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From the Editor's Desk

"Research is to see what everybody else has seen, and think what nobody has thought".

- Albert Szent-Gyorgyi

Research is what propels humanity forward. Without research, life on this Earth will come to a standstill. Research unlocks the unexplored areas, helps us to perceive the world from different perspectives, and helps to broaden our knowledge base. To display the array of Research capabilities of our teaching fraternity as well as research scholars of Languages, Humanities, Commerce, Science, Management, Information Technology, and so on, a refereed, peer-reviewed, bi-annual Journal titled, "Guru Nanak Journal of Multi-Disciplinary Research (GNJMDR)" is being released through our college and this edition is Volume 12, Issue 2. This Multi-Disciplinary Journal serves as a learning medium for Research development and studies from various disciplines. This Journal is a means of exchanging scholarly thoughts, ideas, and research findings among all interested stakeholders to enrich the knowledge and expertise in their respective disciplines.

The topics covered in this Journal are of significant importance in today's rapidly evolving academic landscape. These papers delve into a diverse range of subjects, from literature and linguistics to contemporary issues like the impact of COVID-19 and digital economics. They shed light on critical aspects of our society, culture, and economy. For instance, the exploration of women's lives in literature, as highlighted in the paper "சிற்றிலக்கியங்களில் புலப்படும் பெண் வாழ்வியல்" brings forth important narratives often overlooked. Additionally, the linguistic analysis of biblical interpretations and the study of language and culture in "भाषा और संस्कृति" enrich our understanding of the interplay between language and society. Furthermore, papers like "Issues related to work from home due to COVID-19" provide valuable insights into the challenges posed during the pandemic, while others explore contemporary topics such as digital economics, environmental concerns, and advancements in technology. As this journal serves as a platform for multidisciplinary research, it offers a holistic view of various subjects and their interconnectedness, fostering knowledge-sharing among scholars, researchers, and educators. These papers collectively contribute to our academic discourse, addressing the pressing issues, and advancing our collective understanding of the world we inhabit.

I extend my heartfelt gratitude to all the authors, reviewers, and members of the Editorial team who have contributed their time, effort, and expertise to make this issue a grand success. Their dedication has ensured the high quality and scholarly value of this Journal. This Edition is dedicated to all those who have shared their knowledge and insights, as well as to those who will benefit from the wisdom contained within its pages.

We welcome quality articles from all fields for our upcoming issues, and I encourage researchers and scholars to continue sharing their innovative work with our readers. I wish you all great success in your academic pursuits and hope that this Journal continues to serve as a valuable resource for learning and discovery.

Warm regards,

Dr. T.K. Avvai Kothai
Editor-in-Chief
Guru Nanak Journal of Multi-Disciplinary Research (GNJMDR)

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சிற்றிலக்கியங்களில் புலப்படும் பெண் வாழ்வியல்

முனைவர் க. அமரேசன்
உதவிப்பேராசிரியர், தமிழ்த்துறை
குருநானக் கல்லூரி (தன்னாட்சி)
வேளச்சேரி, சென்னை – 600042.

ஆய்வுச் சுருக்கம்

பெண்கள் பாலினம், சாதி, அரசியல், பொருளாதாரம், மொழி சார்ந்து ஒடுக்கப்பட்டுள்ளனர். தற்காலத்தில் அறிவியல் முன்னேற்றங்கள் உலக அளவில் ஏற்பட்டு இருப்பினும் பெண்களுக்கு எதிரான வன்கொடுமைகள் அதிகரித்து வருகின்றன. அவர்களின் வாழ்வியலானது எப்போதும் கண்காணிக்கப்படுவதாகவும், இருப்பானது கேளிவிக்குரியதாகவும் இருந்து வருகிறது. மனித வரலாற்றில் பெண்களின் நிலை ஆதிக்கம், சமபங்கு, அடிமை நிலை என்று மாறி வந்திருக்கின்றது. பெண்கள் பற்றிய பதிவுகள் பல்வேறு இலக்கியங்களில் கவனம் பெற்றிருக்கின்றன. சங்க இலக்கியம் தொடங்கி தற்கால கவிதை, புனைகதை, புதினம் வரையில் இப்போக்குகளைக் காணமுடிகிறது. பிரபந்த இலக்கியங்களில் பெண்கள் பதிவாகியிருக்கிற சூழல், பதிவு செய்திருக்கும் முறை குறித்து இனி காணலாம்.

