is called as a minimum detour vertex cover of G . A minimum detour vertex cover of G is also known as dn_α -set of G .

Example 2.2 In this graph G , we observe that the set $S = \{v_2, v_5\}$ is a minimum detour set but its vertices are not incidenting all the edges of G . Also note that $S_1 = \{v_2, v_3, v_4, v_5\}$ is both a detour set and a vertex cover of G . Hence it is a detour vertex cover of G . And there does not exist a detour vertex cover of cardinality 3. Hence S_1 is a dn_α -set of G . Thus $dn_\alpha(G) = 4$.

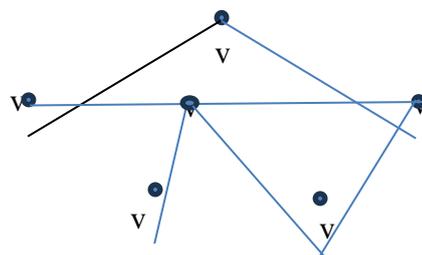


Figure 1

Remark 2.3 Graph in Figure 1 has $S = \{v_2, v_3, v_4\}$ as a minimum vertex cover but it is not a detour set. Thus, a vertex cover need not be a detour vertex cover of G . A graph G can allow more than one dn_α -set. For example, the graph G in Figure 1 has both $S_1 = \{v_2, v_3, v_4, v_5\}$ and $S_2 = \{v_2, v_4, v_5, v_6\}$ as dn_α -sets of G .

Theorem 2.4 Let G be any connected graph. Then $2 \leq \max \{\alpha(G), dn(G)\} \leq dn_\alpha(G) \leq n$.

Proof. At least two vertices must belong to any detour set and so $2 \leq \max \{\alpha(G), dn(G)\}$. It follows from the definition of detour vertex covering number of G that a detour vertex cover must be both a detour set and a vertex cover of G . Thus we have $\max \{\alpha(G), dn(G)\} \leq dn_\alpha(G)$. Also $V(G)$ is itself a detour vertex cover of G . Hence we have $dn_\alpha(G) \leq n$. Thus $2 \leq \max \{\alpha(G), dn(G)\} \leq dn_\alpha(G) \leq n$.

Theorem 2.5 Each detour vertex cover of a connected graph G contains each end vertex of G .

Proof. Since every detour vertex cover is also a detour set of G , the proof follows from Theorem 1.1.

Corollary 2.6 Let $K_{1,n-1} (n \geq 3)$ be a star. Then $dn_\alpha(K_{1,n-1}) = n - 1$.

Proof. The result follows from Theorem 2.5.

Remark 2.7 It is not necessary that every extreme vertex of G belong to every detour vertex cover of G . For example, the graph G in Figure 2, has two extreme vertices namely v_2, v_3 . Here the set $S_3 = \{v_2, v_3\}$ is a minimum detour set of G . But it does not cover the edge v_1v_4 . Thus S_3 is not a detour vertex covering set of G and the set $S_4 = \{v_1, v_4\}$ forms a detour vertex cover of G . Hence in this case no extreme vertex belongs to the detour vertex cover of G . Consider the graph G in Figure 3, it has three extreme vertices v_1, v_3, v_6 . Of that v_6 is specifically an end vertex of G . It is easily observed that $S_5 = \{v_1, v_2, v_5, v_6\}$ is a dn_α -set of G . Here the end vertex v_6 of the graph belongs to the dn_α -set S_5 and the extreme vertex v_1 belongs to the dn_α -set S_5 but the extreme vertex v_3 does not belong to S_5 .

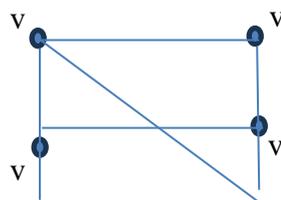
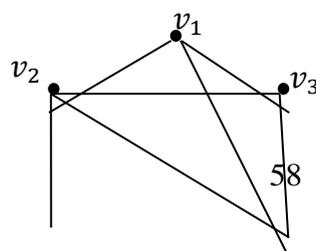


Figure 2



**Figure 3**

Theorem 2.8 If G is a connected graph of order $n \geq 2$, then

(i) $dn_\alpha(G) = 2$ if and only if G is either $K_{2,n-2}$ ($n \geq 3$) or there exists a hamiltonian path joining any two vertices u, v of G such that $V(G) - \{u, v\}$ is either empty or independent.

(ii) $dn_\alpha(G) = n$ if and only if $n = 2$. That is, $dn_\alpha(G) = n$ if and only if $G = K_2$.

Proof. (i) Let $dn_\alpha(G) = 2$. Let $S = \{u, v\}$. We show that either $G = K_{2,n-2}$ or there exists a hamiltonian path joining the vertices of S such that $V(G) - S$ is either empty or independent. Suppose that $G = K_{2,n-2}$. Since in a complete bipartite graph, every edge joins a vertex of one partite set to a vertex of the other partite set, the shortest path joining any two vertices of $K_{2,n-2}$, is also the longest path joining the two vertices. Hence by Theorem 1.2, $dn_\alpha(G) = g_\alpha(G) = 2$ and hence the proof holds. If not, assume that there exists a hamiltonian path joining any two vertices u, v of G . Then $S = \{u, v\}$ serves as a minimum detour set of G and so $dn(G) = 2$. Since $dn_\alpha(G) = 2$, it follows that each edge of G has at least one end vertex in S , and so no two vertices in $V(G) - S$ are joined by an edge in G . Thus $V(G) - S$ is either empty or independent.

Conversely, let $G = K_{2,n-2}$ ($n \geq 3$). Since in a complete bipartite graph, the shortest path joining any two vertices is also the longest path joining the two vertices, we have by Theorem 1.2, $g_\alpha(G) = dn_\alpha(G) = 2$. Suppose there exists a hamiltonian path joining any two vertices u, v of G such that $V(G) - \{u, v\}$ is either empty or independent. Let $S = \{u, v\}$. Then S is a minimum detour set of G . Since $V(G) - S$ is either empty or independent, no two vertices of $V(G) - S$ are adjacent in G . Thus $V(G) - S$ is also a vertex cover of G . Hence $V(G) - S$ is a minimum detour vertex cover of G and hence $dn_\alpha(G) = |S| = 2$.

(ii) Let $dn_\alpha(G) = n$. Suppose that the graph G has a path of length at least 3. Then there must exist at least one vertex of G which lies internally on this path and so $dn_\alpha(G) \leq n - 1$. Since, $dn_\alpha(G) = n$, G must not admit a path of length 3 or more and since it is a connected graph, the only possibility is $G = K_2$.

Conversely, suppose that $G = K_2$. Then clearly, $dn_\alpha(G) = 2 = n$.

Theorem 2.9 Let G be a connected graph with $dn(G) \geq n - 1$. Then $dn_\alpha(G) = dn(G)$.

Proof. Let G be a connected graph with $dn(G) \geq n - 1$. By Theorem 2.4, $dn(G) \leq dn_\alpha(G) \leq n$. If $dn(G) = n$, then $dn_\alpha(G) = n$ and so $dn(G) = dn_\alpha(G)$. If $dn(G) = n -$

1, then let $S = \{x_1, x_2, \dots, x_{n-1}\}$ be a minimum detour set of G . Let there exist a vertex say, x not in S . Then x lies on a detour P joining any two vertices of S . Then all the edges of G including the edges adjacent to x are covered by the vertices of S . Hence S is a dn_α -set of G . Thus $dn(G) = dn_\alpha(G)$.

Theorem 2.10 Let G be a connected graph of order $n > 2$. Then $dn_\alpha(G) = dn(G)$ if and only if there exists a minimum detour set S such that $V(G) - S$ is independent.

Proof. Suppose that $dn_\alpha(G) = dn(G)$. Let S be a minimum detour set of G . Since $dn_\alpha(G) = dn(G)$, S is a detour vertex cover of G . Then each edge of G is incident with at least one vertex in S and so no edge of G has two ends in $V(G) - S$. Thus no pair of vertices of $V(G) - S$ are adjacent and hence $V(G) - S$ is an independent set.

If S is a minimum detour set of G such that $V(G) - S$ is independent, then no pair of vertices of $V(G) - S$ are adjacent. Thus every edge of G has at least one end in S . Hence S is a minimum detour vertex cover of G so that $|S| = dn(G) = dn_\alpha(G)$.

Theorem 2.11 Let T be a tree of order $n \geq 2$. Then the following statements are equivalent.

- (i) $dn_\alpha(T) = dn(T)$.
- (ii) T is a star.
- (iii) $\alpha(T) = 1$
- (iv) The set of all end vertices of T is a vertex cover of T .

Proof. Since in a tree, there exists a unique path between every pair of vertices, the shortest path and the longest path connecting a pair of vertices are the same. Hence the result follows from Theorem 1.3.

Theorem 2.12 Let T be a tree of order $n \geq 3$. Then $dn_\alpha(T) = n - 1$ if and only if T is either a star or a double star.

Proof. Since in a tree, there exists a unique path between every pair of vertices, the result follows from Theorem 1.4.

Theorem 2.13 For the complete graph $K_n (n \geq 3)$, $dn_\alpha(K_n) = n - 1$.

Proof. Since in a complete graph, every pair of distinct vertices are adjacent, at least $n - 1$ vertices of K_n are needed to cover all the edges of K_n . Also any pair of adjacent vertices of K_n forms a minimum detour set of K_n . Then by Theorem 2.4, $dn_\alpha(K_n) \geq n - 1$. Also by Theorem 2.8 (ii), $dn_\alpha(K_n) \neq n$, since $n \geq 3$. Thus $dn_\alpha(K_n) = n - 1$.

Theorem 2.14 For the wheel $W_n = K_1 + C_{n-1} (n \geq 5)$, $dn_\alpha(W_n) = \left\lfloor \frac{n-1}{2} \right\rfloor + 1$.

Proof. Let $C_n: v_1, v_2, \dots, v_{n-1}, v_1$ be the cycle of W_n and x , the vertex of K_1 in W_n . Then $S = \{x, v_1, v_3, \dots, v_{2\lfloor \frac{n-1}{2} \rfloor - 1}\}$ is a dn_α -set of W_n . Hence $dn_\alpha(W_n) = \lfloor \frac{n-1}{2} \rfloor + 1$.

Theorem 2.15 Let S be a minimum detour dominating set of a connected graph G . Then S is a detour vertex cover of G if and only if $V(G) - S$ is an independent set.

Proof. Let S be a minimum detour dominating set of G . If S is a detour vertex cover of G , then every edge of G has at least one end in S . Hence no two vertices in $V(G) - S$ are adjacent so that $V(G) - S$ is independent.

Conversely, let $V(G) - S$ be an independent set of G . Then every edge of G has at least one end in S so that S is also a vertex cover of G . Hence S is a detour vertex cover of G .

3. Conclusion

In this paper, we introduced a new graph theoretic parameter, ‘The detour vertex covering number’ of a graph and discussed its properties. Detour vertex covering number of some standard graphs like complete graph, star graph, wheel graph are determined. Connected graphs of order n with detour vertex covering number 2 and n are characterized. The results given in this paper will be useful in the future study on connected detour vertex covering number, upper detour vertex covering number, open detour vertex covering number etc.

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Neural Machine Translation - Unravel the possibilities

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ABSTRACT

Neural Machine Translation (NMT) has emerged as a powerful approach for automating the translation of text between different languages. Unlike traditional statistical machine translation systems, which relied on complex linguistic rules and hand-engineered features, NMT utilizes deep neural networks to learn the translation patterns directly from large amounts of bilingual data. This paradigm shift has significantly improved the quality of more fluent and accurate machine translations.

Introduction

Neural machine translation revolutionizes the translation process by utilizing artificial intelligence to automatically convert text from one language to another, eliminating the need for human involvement.

The main objective of NMT is to produce accurate translations that capture the essence of the source language and convey it effectively in the target language. Traditionally, human translators have been relied upon for this task, but now machine translation has made remarkable advancements and is making a positive impact worldwide. The days of depending on someone else to translate a text into your native language or any other language are diminishing. Thanks to smartphone applications, anyone can easily comprehend the content on signboards, books, and more.

Machine translation employs various methodologies to achieve its goals

Rule-based Machine Translation: RBMT systems rely on explicit linguistic rules to perform translations. These systems follow predetermined instructions on how words or phrases in the source language should be rendered in the target language. However, this approach demands significant manual effort and poses challenges when scaling to multiple languages.

Statistical Machine Translation: This model relies on a large language resource containing extensive and structured sets of texts. These models are trained to identify the most probable translation based on the frequency of word sequences.

Neural Machine Translation: Neural machine translation is an approach that utilizes artificial neural networks to predict the probability of a sequence of words. It has emerged as the predominant model in modern machine translation.

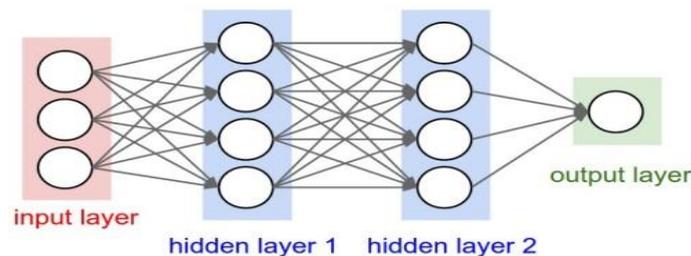
Principles of Neural Networks

In a neural network, there exist three layers: the Input Layer, Hidden Layers, and Output Layer. The Input Layer consists of independent variables, denoted as X , which serve as predictors. These inputs are gathered from external sources like textual data, images, audio, or video files. In a neural network, these X s represent information received from sensory organs.

The Output Layer produces the result of the neural network. In regression problems, it can be a numerical value, while in classification problems, it can be a binary or multi-class label.

Additionally, the output can include tasks such as handwriting recognition, audio or image classification, or text categorization.

Apart from the Input and Output layers, Neural Networks incorporate Hidden Layers that extract features for the model.



Deep Learning is an advanced technology founded on neural networks that aims to mimic the workings of the human cortex. Recurrent Neural Networks (RNN) serves as fundamental network architectures upon which other deep learning models are constructed. RNNs encompass a diverse range of deep learning architectures and possess the ability to process sequences of varying lengths using their internal state (memory). Let's consider that RNNs possess memory, capturing, storing, and utilizing processed information to compute the outcome.

Currently, two types of RNN can be identified:

- ❖ Bidirectional RNN: These operates in two directions, enabling the output layer to simultaneously gather information from past and future states.
- ❖ Deep RNN: These consists of multiple layers, allowing the deep learning model to extract more hierarchical information.

RNNs are primarily employed in text translation.

In addition to RNNs, there exist other models in neural networks, including Long Short-Term Memory, Convolutional Neural Networks, Deep Belief Network, and Deep Stacking Network.

Frameworks for constructing NMT applications

Several popular frameworks are commonly utilized for building neural machine translation (NMT) applications. Here are a few examples:

- ❖ TensorFlow
- ❖ PyTorch
- ❖ OpenNMT
- ❖ Marian
- ❖ Fairseq
- ❖ Nematus

These frameworks represent only a subset of the commonly used options for NMT applications. The choice of framework often depends on specific requirements and familiarity with the framework.

How to Train Machine Translation Engine

A machine translation engine offers many advantages, with reduced translation times and minimized use of human resources being the main benefits. AI-powered machine translation engines leverage data to identify correlations and structures, extracting information from vast amounts of data to tackle problems that would require thousands or millions of hours for a human to process. By incorporating machine learning and deep learning techniques, the capabilities of a machine translation engine are enhanced, allowing for continuous improvement in the results provided. However, achieving enhanced translation quality relies on effective training.

The training process for a machine translation engine can be summarized in four steps:

Incorporation of base data

Training an engine requires high-quality data in the form of translated sentence examples from the source language to the target language.

Data cleaning and normalization

After collecting raw data, it is essential to clean and normalize it, which includes tasks like ensuring the correct use of quotation marks in both languages. Once this is done, the translation engine can be fed with appropriate data.

Possibility of sentiment analysis

Advanced technologies enable translation engines to analyze the sentiment of texts, understanding and considering the true meaning of a text or the speaker's intention during translation. This involves combining machine learning and NLP.

Maintenance

Basic training can span several days, and measures such as a 'stop criterion' allow the engine to automatically determine when it has stopped learning anything new, thus avoiding wastage of time. Additionally, in the case of specialized models for a specific domain, training will be performed using the available data, with the level of specialization determining the aggressiveness or conservatism of the training.

Achieving optimal results necessitates continuous training beyond the initial phase.

Advantages and Disadvantages of NMT

Let's begin with the advantages of using machine translation from the perspective of professional translators.

- ❖ **Speed:** Provides nearly instant translations.
- ❖ **Scalability:** Capable of handling vast amounts of content rapidly.
- ❖ **Flexibility:** One system can translate content into multiple languages.
- ❖ **User-friendliness:** Easy to use for both language professionals and everyday users.
- ❖ **Integration:** Language professionals can use machine translation to expedite their workflow.
- ❖ **Automation:** Automating the initial translation stage accelerates the entire process, making it more affordable for the end client.

These advantages contribute to an efficient translation process, allowing translators to automate the first step and edit the output to deliver the final content faster. This reduces turnaround times and enables professional translators to deliver 100% quality at lower rates compared to translating without machine translation.

The main disadvantages of machine translation are related to output quality:

- ❖ **Quality:** Even the best AI translation tools are still far from matching the quality of professional translators.
- ❖ **Consistency:** The quality of machine translation varies significantly based on the complexity of the input language and the linguistic gap between the source and target languages.
- ❖ **Word-for-word output:** Despite advancements, algorithms still predominantly produce translations that closely resemble word-for-word equivalents.
- ❖ **Grammar:** Although significant progress has been made in recent years, machine translation still faces challenges with grammar, particularly when dealing with languages that have substantially different grammatical systems.

- ❖ **Context:** While AI technologies have made significant strides in contextual understanding, the final results are still far from matching the capabilities of humans.
- ❖ **Nuance:** Algorithms struggle to grasp and replicate the intricate nuances of human language.

Despite the significant advancements in artificial intelligence over the past few decades, the quality of machine translation output has only seen marginal improvements compared to the abilities of professional translators. This demonstrates the complexity of language comprehension and why the human brain remains the most powerful "computer" when it comes to the subtle aspects of communication.

The Future of NMT

Lionbridge's R&D teams estimate that Neural Machine Translation is improving at a rate of 3-7% per year. Current machine translation systems often face difficulties in capturing context and generating translations that account for the surrounding text. Future models are expected to incorporate better contextual understanding and consider the broader context to produce more accurate and contextually appropriate translations.

In the future, machine translation systems have the potential to translate spoken conversations in real-time, translate text within images or videos, and offer broader translation solutions across different forms of media.

Effective cooperation between humans and machines holds the key to the future of machine translation. Human translators will remain essential in tasks such as post-editing, ensuring quality, and fine-tuning translations generated by machines. The development of user interfaces and tools will enable smooth collaboration between human translators and machine translation systems.

Conclusion

Despite its success, NMT still faces challenges such as handling rare or out-of-vocabulary words, translating idiomatic expressions, and handling language pairs with limited parallel data. Ongoing research aims to address these challenges through techniques such as sub word modelling, transfer learning, and reinforcement learning.

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Feature Extraction Techniques for Automatic Glaucoma Identification

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ABSTRACT

Nowadays, automatic glaucoma identification is done by feature extraction and classification techniques. In this paper, feature extraction in frequency domain technique is applied with the combination of wavelet transform with Harr functions and the concept of directional filter bank from contourlet transform are exclusively used for automatic Glaucoma identification. The feature extraction techniques achieve higher accuracy than those of the normal frequency domain methods, and traditional neural network-based classification algorithms used for better classification.

Keywords: *Glaucoma, Wavelet transform, contourlet transform, Support Vector Machines.*

Introduction

Glaucoma is an eye disease normally caused by the variations of Intra-Ocular Pressure in the eye, and it leads to blindness [1]. If the disease is not found in the early stage, the affected person may lose his vision. The anterior chamber of the eye is filled with liquid. If there is no proper drainage, it leads to blindness. So, it should be identified in the early stages to cure the patient. Glaucoma is the second leading cause of peripheral blindness worldwide and results in the neuro-degeneration of the optic nerve, when the damage to the optic nerve fibers occurs, blind spots develop and blind spots usually go undetected until optic nerve is significantly damaged [2]. Early detection and treatment are keys to prevent vision loss from glaucoma. It is useful to identify efficient methods by research to detect glaucoma in the initial stages. The proposed system is used to reduce the processing time taken by the existing techniques of manual-based algorithm without compromising on speed, accuracy, sensitivity, cost and compatibility of the product with relevance to image processing concepts.

Glaucoma affects retinal nerve fiber, due to high intra-ocular pressure in the retina. Retinal nerve fiber is one which carries information from the eye to the brain. Glaucoma affects mainly peripheral vision [3]. Texture-based analysis plays a pivotal role for the diagnosis of glaucoma from fundus image [4]. A number of diagnostic tools and algorithms are being developed by the researchers to identify this disease. But developing an automatic diagnosing tool with accurate identification is quite challenging. This is because these tools need more accuracy and response compared to the diagnostic tools used for

other diseases [5]. A system was developed to diagnose glaucoma by automatically using the texture and higher-order features in the fundus images. The extracted features are classified using Support Vector Machines (SVM), Random forest and Naïve Bayesian classifiers. The three classifiers were compared and evaluated using some performance indices. Another system is proposed to find the fundus images in the optic disc boundary of the retinal images of the patients. The system is used to find Diabetic Retinopathy and Risk of Macular Edema from edge detection and optic disc detection techniques [6]. Gabor wavelet function is implemented for feature extraction using both time and frequency domains. The wavelet transform with Gabor filter bank function has got better result than other time domain functions [7]. Texture features are taken using frequency domain techniques such as Harr function, DWT transform and directional filter bank application using Contourlet transform [8,9].

In this paper the proposed system, which automatically and accurately detects the early stage of glaucoma from the set of fundus eye images and extract the image features using Discrete Wavelet transform with Harr functions and Contourlet Transform. Then the classification is done using Support Vector Machine (SVM) and Linear Discriminant Analysis (LDA)

Preprocessing

The preprocessed fundus image is retrieved after Region of Interest and high intensity point detection. ROI selection has a number of advantages which do not select the unwanted region of the image so that it reduces image size and the time consumption of the processing algorithms. Further, the fundus image contains brightness, and it is extracted by high intensity point selection. The unwanted noise is also removed by using this preprocessing technique.

Methodology

The block diagram of the proposed enhanced feature extraction and classification techniques of the system shown in Figure.1. The real fundus image database with and without glaucoma is collected from a nearby eye hospital. In the pre-processing stage, green plane extraction, highest intensity point detection, and region of interest detection are taken from the fundus images.

The spatial-based feature extraction techniques applied to the fundus images may not give better performance for automatic detection of diseases. Hence the texture features are extracted using frequency domain techniques such as Discrete Wavelet Transform and the Contourlet transform individually.

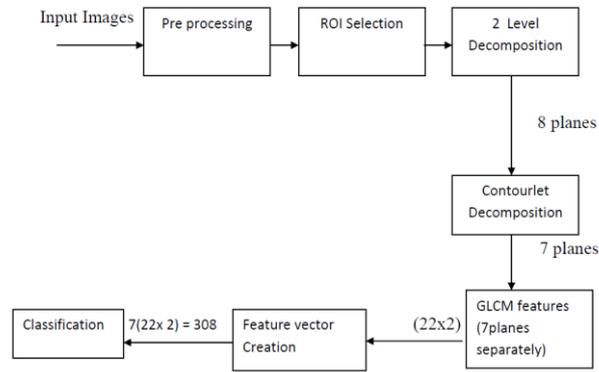


Figure. 1 Block diagram of the proposed system

i) Feature Extraction Using Wavelet Transform

Texture features using wavelet transforms in image processing are often employed to overcome the generalization of features. In DWT, the image is represented in terms of the frequency of content of local regions over a range of scales. This representation provides a framework for the analysis of image features, which are independent in size and can often be characterized by their frequency domain properties [10]. The aim of this work is to automatically classify normal eye images and glaucoma eye images based on the distribution of average texture features obtained from three prominent wavelet families of equations (1),(2) and (3).

$$\text{Average } Dh1 = \frac{1}{p \times q} \sum_{x=\{p\}} \sum_{y=\{q\}} |Dh1(x, y)| \quad (1)$$

$$\text{Average } Dv1 = \frac{1}{p \times q} \sum_{x=\{p\}} \sum_{y=\{q\}} |Dv1(x, y)| \quad (2)$$

$$\text{Energy} = \frac{1}{p^2 \times q^2} \sum_{x=\{p\}} \sum_{y=\{q\}} (Dv1(x, y))^2 \quad (3)$$

The fundus image is fed into high pass filter banks in row ways and fed to the down sampler. Then, the image is fed to low pass filter banks in column ways and also to own sampler.

Thus, DWT is applied to image to get an approximate clean and detail information. Thus, the approximation of the image is found with clear details using multi frequency bands by applying low pass and high pass filter banks row-and column-wise. The image is subdivided into four sub bands using wavelet transform which are HH, LH, HL and LL (approximation), and Wavelet transform decomposes a signal into a set of basis functions (wavelets).

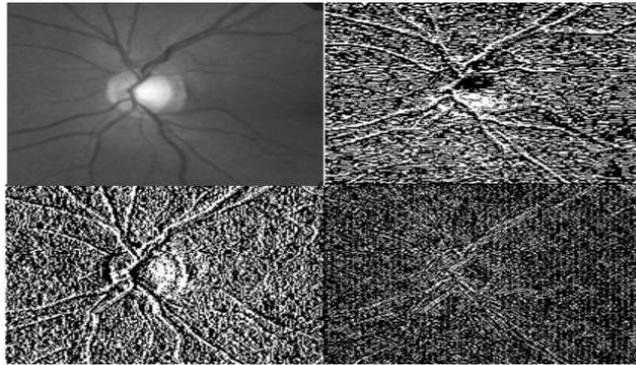


Figure. 2 Output of Discrete wavelet with Harr LL, HH, HL and LH component

ii) Feature Extraction Using Contourlet Transform

The Contourlet Transform is one of the recent transforms in image processing for feature extraction applications. In this transform, the given input images are directed to various orientations in multiple scales with flexible aspect ratios. The dominant features in the given input image are easily captured by this transform using image contours. In this transform, different and multi-scale directional systems are used compared to other transforms. It allows different and flexible number of directions at each scale. It has a large number of filter banks which make this transform computationally more efficient. Classification involves the segregation of the extracted features into the relevant assigned classes. The real skill is to study the geometry in images derived from the discrete signals. The technique is fully developed with the discrete domain so that we can elaborately explore the images. Here, we have built the image with multiresolution and multi direction using cavities which are discrete in nature. The contourlet consists of two steps, namely multiscale decomposition and directional decomposition. Only directional decomposition is applied here by directional filter bank. The output of the directional filter bank contains the Hue moment feature, GLCM feature and energy feature. These features are used for classification of glaucoma.

Classification

The extracted features are loaded as dataset, and these datasets are used for classification of glaucoma fundus images. In this paper The Support vector machines, Linear Discriminant Analysis (LDA) are used. The classifier which produces the best result is used for classification in the final automatic glaucoma identification system.

SVM classification

SVM is an efficient classifier for the classification of complex data. It can be used for the classification of linearly separable and non-separable data. The classes in the training data are separated by a decision line or margin. The data points touched by this decision line are

called support vectors. Based on the majority of the support vectors, the class is assigned to the unknown query under analysis. Here, glaucoma and non-glaucoma are classified effectively with TPR and FPR. The ROC curve is drawn between TPR and FPR as shown in Figure.3.

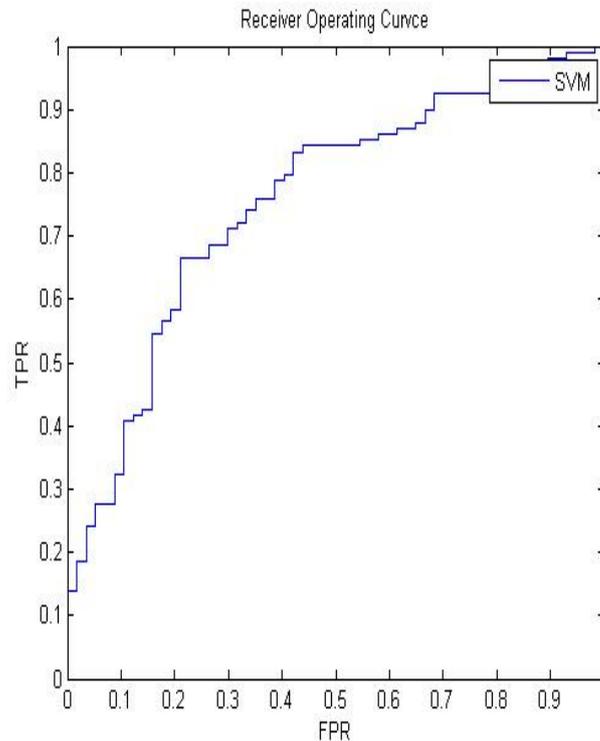


Figure. 3 ROC for Glaucoma classification using SVM

ii) LDA

Linear Discriminant Analysis (LDA) is a traditional method used for data classification applications. This method handles the data easily where the frequencies of data in a class are unequal, and their performance are evaluated and tested by generating random test data. This method finds the ratio of between-class variance to the within-class variance in any particular dataset using maximization and there by guaranteeing maximal reparability. Linear Discriminant Analysis is mostly used for data classification for speech recognition. This method is also used for feature data classification. Here, Glaucoma and Non-glaucoma are classified with TPR and FPR. The ROC curve is drawn between TPR and FPR is shown in figure.4

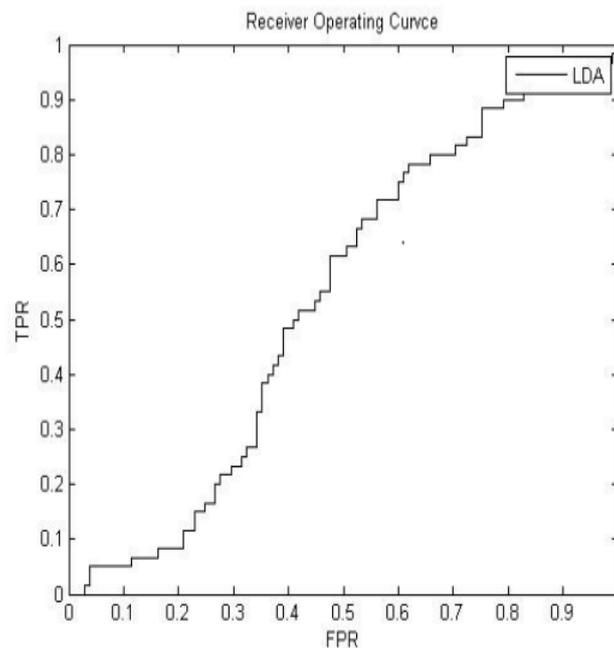


Figure. 4 ROC for Glaucoma disease classification using LDA

Conclusion

The objective of this research paper is to develop a system which automatically identifies extracts and classifies glaucoma and non-glaucoma sets of fundus images. The image is preprocessed, extracted and classified. By applying frequency methods, a computer-based system is developed to automatically detect Glaucoma. Here, an Enhanced Feature Extraction technique is done by combining wavelet and contourlet transforms, and the classification is done by Support Vector Machine. The extracted features are taken efficiently and effectively by the proposed technique.

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Establishment of the United Nations Organization

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ABSTRACT

The United Nations Organization came into existence on October 24, 1945. When the United Nations Charter had been ratified by a majority of the original 51 Member States. The day is now celebrated each year around the world as United Nations Day. The purpose of the United Nations Organization is bring all nations of the world together to work for peace and Development, based on the principles of justice, human dignity and the well-being of all people. It allows countries to balance global interdependence and national interests when addressing international problems. The League of Nations had been established by the European powers after the First World War in order to maintain permanent peace in the world and to prevent the danger of war. But this great organization utterly failed to achieve its ultimate aim due to the selfishness of different countries. The League of Nations was solely based upon the idea of international cooperation. But this idea failed and the Second World War raised its hydra-headed hood. It was the greatest failure of the League of Nations.

Keywords: *Charter Member State United Nations Security Council International Peace International Court of Justice*

Introduction

The Second World War proved to be more destructive than the First World War. It brought in its train several destructive and disastrous results to the whole mankind. The destruction of both the material wealth and the human life was wrought during the course of the Second World War on the large scale. The people of the whole world were scared of the consequences of this war and, therefore, they wanted to get rid of the war for ever. Although they had failed in their first experiment which had been made to establish permanent peace in the world, yet they were not disappointed at their failures. In spite of the League of Nations, the politicians were hopeful that the world peace could only be established by the idea of mutual cooperation, harmony and the feeling of internationalism. This idea gave birth to the United Nations Organization. In the words of Prof. Mookerjee:

“..... in spite of past failures man’s optimism is irrepressible and he has looked forward even in the midst of moral perils of this hideous war, to the prospect of realizing the ideal of one ‘World State’ in which all nations may dwell together in unity. It is this ideal which gave birth to the United Nations Organization.”

The Atlantic Charter

On the 14th day of August in 1941, Roosevelt, the President of the United States of America, and Churchill, the Prime Minister of Great Britain met together on a ship in the Atlantic Ocean near Newfoundland. Both of them made a very important declaration, which contained the aims and fundamental principles for thereconstruction of the post-war world. It was called the ‘Atlantic Charter’ in which an idea was expressed with the hope of a better future for the world. In this charter, they made the declaration:

“We want to establish peace in the world, we accept the principle of self-determination and the formation of a state by every nation and we want the freedom of international trade for every nation. In the end, the hope was expressed that every state by renouncing the war adopt peaceful means to settle the national disputes and conflicts.”

The Atlantic Charter contained eight principles, which were as follows:

No territorial changes would be made without the freely expressed wishes of the peoples concerned.

Every nation would have the right to choose its own form of government.

The rights of sovereignty and self-government would be restored to those countries which were deprived thereof.

All people would be guaranteed a life free from fear of external aggression and efforts would be made to enable all citizens to live freely within the boundaries of their respective nations.

No country would be allowed to take any advantage from the war, i.e., the policy of the renunciation of aggrandisement – territorial or economic – would be adopted.

All nations would have the right to get raw materials from any part of the world.

All countries would have the right to enjoy the freedom to traverse the high seas and oceans without hindrance. Efforts would be made regarding the abandonment of the use of force. These principles were accepted by twenty-six nations in the beginning. The representatives of these nations signed on this document on January 2, 1942. This document was known as the Declaration of the United Nations.

Establishment of the United Nations Organization

In this way, the Atlantic Charter of 1942 embodied a common programme of purposes and principles. It had suggested that an international organization must be established

after the war in order to preserve peace in the world. The Allies also thought it necessary to form a comprehensive organization for the maintenance of peace. For this purpose, the Foreign Ministers of four big powers, i.e., U.S.S.R., China, Great Britain and U.S.A. met at Moscow in November 1943. In this conference, they decided to establish at the earliest possible of sovereign equality of all those states which believed in peace.

In October 1944, another conference was convened at Dumbarton Oaks, a place in the city of Washington. Representatives of Great Britain, Russia, China and America took part in this conference. They placed a comprehensive scheme of an international organization before other nations of the world. This scheme was fully discussed in the conference of San Francisco in which the delegates of fifty countries took part. This conference was convened in April 1945. After a long discussion, the delegates accepted the scheme and they published the United Nations Charter. About 48 nations signed on this charter. Thus, the United Nations Organization came into existence on October 24, 1945.

Member States

Currently made up of 193 Member States, the UN and its work are guided by the purposes and principles contained in its founding Charter. The UN has evolved over the years to keep peace with a rapidly changing world.

Aims of the United Nations Organization

The fundamental aims of the U.N.O were clearly explained in the preamble of the United Nations Charter. The founder nations of the U.N.O., indeed, intended to preserve peace and security in the whole world, to establish friendship and mutual cooperation among all nations, to solve the problems of different countries on the basis of international cooperation, to rectify the international disputes in a peaceful manner and to recognize the fundamental rights and freedom of all people without having any discrimination of caste, religion, sex, language and culture. However, it was not intended to intervene in the internal matters of any country. In the words of an eminent historian:

“The United Nations is an association of states which have pledged themselves, through signing the charter, to maintain international peace and security and to cooperate in establishing political, economic and social conditions under which this task can be surely achieved. Nothing is contained in this charter which shall authorize

the Organization to intervene in matters which are essentially within the domestic jurisdiction of any state”.

In brief the fundamental aims of the U.N.O. as set forth in the Charter were:

To maintain and preserve international peace and security.

To develop friendly relations and harmony among the countries.

To grant equal rights and self-determinations to all countries.

To solve economic, social, cultural and humanitarian problems through international cooperation.

To promote respect for human rights, dignity and freedom.

Not to intervene in the matters which are directly related with the domestic jurisdiction of any country.

Structure of the United Nations

The main parts of UN structure are;

The General Assembly.

The Security Council.

The Economic and Social Council.

The Trusteeship Council.

The International Court of Justice.

The Secretariat.

All were established in 1945 when the UN was founded.

The General Assembly

It is a deliberative body of the United Nations organization. It may also be regarded as a parliament of nations. This body consists of five representatives of each member-state. But each member-state has only one vote. For ordinary matters, a simple and bare majority is enough for decision but on important questions, a majority of at least two-third vote is necessary. The main function of this organ is to consider over the questions relating to international peace and security and to discuss other important international problems. It has no decisive power. It can only put its recommendations before the Security Council. The decisive power has been granted to the Security Council under the constitutions of U.N.O. Its general convention is convened in the month of September each year. But the General Secretary has a right to call a special convention on the request of the Security Council. The General Assembly is also an electing body. It has been empowered to elect the temporary members of the Security Council and all members of the Trusteeship Council and the Economic and Social Council. The

General assembly approves the yearly budget of the United Nations Organization and thus, it controls finances of this great institutions.

The Security Council

It is the chief executive body of the U.N.O. It consists of eleven members-five permanent and six temporary. The 'Big Five' (Russia, China, U.S.A., France and great Britain) are the permanent members of the Security Council of U.N.O. The temporary members are elected by the General assembly for two-year term approved by a majority of two-third vote. Each member of the Council has only one vote. It is the most powerful organ of the U.N.O. Its main function is to preserve peace and security in the world. It has the right to final decision regarding every matter. It has been empowered to enquire and rectify international disputes, to prevent the possibility of war and to take effective steps against the aggressor. It can take diplomatic and economic steps against those nations which violate the constitution of U.N.O. But in special condition, it can also take military action against such nations. The decisions of the Security Council require the affirmative vote of any seven members of the council, but in case of substantive matters, the affirmative vote of all the five permanent members must be included in the majority of seven. In other words, none of its decisions can be implemented till it has the support of all the five permanent members. It is called the veto power that has been granted to the 'Big Five'. The big powers misused the veto power on several occasions and, therefore, this factor has more or less made the Security Council ineffective. Moreover, it has also divided the world into two camps.

The Economic and Social Council

This council is composed of eighteen members (there are twenty-seven members at present). All members of this council are elected by the General Assembly. It is directly responsible to the General Assembly and works under the direction of this organ. The fundamental principle of this body is to build a world of greater stability and well-being, to create a spirit of universal respect for human rights and to promote a higher cultural educational standard. Its main function is to raise the standard of living of the people, to assure them of the human rights and employment, to promote social and economic standard and to encourage the spirit of fundamental rights and freedom. This organ believes in that a better atmosphere can only be created for the maintenance of world peace when the people enjoy a high economic and social standard of living. In

this way, it has nothing to do with politics, but its work is to remove social and economic causes of the war in future.

The Social and economic Council works through the cooperation of several special committees and commissions, such as , the United Nations Educational, Scientific and Cultural Organization (U.N.E.S.C.O.), the United Nations Relief and Rehabilitation Administration (U.N.R.R.A.), Food and Agricultural Organization (F.A.O.), International Labour organization (I.L.O.), International Bank, World Health Organization (W.H.O.) etc. The Council also appoints special committees and commissions work under the guidance of the Social and Economic Council. They study the social and economic problems of the world and put their reports and recommendations before the Council. The Social and Economic Council places these reports and recommendations before the General Assembly and also before different nations. This organ has rendered undoubtedly great services to the mankind in the course of the last few years.

The Trusteeship Council

This Council is composed of the representatives of permanent members of the Security Council, representatives of all those states which hold the administration of colonies and some other representatives elected by the General Assembly. The main function of the Trusteeship Council is to preserve the interests of the territories handed over to it and to help the General Assembly in the administration of those countries over which the U.N.O. holds Trusteeship. This council is directly related with those territories. which were formerly held under the Mandate system of the league of Nations; which have been snatched away from the enemy states as a result of the Second World War; which were voluntarily placed under the Trusteeship Council by the states responsible for their administration. Its main object is to raise the standard of administration of the colonial countries. The colonial countries place the administrative report of their respective colonies before the Trusteeship Council. This Council also listens to the complaints of the colonies. But it has no power to take any effective step to remove those complaints.

The International Court of Justice

It is the judicial organ of the U.N.O. It is the same organization which successfully worked as an integral part of the League of Nations. It is composed of fifteen judges elected by the General Assembly and the Security Council for nine years. Its main function is to solve the legal difficulties that arise between different states and to give

advisory opinions on any legal question referred to it by the General Assembly and the Security Council.

The Secretariat

It consist of the working staff of the U.N.O. The chief controlling officer of the Secretariat is called the Secretary General who is appointed by the General Assembly on the recommendation of the Security Council. The function of this body is to assist all bodies of the U.N.O. The Secretary General is required to make an annual progress report of the U.N.O. and place it before the General Assembly. He has also the right to draw the attention of the Security Council to any specific matter which, in his opinion, may create danger for world peace and security.

Conclusion

Since the inception of the U.N.O., these bodies have been doing their work with great interest and devotion, and though the U.N.O. may not have achieved any spectacular political success, these other organizations have made real contribution in their respective fields. In the political field, the United Nations was cooperation between big nations, specially between America and Russia. But this cooperation has been day by day going down and with it the utility of the United Nations Organization.

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Social Divisions in Kongu Region

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ABSTRACT

In social set up, Tamils witnessed caste segregation, economic disparities and religious variations. Based upon Varna system, the Aryans divided the society into four classes, viz., the Brahmins, the Kshatriyas, the Vaiyas and the Sudras. With the coming of the Aryans into South India the already existing indigenous divisions and subdivisions, based upon occupation of the society came to be amalgamated with these fourfold divisions. The Brahmins who occupied good position in the society made their children to get all kinds of education. Coimbatore, Erode, Salem and Dharmapuri Districts belong to the west zone where Puplic are living in villages engaging in agriculture. The Puplic of Coimbatore District were the pioneers in introducing modern inputs in agriculture.

Keywords: Society - Brahmins – non Brahmins – Mudaliars- Vellalars - Chettairs- Nairs- Naidus- Reddys- Naicks and Kammalas.

Introduction

In social set up, Tamils witnessed caste segregation, economic disparities and religious variations. Based upon Varna system, the Aryans divided the society into four classes, viz., the Brahmins, the Kshatriyas, the Vaiyas and the Sudras. With the coming of the Aryans into South India the already existing indigenous divisions and subdivisions, based upon occupation of the society came to be amalgamated with these fourfold divisions. Yet this Aryan system did not completely overcome the existing class structure in the Tamil region. With the passage of time of the fourfold system which mingled with the social divisions, the Tamils came to be classified into three Primary divisions viz., the Brahmins, the caste- Hindus and the depressed classes.

Classification of the Society

The Brahmins who were in upper strata of the society occupied an eminent position in the society. The Brahmins were only three percent of the population of the Madras Presidency and resided at the place known as *Agrahara*. They have a long tradition of Sanskrit learning. They were noted for highly conservative nature and supremacy. They were divided into a number of endogamous groups and were not evenly settled down in madras Presidency. Nearly half of the Tamil Brahmins lived in the three districts of Thanjavur, Thiruchirapalli and Tirunelveli. Thanjavur was considered to be the citadel of the community. About nine percent of the total population, of Thanjavur was Brahmins. In Tamil Nadu there were two broad

categories of Brahmins, namely, Iyers and Iyengars and among the occupational Tamil Brahmins there were the Vedic Brahmins, domestic Brahmins and temple priests. In the Malabar region of the Madras Presidency, the Tamil Brahmins and the Malabar Brahmins better known as Nambudris and enjoyed higher status. The temple priests played a vital role in the society. They regulated religious life and mingled with the people in the day-to-day activities.

The Reorganization of the administrative system in the nineteenth century gave a lot of opportunities to the Brahmins to improve their standard of life. They became the elite and administrative groups of the Tamil society. In course of time, they occupied a dominant and privileged position in the social setup. They led a luxurious and convenient life at home while the other caste were tilling the soil or engaging in trade activities. The Brahmins gave their *lands* to the non-Brahmin tenants for lease and they also cultivated the lands with the help of the labourers. Thus the Brahmins got income from the landed property and temple assets.

Brahmins

The Brahmins who occupied good position in the society made their children to get all kinds of education. As a result, they got postings in the administration, and their exodus, to towns started. Further, as they were considered an elite class, they got involved in the political activities and influenced the masses highly.

All the socio- political and religious activities were dominated by the Brahmins which was highly responsible for the aggravation of the caste system in Tamil Nadu. The growth of anti-Brahmanism compelled the Brahmins to seek anonymity, which only large amorphous metropolitan crowds could provide.

Non -Brahmins

The Caste- Hindus placed next to the Brahmins in the social strata. Among them, Mudaliars, Vellalars, Chettairs, Nairs, Naidus, Reddys, Naicks and Kammalas gained great influence over the society. They were called non-Brahmin caste – Hindus. Among the caste- Hindus, the Nairs were considered caste Hindus in Malabar region. The Vellala was highly respected and was an influential caste among the non- Brahmin caste – Hindus.

There are several categories of the Vellalas, such as Thondaimandalam Vellalas (Saiva Vellalas), karkartavellalas, Nanchinadu Vellalas, Kongu Vellalas, etc. Invariably, they were land.

Vellala

'Vellala' the word in Tamil denotes 'cultivator'. Simultaneously it also denotes a major caste spread out in all the areas of the Tamil country, i.e., Thodaimandalam, Cholamandalam, KonguMandalam and Pandya Mandalam and subdivided on territorial basis, and then further divided into numerous sub- castes. The outstanding feature of this case is that the members are large scale landowners and cultivators whose ownership goes back in time. Historically, the Vellalas were linked to a group of chieftains and petty chiefs called Velir, the earliest references to whom are found in the Sangam anthologies. Since the beginning of the Christian era up to the Muhammadan invasion in the Fourteenth Century A.D. the vellalaa played roles of varying importance.

Even though the centralized political power in Tamil country weakened from the fourteenth century, due to alien invasions, the aliens associated themselves with the indigenous elite group – the Vellalas. The seventeenth century Mandala Satakampoems (5 or 7 of which are devoted to extolling the past glories of Vellalas) are interpreted as ideological statements of an ancient and continuing though challenged, dominance of Tamil Vellalas. A series of inscription at Vikramasingapuram, Courtallam, Kanyakumari, etc. point to yet another Vellala family associated with Government in Tirunelveli Principality. Vadamalaiyappa Pillaiyam, a KarkattaVellala from Kayanur in Madurai district is mentioned as Karyattu- K-Karttar (agent for administration) to TirumalNayak. Renovation and construction of temple at Tentirupperai, Titukkolor, Sankarankoil, Knyakumari, Tiruchedur and Courtallam are attributed to him.

The Vellalas, as administrative motif, recurs often in the family and state histories of the numerous Palayappattus and Zamins in this area. For example, Chokkampatti, Sivagangai, Ettaiyapuram, Panjalankurichi, Ramanathapuram, etc. in the seventeenth and eighteenth centuries the Vellalas were considered a powerful local caste.

Maravas

The Maravas were warriors caste and not interested in agriculture or trade. Their economic base is smaller vis-a-vis the hostilities between Telugu and Marava Poligars, Vellalas were uniformly sought out by both blocs for key ministerial assignment. The Saiva Vellalas known for vegetarianism occupied a decent place in the society. They had good education and entered the government jobs in various categories. Besides, they engaged in ploughing operation which fetched them a considerable income from agriculture and increased their economic and social status on par with Brahmins. They established their individuality and identity in their social ceremonies by not inviting the Brahmins, the usual practice of other

caste people. The other Vellals lived throughout Tamil Nadu but they were not of the status equal that of Saiva Vellalas in the society.

Mudaliars

Mudaliars are another example of the Indian penchant for diversity in community. There are the Arcot Mudaliars, Vellore Mudaliars, Poonamalle Mudaliars, Senguntha Mudaliars. They were all grouped under the generic name of Vellalar at one time or another. In Tamil country, Vellalar was the common name for people who engaged in agriculture. They were next to Brahmins in hierarchical terms, though the Arcot Mudaliars considered themselves decidedly superior to Brahmins. Perhaps they distinguished themselves in education and generally in Anglophilia it was a location (Vellore) or occupation (Seng-untha- silk weaving) that made for sub-divisions in course of time.

‘Mudaliar’ is a term that means the first-rank person, the leader or the chief. This community is not intimidated by the airs of those above or the assertions of those below. But they are subject to the same influences that impinge on all communities in India. The Thondaimandala Mudaliars belonged to Thondainadu, also known as Thondaimandalam. Kancheepuram was its capital city. The Ekambareswarar Temple there was the place of worship of the Thondaimandalam Mudaliars. The story began with Karikalacholan clearing the dense forest area around Kancheepuram, and settled there about 48,000 Vellala families from the present Tiruchirappalli, Thanjavur and South Arcot regions.

The Mudaliars were highly cultured and staunch Saivaites. One group among them tilled the fields with sweat of their labour. Another group employed labour to work in the lands owned by them. They were also given to intellectual pursuits, saints, spiritualists, chieftains, administrators and thinkers from their ranks. The social transformation that took place in this community over the years can be witnessed at the life histories of the outstanding figures it has produced. The spiritual scholar, Sekkilar, the author of Periyapuram (a biographical account of sixty – three Shaivite Nayanmars) was named Arulmozhi. What Arulmozhi Sekkizhar was in the world of scholarship, Ariyanatha Mualiar was in the field of warfare. Thondaimandala Mudaliar was the Thalavair (Commander-in-chief and Prime Minister) of four consecutive Nayak kings. An area at Sholavandan called Mudaliar fort was constructed by him, and 300 families of Thondaimandalam were settled there. He was responsible for the construction of the “Thousand Pillared Hall” at the Madurai Meenakshiamman Temple.

In the nineteenth century, Vellagal Subramania Mudaliar was gifted with the ability to compose poetry in English and Tamil. Milton’s ‘Paradise Lost- Book I’, was translated by him, using *Viruthappametre*. When the Justice Party was formed in 1917 a number of Mudaliars

joined it. When the party took power in Madras, P.T. Rajan from Mudaliar ranks became a Minister. He also held the post of Chief Minister of the Madras Presidency for some time. S. Muthaiah Mudaliar was responsible for the first Government Order which provided reservation and employment in Government. *Viduthalai* S. Gurusamy, was next in rank to Periyar E. V.Ramaswamy in the “self Respect” Movement. He was a well- known editor of ‘Viduthalai’ newspaper and worked incessantly to remove the cobwebs of superstition in Tamil Nadu. K. Baladandayutham Mudaliar, was a prominent member of the Communist Party of India in the mid 1990s. He was editor in charge of “Janasakthi” and Theozhilarasu, papers run by the party. M.Bhaktavatsalam Mudaliar another stalwart of the community was the Chief Minister of Tamil Nadu and a Cabinet Minister of the State for a long period. O.V. Alagesan who belonged to the Congress Party was the Deputy Railway Minister in the Jawaharlal Nehru Cabinet. Thondaimandala Mudaliar’s service in the field of education was noteworthy due to several distinguished educationists like the twin brothers of Arcot Ramaswamy Mudaliar and Lakshmasamy Mudaliar, N.D. Sundara vadivelu, T. Muthian and Shanmugam, T.K. Chidambaranatha Mudaliar endeavoured to popularize Tamil literature. He was a torch – bearer of Tamil cultural renaissance. In the twentieth century Thondaimandala Mudaliars are included in the list of forward communities.

Kammas

The Kammas and Velamas were the two major sections of the Naidu community. The Kammas were originally warriors by occupation. They were mainly agriculturists. The leading aristocrats of the Madras Presidency and landed Zamindars hailed from Velama group of Naidu caste. The Baliji Naidus, the chief Telugu trading castes were found scattered throughout the Madras Presidency. In the Tamil districts, they were known as Vadugans and Kavarais.

Reddis

The Reddis, otherwise known as Kapus were the largest Telugu speaking single caste in the Madras Presidency. The Chettiers or Chettis were next to the Vellala caste involved in trade and commercial activities. There were numerous sub-divisions among them of them, the most significant and influential group were Nattukottai Chettis, Beri Chettis, Komattai Chettis and Vaniya Chettis. The Nattukottai Chettis were the most enterprising commercial community.

They were mostly traders and moneylenders. They are known for pious and charitable activities. They contributed a considerable share in endowments of various temples. The Beri Chettis had origin later than the Nattukottai Chettis. They also claim themselves to be Vaisyas in Kumbakonam region. They are both vegetarians and non- vegetarians among the Beri

Chettis and Komatti Chettis, known as mercantile class, settled mostly in Salem, Coimbatore and Madurai. The Vaniya Chettis, the popular trader in oil, used to carry on business in oil seeds. They pressed the oil seeds and produced oil of a variety. They made a remarkable contribution to commercial prosperity besides the agricultural occupation. They were well known for their fragility.

Kammalas and Visvakarmas

The artisan castes were a homogenous group constituting not less than onetenth of the total population. They were called as Kammalas and Visvakarmas, supposed to be descended from Visvakarma, the architect among gods. They believed that they are even superior to Brahmins. They also call themselves Asarees and Pattarsand they claim knowledge of the Vedas. The Kammalas are well organized and they practiced vegetarian food. The five divisions among them are Goldsmith (Tattan), Bras Smith (Kannan), Carpenter (Tachchan), Stonemason (kaltachchan) and Blacksmith (Kollan or Karuman). They are called Panchalas. The goldsmiths are not having the practice of intermarriage with the *Kollam* or *Karuman* (Ironsmiths) whereas the rest of others do so. They shaped the woods as plough, house roofs, windows and doors. Plough is needed for agriculture. They wear the holy thread and call themselves as Vishwa Brahmins. They maintain a higher place in the society their services are highly indispensable and useful to the society. The Telugu language is the mother tongue for the 35%+ of the population of Tamil Nadu. There are more than 20 m Telugu castes living in almost all the Districts of Tamil Nadu. Among them Kammahave more population (40 lakhs) whose concentration is in three regions of Tamil Nadu. (The Northern region, west and Southern regions). These people are not able to read and write except the people of border area of Andhra, but they have been following traditional customs and cultural activities.

The Kammashad their migration from the earliest period but more people have migrated during the Vijayanagar rule. Today the Kammapeople are known as Kammavar Naidu in some areas and Nayakkars in some other regions of Tamil Nadu, since they were the warriors of Naick Chiefs in those days. 'Vadugu' in Tamil means Telugu language. All the Telugu speaking people in Tamilnadu are 'Vadugar' including Kammas. Kamma's social, economic and cultural life differs from zone to zone due to the ecological conditions.

Conclusion

Coimbatore, Erode, Salem and Dharmapuri Districts belong to the west zone where Kamma people are living in villages engaging in agriculture. The Kamma people of Coimbatore District were the pioneers in introducing modern inputs in agriculture. They have fitted diesel and electric pump sets in their wells at first in Tamil Nadu. Agro based industries

were started by Kammasin this region. Further they have cultivated commercial crops like cotton, sugarcane and tobacco and other horticulture plants. This helped to start ginning mills, spinning mills and textile mills in the area. Most of the people are in agriculture successfully and interested in agro based small scale industries. Pallars, Parians, Chakkiliyars, Kuluvas and Valluvasearned their daily wages in grain and gifts on special occasions. Their work was also most arduous for men and they performed the whole work of cultivation.

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Kanyakumari Government Museum – A Study

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ABSTRACT

The word 'museum' brings up different kinds of thought to different people. For some, it is a storehouse of treasures and curios of the past, while for others it may be a centre of learning that provides knowledge on various cultures or a place where dust covered objects are dumped in endless number of galleries. In India, there is generally a lack of awareness among the public about the concept of museums and what is actually stands for, despite the nearly two – century old museum heritage. The milieu is gradually changing thanks to the initiatives of various individuals and institutions.

Keywords: Museum, Archaeology, Anthropology, Inscriptions, Coins, Geology

Introduction

The term 'museum' derives from the Greek root *mouseion*, which means the temple of muses - the nine Greek goddesses, who are the daughters of *Zeus* and *Mnemosyne* according to the Greek mythology. These goddesses were revered as deities of various arts and crafts. Gradually, the term began to denote the place where antiquities and objects of arts, crafts and science are exhibited.

The word museum is a Latin word. The word museum first appears in the Oxford Dictionary in 1671. A museum is given many things like academy, library, college common space, academic hall, collection of exhibits. In 1688, The Royal University of London began to call the place where the collections were kept called as museum. Murray in 1904 and Whitlin in 1949 helped to bring the word 'museum' into English. In India, it was initially called Wonder House and Saraswati Salai. It was called by various names like Exhibition Hall, Art Gallery, Showroom, while in Tamil, *Arumborudkkatchi*, *Arungkatsiyagam* and *Arumporul Kappakam*.

Brief History

The history of museums can be traced back to the Classical period. The 'mouseion' of Alexandria, dating back to third century BC is considered as the earliest museum. Though the Chinese, the Japanese and several other communities did have private collections of objects of cultural and natural heritage in the early periods, the modern public museum is a European brainchild. Thus the history of modern museums does not go beyond the 17th century. The Renaissance movement, exchange of goods and idea with the opening up of trade routes, colonization, the growth of the places of worship of different faiths and patronage by the

kingdoms and churches contributed tremendously to the museum movement across the globe. Many museums were thrown open to the public from the 17th century onwards, important being the Louver Museum, Paris; the British Museum, London, and the Museum of Metropolitan Art, New York. The collections of these early museums not only upheld the patriotic fervour, but also provided a place of prominence to various objects acquired by the Western countries from their colonies. Several museums were also set up in the colonies in the 19th and 20th centuries, e.g. the Indian Museum of Calcutta (1814).

Over the years, the nature of museums has been changing. Earlier there were only archaeological or anthropological museums, but now there are museums for almost each and every subject or category of objects on the earth. Nowadays more private museums are coming up across the world. In the modern museums, education goes hand in hand with entertainment. Keeping this trend in mind, many museums across the world create interactive exhibits, which provide entertainment as well as knowledge about the objects and various subjects.

Icom

The International Council of Museums, known as ICOM, was set up in the year 1946 at Paris, to create awareness among the world population about the need to sustain museums in the community. In the post – Second World war period, the very presence of museums was used as a symbol for a country's heritage and culture.

The ICOM defined Museums as a non-profit making industry in the service of the society. Museum performs various functions, such as collecting objects, documenting the collected objects, educating people about the collected objects and finally preserving them for posterity.

Importance of Museum

- Museums play an important part in heritage management.
- Museums help to promote and boost heritage tourism.
- Museums will emerge as major centres of informal learning, especially in the context of globalization which has been demolishing traditional ways of life and cultural systems across the globe.
- Museums are indispensable institutions for the promotion of cultural and natural integrity.

Kanyakumari Government Museum

The first Indian Museum started in India was at Calcutta in 1814 A.D. Madras Museum was the second museum in India was started in 1851. Types and kinds of Museum are National Museum, Regional Museum, State Museum, District Museum, Archaeology site and

Institutional Museum. One of the earliest salvage site museums is at Nagarjunakonda in Andhra Pradesh.

Kanyakumari, the southernmost landmark of India where the sun rises and sets in the sea and where the three seas meet and merge is the centre chosen for the establishment of the tenth museum under the Directorate of Museums, Tamil Nadu. Kanyakumari District Museum was established on 30th January 1991 by Tamil Nadu State Government. Historically, it is rich in Pandyan relics and monuments.

This Government Museum of Kanyakumari is a multi-type object exhibits museum which contains many exhibit showcases on various fields like Archaeology, Anthropology, History, Numismatics, Zoology, Geology, Botany, Children Section and local history, etc.,. Some important collections from Archaeology, Anthropology and History, Numismatics, Geology, Zoology and Botany, local history are Palaeolithic, Microlithic and Neolithic stone tools, terracotta images, original wooden temple car of Swamithoppu temple and wood carvings, Kani tribes and their objects, Travancore kings and family photos and paintings, Iron – cannon and cannon balls, British coins, Travancore Kingdom coins, Indian coins released after 1947, Rock and minerals, rare earth's sands, stuffed birds and animals, wet preserved-marine species, whale-bones, sample wooden pieces, Household objects of Nanjil Nadu, photos of Kanyakumari district, historical and tourist places, beaches and religious centres, etc, were exhibited.

The idols of Thirumangai Alwar, Manikkavasagar, Rama, Natarasar, Devi, Balakrishnan, Sivagnathan are on display in this museum belong to the 15th century A.D. The wood carvings extracted from a temple car of Ramanathapuram are exhibited. Eighteen feet wooden temple car of Swamithoppu Ayya Vaikundaswamy temple, received as a gift and exhibited in the special exhibition hall has exquisite wood carvings of saints, dancers, musician, nomadic girl, etc. The things of betel box, incense burner, hanging lamps, pavai lamp, *gendi* made of brass used by the people of Karaikudi in their day to day life were exhibited in the metal ware showcase.

Musical instruments such as urumi, tamuku, nadaswaram, panchagi and swaragut which are showcased in a display resemble the various type of musical tradition practised by the people in ancient times. Coins are the primary sources to know the history of a Country. With the help of coins, people get to know the chronology of the kings, the economic condition of the country and about the development of arts. A set of model metal-cast coins from 5th century B.C. right down through the age of Kushans, Guptas, Chalukyas, Mughals, Cholas, Pandyas, Vijayanagar and the East India Company adorn the numismatics showcase.

Things like flint and stone, bamboo container for collecting honey, Kokkarai a musical instrument, betel-nut box, Bamboo fire making casket of the Kani tribes, a indigenous tribes community of Kanyakumari district are displayed in Diorama showcase. The ancient war weapons like sword of Kattabomman's period, Iron-cannon and cannon balls collected from Udayagiri fort at Kalkulam taluk in Kanyakumari district are being displayed depicting the type of warfare of the ancient Tamils. A few oil paintings of western style and Indian themes are on display in the paintings gallery. The copies of paintings of famous artist, Raja Ravi Varma's work, some important copy of paintings are titled such as Incontemplation, Mohini Rugmangada, Papa, a milkmaid, Sakuntala, lady with swarbat are adorned the painting gallery. Travancore gallery was inaugurated by Sri Uthiradam Thirunal Marthanda Varma on September 17th 2004, was set up to showcase the period of Kanyakumari district under the Travancore rulers before 1956. It displays the photos of the Travancore kings who ruled Kanyakumari highlighting their achievements. Travancore coins, Chakra stamps, first day covers, documents, Travancore emblem, palm-leaf manuscripts, some interesting wooden objects and few photos of the Diwan Sir C.P.Ramaswamy Iyer's achievements in Travancore kingdom and Gandhiji's travel to Tamil Nadu and costume dolls of the people.

Conclusion

Kanyakumari Government Museum has come to join the ranks of the distinguished and proud of Kanyakumari district. Archaeology and Anthropology artefacts reflects the Palaeolithic, Microlithic and Neolithic age, Kani tribal people life style material evidences are exhibited in the museum Exhibits of wood carvings, temple car of Ayya Vaikundaswamy at Swamithoppu, paintings of Raja Ravi Varma, incidents of Dr. Ramaswamy Iyer, Gandhiji's travel to Tamil Nadu and costume dolls of the people, exhibits of palm-leaf manuscripts, coins and sculptures of gods, goddesses, saints and animals, geological exhibits of rocks, minerals and sands which are acquired from earth, exhibits of marine species and physical form of humn being and other living organisms, posters and pictures of historical places, religious centres, occupations, life style of Kanyakumari district people. People knew from the wooden sculptures that Tamils are good at making not only stone and metal but also wooden sculptures. There are also specimens of coins issued from the 5th century BC to the Kushana, Gupta, Chalukya, Islamic, Chola, Pandya, Vijayanagara and East India Company. Musical instruments, war tools, etc., which illustrate the ancient Tamil Living culture, and the setting in the lush rubber plantation and bush forest environment have been designated this museum. Paintings in oil colours combine Indians in western style with principles. This unique museum

is a treasure house displaying the rare and interesting objects of times of yore, giving a rare opportunity for the onlooker to enrich the store of knowledge.

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Srilankan Refugees in the Rehabilitation Centres in Kanyakumari District

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ABSTRACT

Refugees are people who have fled from their motherland because of war, ethnic conflict and personal danger. They are extremely displaced people with a well-founded fear of persecution in their countries on the basis of race, religion, nationality, political beliefs and unable to return to their own countries. Ceylon Tamils, from time immemorial, were the original inhabitants of Ceylon and India. Britishers also brought the Indian Tamils to Sri Lanka from the south Indian state of Tamil Nadu to work in rubber, tea and coffee plantation mainly as labourers. At that time Indian Tamils has enjoyed all civil rights including voting rights. But Sinhalese formed the majority in the Ceylon Society, they feared the Tamils may overcome the Sinhalese in their own soil. In the meanwhile, the government enacted New Citizenship Act No.18 of 1948 and No.3 of 1965 designed to deny citizenships and voting right to the Indian Tamils. As a result of Citizenship Act, the Tamil Women had lost their earlier voting right. The Lankan Tamils were in better position than Sinhalese in the field of Employment and university education before and after independence. During the election of 1956, Sinhalese majority people began to complain to the then government and discriminated against the minority Tamils in their own country in the field of higher education and in the government employment sector. The question of Sinhalese as Official Language Act also made many Ceylon Tamils including women to quit the job. The serious problems mounted the pressure and created the civil war. So they created unnecessary problems to start the civil war in 1983. This paved the way for the Tamils women to migrate to India as refugees.

Introduction

Sri Lankan Tamils who came to Tamil Nadu as refugees who lost their property during the civil war in Sri Lanka. There are two types of Tamils in Sri Lanka 1. Native Tamils 2. Hill Tamils who were taken from Tamil Nadu during the British rule to develop and maintain tea plantations in the hilly areas of Sri Lanka. But when the hill Tamils dominated the Tamil origins, there arose the problem that ended with civil wars.

In Kanyakumari District there are four active refugee camps namely Perumalpuram, Pazhavilai Gnaranvilai and Kozhivilai. Perumal Puram refugee camp, to located in Agastheeswaram Taluk, it has 542 peoples, Pazhavilai has 211 people, Gnaranvilai has 125 peoples and Kozhivilai has 320 people. The Srilankan refugees are protected by the Tamil Nadu government under various schemes.

Objectives of the Study

The article entitled, Sri Lankan Refugees in the Rehabilitation Centres in Kanyakumari District with Special Reference to Women and Children, is very much helped to understand various things related to Sri Lankan Refugees in Kanyakumari District.

- To analyse the causes and the various phases of the arrival of Sri Lankan refugees in Tamil Nadu, Specifically in Kanyakumari District.
- To know about the rehabilitation campus in Kanyakumari District and understand the life condition of refugees who are in the rehabilitation camps.
- To focus the miseries and the various needs of the refugees especially their demand about Indian Citizenship.
- To access the government policy as well as the voluntary organizations towards the wellbeing of the refugees.
- To examine the condition of women and children and their needs in the various aspects.

Keywords

Lankan Tamils - Citizenship Act – Sri Lankan Refugees – Native Tamils – Hill Tamils - Rehabilitation Campus - Rehabilitation Department Office.

Government administration

As for as India is concerned, the central government gets assistance for the refugees and the state government takes care of them. The state government implement the action plans for the refugee's population and submits them to central government to get the appropriate expenditure. However in terms of the interests of the Sri Lankan Tamils, not only the central government is helping but also the state government is giving its full contributions in various projects.

The Tamil Nadu government Rehabilitation Department Office is located in the fourth flore of Ezhilagam, Chennai. Commissioner of Rehabilitation Department and other officers are present here. Under the Rehabilitation Department and other officers are present here. Under the Rehabilitation Department District Collector, Assistant District Collector, (general) special District Collector for refugees etc. are responsible for the refugee's population in each district. Also the camps will be under the supervision of the local authority of the taluk, where the campus are locating.

Identity Card

Sri Lankan Tamil refugees were issued identity cards with their basic details and family photograph. Such identity cards will be issued immediately after registration at the refugee hall camp. Since, 2007, the refugees in the camps have been given personal identity cards issued by the department of Rehabilitation and District administration, and also have been registered under the Aadhaar ID card scheme of the government of India.

Censorship

In the early days, the refugee settlements functioned as protective zones. Each camp is staffed with police officers and intelligence officers. There are restrictions like returning to the location by evening. Even though the restrictions have eased over time and refugee people are moving like the people of Tamil Nadu, even today, the system of census of refugees by government officials is in practice. Census of refugee population is conducted on the first and third Sundays of every month by the camp Revenue Inspector and Intelligence Department. Even today these camps are surveillance by intelligence agencies, police etc. inside the camps.

Aids related to Education

The government of Tamil Nadu have launched number of schemes for the development of education of the refugees.

- i) Anganwadi center in the camps itself.
- ii) Free coaching
- iii) In expensive bicycle
- iv) In expensive lap top
- v) Rs. 20000 tuition assistance for first generation engineering students.
- vi) Education assistance for higher education students
- vii) Allotment of five seats each in all government backward welfare hostels.

Under these schemes 16 students from Perumal Puram and 11 students from Pazhavilai are benefited. Though opportunities for engineering education have been available with the help of the Tamil Nadu government in the subsequent times, Sri Lankan Tamil refugees are not admitted in the government medical college till date. Only few students are studying in private colleges. The Tamil Nadu government has addressed that Sri Lankan refugee students completing their school education in Tamil Nadu can also participate in the general examination for engineering colleges under general category. Following this, eligible Sri Lankan Tamil refugee students continue their engineering education by participating in the public consultation for engineering education.

Job Opportunity

No special employment opportunities, have been created by the government for the refugees. In the early days there were restrictions on leaving the camp for employment. Now they have gradually decreased. Refugees are doing the job available to them according to the location of the campus. Most of the refugees are involved especially is painting work. Some educated people worked in private companies. Refugees do not have government employments permits. Some time there are causes of denial of employment in private companies on the grounds of being a refugee even if qualified charitable organizations working in the camps provide some vocational training and support for small business.

Altra India

Altra India – This compulsory started working in refugee camps only after 2004. However the company carried out work with emphasis on the construction of toilet and permanent house in the area currently, it is implementing programs like training, credit assistance to improve livelihood.

Leprosy India

Leprosy India implementing the child Nutrition programme. It is carrying old works such as providing nutritional food for children and providing educational equipment. Multipurpose social service centers are doing their best in the camps near their premises according to their financial resources. Housing construction, toilet construction vocational training are provided to them.

Charities and Aids

In case of working among the SriLankan Tamil refugees, the work can be continued with the permission of the Rehabilitation Department of the Tamil Nadu Government. In that way, various charitable organizations are doing rehablits taken work for SriLankan tamil refugees with the permission of Tamil Nadu Governments Rehabilitation Department notable among them are,

Ezha Etheliyar Rehabilitation Corporation

Ezha Etheliyar Rehabilitation Association is a charity organization run by Sri Lankan Tamil for Sri Lankan Tamil refugees. It has been working in Sri Lankan refugee camps since it's incept. Its activities include grew up structures, educational assistance, formation of self – help group and awareness regarding certifications.

Special care for women and children

The women and children from these camps were benefited by the various schemes like Marriage Assistance Scheme, Girl Child Protection Scheme, Scholarship for destitute,

Scholarship for the differently abled, Widow's Allowance, Providing free sewing machine to women who know sewing, Chief Medical Insurance Scheme, Burial Scheme.

Clothes, Utensils

One a year, the government used to provide cloths over been used to make it possible for people to pick up the clothes they need to Co-op Tax. Coupons are issued for purchase of dhoti, towel, Baniyan, mat, bed sheet, etc. for men and saree, skirt, jacket, bed sheet etc. for women at the price fixed by the government. Similarly, children are given coupons to buy their cloths. Aluminium utensils worth Rs.250 are provided by the government. Once in two years apart from these, inset of the governments social welfare schemes implemented for the people of Tamil Nadu have also been extended to Sri Lankan Tamils.

Conclusion

Thus the government as well as social organizations rendered meritorious services to the welfare of the refugees especially women and children. But these are not fully satisfy the needs of them. They need more care and measures. The women and Children from the camps are not satisfied with their adequate facilities. They need more facilities to run a healthy life. The demanded to provide Indian citizenship to them. They argued then only they can get Ration Card and Government jobs to led a healthy life. But the Indian Government not ready to provide Indian Citizenship to them because of fear and confusion. The Indian government is ready to send them back to their own mother country but they are not willing. So their life is a complex problem in the Rehabilitation camps.

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The Sarvodaya Movement

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ABSTRACT

The Gandhian Sarvodaya is an alternative to Western Socialism. It aims at the formation of a classless society and the destruction of the differences between the rich and the poor, it encourages individual labour, it encourages production by making use of manual labour and machines system of without hindrance to individual initiative and rural industries, it confirms minimum wage to all, it aims at the utilisation of private property and individual talent in excess of basic necessity as a trust for the public welfare, it is a social order in where all will work, it is a political system in which differences were resolved by discussion and it desires everyone to have faith in God and do service to people, children of God.

Keywords: Sarvodaya, Truth, Non-violence, Western Socialism, Marxian Communism, Trusteeship, Village panchayat, Industries

Introduction

The term Sarvodaya which means “The welfare of all” was coined by Mahatma Gandhi. To denote the ideal, social and economic order which he desired to be established in India, as well as in the other parts of the world. At first he used it as the title of the Gujarati translation of the book “Unto This Last” written by John Ruskin. He experimented with Ruskinian Socialism. For example he fixed the same wage for with all who worked in his farm irrespective of colour or nationality. Gandhiji was influenced by socialistic ideas coupled with his ideals of Truth and Non-violence shaped his final ideal called Sarvodaya.

“Sarvodaya” is the Gandhian alternative to Western Socialism and Marxian Communism. Like all socialists he was also against private property, inequality of income and exploitation of the weak by the Strong. But he differed from Western Socialists only in the means that are to be used in achieving the ideals. He was essentially a man of religion and so his ideals were surcharged with ethical and religious principles. He envisaged a thorough change in the existing social order, economic organisation, political system and cultural values. All these revolutionary ideas of Gandhiji are denoted by the single term Sarvodaya.

Classless Society

Gandhiji wanted to establish a classless society, in which the people would be neither poor nor rich. He was against the capitalist system where wealth is accumulated in the hands of few persons. His goal was Sarvodaya, the welfare of all and this included not only the poor and the weak but also the capitalist and the landlord. The capitalist must swear not to use his

wealth for his personal ends but to spend for the society. The landlord must voluntarily give up his lands to the poor. The weaker sections must try to change the hearts of their masters by non-violent non-co-operation. The new social order must be based on truth and non-violence.

Human Labour

Gandhiji was against the use of machinery, large scale production, industrialisation and urbanisation vehemently. In his ideal state the villages would dominate the cities. Village industries would replace large scale industries. Machines would be used in the minimum. According to him large industries lead to mass unemployment in villages any exploitation of the weak by the strong.

He was a great advocate of manual labour. According to him each one must physically work and earn his livelihood. One should take up agriculture, weaving, Spinning, carpentry, smithy or any other work which needs manual labour. No worker is inferior to the other worker. Whether one does mental or manual work, it is the same and the wages must be equal.

According to him all riches, material and intellectual, belonged only to God, and could be held by the individual as a trust. According to Gandhi “God alone is the sovereign of the material world. Humans may enjoy it as its trustees, renouncing any claim to absolute ownership”

Trusteeship Principle

It is not by violent revolution or by State coercion. Social change brought about by force will not be permanent. Therefore he advocated the principle of Trusteeship, for effecting a peaceful change. One who acquires more wealth by chance he must consider himself as a trustee of the surplus wealth, holding his riches on behalf of the poor. He could increase his wealth not for his own sake but for the sake of the nation. The state will allow him to take a commission for the services rendered to the society. After the death of a trustee, his son may succeed to his trusteeship.

If a capitalist does not behave as a trustee, the exploited people may adopt non-violent non-co-operation and civil disobedience to change the heart of the rich man. Thus Gandhi never adopted a hostile attitude towards emerging modern industries in India and rather advocated the concept of trusteeship wherein the capitalists were held as trustees for workers. In later years, Gandhi did try to give concrete shape to his social economic ideals by taking up the programme of Khadi, village reconstruction, welfare of Harijans, specially focusing on the abolition of evil practices of Untouchability.

New Political System

In the political field also Gandhiji had novel ideas. He was not in favour of a monolithic state with enormous powers to control the individual. He was in favour of tiny village republics. He wanted every village to be self-sufficient. He dreamt of the Panchayat Raj in which village Panchayats would administer the affairs of the village without external pressures. Villages should also settle all the cases whether civil or criminal in Panchayat Courts. The village lands must be possessed in common by the village panchayat. Every villager must work for the village and not for himself. He should get a wage which would be equal to his elemental need. The villagers should use only non-violent methods such as non-co-operation and Satyagraha to achieve orderly civil life and also defence against external forces. Small autonomous village republics with small industries and agriculture were the dream of Gandhiji.

Conclusion

Gandhiji's ideology, teachings and principles still have great relevance in socio-economic and political life of both the Indians and people across the globe by virtue of their universality and concern for the entire humanity. As contemporary society is a fragmented and polarised society with an absence of a basic consensus, in such scenario Gandhiji's prescription of tolerance and mutual respect is just more than relevant in today times. Today, when the whole world is facing crisis in terms of social, economic and environmental challenges such as poverty, racial discrimination, social disharmony, violence, terrorism, conflict, crime, religious bigotry, ethnic discord, communal frenzy, environmental degradation, pollution, global warming, and so forth, Gandhian philosophy can emerge as a game changer to provide equitable solution to all these issues and help in the providing an effective panacea for eliminating and eradicating the ills and evils of all these social and economic challenges that afflict contemporary societies and politics throughout the world. Through Gandhian techniques of Sarvodaya and decentralisation, the moral compass of today's degenerated politics can be effectively shifted back in the righteous direction of equitable and sustainable development along with good governance. It, therefore, seems that Gandhian philosophy is more relevant today than yesterday and will continue to have relevance throughout the coming ages.

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Women Worker's Legislations - Indian Perspective

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ABSTRACT

Women workers has been an important and integral segment of work force in India. In The present Study comprises the analysis of the legal and constitutional Indian perspective of welfare status of women workers. These welfare legislations which stress upon socio-economic welfare of women workforce. With the changing socio-economic scenario and importance of working women's productive roles have assumed new dimensions. During the preceding century, the parliament of India has come up with a number of legislative measures providing various safeguards and empowering the female workforce so that they can live with dignity and peace.

Keywords: *women workers, welfare legislations, constitution, Indian perspective, socio - economic and political.*

Introduction

The Supreme Court has stressed the working conditions at work places, better standard of life, hygienic, wages, insurance, health and safety, sexual harassment at workplace etc. to make their life meaningful. Most of the problems which working women beset are in reality rooted in the social and economic perspective of the position of women. The amendment has been a welcome measure, and has empowered women to a great extent both politically and socially. Within this constitutional framework of a democratic policy, our laws, growth, development policies, plans and programmes have repeatedly aimed at women's advancement in different spheres of life. The legislative provisions for the protection and welfare of women workers are largely inspired by the International Labour Organisation (ILO) Conventions.

Ilo and Conventions Concerning Women Labour

India is a member of International Labour Organisation (ILO) since 1919. Three years later the country became a permanent member of the ILO and in 1928 the first ILO branch was established in Delhi. The ILO standards concerning balance of work and family, health, equality, sex-based and discrimination in the employee-employer relationship;

Laws Relating to Working Women

ILO prescribe minimum working hours, regulate the conditions, principle of non-discrimination in wages, workers irrespective of their sex, region, ethnicity, physical ability or other attributes. The followings are the most important laws related to women workers,

The Prohibition of Sexual Harassment of Women at Workplace Act, 2013

Procedural Requirements for Employers

- Section 4 lays down the establishment of an Internal Complaints Committee (ICC).
- If a workplace has less than 10 employees it is difficult to set up ICC. Local complaints committee (LOC) established at the district level.

The Complaint Process

- Section 9 requires that a complaint to be filed within 3 months of the date of incident.
- This may be extended to another 3 months if the woman can prove that grave circumstances prevented her from filing at an earlier time although “grave” is not defined within the act.
- The ICC is required to complete the inquiry within 90 days of receipt of a complaint then obliged to take action on the report within 60 days.
- Employers are required to ensure timely submission of reports to the District Officer.
- If a complaint is not proven, the ICC can instruct the employer or appropriate District Officer that no further action is required.

The Maternity Benefit Act, 1961

- Article 42 of the Constitution of India imposes obligation upon the securing work and for maternity relief.
- The maternity benefit is a payment of her actual absence immediately preceding and including the day of her delivery and for six weeks immediately following that day.
- In the matters relating to maternity leave, economic benefits during absence of work.
- Maternity protections more adequate in the following spheres:
- More liberal provisions for extended or extra leave during child’s infancy,
- More effective protection against dismissal during pregnancy,
- Greater encouragement of breastfeeding and wider provisions of nursing breaks,
- Establishment by social security schemes to care for infants of working parents.

Maternity Benefits: A woman can get maternity Benefits,

- During and after Pregnancy (during the early months of motherhood).
- Government employed women are entitled for maternity leave with full pay.
- Other working women are entitled for 16 weeks maternity benefits.
- Even unmarried women are entitled for maternity benefits.
- Only those Government employees can avail these benefits, which have less than two surviving children.

- If a woman wants she can avail few days before the delivery and the remaining leave after the delivery, or she can avail the entire leave at the same time.
- The employer cannot make a woman do any heavy work in the last working month of pregnancy.
- A woman is entitled to 45 days leave full wages in case of miscarriage.
- The National maternity Benefit scheme was modified and new scheme called Janani SrakshaYojna was introduced.

Complaint: Section 17 talks of complaint that can be made to the inspector appointed under the Act. Section 23 talks of complaint that may be lodged in a court of law after exhausting the remedies provided under the Act.

Procedure to Seek Remedy

- The inspector may enter any place where women are working, in exercise of powers given to him under the Act and records required to be maintained
- The woman should have put 80 days of work before in a delivery period of one year to be able to claim the benefits under the Act.
- Where she has failed to give such a notice, she may apply to the Inspector who shall make the necessary orders within 30 days from the date of the decision.
- Where the employer is guilty of payment, he is punishable with imprisonment not less than 3 months to one year and with fine for not less than Rs. 2000 to Rs. 5000

The Factories Act, 1948

Rights of Working Women in Factories

- Women must have separate toilets and washrooms with doors.
- If a factory has more than 30 women workers the employer must provide a creche for the workers children.
- Women cannot be made to lift more than the prescribed weight.
- Women cannot be made to work more than 48 hours in a week.
- Women must get one day off in a week.
- Women cannot be made to work for more than 5 hours at a stretch.
- Women cannot be made to work only between 6 in the morning and 7 in the evening.
- Shift can change only after weekly or other holiday and not in between.
- Night shift for women
- Factories Act has been proposed to be amended to allow night shift for women workers.
- Section 66 to allow women workers between 7:00 pm and 6:00 am.

- To ensure occupational safety and adequate protection to the women workers.
- For contravention of the provisions of up to 2 years or fine up to Rs. 1,00,000.
- Contravention causing death or serious bodily injury- fine not less than Rs. 25,000 in case of death and not less than Rs. 5000 in case of serious injuries.
- Continuation of Contravention – imprisonment up to 3 years or fine not less than Rs. 10,000 which may extend to Rs. 2, 00,000.
- On contravention of chapter IV pertaining to safety or dangerous operation.

The Equal Remuneration Act, 1976

- If two workers are doing the same work, they should be paid equal wages.
- Even Article 39 of the Constitution envisages that the state shall direct its policy, among towards securing that there is equal pay for equal work for both men and women.
- **Advisory committee:** Committee shall consist of not less than ten persons of which one-half of women.
- Power of appropriate government to appoint authorities for hearing and deciding claims and complaints:
- Every authority appointed shall have all the powers of a civil code under the Code of Civil Procedure, 1908 (5 of 1908), for the purpose of taking evidence and of enforcing the attendance of witnesses and compelling the production of documents.
- An appeal within 30 days but not thereafter is allowed.

Remedies under the Act

The Magistrate may take up the case on its own or on receiving a complaint either from the appropriate Government or the aggrieved person or any recognized Welfare Institution or Organization and even Public Interest Litigation may be filed for discrimination in payment on grounds of gender.

Complaint Process

- Either of the parties may appeal to the appellate authority as notified by the Government under the Act within 30 days of the original order.
- Alternatively, a Public Interest Litigation may be filed in the court of law or the Legal Services Authority may be approached for getting appropriate relief and legal aid.

Minimum Wages Act, 1948

- Every woman must be paid the same wage as a man for the same kind of work i.e., equal to the man and not less.

- Even if a person agrees to work on less wages than prescribed by the government, the employer is bound to pay the minimum wages.
- Minimum wages must be fixed on: Daily basis, Hourly basis and Monthly basis.

Remedy / Procedure under Act

- If the employer is not paying the Minimum Wages then the labour can complain to the labour inspector.
- The employer cannot make the labour work for more than 9 hours which includes the time for rest also.
- If the labour works for more than 9 hours he/she will get the extra money which is doubled the wages.
- Every week there should be one day paid rest.
- The Presiding Officers of the Labour court and Deputy Labour Commissioners hear and decide claims arising out of payment of less than the minimum rates of wages.

Complaint Process

- Every application under this Act must be presented within 6 months from the date on which the minimum wages become payable.
- A single application may be filed on behalf of any number of employees.
- No appeal shall lie against the decision of the authorities under the Act.

Review of Literature

Andre Bataille's (1999) article on "*Empowerment*" the article explains the empowerment process through the expansion of the civil, political and social rights of citizens and says it is a laborious and unexciting process.