கலைச்சொற்கள்: இளைய பள்ளி, பண்ணையார், பருத்தி பை, மொண்ணை, எலும்பு, வாத்தியார், மலடி, இருசி, வெள்ளாட்டிக் கள்ளன், முடிச்சவிழ்க்கி, வேசியர்.

முன்னுரை

பெண்களை போகப்பொருளாக பார்க்கும் சமூக அமைப்புக்குள் பெண்ணின் இருப்பு என்னவாக இருக்கும் என்பது கேள்வி. அடித்தள மக்களைக் காட்டிலும் அடிநிலையில் பெண்களின் வாழ்வியல் இருக்கிறது. சமச்சீரற்ற சமூகத்தில் ஒட்டுமொத்த சமூகத்தாலும் பெண்கள் ஒடுக்கப்படுகின்றனர். படைப்பிலக்கியங்களில் இவர்கள் பெரும்பான்மை காட்சிப் பொருளாகவும் ஆணின் இன்ப நுகர்ச்சிக்குரியவளாகவுமே இருக்கின்றனர். ஔவையார், காக்கைப்படினியார்,காரைக்காலம்மையார், ஆண்டாள் உள்ளிட்ட மிகவும் சொற்பான பெண் படைப்பாளர்களையே தமிழ் இலக்கிய வரலாற்றில் பார்க்கமுடிகிறது. பெரும்பான்மை ஆண் புலவர்கள் பாடிய பாடல்களில் பெண்ணின் வாழ்வியல் எதுவாக இருக்கும் என்பதற்கு விடையளிக்க இகட்டுரை முயல்கிறது.

பொதுவெளியை எதிர்கொள்ளுதல்

பண்ணையார் தன்னிடம் உழைக்கும் பெண்களிடத்தில் வரம்புமீறி நடந்துகொள்ளல், உடல், மனம் சார்ந்து ஒடுக்குதல் போன்றவற்றிற்கான எதிர்ப்பை பள்ளு இலக்கியங்கள் பதிவு செய்கின்றன. குறிப்பாக, முக்கூடற்பள்ளு, திருவேட்டை நல்லூர் அய்யனார் பள்ளு போன்ற நூல்களைச் சுட்டலாம். முக்கூடற்பள்ளுவில் 'பருத்தி பை வயிறு', 'கீரைமத்து தலை', 'சுரைவித்து பற்கள்', 'சொத்தை மாங்கொட்டை வாய்', 'தாறுமாறான மீசை', 'சண்ணைக்கடா போல் நடை', 'மொண்ணை முகம்' என்றெல்லாம் பள்ளியர்களின் ஏசலுக்கு உள்ளாகிறான் பண்ணையார். சான்றாக, வயது மூபான பண்ணையார் பண்ணை வயலில் வேலை செய்யும் இளைய பள்ளியைப் பேத்தி என்றும் பின்பு மெதுவாய் வா என்று பாலியல் சார்ந்து இன்னல் செய்வதை,

இளைய பள்ளி பேச்சை கேட்டும்
சாத்திமகள் காத்தி தன்னைப் பேத்தி என்பாராம்
மெள்ளச் சன்னையாய்க் களத்திலே
வாபின்னை என்பராம் (முக்.பள்.35)

என்ற பாடல்வரிகள், முக்கூடற்பள்ளுவில் வெளிப் பட்டிருக்கின்றது.

பள்ளி, கல்லூரி மாணவிகள் மீது பாலியல் வன்முறைகள் பெருகிவரும் தற்காலத்தில் பிரபந்த இலக்கியங்களும் இத்தகையப் பதிவுகளை கொண்டிருக்கின்றன. அதாவது, சுந்தரி அம்மானையில் சுந்தரி என்னும் அரசன் மகள் ஆசிரியரின் பாலியல் துன்புறுத்தலுக்கு ஆளாகிறாள். அவ்வாசிரியர் பிற மாணவர்களிடத்திலிருந்து சுந்தரியைத் தனிமைப்படுத்தி பாலியல் சீண்டலில் ஈடுபடுகிறார். வாத்தியார் தானும் வகையுடனே தான்பார்த்துப் ராசகுமாரத்தி மூத்தபிள்ளை தனையைழைத்து