Dr.G.Q.Mir, (2001) "*Women Workers and The Law*" analyses the present scenario of working population in India with regard to Employees State Insurance Act and Maternity Benefit Act although they are covering the same field of maternity benefit yet they are not uniform in contribution periods and benefits provided and implications for the growth and development.

Dr. Kamini B. Dashora (2013) in their article "*Problems faced by Working Women in India*", analyse the Indian society makes it difficult for a working woman to balance her domestic environment with the professional life and family.

Statement of the Problem

Discrimination against women in employment and disparity in wages is a universal phenomenon. However, empowerment and equality are the concepts based on the gender sensitivity of society towards their problems. The intensification of women's issues and rights

movement all over the world during the last few decades is reflected in the form of various conventions passed by the Nations.

Objectives

- To analyse the present constitutional labour welfare and legislations relation to women.
- To analyse the law relating to empowerment of working women in India.

Methodology

The Study comprises of review and evaluation of secondary sources information from the office of Registrar General & Census Commissioner of India, as per Census 2011, the National Sample Survey Organization (NSSO) these are two main sources of data on women's employment and articles, journals, internet sources were used.

Data Analysis and Interpretation

Table 1 - The Number of Female Workers

Country	Total No.of Female Workers (million)	female workers			
		Rural (million)	Urban (million)	Organised sector (in lakh)	Unorganised sector (in lakh)
India	149.8	121.8	28.0	59.54	32.14

Source: Census of India-2011, Government of India

From table 1, it is evident that the total number of female workers in India is 149.8 million and female workers in rural and urban areas are 121.8 and 28.0 million respectively.

Table 2 - The Work Participation Rate for Women in India

Year	Work Participation Rate (per cent)
1981	19.67
1991	22.27
2001	25.63
2011	25.51

Source: Census of India-2011, Government of India

Table 2 shows that the Work Participation Rate of Women has reduced marginally in 2011 but there is an improvement from 22.27 per cent in 1991 and 19.67 per cent in 1981.

Findings

- ❖ 149.8 million are the total number of female workers in India.

- ❖ 121.8 and 28.0 million are female workers in rural and urban areas.
- ❖ As per Census 2011, the work participation rate for women is 25.51 per cent as compared to 25.63 per cent in 2001.

Suggestions

- Providing vocational training courses and certification to women to meet the trained skill workforce to the industry and service sector etc. in the country.
- Fully utilize the allotted funds were utilised in the allotted time.
- Proper determinant, planning and execution of the women workers welfare legislation.
- Increase the awareness levels towards securing the working women with rights.
- Reduce the loopholes present in these enactments of laws have been in operation.

Conclusion

To encourage the women in India to equally participate with men in every sphere there needs to be a sea change in the mind-set of the people of the country. Not just the women themselves need to be aware, but the men have to wake up to a world that is moving towards equality, equity and towards shunning gender disparity. The status and dignity of women is very much associated with their contribution towards the economic activities and growth of the nation. Women an epitome of power, and once given an exalted status, are in need of empowerment-legal, social, political and economic. So that women workers enjoy a unique position in every society and country.

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Challenges Faced by Migrant Workers in India during COVID-19 Lockdown and Reverse Migration

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ABSTRACT

The COVID-19 pandemic and subsequent lockdown in India have had a significant impact on migrant workers. This study examines the challenges faced by migrant workers during the pandemic, particularly during the lockdown and reverse migration. We explore the meaning of migrant workers and the trends and patterns of internal migration in India. We also examine the push and pull factors that influence migration, as well as the economic, social, and mobility impacts of the pandemic on migrant workers. Additionally, we investigate the unexpected lockdown and the government's neglect of stranded migrant workers during this time. Finally, we discuss the complicated transportation policies during the pandemic and their effects on migrant workers. This study highlights the need for policy changes to better protect the rights and welfare of migrant workers in India, particularly during times of crisis

Keywords: *Migrant workers, Internal migration, COVID-19 lockdown, Reverse migration, Challenges*

Introduction

Migrant workers play a crucial role in India's economy, contributing to various sectors such as agriculture, construction, and manufacturing. However, they face numerous challenges in their daily lives, including social exclusion, limited access to basic services, and precarious employment conditions. The COVID-19 pandemic has brought these issues to the forefront, highlighting the urgent need for policy interventions that address the concerns of migrant workers. The outbreak of COVID-19 has brought unprecedented challenges to the world, and the pandemic's impact on vulnerable populations, such as migrant workers, has been particularly severe. India, with its vast population of migrant workers, has faced significant challenges in addressing the needs of this vulnerable group during the pandemic. The sudden and unplanned lockdown imposed by the Indian government in March 2020 left millions of migrant workers stranded, struggling to access basic necessities like food, shelter, and healthcare. This situation led to the largest reverse migration in India's history, with millions of migrant workers returning to their home states in search of safety and security. This study aims to explore the challenges faced by migrant workers in India during the COVID-19 lockdown and reverse migration, including economic, social, and mobility impacts. Additionally, this study will examine the causes of migration, both push and pull factors, as

well as the Indian government's response to the crisis. By understanding the challenges faced by migrant workers during this unprecedented time, we hope to identify potential solutions to better support this vulnerable population in the future.

Statement of the problem

Migrant workers in India have a number of issues, which have been compounded by the COVID-19 pandemic. The COVID-19 pandemic and the subsequent lockdown in India have created an unprecedented crisis for migrant workers, who have been among the worst affected. In India has resulted in the displacement and distress of millions of migrant workers. The sudden loss of livelihoods, coupled with the lack of social security and support systems, has forced these workers to embark on a perilous journey back to their home states. The sudden and unplanned lockdown left millions of migrant workers stranded in cities, without jobs or income, and with limited access to food, shelter, and medical care. The lack of transportation and the closure of borders made it difficult for them to return to their hometowns, leading to a mass exodus of migrant workers on foot. The reverse migration has exposed the multiple challenges faced by migrant workers in India, including economic, social, and mobility issues. This study aims to investigate the challenges faced by migrant workers during the COVID-19 lockdown and reverse migration, and to identify the underlying factors contributing to these challenges.

Objectives of the Study

1. To explore the push and pull factors involved in migrant workers.
2. To investigate the causes of reverse migration among migrant workers in India during the COVID-19 pandemic.
3. To examine the impact of the COVID-19 lockdown on migrant workers in India, in their economic, social, and mobility challenges.

Research Methodology

This study utilizes a qualitative research approach, relying solely on secondary sources, and gathered relevant data from existing sources, such as government reports, surveys, and news articles.

Limitations of the study

1. There is a possibility of missing relevant literature due to search criteria and the lack of primary data collection.
2. Secondary sources may not provide enough context for the findings, limiting the ability to understand the nuances and complexities of the challenges faced by migrant workers in India during the pandemic.

Meaning of migrant workers

A migrant worker is a person who migrates within a home country or outside it to pursue work. Migrant workers usually do not have the intention to stay permanently in the country or region in which they work.

Internal Migration in India: Trends and Pattern

The Census of India distinguishes between two types of migration: Migration by Birthplace and Migration by Place of Last Residence. If a person is counted in the Census at a location different from their place of birth, they are considered a migrant by Birthplace. On the other hand, if a person has previously lived in a location other than their current Census location, they are considered a migrant by Place of Last Residence.

In India, there were 454 million migrants as of the 2011 Census, a huge increase from the 220 million and 315 million figures recorded in 1991 and 2001, respectively. Between 2001 and 2011, 74.7% of all migration was tied to marriage and families, with other family-related migration replacing marriage migration. Marriage migration accounted for 40% of rural-to-rural migrants while interstate marriage migration accounted for only 4.8%. In contrast, interstate migrants made up 43% of the rural to urban migration for employment and enterprise. Interstate mobility was essential to a commercial and labour migration.

Causes of Migration: Understanding the Factors

A thorough investigation finds that there are many factors that influence migration, which can be broadly categorised into four categories: environmental, economic, cultural, and socio-political. These variables can be categorised as push or pull variables.

Push Factors: Factors that Force Migration

Push factors are circumstances that push people to migrate because of the risk they face if they stay in their current area. Poverty, a lack of job possibilities, unemployment, underdevelopment, poor economic conditions, natural disasters, and a lack of fertile land are examples of push factors.

Pull Factors: Factors that Attract Migration

The conditions in the destination country that entice people or groups to leave their homes are referred to as pull factors. These characteristics contribute to place utility, or the appeal of a location that entices people to relocate. Better employment and education opportunities, higher wages, better facilities, and better working conditions are examples of pull factors.

Confronting Multiple Challenges During Reverse Migration

Due to the loss of jobs and income in the cities brought on by the COVID-19 pandemic, millions of migrant workers in India have begun to move back to their original states. However,

obstacles like limited mobility, a lack of access to social security and healthcare, and weaknesses in the unregulated labour market have made their return to their home country difficult. The challenges that both categories of migrant workers faced during reverse migration, repatriation, and reintegration have emphasised the urgent need for legislative measures to address their concerns.

The economic impact

The COVID-19 pandemic has had a significant impact on the economic conditions of migrant workers in India, especially those with low-income backgrounds. Due to the sudden lockdown, many of them lost their jobs and were not paid their wages, which compelled them to return to their home states in search of work. Wage theft emerged as a common issue reported by both internal and international migrants, which further worsened their economic struggles. The lack of employment opportunities and basic facilities such as electricity and water provided by their employers forced them to return to their villages, where they faced a lack of immediate governmental support. The economic challenges faced by migrant workers underscore the need for policy interventions to address their concerns and enhance their well-being.

The social impact

Before and after the government repatriation efforts during the COVID-19 pandemic, migrants in India faced social difficulties. On their return trip, at quarantine facilities, and in their villages, migrants reported experiencing discrimination and being held responsible for the virus's spread. In addition, a large number of migrants had little literacy skills and minimal ability to bargain with their employers. They also lacked the financial means to pay for housing, food, and return tickets. The necessity for Governmental measures to alleviate discrimination and advance the social welfare of migrants in India.

The migrant worker's mobility impact

The central government of India was initially hesitant to save stranded migrants at the onset of the COVID-19 pandemic. These migrants consequently encountered numerous challenges as they attempted to cross state boundaries, including instances of police brutality and even fatalities from exhaustion and dehydration. The pandemic had an especially negative impact on low-wage workers in sectors like restaurants and construction; many of them lost their employment and were left stranded on the streets without assistance. All foreign newcomers were required to undergo a 14-day quarantine by the Ministry of Health & Family Welfare, the first seven of which were spent in institutional quarantine. International migrants had to cover the costs of quarantine facilities and COVID-19 testing on their own, whilst internal migrants got state sponsorship.

An Investigation of India's Lockdown Practises

An unexpected lockdown

The Indian government implemented a lockdown with very short notice of only four hours, which was an unexpected and rare phenomenon in a democracy. The public had not been given any warning, despite the first case of COVID-19 being reported in January 2020 and its numbers increasing by mid-March. The government officials had assured the public that the virus had not yet taken the form of an epidemic and that there would be no lockdown in the near future. However, on March 24, 2020, the Prime Minister announced a three-week nationwide lockdown effective from March 25, 2020. This sudden lockdown led to panic buying of essentials and the return of migrant workers to their hometowns, which could have been anticipated and taken into account by the government. The United Nations Human Rights Commissioner and the National Human Rights Commission of India expressed deep concern over the plight of affected migrant workers, and human rights violations were reported during the lockdown.

Government neglect of stranded migrant workers during lockdown

In the lockdown, the Indian government made a second mistake by doing minimal to help the stranded migrant workers. Most migrant workers in India are neither permanent employee nor paid much. The government demanded that firms pay their full wages, but many small enterprises lacked the funds necessary to accede. Indian Inc. also demonstrated a disregard for workers by implementing measures like layoff and non-payment of dues. Many workers lost their jobs and were unable to support themselves without help. The government assured that food supply would be uninterrupted during the lockdown, but most migrant workers didn't have ration cards and couldn't benefit from the free ration scheme. A survey revealed that 96% of stranded migrant workers didn't receive rations, 70% didn't receive cooked food, and 89% didn't receive payment from their employers during the lockdown.

The Plight of Migrant Workers During COVID-19 Lockdown in India

During the lockdown in India due to the COVID-19 pandemic, many migrant workers were left stranded without transportation and had to travel on foot or by other means to reach their hometowns. Sadly, some of them died due to hunger, accidents, or even suicide. Despite the dire situation, the government did not provide adequate assistance to the migrants and failed to set up food and water stations for them. Instead, police and paramilitary forces were relied upon to enforce the lockdown, resulting in some instances of brutality towards the migrants.

Complicated Transportation Policy During COVID-19 Pandemic

The Indian government allowed migrant workers to return home during the COVID-19 lockdown, but the process was complicated. Migrants had to obtain a medical fitness certificate, register online with their home state, and secure a travel pass from the local police station. However, many migrants did not have access to smartphones or internet facilities, and the websites frequently crashed. Meanwhile, middle and upper-class passengers were able to travel more easily. This disparity in treatment compromised the migrants' rights and reflected a larger issue of injustice.

Findings of the study

1. Migration in India is influenced by various factors, including push factors like poverty, lack of job opportunities, and natural disasters, and pull factors like better employment and education opportunities, higher wages, and better facilities.
2. There has been a significant increase in the number of migrants in India, with 454 million migrants as of the 2011 Census. The majority of migration is tied to marriage and families, with other family-related migration replacing marriage migration.
3. There is a higher percentage of inter-state migration for employment and enterprise, particularly in rural-to-urban areas.
4. Many lost their jobs and were not paid their wages, which forced them to return to their home states in search of work. Wage theft emerged as a common issue, which further worsened their economic struggles.
5. Migrants in India faced social difficulties, including discrimination and blame for the virus's spread, highlighting the need for government measures to address these issues.
6. The COVID-19 pandemic has exposed the vulnerability of migrant workers in terms of their mobility, with many facing significant challenges when attempting to return to their home states.
7. The sudden lockdown led to panic buying of essentials and the return of migrant workers to their hometowns, which could have been anticipated and taken into account by the government. Human rights violations were also reported during the lockdown.
8. There is an urgent need for the government to address the lack of social security and basic facilities for migrant workers, especially during times of crisis like the COVID-19 pandemic.
9. The COVID-19 pandemic exposed the vulnerabilities and neglect of migrant workers in India. The lack of adequate transportation, food, and water stations resulted in the tragic deaths of many workers

10. The complicated transportation policy during the COVID-19 pandemic in India disadvantaged migrant workers who did not have access to smartphones or internet facilities, and favoured middle and upper-class passengers.

Suggestions

1. The government needs to take policy measures to address the economic challenges faced by migrant workers, such as providing better access to social security and healthcare and creating more employment opportunities in their home states.
2. It needs to address the issue of wage theft among migrant workers to implement strict legal measures and regulations to ensure that employers pay their workers fairly and on time.
3. To alleviate discrimination and advance the social welfare of migrants in India to promote social integration through awareness campaigns and community programs
4. To improve the mobility of migrant workers during crises like the COVID-19 pandemic, governments should establish clear guidelines and procedures for safe and efficient transportation, including provisions for food, water, and medical assistance during the journey.
5. The government should provide more notice and preparation time before implementing any future lockdowns to prevent panic and minimize the negative impact on the public.
6. The Government to implement a comprehensive plan for the welfare of migrant workers, including access to food, shelter, and healthcare during such crises.
7. The Indian government should prioritize the welfare of migrant workers during future crises and establish better systems for their protection and support.
8. The Indian government should have provided better access to registration facilities and streamlined the transportation process to ensure that all migrant workers had equal access to travel back home during the pandemic.
9. The Government should work towards addressing larger issues of injustice and inequality in the country.

Conclusion

The study identified various factors influencing migration patterns in India, including economic and social factors. It also revealed the vulnerability of migrant workers, with many facing economic struggles and social discrimination. Additionally, the study highlights the government's neglect of migrant workers, particularly during the COVID-19 pandemic, and the urgent need for policy measures to address their welfare, including access to social security, employment opportunities, and healthcare. The study suggests several measures to alleviate the challenges faced by migrant workers in India, including addressing wage theft, promoting

social integration, establishing clear guidelines for safe transportation, and addressing larger issues of injustice and inequality in the country. Overall, the study emphasizes the importance of protecting the rights and welfare of migrant workers in India, particularly during times of crisis.

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A Study on Problems and Challenges Faced by Women Entrepreneurs in Nagercoil Town

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ABSTRACT

An entrepreneur is an individual who creates a new business, bearing most of the risks and enjoying most of the rewards. The entrepreneur is commonly seen as an innovator, a source of new ideas, goods, services, and business or procedures. Women entrepreneur is a person who accepts challenging role to meet her personal needs and become economically independent. A strong desire to do something positive is an inbuilt quality of entrepreneurial women, who is capable of contributing values in both family and social life. With the advent of media, women are aware of their own traits, rights and the work situations. The challenges and opportunities provided to the women of digital era are growing rapidly that the job seekers are turning into job creators. They are flourishing as designers, interior decorators, exporters, publishers, garment manufacturers and still exploring new avenues of economic participation. This study focuses on problems and challenges faced by women entrepreneurs. For this purpose, both primary and secondary data were collected. For collecting data, convenient random sampling technique was used. This study concludes that, inspite of various difficulties the women entrepreneurs face, they are courageous enough to face the situation bravely and try to flourish in the business world.

Keywords: *Entrepreneurs, entrepreneurship, constraints, challenges*

Introduction

An entrepreneur is an individual who creates a new business, bearing most of the risks and enjoying most of the rewards. The process of setting up a business is known as entrepreneur. The entrepreneur is commonly seen as an innovator, a source of new ideas, goods, services, and business or procedures. Women entrepreneur may be defined as the women or a group of women who initiate, organize and run a business enterprise. According to Schumpeter, "Women who innovate, imitate or adopt a business activity are called women entrepreneurs."

Women entrepreneur is a person who accepts challenging role to meet her personal needs and become economically independent. A strong desire to do something positive is an inbuilt quality of entrepreneurial women, who is capable of contributing values in both family and social life. With the advent of media, women are aware of their own traits, rights and also the work situations. The challenges and opportunities provided to the women of digital era are growing rapidly that the job seekers are turning into job creators. They are flourishing as

designers, interior decorators, exporters, publishers, garment manufacturers and still exploring new avenues of economic participation.

In India, although women constitute majority of the total population, the entrepreneurial world is still a male dominated one. Women in advanced nations are recognized and are more prominent in the business world. But the Indian women entrepreneurs are facing some major constraints like identifying the available resources, lack of confidence in their strength and competence, socio-cultural barriers, market-oriented risks etc.

Statement of the problem

Women entrepreneurs are very important for social development of a nation. Entrepreneurship plays the biggest role in women's life. In the current emerging market scenario, the Government of India and the State Government are providing lot of assistance and support to the women to empower them through self-entrepreneurship. Entrepreneurship has a direct relationship with the economic growth and development. With regard to Nagercoil, the study area, there are many sectors that provide entrepreneurial opportunities to women. Hence the researcher has conducted a study on the topic "A study on Problems and challenges faced by women entrepreneurs" in Nagercoil.

Objectives of the study

1. To know the demographic profile of the entrepreneurs.
2. To find out the problems and challenges faced by the entrepreneurs.
3. To give necessary suggestions for improvement.

Methodology

The present study intends to analyse the problems and challenges faced by women entrepreneurs in Nagercoil. The methodology of the study includes selection of sample, method of data collection and analysis. For this study 50 women entrepreneurs are selected as samples using convenient random sampling technique. Primary data were collected from the sample women entrepreneurs using a well-structured questionnaire. Secondary data were collected from Websites, magazines and Journals.

Review of literature

Singh Surinder Pal, (2008) in his study identified the reasons and influencing factors behind entry of women in entrepreneurship. According to him the obstacles for the growth of women entrepreneurship are lack of interaction with successful entrepreneurs, social un-acceptance as women entrepreneurs, family responsibility, gender discrimination, missing network, low priority given by bankers to provide loan to women entrepreneurs. He suggested

the remedial measures like promoting micro enterprises, unlocking institutional frame work, projecting and pulling to grow and support the winners etc.

Meenu Maheshwari, Priyasodani (2015) presented a paper on Women Entrepreneurship. The purpose of this paper was to look at the literature around women entrepreneurship in general. Lack of access to finance, technological constraints, environmental and societal issues, insufficient supply of labour and tax policies are providing a restrictive environment in which women entrepreneurs are finding it difficult to succeed, despite having clear motivations and goals.

Mala Mahanta (2016) found in her research on "Importance and challenges of women entrepreneurs" that development of entrepreneurship among women leads to greater empowerment of women. At present, women are coming to start their business in both traditional and non - traditional activities with support from their family, society, banks and government. Infrastructure facilities like power supply, building, space, family problems, lack of recognition and appreciation, non - availability of skilled manpower, lack of skill and financial support, adequate marketing are the major challenges for women.

Data Analysis and Interpretation

Table: 1
Demographic Profile

Sl. No.	Variables	Particulars	Number of Respondents	Percentage
I	Age	18-25	21	42
		26-35	10	20
		36-50	11	22
		Above 50	8	16
		Total	50	100
II	Educational qualification	HSC	13	26
		UG	17	34
		PG	7	14
		Professional	13	26
		Total	50	100
III	Marital Status	Married	29	58
		Unmarried	21	42
		Total	50	100

Majority of the respondents belong to 18-25 age category and most of the respondents are qualified with UG degree. More than 50 percent of the respondents are married.

Motive behind starting the business

There will be some motivating factors that trigger the women to take decision to become

an entrepreneur. Therefore, it is necessary to analyse these factors. The factors motivating the respondents to start a business is given in Table 2

Table 2

Motive behind starting the business

Motivating factor	No. of respondents	Percentage
Status	3	6
Passion	12	24
Livelihood	6	12
Ambition	12	24
Government Subsidy	1	2
Independence	11	22
Market opportunities	2	4
Others	6	12
Total	50	100

Source: Primary data

The table 2 shows that “Passion and Ambition” to start business is a motivating factor to 24 per cent of the respondents and “Government subsidy” is the motivating factor to 2 per cent of the respondents. So, it is understood that majority of the respondents are motivated by “Passion and Ambition” to start a business.

Source from where women entrepreneurs borrow money

Money is the life of blood of any business. No single business can survive without making investment. Availability of finance is an important prerequisite for establishing any entrepreneurial activity. Table 3 shows the source from where the respondents raise finance.

Table 3

Source from where women entrepreneurs borrow money

Source	No. of respondents	Percentage
Friends and Relatives	21	42
Private money lenders	8	16
Loan from commercial banks	17	34
Loan from development banks	4	8
Total	50	100

Source: Primary data

The Table 3 shows that 42 per cent of the respondents borrow money from friends and relatives, 16 per cent of the respondents borrow money from private money lenders, 34 per cent of the respondents borrow money from commercial banks and 8 per cent of the

respondents borrow money from Development banks. This infers that majority of the respondents borrow money from friends and relatives.

Problems faced by women entrepreneurs while applying for loan

While applying for loan women may face lot of problems. This is shown these in Table 4

Table 4

Problems faced by the respondents while applying for loan

Problems	No. of respondents	Percentage
Lack of proper security	13	26
Lack of convincing power	8	16
Lack of proper knowledge	12	24
Others	17	34
Total	50	100

Source: Primary data

The Table 4 shows that “Lack of proper security” is the major problem faced by 26 per cent of the respondents, “Lack of convincing power” is the major problem faced by 16 per cent of the respondents, “Lack of knowledge” is the major problem faced by 24 per cent of the respondents.

The sector women entrepreneurs are doing business

There are many sectors that provide employment opportunities. Of them, the sector that provides employment in large is depicted in table 5

Table 5

The sector women entrepreneurs are doing business

Sector	No. of respondents	Percentage
Manufacturing	23	46
Service	16	32
Others	11	22
Total	50	100

Source: Primary data

Table 5 clearly shows that 46 per cent of the respondents are doing business in Manufacturing sector, 32 per cent of the respondents are doing business in service sectors and 22 per cent of the respondents are doing business in various other sectors.

Sources of finance selected by women entrepreneurs to solve their financial problem

Women entrepreneurs face lot of financial problems in their business field and they try to solve their financial problems in many ways. Table 6 shows how they solve their financial problems.

Table 6
Sources of finance

Source	No. of respondents	Percentage
Bank loan	14	28
Family support	21	42
Private money lenders	13	26
Others	2	4
Total	50	100

Source: Primary data

Table 6 shows that 28 per cent of the respondents solve their financial problem by borrowing money from banks, 42 per cent of the respondents solve their financial problems by borrowing money from family members, 26 per cent of the respondents solve their problems by borrowing money from private money lenders and 4 per cent of the respondents solve their financial problems by other sources.

Reason for the inability to survive in the business field by women

Even though an entrepreneur has all capacities, there are some difficulties that always stand on the way. There are some difficulties that affect the growth of entrepreneurship. The reasons for the inability to survive in business field is given in table 7.

Table 7
Reason for the inability to survive in the business field by women

Reasons	No. of respondents	Percentage
Family problem	10	20
Financial problem	15	30
Negative socio-cultural attitude	8	16
Lack of self confidence	9	18
Lack of support from the family	8	16
Total	50	100

Source: Primary data

Table 7 shows that 30 per cent of the respondents are unable to survive in the business field because of “Financial problems”, 20 per cent of the respondents are unable to survive in the business field because of “Family problems” and 16 per cent each of the respondents are unable to survive in the business field because of “Negative socio cultural attitude” and “Lack of support from the family” respectively, majority of the respondents are unable to survive in the business field because of “Financial issues”.

Challenges women entrepreneurs have experienced

The challenges and opportunities available to the women of digital era are growing rapidly that the job seekers are turning into job creators. Table 8 shows the challenges faced by women entrepreneurs.

Table 8
Challenges women entrepreneurs have experienced

Challenges	Garrett means score	Rank
Gender perspective	38.9	V
Family issues	60.7	I
Fear of failure	48	III
Lack of financial support	60.5	II
Lack of confidence	41.8	IV

Source: Primary data

Table 8 shows that “Family issues” ranked first with the mean score of 60.7, “Lack of financial support” ranked second with the mean score of 60.5 and “Gender perspective” ranked fifth with the mean score of 38.9. So, it is clear that Family issue is the major challenge faced by women entrepreneurs.

Challenges faced by women entrepreneurs during the start-up phase

Every start up founder knows from the outset that they have to face various challenges. This table shows the challenges faced by women entrepreneurs during the start-up phase.

Table 9
Challenges faced by respondents during the start-up phase

Challenges	No. of respondents	Percentage
No obstacles	4	8
Doubt of self confidence	9	18
Financial issues	24	48
Lack of information	11	22
Combining domestic and business life	2	4
Total	50	100

Source: Primary data

Table 9 shows that the main challenge for 48 per cent of the respondents is “Financial issues” while starting their business, and for 22 per cent of the respondents the challenge is “Lack of information” and for 4 per cent of the respondents the “Combining domestic and

professional life” is the challenge faced by them.

Present status of the business

Status is an accepted or official position, especially in a social group. Table 10 shows the current status of women entrepreneurs.

Table 10
Present status of the business

Status of the business	No. of respondents	Percentage
Its blooming	13	26
Running normally	15	30
Good enough to survive	20	40
Undergoing loss	2	4
Total	50	100

Source: Primary data

Table 10 shows that 40 per cent of the respondents said that their business is good enough to survive, 30 per cent of the respondents said that their business is running normally and 4 per cent of the respondents said that their business is undergoing loss.

Suggestions

Based on the findings of the study, the following suggestions are made which can help the women entrepreneurs.

- Due to family issues many of the respondents are hesitated to start their business, so the family members of women entrepreneurs should come forward to support the women to achieve their goal.
- Steps may be taken to make the family members aware of the potentialities of women and their dual role in society. At the same time negatives social attitude towards women should be changed.
- Guidance cell for women entrepreneurs can be set up to handle the problems of women entrepreneurs.
- Housewives should be motivated to learn the technique of earning additional income.
- Better educational facilities and schemes should be extended to women folk by the government.
- Adequate training program on management skills can be provided to the women community.
- Encourage women's participation in decision-making.

Conclusion

Entrepreneurship among women, no doubt improves the wealth of the nation in general and of the family in particular. Women today are more willing to take up activities that were once considered the sole right of men, and have proved that they are shining like men with respect to contribution to the growth of the economy. Women entrepreneurship must be molded properly with entrepreneurial traits and skills to meet the changes in trends, challenges global markets and also be competent enough to sustain and strive for excellence in the entrepreneurial area.

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Digitalisation Transformation: How It Impact Banking Employees in Kanyakumari

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ABSTRACT

The goal of this study is to determine how impact of digitalisation and other factors, such as Important Skills, Impact of Digitalization, Skills to perform in Digitization and changes after Digitalization are related to these factors. The authors used convenient sampling technique, structured survey instrument, 64 respondents from bank employees of private and public sector banks were surveyed, and the data were analysed after checking the instrument's psychometric properties by performing t-test analysis and garret rank. SPSS tools for analysis. Paperless transaction help to do the work faster has been changed after digitalization and Cyber Security knowledge should be development more for bank employees. Self-report measures, like all survey studies, suffer from common technique bias and social desirability bias. However, the authors have taken sufficient precautions to minimise these restrictions. This study contributes to both practicing bank employees and the literature on digitalization banking. This study provides a new light to Impact of Digitalisation in bank.

Keywords: Digitalization, Banking and Employee.

Introduction

The recent wave of Digitalization has generated an intense debate among economists, and attracting both strong supporters and opponents. On 14th august 1991, the Government of India (GOI) appointed a committee headed by Mr.M.Narashimham to suggest the modus operandi for reforms of the banking Sector. Digitalization means the transformation of data and information into digital structure with the reception of innovation. Now in day-to-day life most of the people in over country has smart phones and smart gadgets, and they have great knowledge about technology. In Digital society, the banking sector has been passing through a massive transformation due to growing economic reform and technology. Digitalization concept is given end-to-end service online through mobile, Tablets and the Internet. Traditional Banking operations include voucher posting, accounting, and consolidating the general ledger in manual, but after digitalization the works are done by using digital mode.

Statement of the Problem

After the banking sector underwent a rapid digital transformation characterised by the widespread adoption of technology-driven solutions and cutting-edge digital services, there is an increasing need to thoroughly research and comprehend the complex effects of digitalization

on banking employees. To understand how banking employees feel about the transition from traditional to digital banking. The researcher is motivated to select the title “Digitalisation Transformation: How It Impact Banking Employee in kanyakumari”.

Research Gap

While many studies have looked into how digitalization is affecting the banking industry and its customers, there is still a substantial knowledge vacuum regarding the complex effects of digitalization on banking workers. Even though this topic has been briefly touched upon in several research, a thorough study is required to fill in the information gaps that currently exist. So to fulfil this gap I am going to study about Digitalisation Transformation: How it Impact Banking Employees in Kanyakumari

Objectives

- To explore the digitalization in the banking sector in India.
- To study the Impact of digitalization on banking employees

Research Methodology

The study is indented to understand the digital transformation in banking employees. For this, 64 bank employees accessing digital banking were selected in the kanniyakumari using a convenient sampling technique. The primary data were collected through interview and secondary data from secondary sources is collected from Journals, websites, and bank data.

REVIEWS of Literature

Arunangshu in his paper focuses on the digitalization of the rural banking system in India. Digital banking systems have enormous potential to change the landscape of financial inclusion. They found that with the features of low cost, ease of use of digital banking can accelerate the integration of the unbanked economy to the maintenance

Jeevanandham depicts, the impact of digitalization on the Indian banking sector among 50 samples of males and females in the Dindigul. This paper covers the implications of the digitalization exercise for banks and their customers, the convenience sampling method for collecting data. The study found that lack of education leads to ignorance of digital banking. After digitalization people can check their bank account details, pay their bills Online, and transfer money to other accounts. All these things can happen only through education.

Rajeshwari in his research paper found that digital banking increases the expectations of customers from banks. With the help of secondary data, they analyze that digital banking become a milestone in Indian banking system. It enhances the growth and progress of the Indian banking. It found that due to digital banking the operating cost of banks has been reduced

rapidly. Lower operating cost means more profits for the banks. According to him, digital banking has the power change the banking structure.

Digital Payments in India

The Reserve Bank of India (RBI) installed its first computer in 1968, and a larger one in 1979. But the United Commercial (UCO) Bank, the Standard Chartered Bank, Lloyds' Bank, Grindlays, and others had installed accounting and other machines before 1966. Operations such as payrolls had been computerized fairly early on. Some head offices began to use computers by the beginning of the 1980s. Instead of increasing the bookkeeping and MIS (Management Information System).

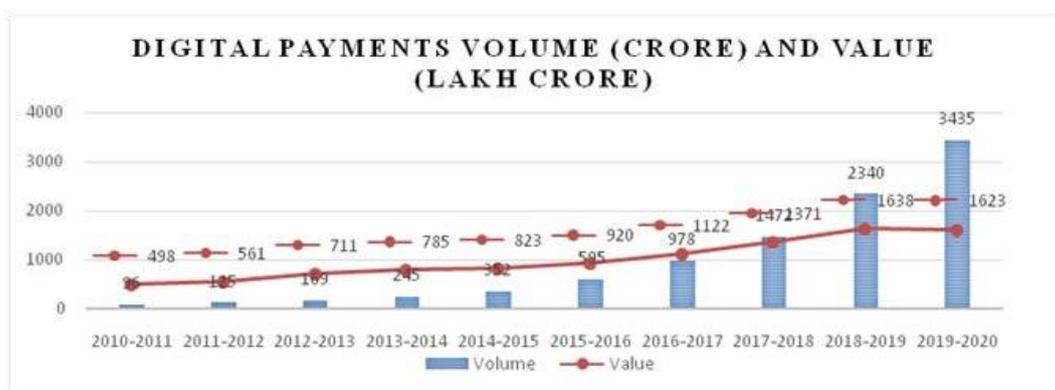
The SBEI Committee was constituted by the Reserve Bank of India in September 1988 to draw up a perspective plan for computerisation in banks, during 1990-94, and to consider other allied issues. The Committee was headed by Dr. C. Rangarajan, Deputy Governor, Reserve Bank of India, and had members drawn from Government and banks as well as financial, software/hardware, and training institutions. The Committee appointed a Technical Group to assist it in its deliberations. The Group was headed by Dr. S. Ramani, Director, NCST, with members from RBI, DOE, MTNL, NIBM, IIM, Consultants, and banks.

Digital Payment Methods

Banking Cards (Debit/ Credit/ Cash/ Travel/ Others), Unstructured Supplementary Service Data (USSD), Aadhaar Enabled Payment System (AEPS), Unified Payments interface (UPI), Mobile Wallets, Banks Pre-Paid Cards, Point of Sale, Internet Banking and Mobile banking and Mirco ATM.

Digital Payments Volume and Value (2010-2020)

Fig:1



Source (RBI data)

Fig 1 shows the growth of digital payment from 2010-2020. In 2010-2011 Digital payment was only 96 Crore but in 2020 it was 3435 Crore it's was massive growth.

Data Analysis and Interpretation

Table 1
Demographic Profile of Respondents

Variables	Parameters	Frequency	Percentage
Gender	Male	36	56
	Female	28	44
	Total	64	100
Age	Below 30	14	22
	31-40	16	25
	41-50	26	40
	Above 51	8	13
	Total	64	100
Designation	Assistant Manager	12	19
	Branch Manager	18	28
	Cashier	21	33
	Clerk	13	20
	Total	64	100
Education	SSLC	13	20
	UG	18	28
	PG	16	25
	Professional	17	27
	Total	64	100
Bank Name	Canara Bank	10	16
	IDBI	14	22
	Karur Vysya Bank	13	20
	SBI	15	23
	Union Bank of India	12	19
	Total	64	100

(Source: Primary data)

Table 2
Impact of Digitalization

Particulars	Yes	No
Way of working easier after digitalization	64	0
Digitalization has changed the way of working of employees	64	0
Digitization has great impact on banking sector	64	0
Employment trends in banking has changed after digitalization	58	6

(Source: Primary data)

Table 2 revealed that 64 respondents given yes to the impact of digitalization as way of working easier after digitalization, digitalization has changed the way of working of employees and

digitization has great impact on banking sector. Only 6 respondents have given no for employment trends in banking have changed after digitalization.

Table 3
Skill to perform in Digitization

Particulars	No. of Responses	Percentage
High demand for a digital specialist	9	19
Increased in data driven decision making	4	6
Compliance handling talent	15	23
All the above	35	52
Total	64	100

(Source: Primary data)

Table 3 show that 52 per cent of respondents given preference to all the above has great impact on banking employment, 23 per cent respondent give preference to Compliance and security handling talent, 19 per cent respondent give preference to digital specialist and 6 per cent of respondents given preference to Increased in data driven decision making.

Table 4
Important Skills needed after Digitization

SI No.	Variables	Mean Score				Total	Rank	F-Statistics	Sig
		Below 30	31-40	41-50	Above 51				
1	Cyber Security	5	4.5	3.88	3.25	4.45	I	50.02	.000
2	Cloud Computing	3.64	3.87	3.84	4	3.82	IV	1.66	.202
3	Managing Risk in the Digital	4	3.81	3.84	4	3.89	III	.03	.848
4	Data Visualisation	5	3.56	4.53	5	4.20	II	.88	.350
5	Learning Technology	3	3.06	4.26	5	3.78	V	77.64	.000
Average Score		3.76	4.07	4.25	4.03				

(Source: Primary data)

*-Significant at one per cent level

It is observed from the table 4 that among the 5 variables identified, “Cyber Security” is the most important variable that is expected by the employees which is ranked first with the mean score of 4.45, followed by the variable “Data Visualisation” which is ranked second with the mean score of 4.20,”Data Visualisation”, and “Data Visualisation” have been given third and

fourth ranks with the mean source of 3.89, 3.82 respectively. The last important need after digitalisation is to “Learning Technology” which is ranked fifth with the mean score of 3.78

Table 5
Variables changed after Digitalization

SI. No.	Variables	Garret Mean	Rank
1	Helping in reducing work stress level	51.10	III
2	Paperless transaction help to do the work faster	52.92	I
3	Increased interest in work	52.37	II
4	Do work more efficiently	46.60	IV
5	Increased job Satisfaction	45.98	V

(Source: Primary data)

It is evident from the table 1.5 reveals that out of five identified Variables that changed after digitalization “Paperless transaction help to do the work faster” is the most import factor which is ranked first with the mean source of 52.92. The Variable “Increased interest in work” is ranked second with the mean source of 52.37 followed by the Variables “Helping in reducing work stress level”, “Do work more efficiently” and “Increased job Satisfaction” with the mean source of 51.10, 46.60, 45.98 are ranked third, fourth and fifth respectively by the sample respondents.

Findings

The major finding of the study is stated as blow:

- Out of 64 respondents 100 per cent have given digitalization changed their way of working, made it easier and it has a great impact in banking sector. Only 6 respondents have given no for employment a trend in banking has changed after digitalization.
- 52 per cent of respondents give preference to all the above has a great impact on banking employment, 23 per cent of respondents give preference to Compliance handling talent, 19 per cent of respondents give preference to Digital specialist and 6 per cent of respondents given preference to data is increasing Increased in data driven decision making.
- Out of 64 respondents the important skills needed after Digitalization among below 30 and above50 age group has significant difference have been identified in the case of two variables Data Cyber Security and Data Visualisation, since their respective ‘f’ statistics at one per cent level.
- Out of five identified variables that changed after digitalization “Paperless transaction help to do the work faster” is the most impact factor which is ranked first with the mean source

of 52.92. The Variable “Increased interest in work” is ranked second with the mean source of 52.37 followed by the Variables “Helping in reducing work stress level”, “Do work more efficiently” and “Increased job Satisfaction” with the mean source of 51.10, 46.60, 45.98 are ranked third, fourth and fifth respectively by the sample respondents.

Suggestions

- Create thorough training programmes that address compliance, digital skills, and data security, and provide staff with the freedom to specialise in certain areas based on their preferences.
- Create specialised training courses in data cyber security and data visualisation to meet the demands of workers under the age of 30 and over the age of 50, maximising skill growth in these important areas for both age groups.

Conclusion

Post-independence lot of changes have been happened in India in all the sector, like banks also developed an in massive level, first in banking process there was only were vouching methods and a ledger for the banking process. Day by day it got changed and in 1990^s banking process digitalization has been introduced in India. In 1998 E-banking has been started then in 2003 multi-channel integration and Omni channel and now the internet of everything. Electronic banking is a modern technology offered by banks to their customers so that they can conveniently conduct their banking transactions at a time that suits them and can access their bank account 24 hours a day and 7 days a week. During the pandemic period digital banking was so useful. Banking employee’s works is also done easily after digitization, so they are happily doing their work and the stress level of the employees is also reduced and due to that employees are satisfied with the job. If the “Employees in the banks are happy the customers who come to the bank also happy”. Banks plays an important role in Indian economy.

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A Study On Customer's Satisfaction Towards Google Services With Reference To Chennai City

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ABSTRACT

Google LLC is an American multinational technology company that specializes in Internet-related services and products, which include online advertising technologies, search engine, cloud computing, software, and hardware. It is considered one of the Big Four technology companies, along with Amazon, Apple and Face book. More than 70 percent of worldwide online search requests are handled by Google, placing it at the heart of most Internet users' experience. Its headquarters are in Mountain View, California. Google has become one of the fastest growing networks among today's generation. A project or assignment without Google's involvement has become impossible for students. In our country, Android phones are used highly compared to iPhone and these android based phones are completely controlled by Google Services likely Google play store, Google maps, Google play music etc. Therefore, Google plays a very important role in our day-to-day life. And these services are highly used by IT employees compared to us. Though Google holds lot of merits but it has some unspoken barriers which set it back. Google plays a very important role in our day-to-day life. And these services are highly used by IT employees compared to us. Though Google holds lot of merits but it has some unspoken barriers which set it back. So, this study is made on understanding the customer satisfaction level towards Google's well-known services. The study has been made to find out the customer's satisfaction towards Google's services with special reference to Chennai City. The most popular applications provided by Google are Map and YouTube. YouTube holds a wide number of celebrities and it even helped many people in increasing their passion. But to catch a promissory position in future world, Google must try to introduce most attractive and easily accessible services to its customers. This study is carried out on the basis of both primary and secondary sources. The total number of samples is 50 IT people and they were selected in the area of Chennai city. The relevant data were collected through online questionnaire through Google drive. The researcher used the method of convenient sampling technique.

Keywords: Google, Services, Information Technology, Employees, Search engine

Introduction

Google was founded in 1998 by Larry Page and Sergey Brin while they were Ph.D. students at Stanford University in California. Together they own about 14 percent of its shares and control 56 percent of the stockholder voting power through super voting stock. They incorporated Google as a privately held company on September 4, 1998. An initial public offering (IPO) took place on August 19, 2004, and Google moved to its headquarters in Mountain View, California, nicknamed the Google plex. In August 2015, Google announced

plans to reorganize its various interests as a conglomerate called Alphabet Inc. Google is Alphabet's leading subsidiary and will continue to be the umbrella company for Alphabet's Internet interests. Sundar Pichai was appointed CEO of Google, replacing Larry Page who became the CEO of Alphabet. Google.com is the most visited website in the world. Several other Google services also figure in the top 100 most visited websites, including YouTube and Blogger. Google is the most valuable brand in the world as of 2017, but has received significant criticism involving issues such as privacy concerns, tax avoidance, antitrust, censorship, and search neutrality. Google's mission statement is "to organize the world's information and make it universally accessible and useful", and its unofficial slogan was "Don't be evil" until the phrase was removed from the company's code of conduct around May 2018. Information Technology in India is an industry consisting of two major components: IT services and business process outsourcing (BPO). The sector has increased its contribution to India's GDP from 1.2% in 1998 to 7.7% in 2017. The United States accounts for two-thirds of India's IT services exports.

Statement of the problem

Google has become one of the fastest growing networks among today's generation. Google plays a very important role in our day-to-day life. Now a days a project or assignment without Google's involvement has become impossible. In our country, Android phones are used highly compared to iPhone and these android based phones are completely controlled by Google Services likely Google play store, Google maps, Google play music etc. And these services are highly used by IT employees compared to us. Though Google holds lot of merits but it has some unspoken barriers which set it back. So, this study is made on understanding the customer satisfaction level towards Google's well-known services. The study has been made to find out the customer's satisfaction towards Google's services with special reference to Chennai City.

Objectives of the study

- To find out the effects of Google services in our day-to-day life.
- To analyse the usage of Google among IT employees.

Methodology

This study is carried out on the basis of both primary and secondary sources. Primary data were collected by means of systematically prepared questionnaire in Google drive. Secondary data has been collected from various Books, Journals, Thesis and Websites.

Sampling design

Study is descriptive and analytical. It is descriptive in the sense it exists at present and it includes facts and findings. It is analytical in the sense it involves analysis of the collected data and information. The total number of samples is 50 IT people and they were selected in the area of Chennai city. The relevant data were collected through online questionnaire through Google drive. The researcher used the method of convenient sampling technique. Convenient sampling comes under the non- probability sampling method, which means, it does not provide equal opportunity to all the IT people in Chennai city.

Analysis and interpretation

Experience of the respondents

Experience always makes a person perfect. Experience in the field of work always increases the competency and the level of performance. So here the experience plays a very important role in knowing customer's viewpoint on the services of Google. The experience level of the sample respondents is given in Table 1.

Table 1
Experience of the Respondents

Experience	No. of respondents	Percentage
1-5 years	19	38
5-10 years	10	20
10-20 years	19	38
Above 20 years	2	4
Total	50	100

Source: primary data

Table 1 shows that 38 per cent of the sample respondents are having 1-5 years and 10 -20 years of experience, 20 per cent are having 5-10 years and 4 per cent of samples respondents are having above 20 years' experience. So, it can be said that, mostly Google services are used by the people with less experience.

Gadgets used by respondents

The usage of any service by the customers directly or indirectly depends upon the source they have with them. So, the gadgets used by the sample respondents are given below in Table 2.

Table 2
Gadgets used by Respondents

Gadgets	No. of respondents	Percentage
Tablet	7	14
Smart watch	3	6
Smartphone	24	48
Laptop	16	32
Total	50	100

Source: primary data

Table 2, it shows that 48 per cent of the sample respondents use Smartphones, 32 per cent of them use Laptop, 14 per cent of them use Tablet and only 6 per cent of the respondents use Smartwatch. So, it clearly proves that respondents who use smartphone and laptop use Google services to the maximum.

Effects of google service among respondents

The services offered by Google have offered many types of services to the IT employees. They have answered to its Merits and inefficiencies, in terms of Time, Energy, and Money etc. the following table will present you with the required details:

Table 3
Effects of google service among respondents

Particulars	Yes	No	Maybe
Time	35(70%)	5(10%)	10(20%)
Energy	30(60%)	5(10%)	15(30%)
Any charge	8(16%)	34(68%)	8(16%)
Easy Accessibility	50(100%)	-	-
Multitasking	41(82%)	5(10%)	4(8%)
Secured Transaction	20(40%)	8(16%)	22(44%)
Relevant results	13(26%)	37(74%)	-

Table 3 clearly signifies that 70 per cent of the sample respondents agree that their Time consumption have been reduced due to Google's services, 60 per cent of the respondents agree that their energy consumption on work have been reduced due to Google's services, 68 per cent

of the respondents say that they don't pay any kind of charges for the Google's services used by them, 100 per cent of the sample respondents agree that they have an Easy accessibility towards Google's services, 82 per cent of the respondents agree that their multitasking capability have been increased due to Google's services, 44 per cent of the respondents say that maybe Google's service-based transactions are secured, and 74 per cent of the sample respondents complain that Google search engine does not provide relevant result.

Usage of google services

Google and its services play an important role in our day to day life. In case of IT industry; it plays a very important role. The following table shows its importance among IT employees.

Table 4

Answer	No. of respondents	Percentage
YES	36	72
NO	6	12
MAYBE	8	16
Total	50	100

Source: primary data

In the Table 4, 72 per cent sample respondents agree that Google plays a very important role in their day to day life.

Usage of search engine

Google search engine is widely used for every purpose. And how many times it is used by IT employees at their workplace is represented in the following table.

Table 5

Usage of search engine

Usage	No. of respondents	Percentage
2-3 times	6	12
3-6 times	13	26
More than 6 times	26	52
I don't use at all	5	10
Total	50	100

Source: Primary data

In the table, 52 per cent of the respondents use Google's Search engine for more than 6 times in a day at their workplace, 26 per cent of the respondents say that they use nearly 3-6 times in a day, 12 per cent use 2-3 times in a day and 10 per cent say that don't use at all.

Opinion regarding the services of google

Ranking plays a very important role while considering an opinion. So here the ranking has been allotted to the Google applications as per the opinion given by the sample respondents.

Table 6
Opinion regarding the services of google

Applications	Highly Satisfied	Satisfied	Neutral	Dis satisfied	Highly Dis satisfied	Total	Mean score	Rank
Google Maps	37 (185)	10 (40)	3 (9)	–	–	234/50	4.68	I
Google Chrome	35 (175)	12 (48)	3 (9)	–	–	232/50	4.64	II
YouTube	30 (150)	20 (80)	–	–	–	230/50	4.6	III
Google Play	29 (145)	12 (48)	6 (18)	2 (4)	1 (1)	216/50	4.32	IV
Gmail	21 (105)	19 (76)	9 (27)	1 (2)	–	210/50	4.2	V
Google Drive	13 (65)	25 (100)	7 (21)	–	5 (5)	191/50	3.82	VI
Google cloud	4 (20)	18 (72)	15 (45)	6 (12)	7 (7)	156/50	3.12	VII
Google Business	3 (15)	6 (24)	16 (48)	7 (14)	18 (18)	119/50	2.38	VIII
Google Duo	2 (10)	8 (32)	22 (66)	10 (20)	8 (8)	136/50	2.72	IX
Google Plus	1 (5)	6 (24)	13 (39)	10 (20)	20 (20)	108/50	2.16	X

Sources: Primary data

Table 6 depicts that Google maps hold first rank with the mean score of 4.68. Google Chrome holds second rank with the mean score of 4.64. YouTube holds third rank with the mean score of 4.6 and Google plus holds the 10th rank with mean score of 2.16. Therefore, the ranking clearly represents the importance of Google maps in our day to day life.

Suggestions

The suggestions proposed here are mainly based on the measures suggested by the sample respondents. Suggestion only makes a chance for the growth of any business. Hence the researcher suggests the following as important suggestions for this study.

- The YouTube trending section must have worldwide videos.

- Tracking of user's location must be chosen by them itself.
- YouTube videos should have a smaller number of advertisements.
- The user's search history must be deleted permanently as per the request of the concerned person.
- Unsecure websites must be blocked.
- The security must be strengthened (non-hackable).

Conclusion

Now-a-days there are number of service providers in internet. In the present time, each and every people in the world are using internet at high scale and depended over it for their own purposes. Google plays an important role in our day-to-day life and Google is the biggest service provider in the Internet. The most popular applications provided by Google are Map and YouTube. YouTube holds a wide number of celebrities and it even helped many people in increasing their passion. But to catch a promissory position in future world, Google must try to introduce most attractive and easily accessible services to its customers. These suggestions bound to pave the way for greater success.

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Factors Influence for the Adoption of Green Banking Practices of Commercial Banks in Thiruvananthapuram District

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ABSTRACT

The main aim of the study is to know the factors behind for the adoption of green banking practices of commercial banks and identify the relationship between factors influencing the adoption of green banking practices and demographic profile of employees. Banks can play a crucial role in ensuring environmentally sustainable and socially responsible investments in the economy. It is at the interest of the banks to practice green banking and thereby avoiding the aforesaid risks involved in the banking sector. Thus, now a days, banks are gradually coming to realize that there is an immediate need for a shift from 'profit, profit and profit' motive to 'planet, people and profit orientation' for sustainable development in the long-run. In this context, an attempt has been made to study the factors influence for the adoption of green banking practices of commercial banks in Thiruvananthapuram District. The research was undertaken on the basis of data collected from both primary and secondary sources. The primary data were collected from employees who are working in commercial banks with the help of questionnaire. Survey method has been followed for the study. The simple random sampling method has been selected for the purpose of this study. It is found that reputational risk and credit risk are the important nature of problems faced while operating with green banking among the bank employees who are Manager. The study discloses that start-up face and reputational risk are the important nature of problems faced while operating with green banking among the employees who are executives.

Keywords: *Green banking practices, Commercial Banks, Gain energy efficiency and Employees*

Introduction

Green banking practices are the new innovation the field of banking sector. Green banking pertains to the business of banking sector were managed in a most significant manner that helps for the overall diminution of external carbon emission and internal carbon footprint. Green banking not only promotes environmental sustainability but also the social responsibility. Green Banking covers both internal and external aspects. Internal in rappings of its day by day working i.e. paperless banking which includes use of newer technologies to save the paper and so the environment. Replacing daily courier services with scans and electronic deliveries, electronic transfer of salary and reimbursements, implementation of the online banking system, use of ATM's for cash withdrawals and deposits, e-statements of accounts,

electronic fund transfer through RTGS can lead to an increase in customer convenience, reduction in costs incurred by the banks and an improvement in the banking performance. External aspect of Green Banking includes change in the habit of its industrial customers to protect and sustain the environment.

Statement of the Problem

Innovation refers to introducing something new in the economy. Green banking is a new term to the banking sector as well as to the customers. At the introduction stage of this system faces lot of problems like lack of awareness of employees. This problem creates a hindrance to the installation process. However it is very good and very effective and approvable to the sector for the protection of the environment. It is an eco-friendly system so everyone can accept it with pleasure. Extremely it is a new concept so the people are not too much aware about these practices adopted by the banking sector.

Banks in India are playing a vital role towards sustainable development by introducing various green banking practices. Adoption of these green banking practices by the customers will result savings of energy, fuel, paper and other natural resources. During their day to day business banks heavily contributes towards the carbon emission in terms of use of paper, electricity, stationary, lighting, air conditioning, electronic equipment, etc. even though this is moderate compared to other carbon sensitive industries like steel, oil and gas, etc. In the case of banks, the direct interface with the environment has considerably increased due to rapid growth of the banking industry. Being a major source of fund provider, banks can play a crucial role in ensuring environmentally sustainable and socially responsible investments in the economy. It is at the interest of the banks to practice green banking and thereby avoiding the aforesaid risks involved in the banking sector. Thus, now a days, banks are gradually coming to realize that there is an immediate need for a shift from ‘profit, profit and profit’ motive to ‘planet, people and profit orientation’ for sustainable development in the long-run. In this context, an attempt has been made to study the factors influence for the adoption of green banking practices of commercial banks in Thiruvananthapuram District.

Objectives of the Study

- i) To identify the nature of problems faced by employees while operating with green banking
- ii) To identify the relationship between factors influencing the adoption of green banking practices and demographic profile of employees

Hypotheses

Null Hypothesis (H_0) : “There is no significant association between the age group of the sample employees and factors influencing the adoption of green banking practices”.

Null Hypothesis (H_0) : “There is no significant association between the marital status of the sample employees and factor influencing the adoption of green banking practices”

Methodology

The research was undertaken on the basis of data collected from both primary and secondary sources. The primary data were collected from employees who are working in commercial banks with the help of questionnaire. Survey method has been followed for the study. Questionnaires were constructed to collect primary data from the employees who are working in commercial banks. The secondary data were collected from the reports of the commercial banks, related agencies, seminars, workshops, proceedings, magazines, journals, and websites etc.

Sampling Design

The simple random sampling method has been selected for the purpose of this study. There are 3402 public sector commercial banks branches in Kerala, 459 public sector commercial banks branches and 12 public sector commercial banks located in Thiruvananthapuram District. Among them only 5 public commercial banks are taken for the study. These five public sector commercial banks have 370 branches in total, 50 percent of the branches are taken for the study and only one employee is taken from each branch for analysis (i.e., 185 employees).

Table 1

Sample public sector commercial bank branches taken for the study

Sl. No	Name of the Bank	No. of Branches	No. of Branches Taken	Sample Employees Taken
1.	State Bank of India	154	77	77
2.	Canara Bank	90	45	45
3.	Union Bank of India	54	27	27
4.	Indian Overseas Bank	43	21	21
5.	Indian Bank	29	15	15
	Total	370	185	185

Source: Secondary data: Lead Bank, Thiruvananthapuram

Analysis and Interpretation

Association between age group of the sample employees and factors influencing the adoption of green banking practices

To find out the association between age group of the sample employees and factors influencing the adoption of green banking practices, analysis has been made with the following null hypothesis.

Null Hypothesis (H_0) : “There is no significant association between the age group of the sample employees and factors influencing the adoption of green banking practices”.

To test the above null hypothesis, one way ANOVA test has been used and the result is presented in the following table.

Table 2
One Way ANOVA for Factors influencing the adoption of green banking practices based on Age group of Employees

Factors	Age group	Sum of Squares	df	Mean Square	F	Sig.
Environment Factor	Between Groups	537.802	5	107.560	5.359	.000
	Within Groups	12525.069	179	20.072		
	Total	13062.871	184			
Economic Factor	Between Groups	821.931	5	164.386	6.028	.000
	Within Groups	17017.410	179	27.271		
	Total	17839.341	184			
Policy Guideline Factor	Between Groups	25.348	5	5.070	.706	.619
	Within Groups	4478.341	179	7.177		
	Total	4503.689	184			
Legal Factor	Between Groups	210.714	5	42.143	3.314	.006
	Within Groups	7908.960	179	12.715		
	Total	8119.674	184			

Source: Computed Data

The ANOVA test shows that there is a statistically significant relationship between age group of the employees and environment factor influencing the adoption of green banking practices. Therefore, **H_0 is rejected** (p -value $0.000 < 0.05$) at 5% level of significance. That is the sample employees differ significantly in the environment factor influencing the adoption of green banking practices when they are classified based on their age group. Hence it is inferred that the environment factor influencing the adoption of green banking practices is differ among the different age group of the employees in the study area.

The ANOVA test shows that there is a statistically significant relationship between age group of the employees and economic factor influencing the adoption of green banking practices. Therefore, **H₀ is rejected** (p-value $0.000 < 0.05$) at 5% level of significance. That is the sample employees differ significantly in the economic factor influencing the adoption of green banking practices when they are classified based on their age group. Hence it is inferred that the economic factor influencing the adoption of green banking practices is differ among the different age group of the employees in the study area.

The ANOVA test shows that there is a statistically significant relationship between age group of the employees and legal factor influencing the adoption of green banking practices. Therefore, **H₀ is rejected** (p-value $0.006 < 0.05$) at 5% level of significance. That is the sample employees differ significantly in the legal factor influencing the adoption of green banking practices when they are classified based on their age group. Hence it is inferred that the legal factor influencing the adoption of green banking practices is differ among the different age group of the employees in the study area.

The ANOVA test further shows that there is no statistically significant relationship between age group of the employees and policy guideline factor influencing the adoption of green banking practices. Therefore, **H₀ is accepted** (p-value $0.619 > 0.05$) at 5% level of significance. Further it is found that the policy guideline factor influencing the adoption of green banking practices is not varied among different age group of the employees.

Association between marital status of the sample employees and Factor influencing the adoption of green banking practices

To find out the association between marital status of the sample employees and factor influencing the adoption of green banking practices, analysis has been made with the following null hypothesis.

Null Hypothesis (H₀) : “There is no significant association between the marital status of the sample employees and factor influencing the adoption of green banking practices”

To test the above null hypothesis, ‘t’ test has been used and the result is presented in the following table.

Table 3
‘t’ test for Factor influencing the adoption of green banking practices
based on Marital Status of Employees

Factors	Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	p Value
Environment Factor	Equal variances assumed	.860	.354	1.224	.222
	Equal variances not assumed			1.209	.227
Economic Factor	Equal variances assumed	1.000	.318	2.542	.011
	Equal variances not assumed			2.567	.011
Policy Guideline Factor	Equal variances assumed	.246	.620	.709	.479
	Equal variances not assumed			.728	.467
Legal Factor	Equal variances assumed	.003	.960	.910	.363
	Equal variances not assumed			.967	.334

Source: Computed data

The ‘t’ test shows that there is a statistically significant relationship between marital status of the employees and economic factor influencing the adoption of green banking practices. Therefore, **H₀ is rejected** (p-value 0.011 < 0.05) at 5% level of significance. That is the sample employees differ significantly in the economic factor influencing the adoption of green banking practices when they are classified based on their marital status. Hence it is inferred that the economic factor influencing the adoption of green banking practices is differ among the different marital status of the employees in the study area.

The ‘t’ test further shows that there is no statistically significant relationship between marital status of the employees and environment factor influencing the adoption of green

banking practices. Therefore, **H₀ is accepted** (p-value 0.222 > 0.05) at 5% level of significance. Further it is found that the environment factor influencing the adoption of green banking practices is not varied among different marital status of the employees.

The ‘t’ test further highlights that there is no statistically significant relationship between marital status of the employees and policy guideline factor influencing the adoption of green banking practices. Therefore, **H₀ is accepted** (p-value 0.479 > 0.05) at 5% level of significance. Further it is found that the policy guideline factor influencing the adoption of green banking practices is not varied among different marital status of the employees.

The ‘t’ test further highlights that there is no statistically significant relationship between marital status of the employees and legal factor influencing the adoption of green banking practices. Therefore, **H₀ is accepted** (p-value 0.363 > 0.05) at 5% level of significance. Further it is found that the legal factor influencing the adoption of green banking practices is not varied among different marital status of the employees.

Category of job level of Bank Employees and Nature of problems faced while operating with green banking

In order to find the relationship between category of job level of bank employees and nature of problems faced while operating with green banking, ‘ANOVA’ test is used. The hypothesis is framed as follows,

The null hypothesis (H₀) - “**There is no significant difference among different category of job level of bank employees with respect to the nature of problems faced while operating with green banking in Thiruvananthapuram District**”.

The result of ‘ANOVA’ test for nature of problems faced while operating with green banking among different category of job level of bank employees is presented in Table 4.

Table 4

Nature of problems faced while operating with green banking among different category of job level of sample bank employees

Nature of Problems	Category of job level (Mean Score)				F Statistics
	Manager	Executives	Officers	Clerks	
Start-up face	4.1181	4.6818	4.3333	4.0833	3.510*
Higher Operating Cost	4.0551	4.5455	4.3704	4.0794	2.717*
Reputational Risk	4.3622	4.6385	4.6296	4.4167	1.624
Credit Risk	4.2598	4.5159	4.4074	4.2917	0.908
Brand Risk	3.7323	3.8182	4.0741	3.5833	1.740

Source: Primary data

*-Significant at five per cent level

Table 4 discloses that reputational risk and credit risk are the important nature of problems faced while operating with green banking among the bank employees who are Manager as their mean scores are 4.3622 and 4.2598 respectively. It further discloses that start-up face and reputational risk are the important nature of problems faced while operating with green banking among the employees who are executives as their mean scores are 4.6818 and 4.6385 respectively.

Table 4 reveals that Reputational Risk and Credit Risk are the important nature of problems faced while operating with green banking among the employees who are officers as their mean scores are 4.6296 and 4.4074 respectively. Further indicates that Reputational Risk and Credit Risk are the important nature of problems faced while operating with green banking among the employees who are clerks as their mean scores are 4.4167 and 4.2917 respectively. Regarding the nature of problems faced while operating with green banking among different category of job level of bank employees, start-up face and higher operating cost are statistically significant at 5 per cent level.

Suggestions

- ✓ It is found from the study that there is a significant difference between educational qualification of employees and challenges faced by employees while adopting green banking services of commercial banks. It is suggested that the banks may concentrate on different educational qualification of employees regarding challenges faced while adopting green banking services namely start-up face and higher operating cost.

Conclusion

Green Banking is the emerging concept in India; globally it is being accepted on huge level, while Indian banks are still having big way to go. Green Banking may be seriously considered as a solution to the crucial situation of global warming growing due to rapid corrosion of global climatic modifications. On the overall basis, it may be concluded, the concept of Green Banking is a need of an hour looking at the current pollution and harmful effects of Global Warming. At least it will contribute to environmental conservation which makes the citizens' to breath fresh air and stay healthy.

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A Study On Online Consumers’ Buying Behaviour and Electronic Word Of Mouth (eWOM)

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ABSTRACT

Nowadays, social media platforms are widely used by people of all ages for various purposes. However, it is observed that the younger generation is mainly utilizing these platforms for both educational and entertainment purposes. As a result, the study focuses on individuals who use social media for online shopping. The study investigates the consumer online buying behaviour and the positive conversations, also known as eWOM which subsequently influence consumers to make purchase decisions. Compared to traditional advertising costs, Electronic Word Of Mouth (eWOM) is a cost-effective approach that can reach a large audience and earn more profit in a shorter period. This study concentrates on young users of social media. The data were collected from 200 respondents who is involved in online shopping. A Stratified random sampling method is used to collect the data and SPSS 21 is used to analyse the data. The findings of the study shows that there is a strong relationship between eWOM and consumer buying behaviour while purchasing online.

Keywords: *Social media, eWOM, Online shopping, Buying behaviour.*

Introduction

Social media platforms provide people with the opportunity to express their opinions about retailers, products and services through Electronic Word-Of-Mouth (e-WOM). Many of the largest online retailers like Walmart, Amazon, Costco, Home depot enabling customers to leave online reviews of the products they sell. Trust forms the foundation of online shopping and is established through the credibility and reliability demonstrated by E-retailing companies. In traditional brick-and-mortar stores, consumers have the opportunity to examine products, interact with sales people, and assess the overall credibility of the establishment. However, in online transactions, these elements of personal interaction and physical inspection are absent. Reviews, comments, and discussions from customers on the internet can be referred to as Electronic Word of Mouth (eWOM). E-WOM refers to the spread of information, opinions, and recommendations about products, services, or brands through electronic channels such as online reviews, social media platforms, forums, blogs, and other online communities. E-WOM on the internet, such as online consumer reviews, ratings, comments, posts etc. offers some advantages over traditional word-of-mouth. One of the key differences is that E-WOM is measurable since comments and reviews are written and available on websites, making it easier to track and analyze. Furthermore, marketers have more control over certain types of eWOM

messages. For example, in platforms like Amazon.com, marketers can decide whether to allow consumer reviews to be displayed or not. They can also offer specific review formats or guidelines to guide consumers in posting their opinions in a desired way. This level of control provides marketers with opportunities to strategically manage and shape the eWOM surrounding their products or services. By encouraging positive reviews, addressing negative feedback, and guiding the overall sentiment of eWOM, marketers can leverage eWOM as part of their marketing strategies. They can also analyze the content of eWOM messages to gain insights into consumer perceptions, preferences, and areas for improvement. However, it is important to note that while marketers have some control over eWOM, it is ultimately a dynamic and organic form of communication. Consumers have the freedom to share their opinions and experiences, and their authentic feedback can significantly impact the perception and reputation of a product or brand.

Therefore, while marketers can strategically apply marketing strategies for eWOM, it is crucial to maintain transparency, authenticity, and ethical practices in managing online consumer reviews and other forms of eWOM. Building genuine trust and fostering positive customer experiences should remain at the forefront of any eWOM strategy.

Review of literature.

- The emergence of electronic word of mouth (eWOM) can be attributed to the growing number of internet and social media users who utilize online technologies to seek out relevant information (ACNielsen, 2008). WOM has been consistently found to exert a considerable influence on consumer decision-making (Katz and Lazarfeld, 1955). In line with the findings on WOM, studies have demonstrated that eWOM (electronic Word-of-Mouth) tends to possess greater credibility, empathy, and relevance for customers compared to information generated by marketers on the Web (Bickart and Schindler, 2001). Trust is established when buyers have certain expectations that the seller will act in a reliable, ethical, and socially appropriate manner, without taking advantage of the situation. It involves the seller fulfilling their commitments and behaving in a dependable way, even in situations where the buyer may be vulnerable or dependent on the seller (Gefen et al., 2003). Indeed, consumers' perceptions of trustworthiness play a significant role in shaping their ultimate purchasing decisions when interacting with sellers (Gupta et al., 2009). Trust plays a crucial role in online commerce. In order to encourage consumers to make purchase decisions and complete transactions, sellers must establish a level of trust that surpasses the threshold for trustworthy behavior. When consumers trust a seller, they are more likely to feel confident in buying their products and transferring money. By focusing on these trust-

building factors, sellers can create an environment where consumers feel confident and comfortable making purchase decisions and transferring money online. Building trust is an ongoing process, and consistently delivering on promises and maintaining a positive reputation are key to fostering long-term customer trust and loyalty (Bente et al., 2012).

- Consumer Behavior involves examining individuals' needs, motivations, and cognitive processes when deciding between products and the tendencies related to purchasing various goods and services (Orji et al., 2017). Hence, it is of utmost importance for the marketing team to comprehend the elements that impact customers' purchasing processes and decisions (Noel, 2017).
- Most studies indicate that social earned media, such as recommendations and discussions on social platforms, can exert a more profound influence on consumer behavior compared to paid and traditional earned media. Information obtained from social sources, including online communities, tends to be more persuasive in shaping consumer perceptions and driving purchasing decisions (Trusov et al., 2009). There exists a positive correlation between social earned media and online buying behavior, with noteworthy impacts on sales, particularly stemming from online community engagement. The cumulative effect of ongoing social earned media activity ultimately results in a substantial, long-term influence on sales outcomes (Stephen & Galak, 2002). When consumers come across positive electronic word-of-mouth (e-WoM) messages regarding a product or service, they are more inclined to express their intention to share these positive sentiments with others, especially in comparison to situations where they encounter negative messages (Sozer, 2019).

Types of Consumer Buying Behaviour

Habitual Buying Behavior:

Habitual buying behavior refers to a type of consumer behavior where individuals make purchases out of habit or routine without much conscious thought or evaluation. In this buying behavior, consumers have established repetitive buying patterns and tend to buy the same products or brands consistently over time. Habitual buying behavior is commonly observed for low-cost, frequently purchased items such as everyday household products, food items, or personal care items. Marketers often target this type of behavior by focusing on brand recognition, loyalty programs, and creating convenient purchasing experiences to reinforce the habit and encourage repeat purchases.

Dissonance-Reducing Buying Behavior:

Dissonance-reducing buying behavior refers to a type of consumer behavior that occurs when individuals experience post-purchase dissonance or cognitive dissonance. Cognitive dissonance is the uncomfortable feeling of psychological tension or doubt that arises when a consumer has conflicting thoughts or beliefs about a purchase decision.

Complex Buying Behavior:

Complex buying behavior refers to the process in which consumers engage in extensive research, evaluation, and decision-making when making complex purchases online. It involves high-involvement products or services that are typically expensive, have a significant impact on the consumer, or require careful consideration due to their complexity

Variety-Seeking Buying Behavior:

Variety seeking buying behavior refers to a consumer's tendency to actively seek out new and different products or brands, often driven by a desire for novelty, variety, or stimulation. Consumers exhibiting variety seeking behavior are not loyal to a particular brand or product and are open to trying out different options.

Relationship Buying Behavior:

Relationship buying behavior refers to a consumer's preference for establishing and maintaining long-term relationships with specific brands, products, or service providers. It is characterized by a strong sense of loyalty, trust, and emotional connection between the consumer and the brand.

Statement of the Problem

Due to technological advancements, people are increasingly embracing a modern lifestyle. First of all, the widespread use of technology has prompted many businesses and entrepreneurs to turn to social media as a means to promote their products. Secondly, consumers now dedicate a significant portion of their time to social media and often make purchases through these platforms, a trend that has been accelerated by the global pandemic. Thirdly, while in the past, businesses primarily relied on TV, magazines, and newspapers for advertising, today, even small-scale businesses are recognizing the value of advertising on social media pages, resulting in substantial profits in a short timeframe. Fourthly, today's consumers are well-informed and discerning; they no longer blindly trust all advertisements. Instead, they rely on websites and other media platforms to post reviews, which provide information about product ratings in the form of likes, comments, and reviews. This information influences their trust about a brand or product, making customer reviews more critical than ever. Fifthly, compared to traditional advertising costs, electronic word of mouth (eWOM) is a cost-effective approach that can reach

a larger audience in a shorter period. Most existing literature emphasises on the EWOM but only studies is made on relationship between the both variables in order to fill this gap the study is undertaken. These factors have motivated the researcher to conduct a study on this topic.

Objectives of the Study

1. To study the demographic profile of the respondents on contemporary social media users.
2. To gain insights into different types of buying behaviour.
3. To explore the relationship between EWOM and consumer online buying behavior.

Methodology

Data are collected from 200 sample respondents in Nagercoil. A stratified random sampling method is adopted to analyse the data. Secondary sources such as journals, internet sources, and websites can provide a comprehensive understanding of consumer buying behavior and EWOM among online users. Secondary data sources offer a wide range of information and insights from various perspectives, allowing for a thorough analysis of the subject matter. Journals often provide in-depth research studies conducted by scholars and experts in the field of marketing, consumer behavior, and online commerce. These studies will explain whether there is any relationship between relationship between online buying decisions and EWOM., the impact of eWOM on consumer choices, the role of online reviews in shaping perceptions, and the effectiveness of different marketing strategies in the digital space. The internet and websites are rich sources of information as well. Online platforms, social media networks, and e-commerce websites host a vast amount of user-generated content, including reviews, comments, discussions, and testimonials. Analyzing these sources can provide valuable insights into how consumers express their opinions, the factors they consider when making purchasing decisions, and the influence of eWOM on online shopping behavior. By combining and analyzing data from the data collected and from the secondary sources, researchers and analysts can gain a comprehensive understanding of consumer buying behavior in the online context. This knowledge can help businesses shape their marketing strategies, improve customer experiences, and leverage eWOM effectively to build brand reputation and drive sales.

Table 1
Demographic profile of the respondents

Category	Profile	Total number	Percentage
Gender	Male	79	39.5
	Female	121	60.5
Age	Less than 18	54	27
	18-25	146	73
Educational qualification	Basic/Secondary	27	13.5
	Undergraduate	72	36.0
	Graduate/Master degree	60	30.0
	Others	41	20.5
Position	Students	72	36.0
	Employee	76	38.0
	Other	52	26.0
Frequency of buying (Per month)	None or one time	22	11.0
	2-3 times	81	40.5
	4-5 times	59	29.5
	Over 5 times	38	19.0

Source: Primary data

Data Analysis

The data were analyzed using SPSS version 21. Both descriptive and inferential statistics were used as presented in the Results section, in responding to the research objectives.

Results:

Internal Reliability of the Scales

Two major scales were used for the study: Consumer online buying behavior (7 items) and Electronic word of mouth (5 items).. The internal reliability of other scales was tested using Cronbach's Alpha, as Table 2 shows have showed to have a very high reliability as they score above .888.

Table 2
Internal Reliability of the Scales

Internal Reliability of the Scales		
	No. of Items	Cronbach's Alpha
Consumer online buying behavior	7	.97
Electronic word of mouth	5	.88

Table 3
Testing the relationship between the consumer online buying behaviour and Electronic Word of Mouth

Testing the relationship between the consumer online buying behavior and Electronic Word of Mouth						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.106	1	5.106	5.186	.024
	Residual	194.963	198	.985		
	Total	200.069	199			
a. Dependent Variable: Online buying behavior						
b. Predictors: (Constant): Electronic word of mouth						

Table 4
Coefficients from Regression Analysis

Coefficients from Regression Analysis						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.580	.391		6.592	.000
	EWOM	.221	.097	.160	2.277	.024

Source: Primary data

The table 4 clearly shows that there is a relationship between EWOM and consumer online buying behavior because the P value is less than (0.05) which is (0.02). Hence, it is proved.

Results and Discussion

- It is widely recognized that consumers are unique individuals with varying buying patterns influenced by factors such as their standard of living, preferences, and personal desires. While consumer behavior can encompass various types, it is important to acknowledge that

external circumstances, such as the pandemic period, can significantly impact consumer behavior and lead to more constrained or compulsory buying behavior.

- During the online consumer buying behavior journey, it has been observed that retailers play a vital role in ensuring customer satisfaction. One of the key ways retailers can achieve this is by actively engaging with customer recommendations and feedback in the form of comments and reviews on their official website or within the shopping environment.
- It is found that electronic word-of-mouth (e-WOM) plays a crucial role for retailers in aligning their product launches with the needs and demands of consumers. This is achieved through the continuous flow of information provided on the retailer's website.
- The purpose of the research is to find the impact of electronic word of mouth. Hence the results support that there is strong relationship between the EWOM and online buying.

Suggestions

- Retailers should actively engage with consumers through social media platforms, online reviews, and customer feedback to shape and influence E-WOM.
- It is important to conduct retailer-initiated E-WOM campaigns, such as influencer marketing or brand ambassador programs, on consumer buying behavior.

Conclusion

The landscape of marketing has significantly shifted with the advent of EWOM in online shopping, disrupting the traditional profit generation model reliant on advertisements and discounts. As social media gains global prominence, online sellers face the daunting task of establishing a reputable presence to attract customers. To achieve success in the online marketplace, retailers must specifically target the ever-growing population of active young adult netizens. Furthermore, it is noteworthy that female consumers exhibit higher engagement and purchasing behavior in the online realm compared to their male counterparts. Consequently, my study centres on understanding the online shopping preferences and behaviors of consumers. The landscape of marketing has significantly shifted with the advent of eWOM in online shopping, disrupting the traditional profit generation model reliant on advertisements and discounts. As social media gains global prominence, online sellers face the daunting task of establishing a reputable presence to attract customers. To achieve success in the online marketplace, retailers must specifically target the ever-growing population of active young adult netizens. Furthermore, it is noteworthy that female consumers exhibit higher engagement and purchasing behavior in the online realm compared to their male counterparts.

Consequently, my study centres on understanding the online consumer behaviour and Word of Mouth reflections among the social media users.

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**Hidden Loveliness of Naga Woods:
An Eco-perspective Reading of Easterine Kire's *When the River Sleeps*.**

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ABSTRACT

*Culture of Nagaland is centered on nature, myths and religious beliefs. Easterine Kire acts as a poignant literary voice of Nagaland. Her writings open up the unique Indigenous tradition and culture of the Nagaland to the entire world. She has been awarded Governor's Medal of excellence in Naga literature in the year 2011. This paper titled "Hidden Loveliness of Naga Woods: An Eco-perspective Reading of Easterine Kire's *When the River Sleeps*" attempts a nature walk-through to understand the lifestyle of the Naga people. The aim of this paper is to conduct an eco-perspective reading of Kire's novel *When the River Sleeps* to understand the lifestyle and deep bond between the Naga people and nature. It sheds light to the unique relationship between the nature and the Naga people. Nature is an indispensable component in the life of every human being. When nature is given its own importance and protected by the human beings, it showers prosperity on human beings. The importance of growing trees and conserving nature must be explained to the younger generation. Kire explains the deep bond nature has with the human beings. The culture bound people consider nature as a sibling. They have a large number of clans and they live a life without any stress or tension of the corporate world. They have their own myths and dreams and they go behind their dreams to succeed in their life.*

Keywords: Native people, culture, nature, dreams, modernity.

Introduction

Nature is one among the greatest blessings showered upon earth by God. When there is a coherent relationship between the nature and human beings, which would lead to the physical and mental affluence of the human beings. The objective of this paper is to analyse the profound relationship between the Naga people and nature and to create awareness regarding the importance of nature in the hearts of every human being. Reviewers have reviewed the writing of Kire as a delight. And her novel *When the River Sleeps* has been reviewed as the book which takes the readers deep into the woods of the Nagaland. It also focuses on the myths and legends of the state which has been deeply related to the nature. The relationship between the human beings and nature has been discussed by the eco critics and the theory eco criticism has been developed.

Eco criticism

Eco criticism is an interdisciplinary field connecting writers, historians, natural scientists,

anthropologists, literary critics etc. It acts as a medium to connect the human beings with the world around them. Greg Garrard defined Eco criticism as “the study of the relationship between human and the non- human, throughout the human cultural history and entailing critical analysis of the term ‘human’ itself” (Magade 113).

The term Eco criticism has been coined by William Reuckert in his article titled *Literature and Ecology* in the year 1978. Cheryll Glotfelty, father of Eco criticism, in his work *The Eco criticism Reader* states that “Just as feminist criticism examines language and literature from a gender-conscious perspective, and Marxist criticism brings an awareness of modes of production and economic class to its reading of texts, environmental critics explore how much nature and natural world are imagined through literary texts” (qtd in Roy, 14). In short it can be stated that, Eco criticism is a relationship between nature and literature or the relationship between literature and physical environment.

Easterine Kire

Easterine Kire who has written novels, volumes of poetry and short stories, is one of the greatest literary voices of her region. She opens up her Naga tradition and culture throughout the world using her literary works as a tool. She has woven the plot of the novel miraculously that it takes the reader to the situation where the relationship of nature with the human beings and the prominence of conserving nature have been clearly explored.

Through *When the River Sleeps*, Kire takes her readers to remote mountains of Nagaland in the north eastern part of India. There are a number of natural and supernatural wonders which amuses the readers as well as explains the importance of the nature in human life. She invites the readers to know the lives and the minds of the people of Nagaland especially the rituals, traditions, culture, beliefs, life style etc. This novel is jam-packed with supernatural elements such as spirits, sleeping river, dirty forest, stone with powers etc. In addition to it, she unveils the beauty of the woods of Nagaland. The heart of the human beings has been suppressed by various tensions, stress either from their work space or from their loved ones. There is no treatment for the wounded hearts. But Nature’s beauty is the virtuous beauty that soothes the mind of such human beings. Kire portrays this beauty of nature in her novels.

Plot of the novel

Vilie, who is the protagonist of the novel, takes a journey to make his dream come true. He has already heard the story of the sleeping river and the stones with power in it. That was the dream that disturbs Vilie often. According to him, the forest is his wife. “THE FOREST IS MY WIFE” (Kire 7). He lives in the forest lonely with trees and animals as his companions. He is also accompanied by some Nepali families as his neighbours who live in some distance

to Vilie. Many men from various tribes come to Vilie just to hear from him. He has a dream in which he takes the heart stone from the sleeping river. He travels to make his dream true. On his way, he faces a lot of obstruction. But his positivity, oneness with nature and the help from some people helped him to get the stone from the sleeping river. Through his journey Vilie takes every reader to the Naga woods and the hidden beauty of the Naga woods have been revealed.

Medicine and seers

The ancient human beings lived one with nature. They know every movement of nature including the change in monsoons and climates. Similarly, the people of Nagaland still live one with nature and they understand the importance of nature as well as every movement of it. Mother Nature is filled with answers for every question within her. She carries medicine for every disease just to save living organisms. Kire cleverly brings out certain medicinal herbs which the tribes of Nagaland use and which is available for plenty in the woods of the Nagaland. Vilie on his way to the sleeping river meets an old man who explains him about the importance of two herbs named Ciena or Bitter wormwood, ginseng, vilhuunha, senyiega, tsomhou and Tierhutiefu which are considered to be the best remedy for many ailments. “He recalled the names of the herbs that he should not be without, Ciena or bitter wormwood and Tierhutiefu, a soft leafed plant with a rather unpleasant smell” (Kire 32). Similarly, Kire brings out how the seers cure viral fever using herbs “He thought of the people from his village who used to fall sick when they wandered into the Rarhuria while out hunting or cutting wood. To cure them the seer would give them a drink made of ginseng and tsomhou, the wild sour seeds that grew on trees” (Kire 54). These incidents prove how nature becomes the best healer. In another incident, Vilie used the herb named ginseng to smear its paste and drink the juice of its root to protect him from the insects and the climatic condition of the forest in which he stays for that night. The leaves of the nettle plants are also used as medicine. Nature acts as a best healer for most of the diseases of the human beings.

Trees

Jesus uses Fig tree in his parables to teach human beings about life. Similarly, Kire used fig tree to explain the relationship of Nagas with nature. The Angami tribes consider the fig trees as their brothers. “Along the way, he saw many fig trees. The Zeliangs did not like to cut down the fig tree. They called it their brother - tree” (Kire 116). Considering the trees as one’s sibling prevents him/her from cutting down the trees. When nature is considered as Mother Nature, the trees, plants, birds and animals which she bore must be considered as her children. There is a deep relationship between the human beings and nature due to which

without nature, human beings cannot survive. But Nature is immortal. So, even without human beings, nature can survive. Nagas depends entirely on Nature. They build their houses using the bamboos and other logs taken only from the thickly dense forest. This in turn never affects the Ecosystem. Children are sent to the forests to collect herbs. This practice helps the children to get connected with the nature. Their festivals and feasts are also connected with the Nature. So, these people lead a happy life without worrying about anything. The woods of Nagaland are filled with resources. It feeds everyone who approaches it. No one is left in hunger. Vilie carries food only for few days of his travel. And for the remaining days, it is the forest which provides food and shelter for him.

Man's psychological dependence on nature

Nature is the best healer in every situation of human life. The interdependency is evident as "No human beings can claim to survive without getting influenced by some sort of external environment" (Myles 2). In certain situation, nature also becomes the subaltern because, it is voiceless and it has to face the oppressions by human beings. But when nature comes out of its oppressions and reacts against the oppressors, human beings suffer as they can't face the anger of nature. It is the work by the eco-friendly writers that gives voice for the nature. John Charles Ryan (2018) in his article "The year's work in Critical and Cultural Theory" focuses on the Climatic change which is the major problem the world is facing today. According to him, the publications on Eco criticism mainly focus on the ways to create awareness among the people. When the advantage of the lovely woods of the Nagaland has been preached through the writings of the Indigenous writer, the readers would be tempted to conserve the woods and to plant more trees. This might prevent deforestation and might pave way for afforestation.

River

River must be given much importance as; water is the major source of life. Kire through her writing brings out that the heart stone in the sleeping river acts as a boon that gives whatever one asks for. Through the heart stone of the river, she explains river as a source of fertility, life and happiness. Where there is river, there is fertility and life. The river also acts a source of income to the people around the river. The people, who belong to the village of weavers, collect fishes and frogs from the river. No one returns empty handed from the river. The mothers collect frogs from the river and dry them and save t for later because, frog is considered as the best medicine for many diseases. These days many rivers have disappeared due to the climatic changes, rise in temperature and aggression of river by human beings. This may lead to the drought in the future generation.

Nettle plants

The life of Nagas is totally dependent on nature. The nettle plants, that grows at the heart of the forest acts as the major source of income for the Angami tribes. This plant has been transformed into various forms by the people and sold. Even the protagonist Vilie once tried to knit using the nettle fibers. Woods of Nagaland plays a major role in the life of the people in Nagaland. It is the journey of Vilie into the woods lights up the truth that, nature acts as the life source of the human beings. Kire acts as the first woman writer from Nagaland to bring out such information which clearly portrays the relationship between the human beings and nature.