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மணலுக்குத் தானும் போகவேண்டாம்
நீதானும் பிள்ளைகள் போனபின்பு
பேய்கொண்ட வாத்தியவன் பூந்தோட்டந்
தன்னில் பொங்கியிட வேணுமென்றான் (சுந்.அம்.226 -234) என்பதின் வழி உள்வாங்க முடிகிறது. சுந்தரி தன்னை ஆசிரியரிடமிருந்து காத்துக்கொள்ள 'ஆசிரியர் தந்தைக்கு ஒப்பானவர்' என்று வேண்டுகிறாள். இதனை,
ஆதிகுருவே அய்யாநீ தீண்டாதே
கைச்சரம் பண்ணாதே கர்த்தாவே எந்தகப்பா (மேலது.237-240) என்கிற பாடல் வரிகள் வெளிப்படுத்துகின்றன. பெண்களின் வாழ்வை விளங்கிக்கொள்ள பத்தொன்பது இருபதாம் நூற்றாண்டில் பெண்களின் நிலையை அறிவது அவசியமாகிறது. "குமரி மாவட்டத்தில் ஒடுக்கப்பட்ட சாதியினர் இடுப்புக்கு மேலே ஆடை அணியும் உரிமையற்றிருந்தனர். பெண்கள் மார்பை மறைக்கும் உரிமைக்காகப் போராடி வெற்றி பெற்றது ஒரு முக்கிய வரலாற்று நிகழ்ச்சி. 19ஆம் நூற்றாண்டில் மூன்று கட்டங்களாக நிகழ்ந்த இப்போராட்டம்தான் 'தோல் சீலை போராட்டம்' என்று அழைக்கப்படுகின்றது" (சிவசுப்பிரமணியன். ஆ:2006) என்கிறார்.

பெண்ணுடல் இன்பம் – இழிவு

பெண்ணின் உடலை இன்பமானது, இழிவானது எனும் எதிரெதிர் நிலையில் சிற்றிலக்கியங்களில் பார்த்துள்ளனர். பெண் உடல் பற்றிய இழிவு சார்ந்த கருத்தாக்கம் இல்லறம் ஒழிந்து துறவறம் அணுகும் ஆண்களின் பார்வையிலிருந்து வருகிறது. மதங்கள் பெண் கீழானாவள், அவளது உடல் தீட்டு எனும் கருத்தாக்கத்தைக் கொண்டுள்ளன. உலகாயுதம், பௌத்தம், சமணம், சாங்கியம் உள்ளிட்ட சமய வழிமுறைகளை எதிர்த்து சைவத்தை நிலைநிறுத்துவதாக அமையும் 'நாகை கனகசபை நாதர் உலா' உலகாயுத மறுப்பு எனும் பகுதியில் பெண்ணின் உடலை இழிவாகச் சித்திரிக்கிறது. அதாவது,

ஆரும் அருவருக்கும் ஆகா மலத்தைஇந்தப்
பாரில்ஊர்ப் பன்றிதின்னும் பண்புபோல் சோரிஎன்பு
மேதைநீர் மச்சைமுடை மென்தோல் கபமலத்தை
மாதரின்பம் என்னும் வழிவிட்டே நீயொடும்
சோதிஅரன் பாதம் தொழுதுய்... (நாகை.க.உ..525-527)

இரத்தம், எலும்பு, சதை, சிறுநீர், மச்சை, முடைநாற்றம் வீசும் உடலின் தோல், கோழை ஆகியவற்றை உள்ளடக்கிய பெண்ணின் உடல் வெறுக்கத்தக்கது என்கிறது. குமரேச சதகம், 'மன்னர் உறவு கொள்ளுகிற பெண்ணை புணர நினைப்பவர் பதர்' என்கிறது. இந்நூல் பெண்ணை வேசையர் என்று கூறுகிறது.

மன்புணரும் வேசையுடன் விபசரிக் கின்றபதர்
மனிதரில் பதரென்பர்காண். (கும.ச.28)