Conclusion

There must be awareness among the people regarding the importance of nature. This awareness never occurs without stimulations. Kire through the heart stone stimulates the heart of every human being regarding the importance of nature and the relationship nature has with human beings. It is well known that, when one hand is put in the effort to create a new environment, the gain would be less. But with the initiative of the single hand, when other hands come together, then the result would be great. With the narration of the Kire, one can have a clear picture of the beauty and fertility of the woods in the Nagaland and the oneness of nature by the people on Nagaland. The damages created by the human beings to the nature can be rectified by the preventive measures such as afforestation, not using the agricultural lands for other purposes such as building houses or other buildings, maintaining the rivers and ponds by cleaning it regularly and taking care of the plants, trees and animals around us. To conclude, it can be stated that, the woods mentioned in the novel can be considered as a mere example for understanding the importance of nature. So, with the deep understanding, let's be happy by living in communion with nature.

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Fibrillation and Flutter in Hoover's Duology: A Post Structuralist Outlook on the Psyche and Scenario

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ABSTRACT

The paper entitled as, "Fibrillation and Flutter in Hoover's Duology: A Post Structuralist Outlook on the Psyche and Scenario" is the study of Post Structuralism through the lens of Colleen Hoover's tiktok and bookstagram famous duology, It End With Us and It Starts With Us. Both the book carries the same story which resemble the past and present simultaneously but the centre in every structure of the chapter differs and changes its centerism. Focal point of the narration in the novel changes continuously changing through different perspective. As motifs and symbols constantly recur, the focal point of the narration varies resulting in transition towards the next segmented subplot. The social structure, characters, perception and the reader's standpoint can be considered as the heart of the story. The former book oscillates between the past and the present reasoning the characters whereas the latter proceeds with the present and future pondering of the characters, instead of maintaining its center and structure in one touch point, it incorporates different radical point in every structure it creates. Though the perspective of readers commence with the changing nucleus of the novel, the characters dealing inside the fiction undergo a shift in significant state of characters life's structure. Here, post structuralism takes its turn by the characters psychological mindset and starts re-establishing its own core point according to its way of processing. The phenomenological structure of the novel is concrete, with variation in the centre of individual sphere of actions in accordance to the reader's perspective.

Keywords: focal point, structure, plot, conflict, variables.

Cutting down its ties from structuralism there arises the new concept of post-structuralism, where it started to discover margin and varied centres in concrete structures. Most post structuralist's critique is involved with figuring out the presence of binaries and dichotomies. Jacques Derrida argues that the very shape of idea inside the western lifestyle deemed to have been drawn from such binary oppositions. Colleen Hoover's duology collection *It Ends With Us* and *It Start With Us* has its binary views where the former book involves the past and present and the latter implies the impending inevitability of present and future. In the novel, the characterisation of the characters are built by the past and present incidents. The binary view of both the life in an oscillating mode have been brought and it represents the margin in that structure. The structure has a strong and mounted background

along with the foundational margin, but the focal point tends to change its position retaining the thought process and the point of view of the readers.

The margin takes a restrictive role but the centre differs according to the angle of the perspective of the readers. In the book of Pramod K. Nayar, he says that,

The very term structure presupposes a unity, a centre and margins. There is never a center without a margin. In fact, if we did not have margins, we cannot locate a centre. This means the existence of the centre is never defined and unified, it depends on the existence of the margin. The centre is identified in its difference from the margin. And, however the meaning of the center is deferred until we explain the term 'margin (51). The domain of the structure of this particular novel is derived from the plot of the fiction, where it is evolutionary and it evolves front and back of both the books. The story is linear in structure thus taking its path attentively throughout its end. It begins with the characterisation of the characters from an individual perspective and waves towards its zenith in a progressive manner. Both the books constitute the same story and the way of dealing is different. It moves in correspondence to the binary oppositions on present, past and future respectively.

The novel opens with the Lily Bloom, a young college graduate living in Boston. She finds Ryle Kincaid, a resident surgeon and falls in love with him. The couple has chemistry but it becomes clear that both have different aims when it comes to relationship. Ryle wants a casual fling while Lily is looking for a serious relationship. They both part ways but again meet after six months, when Lily hires Allysa, Ryle's sister to work at a flower shop, she has recently opened. Ryle and Lily end up in the serious relationship and plans for their wedding. Throughout this time, Lily finds herself revisiting her past but she never mourns for the death of her father, who was abusive towards her mother. In order to relive her past, she rereads old journals that she wrote when she was 15. Those journals narrate her encounter with Atlas Corrigan, a homeless, 18 year old boy. The structure (ie, story) moves in a linear and stable way but the center changes to the journal when she starts to read it. The journal is the foremost way for the initial destruction in their marital life but later the magnet in fridge and the tattoo in her collar bone take the role of the centrism respectively. The center changes according to the structure it adapts.

Lily in her past witnesses her dad abusing her mother, she knows the way her mother was treated and she always hesitated to think of that and she wanted her life to be happy without the physical struggles her mother faced in her life. But when Ryle knows about the diary, he starts tormenting her. At this point of the story (ie, structure), the center changes from the diary to domestic violence. "I can feel his breath against my ear as he mutters something inaudible.

My heart is racing, my whole body is still shaking my tears are still somehow falling and I am gasping for words". (*ISWU* 266)

After moving out of their home for training purpose, Ryle comes back and discovers Lily's pregnancy, he wishes her forgiveness. However, Lily maintains her silence and distance between them. Despite, accepting his help during pregnancy she avoids his presence near her, she always made sure that he was out of sight. After Emerson's birth, she asked Ryle to give her divorce. And here in this plot (ie, structure) the center changes to the new born baby. The second book that starts with her after months of her divorce, there starts a new relationship between Atlas and Lily, she holds it private for few months and then she makes it public. Atlas feels mysterious and the way then his story starts to unwrap, the center here changes to from the baby to trauma. "Maybe the idea of love ending being a negative thing is simply a matter of perspective. Because of me, that idea that a love came to an end means that, at some point, there was love than existed" (*IEWU* 318).

The phenomenological structure of this novel comprises the overall plot which varies in accordance to the perspective of the main characters taken into focus in a particular sphere, for example, in *It Ends With Us*, Lily Bloom's perspective which remains as a constant gives birth to other variables that form temporary spheres of action constituting more than one centre at a time. In the second novel *It Starts With Us*, Atlas Corrigan is at the centre of focus, with various other spheres of action. In both the novels, through certain probable centres, it tends to vary in accordance to the perception of the reader, for example, in *It Ends With Us*, the major cause for Lily and Ryle are many. Some may perceive that Ryle's anger disorder resulted from his insecurities and partially narcissistic behaviour as the root cause, while some may shift the blame on Lily for having things that are related to her past that are irrevocably affecting her present (thus resulting in the binary opposition). Others may relate the root with that of the very existence of Atlas himself, while in reality many variables happen to contribute to this conflict in varying degrees. Further the characters themselves are transitional in their position as short-term variables, for example, in *It Starts With Us*, Atlas transitions from a mere moral support to Lily to a lovelorn, world renowned typical book- boyfriend.

The established structure or the margin of the novel, is concrete in its domain in both the novels. The center of the particular sphere of action in a given novel is transitory as the characters are not static in their position and are partially evolutionary in the course of action of the plot and highly depends on the way in which the reader perceives something to be the fundamental cause of a certain effect in a sphere of action. There is no chance for a tangible, absolute, all-encompassing center owing to ephemeral variables and constants. Despite the

internal turmoil that influences every action of the characters in the novel, especially that of Lily, Ryle and Atlas, the course of the plot is steady and linear, just like a fibrillating heart amidst the flutter of life.

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Unveiling the Dichotomy of Jewish Tradition and Modernity in *My Jewish Year: 18 Holidays One Wondering Jew* by Abigail Pogrebin

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ABSTRACT

Tradition and modernity are dynamic forces that shape societies, belief systems and personal identities. They represent contrasting yet interconnected aspects of human existence. Throughout history, societies have witnessed the interplay between tradition and modernity which serves as a microcosm for a broader global dilemma. The chapter entitled, "Unveiling the Dichotomy of Jewish Tradition and Modernity in My Jewish Year: 18 Holidays One Wondering Jew by Abigail Pogrebin" investigates a dynamic interplay between tradition and modernity in My Jewish Year by Abigail Pogrebin. The clash between preserving age-old customs and embracing contemporary values has been a recurring theme in literature which is exquisitely portrayed in My Jewish Year. Drawing upon the theoretical framework of New Historicism, this study examines how the memoir explores the tensions arising from the clash between preserving traditional practices and the forces of modernization. Through a close reading of the narratives, this chapter highlights the author's nuanced portrayals of Jewish identity, cultural heritage and the complexities inherent in negotiating tradition and modernity.
Keywords: *tradition, modernity, custom, heritage, identity, history*

New Historicism or Cultural Poetics emerged in America in 1980s as a reaction towards the historical approach of the New Historicism. This literary theory was proposed by Stephen Greenblatt in the twentieth century and its main tenet is the interpretation of literature in terms of the milieu from which it emerged. New historicism insists on "the historicity of texts and the textuality of history" (Woolfreys 169). Colebrook argues that New Historicism studies the relation between text and history. New historicist believes that history is a matter of interpretation and not fact.

Abigail Pogrebin's thought provoking memoir, *My Jewish Year: 18 Holidays, One Wondering Jew* provides a deeply personal account of her exploration of Jewish holidays over the course of a year. Pogrebin, a self-described wondering Jew embarks on a journey to reconnect with her Jewish roots, seeking a deeper understanding of her cultural and religious identity. The Jewish tradition is rooted in centuries-old customs, rituals and beliefs that have been passed down from generation to generation. Pogrebin's exploration of the Jewish year highlights the power of Jewish holidays and the profound meaning they hold for individuals and communities. These celebrations provide a sense of continuity and connection to a shared

history emphasizing the importance of preserving and honoring one's cultural heritage. While tradition and modernity may seem contradictory at times, Pogrebin's narrative emphasizes the importance of finding a balance between the two. She demonstrates that embracing modernity does not necessarily mean abandoning tradition. Instead, it entails reinterpretation, innovation and the integration of contemporary values while staying true to the core principles of Judaism.

Pogrebin's memoir takes the readers on a journey through the Jewish year encompassing various holidays, festivals and observances. Each celebration is a thread connecting past, present and future. Pogrebin delves deep into the historical roots of the traditions while simultaneously experiencing them in her contemporary life. This juxtaposition exemplifies the ongoing negotiation between tradition and modernity that Jewish people navigate. By embracing her identity as a wondering Jew, Pogrebin not only captures her individual journey but also underscores the complexity of Jewish identity in a diverse world. One of the central themes in Pogrebin's memoir is the interplay between tradition and modernity. This echoes throughout Jewish literature, with authors like Chaim Potok exploring similar tensions in his work *The Chosen*. In the context of *My Jewish Year*, the balance between ancient rituals and contemporary life becomes apparent. For instance, the observance of Passover is steeped in millennia-old traditions, yet Pogrebin's personal account reveals the ways in which she navigates these customs in a modern context.

Tradition often rooted in historical practices provides a sense of continuity and identity for communities. Jewish holidays, like many other religious observances are steeped in traditions that carry profound significance. However, the evolution of society and the influence of modernity challenge these age-old customs. Modernity, characterized by rapid societal change, technological advancements and evolving worldviews challenges established traditions by questioning their relevance in contemporary life. Pogrebin's exploration illustrates how modern interpretations of rituals can infuse vibrancy into these celebrations while staying true to their essence. This notion resonates well beyond the context of Jewish holidays; it exemplifies the broader societal challenge of maintaining heritage in a world that constantly evolves.

Hanukkah often referred to as the Festival of Lights symbolizes the triumph of light over darkness. Pogrebin's examination of this holiday offers insights into the struggle faced by American Jews in maintaining their traditions amidst a predominantly Christian society. She describes how she incorporates Jewish rituals into her daily life such as lighting candles on Friday nights or observing fasts. These practices help her feel connected to her Jewish heritage even as she lives in a society that is increasingly secular. Pogrebin encounters a wide variety

of Jewish communities throughout the year from ultra-orthodox to secular. She learns that each community has its own unique traditions and practices. In the realm of cultural and social dynamics the interplay between tradition and modernity remains a perennial topic of discussion. The tension between honoring the past and embracing the present is a crucial aspect when it comes to religious practices and observances. Abigail's memoir, *My Jewish Year* provides a valuable lens to examine this dichotomy.

New Historicism as emphasized by Woolfreys insists on understanding the historicity of texts recognizing that they are products of a specific time and place. Pogrebin's memoir embodies this notion as she documents her personal journey through the Jewish calendar exploring the meaning and significance of each holiday. By examining the historical context in which these traditions emerged Pogrebin unravels the layers of cultural, social and religious influences that have shaped Jewish customs over time. The interplay between historicity and textuality is evident in *My Jewish Year*. Pogrebin navigates the historical roots of Jewish holidays while examining their evolving significance in contemporary Jewish life. By giving voice to individuals who have reinterpreted Jewish holidays, Pogrebin emphasizes the importance of multiple narratives and the ongoing negotiation of historical meanings within the Jewish community.

Pogrebin's memoir can be seen as a realm of retrievable facts grounded in historical and cultural contexts. In *My Jewish Year*, Pogrebin serves as the human interpreter weaving together personal anecdotes, interviews and reflections to create a narrative that reflects her own experiences and perspectives. Pogrebin's position as an author and a member of the Jewish community gives her a certain authority in shaping the narrative of the memoir. She also acknowledges the multiplicity of voices and perspectives within the Jewish community incorporating interviews and conversations with individuals who offer diverse interpretations and experiences. The memoir also addresses the social implications of observing the Jewish holidays. Pogrebin's interactions with different Jewish denominations reveal the tensions and variations in practices reflecting the broader diversity within the Jewish community.

Pogrebin's journey highlights the concept of the textuality of history where history itself can be viewed as a collection of narratives, interpretations and experiences. As Pogrebin engages with various Jewish holidays, she encounters diverse perspectives and interpretations from the individuals she interacts with including rabbis, scholars and ordinary practitioners. Each person brings their own understanding and meaning to these ancient traditions weaving their personal narratives into the larger tapestry of Jewish history.

In addition to *My Jewish Year*, Pogrebin's memoir can be contextualized within a broader framework of literature and cultural discourse. Books like *The Sabbath* by Abraham Joshua Heschel and *This Is Real and You Are Completely Unprepared* by Alan Lew provide further insights into the spiritual and cultural significance of Jewish holidays. These works emphasize the importance of mindfulness, ritual and community in celebrating these occasions.

Tradition forms the bedrock of cultural and religious identity. It binds generations together providing a sense of belonging and continuity. In *My Jewish Year*, "Mom and Dad arrive on time; and my sister's and brothers' families rush in late from the office and school ... We always end up racing to say the blessings and scarf food before the sun sets and the urgent hour arrives when we have to start fasting as we clamber into cabs to get to Kol Nidre services" (*My Jewish Year* 51). In the context of Pogrebin's account the *Kol Nidre* service represents an ancient Jewish ritual that holds deep significance. It is a time for introspection, repentance and reconciliation. The tradition of observing this service is an intrinsic part of preserving Jewish heritage and spirituality. Living in a rapidly changing world, Pogrebin and her family find themselves torn between traditional customs and the demands of modern life. The pressures of work, school and other commitments encroach upon the time and attention is required to engage fully in religious observances. Pogrebin's mention of her sister and brother's families highlights the struggle of balancing traditional obligations with the demands of a hectic contemporary lifestyle. Despite their tardiness they actively participate in the *Kol Nidre* service which demonstrates their commitment to preserve their Jewish heritage while acknowledging the constraints of their modern lives.

In *My Jewish Year*, Pogrebin opines, "My siblings and I wrote new Hanukkah-appropriate lyrics to a medley of Broadway show tunes. From West Side Story: 'When you're a Jew all the way from your first little bris, to your bar mitzvah day....' From Evita: 'Don't cry for me, Antiochus... the truth is I burned the latkes....'" (*My Jewish Year* 7). Pogrebin's act of writing *Hanukkah* lyrics to a medley of Broadway show tunes reflects her desire to bridge the gap between tradition and modernity. By infusing modern elements into the celebration she seeks to engage younger generations and make the holiday more accessible and relatable to their experiences. The fusion of traditional themes with modern artistic expression opens up avenues for engagement sparking conversations and creating connections between Jewish tradition and the wider world.

Sukkot known as the Feast of Tabernacles is a Jewish holiday that commemorates the Israelites' journey through the wilderness and their dependence on God for sustenance. One of the central features of *Sukkot* is the construction of *sukkahs*, temporary huts or booths. These

structures serve as a reminder of the Israelites' dwellings during their time in the desert. Traditionally, *sukkahs* are built with simple materials such as branches and foliage embodying a sense of humility and impermanence.

Pogrebin avows, "For an hour, I am given proud house tours of *sukkahs* with chandeliers and velvet walls, with silky tablecloths and verdant roofing. I receive tutorials on how to build a solid-but-porous roof, how many guests a *sukkah* can accommodate" (*My Jewish Year* 84). Pogrebin witnesses an intriguing divergence from traditional *sukkahs*. The descriptions of chandeliers, velvet walls, silky tablecloths and verdant roofing demonstrate a departure from the modesty typically associated with this observance. The traditional *sukkah* emphasizes the value of simplicity and detachment from material possessions reminding individuals of the transitory nature of physical existence. The extravagant *sukkahs* with their opulent adornments reflect a more modern approach to Jewish holiday observance. This shift can be seen as an attempt to bridge the gap between tradition and modernity accommodating the desires and preferences of contemporary Jews while still honoring the religious significance of *Sukkot*. By incorporating luxury elements, these *sukkahs* attract younger generations who are more accustomed to opulent surroundings.

While modernity offers opportunities for reinterpretation and creativity it also raises questions about the preservation of religious authenticity. By embracing modern designs and embellishments there is a risk of diluting the core messages and symbolism inherent in traditional practices. Striking a balance between innovation and the preservation of religious integrity becomes crucial to avoid losing the essence of the holiday. The line describing the tutorial on building a "solid but porous roof" (*My Jewish Year* 71) encapsulates the essence of navigating the tension between tradition and modernity. The solid roof signifies the importance of maintaining the foundational values and teachings passed down through generations. Simultaneously, the porous nature of the roof suggests an openness to change, new perspectives and contemporary expressions of faith. This imagery embodies the ongoing dialogue between tradition and modernity within Jewish holiday observance.

Pogrebin explores the intricate relationship between tradition and modernity within Judaism. One particularly intriguing aspect is the evolving nature of rabbinic decrees surrounding the observance of *Shabbat*. It is the Jewish day of rest which has been a cornerstone of Jewish observance for millennia. The prohibitions and guidelines surrounding *Shabbat* observance have been shaped by centuries of rabbinic interpretation. One such prohibition is the ban on kindling a fire on *Shabbat*. This prohibition rooted in the biblical commandment aims to preserve the essence of rest and refrain from work during the sacred

day. As modernity and technological advancements have emerged Jewish communities have faced new challenges in upholding *Shabbat* observance while embracing progress.

In *My Jewish Year*, Pogrebin limns, “I once attended a Jewish conference where making hot tea was prohibited, even if the water was on a burner that had been turned on before *Shabbat*, because the tea bag leaves would be transformed by the hot water in a way that constituted cooking” (*My Jewish Year* 114). The ban on making hot tea illustrates this evolving landscape. Historically, kindling a fire required physical effort making it a clear violation of *Shabbat*. The advent of electric kettles, electric burners and the act of turning a knob or pressing a button to generate heat has raised further questions about the interpretation of the prohibition. As these devices do not involve direct human intervention in generating heat, it prompts some to argue that they are not in violation of traditional laws. However, others argue that the underlying principles of *Shabbat* observance extend beyond the technical aspects and should consider the broader intent of refraining from work.

Tradition holds a significant place within Jewish culture and religion. Rooted in historical and religious teachings traditions act as a guide for Jewish individuals preserving their heritage and connecting them to their ancestors. As society progresses and new technologies emerge adherence of religious faiths are often faced with the challenging of adapting age-old traditions to the modern world. In the case of Judaism, technological advancements have raised numerous questions regarding the interpretation and application of ancient laws and prohibitions. Pogrebin’s memoir demonstrates how rabbinic decisors have grappled with these issues particularly in relation to the prohibition on making hot tea on *Shabbat*.

Throughout the centuries, Jewish legal authorities known as rabbinic decisors have continually engaged with the impact of modernity on religious practices. The prohibition on making hot tea on *Shabbat* serves as an example of this evolution. Initially, the rabbinic decisors put a ban on kindling a fire on *Shabbat*, as it is considered a violation of *Shabbat* laws. However with the advent of gas burners and electric kettles debates arose regarding whether these forms of heating water constituted the same level of transgression. Pogrebin’s memoir sheds light on how these decisors assess the permissibility of various practices such as the use of pre-existing heat sources or non-sparking heating elements.

The broader implications of the interplay between tradition and modernity extend beyond Jewish holidays. This theme transcends religious boundaries and resonates across cultural, social and geographical divides. In a globalized world, where cultures interact and intertwine, the tension between tradition and modernity becomes a universal concern and is

present in various facets of life, including family dynamics, education, governance and artistic expression. The dynamics of change and continuity influence how societies grapple with globalization, technological advancements and shifting values. In a world characterized by rapid transformations, societies often find themselves at crossroads, needing to redefine the relevance of tradition in the context of modern realities. Different societies grapple with preserving cultural roots while embracing contemporary ideals. This dynamic is particularly evident in phenomenal evolution and transition of the authentic culture which is recorded in many of the books of *Tanakh* and other Second Temple literature books like Sirach, Tobit, etc. As societies evolve institutions must strike a balance between venerating the past and adapting to new paradigms. Finding this equilibrium fosters resilience, allowing societies to draw strength from their roots while fostering innovation and progress. The struggle between retaining authenticity and accommodating change extends to domains such as education, gender roles and technology adoption. The interplay between tradition and modernity is far from static; it is a dynamic process that requires ongoing dialogue and understanding.

The literary work, *My Jewish Year: 18 Holidays, One Wondering Jew* by Abigail Pogrebin sheds light on the complex interplay between tradition and modernity within the Jewish community. Through rich storytelling and personal introspection, Abigail Pogrebin captures the complexities and challenges faced by individuals seeking to maintain their cultural heritage in a rapidly changing world. *My Jewish Year* serves as a reminder that tradition and modernity are not irreconcilable forces but rather intertwined aspects of a vibrant and evolving cultural tapestry. By embracing the essence of the traditions while adapting to the demands of the present, individuals can forge a path that acknowledges their past while embracing the possibilities of the future.

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**Segregating Antiquity from Fantasy:
An Inspection on Tracy L. Higley's *The Queen's Handmaid***

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ABSTRACT

*Historic fiction, in general is a blend of both historic figures and non-historic fictional characters, re-telling a story from either a narrator's point-of-view or a character's perspective. In this re-telling, in order to spice things up and display more realistically, the author tends present a probable alternative reality that oscillates between actual history and the past according to the writer, presenting a credible account of what must have really happened. In such a case, it is necessary to dissect the text, isolating history from speculations and fantasy and trace it to its roots, enabling the reader to be aware of the influence and background of a particular history and possible historic allusions in the text. This paper entitled "Segregating Antiquity from Fantasy: An Inspection on Tracy L. Higley's *The Queen's Handmaid*" traverses through the novel and displays the perception in which history is portrayed, delineating historic facts from that of the author's fictional narration.*

Keywords: *history, fiction, facts, literature, scrolls.*

History is a subject that deals with facts recorded by men from the past who were entrusted by emperors and royalties to write about their achievements and conquests. Recording of events has been done at the behest of the victors and hence it could not be neutral or unbiased at times. However, no matter the slant or bias, history is always treated as facts and information from the past. From ancient times, there has been a tradition to record all events of a place. This tradition to record events has been in practice much before the arrival of printing press as there have been rare manuscripts written on paper, leaves and dried skins of animals. It shows the propensity of the people of earlier times to record information in written form for future generations.

The main connection between literature and history is that literature is used to report and represent history. The two are, therefore, intertwined with one another. The biggest difference between literature and history is the latter posits itself as fact, while the former is taken to be an artistic form. The twin ideas of fact and entertainment intertwine often within literature and history to produce historical fiction and narrative non-fiction.

Historical fiction is a popular form of literature. It shows the deep connections between history and literature by having the writer study a particular era from the past in order to write

a story. These stories may be wholly fictional or they might be fictionalized accounts of real people and real events. Popular authors of historical fiction include Bernard Cornwell who wrote books on Napoleonic Europe, the Dark Ages and the Battle of Agincourt, and Hilary Mantel, who wrote “Wolf Hall,” a book about Thomas Cromwell.

Tracy Higley’s *The Queen’s Handmaid* belongs to the genre of historic fiction that explores the lives of Herod and his family as well as the changing times of Israel, Rome, and Egypt. Higley has not only presented facts but has also infused fictional narrations that give an antique appeal to the readers, taking them back to the worlds of kings and queens. So it is necessary to discern and isolate facts from fiction and deliberate upon how the author has inculcated historic incidents to form a work that belongs to the genre of literature. New historicism theory can be of great assistance to do this analysis.

New Historicism is a literary theory based on the idea that literature should be studied and interpreted within the context of both the history of the author and the history of the critic. Based on the literary criticism of Stephen Greenblatt and influenced by the philosophy of Michel Foucault, New Historicism acknowledges not only that a work of literature is influenced by its author's times and circumstances, but that the critic's response to that work is also influenced by his environment, beliefs, and prejudices.

New historicism basically takes into account that literary work or rather any literature work has time, place and thus a historical event as its key components and that these key elements can actually be deciphered from the literary text following keen analysis of the text even if these elements are not clearly depicted by a writer in his or her work. With this as base, this paper entitled “Segregating Antiquity from Fantasy: An Inspection Tracy L. Higley’s *The Queen’s Handmaid*” traverses through the novel and displays the perception in which history is portrayed.

Before exploring the historic facts, it is necessary to be aware of the circumstances and the background of the story. In Egypt, Cleopatra ruled and had successfully seduced Mark Antony, who then married Octavius Caesar’s biological sister named Octavia. Both Egypt and Judea were under the control of Rome, which was ruled by the triumvirates Mark Antony, Lepidus and Octavius Caesar. Marc Antony’s growing allegiance to Cleopatra alienated him from Octavius Caesar and from Rome. By the summer of 30 BC, he and Cleopatra were both dead at their own hands.

In Jerusalem, the Maccabean revolt that placed the Hasmonean family on the throne occurred 120 years before the start of *The Queen’s Handmaid*, and eventually that feuding family invited Rome into the conflict in hopes of settling it. Instead, in 63 BC, the Roman

general Pompey nearly destroyed Jerusalem and made Israel a client kingdom of the Roman Republic. Pompey restored the Hasmonean Hyrcanus (Alexandra's father) as High Priest, but placed the Idumean Antipater (Herod's father) on the throne as king.

Antipater was a shrewd politician, a friend to Julius Caesar, and he paved the way for his son Herod to eventually become king. Factions within Jerusalem were still supporting the dethroned Hasmoneans, in the person of Hyrcanus's nephew Antigonus. Antipater was later assassinated in a political rival and Antigonus took charge, imprisoning Antipater's family. But Herod managed to escape.

The very opening of the story begins with the meeting of two great incredibly powerful leaders: Cleopatra and Herod the Great. In original history, Herod fled from Judea to Alexandria and he was well received by Cleopatra, who offered to appoint him as commander of her army. Anxious to reach Rome, Herod declined. In the novel, the meeting between Herod and Cleopatra is narrated briefly focusing more on their possible conversations and how she tried to seduce and win Herod. When all her efforts go futile, she tries to force a kiss on him, which Herod delightfully returns with coldness. Then she proceeds to talk business about providing him ship to travel back to Rome. There is no of mentioning of army or political alliance. Unable to hold it any longer, Herod blurts out that he may inform Antony about her advances. She then sends him away and plans what to do next. However fictionalized, Higley never fails to display the calculative mind of Cleopatra: "Inside her own chamber, she slammed the door on his guards and collapsed against it. It would be a delicate business to destroy one of Antony's closest friends without incurring her lover's wrath. But she had not ruled Egypt alone for nearly twelve years without learning how to make convenient deaths appear as accidents" (ch. 4).

After Herod became king of Judea, enmity developed between them, for his accession had frustrated Cleopatra's plans to annex Judea. Cleopatra incited Antony against Herod. She also lent a ready ear to the complaints of Alexandra, Mariamne's mother had quarrelled with Herod for refusing to appoint her son Aristobulus as high priest. In the novel, Alexandra sends a portrait of her son and daughter along with a letter to Cleopatra asking her to show it to Marc Antony, thus, urging her to persuade Antony to favor Aristobulus. Antony requested Aristobulus to come to Egypt and Herod panicked, and he refused to Antony's request, with the reason that Aristobulus was too popular that his departure could cause riots. To keep Aristobulus in Judea and away from Antony, Herod makes him High Priest, deposing Ananel, who had been appointed for life. But unfortunately, by chapter 19, Aristobulus and Alexandra

were caught red handed while trying to sneak out by one of Herod's eunuch and their plan gets foiled.

Cleopatra openly supported Alexandra and it was as a result of her intervention that Herod was required to account Antony for the death of Aristobulus. Though Herod succeeded in saving his throne, he was compelled to cede Cleopatra Jericho and its environs together with certain areas of Arabia. These he subsequently leased from her; but this did not improve their personal relationship. In the novel, the conversations exchanged between Mariamme and Aristobulus delineates Cleopatra's attempt to pressurize Herod and show him who the boss is: "All I have seen of Cleopatra's actions since Herod took the throne tells me she wants only to restore her Ptolemaic kingdom of old—including Syria and every bit of Judea. Look at all she has convinced Antony to grant her already—the rights to collect bitumen tar from the Salt Sea, the date-palms and balsam of Jericho—" (ch. 18)

The next historic incident that Higley has used is, the Battle of Masada. The siege of Masada was one of several historical events recorded by Roman-Jewish historian Flavius Josephus during the First Jewish-Roman War. The site of the siege is the ancient Masada fortress. The siege occurred between 73 and 74 CE, after the fall of Jerusalem. The siege of Masada was a pivotal event in the First Jewish-Roman War as it brought an end to the first revolt by the Jewish people against the Roman Empire in Roman-controlled Judea. Flavius Silva led fifteen thousand men and women to the area surrounding Masada. This group included about eight thousand fighting men. The Roman legion surrounded the plateau and built many camps and a large circumvallation wall. The novel too presents all these incidents through the eyes of the protagonist Lydia, but it presents something more: the reason for Herod to fight zealously in this siege: because Herod's mother Cypros, his sister Salome, his mother-in-law Alexandra and his betrothed wife Mariamme were trapped in the Masada fortress. The novel also states that the more Herod neared Judea, he became more of a forsaken husband who yearns for his wife's company. Initially the rebels seemed to be gaining an upper hand in the war, but finally Herod and his troop managed to win the siege and rescue his precious women of importance. Higley has thus managed to paint the picture of Herod as a lovey-dovey husband rather than a ruthless aristocrat as per mentioned in actual history.

The Queen's Handmaid deftly presents the shrewd way in which Herod decided to take Jerusalem, before he entered the city. He declares to his family that he will take the city with "force of his magnanimous personality alone" (ch. 15). He first sends emissaries at the gates of the city proclaiming that Herod has come in peace. But ironically the people were well aware of the existence of Roman legions on the outskirts of the city.

By origin, Herod was an Idumean. The people of Jerusalem were too conscious about his Idumean bloodline and they refused to accept him. But Herod moves one step further and marries the Hasmonean princess named Mariamme and announces it gleefully, thereby making claims to his kingship legitimate. His campaign was successful enough that he managed to stir the hearts of many Jews. Herod takes this as his cue and with his Roman legion led by Macherus, he takes Jerusalem by force which now has much less resistance. The novel vividly presents a scene of bloodshed and chaos during this siege:

Everywhere, people ran and people screamed. Some bloody already, lurching and clutching at walls, searching for home and safety. A woman ran past, about Lydia's age, one cheek slashed from lip to eye. Her gaze tumbled over Lydia without comprehension, without reason. Lydia gasped with pity. The siege fires were everywhere now. Smoke snaked upward from the city in a hundred columns of death, lives and homes reduced to ash. It burned her eyes and clogged her throat . . . The fighting grew fiercer the nearer she came to the Temple area. Its enclosure walls hid an enormous courtyard. The Temple itself soared above the walls, its face set toward the east. Sunlight glanced off gold and Lydia blinked against the glare, raised a hand to her brow. Bodies were everywhere. Romans, Jews, and Herod's men alike littered the paving around the Temple walls. Blood pooled in cracks, ran like liquid mortar in tracks around the flat-hewn stones. Bashed heads, gored chests, lopped limbs. (ch. 17)

Before being taken as prisoner, in the novel, Antigonus rushes to the feet of the Roman general, trying to gain his favour, only to be mocked by the general who calls him with a female version of his name, 'Antigone.' Historically there is no such claim to this incident. But the way Higley incorporated this fictional scene makes the reader contemplate on how miserable Antigonus would have been treated in the hands of Romans. History narrated with spice and heart-touching scenes is one of the specialities of historic fictions, which is aptly found in Higley's novel.

In the end, Antigonus was taken as a prisoner. He was taken to Antioch and executed, ending Hasmonean rule. Josephus states that Mark Antony beheaded Antigonus (*Antiquities*, XV 1:2 (8–9)). Roman historian Cassius Dio says that he was crucified and recorded in his *Roman History*: "These people [the Jews] Antony entrusted to a certain Herod to govern; but Antigonus he bound to a cross and scourged, a punishment no other king had suffered at the hands of the Romans, and so slew him". In his *Life of Antony*, Plutarch claims that Antony had beheaded Antigonus, which serves as the first example of that of a punishment being inflicted on a king.

While Herod used the Hasmoneans to legitimize his own rule he was, at the same time, fearful of them and regarded them as threats. For instance, Aristobulus III, a grandson of Hyrcanus, and the brother of Mariamne, was made high priest in 36 BC. In the following year, however, fearful that the people of Jerusalem might make the Hasmonean Aristobulus their king as well, Herod murdered him.

Hyrcanus was a victim of Herod's jealousy as well. Although Herod honoured the former monarch, with every mark of respect, he was waiting for a chance to get rid of him. This opportunity came in 30 BC, when Hyrcanus was accused of plotting with the King of Arabia, condemned, and executed. Even his beloved wife, Mariamne, was not spared, being charged with adultery (Herod in fact was suspicious that his wife and her family were plotting to dethrone him), found guilty, and executed.

In the novel, death of both Mariamme and Aristobulus are scripted as doings of Herod's sister Salome, who worked behind the scenes. Aristobulus was murdered submerging him forcefully in Herod's pool under the guise of playing in the pool. Mariamme, on the other hand, was proved guilty through a false trial where she was blamed for two things: for not visiting the king's chamber for a year and for being close with Herod's trusted friend Sohemus, although their relationship was nothing more than an innocent friendship. Higley's version of story tells us that Herod went into madness after Mariamme's death. This information is passed on from David, one of Lydia's friends who warn her about Herod, as she decides to leave the palace after Mariamme's death: "Be careful," David said. "Herod is beside himself with grief and rage. He staggers from room to room, crying out for Mariamme as if she lives." (ch. 37)

In actuality, after Mariamme died, Herod did go mad for a while, but soon he managed to find another girl with same appearance and same bearings of that of his beloved Mariamme and history labels her as Mariamme II. If Higley has attempted to make Herod seem like a ruthless yet ardent lover, like in Chinese webcomics, then she has done a really great job in moving the hearts of readers, making them think almost for a second that Herod's love for her was genuine and not an obsession.

Higley has not only displayed actual history through her fictional writing, but has also made allusions to the birth of Jesus Christ in her novel. When the death of Herod was imminent in the battle against Syria, Herod gave his brother Joseph an order to kill Mariamme and her child, if the news of his death would reach them, lest she remarries another man after his demise. Simon and Lydia somehow learns of this plan of Herod and decide to take away nine months pregnant Mariamme away from the palace to some safer place. This incident is more

relatable with that of Joseph and Mary (who is pregnant with baby Jesus Christ) flee from Nazareth, when Herod had ordered the death of all children below age two.

Just as how the pregnant Mary ends up in Bethlehem, Mariamme arrives at Bethlehem during night time to take rest. The only difference is Mariamme managed to get an inn to stay, whereas Mary never got one. Both of them go into labour at midnight. Here comes the interesting fact: when Mariamme was asked for her name during her labour pain, she introduced herself as 'Mary' and gave birth to a healthy baby boy. This incident of Mariamme giving birth to her son is illustrative of Mary giving birth to baby Jesus Christ. Again, Mariamme had extra assistance of a midwife during the childbirth, and there is no solid evidence of Mary from Bible giving birth all by herself. So it is normal to perceive that she might have had the assistance of a midwife, which has been left unrecorded by the historians, owing to its insignificance.

With all the major historic incidents of eminence narrated, now it is requisite to explore how Higley brought these all together and cooked it into a story that would become a best-seller. In the novel, Lydia is found out to be a lost- Judean princess with the help of the pendant she received from Samuel in Alexandria and through the words of Banafrit who discloses the fact that Lydia is the daughter of a Hasmonean princess Shira and the king of Cyprus who happens to be the twelfth brother of Ptolemy. The circumstances of the death of Ptolemy's brother, king of Cyprus, is factual, but details of his wife's identity are unknown. It is here that Higley fictionalized her connection with Judea, by creating an imaginary character named Shira making her a sibling of Alexandra.

With all the characters put into place, the story will be as follows: King of Cyprus and Hasmonean princess Shira must have come in contact with one another, after Rome took over Judea. In Egypt when Cleopatra's sister tried to take over the throne, she eliminated all the possible heirs to the throne in which King of Cyprus and Shira should have been murdered. But unfortunately Cleopatra killed Benerice and took over the throne. Apart from being the Egyptian Pharaoh, Cleopatra herself has Greek bearings, that would make Lydia half Greek, half Egyptian (as she was raised in Alexandria) and half Hasmonean, making her a potential heir to all the three kingdoms. With this information at hand, Higley has also included a fictional scene where Cleopatra, on her yearly visits to Judea meets up with Lydia once again. Cleopatra being aware of Lydia's new found identity is threatened and she tries to intimidate her, to which Lydia gives a sharp reply:

“Cleopatra shouted in Lydia’s face. “You think I fear you? You worthless little worm-servant! You are nothing but a half-breed, raised in the sewers. You are no more to me than an insect.”

“And yet here you are.” Lydia kept her voice low. “Seeking me out. Attempting to intimidate me.”

It felt like freedom, to speak thus to Cleopatra.” (ch. 31)

Higley could have turned the plot the other way around, and made Lydia the queen of Egypt through Herod who has better relations with Octavius Caesar, when Cleopatra and Mark Antony died at once. This could have altered the historicity of the novel, making it more absurd and unrealistic. But she does not do that; she has rather created a strong character who stays unwavering by wealth, power or aristocratic life. Lydia decides to embrace the identity of a normal Jewish woman and lead a peaceful life with new beginning at the end of the novel.

Higley has created her character in such a way that she moves throughout the novel seamlessly without any block. Whether be it Egypt, Rome or Judea, there is inaccuracy, with no complete facts about the names or identities of the slaves of these great messed up aristocratic families. This enables Higley to fit Lydia beautifully into the position of a slave who could have had the possibility to rewrite the history, thus without altering the actual history.

In all the three kingdoms, as far as Higley is concerned, Lydia has served as a maid. And this addition of character in no way alters the historic happenings of the novel or the course of the plot. It is just that the whole history is reviewed from the eyes of a nobody, on whom Higley has bestowed a character and a purpose to keep the pace of the plot in motion.

The driving force behind all this that holds down Lydia from making any clear decisions is the ancient scrolls and the task to hand it over to Chakkiym. Chakkiym means ‘wise men’ in general. Apart from the three wise men who travelled around the globe to meet baby Jesus Christ, the other place in Bible where wise men are mentioned more is in the Book of Daniel.

According to the biblical and archaeological history, Daniel was made the ruler over Babylonian provinces by Nebuchadnezzar. And being a ruler gives him the privilege and possibility of raising a retinue of people on his own. In the last chapter of book of Daniel, Daniel gets a vision from heaven, where an angel instructs him to seal up some words revealed to him, which should not be opened until the time of Messiah. In New Testament, in one of the biblical stories that has been recorded, Jesus Christ is seen reading from the scrolls of Isaiah the Prophet in the synagogue. Connecting these two incidents, Higley has drawn the plot of the

existence of wise men apart from the Pharisees and Sadducees, who protect the fictional scrolls of Daniel which has been passed down from generation to generation.

Humans are prone to make mistake in one way or the other. To epitomize this characteristic, Higley makes one of the descendants of these wise men to lose this scrolls and makes it to be found by another Jew in exile named Samuel. Here too, Higley has drawn this name from the biblical character named Samuel, who anoints the Israeli kings Saul and David respectively. This can be interpreted in novel in a similar manner: by presenting her mother's necklace and the divine scrolls, Samuel the prophet anoints Lydia to undertake the journey of her life. At the end of the novel, Simon and Lydia travel to Persia to hand over the scrolls to the wise men. The recent excavation of Dead Sea Scrolls from Nag Hamadi Wadi provides the possibility of existence of Daniel's fictional scrolls. This paper has shed light on the fine line that separates fantasy from antiquity with numerous possibilities for reality.

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Culture and Technology: An Inevitable Correlation

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ABSTRACT

Technology shapes distinctive cultures and differentiates one from another. It also permits humans to intermix and comprises the elements of tradition such as travel, food, government, education and art. Technology is impeded in human life and culture too. In various parts of the world, it has been used for connecting and refreshing people. But the impact of technology in culture and the cultural defeat by means of technologies in today's world is unknown. Employing the impact, diffusion, the changes occurred as the technology underwent a developmental process that really needs to arrive and be analysed. Technology makes people walk in new phases of life along with cultural values. Society and culture set the priorities for the development of science and technology. Technology and society or generation and tradition refers to co-dependence, co-affect and co-manufacturing. This unbreakable connection existed from the beginning of mankind and it has always been a matter of topic whether technology is boon or bane for society. The impact of technology on culture, tradition and social values is undoubtedly huge and classified as how it results in this society today and how it influences human activities.

Keywords: *technology, culture, impact, variation, society.*

Introduction

Culture refers to the intellectual and moral characteristics standard of a particular society or era. This includes, for example, art, literature, music, and philosophy. It can also refer to the way people behave towards each other, including their values and morals. Culture is often seen as something that distinguishes humans from other animals, and also thought to be one of the things which make humans unique as species. Culture is the collective term to identify the ideas, customs and social behaviour of a particular people or society. Culture is a vast area and a particular culture can be observed among a particular group of people which was created by a group of people, over a long period of time. While traditions are the ideas and beliefs that are passed down from one generation to another generation as a part of a culture. Many cultures have common rituals and ceremonies that are passed down from generation to generation. These rituals and ceremonies help this world to keep the culture alive and pass it on to the next generations.

Objectives

The research aims

- To find the relationship between culture and technology

- To find significance of culture and technology in relation with modern generation
- To explore the rise and fall of culture and technology in relation to one another

Methodology

Theoretical research is a logical exploration of a system of beliefs and assumptions. This kind of research includes theorizing or defining how a cyber system and its environment behave by exploring or playing out the implications of how it is defined. The paper entitled “Culture and Technology: An Inevitable Correlation” is done based on the theoretical research method. The research is made through numerous observations which includes articles, web documents and facts.

Culture and Technology

There has always been a connection between culture and technology. Technology has always influenced human culture just as culture has sparked advancements in technology. There is a complex relationship between both culture and technology. There are no real starting or ending points in this case. They both interconnect to influence each other as they develop and change overtime. In the 19th, 20th and 21st centuries, technology and culture both significantly influenced one another. Owing to the evolution of culture over the decades, technology has also developed in many ways. Technology is an imperative term which is incorporated in all aspects of culture including travel, food, government, education and art.

Technology shapes different cultures and differentiates one from another. It allows people to intermingle. Through the development of computers and teleconferencing, a specialized learner can access knowledge through a conference halfway across the world without leaving a person's home. Technology does allow for every opportunity to be afforded, but creates more opportunity than in the past. These technological advancements allow the opportunity previously separated by socioeconomic status to be taken away. Established traditions and customary ways of life are dislocated by the invasion of foreign influences and images from the new global cultural industries which traditional communities find particularly seductive, impossible to reject, but difficult to contain.

Current Technology

Worldwide communications nowadays are stimulated through cultural variations, like email, mobile phones, etc. In this generation, people started using technologies as their day-to-day life's routine, and it ended up becoming one's culture. Technology started ruling the world and it is more common and an easiest way to connect with people. During Covid-19, people who are not aware of technology have also ended up using technology to spend their time.

Academics and universities commenced technologies as a main source to reach students. Technology plays a major role in connecting people without delay. Technology also additionally given the modern gadgets in current decades, like smartwatches, tablets, and voice assistant gadgets. Those gadgets enable people to switch cash immediately and make purchases for the whole lot from clothes, meals, delivery, groceries, furniture and more.

Technology has modified traditional modes of entertainment, how people meet each other and consume all types of media. It also makes advancements in safety when it comes to home security and medical devices in a more user-friendly manner. Technology is not only increasing the human lifespan but also the way we live (Barbara's Bray). Initiated with the use of the printing press, allowed the masses to receive news, read books and attend school. Communities developed within large cities to protect and sustain the different cultures. Every nation and its community have their own identical coherence, culture, tradition and social norms and values. After seeing successful technology like Alexa, Google Assistant, Cortana and self-driven cars, Artificial Intelligence (AI) has generated plenty of noise from the users. Artificial Intelligence is one of the new traits which highlighting and triumphing inside the IT enterprise for the last five years. Introducing the world's first artificial womb facility, powered entirely by renewable energy. It is known as Ectolife which allows a barren couple to conceive a baby and become the true biological parents of their own offspring. It is considered as the best invention for women who have complications in their uterus due to cancer or any other surgeries.

Premature births and C-sections will soon be a thing of the past. It allows the baby to develop in an infection free environment, the facility features seventy-five highly equipped labs and each state of the art lab can accommodate up to four hundred growth pods or artificial wombs. A single building can incubate up to thirty thousand lab grown babies per year. This current invention can be considered as the best creation of all. AI provides a computer program the ability to think and learn on its own. It is a stimulation of human intelligence into machines to do things that we would normally rely on humans. Chat GPT, Google Bard, Microsoft Bing, and such AI programs strive for the whole educational system with extraordinary solutions.

Earlier and Current Generation in Culture and Technology

In the past, writing letters, sending faxes, or using wired telephones were the best way to communicate remotely with someone. In order to connect with someone today, there are many more efficient options available. Modern technologies are the outcomes of the advancement of traditional technologies. As the time passes, the new innovations replace the older ones based on the existing concept of knowledge and ideas. For instance, if one compares

the television before ten to fifteen years and now, they can find vast differences between them. The televisions at that time used to be very heavy with black and white screens and antennas were required in order to operate them. But now, the TVs are found in many shapes and sizes with various specifications. In the market, customers can find the traditional televisions with improved and additional features. One can spend their time on social media, chatting, video calling, mailing someone or else through audio call. These new methods can help people to keep in touch with loved ones, especially when people live in remote areas and to monitor aged relatives who live alone.

Social media is a great way to keep in touch, in general, allowing one to see what their loved ones are doing through the photos and updates of their posts. Wired phones replaced with smartphones. Hand written letters dispatched through postal carriers changed through emails which might be added in seconds. Film cameras also updated into digital and Map books used to find out a way to attain vacation spots which were modified into Google's map. In meetings, senior employees prefer notepads and pens while the younger workers bring their smartphones and gadgets to take notes. Devices and gadgets which are used today were radically different in the past. Some of the first gadgets and devices were simple, so big and controversial, only few people had access to the gadgets. In this century, technology becomes simple and everyone attempts to access it.

The current generation learners can collaborate on institution tasks using technology - based tools such as wikis and google docs. The walls of the classrooms are no longer a barrier for the learners for communicating and working collaboratively. It also changes the role of the teachers and the learners. Culture is segregated when people start using technology in their daily life, the way their culture is brought up changes to technology which also influences the world. The relationship among technology and culture is cyclical. Logically, a culture develops technology based on the needs or desires of the people. Technology spreads and it is absorbed into the lives of the people and it affects their culture and way of life.

Impact of Technology in Culture

Technology is changing every aspect of human lives. The benefits provided by new digital approaches are having a huge impact on this society. However, one of the greatest business challenges is not about the devices, software or solutions, it is about how people manage the process of cultural change. In agriculture, the introduction of machines for sowing and harvesting greatly reduces the need for manual labour. There was less need for large families to work on farms. In the criminal justice system, the ability to examine innocence through DNA testing has saved the lives of people on death row. The amount of inequality to

access the technology also increases. There are two forms of divisions which give unequal access to technology. In that, the higher income people have greater access to technology than lower income people. It is known as 'digital divide' and then it creates the second division called 'knowledge gap'. Few colleges have the best technical labs with the latest gadgets that increase the possibilities of gaining good proficiency. On the other hand, with less technological resources, they will not gain any growth which is not enough for their job market. Technology also has a great impact on a global scale.

In one way, technology impacts global cultures through media globalization. It is known as the main way to influence people through media technology. People are able to get information immediately because of mobile phones and the internet. One of the biggest advantages of these technological advancements is that it led to increasing the sense of globalization and bringing together people across boundaries. Now with technology, people can connect all over the world and know their culture.

Advantages

Every nation and its community had its own identical coherence, culture, tradition and social norms and values. Living standard of people has particularly risen up and has become sophisticated due to technology. Nowadays education has been gradually conquering modern technology. Moderately it is acceptable but it differs from place to place. On the other hand, it has abundantly increased the usage of preservatives from the marketplace rather than natural products. Most people refer to this for time preservation, packed and canned foods are most common among this generation. The previous generation used to obtain advice and ideas only from their elders in cooking and marital life. But now websites, search engines and other online platforms such as YouTube, Google, etc. provide and promote self-learning in a self-paced manner. Science and technology can be beneficial to all communities as long as they are used by people with a well-balanced mind. Though IVF and surrogacy it is welcomed and well received throughout the world, there is a cultural stigma that prevails not only in third world countries but also in second and first world countries laying emphasis on the authenticity of child's development, the incapability of the parent as a failure and controversies that revolve around the procedure itself. Without culture, technology cannot be retained, therefore they are interdependent.

Disadvantages

To a certain extent, the modern world would definitely change the purity of traditional culture. It has also had a great impact on society by replacing spirituality. Because of technological development, it results in gradual curtailment of adoption rates and the need and

hope of people is exploited. Though AI implores people with new visions and new angles, it dims culture-based creativity, especially in the areas of conforming to old conventions of the society. Many people have become jobless because of the intervention of the society.

Findings

- Culture can improve the development and acceptance of advancements in science and technology.
- It mostly happens when there is a fear of the new battle or replacing a cultural heritage.
- Culture and society both set the priorities for the development of science and technology.
- Culture affects the time and energy and financial resources which are dedicated to research and development, and its priorities in particular projects.
- It affects how much personal sacrifice people are willing to endure the pursuit of science and technology development.
- It determines the reward from society for their achievements which are financially and otherwise.
- Society is a shared understanding whose personality is its culture, and whose knowledge is its science, which it uses to create the technology it needs to achieve its aims.
- People try to carry both culture and technology as the equivalent manner to balance them in this world.

Conclusion

Implementation of technology influences the values of society by changing expectations and realities. Over emphasizing technology which has created lack of trust among people. Technology can also be blamed for unemployment, cultural lag, changes in social institutions. Development of technology is to be from our tradition, culture and heritage. There is a saying, "technology stems from humanity". Our tradition connects us throughout history. Cultural practice is necessary and unavoidable for sustaining this society. The development of technology is a series of processes which evolve through time. Tradition, culture and heritage are soil fertilizing a better society, a better world, with advanced technology. Because culture and values are not static. They evolve constantly with time and contextual changes. Technology is also included as a part of this modern culture. There cannot be any loss because of modern technology, merely a change in it. Whether the change is a loss or an improvement, it depends on the person analysing it, not the change in itself. In this evolving world, culture and technology plays a major part and it became the source of living. The culture and technology are coexisting and interrelated to each other.

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**Desideratum for Ecological Sustainability:
A Study on Mamang Dai's *The Legends of Pensam***

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ABSTRACT

*Land and its people are inseparably assembled to constitute the ecosystem of any topographical region. Being naturally gifted with an attractive topography, the North East region of India has produced literary texts into which nature and its significance in human life have automatically negotiated their ways. The tribes of Arunachal Pradesh are the preservers of natural resources by maintaining an equilibrium with nature. But, the post-independent scenario of the land has undergone drastic changes both environmentally and socio-politically. The aim of this study is to decode the eco spiritual qualities of the tribals with reference to Mamang Dai's *The Legends of Pensam*. Dai's concern, in her work extend from harmful effects of deforestation, human encroachment on forest lands, the human-induced dangers which flora and fauna have to endure, human relationship with non-human beings and deification of nature. The study further highlights the vision of abolishing social ideologies and hierarchies that perpetuate ecological destruction, and to use traditional as well as scientific knowledge to ensure ecological stability.*

Keywords: *Eco spirituality, Sustainability, Topography, Deforestation, Stability.*

The obligation to conserve natural resources and protect global ecosystems in order to support health and well-being is known as environmental sustainability. Forward thinking attitude is the important element in sustainable developments. In fact, the U.S. Environmental Protection Agency (EPA) defines it as “meeting today’s needs without compromising the ability of future generations to meet their needs.” (Sphera) Many green ideas and business responsibility fall under the broad category of sustainability. Ecocriticism is a literary theory that studies science, literature, anthropology, sociology, psychology, and other topics in order to better understand how people see nature. It makes an effort to examine how the environment is expressed in literary writings and theoretical discussion. The theme of nature has been prominent in many English-language literary works. The destruction of the ecosystem throughout the world has been greatly influenced by colonialism, and for a very long time, people believed that nature was some kind of endless supply. Numerous works of Indian English fiction also have this topic. Many authors make it their main topic, while others make it secondary to their main story. In order to better understand ecocriticism, I wish to employ Indian English literature in this essay.

The Northeast Indian states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura, which together make up around 260,000 square kilometres, are well-known for their abundance in natural resources and cultural variety. Its position is also extremely geopolitical due to its proximity to the foreign lands of Bangladesh, Myanmar, Tibet, and Bhutan. This region has a better connection to and appreciation for nature than the rest of the country. As the environment has been a crucial component of their way of life, Northeast India has developed its own vernacular architecture that has changed over time and is mindful to the local climate, people, and materials. The importance of sustainability and its development has never diminished.

Arunachal Pradesh is recognised as one of the major ‘biodiversity hotspots’ of India and the entire world, for its extensive variety of flora and fauna. This northeastern state is home to a variety of indigenous tribes along its valleys. One of these societies includes the Adi tribe, whose members live in perfect harmony with the natural world. They continue to live traditionally, totally reliant on nature, without disrupting the area’s ecological equilibrium. However, Arunachal Pradesh’s current situation is undergoing quick changes. The ancient way of life and belief system of the Adis, which in the past were in harmony with pristine nature, have been severely damaged by the socioeconomic, political, and environmental developments of this state.

Due to the presence of numerous ethnic groups with a variety of cultural practices, dialects, and religious beliefs in northeast India, it is referred to as a melting pot of different races, castes, and cultures. One of India’s most underrepresented regions is this one. A collection of literary writings that is wholly distinct from that of the rest of India may have developed as a result of the region’s geography and the blending of several ethnic groups. The literature in English from the northeastern section of India has been stereotyped, just like the area itself. However, if we conduct a critical analysis of the literary works produced in this region, we will discover that the majority of the writers including Mamang Dai, Temsula Aao, Aruni Kashyap, and Easterine Kire are intentionally address geopolitical and environmental issues like resource exploitation, ecological degradation, and drastic climate change in their works.

Mamang Dai, as a member of the Adi community, is naturally acquainted with their historical traditions, worldview, and collection of myths, stories, and fables. She is a noted poet, journalist, and a former civil servant of Arunachal Pradesh. Dai respectfully depicts the Adi tribe’s relationship with the natural environment while retaining its ancient practises, tales, and beliefs in all her works. One of the ethnic sub-groups of the Tani people, the ‘Adi’ tribe,

may be found in a number of districts of Arunachal Pradesh, including East Siang, West Siang, Upper Siang, Lower Dibang Valley, and Lohit Namsai. By telling the simple, harmonious stories of the ignorant ethnic group living in the wild, lush, and green Siang valley of Arunachal Pradesh, a site recognised for its biodiversity hotspots with vast range of flora and animals, Dai hopes to dispel the old dust of “stereotype” created for this region. However, the country’s post-independence environment and sociopolitical structure have seen significant changes. The altered landscape of the area has drawn the attention of Dai’s literature, and her most recent book accurately illustrates the challenges that the Adis in this area face as they work to modify their lifestyles for survival despite all the difficulties.

Mamang Dai’s *The Legends of Pensam* is a novel that has a strong ecological concern. History, myth, tradition, memory, and fiction merge together in this novel, which showcases the unique ecology of Arunachal Pradesh. The clash between tradition and modernity and the degeneration of traditional values during the colonial period as well as the ecological degradation of the land can well be studied from an ecological viewpoint. The novel advocates the restoration of the age-old bond between man and the nature as a way of retaining the identity of the tribal communities in the contemporary world of globalization and modernization.

An anthropological study that supports tribal spiritualism is found in *The Legends of Pensam*. Dai emphasises the generosity of her kin in the Prologue, “I was born in the mountains, in a village where boys kicked rocks around pretending at football (3). The book is filled with shamanic and mountain ceremonies, highlighting the tribal clans' profound faith in the enduring consequences of these practises. For instance, everyone in the Adi tribe believes that Biribik, the water serpent, represents all spirits, and that anytime there is an odd sight in the river, something horrible would undoubtedly happen in the village. The sufferings are then treated and cured using an old Serpent ritual. In fact, the novel’s recurring motif is this. The important aspects of ecospirituality that are discussed in this book include pahari pratha, or mountain rites and spiritual practises, connected to Northeastern tribes, as well as folklore and myths. Dai considers the Adi’s ecological and spiritual concerns in all her works.

Dai emphasizes the Adi community's position as being stuck between myth and fact. She skillfully weaves together four interconnected pieces of tribal lore: ‘a matter of time’, ‘a diary of the world’, ‘a song of the rhapsodist’, and ‘daughters of the village’. which caused readers hearts to race. The book features likeable individuals whose established beliefs and traditional rituals centre on their precarious lives. The novel’s prologue opens with a myth about a woman who fought a powerful force to weave a tapestry. Regarding the storylines presented in the work, the initial portion comes off as hallucinatory, fantastical, unrestrained,

and open-ended. When the protagonist Hoxo opens his eyes after being unexpectedly dropped from the sky, he discovers bamboo, a green waterfall, and walls of trees that are covered in greenery. Lutor, the renowned Ida clan head and a resident of the settlement, discovers him. As a result of their superstitious beliefs, none of the locals inquire about the infant. None of the locals question about the infant due to their superstitious beliefs. Unfortunately, Lutor encounters Birbirik, a water snake with a horned head that resembles a malicious spirit, which leads to his death later during a hunting adventure. Here we discover stories inside stories about the mythology, spirits, and culture of the Adi tribe. This section of the book describes the character's enigmatic deaths amid the hills deep and dark trees.

In another story Pinyar the widow says, "Faith is everything" (35). After experiencing her husband's betrayal, losing her kid, and having her home burned down, she was weary of her existence. As we can see, "It seems my destiny is cursed" (28). The final tale in this segment depicts the terrible reality of outsiders entering the uninhabited areas of the Adi tribes and how this has affected the local's perception of them as a disease. Their people was devastated by this abrupt transformation since the declining beauty of nature seemed unfathomable to their impressionable eyes. As Hoxo says, "We saw a new glimmer in the distance. Our footsteps led us down unknown paths" (42). However, the desire to maintain their origins and live a traditional tribal lifestyle was rekindled in their hearts as a result of the social changes.

The second part of the novel starts with the entrance of migluns (Britishers) in the Adi lands. These newcomers started to rule the region by building roads, assuming political authority, and propagating Christianity, ushering in 'civilization' in a region that had previously been uncivilised. To understand more about the culture and traditions of the tribal people, Mona and Jules, a couple from other regions, travel to the village. They both take part in the village's customary celebrations and rituals, and they both enjoy the folk music performed by the locals. They return from the area with a wealth of impressions, tales, and experiences from the Adi people, making the trip worthwhile.

The third part of the novel tells the love tale of Nenem, a mythical figure who falls in love with David, a British officer; their relationship lasts for a time until they are split up. Nenem, a nature lover, is unwilling to uproot herself from her own country and move to another for the sake of love because David has been assigned somewhere else. This demonstrates how the indigenous people rely on a close relationship with nature to survive. Nenem states: "No one dies of love. I loved him, and now I am enough on my own" (109). With an angelic heart and a dovelike mind, she represents a legend. Losi, her daughter, is born after she marries Kao. When her hamlet floods after an earthquake, she is forced to leave it and relocate. Her life is

suddenly filled with uncertainty. She begins to feel unhappy, suffering swirls inside her feeble heart, and she eventually exits this world. The life of Nenem illustrates how being cut off from one's roots brings early death and how one's existence is connected to the wonders of nature.

The novel's fourth section of the narrative sheds light on the continuous changes in the neighbourhood that terrorise the populace. As the trumpets of modernity blow, innocence is lost, beauty is fading, and the atmosphere is foul-smelling. Through the characters, the hatred towards the modern age is underlined. As Larik says, "This terrible road is all they have for us in 50 years! And what does it bring us? Outsiders. Thieves. Diseases" (156). The locals maintain their usual customs, culture, and beliefs despite the changes, demonstrating their steadfast affection for the beautiful area. The Adi tribes rich oral legacy, distinctive indigenous culture, and communal living are all shown in the book. Members of the older generation are shown in the text whistling in protest at the shift and to protect their indigenous heritage from being wiped out. As a result, the villagers move back and forth between living a traditional and contemporary lifestyle. In the course of the novel, Dai vividly depicts the Adi tribes colourful culture and history, inspiring awe at their efforts to preserve their pristine culture by writing down oral tradition for future generations.

Dai describes the topography and anthropology of the North East India in the Author's note to *The Legends of Pensam*:

Arunachal Pradesh in North East India, bordering Bhutan, china and Myanmar is one of the largest states in the country, and also one of the greenest. It is the homeland of twenty six tribes with over one hundred and ten sub-cans... The mightiest of its rivers is the Siang... Siang valley is the territory of the Adi tribe who are the subject of this book. (qtd. in Satapathy and Nayak)

Verrier Elwin, one of the greatest defenders of the North East, mentions the same valley in one of his important ethnographic works. "Siang, the happiest of the NEFA divisions, is the home of bright colours, lovely weaving, dancing, singing and an enchanting people formerly known collectively by the Assamese word Abor which means independent, but who now call themselves Adi or hillsmen". (Elwin)

The basic goal of ecocriticism is to evaluate any literary work in terms of how it relates to the environment. It looks at how the natural world and the environment are portrayed in literary and cultural writings. Ecological imbalance, environmental degradation, and their effects on human civilization are the primary concerns of ecological studies. This coexistence of the natural and human worlds has been questioned in a variety of discourses, from ecological studies to ecocriticism. Glotfelty, in the *Introduction to The Ecocriticism Reader: Landmarks*

in *Literary Ecology*, states “ecocriticism takes an earth-centred approach to literary studies.” (Glotfelty) Chingangbam Anupama, in her scholarly essay *An Ecocritical Approach: A Study of Selected North East Indian Poets*, points out that “ecocriticism deals with the expression of judgment upon the writings which marks the relation between nature and man or effects of culture on nature.” (Anupama 59-67) Prof. Thomas K Dean of the University of Iowa includes culture in ecocriticism and says: Eco-criticism is a study of culture and cultural products like art works, writings, and scientific theories that is in some way connected with human relationship to the natural world.

One of the most significant changes to the region has been the fast urbanisation of North-Eastern India, which has led to the adoption of a smart city development plan by nine cities. In order to turn these traditional cities into smart cities with infrastructure and services for all demographics, an inclusive governance was formed. For these smart cities, it has been highly successful to boost economic growth through sustainable development, such as the use of renewable energy, recycling programmes, and efficient waste management. Smart cities are now being created in Aizawl, Guwahati, Shillong, Agartala, Imphal, Pasighat, Kohima, Itanagar, and Gangtok with a sustainable emphasis on their economies, tourism, resource management, energy sources, biodiversity, and urban transportation.

As the name implies, bioclimatic architecture incorporates the local microclimate into construction plans for environmentally friendly outcomes. It improves the balance between social inclusion, environmental conservation, and economic development. Even if the majority of the North Eastern vernacular architecture is environmentally, materially, and energetically sustainable, the region will gain immensely from continuing to use these practises. Maximizing the use of natural and renewable resources, designing for climate change, reducing the use of artificial energy and water, and having effective building systems in place are the fundamental tenets of sustainable building design.

In the Northeast of India, bamboo is one of the most plentiful and sustainable resources. Manipur and Arunachal Pradesh are the two wealthiest states in India for cultivating bamboo, each with 53 types. Bamboo is primarily utilised for building and structural purposes, as well as to replace wood in industrial, handicraft, and culinary goods. Numerous studies have demonstrated the value of bamboo in reducing soil erosion and enhancing soil water retention, among other things. Additionally significant carbon sources and sinks are bamboo forests. Bamboo is able to isolate carbon more quickly, which aids in limiting forest fires thanks to its fast biomass buildup and efficient solar energy fixation. In the North-East Region, bamboo is an essential component of sociocultural and economic life.

The Northeastern region of India has a history of placing a high value on the environment in both its lifestyle and culture. There are still a lot of important gaps in our current understanding of other aspects of sustainability, despite the fact that environmental conservation has been passively practised here for more than 5,000 years in ancient India. Deforestation, quarrying, overharvesting, and pollution are only a few of the environmental hazards that have resulted from the search for development in impoverished countries. By incorporating all local communities and governing authorities, resources may be used sustainably with the right sustainable management and education. They can work together to turn the Northeastern region into a place where India can develop its future.

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அறவழி காட்டும் அற இலக்கியங்கள்

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முன்னுரை:

அறத்தின் மேன்மை அகிலத்தைக் காக்கும் உயிர்மை. கொடியன அகலவும் நன்மைகள் பெருகவும் அறச்செயல்கள் மேலோங்க வேண்டும். மனிதனின் மிருகத்தன்மை அகல அன்பு வழி முக்கியம். அந்த அன்பு வழியை அடைய அறவழித் தடம் மிக அவசியம். உலகின் தற்போதைய போக்கு மிகவும் கெடுமைத்தன்மை வாய்ந்ததாக உள்ளது. எவ்வழியையும் துச்சமென நினைக்கும் பழக்கம் அதிகரித்து விட்டது. எவருக்கும் நன்மைகள் செய்ய யோசிப்பதில்லை. இதிலிருந்து மாற அறவழி மிக முக்கியம். ஊர்போற்றவும் உலகம் காக்கவும் எழுந்ததே அற இலக்கியங்கள். இந்த அற இலக்கியங்கள் காட்டும் அறவழியை விளக்குவதாக இக்கட்டுரை அமைந்துள்ளது.

அற இலக்கியங்கள்:

களப்பிரர்கள் காலம் தமிழகத்தின் இருண்ட காலமாக கருதப்படுகின்றது. இக்காலத்தில் பண்பாடற்றச் செயல்களும் பல கொடுமைகளும் தலை விரித்து ஆடியது. அதனால் அன்பு வழியைக் காட்டவும் அறவழியைப் போதிக்கவும் எழுந்ததே அற இலக்கியங்கள். பதினெண்கீழ்க்கணக்கு நூல்களில் உள்ள திருக்குறள், நாலடியார், நான்மணிக்கடிகை, இன்னாநாற்பது, இனியவை நாற்பது, திருகடுகம், ஆசாரக்கோவை, பழமொழி, சிறுபஞ்சமலம், முதுமொழிக்காஞ்சி, ஏலாதி, ஆகிய பதினொரு நூல்கள் அற இலக்கியங்களாகக் கொள்ளப்படுகிறது.

தமிழ் சமூகத்தில் நீண்ட காலமாகப் பல்வேறு குலங்களுக்குள்ளும் அரசர்களுக்குள்ளும் நடந்த இடைவிடாத போர்கள் அக்கால மக்களுக்கு ஒருவித மனச்சோர்வையும் விரக்தியையும் அளித்தன. கொலை, கொள்ளை, கள் குடித்தல், பரத்தையர் ஒழுக்கம் போன்ற தீயச்செயல்கள் மிகுந்திருந்தன. இக்காலத்தில் சமய பிரச்சாரம் செய்யவந்த சமண, பௌத்த சமயங்கள் இப்போக்கைக் கண்டித்தன. சமூகத்தின் அனைத்துத் தரப்பினருக்கும் அரசன் முதல் குடிமக்கள் வரை அனைவருக்கும் புதிய கருத்துக்களையும் நீதியையும் போதித்தன. அறநூல்களின் கருத்துக்கள் பெருங்குழப்பத்தில் ஆழ்ந்திருந்த தமிழ்ச் சமூகத்திற்கு ஒருவித தெளிவைக் கொடுப்பது போல் அமைந்திருந்தன.

அறச்செயல்கள்:

வாழ்க்கை வாழ பல நெறிமுறைகள் உள்ளன. இந்த நெறிமுறைகளைக் கையாண்டு வாழும்போது தேவையற்ற பிரச்சனைகள் களையப்படுகின்றன. பல உயிர்கள் காக்கப்படுகின்றன. பெரும் சேதங்கள் நிகழாமல் அகல்கிறது நாம் வாழும் பூமியில் அமைதியை நிலைநாட்டுவது நம் ஒவ்வொருவரின் கடமை ஆகும். தேவையற்றச் செயல்களைத் தவிர்த்து உயிர்கள் இன்புற்று வாழ எது வேண்டுமோ அதை மட்டுமே மேற்கொண்டால் இவ்வுலக வாழ்வு சீராகவும் சிறப்பாகவும் அமையும். அறச்செயல்களின் தேவை எதற்கு என்று ஆராய்ந்தால் இவ்வுலக

வாழ்வை விடுத்து மறு உலக வாழ்வை அடைய ஒவ்வொருவரும் அறத்தைக் கையாள வேண்டும். அதுமட்டுமல்லாது நாம் செய்யும் நல்ல செயல்கள் நமக்குத் தெரிந்தும் தெரியாமலும் பிற உயிர்களை வாழ வைப்பதாக அமையும். ‘அறம் செய விரும்பு’ என்றார் ஓளவை. தன்னுடன் வரத் துணை வேண்டுமென்றால் அறம் செய்ய வேண்டும் என்று கூறுகிறார் விளம்பிநாகனார். இதனை,

“இன்னாமை வேண்டின் இரவெழுக, இந்நிலத்து
முன்னுதல் வேண்டின் இசைநடுக, தன்னொடு
செல்வது வேண்டின் அறம் செய்க, வெல்வது
வேண்டின் வெகுளி விடல்”

என்னும் நான்மணிக்கடிகை பாடல் வழி அறிய முடிகிறது.

“மன்னா உலகத்து மன்னுதல் குறித்தோர்
தம்புகழ் நிறீஇத் தாம்மாய்ந் தனரே” (புறம்-165)

என இவ்வுலகில் நிலையானப் புகழை நிறுவவேண்டுமானால் நல்லச் செயல்களைச் செய்து விட்டுத்தான் மறைதல் வேண்டும் என புறநானூறு புலப்படுத்துகிறது. மணிமேகலையும்,

“அறமெனப்படுவது யாதெனக் கேட்பின்
மறவா திதுகேள் மன்னுயிர்க் கெல்லாமை
உண்டியும் உடையும் உறையுளும் அல்லது

கண்டது இல்” (மணிமேகலை ஆபுத்திரனோடு அணிபல்லவமடைந்த காதை 228-230)
என அறத்திற்கு விளக்கம் தருகிறது.

“ஈதற்கு செய்க பொருள்” (நாலடி 90)என நாலடியாரும்,

நிறைநெஞ்ச உடையானை நல்குரவு அஞ்சும் (திரி 72) எனத் திரிகடுகமும்,

கண்ணுக்கு அழகு கண்ணோட்டம் (சி.மு 7) எனச் சிறுபஞ்சமூலமும் அறத்தின் தேவையை எடுத்தியம்புகின்றன.

நிலையாமை:

இந்த உலகத்தில் மாற்றங்களே மாறாதவைகளாக உள்ளன. எதையுமே நிலையானதாகக் கொள்ளமுடியாது. இப்படியான உலகில் மனிதன் உலகியல் சார்ந்து ஓடிக்கொண்டிருக்கிறான். வள்ளுவர் இதனை,

“நில்லாத வற்றை நிலையின என்றுணரும்
புல்லறி வான்மை கடை” (குறள்-331)

எனத் தன் குறள் வழி உலகுக்கு உணர்த்த முற்பட்டுள்ளார். மானிட வாழ்வு சடுதியில் மறைந்து போகும் மாய வாழ்வாகவே உள்ளது. எத்தனை உறவுகள் இருந்தாலும் எவ்வளவு செல்வங்கள் சேர்த்து வைத்திருந்தாலும் உலகெலாம் புகழ் ஒங்கி இருந்தாலும் ஒருநாள் அனைத்தையும் விட்டுவிட்டு இவ்வுலகிலிருந்து மறைந்து விடுதே மனிதத்திற்கு வகுக்கப்பட்ட நியதி. இது அனைத்து உயிர்களுக்கும் பொருந்தும். உலக நிலையாமையை உணர்ந்தவர்கள் தங்களின் முதுமையில் துன்பங்கள் வந்து சேரும் என்பதற்காக இளமையிலேயே கவனமாக அறச்செயல்களைச் செய்து வாழ்ந்திருப்பர். இளமையில் தான் விரும்பியபடி அறத்திற்குப் புறம்பாக நடப்பவர்கள் முதுமையில் துயரப்படுவார்கள். இவ்வுண்மையை நாலடியார்,

நரைவரும் என்றெண்ணி நல்லறிவாளர்
குழவி யிடத்தே துறந்தார் புரைதீரா
முன்னா இளமை மகிழ்ந்தாரே கோல்ஊன்றி
இன்னாங் கெழுந்திருப் பார் (நாலடியார்11)

என அறிவறுத்துகிறது.எவ்வளவு வெல்வம் சேர்த்தாலும் அது ஒருநாள் விட்டுச் சென்று விடும்.
எனவே தன்னிலையில் மாறாது மனிதன் வாழவேண்டும் என்பதை,

“முற்பெரு கலிற்பின் சிறுகாமை சிறந்தன்று.” (முதுமொழிக்காஞ்சி சிறந்த பத்து)

என முதுமொழிக் காஞ்சி எடுத்துரைக்கிறது.

“காலும் இரண்டும் முகட்டலக் கொன்றுள
பாலுள் பருங்கழி முப்பத்தி ரண்டுள
மேலுள் கூரை பிரியும் பிரிந்தால்முன்
போலுயிர் மீளப் புகஅறி யாதே” (திருமந்திரம் யாக்கை நிலையாமை 5)

நன்றி உணர்வு:

நன்றி உணர்வு நானிலத்தைக் காக்கும் உயர் கவசம். மானிடத்தின் உணர்வில் நன்றியறிதல் காணாமல் போய்க்கொண்டிருப்பது மிகவும் வேதனைக்குரியது. தக்கநேரத்தில் செய்யும் உதவியானது தலைமுறையைக் காக்கும் இயல்படையது. உற்ற நேரத்தில் செய்யப்படும் உதவி உலகைக்காக்கம் சிறப்படையது. இதனையே குறள்

“காலத்தினாற் செய்த உதவி சிறிதென்னும்
ஞானத்தின் மாணப் பெரிது”

என்று குறள் குறிப்பிடுகிறது. நன்றி உணர்வில்லாதவர்களைக் கீழோர் என நாலடியார் குறிப்பிடுகிறது. இதனை,

“தினையனத்தே யாயினும் செய்நன்றுண்டால்
பணையனத்தா உள்ளுவர் சான்றோர் - பணையனத்து
என்றும் செயினும் இலங்கருவி நன்னாட
நன்றில நன்றியாரார் மாட்டு” (நாலடி 344)

என்ற வரிகளில் மெய்ப்பிக்கிறது.

நன்றிப் பயன் தூக்கா நாணிலி எச்சம் இழந்து வாழ்வார் (திரி 62)

என திரிகடுகமும்,

நன்றிப் பயன் தூக்கி வாழ்தல் நனியினிது (இனி நாற் 30)

என இனியவை நாற்பதும் நன்றியறிதலின் பெருமையை வரையறுக்கின்றன. புறநானூற்று வரிகளில்,

“நிலம்புடை பெறர்வதாயினும் மொருவன்
செய்தி கொன்றோர்க் குய்தி யில்லென
அறம்பா டிற்றே” (புறம் 34:4-5)

என்று கூறப்பட்டிருப்பது நன்றியறிதலின் உயர்வை யாவரும் புரிந்து கொள்ளும் வண்ணம் அமைந்துள்ளது.

முடிவுரை:

முன்னோர் வகுத்த அறநெறிகளை கடைபிடித்து வாழ்வது மானிடத்தின் தலையாய் கடமைகளில் ஒன்று. நல்ல செயல்களைச் செய்ய ஆராயவேண்டிய தேவை இல்லை. பிற உயிர்களிடம் அன்பு காட்டுவதுடன் அடைக்கலம் கொடுக்கவும் மானிடத்தின் இயல்பாக அமைதல் வேண்டும். தாவி ஓடும் நதிபோல் வாழவும் ஓர்நாள் தாவி மறைந்துவிடும். கொஞ்சநாள் உலகில் கொஞ்சமேனும் அறத்தை கடைபிடித்தால் கொஞ்சமேனும் உய்வடைய வழிபிறக்கும். அறநூல்களை அறிந்து அவற்றின் கருத்துகளைப் போற்றி கடைபிடித்து வாழ்வில் இனிமையடையும் நிலையை எய்துவோம்.

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2. இராமநாதபிள்ளை (வி.உ) 1942 திருமந்திரம், திருநெல்வேலி தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்புக்கழகம், திருநெல்வேலி.
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தமிழ் வளர்த்த கிறிஸ்தவம்

செ. சுனிதா

தமிழ்த்துறை, திருச்சிலுவை கல்லூரி (தன்னாட்சி), நாகர்கோவில் - 629004.

மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம், திருநெல்வேலி - 627012.

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ஆய்வுச்சுருக்கம்

தமிழ்நாட்டில் பண்டைக்காலத்தில் பல சமயங்கள் இருந்தன என்பதை நாம் அறிவோம். தமிழ்நாட்டில் இருந்த சைவ, வைணவ சமயங்களும் தமிழ்நாட்டிற்கு வந்த சமண, பௌத்தம் போன்ற மதங்களும் தமிழ் வளர்ச்சிக்கு எப்படி உறுதுணையாக இருந்தனவோ அதுபோல், கிறிஸ்தவ மதமும் தமிழ்நாட்டிற்கு வந்து தமிழில் சில மாற்றங்களை செய்து தமிழ் வளர வழிவகுத்தது எனலாம். தமிழ்நாட்டிற்கு சமயப்பணி புரியும் நோக்குடன் கிறிஸ்தவப் பெரியோர்கள் பலர் வந்தனர். ஜாண்பிரிட்டோ, பெர்னாண்டசு, இராபர்ட் நோபிலி, வீரமாமுனிவர், போப்பையர், கால்டுவெல் போன்ற மேனாட்டார் செய்த தொண்டினால் கிறிஸ்தவ சமயமும் தமிழும் வளர்ந்தன. அவர்களில் ஒருசிலரைப் பற்றி மட்டுமே இக்கட்டுரையில் ஆய்வுசெய்யப்பட்டுள்ளன.

முன்னுரை

தமிழ், இலக்கியச் செழுமைக்குப் பெயர் பெற்ற மொழி. அழகும், ஆழமும் நிறைந்த செய்யுள்களாலும், பாடல்களாலும் தமிழ் இலக்கிய உலகம் ஆழமாக வளர்ந்திருந்தன. தமிழ் மொழிக்கு ஒரே ஒரு குறை மட்டுமே இருந்தது. பதினாறாம் நூற்றாண்டின் துவக்கத்தில் தமிழில் உரைநடை நூல்கள் இல்லை. வெறும் பாடல்கள் மட்டுமே இலக்கியத்தில் இருந்தன. உரையிடையிட்டப் பாட்டுடைச் செய்யுள்கள் கூட கவிதையாகவே அமைந்திருந்தன.

ஓலைச் சுவடிகளில் ஆணிகளால் எழுதிக் கொண்டிருந்த காலம் அது. பக்கம் பக்கமாக உரைநடையை எழுதுவது சுலபமில்லை. எழுதும் வேலை குறைவாகவும், அது தரும் பயன் மிக அதிகமாகவும் இருக்க வேண்டும் என்பதுதான், அந்தக் காலப்புலவர்களின் எண்ணமாக இருந்தன. எனவே அவர்கள் கவிதைகளையே இலக்கியத்துக்கான வடிவமாக்கிக் கொண்டார்கள். இதனால் உரைநடை இலக்கியம் தமிழில் வளரவில்லை. இருந்த சில உரைநடை நூல்களில் பெரும்பாலானவை சமஸ்கிருதத்திலேயே அமைந்திருந்தன.

உரைநடை இலக்கியம்

உரைநடை இலக்கியங்களால்தான், மக்களுக்குத் தகவல்களை மிக விரைவாக, எளிதாக விளக்க முடியும். கவிதைகளை மனப்பாடம் செய்து, அவற்றின் பொருளறிந்து கற்பதற்கு ஏராளமான நேரத்தைச் செலவிட வேண்டி இருந்ததால், உரைநடை இலக்கியத்தின் தேவை இன்றியமையாத ஒன்றாக இருந்தன.

தமிழின் முதல் உரைநடை நூல்

தமிழின் முதல் உரைநடை நூலை எழுதிய பெருமை இயேசு சபை பாதிரியார்களையே சாரும். கிறிஸ்தவ மதத்தைப் பரப்புவதற்காக வந்த அவர்கள், முதலில் மொழியைக் கற்றார்கள். அவர்களில் பலர் நல்ல தரமான இலக்கிய நூல்களைப் படைக்குமளவுக்கு மொழியறிவுப் பெற்றார்கள். கி.பி.1577-ல் 'கிறிஸ்தவ வேதோபதேசம்' என்ற உரைநடை நூல் வெளியிடப்பட்டது. இதுதான் தமிழில் வெளியான முதல் உரைநடை நூல். இந்நூல் வெளியாகி, இரண்டு ஆண்டுகளுக்குப் பின் 'கிறிஸ்தவ வணக்கம்' என்ற நூல் ஆணிக் என்ற பாதிரியாரால் அச்சிடப்பட்டது. அதன்பின் பதினேழாம் நூற்றாண்டில் வாழ்ந்து வந்த ராபர்ட் நோபிலி,

பதினெட்டாம் நூற்றாண்டின் தொடக்க காலங்களில் வாழ்ந்து வந்த வீரமாமுனிவர் போன்றோர் பல உரைநடை நூல்களை இயற்றினார்கள்.

உரைநடை நூலின் வளர்ச்சி

பதினாறாம் நூற்றாண்டிலேயே உரைநடை நூல் அறிமுகம் ஆகியிருந்தாலும் அது வளரத் தொடங்கியது பத்தொன்பதாம் நூற்றாண்டில்தான். அதுவரை மிகவும் குறிப்பிட்ட நூல்கள் மட்டுமே தமிழ் உரைநடை வடிவில் எழுதப்பட்டன. இடைப்பட்ட நூற்றாண்டுகளில் உரைநடை வளரவேயில்லை என்பது வியப்பளிக்கிறது. பத்தொன்பதாம் நூற்றாண்டில் அச்சுப்பொறிகள் ஆங்காங்கே நிறுவப்பட்டதால் உரைநடை நூல்கள் ஏராளம் வெளிவந்தன. கிறிஸ்தவ மதத்தைப் பரப்புவதற்காக எளிய விலையிலும், இலவசமாகவும் நூல்களும் பிரசுரங்களும் அச்சிடப்பட்டன.

கிறிஸ்தவர்களின் புதிய அணுகுமுறை இந்தியாவிலிருந்து பிற மதத்தினரை எழுச்சிக்கொள்ளச் செய்தன. அவர்களும் தங்கள் பங்குக்கு நூல்களையும் பிரசுரங்களையும் அச்சிட்டு வெளியிட்டார்கள். தமிழ் மொழியில் உரைநடை நூல்கள் ஏராளம் வரத் தொடங்கின. இந்த அச்சுநூல்கள், விலையில் மிகவும் குறைவாகக் கிடைத்ததாலும், பல நூல்கள் இலவசமாகக் கிடைத்ததாலும் சமூகத்தின் கீழ்த்தட்டு மக்களாலும் மிக எளிதாக நூல்களைப் பெற முடிந்தது. மதப் பிரச்சாரத்தின் வெளிச்சத்தில் தமிழ் உரைநடை வளர்ந்தது.

அச்சுப்புத்தகங்களின் வரவு, இலக்கிய வளர்ச்சியில் மிக முக்கியமான ஒரு திருப்புமுனையாக அமைந்தது. இந்தியாவிலேயே முதன் முதலில் அச்சு ஆரம்பித்தது தமிழ் மொழியில்தான். அதையும் செய்தது இயேசுசபை பாதிரியார்கள்தான். அச்சுப்பொறிகள் முதலில் கேரளாவிலுள்ள கொச்சியில்தான் நிறுவப்பட்டன. அதன்பின்னர் திருநெல்வேலியிலுள்ள புன்னைக்காயல் என்ற இடத்தில் அச்சுப்பொறி ஒன்று நிறுவப்பட்டது. தமிழின் முதல் உரைநடை நூல்கள் இரண்டுமே கேரளாவில் அச்சிடப்பட்டதாக நம்பப்படுகிறது.