தூது, உலா, குறவஞ்சி, பள்ளு போன்ற இலக்கியங்களில் பெண்கள் பற்றிய வருணனைகள் பாலியல் உணர்வைத் தூண்டுபவையாக உள்ளன. இறைவன், தலைவன், வள்ளல் போன்றோர் வீதியில் உலா வருகையில் பேதை, பெதும்பை, மங்கை, மடந்தை, அரிவை, தெரிவை, பேரிளம்பெண் ஆகியோர் கண்டு காதல் அல்லது காமம் கொள்வதாக உலா சிற்றிலக்கியம் கூறுகின்றது. ஏழு வயது நிரம்பிய குழந்தை நாகையில் இருக்கும் கனகசபை நாதர், உலா வருகையில் அவரை கண்டு காதல் கொண்டாதாக நாகை கனகசபை நாதர் உலா பதிவுசெய்திருக்கிறது. 'ஆடை விளகினும் ஆண்களை கவரும் உடல் அமைப்பு இல்லாத சிறுமி' என்று சித்திரிக்கப்பட்டுள்ளது இருப்பினும்,

காதல்மிக உள்ளம் கலங்கிப் புலம்பும் அந்தக்
கோதில்எழில் மாதர்க் குழாத் தொருத்தி (நா.க.உ..98)

என்பதாகச் சொல்கிறது. தெரிவை பருவத்துப் பெண்ணின் காது, கூந்தல், பாதம், இடை ஆகியவற்றோடு பிறப்புறுப்பையும் (நா.க.உ..431-432) வருணித்துள்ளனர். சரபேந்திர பூபாலக் குறவஞ்சியும் இதே தன்மையில் அமைந்திருக்கிறது. மதனவல்லி என்பவள் சரபேந்திரர் உலா வர அவர் மீது காதல் கொள்கிறாள். அவளது அழகை அந்நூலாசிரியரான கொட்டையூர் சிவக்கொழுந்து தேசிகர் பின்வருமாறு வருணிக்கிறார்.

தங்கமுலைப் பம்பரத்தை
அம்புவிமீது ஆட்டிடும்மா தங்கமே – இடை
சாயலுறும் நல்துடியை
வாயிலறை வித்திடுமோர் சிங்கமே. (சரபேந்.கு.8:3)

என்றும் பாலியல் சார்ந்த பொருளாக பெண்ணை அடையாளப்படுத்தி

இருக்கின்றது. அவர்களது உடலை 'பாதாதி கேசம், கேசாதி பாதம்' என்ற முறையில் வருணித்திருக்கும் போக்கு படைப்பாளியின் நோக்கத்தை வெளிப்படுத்துகிறது.

ஆண் - பெண் சமச்சீரின்மை

பெண்கள் இன்று பல்வேறு துறைகளில் தங்களின் பங்களிப்பைச் செய்து வருகின்றனர். அறப்பளீசுர சதகம்,
பெண்புத்தி கேட்கின்ற மூடரும்
தந்தைதாய் பிழை புறம் சொல்லும்
மூடரும் (அறப்.ச.35) என்று பெண்களின் கருத்தைக் கேட்டுச் செயல்படுபவர், தந்தை தாயின் பிழையை வெளியில் கூறுபவரை மூடர் என்கிறது. குமரேச சதகம், 'பெண்ணின் கருத்தைக் கேட்டு வாழும் ஆண் எதற்கும் உதவாத கழிவாகிய பதர்' என்று கூறுவதும் கவனிக்கத்தக்கது.

குழந்தைப்பேறு

குடும்ப உறவில் பெண்ணானவள் குழந்தையைப் பெற்றெடுத்தல் அவளின் பிறவிக் கடமையாகிறது. பெண்ணின் வாழ்க்கைத் திருமணம் செய்வதோடு முடியாமல் குழந்தையைப் பெற்றெடுத்தலில் முழுமை கொள்வதாக இச்சமூகம் கருதுகிறது. இது கடந்த காலம் மட்டுமன்றி நிகழ்கால சமூக எதார்த்தமாகவும் இருக்கிறது. இதனை அடிப்படையாகக் கொண்டு பெண்ணுக்கு குழந்தையில்லையெனில் ஆண் மறுமணம் செய்வது நடக்கிறது. வீரையன் அம்மானையில் குழந்தைப் பேறு இல்லாத அருந்ததியப் பெண் பல்வேறு பழிச்சொற்களுக்கு உள்ளாகிறாள். வீரையன் எனும் குழந்தையைக் காட்டில் இருந்து எடுத்த பின்பே தன்வாழ்க்கை முழுமையடைந்ததாகக் கூறுகிறாள். இதனைப் பின்வரும் பாடல் வெளிப்படுத்துகிறது. அப்பெண் தன் குழந்தையைத் தாலாட்டுகையில்,