அச்சுத்தொழிலின் முடக்கம்

இந்தியாவின் வணிக மாற்றங்கள் அச்சுத் தொழிலில் ஒரு தேக்கத்தை ஏற்படுத்தின. இயேசு சபை பாதிரியார்களை டச்சுக்காரர்கள் விரட்டியடித்தார்கள். எனவே, அச்சுத்தொழிலும் முடங்கியது. அதன்பின் ஸீகன்பால்கு என்னும் டேனிஷ் சபையைச் சேர்ந்தவரின் முயற்சியால் ஜெர்மனியிலிருந்து அச்சுப்பொறிகளும் அச்சு எழுத்துக்களும் வரவழைக்கப்பட்டு தரங்கம்பாடியில் அச்சுக்கூடம் நிறுவப்பட்டன. 1713-ம் ஆண்டில் நிறுவப்பட்ட இந்த அச்சுப்பொறி, பல நூல்களைப் பதிப்பித்தது. இந்தியர்கள் அச்சுப்பொறி தயாரிக்கக்கூடாது என்ற சட்டம் கூட அந்தக் காலத்தில் இருந்தது. அந்தச் சட்டம் 1835-ல் தான் விலக்கிக் கொள்ளப்பட்டது. அதன்பின்னர் அச்சுத்தொழில் அசுர வளர்ச்சி கண்டது.

தமிழ்மொழியின் வளர்ச்சி

கிறிஸ்தவ மதத்தினரின் மதப்பிரச்சாரம் ஒருவகையில் தமிழ்மொழியை வளர்ச்சியடையச் செய்தது என்றால் அது மிகையல்ல. தமிழ் மீது தணியாத தாகம்கொண்டு இதை அவர்கள் செய்யவில்லை என்றாலும் கிறிஸ்தவத்தைப் பரப்ப வேண்டுமெனில் தமிழ் மொழி தெரிந்திருக்க வேண்டும் என்பதை அவர்கள் அறிந்திருந்தார்கள். எனவே அவர்கள் தமிழ் மொழியைக் கற்று, மொழிபெயர்ப்பு இலக்கியங்களையும் படைப்பு இலக்கியங்களையும், அச்சு, உரைநடை போன்ற தளங்களையும் விரிவுபடுத்தினார்கள்.

தமிழ் மொழியின் வளர்ச்சிக்கு தொண்டாற்றிய மேனாட்டு கிறிஸ்தவர்களுள் ஒருசிலர் :-

பூணூல் போட்ட கிறிஸ்தவர் ராபர்ட் டி நோபிலி – தத்துவ போதக சுவாமிகள்

கி.பி.1606-ல் தமிழ்நாட்டுக்கு வந்த நோபிலி இத்தாலி நாட்டைச் சேர்ந்தவர். இயேசு சபையைச் சேர்ந்த இவர் மதுரைக்கு வந்தபோது, தமிழகத்தில் வேரோடிப் போயிருந்த சமயப் பிரிவினைகளை முதலில் கவனித்தார். பெரும்பாலான மதச்செய்திகள் எல்லாம் அடித்தட்டு மக்கள், அல்லது கீழ்ச்சாதி என்று சொல்லப்படுகிற மக்களை மட்டுமே சென்று சேர்கிறது என்றும், உயர்குல இந்துக்கள் கிறிஸ்தவத்தை நிராகரித்தார்கள் என்பதையும் அவர் புரிந்து கொண்டார். உடனே அவருடைய பார்வை, உயர்குல இந்துக்களின் மேல் விழுந்தது. அவர்களை கிறிஸ்தவ மதத்துக்கு மாற்ற வேண்டும் என்று திட்டமிட்டார்.

அதற்கு இன்னொரு காரணமும் இருந்தது. உயர்குல இந்துக்கள் மட்டுமே கல்வியறிவுடனும், சமூக மரியாதைக்குரிய மனிதர்களாகவும் இருந்தார்கள். எனவே, அவர்கள் கிறிஸ்தவ மதத்தைத் தழுவினால் கிறிஸ்தவம் மிக வேகமாக வளரும் என்பது அவருடைய கணிப்பு. அவர் உயர்குல இந்துக்களின் நடைஉடை பாவனைகளையும், உணவுப் பழக்கவழக்கங்களையும் முதலில் கண்டறிந்தார். அவர்களுடைய அடையாளங்கள் என்னென்ன என்பதையும், சாஸ்திர சம்பிரதாயங்களையும் ஆழமாகக் கவனித்தார். அவர்களிடம் இருந்த தீண்டாமை என்ற சாஸ்திரம்தான், கிறிஸ்தவத்தை கொண்டு செல்ல மிகப்பெரும் தடையாக இருக்கிறது என்பதை அவர் அறிந்து கொண்டார்.

பிராமணர்களைப் பற்றி நன்கு புரிந்துகொண்ட நோபிலி, ஒரு பிராமணர்போல வேடமிட்டார். தங்க பூணூல் அணிந்தார். நெற்றியிலும் மார்பிலும் சந்தனம் பூசினார். அசைவ உணவை ஒதுக்கிவிட்டு, சைவ உணவை மட்டுமே உண்டார். பெயரையும் தத்துவ போதக சுவாமிகள் என்று மாற்றிக் கொண்டார். அவருடைய வேடத்தை நம்பினாலும் அவரை பிராமணர் என்று நம்புமளவுக்குப் பூர்வீக பிராமணர்கள் முட்டாள்கள் இல்லை எனவே, அவரைச் சோதித்தார்கள்.

அவர்களை சமாளிக்க நோபிலி ஒரு திட்டமிட்டார். மிகவும் பழைய ஓலை ஒன்றில் சமஸ்கிருதத்தில் ஒரு ஸ்லோகம் எழுதினார். அதில் ரோமில் உள்ள இயேசு சபைப் பாதிரியார்கள் உண்மையிலேயே பூர்வீக பிராமணர்கள் என்று குறிப்பிட்டு அனைவரையும் நம்பச் செய்தார். அதற்குப் பிறகு நோபிலியால் உயர் குல மக்களோடு உறவாட முடிந்தது. பலருக்குக் கிறிஸ்தவ மதத்தைப் பற்றி விளக்கினார். அவர்களை தன்பால் இழுத்தார்.

உரைநடை நூல்கள்

தமிழ் மொழியை நன்றாகக் கற்றுதேர்ந்த இவர், ஏராளமான உரைநடை நூல்களை எழுதினார். பல கிறிஸ்தவத் தத்துவங்களை தமிழ் மொழியில், தமிழ் மக்களுக்காக எழுதினார். இயேசு நாதர் சரித்திரம், ஞானோபதேச காண்டம், நித்திய ஜீவன் சல்லாபம் உள்பட பதினேழு உரைநடை நூல்களை தமிழ் மொழியில் எழுதினார்.

இவருடைய இந்த வேட அணுகுமுறையைக் கிறிஸ்தவத் தலைமையிடம் கண்டித்து யாரையும் ஏமாற்றி மனம் மாற்றுதல் தவறு என்று கடிந்து கொண்டது. தான் யாரையும் ஏமாற்றும் நோக்கத்தில் இதைச்செய்யவில்லை என்றும், உயர்குல இந்துக்களை நெருங்கிப் பழகும் ஒரு வாய்ப்பை ஏற்படுத்திக் கொள்ளவே அப்படி நடந்து கொண்டதாகவும் நோபிலி விளக்கினார். கிறிஸ்தவ மதத்தை பரப்புவதற்காகத் தன்னுடைய விருப்பு வெறுப்புகளை விட்டு ஓர் உயர்குல இந்துவைப்போல நடந்து கொண்டது, பார்வைக்குத் தவறாக இருந்தாலும் அடிப்படையில் அவர்

நிறைவேற்றியது 'எல்லா இனத்தாருக்கும் நற்செய்தியை அறிவியுங்கள்' என்ற இயேசுவின் கட்டளையைத்தான் என்று கூறி ரோம் இவர் குற்றமற்றவர் என்று அறிக்கை வெளியிட்டது.

இந்தச் சலசலப்புகள் வெளியே தெரிய ஆரம்பித்தன. உண்மை தெரிந்த உயர்குல இந்துக்கள், இவரைப் புறக்கணித்தார்கள். இவரை யாரும் சேர்த்துக் கொள்ளவில்லை. தனக்கு மதுரை உயர்குல மக்களிடம் இருந்த ஆதரவு விலகிவிட்டதை அறிந்த நோபிலி, வட தமிழகத்துக்குத் தன்னுடைய பணியை மாற்றிக்கொண்டார். கி.பி.1656-ல் சென்னையில் காலமானார்.

வீரமாமுனிவர் - கான்ஸ்டண்டைன் ஜோசப் பெஸ்கி

போர்ச்சுகீசியரான வாஸ்கோடகாமா, ஐரோப்பாவிலிருந்து இந்தியா வருவதற்கான கடல்வழியைக் கண்டுபிடித்தப்பின் போர்ச்சுகீசியர், டச்சுக்காரர், பிரெஞ்சுக்காரர், ஆங்கிலேயர் ஆகியோர் இந்தியாவோடு கடல் வணிகம் மேற்கொண்டனர். ஐரோப்பியர் வருகையும் ஆங்கிலத்தின் செல்வாக்கும், மேனாட்டுக் கிறிஸ்தவர்களின் தொடர்பும் தமிழ் புதிய திசையில் பயணம் செய்ய வாய்ப்பு ஏற்படுத்திக் கொடுத்தன. அவ்வகையில் தமிழ் மொழியின் வளர்ச்சியில் சமய தொண்டாற்ற வந்த கிறித்துவப் பாதிரிமர்களின் பணி முக்கிய பங்கு வகிக்கிறது. அவர்களில் வீரமாமுனிவர் தமிழ் மொழிக்கு ஆற்றியுள்ள பணி போற்றத்தக்கது. தமிழ் எழுத்தில் அவர் செய்த சீர்திருத்தம் மகத்தானது.

கான்ஸ்டான்டியன் ஜோசப் பெஸ்கி என்பது இவருடைய இயற்பெயர். இதற்கு தைரியநாதர் என்று பொருள். பன்மொழி வித்தகர். உலகபொதுமறை என்று போற்றப்படும் திருவள்ளுவரின் திருக்குறள் வெளிநாட்டவரின் கவனத்தை ஈர்த்தது என்றால் தமிழர்களின் பெருமையையும், தனிச்சிறப்பு வாய்ந்த மொழியையும் பண்பாட்டையும் இலத்தீன் மொழி பெயர்ப்பால் ஐரோப்பிய நாடுகளுக்கு முதன் முதலில் வெளிப்படுத்திய பெருமைக்குரியவர் வீரமாமுனிவர் ஆவார். 1710-ல் இந்தியா வந்தார். தூத்துக்குடியை சேர்ந்த கடற்கரைப் பகுதிகளில் சில காலம் தங்கியிருந்தார். அப்போது தமிழை நன்றாகக் கற்றுக்கொண்டார். தனது இறைபணிக்கு மொழி தடையாக இருக்கக்கூடாது என்பதற்காக தமிழ் மொழியைக் கற்று தேர்ந்தார். தமிழ் மொழியில் புலமைப் பெற்ற பிறகு தம்பெயரை வீரமாமுனிவர் என்று மாற்றிக் கொண்டார். தமிழின் மரபினை அடிப்படையாகக் கொண்டு காப்பியம் பாடினார். கவிதைகள் புனைந்தார். இலக்கண நூல்கள் இயற்றினார். உரைகள் எழுதினார். முதல் தமிழ் அகராதி வீரமாமுனிவரால் இயற்றப்பட்டது. இருமொழி அகராதி, பன்மொழி அகராதிகள் உருவாக்கினார். மொழிபெயர்ப்பு, இலக்கணப்பணி, அகராதிப்பணி, ஆய்வு நெறிப்பணி என பல வகையில் தமிழுக்குத் தொண்டு செய்தார்.

நாகரிகம் தோன்றுவதற்கு முன்பே, மக்கள் இனக்குழுக்களாக இயங்கி வந்த போது ஓய்வு நேரங்களில் சக மனிதர்களிடம் தொடர்பு கொள்வதற்கும், குடும்ப உறவினர்களுடன் பொழுதை கழிக்கவும் கதைக்கூறும் மரபைக் கையாண்டு வந்துள்ளனர். மக்கள் மத்தியில் கதைகளுக்கு நல்ல செல்வாக்கு இருப்பதை உணர்ந்த அறிஞர்கள் தம் கற்பனை வளத்தையும் மக்களிடையே வழங்கி வந்த கதைகளையும் இணைத்து புதிய கதைகளைப் புனைந்தனர். இக்கதைகள் அறக்கருத்துக்களை வலியுறுத்தவும், சமய கருத்துக்களை பரப்பவும், பொதுமக்களுக்கு மகிழ்ச்சியூட்டவும் பயன்பட்டன. கற்றுவல்ல அறிஞர்கள் தாங்கள் இயற்றிய

செய்யுள்களிலும் காப்பியங்களிலும் கதைகள் இடம்பெறச்செய்தனர். உரையாசிரியர்களும் கதைகளைச் சான்றாகப் பயன்படுத்தினர்.

தமிழின் முதல் காப்பியமாகிய சிலப்பதிகாரத்தில் கீரிப்பிள்ளையை கொன்ற பார்ப்பனிய பெண்ணின் கதை பஞ்சதந்திரக் கதையை சிறு மாறுதலுடன் எடுத்தாளப்பட்டுள்ளது.

மக்களிடையே வழங்கிய வாய்மொழிக்கதைகள் தமிழ் இலக்கியங்களிலும் உரைநூல்களிலும் பயன்படுத்தப்பட்ட போதிலும் 19-ம் நூற்றாண்டு வரை அக்கதைகள் நூலாகத் தொகுக்கப்படவில்லை. தமிழில் உரைநடை வளர்ச்சியுறாமையே இத்தகைய நிலைக்குக் காரணமாகும். 19-ம் நூற்றாண்டிலேயே தமிழ் உரைநடையின் நிலை இவ்வாறு இருந்ததென்றால் 18-ம் நூற்றாண்டில் உரைநடையின் நிலை எவ்வாறு இருந்திருக்கும் என்று நம்மால் புரிந்து கொள்ள முடிகிறது. சமய கருத்துக்களையும் அறிவுரைகளையும் கூற மட்டுமே பயன்பட்டு வந்த உரைநடையை வீரமாமுனிவர் மாற்றி வேடக்கைக் கதையொன்றினை எழுதித் தமிழ் உரைநடையில் கதை எழுதும் பணியினைத் துவக்கினார்.

பரமார்த்த குரு என்ற குருவையும், மட்டி, மடையன், பேதை, மிலேச்சன், மூடன் என்ற அவரது ஐந்து சீடர்களையும், அவர்களது மூடத்தனமான செயல்களையும் 1. ஆற்றைக்கடந்த கதை 2. குதிரை முட்டை வாங்கின கதை 3. வாடகை மாடேறிப் பிராயணம் போனது 4. குதிரை பிடிக்கத் தூண்டில்விட்ட கதை 5. குதிரை மேனினூருக்குப் போன கதை 6. பிராமணன் சொன்ன புரோகிதக்கதை 7. குதிரையிலிருந்து விழுந்த கதை 8. குருவை சேமித்த கதை என்னும் எட்டுக் கதைகளை நகைச்சுவை ததும்பச் சித்தரித்துள்ளார். இந்த எட்டுக் கதைகளும் ஒரு தொடர்புடையனவாக அமைந்திருந்தாலும் ஒவ்வொன்றும் ஒரு தனிக்கதையாக அமைந்துள்ளன.

தமிழ்நாட்டில் வழங்கிவந்த கதைகளையும், தாம் அறிந்திருந்த பிறமொழிக் கதைகளையும் தம் கற்பனையில் தோன்றிய கதைகளுடன் இணைத்தே இந்நூலை உருவாக்கியுள்ளார். இக்கதையில் உப்புமுட்டை சுமந்து செல்லும் கழுதை ஆற்றில் விழ, உப்பு கரைந்துபோதல், ஆற்றைக்கடக்கும் பொறாமை உணர்வு கொண்ட நாய் தன் நிழலைக்கண்டு சண்டையிட்டு வாயில் கவ்வியிருந்த கறித்துண்டை இழத்தல் என்ற இரண்டு கதைகள் “ஆற்றைக் கடந்த கதையில்” கிளைக்கதைகளாக வருகின்றன. இவ்விரண்டு கதைகளும் ஈசாப் நீதிக்கதைகளாகும்.

குதிரை மேனினூருக்குப் போன கதையில் சிறுநீருக்கு வரிபோட்ட மன்னன் ஒருவரின் செயல் கூறப்பட்டுள்ளது. இது இலத்தீன் எழுத்தாளர் ‘பூவன்ஸ்’ என்பவரின் அங்கத நூலிலிருந்து எடுத்த நிகழ்ச்சியென்று மறைத்திரு ஞானப்பிரகாசம் அடிகளார் கூறியுள்ளார். குருவை சேமித்த கதையில் வரும் ‘உலக்கைப் பூசை’ குறித்த கதை தமிழ்நாட்டில் வழங்கும் வாய்மொழிக்கதையாகும்.

இக்கதையில் மிளிர்ந்த நகைச்சுவை மக்களைப் பெரிதும் கவர்ந்ததால் தெலுங்கு, மலையாளம், கன்னடம் போன்ற தென்னக மொழிகள் பலவற்றிலும் இதுவெளிவந்தது. இந்நூல் வீரமாமுனிவரால் எழுதப்பெற்ற தழுவு நூலாகும். ஐரோப்பாவில் பிரபலமாக இருந்த நடையை வீரமாமுனிவர் தமிழ் பண்பாட்டிற்கேற்ப மொழிபெயர்த்தார். வீரமாமுனிவரின் உரைநடை எப்படி இருந்தது என்பதை அறிய விரும்புவோருக்கு மூலநூல் கிடைப்பதில்லை.

தமிழின் முதல் அச்சநூலான ‘தம்பிரான் வணக்கம்’ தொடங்கிப் பல நூல்களை கிறிஸ்தவ பாதிரிமார்கள் உரைநடையில் எழுதியுள்ளனர். வீரமாமுனிவர் எழுதியுள்ள

முப்பதுக்கும் மேற்பட்ட நூல்களில் உரைநடைநூல்கள் வேதியர் ஒழுக்கம் வேதவிளக்கம், பேதகம் மறுத்தல், லூத்தர் இயல்பு, பரமார்த்த குரு கதை போன்ற நூற்கள் ஆகும்.

வீரமாமுனிவர் கிறிஸ்தவ சமயத்தின் வழியாக சிற்றிலக்கியங்களைப் பாடி தமிழ்த்தொண்டாற்றியுள்ளார். கொள்ளிடத்தில் வடகரையில் உள்ள திருக்காவலூர் என்னும் ஊரில் எழுந்தருளியுள்ள அடைக்கல மாதாவைப் பற்றி 'திருக்காவலூர் கலம்பகம்' பாடியுள்ளார். கிறிஸ்தவ சமய நவ கன்னியருள் ஒருவரான கித்தேரி அம்மையாரின் திருவுருவத்தை திருக்காவலூரில் அமைத்து அவர் பெருமையை அம்மாணை நூலாக இயற்றினார். இது கித்தேரி அம்மாள் அம்மாணை என்று வழங்கப்பெறுகிறது. மேலும் தஞ்சையை ஆண்ட மராட்டிய மன்னனால் துரத்தப்பட்டபின் கிறிஸ்தவர்களுக்கு அடைக்கலம் கொடுத்துக் காத்த தேவமாதாவின் மேல் 'அடைக்கல நாயகி வெண்பா' என்ற இலக்கியத்தைப் படைத்தார். மட்டுமின்றி தமிழிலுள்ள நயமான நீதிகளை எல்லாம் தொகுத்துத் 'தமிழ் செய்யுள் தொகை' என்ற நூலை வெளியிட்டார். இவை தவிர 'கருணாகரப் பதிகம்' என்ற நூலையும் அன்னை அழுங்கல் அந்தாதி என்ற சிற்றிலக்கியங்களையும் தமிழுக்கு வழங்கிச் சிறப்பித்துள்ளார். தமிழுக்கு பல நன்மைகள் செய்து, தமிழ் மூலம் கிறிஸ்தவத்தின் வளர்ச்சிக்கும் தன்னாலான பங்களிப்பை அளித்த வீரமாமுனிவர் 1742-ல் காலமானார்.

ஸீகன் பால்கு

கிறிஸ்தவ மதத்திலுள்ள புராட்டஸ்டண்ட் பிரிவிலிருந்து முதன் முதலாக இந்தியாவுக்கு வருகைத் தந்தவர். தன்னுடைய நண்பர் பிளிஷெள என்பவருடன் 1705-ம் ஆண்டு தரங்கம்பாடிக்கு வந்து சேர்ந்தார். இவர், ஜெர்மன் நாட்டிலுள்ள புல்ஸ்னிட்ஸ் என்ற நகரில் பிறந்தவர். டென்மார்க் நாட்டின் அரசன் நாலாம் ஃபரெடிக் என்பவர் தமிழ்நாட்டுக்கு மதபோதகர்களை அனுப்பவேண்டும் என்று விரும்பி அழைப்பு விடுத்தார். இதைக்கேள்விபட்ட ஜெர்மன் நாட்டு ஸீகன் பால்க் தன்னுடைய நண்பருடன் டென்மார்க் நாட்டு அரசரைச் சென்று சந்தித்து தமிழ்நாட்டுக்குப் பயணமானார்.

சிறுவயதிலிருந்தே இறை பக்தியில் சிறந்த விளங்கிய ஸீகன் பால்க் தமிழ்நாட்டில் கிறிஸ்தவ மதத்தைப் போதிக்கத் தொடங்கினார். மொழி அவர்களுக்கு ஒரு தடையாக இருந்தது. கற்றுக்கொண்ட தமிழை வைத்து இறைபணி செய்து வந்தார். வீரமாமுனிவரைப்போல, இவர் தமிழில் பெரும் புலமை பெற்றவரில்லை. மதத்தை எடுத்துரைக்குமளவுக்குக் கற்றிருந்தார்.

இவர் செய்த மிகப் பெரும்பணி ஜெர்மனியிலிருந்து அச்சு இயந்திரத்தையும் தமிழ் எழுத்துக்களையும் வரவழைத்ததுதான். இதன் மூலம் ஏராளமான உரைநடை நூல்கள் பொதுமக்களிடையே பெருமளவு புழங்கின. கிறிஸ்தவ மதத்தைப் பரப்பவும், தமிழ் மொழியை வளர்க்கவும் இந்த அச்சு இயந்திரங்கள் உதவின. ஆலயங்கள், கல்வி நிலையங்கள் போன்றவற்றை ஏற்படுத்தியும், கிறிஸ்தவ மதம் சார்ந்த நூல்களை தமிழ் மொழியில் மொழி பெயர்த்தும் கிறிஸ்தவ மதம் வளர மிகப்பெரும் தூணாக நின்றார். இவர் மூலமாகத்தான் புராட்டஸ்டண்ட் கிறிஸ்தவமதம் இந்தியாவில் முளைவிட்டது. 1719-ம் ஆண்டு இவர் மரணமடைந்தார்.

மதப் பிரச்சாரத்தில் மேலும் சிலர்

ஸீகன் பால்குக்குப் பின் பிரான்சிஸ் வயிட் எல்லிஸ் என்ற ஆங்கிலேயர் கிறிஸ்தவ மதத்தைப் பரப்புவதில் ஈடுபட்டார். இவர் வீரமாமுனிவரின் வாழ்க்கை வரலாறு, அவர் எழுதிய

நூல்கள் போன்றவற்றை அச்சில் கொண்டுவந்தார். திருக்குறளின் முதல் பதிமூன்று அதிகாரங்களை ஆங்கிலத்தில் மொழிபெயர்த்தார். பலரை கிறிஸ்தவ மதத்துக்குள் கொண்டு வந்த இவர், 1819-ல் காலமானார்.

இவருக்குப்பின் சார்லஸ் தியோபிலஸ் எட்வர்ட் இரேனியஸ் என்ற ஜெர்மனியர் 1814-ல் சென்னைக்கு வந்தார். இவர் லூத்தரன் மிஷன் என்ற கிறிஸ்தவ மதப்பிரிவைச் சார்ந்தவர். இறைபணியைப் பெரும்பாலும் மனிதநேய பணிகளின் மூலமாக வெளிப்படுத்தினார். விதவைகள் மறுவாழ்வு, பள்ளிக்கூடங்கள் கட்ட நிலம் வாங்கிக்கொடுத்தல், ஆலயங்கள் கட்ட உதவுதல், ஏழைகளின் வறுமை போக்க உதவுதல் எனப் பலச் செயல்களைச் செய்தார். மக்களோடு மக்களாக வாழ்ந்தார். இவருடைய பணிகளில் கவரப்பட்டு பலர் கிறிஸ்தவத்தை ஏற்றுக்கொண்டனர். 1838-ம் ஆண்டு இவர் காலமானார்.

அயர்லாந்துக்காரரான ராபர்ட் கால்டுவெல் தென் தமிழகத்தில் ஏராளமான கிறிஸ்தவர்கள் உருவாக பெரும் பங்காற்றியவர். திருநெல்வேலியை அடுத்துள்ள பகுதிகளில் இவருடைய போதனைகள் காரணமாக, சில நூறுகளாக இருந்த கிறிஸ்தவர்களின் எண்ணிக்கை லட்சத்தை தாண்டியது. 'திராவிட மொழிகளின் ஒப்பிலக்கணம்' என்ற நூலை எழுதிய இவர் அதனை ஆங்கிலத்தில் மொழி பெயர்த்துள்ளார், 'நற்கருணைத் தியான மாலை', 'தாமரைத் தடாகம்' போன்றவை இவர் இயற்றிய பிற நூல்கள். 1891-ம் ஆண்டு இவர் காலமானார்.

முடிவுரை

உலகின் மூத்த மொழியாம் தமிழ்மொழியின் வளர்ச்சியில் பல சமயங்களின் பங்களிப்பு இருந்தாலும் மேனாட்டு கிறித்துவச் சான்றோர்களின் தொண்டுகள் மகத்தானது. அவர்களுள் வீரமாமுனிவரின் அரும்பெரும் தொண்டுகள் தமிழ்மொழிக்குக் கிரீடம் போன்றன. தமிழ்மொழி வளர்ச்சியில் புரட்சியை ஏற்படுத்திய வீரமாமுனிவர் ஆற்றிய சிறந்த பணிகள் தமிழ் கூறும் நல்லுலகம் இருக்கும்வரை சிறந்து இருக்கும். எழுத்துச் சீரமைப்புப் பணியிலிருந்து தொகுப்பு, அகராதி மொழிபெயர்ப்பு, ஒப்பிலக்கணம், இலக்கணம், உரைநடை, சிற்றிலக்கியம், காப்பியம், இலக்கியம் இவைகளையெல்லாம் எடுத்தியம்பிய இம் மேனாட்டுச்சான்றோர்களால்தான் தமிழன்னை வளம் பெற்றிருக்கிறாள்.

இன்றும் கிறிஸ்தவ சமயமானது பல்வேறு இலக்கியங்களால் தமிழ்மொழியின் வளர்ச்சிக்கு சிறந்தப் பணி ஆற்றி வருகின்றது என்பதில் எள்ளளவும் ஐயமில்லை.

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ஆய்வுச்சுருக்கம்

மனித இனத்தின் அடிப்படைத்தேவைகளில் ஒன்று உணவு. இத்தகு உணவினை தமிழினம் போற்றிப்பாதுகாத்தது. ஆரோக்கியமான உணவினை உட்கொண்டு மகிழ்வோடு வாழ்ந்தனர். அனைத்துப்பகுதிகளிலும் ஒரே வகையான உணவு விளைவதில்லை.நிலத்திற்கேற்ப மாறுபட்டது.விளைச்சல் அதிகமான காலங்களில் உணவினைப் பதப்படுத்தியும் பிறருக்குப் பகிர்ந்தும் அளித்தனர். உணவு தொடர்பான செய்திகள் ஒரே களத்தைக் கொண்டவையாகவோ ஒரே காலத்திற்குரியனவாகவோ இல்லாமல் ஐவகை நில வாழ்களங்கள் தோறும் மாறுபட்டன.அவர்களது உணவு முறையினை ஆராய்வதே இக்கட்டுரையின் நோக்கம்.

முன்னுரை

விருந்தோம்பலில் தலைசிறந்த தமிழனின் பண்பாட்டு வளர்ச்சிக்கு வழி வகுத்தது உணவு. அவர்களது வாழ்வியல் அடையாளங்களில் அவர்களின் உணவு பழக்கம் உடல் சார்ந்த தேவையாக இன்றி சமூகம் சார்ந்ததாக பாரம்பரியத்தின் இன்றியமையாததாக இருந்தது எனலாம். விருந்தினர்களுக்குக் கொடுக்கும் மரியாதையாலும் குடும்ப நிகழ்வுகளாலும் ஊர் சார்ந்த நிகழ்வுகளாலும் அவர்கள் வாழ்வில் உணவு பெற்றிருந்த சிறப்பு புலனாகும். ஊன், உண், உணவு என்ற வேர்ச்சொற்கள் “உள்” அதாவது உட்கொள்ளுதல் என்பதிலிருந்து பிறந்ததாகும் என்கிறார் தொ.பரமசிவன்.

“உணாவே வல்சி யுண்டி யோதன

முசமை பதமே யிரையா கார

முறையே யூட்ட முணவெனலாகும்”1 (பிங்கல நிகண்டு -1153)

உணா, வல்சி, உண்டி, ஓதனம், அசனம், சதம், இரை, ஆகாரம், உறை, ஊட்டம் என உணவினை பிங்கல நிகண்டு பலபொருட்களால் குறிக்கிறது. தொல்காப்பியர் கருப்பொருட்களில் “தெய்வம் உணாவே” என்றழைக்கின்றார்

மனித உடலானது உணவால் வாழ்வது. இவ்வுடலுக்கு முதன்மையானது உணவு.உணவென்று சொல்வது நிலமும் நீருமே.ஆகையால் நல்ல நிலமும் நல்ல நீர்ப்பாசனமும் மிகமிக இன்றியமையாதவை.உணவு நிலம் நீர் ஆகியவற்றின் கொடை நீரையும் நிலத்தையும் சேர்த்து வைத்தவர் உடம்பையும் உயிரையும் படைத்தவர் ஆவார் என்பதே இப்பாடல் தரும் பொருளாகும். ”உண்டிக்கொடுத்தோர் உயிர் கொடுத்தோரே” “உண்டி முதற்றே உணவின் பிண்டம்”

“உணவெனப்படுவது நிலத்தோடு நீரே,

நீம் நிலனும் புணரியோர் ஈண்டு

உடம்பும் உயிரும் புடைத்திசினோரே”2(புறம் 18)

ஆம் தங்கள் மண்ணில் விளைந்த பொருட்களை சமைக்கவும் மீதமானவற்றைப் பதப்படுத்தவும் இன்னும் அதிகமானவற்றை பிற நிலத்தாரிடையே

பண்டமாற்றவும் பிறருக்குப் பகிர்ந்து கொடுக்கவும் பழகிக்கொண்ட பழந்தமிழ் மக்களின் சமூக செழிப்பின் அடையாளமாக உணவு இருந்தது. சங்காலத்து வாழ்ந்த மக்களிடையே உணவு தேவையை நிறைவு செய்தாலும் அது இனம் சார்ந்த பண்பாட்டாலும் சுற்றுப்புறச் சூழல்களாலுமே வரையறுக்கப்பட்டது. குறிஞ்சி, முல்லை, மருதம், நெய்தல், பாலை என வகைப்படுத்தப்பட்ட நிலங்களில் எல்லாம் ஒரே விதமான பொருட்கள் கிடைக்கப்பெறவில்லை. அந்தந்த நிலத்தில் ஓடும் நீரால் தானியங்கள் பல வகைகளில் விளைவிக்கப்பட்டன. அதனடிப்படையில் அறுசுவையோடு மருத்துவ குணமும் கொண்ட பொருட்களை சமைத்து உண்ணும் ஒரு உணவு முறையை வழக்கத்தில் தமக்கான அடையாளமாகக்கொண்டு வாம்ந்ததை இக்கட்டுரையில் காண்போம்.

தொல்காப்பியம் சுட்டும் உணவும் நீரும்

“மெய்திரி வகையின் எண்வகை உணவின் செய்தியும் வரையார்”³ (தொல் மரபியல் 623பொருள்)

நெல், காணம், வரகு, இறுங்கு, திணை, சாமை, புல், கோதுமை ஆகிய எண் வகை தானியத்தை உருவாக்கிப் பேணியதைச் சுட்டுகிறார். இவர் ஐவகை நிலங்களிலுள்ள மக்களின் உணவு, நீர், தொழில் ஆகியவற்றை கூறும்போது கீழ்க்கண்டவாறு வகைப்படுத்துகிறார்.

- குறிஞ்சி நில மக்கள் உணவாக திணை, தேன்,கிழங்கு, மூங்கிலரிசியையும் நீராக அருவிநீர், சுனை நீரையும் வகைப்படுத்துகிறார்
- முல்லை மக்கள் உணவாக வரகு, சாமையையும் நீராக கான்யாற்று நீரையும் வகைப்படுத்துகிறார்.
- புலை நில மக்கள் உணவாக ஆறலைந்த பொருள், சூறை கொண்ட பொருளையும் நீராக அறுநீர் கூவலும், சுனை நீரையும் வகைப்படுத்துகிறார்.
- மருதநில மக்கள் உணவாக செந்நெல், வெண்ணெல்லையும் நீராக ஆற்றுநீர், மணைகிணற்றுநீர், பொய்கை நீரையும் வகைப்படுத்துகிறார்.
- நெய்தல்நில மக்கள் உணவாக உப்புக்கு விலைமாறிய பண்டம், மீனுக்கு விலைமாறிய பண்டத்தையும் நீராக மணற்கிணறு, உவற்கு நீரையும் வகைப்படுத்துகிறார்.

இவ்வாறு வகைப்படுத்தப்பட்ட நிலத்தாரின் உணவுவகைகளாவன

குறிஞ்சி

மலையும் மலைசார்ந்த இடமுமாகிய குறிஞ்சி நில மக்கள் மலை மற்றும் மலைசார்ந்த காடுகளில் கிடைக்கும் உணவுகளான கிழங்கு, தேன், திணை, மூங்கிலரிசி, பலா,மா, கள், ஊண் போன்ற உணவுகளை பச்சையாகவும் சமைத்தும் உண்டனர்.

“தேனினர் கிழங்கினர் ஊன் ஆர் வட்டியர்

சிறு கண் பன்றிப் பமுதுளிப் போக்கிப்

பொருதுதொலை யானைக்கோடுசீ ராகத்

தூவொடு மலிந்த காய கானவர்”⁴ (மலைபடுகடாம் 155)

என்பதன் மூலம் கானவர்கள் சிறுகுடியில் தேனும் கிழங்கும் பெறலாம். கானவர்கள் யானைத் தந்தத்தில் இருபக்கமும் உறி கட்டி தேன், கிழங்கு, காட்டுப்பன்றி ஊனும் கலந்த உணவு

பண்ட கூடைகளை (வட்டில்) தம் குடில்களுக்கு சுமந்து சென்றதை அறியமுடிகிறது.”நெய்யொடு மயக்கிய உழுந்துநூற்றன்ன வலையஞ்சிலம்பின ”நெய்யொடு கலந்த உழுந்த மாவைப் போன்று திணை காவல் காக்க வந்த உன்னை தலைவன் காண வருவான் என்ற ஐங்குநூறு தோழி கூற்று பாடல் மூலமும் “சாரல் பலவின் கொழுந்துணர் நறும்பழம் இருங்கள் விடரளை வீழ்ந்தென வெற்பில்” மலைச்சாரலில் கொழுத்த பலாப்பழம் கல்லுக்குகையில் வீழ், அங்குள்ள தேன் கூடு சிதறும் என்பதன் மூலமும் இவர்களது உணவு முறையை அறிய முடிகிறது.அருவி நீரில் அடித்து வரப்பட்ட பலாப்பழத்தின் கொட்டைகளிலிருந்து எடுக்கப்பட்ட மாவையும்,புளியம்பழத்தின் புளிப்பையும்,உலையாக வார்த்த மோருக்கு அளவாகக் கலந்து, மூங்கில் வளர்ந்து முற்றிய நெல்லரிசியை, மலைச்சாரல்களில் மணம்வீசும்படி துழாவி சமைத்த உணவினை தாமும் உண்டு விருந்தினர்களுக்கும் அளித்ததை மலைபடுகடாம் எடுத்துரைக்கிறது.

“கார்பெயல் தலைஇய காண்பு இன் காலைக்

களிற்று முக வரியின் தெறுழ்வீ பூப்பச்

செம்புற்று ஈயலின் இன்அளைப் புளித்து

மென்தினை யாணர்த்து...”5 (புறம் 119 1-3)

கார் காலத்தில் யானையின் முகத்திலுள்ள சிறுபுள்ளிகளைப் போன்று தெறுழ் பூக்கள் பூத்தன. செம்புற்றுகளிலிருந்து வெளிவந்த ஈசலை இனிய மோரில் கலந்து மென்தினை உணவோடு உண்டனர் என்கிறார் கபிலர். சிறிய தலையுடைய செம்மறி ஆட்டினது பழுப்பு நிறம் அமைய முற்றிய தயிரிலே கொல்லையில் விளைந்த வரகரிசியோடு, கர்காலத்து மழைபெய்து நீங்கிய ஈரமான வாயிலையுடைய புற்றிலிருந்து வெளிப்படும் ஈயலையும் சமைத்த இனிதான சூடான புளியஞ்சோற்றில் செவலைப்பசுவின் வெண்ணெய்யை கலந்து உண்டதாக அகநானூறு 394 வது பாடல் எடுத்துரைப்பதன் மூலமும் கானவர்கள் உணவு புலப்படுகிறது. இவைதவிர வேட்டையில் கிடைத்த இறைச்சியை சுட்டும், பாணைகளில் இட்டு சமைத்தும் உண்டனர் பமழ், மூங்கில்நெல், தேன் கலந்து கள்ளினைத்தயரித்து மூங்கிலால் ஆன குழாயினுள் அடைத்து வைத்தனர். இதனை தேறல், நறவு எனவும் அழைத்தனர். இககள்ளினை விழாவின் போதும், வெற்றியைக்கொண்டாடும் போதும், சடங்கு நிகழ்வுகளின் போதும் ஆண்களும் பெண்களும் உண்டதோடு வரும் விருந்தினர்களுக்கும் அளித்து மகிழ்ந்ததையும் அறியமுடிகிறது. இவ்வாறு குறிஞ்சிநில மக்கள் உணவு முறையினையும் உணவு உற்பத்தித் திறனையும் நன்கு உணரமுடிகிறது.

பாலை

குறிஞ்சியும் முல்லையும் முறையில் திரிந்த வறண்ட தரிசு நிலமே பாலையாகும். விற்றிடித்து வேட்டையாடும் எயிற்றியர்கள் புளிக்குழம்பேர்டு கலந்த சோற்றினை வேட்டையாடி கொண்டு வந்த ஆமான் இறைச்சியோடு உண்டனர். எனும்புகள் சேர்த்து வைத்த புல்லரிசியைத் தேடிச்சேர்த்து,மான்களைக்கட்டியிருக்கும் விளா மரத்தின் அடியிலே அகழ்த்திருக்கும் உரலிலே நெல்லைக்கொட்டி உலக்கையால் குற்றிக் கொழித்தெடுத்த பின்னர் கிணற்றில் சிறிதளவு ஊறியிருக்கும் நீரை முகர்ந்து வாயிழந்த பானையிலே ஊற்றி சோறாக்கி (கருவாடு) உப்புகண்டத்துடன் உண்பார். இதனை பெரும்பாணாற்றுப்படை பின்வருமாறு எடுத்துரைக்கிறது.

“நுண்பல் அடக்கிய வெண்பல் எயிற்றியர்

பார்வையாத்த பறைதாள் விளவின்

நீழல் முன்றில் நிலவுரல் பெய்து
குறுங்காழ் உலக்கை ஓச்சி நெடும் கிணற்று
வல்லூற்று உவரி தோண்டித் தொல்லை
முரவு வாய்க்குழி முரி அடுப்பேற்றி
வராத அட்ட வாடின் புழுக்கல் “6 (பெரும்பாணாற்றுப்படை 94- 100)

மேலும்,

“கொடுவில் எயினர் குறும்பில் சேப்பின்
களர் வளர் ஈந்தின் காழ் கண்டன்
சுவல் விளை நெல்லின் செவ்விழ்ச் சொன்றி
ஞமலி தந்த மனவுச்சூல் உடும்பின்
வறைகால் யாதத்து வயின்தொறும் பெறுகுவீர்”7

(பெரும்பாணாற்றுப்படை 129 -133)

எயினர்கள் மேட்டு நிலத்தில் விளைந்த நெற்சோறை உண்டனர். அது களர் நிலத்திலுள்ள ஈச்சமரத்தின் விதை போன்று காணப்பட்டது. இச்சோற்றினை நாய்கள் பிடித்துக்கொண்டு வந்த உடும்புப் பொறியலோடு உண்டனர் என்பதையும் அறிய முடிகிறது.

முல்லை

“மாயோன் மேய காடுறை உலகம்” என்பார் தொல்காப்பியர். திருமாலை தெய்வமாக வழிபடும் முல்லைத்திணை மக்கள் வாழ்வு திறந்தவெளி மேய்ச்சல் நிலத்தைச் சார்ந்ததாக இருந்தது. மேய்ச்சலைத் தொழிலாக உடைய இவர்கள் “இருங்கிளை ஞெண்டின் சிறுபார்ப்பன்ன பசுந்திணை முரல் பாலொடும் பெறுகுவீர்” அதாவது ஆயர்நில மக்கள் இடத்தில் தங்கினால் அவர்கள் பெரியசுற்றமாகிய நண்டின் பார்ப்பை (குஞ்சு) ஒத்த பசிய திணை அரிசியால் ஆக்கிய சோற்றைப் பாலுடன் பெறுவீர் என்ற கடியலூர் உருத்திரங்கண்ணனாரின் வரிகள் இங்கு ஒப்பு நோக்கத்தக்கது.

“செவ்வீ வேங்கைப் பூவின் அன்ன
வேய் கொள் அரிசி மிதவை சொரிந்த
சுவல் விளை நெல்லின் அவரை அம்புளிங்கூழ்
ஆற்கு இடை உழந்த னும் வருத்தம் வீட
அகலுள் ஆங்கண் கழி மிடைந்து இயற்றிய
புல்வேய் குரம்பைக் குடிதொறும் பெறுகுவீர்
பொன் அறைந்தன்ன நுண் நேர் அரிசி
இழுவி வெண் எறிந்து இயற்றிய மாக்கண் - அமலை
தண்ணீது கொழிந்த பூழி அன்ன
உண்ணுநர்த் தடுத்த நுண் இடி நுவணை
நொய்மர விறகின் ஞெகிழி மாட்டி”8 (மலைபடுகடாம் 434-446)

இரவில் வேங்கை மரத்தின் பூக்கள் போன்ற அழகான மூங்கில் அரிசியால் சமைத்த உணவும், மேட்டு நிலத்தில் விளைந்த நெல்லின் அரிசியையும் அவரைக்காய்களால் சமைத்த புளிக்குழம்புடன் உண்டனர். அமலையாகிய பொங்கற்சோற்றில் வெண்ணெய் சேர்த்து

வெள்ளாட்டு இறைச்சியுடன் கூட்டியும், பலகாரம் (நுவணை) எனும் திணைமாவு ஆகியவற்றையும் உண்டனர். என கபிலர்கூறுவதிலிருந்து முல்லை நில மக்களின் உணவும் விருந்தோம்பலையும் அறிய முடிகிறது.

மருதம்

சோற்று வளம் மிகுந்தது மருதநிலம். பிறநிலத்து மக்களைக்காட்டிலும் வறுமையறியாது வளமுடன் வாழ்ந்தனர். பேரூரும் சிற்றூரும் கொண்டிருந்த இவர்களது வீடுகளில் செந்நெல் வெண்ணெல் அரிசிச்சோறும் காய்கறிகளையும் நிரம்ப உண்டனர். மருதநில செல்வர்கள் வீட்டில் வெண்மையான நெற்சோற்றுடன் வீட்டில் வளர்த்த பெட்டைக்கோழியின் பொரியலைச் சேர்த்து உண்டனர் என்பதை “தொல்பசி அறியாத் துளங்கா இருக்கை முல்லல் பேரூர் மடியின் மடியா வினைஞர் தந்த வெண்ணெல் வல்சி மனைவாழ் அளிகள் வாட்டொடும் பெறுகுவீர்” என பெரும்பாணாற்றுப்படை ஆசிரியர் கூறுகிறார். கல்வியறிவும் மக்களுக்கு நல்வழிகாட்டும் மாண்பும் தனக்கெனவாழாத் தன்மையும் கொண்ட மருதநில அந்தணர்கள்,

“மறை காப்பாளர் உறைபதிச் சேப்பின்
பெருநல் வானத்து வடவயின் விளங்கும்
சிறுமீன்புரையும் கற்பின் நறுநுதல்
வளைக்கை மகடுஉ வயினறிந்து அட்ட
சுடர்கடைப் பறவைப் பெயர்படு வத்தம்
சேதாநறுமோர் வெண்ணெய்யின் மாதுளத்து
உருப்புறு பசங்காய்ப் போழொடு கறிகலந்து
கஞ்சகம் நறுமுறி அளைஇப் பைந்துணர்
நெடுமரக் கொக்கின் நறுவடி விதிர்த்த

தகைமாண் காடியின் வகைப்பட பெறுகுவீர்”9 (301-310)

யார் தனது இல்லத்திற்கு வந்தாலும் அவர்களை வரவேற்று நெற்சோற்றினையும் மாதுளம்பிஞ்சைப் பிளந்து மிளகும், கறிவேப்பிலையையும் கலந்து பசும் நெய்யிலே வேகவைத்தப் பொரியலையும், வடுமாங்காயினையும், பருப்புசாதம், தயிர் சாதம், புளிசாதம் போற்றவற்றை அளிப்பதாக பெரும்பாணாற்றுப்படை ஆசிரியர் கூறுவது புலனாகிறது. உலகிற்கே உணவிடும் மருதநில உழவர்கள் தாம் வாழ்ந்த பகுதிகளில் விளைந்த உணவுப் பொருட்களையே சமைத்து உண்டனர். இங்குள்ள பெண்கள் தங்கள் கைகளால் குற்றிய அரிசியால் சோறாக்கி வயலில் பிடித்த நண்டையும் தங்கள் கொல்லைப்புறத்தில் விளைந்த பீர்க்கங்காயையும் சேர்த்து சமைப்பர். தனது இல்லத்திற்கு வரும் விருந்தினர்க்கும் அளித்து மகிழ்வர் .இதனை சிறுபாணாற்றுப்படை

“இருங்காழ் உலக்கை இரும்பு முகம் தேய்த்த
அவைப்பு மாண் அரிசி அமலை வெண்சோறு

கவைத்தாள் அலவன் கலவையொடு பெறுகுவீர்”10 (192-195)

வயல்களில் பிடித்த வாளைமீன், தூண்டிலில் பிடித்த வரால் மீன், இறைச்சித்துண்டுகள், மது, பழையகஞ்சியும் உண்டனர். நெல் விளைச்சல் குறைவாக இருக்குமிடங்களிலுள்ள உழவர்கள் புன்செய்ப் பயிர்களை விளைவிப்பர். அவர்களது இல்லத்தில் வரகரிசிச்சோறும் புழுக்கிய அவரைப்பருப்பும், அவரை விதை, மூங்கிலரிசி, நெல்லரிசி இவற்றைப் புளியுடன் சேர்த்து

சமைத்தும் உண்டனர். இவ்வுழவர்களை ஏழை உழவர்கள் என பெரும்பாணாற்றுப்படையும் மலைபடு கடாமும் குறிப்பிடுகிறது. இதன்மூலம் இம்மக்கள் உணவு முறையினையும் உணவு உற்பத்தித் திறனையும் நன்கு உணரமுடிகிறது

நெய்தல்

கடலும் கடல் சார்ந்த இடமுமான நெய்தல் நில மக்கள் பிற நில பகுதி மக்களைக்காட்டிலும் மீனை சமைத்து உண்டனர். இங்குள்ள பரத்தியர் உப்புக்கு விலையாகப்பெற்ற நெல்லினது அரிசியால் ஆக்கப்பட்ட வெண்சோற்றில் புளியிட்டு சமைத்த அயிரை மீன் குழம்பையும் கருவாட்டுப் பொறியலையும் தனது தந்தை உண்ணத்தருவாள் என குடவாயிற் கீர்த்தனாரின் பாடல் கூறுவதன்மூலம் இவர்களது உணவுமுறை புலனாகிறது

“உப்பு நொடை நெல்லின் மூரல் வெண்சோறு
ஆயிலை துழந்த அம்புளிச் சொறிந்

கொழுமீன் தடியொடு குறுமகள் கொடுக்கும்”11(அகநானூறு 60)

இங்குள்ள நுளைச்சியர் அரித்த கள்ளையும் உலர்ந்த குழல் மீனின் சூட்டிறைச்சியையும் உண்டனர். நெல்லை இடித்து மாவாக்கி ஆண்பன்றி உண்ணக்கொடுத்து நன்கு கொழுக்க செய்து அதனைக்கொண்டு அதன் இறைச்சியோடு களிப்பு மிகுந்த கள்ளையும் உண்டனர் என்பதை,

“அரித்த பழம்படு தேறல் பரதவர் மடுப்ப
கிளை மலர்ப் படைப்பைக் கிடங்கில்
அறல் குழல் பாணி தூங்கியவரொ

வுறல் குழல் சூட்டின் வயின்வயின் பெறுகுவீ” 12

(சிறுபாணாற்றுப்படை 154-163)

“பூம்புற நல்லடை யளைஇத் தேம்பட

வெல்லையு மிரவு மிருமுறை கழிப்பி

வல்வாய்ச் சாடியின் வழைச்சற விளைந்த

வெந்நீ ரறியல் விரலனை நறும்பிழி

தண்மீன் சூட்டொடு தளர்தலும் பெறுகுவீ”13

(பெரும்பாணாற்றுப்படை 271-282)

காவிரி பூம்பட்டினத்து கடல் சார்ந்த மக்கள் கடல் இறா,வயல் ஆமை இவையிரண்டையும் பக்குவம் செய்து உண்டனர். மேலும் பனங்கள்,நெல்லரிசிக்கள் இவற்றையும் உண்டனர்.கள் விற்கும் கடைகளில் மீன் மற்றும் விலங்கும் பொறித்து பரிமாறினர்.

“கடல் இறவின் கூடு தின்றும்

வயல் ஆமைப் புழுக்கு உண்டு”14 (பட்டினப்பாலை -65-66)

இதன்மூலம் இம்மக்கள் உணவு முறையினையும் உணவு உற்பத்தித் திறனையும் நன்கு உணரமுடிகிறது

முடிவுரை

சங்ககால மக்களின் உணவு மரபு மிகவும் போற்றுதற்குரியதாக இருந்துத என்பதை அதை ஆராய்ந்த அறிஞர்கள் கூறுவர். ஆரோக்கியமாக முதுமையிலும் இளமையாக வாழ்ந்தற்கு

இவர்களது உணவே மிகசிறந்த சான்றாக உள்ளது ஐவகை நிலங்களிலுமுள்ள மக்கள் இயற்கையோடு இயைந்து தங்களது தொழில் முறைகளில் செம்மையும் வளமையும் கலந்து பல தானியங்களையும், மது மீன், இறைச்சி, தம் நிலம் சார்ந்த பண்பாட்டு மாற்றங்களுக்கேற்ப உணவினை சமைத்து உண்டு மகிழ்ந்தனர் என்பதை அறிய முடிகிறது. உயிர் வாழ்க்கைக்கு அடிப்படையான உணவு இன்று சுவை இன்பத்திற்காக மாறிவிட்டது என்பதில் ஐயமில்லை எனலாம்.

அடிக்குறிப்புகள்

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மாணவர்கள் மத்தியில் எண்மின் ஊடகத்தின் ஊடுருவல்

¹அருட்சகோதரி. ஆன்றின் மேரி, ^{*2}அ. டெல்பின்

¹கணிதத்துறை, திருச்சிலுவை கல்லூரி (தன்னாட்சி), நாகர்கோவில் - 629004.

²தமிழ்த்துறை, திருச்சிலுவை கல்லூரி (தன்னாட்சி), நாகர்கோவில் - 629004.

மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம், திருநெல்வேலி - 627012.

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ஆய்வுச் சுருக்கம்

மனிதரின் கண்டுபிடிப்பின் உச்சமாக, அறிவியலின் வளர்ச்சியாக ஆற்றல் மிக்க எண்மின் சமூக ஊடகங்கள் (**Digital Social Media**) இருக்கின்றன. மற்ற அனைத்து விதமானவற்றையும் பின்தள்ளி விட்டு, இன்று எண்மின் சமூக ஊடகங்கள் இல்லாமல் வாழமுடியாது என்ற சூழ்நிலை உருவாகி விட்டது. இன்ஸ்டாகிராம், வாட்ஸ்அப், பேஸ்புக் என ஒன்று தொடங்கி மற்றொன்று என்று முடிவில்லாமல் சென்று கொண்டிருக்கும் எண்மின் சமூக ஊடகங்களின் நிரல்களை யெல்லாம் பார்த்து பார்த்து பிறகு வேறு எவற்றையும் பார்ப்பதற்கு ஆர்வம் இருக்காமல் 'ஓர் ஊடகப் போதைக்குள்ளே' மாட்டிக் கொண்டு மனிதர்கள் வெளிவர இயலாமல் நோயாளியாகி விடுகிற அவநிலை தொடர்கிறது. எண்மின் ஊடகங்கள் குறித்த விழிப்புணர்வும், சரியான விதத்தில் அதனைக் கையாளும் திறனும் மக்களிடையே பயிற்றுவிக்கப்படுதல் அவசியமாகின்றது. இந்த ஆய்வுக்கட்டுரையின் கருத்தும் இதுவேயாகும். இக்கட்டுரையில் மாணவர்கள் மத்தியில் ஊடகங்களின் தாக்கம் எந்த விதமான பாதிப்புகளை ஏற்படுத்தியிருக்கிறது என்பது குறித்த தகவல்கள் மாணவர்களிடம் நடத்தப்பட்ட மதிப்பீட்டாய்வின் அடிப்படையில் புள்ளி விபரங்களுடன் கொடுக்கப்பட்டுள்ளது. இது எண்மின் ஊடகத்தின் ஊடுருவல் பற்றிய ஒரு முழுமையான ஆய்வுக் கட்டுரையாகும்.

முகவுரை:-

மாணவர் மத்தியில் எண்மின் ஊடகத்தின் ஊடுருவல் (புள்ளி ஆய்வுடன்)

எண்மின் சமூக ஊடகங்கள் விடுக்கும் சவால்கள்:-

“ஊடுருவல் எண்மின் சமூக ஊடகங்களைக் கொண்ட கைபேசியோடு அகில உலகமெல்லாம் அலைந்து திரிந்தாலும் தன் கல்வியை, வேலையை, மதிப்பை, மாண்பை, குடும்பத்தை, சமூக வாழ்வை இழந்தால் என்ன பயன்? – என்ற மாபெரும் கேள்வியினை நம் கண்முன்னே எடுத்து வைக்கிறது இன்றைய எண்மின் ஊடக பயன்பாடு. குழந்தைகள் முதல் பெரியவர் வரை சிறார்கள் அனைவரும் ஊடகங்களை நோக்கி நகர்கின்றனர், ஈர்க்கப்படுகிறார்கள்; மாணவர்கள் கவரப்படுகிறார்கள், பெண்கள் திசைதிருப்பப்படுகிறார்கள்; முதியவர்கள் மூழ்கிப் போகிறார்கள். ஊடகங்கள் ஏற்படுத்தியிருக்கும் தாக்கங்கள் குறித்த ஓர் புள்ளியியல் ஆய்வுடன் இக்கட்டுரையில் காணலாம்.

அறிவியல் அதிசயம் - அலைபேசி

சுய பயன்பாட்டில் உற்ற நண்பனாக கற்றல் மற்றும் ஆராய்ச்சி, பொழுது போக்காக, நினைவூட்டி, நாட்காட்டி, தகவல் பெற, என் நம்முடன் பின்னிப் பிணைந்துள்ளது அலைபேசி.

‘ஊடக போதை’யெனும் நோய்

‘ஊடகப்போதை நோய்’- என்பது பெருவிருப்பமாகவும், கட்டாயமாகவும், ஊடக சாதனங்களை அளவுக்கு அதிகமாக பயன்படுத்துதல் ஆகும். இணையதளங்கள் சமூக ஊடகங்கள், ஊடக விளையாட்டுகள், கைபேசி பயன்பாடு ஊடகப்போதை நோயாக உருமாறலாம். ‘டோப்பமின்’ நரம்புக்கடத்தி மூளையிலுள்ள இன்ப வழிதடம் வழியே மூளையில்

செயல்படுகிறது. ஒரு நல்ல உணவு உண்ணுதல், இசை கேட்டல் போன்ற இன்பமான செயல்களைச் செய்யும் போது டோப்பமின்,சுரக்கிறது. ஒரு செயலின் மூலமாக கிடைக்கும் இன்பம் செயற்கையாக அதிகப்படியான இணைய பயன்பாட்டின் மூலம் கிடைக்கப் பெறும் போது மூளை மிக வேகமாக சோர்வடைகிறது.

எண்மின் தளங்களின் பல்வகைப் பயன்பாடு

எண்மின் கருவிகள் இன்றைய மனிதர்களை எண்மின்னாகவே மாற்றியிருக்கின்றன. வீட்டு உபயோகமாகவோ, கல்விக்காகவோ, ஆரோக்கியத்திற்காகவோ, தகவல்களை அறியவோ அல்லது பொழுது போக்கிற்காகவோ அதிக அளவிலான எண்மின் கருவிகள் பயன்படுத்தப்படுகின்றன. ஸ்மார்ட் கார், விளையாட்டுபொம்மை, அடுப்பு, டாய்லட், ஸ்மார்ட் மனிதன் என எண்மின் கருவிகளின் தேவை அதிகரித்துக் கொண்டே போகிறது.

ஆபத்தானஇணையதள விளையாட்டுகள்; சூதாட்டங்கள்;

இணையத்தில் உலவும் பல ஆபத்தான விளையாட்டுக்கள் பண ஆசையையும், புகழ்ச்சியையும் சிறார்களிடம் ஏற்படுத்துகின்றன.“உழைத்தால் உயர்வு”- என்ற அறத்தின் கல்விக்கு, எதிரான இத்தகைய விளையாட்டுக்கள் இளையோர்களை இழுக்கின்றன.

“ஈன்றான் பசிகாண்பான் ஆயினுஞ் செய்யற்க

சான்றோர் பழிக்கும் வினை”

என்ற அறக்கருத்துக்கு எதிராக இன்று பள்ளிக் குழந்தைகள் மத்தியிலும் தீயவழியில் பணம் சம்பாதிக்கும் ஆசையையும் இந்த தளங்கள் உருவாக்குகின்றன,“விளையாட்டு விளையாடும்” - என்பது முன்னோர் போதனையும் ஆகும் பொம்மைகளை விட்டு விட்டு உண்மைக்குத் திரும்புவோம்.

கட்டாயமாக்கப்படும் நுகர்வுக்கலாச்சாரம்:-

கி.மு 3000 – ல் எகிப்தில் தீப்ஸ் நகரில் தொலைந்து போன ஷெம் என்னும் அடிமையைத் திரும்பக் கொண்டு வந்து ஒப்படைப்பவர்களுக்கு உரிய சன்மானம் வழங்குவதாகக் கூறி, அன்றைய பாப்பிரஸ் காகிதத்தில் எழுதப்பட்ட விளம்பரம் தான் இது வரை கிடைத்த விளம்பரங்களில் எல்லாம் மிகப் பழமையானவை. ஆனால் இன்றைய காலக்கட்டத்தில் விளம்பரங்களின் நிலைமையே வேறு. தேவைக்கு அதிகமாக பொருட்களை வாங்கத் தூண்டுகிறது. (ஓர் நுகர்வுக் கலாச்சாரம்).

சைபர் கிரைம்மோசடிகள்:-

Artificial Intelligence எனப்படும் செயற்கை நுண்ணறிவு மனிதர்கள் நினைக்கும் விதத்தை நகலெடுக்க கணினிகளை உருவாக்குவதற்கான வழி.இதனை அதிக அளவில் பயன்படுத்தி அதில் மூழ்குபவர்கள் உண்மையில் இருந்து விலகி ஒரு பொய்யான உலகத்தில் வாழத் துவங்குகின்றனர்.டோப்பமின் அளவு குறையும் பொது அது பல்வேறு பக்கவிளைவுகளை அவர்களுக்கு உண்டாக்குகிறது. இதனால் உணர்ச்சிகளை முறையாக கையாள தெரியாத நிலை, அளவுக்கு அதிகமாக போகும் போது முடிவுகளை எடுக்கத் திணறுவது, தனிமையை நாடுவது, அர்த்தமற்ற வாழ்க்கையை வாழ்வதாக உணர்வது,தற்கொலை எண்ணங்கள், பிறரோடு அன்பைப் பகிர முடியாத நிலை, யதார்த்தமற்ற எதிர்பார்ப்பு, சமூக தனிமைப்படுத்தல் போன்ற விளைவுகளை ஏற்படுத்துகின்றன.

எண்மின் ஊடகப் பாதுகாப்புகள் மற்றும், பொறுப்புகள்

மின்சாதனத்தை மற்றவரை துன்புறுத்தும் கருவியாக பயன்படுத்தலாகாது. மற்றவரின் மின்சாதனத்தை ஊடுருவவோ, உளவு பார்க்கவோ கூடாது. மற்றவரின் கணினிலுள்ள கோப்புகளை பதுங்கிச் சென்று தாக்கலாகாது. மின் சாதனம் மூலம் அறிவு திருட்டில் ஈடுபடலாகாது. பிறர் எனக்கு என்ன செய்யக் கூடாதென விரும்புகிறேனோ, அதை நான் அவர்களுக்கு செய்யலாகாது. காவல்துறைக்கு எல்லை மீறிய அதிகாரத்தை இச்சட்டம் அளிக்கிறது. அரசாங்கங்கள் தொலைபேசி உரையாடல் போன்ற அனைத்துத் தகவல் தொடர்பு நடவடிக்கைகளையும் கண்காணித்திட முடியும்.

பிள்ளைகளின் ஆளுமை உருவாக்கத்தில் பெற்றோர், ஆசிரியரின் கடமைகள்:

குழந்தையின் முன் சண்டையிடாதீர்கள் குழந்தையின் முன் போதைப் பொருட்களைப் பயன்படுத்தாதீர்கள். 'குழந்தையை அன்பு செய்கிறேன்' - என்று தேவையில்லாத அளவிற்கு பாதுகாத்து வளர்ப்பது, அவர்களுக்கு வாழ்வின் கற்றுக் கொடுக்க தவறுதாகும். பெற்றோர் தங்களது ஆளுமைக் கோளாறுகளை சரி செய்ய வேண்டு, தன் செயல்களின் விளைவிற்கு பொறுப்பேற்க வேண்டும். பெற்றோர் ஓர் நல்ல முன் மாதிரியாக இருக்கவேண்டும். குழந்தைகளின் ஆளுமை உருவாக்கத்தில் ஆசிரியர் பெரும் பங்கு வகிக்கின்றனர்.

மாணவர்களின் திறன், பயிற்சியில் கல்வி விழிப்புணர்வு நிறுவனங்களின் செயல்பாடுகள்.

குழந்தைகள் சிறார் மற்றும் பதின்மபருவத்தினரின் வளர்ச்சி என்பது உடல் வளர்ச்சி, சமூக வளர்ச்சி என 5 பரிமாணங்களின் அடிப்படையில் இருக்கிறது. இதன் முக்கியமானதொரு பணி அவர்களை ஆற்றல் பெறச் செய்வதாகும். ஆற்றல் பெற வேண்டுமென்றால், அவர்கள் தங்கள் அறிவையும் திறனையும், மதிப்பீடுகளையும் மேம்படுத்திக்கொள்ள வாய்ப்பு இருக்க வேண்டும். கல்வி நிறுவனங்களில் செயல்படும் மாணவர் குழுக்கள், இயக்கங்கள் வழியாக திறன் மேம்பாட்டுக் கல்வி வழங்கலாம். குழு ஆய்வு, விவாதம், பட்டிமன்றம், நாடகம், கதை சொல்லுதல் போன்ற உத்திகளைக் கையாளலாம்.

இளைஞர்களுக்கான தீங்குகளைத் சமூகப்பணியமைப்புகளின் ஈடுபாடுகள்

ரோமை அரசில் அக்டேவியன், ஆன்றானியோவிற்கு எதிராக நாணயங்களில் சிறு போலி வசனங்களைப் பதித்தான். ஹிட்லர், முசோலினி ஆகியோர் போலிச் செய்திகளை ஆயுதமாகப் பயன்படுத்தினர். இன்று மின் ஊடகங்கள் வழியாக மிக வேகமாகவும் புதிய வடிவங்களிலும் பொய்கள் பரப்பபடுகின்றன. குறிப்பாக பெண்களைப் பற்றிய போலிச் செய்திகள் அவரையும், அவரது குடும்பம் மற்றும் அவர் பொறுப்பேற்றிருக்கும் அமைப்புகள் மீது மீட்க முடியாத பாதிப்புகளை ஏற்படுத்தி விடுகிறது. திருகுறளில் ஒழுக்கமுடைமை, இனியவை கூறல், புறங்கூறாமை போன்ற அதிகாரங்கள் ஆகியவற்றை ஊடகக் கல்வியாக பயன்படுத்தி விழிப்புணர்வு வழங்கலாம்.

மாணவர்களிடம் கீழ்க்கண்ட கேள்விகளின் அடிப்படையில் ஆய்விற்கான தரவுகள் சேகரிக்கப்பட்டன:-

1. உங்கள் அன்றாட வாழ்வில் எத்தனை முறை இணையத்தைப் பயன்படுத்துகிறீர்கள்?
2. உங்கள் இணைய பயன்பாட்டின் முக்கிய நோக்கம் என்ன?

அ. கல்வி

ஆ. வேலை வாய்ப்புகள்

இ. பொழுதுபோக்கு

ஈ) சமூக தொடர்புகள்

உ) தனிப்பட்ட இன்பம்

3. இணையத்தைப் பயன்படுத்தும் போது நீங்கள் எப்போதாவது தனிமையாக உணர்கிறீர்களா?
4. நீங்கள் இன்டர்நெட்டைப் பயன்படுத்தும்போது பிறருக்குத் தொல்லையாக இருப்பதைக் காண்கிறீர்களா?
5. உங்கள் இணையப் பயன்பாடு எப்போதாவது உங்கள் படிப்பைப் புறக்கணிக்க காரணமாக அமைந்ததா?
6. உங்கள் மொபைல் போன் அல்லது இணையத்தை தகாத முறையில் பயன்படுத்தியதற்காக நீங்கள் எப்போதாவது கண்டிக்கப்பட்டிருக்கிறீர்களா?
7. இணையத்தை அதிகமாகப் பயன்படுத்தியதற்காக நீங்கள் தண்டிக்கப்படும் போது கோபமாக அல்லது வன்முறையாக உணர்கிறீர்களா?
8. உங்கள் இணைய பயன்பாடு உங்கள் படிப்பை எதிர்மறையாக பாதிக்கிறது என்று நீங்கள் நம்புகிறீர்களா?
9. இணையத்தைப் பயன்படுத்துவதன் மூலம் உங்கள் செயல்திறன் மேம்பட்டதாக உணர்கிறீர்களா?
10. நீங்கள் எப்போதாவது இணையத்தைப் பயன்படுத்துவதை குறைக்க அல்லது தவிர்க்க முயற்சித்திருக்கிறீர்களா?
11. இணையத்தைப் பயன்படுத்துவதன் விளைவாக உங்கள் ஆளுமை மேம்பட்டதாக நீங்கள் நம்புகிறீர்களா?
12. இணையம் இல்லாமல் வெறுமை உணர்வை உணர்கிறீர்களா?
13. உங்கள் இலக்குகளை அடைய இணையம் உங்களுக்கு உதவியுள்ளதா?
14. வெளிப்புற சூழ்நிலைகள் (அழுத்தம் அல்லது சலிப்பு போன்றவை) பங்களிக்கும் என்று நீங்கள் நம்புகிறீர்களா? நீங்கள் இணையத்தை அதிகமாக பயன்படுத்தினால்?
15. இணையத்தின் அதிகப்படியான பயன்பாட்டிலிருந்து வெளியே வர உங்களுக்கு உதவ ஆலோசனை பெறுவதை நீங்கள் பரிசீலிப்பீர்களா?

500 மாணவர்களிடமிருந்து பெறப்பட்ட தரவுகளின் அடிப்படையில் ஆய்வு முடிவுகள்:-

பியர்சன் சி-சதுர சோதனையைப் பயன்படுத்தி விளக்கம்

கல்வி நிலைகளின் விநியோகம் மற்றும் அன்றாட வாழ்க்கையில் ஒருவர் எவ்வளவு அடிக்கடி இணையத்தைப் பயன்படுத்துகிறோம் என்பதை ஒப்பிடும் குறுக்கு அட்டவணை.

1. 56.6% UG மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகிறார்கள்.
2. 29.5% UG மாணவர்கள் அடிக்கடி இணையத்தைப் பயன்படுத்துகிறார்கள்.
3. 2.9% UG மாணவர்கள் எப்போதும் தங்கள் அன்றாட வாழ்க்கையில் இணையத்தைப் பயன்படுத்துகிறார்கள்.

இதேபோல், 1.3% முதுகலை மாணவர்கள் இணையத்தைப் பயன்படுத்துவதில்லை. 45.3% முதுகலை மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர். 44% மாணவர்கள் அடிக்கடி உபயோகிக்கின்றனர். 9.3% மாணவர்கள் பொரும்பாலும் தங்கள் அன்றாட வாழ்க்கையில் இணையத்தைப் பயன்படுத்துகின்றனர். “பியர்சன் சி”- சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடனும்

14.644 மற்றும் பி-மதிப்பு 0.006 ஆகும். P-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், கல்வி நிலைக்கும் அன்றாட வாழ்வில் இணையத்தைப் பயன்படுத்துவதற்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது.

தமிழ்,ஆங்கிலம் கணிதம், இயற்பியல், வேதியல், உடற்கல்வி, கணினி அறிவியல், வணிகவியல், கல்வி மற்றும் பொறியியல் போன்ற துறைகளில் உள்ள மாணவர்களிடம் அன்றாட வாழ்க்கையில் ஒருவர் எவ்வளவு அடிக்கடி இணையத்தைப் பயன்படுத்துகிறார் என்பதை ஒப்பிடும் குறுக்கு அட்டவணை, தமிழ்த் துறையினர் 58.3% என்பதைக் காட்டுகிறது. மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர். ஆங்கிலத் துறையிலிருந்து, 48.4% மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர். 35.2%மாணவர்கள் அடிக்கடி பயன்படுத்துகின்றனர். 1.1%மாணவர்கள் எப்போதும் தங்கள் அன்றாட வாழ்வில் இணையத்தைப் பயன்படுத்துகின்றனர். கணிதத் துறையிலிருந்து, 58.4%மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர். 28.2%மாணவர்கள் அடிக்கடி பயன்படுத்துகின்றனர். 3%மாணவர்கள் எப்போதும் தங்கள் அன்றாட வாழ்க்கையில் இணையத்தைப் பயன்படுத்துகின்றனர். வேதியியல் துறையிலிருந்து, 69.2 %மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர் 23.1% மாணவர்கள் அடிக்கடி பயன்படுத்துகின்றனர். கணினி அறிவியல் துறையிலிருந்து, 55.6% மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர். 27.8% மாணவர்கள் அடிக்கடி பயன்படுத்துகின்றனர். 32.6%மாணவர்கள் அடிக்கடி பயன்படுத்துகின்றனர் மற்றும் 6.5% மாணவர்கள் பெரும்பாலும் தங்கள் அன்றாட வாழ்க்கையில் இணையத்தைப் பயன்படுத்துகின்றனர். கல்வித் துறையிலிருந்து, 25.0% மாணவர்கள் சில நேரங்களில் இணையத்தைப் பயன்படுத்துகின்றனர். 12.5%மாணவர்கள் எப்போதும் தங்கள் அன்றாட வாழ்க்கையில் இணையத்தைப் பயன்படுத்துகின்றனர். இறுதியாக இணையத்தைப் பயன்படுத்துகின்றனர் மற்றும் 31.4%மாணவர்கள் அடிக்கடி பயன்படுத்துகின்றனர் மற்றும் 10.8%மாணவர்கள் பெரும்பாலும் மற்றும் 2.5%மாணவர்கள் எப்போதும் தங்கள் அன்றாட வாழ்வில் இணையத்தைப் பயன்படுத்துகின்றனர். பியர்சன் சி சதுர மதிப்பு 32 டிகிரி சுதந்திரத்துடன் 47.717 மற்றும் பி-மதிப்பு 0.037 ஆகும். P-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், தினசரி வாழ்வில் துறைகளுக்கும் இணையப் பயன்பாட்டிற்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது.

பெற்றோர்களின் பின்புலத்தின் அடிப்படையில் மாணவர்களின் இணையப்பயன்பாடு எவ்வாறு உள்ளது எனும் அடிப்படையில் செய்யப்பட்ட ஆய்வின் முடிவுகள்:-

பியர்சன் சி-சதுர மதிப்பு 16 டிகிரி சுதந்திரத்துடன் 35.762 மற்றும் பி-மதிப்பு 0.003 ஆகும். P-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், தந்தையின் தொழிலுக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது. இதேபோல், தந்தையின் தொழிலுக்கும், அன்றாட வாழ்வில் ஒருவர் இணையத்தை எவ்வளவு அடிக்கடி பயன்படுத்துகிறார் என்பது, தனிப்பட்ட இன்பத்திற்காகப் பயன்படுத்துதல் மற்றும் ஆய்வுகள் பாதிக்கப்படுவது போன்ற பல்வேறு காரணிகளுக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது.

பியர்சன் சி-சதுர மதிப்பு டிகிரி சுதந்திரத்துடன் 46.336 மற்றும் பி-மதிப்பு 0.001 ஆகும். P-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், அம்மாவின் தொழில் மற்றும் கல்விக்கான இணையப் பயன்பாட்டிற்கு இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது. பியர்சன் சி-சதுர மதிப்பு 20 டிகிரி சுதந்திரத்துடன் 52.860 மற்றும் பி-மதிப்பு 0.000. P-மதிப்பு 0.05க்கும் குறைவான இருப்பதால், தாயின் தொழில் மற்றும் தனிப்பட்ட இன்பத்திற்கான இணையப் பயன்பாட்டிற்கு இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது. மேலும், அம்மாவின் ஆக்கிரமிப்புக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது. இணையத்தை அதிகமாகப் பயன்படுத்தியதற்காகத் தண்டிக்கப்படும்போது கோபமாக அல்லது வன்முறையில் ஈடுபடுதல், இணையப் பயன்பாடு படிப்பை எதிர்மறையாக பாதிக்கிறது, மற்றும் இணையத்தைப் பயன்படுத்துவதால் ஒருவரின் ஆளுமை மேம்பட்டுள்ளது என்ற நம்பிக்கை மேலெழுந்துள்ளது.

சமூக இணைப்புகளுக்கான இணையப் பயன்பாட்டிற்கு எதிரான பாலின விநியோகத்திற்காக குறுக்கு அட்டவணை வடிவமைக்கப்பட்டுள்ளது. பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 32.855 மற்றும் பி-மதிப்பு 0.000 ஆகும் பி-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால் பயன்பாட்டிற்கு இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது.

இணையத்தைப் பயன்படுத்தும் போது தனிமை உணர்வுக்கு எதிராக பாலின விநியோகத்திற்காக குறுக்கு அட்டவணை வடிவமைக்கப்பட்டுள்ளது. பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 15.700 மற்றும் பி-மதிப்பு 0.003 ஆகும். பி-மதிப்பு 0.05க்கும் குறைவாக இருப்பதால், இணையத்தைப் பயன்படுத்தும் போது பாலினம் மற்றும் தனிமை உணர்வு ஆகியவற்றுக்கு இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது.

இணையத்தை அதிகமாகப் பயன்படுத்தியதற்காகத் தண்டிக்கப்படும் போது கோபமாக அல்லது வன்முறையாக உணர்கிறேன், எனும் கருத்தின்படி. பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 25.894 மற்றும் பி-மதிப்பு 0.000 ஆகும். பி-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், பாலினம் மற்றும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது இணையத்தை அதிகமாகப் பயன்படுத்தியதற்காகத் தண்டிக்கப்படும்போது கோபமாக அல்லது வன்முறையாக உணர்கின்றதாக, ஆய்வு முடிவு தெரிவிக்கின்றது.

இணையம் இல்லாமல் வெறுமை உணர்வை கருத்தின்படி உணர்கிறேன் எனும் பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 22.492 மற்றும் பி-மதிப்பு 0.000 பி-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், பாலினம் மற்றும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது இணையம் இல்லாமல் வெறுமை உணர்வை உணர்கிவதாக, ஆய்வு முடிவு தெரிவிக்கின்றது.

வெளிப்புற சூழ்நிலைகளின் பாதிப்பின் அடிப்படையில் பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 25.483 மற்றும் பி-மதிப்பு 0.000 பி-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், பாலினம் மற்றும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது வெளிப்புற சூழ்நிலைகள் (மன அழுத்தம்) பயன்படுத்துவதற்கு பங்களிக்கின்றன என முடிவுகள் அறிவிக்கின்றன.

குறுக்கு அட்டவணையானது கல்வி நிலைகளுக்கு எதிராக விநியோகத்திற்காக வடிவமைக்கப்பட்டுள்ளது இணையத்தில் செலவழித்த நேரத்தின் அளவு. பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 14.644 மற்றும் பி-மதிப்பு 0.006 ஆகும். பி-மதிப்பு 0.05க்கும் குறைவாக இருப்பதால், கல்விக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது இணையத்தில் செலவழித்த நேரத்தின் அளவு.

குறுக்கு அட்டவணையானது முதல் தலைமுறை கற்பவர்களின் விநியோகத்திற்காக வடிமைக்கப்பட்டுள்ளது. பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 12.562 மற்றும் பி-மதிப்பு 0.016 ஆகும். பி-மதிப்பு 0.05 க்கும் குறைவாக இருப்பதால், முதல் தலைமுறை கற்பவர்களுக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது இணையத்தைப் பயன்படுத்தும் போது தனிமையாக உணர்வதாக ஆய்வு அறிவிக்கின்றது.

தினசரி வாழ்வில் ஒருவர் இணையத்தை எவ்வளவு அடிக்கடி பயன்படுத்துகிறார் என்பது, பொழுதுபோக்கிற்காக இணையத்தைப் பயன்படுத்துதல், சமூகத் தொடர்புகள், இணையத்தைப் பயன்படுத்தும் போது பிறரைத் தொல்லையாகக் கருதுதல், படிப்பைப் புறக்கணித்தல், கோபம் அல்லது வன்முறை உணர்வு போன்ற பல்வேறு காரணிகளுக்கும் துறைக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளதை, இணையத்தை அதிகமாகப் பயன்படுத்தியதற்காக தண்டிக்கப்படும் போது, இணையம் இல்லாமல் வெறுமை உணர்வை உணர்வதை மற்றும் பியர்சன் சி ஸ்கொயர் சோதனை குறிப்பிடுவது போல் வெளிப்புற சூழ்நிலைகள் (அழுத்தம் அல்லது சலிப்பு போன்றவை) இணையத்தை அதிகமாகப் பயன்படுத்த உதவுகின்றன எனும் எனும் ஆய்வு முடிவுகள் மூலம் தெரியவருகிறது.

இறுதியாக, ஒற்றைப் பெற்றோர் குழந்தையாக இருப்பதற்கும் வேலை வாய்ப்புகளுக்காக இணையத்தைப் பயன்படுத்தும் பயன்படுத்துவதற்கும் இடையே குறிப்பிடத்தக்க தொடர்பு உள்ளது பியர்சன் சி-சதுர மதிப்பு 4 டிகிரி சுதந்திரத்துடன் 11.634 மற்றும் பி-மதிப்பு 0.020 ஆகும்.

தொகுப்புரை:-

மேலே உள்ள அட்டவணையின் அடிப்படையில், பின்வரும் ஆராய்ச்சி முடிவுகளை நாம் ஊகிக்க முடியும்

மாணவர்களிடையே அன்றாட வாழ்வில் இணையத்தைப் பயன்படுத்துவதற்கும் துறைகளுக்கும் இடையே குறிப்பிடத்தக்க தொடர்பு இருப்பதாக ஆய்வு சுட்டிக்காட்டுகிறது. இந்த முடிவு புள்ளியியல் பகுப்பாய்வு மூலம் ஆதரிக்கப்படுகிறது, குறிப்பாக பியர்சன் சி-சதுர மதிப்பையும், 0.037 இன் பி-மதிப்பையும் அளித்தது, இது 0.05 க்கும் குறைவானது. துறைகளுக்கும் இணையப் பயன்பாட்டுக்கும் இடையிலான தொடர்பு வெறும் தற்செயலானதல்ல என்பதை இது அறிவுறுத்துகிறது.

பல்வேறு துறைகளில் இணைய பயன்பாட்டின் அதிர்வெண்ணிய வேறுபாடுகள் உள்ளன. உதாரணமாக, உடற்கல்வி மற்றும் பொறியியல் துறைகள் மற்ற துறைகளுடன் ஒப்பிடும்போது அடிக்கடி அல்லது எப்போதும் இணையத்தைப் பயன்படுத்தும் மாணவர்களின் அதிக சதவீதத்தைக் கொண்டுள்ளன. இந்தத் துறைகளில் உள்ள மாணவர்கள் தங்கள் அன்றாட வாழ்க்கையில் அடிக்கடி இணையத்தைப் பயன்படுத்துகிறார்கள் என்பதை இது குறிக்கிறது.

தமிழ்,ஆங்கிலம் மற்றும் வேதியல் துறைகளில் சில நேரங்களில் இணையத்தைப் பயன்பாட்டின் வெவ்வேறு வகைகளில் மிகவும் சீரான விநியோகத்தை வெளிப்படுத்துகின்றன. இந்தத்துறைகளில் உள்ள மாணவர்கள் இணையப் பயன்பாட்டில் மிகவும் சீரான விநியோகத்தைக் கொண்டுள்ளனர், ஒப்பிடக்கூடிய எண்ணிக்கையிலான மாணவர்கள் ஒவ்வொரு வகையிலும் (பெரும்பாலும், சில நேரங்களில், எப்போதும்) விழுவார்கள் என்று இது அறிவுறுத்துகிறது.

ஒட்டுமொத்தமாக, இந்த கண்டுபிடிப்புகள் மாணவர்களிடையே இணைய பயன்பாட்டில் துறை வேறுபாடுகள் இருப்பதை எடுத்துக்காட்டுகின்றன. ஆய்வுத் துறையின் தன்மை அல்லது தனிப்பட்ட ஆர்வங்கள் போன்ற காரணிகள் அன்றாட வாழ்வில் இணையப் பயன்பாட்டின் அதிர்வெண்ணை பாதிக்கலாம் என்பதை முடிவுகள் குறிப்பிடுகின்றன. மாணவர்கள் எந்த நோக்கத்திற்காக டிஜிட்டல் மீடியாவைப் பயன்படுத்துகிறார்கள் என்பது தான் முக்கியம். இது கல்வி அல்லது தகவல் அல்லது தேவையான தரவிற்காக இருந்தால், அது நேர்மறையான தாக்கத்தை ஏற்படுத்தும். மறுபுறம், டிஜிட்டல் சமூக ஊடகங்களின் அடிமைத்தனமாக தன்மை மற்றும் மாணவர்களின் வாழ்க்கையில் அதன் சாத்தியமான விளைவுகள் தீவிர கவலையை ஏற்படுத்தும்.

டிஜிட்டல் சமூக ஊடகங்களுக்கு அடிமையாதல் என்பது ஒரு சிக்கலான நிகழ்வாகும், அது உச்சநிலைக்கு செல்லும் போது, கல்வி செயல்திறன், மனநலம் மற்றும் சமூக உறவுகள் உட்பட வாழ்க்கையின் பல்வேறு களங்களில் எதிர்மறையான விளைவுகளுக்கு வழிவகுக்கும். இந்த போதைக்கு பங்களிக்கும் காரணிகளைப் புரிந்துகொள்வது அதன் தாக்கத்தை நிவர்த்தி செய்வதற்கும் சாத்தியமான தீங்குகளைத் தணிப்பதற்கும் பயனுள்ள உத்திகளை உருவாக்குவதற்கு முக்கியமானது.

பூவின் அர்ப்பணிப்பு காய் ஆகிறது

காயின் அர்ப்பணிப்பு கனி ஆகிறது

கனியின் அர்ப்பணிப்பு விதையாகி விருட்சமாகிறது!

இணையத்திற்கு மனிதனின் அடிபணிவு

போதை நோயும் உருமாறுகிறது...

விருட்சம் உலகைக் காக்கும் - என்மின் அடிமைத்தனம்

விஷமாகி உயிரைப் போக்கும்.

என்மின்களின் பயன்பாட்டினை மக்கள் தங்கள் கட்டுப்பாட்டிற்குள், வைக்க வேண்டுமேத் தவிர, என்மின்களின் கட்டுப்பாட்டிற்குள் வந்து தன்வசமிழப்பதைத் தவிப்போம் - ஆகப்பெரும் சக்தியாக மனித சக்தியாக உருவெடுப்போம்.

துணை நூற்பட்டியல் (துணை நின்ற நூல்கள்)

1. திருக்குறள் (மூலமும், உரையும்), பரிமேலழகர் உரை, அருணா பதிப்பகம்.
2. உமர் உஸ்மான், சமூக ஊடகங்கள் பற்றி 40 நபிமொழிகள், நல்லாயன் பதிப்பகம்
3. கபிஷ் மெஹ்ரா, சமூக ஊடகங்களின் காலங்களில் புத்தங்கள், ஹரிந்துஸ்தான் டைம்ஸ் பத்திரிக்கை (ஏப்ரல் 26, 2018).
4. ஸ்ரீராம் வெங்கட்ராமன், தென்னிந்தியாவில் சமூக ஊடகங்கள், UCL (யு.சி.எல் பிரஸ்) Press.
5. டேனியல் மில்லர், உலகம் சமூக ஊடகங்களை எப்படி மாற்றியிருக்கிறது, UCL (யு.சி.எல் பிரஸ்) Press.

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