மலடி மலடியென்று வையகத்தோர் சொல்லையிலே
மலடியென்ற சத்தம் மறக்கவந்த கண்மணியே
இருசி இருசியென்று எல்லோருஞ் சொல்லயிலே
இருசியென்ற சத்தம் இனியடக்க வா கண்ணே (வீ.அ:691 - 696)

என்கிறாள். அப்பெண் 'மலடி'யென்றும் 'பூப்படைய தகுதியில்லாப் பெண்' என்றும் இழிவுக்கு உள்ளாக்கப்பட்டுள்ளாள். இங்கு 'இருசி' என்றால் 'பூப்படையத் தகுதியற்றவள்' என்பது பொருள். 'நாலுமந்திரி கும்மி' கருவுறாத பெண் கிளியைக் குழந்தையாக நினைத்து வளர்த்து வந்ததைக் கூறுகிறது. இதனை,

கிள்ளை யென்று கிளிதான் வளர்த்தாள்
கெற்பமில் லாத மலடி யினால்
பிள்ளை போலே அதைத்தான் வளர்த்து அவள்
பேசவு நன்றாய் வருத்தி வைத்து (நா.கு.146)

என்கிற வரிகள் உணர்த்துகின்றன.

பாலியல் தொழிலாளிகள்

தமிழ்ச் சமூகத்தில் பாலியல் தொழிலாளர்களைப் பரத்தையர், காமக்கிழத்தியர், வேசையர், வேசி, விலைமாது, பாலியல் தொழிலாளர்கள் என்று வாழும் சூழலுக்கேற்ப வேறு காலக்கட்டங்களில் அழைத்துள்ளனர். வேசியர்கள் பரதம் ஆடி முடிந்து சில ஆண்களின் வீட்டிற்கு சென்றதாக 'கவிராயர் பணவிடு தூது' பதிவு செய்திருக்கிறது. அவ்வாறு அப்பெண் சென்ற வீட்டின் ஆணை 'உத்தமன்' என்கிறது. மேலும் 'வேசியர்கள்' என்று அடையாளப்படுத்துவதோடு பாலுறுவு மொழி பேசி பிறரது பணத்தை கவர்ந்து கொள்வதாகவும் பதிவு செய்கிறது. சான்றாக,

.......வேசியர்கள்
மத்தள தாள வரிசை உடன்பரத
வித்தைபா ராட்டுவதும் முன்னிருந்த – உத்தமனைப்
பார்த்து நகைத்துப் பரதம் முடிந்ததன்பின்
சீர்த்தி யவன்மனையுள் சென்றிருந்து (கவி.தூ.88-95)

செண்டலங்காரன் விறலி விடு தூது நூலில் மாணிக்க மாலை என்ற வயதான பாலியல் தொழிலாளி தனது மகள் மதானபிசேகத்திற்கு பாலியல் தொழில் சார்ந்த நுட்பங்களைக் கற்றுக்கொடுக்கிறாள். அதனுடன் ஆணாதிக்கச் சமூகத்தை எதிர்கொள்ளும் தந்திரங்களையும் கூறுகிறாள். 'பண்டிதர் வந்திருக்கையில் யாராவது உன்னை அழைத்தால் அவரை கூடையில் மூடி வை'. 'கடுக்கன் அணிந்திருக்கும் புலவர் வந்தால் ஐந்து பொன் கேட்டால் அரைப்பணம் தருவேன் என்பார் அவரை மகிழவைத்தால் நம்முடன் பாடல் பாடுவார். இல்லையெனில் வசை பாடுவார்'. 'கச்சேரிக்கு வந்தழைக்கும் சேவகர் வந்தால் அவர் கொடுப்பதை வாங்கிக் கொள்ள வேண்டும். அப்பொழுதுதான்

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நமது பாலியல் தொழில், நாட்டியத்தொழில் தொடர்ச்சியாக நடக்கும்' என்கிறாள். 'ஊர் மணியக்காரர் வந்து அழைத்தால் முடியாது என்றால் பொல்லாப்பு உண்டாகும்'. எனவே, மாதவிலாக்கானதாகக் கூறி,

சாதனையாச் சேலையிலே
தம்பலத்தின் சாறு உமிழ்ந்து
சூதகம் ஆனேன் என்று தூர இரு
(செண்.தூ.40)

என்று அவரை தவிர்த்துவிடும்படி உரைக்கிறார். மேலும் அடித்தள மக்களின் எதிர்ப்புக் குரலாக, வாகுபட்டரை பாலியல் தொழிலாளியான தாய்க்கிழவி சாடுவதைக் காணலாம். வாகுபட்டர் சித்திர வல்லியிடம் பொன், பொருளை இழந்து வழக்குத் தொடுக்கின்றான். இதனை எதிர்த்து தாய்க்கிழவி பேசுகிறாள். அதாவது, 'முகமாயக் கள்ளன்', 'முடிச்சவிழ்க்கி', 'திருடன்', 'மூடன்', (மேலது,475 - 476)'சுடுமூஞ்சி', 'வெள்ளாட்டிக் கள்ளன்', 'கா சென்றாள் சாவான்', 'பெற்றத் தாய்க்கு உணவிடாதவன்', 'வாய்க்கரிசி நோண்டி மடிப்பிச்சை வாங்குவான்' (மேலது, 484) என்பதிலும் அவளது கலகக் குரலை, கேட்க முடிகிறது.

முடிவுரை

சிற்றிலக்கியக் காலத்தின் பெண்களின் வாழ்வியலானது சிற்றிலக்கியங்களில் பன்மைத்துவத்துடன் இருக்கின்றது. பெண்கள் குடும்பம், பொதுச்சமூகம் சார்ந்தும் சாதி சார்ந்தும் ஒடுக்கப்பட்டுள்ளதை விளங்கிக்கொள்ளலாம். வயல் வேலை, வேட்டைத்தொழில், அரசன் மகள் – மாணவி, பாலியல் தொழிலாளி, பரதக் கலைஞர், இறைவன் மீதும் மன்னர் மீதும் காதல் கொள்ளும் பெண்களென பலதரப்பட்ட வாழ்வியலை விளங்கிக்கொள்ள முடிகிறது. இருப்பினும் பெண்கள் இரண்டாம் நிலைக் குடிமக்களாகவே நடத்தப்பட்டுள்ளனர். அவர்களின் குரல் விடுதலையுணர்வோடு ஒலிக்கமாலே இருந்திருப்பதை சிற்றிலக்கியங்கள் பதிவுசெய்திருக்கின்றன. விலக்காக பள்ளியரும், பாலியல் தொழிலாளரும் மட்டுமே ஆண்களை விமர்சிக்கும் போக்கையும் எதிர்க்கின்ற பண்பையும் பெற்றுள்ளனர் என்பது வெளிப்படுகிறது.

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குறியியல் : படிமங்களின் அர்த்தப் பின்புலம்

A rose by any other name would smell as sweet -William Shakespeare

ரவி க்ருஷ்ணம்
உதவிப் பேராசிரியர்
தமிழ்த்துறை
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செங்கல்பட்டு.-603001.

ஆய்வுச்சுருக்கம்

குறியியல் என்னும் சிந்தனைப் புலத்தின் பரிணாம வளர்ச்சி- பெர்டினட் சசூர்- குறியியலின் விளக்கம், சார்லஸ் சாண்டர்ஸ் பியர்சின் குறியின் வரையறை - சசூரும் பியர்சும் முரண்படும் கோணம் – குறிகளின் வகைகள் ஆகியன தமிழ்ச் சமூகத்தின் பின்புலத்தில் விளக்கப்படுகின்றன. குறிப்பான் – குறிப்பீடு இவற்றிற்கான தற்காலிக தொடர்பு- சார்லஸ் சாண்டர் முன்வைக்கும் பொருள் (Object), பிரதிபலிப்பு (Represent), விளக்கம் (Interpretation) ஆகியவற்றின் வழி செயல்படும் குறியியக்கம் காட்டப்படுகிறது. உருவக்குறி (Icon) – சுட்டுக்குறி (Index)- குறியீடு (Symbol) இவற்றிற்கான தொடர்பும் தொடர்பின்மையும் காட்டப்படுகிறது. வணிக நிறுவங்களின் நிறுவன முத்திரைக்குப் பின்னால் இயங்கும் அர்த்தம்- சமூகப் பொருளாதார அரசியல் கோணம் விவாதிக்கப்படுகிறது- பெப்சி – கோக்கோ கோலா ஆகியவற்றின் முத்திரை மாற்றம் விவாதிக்கப்படுகிறது. சங்கேதம் (Codes), குறி (Sign) இவற்றிற்கு இடையேயான வேறுபாடு, சங்கேதங்களின் வகைகளான உடல்மொழி சங்கேதம்,மொழிவழி சங்கேதம், வணிக சங்கேதம் ஆகியனவும் விளக்கப்பட்டுள்ளன. சமூகத்தில் அர்த்த உருவாக்கம் நிகழ்த்தும் குறிகளின் அரசியல் மற்றும் அறிவியல் கோணம் ஆராயப்படவேண்டிய துறையாக சுட்டிக் காட்டப்பட்டுள்ளது.

குறியியல்

குறியியல் என்பது சமூகத்தில் அர்த்தங்களை உருவாக்கும் அறிவியல் என வரையறுப்பார் குறியியலாளர் கெயிர் எலம். (Semiotics can be best be defined as a science dedicated to the study of the production of meaning in society- Keir Elam, The Semiotics of Theatre and Drama) பெர்டினான் டி சசூர் மொழியியல் என்னும் மொழிதொடர்பான ஆய்வில் குறியியல் ஒரு பகுதியாக அமைந்திருப்பதை 1916இல் வெளியான தன்னுடைய பொது மொழியியல் மீதான சொல்லாடல் (Discourse on Linguistics] என்னும் நூலில் விவரித்தார். குறியியலை சசூர் Semiology என்னும் சொல்லால் குறிப்பிட்டார். இச்சொல் இன்று பிரான்சில் மட்டுமே வழக்கத்தில் உள்ளது. பிரான்ஸ் தவிர்த்தபிற நாடுகளில் Semiotics என்னும் பதமே வழக்கத்தில் உள்ளது. தமிழில் குறியியல் சிந்தனைகளைக் குறி. குறிப்பு என்னும் சொற்களின் வழியாகவே அறிய இயலுகிறது என்கிறார் அப்துல் ரகுமான். (அப்துல் ரகுமான், புதுக்கவிதையில் குறியீடு,ப.1)

குறி என்னும் சொல்லிற்கு ஏற்ற ஆங்கிலப் பதமாக பர்ரோவின் ஆங்கில அகராதி Symbol என்னும் சொல்லைக் குறிப்பிடுகின்றது. (Burro – English Dictionary) குறி என்னும் இச்சொல்லிற்குச் சென்னைப் பல்கலைக் கழகத் தமிழ்ப்பேரகராதி முப்பத்து நான்கு பொருள் களைத் தருகின்றது. இவை யாவும் தமிழிலக்கியப் பரப்பில் இதுவரை பயன் படுத்தப் பட்டுள்ளன என்பது உள்கிடைக்கையாகும்.

குறி, இடுகுறிவரை, அடையாளம், நினைவுக்குறி, அறிகுறி, அடையாளக் குறிப்பு, அறிவில் புக்குறி, தெரிவிப்புக் குறி, தனிச்சிறப்புக் குறி, சின்னம். சுட்டுக்குறி, தெரிந்த எழுத்துக்குப் பதிலாகப் பயன்படுத்தப்படும் தெரிய வாரா எழுத்துமுறை குறியீடு குழுக்குறி சின்னம்,

சைகை, கையடையாளம், மெய்யறுகுறிப்பு, செயற்குறிப்பு, சாடை, நினைவூட்டுக் குறிப்பு, விளம்பரக் குறியீடு, மரபுக்குறி முன்னம், எதிர்ப்புக் குறி, எச்சரிப்புக் குறி, முன்னம், நோயின் குறி. இடர்க்குறி, உற்பாத, இராசிச்சின்னம், வான்மனைக்குறி. இவையனைத்து சொற்களும் பெயர்ச்சொற்களாகச் சென்னைப் பல்கலைக்கழகப் பேரகராதி குறிப்பிடுகின்றது. குறியியல் என்ற பெரும் அர்த்த விளக்கத் துறையின் அடிப்படை அலகு குறி(sign) இதனை விளக்குவதில் சசூரும், பியர்சும் தங்களுக்குள் மாறுபடுவர்.

குறியியல் சசூரின் விளக்கம்

குறியியலை சங்கேத அறிவியல் என சசூர் பின்வருமாறு வரையறுப்பார்.

"இது சமூக உளவியலின் ஒரு பகுதியாகவும் பொது உளவியலின் உட்கூறாகவும் அமைவது. இதனை நான் சிமியாலஜி என அழைப்பேன். சிமியாலஜி குறிகளால் அமையப் பெறுவதும் ஆளப்பெறுவதுமான அமைப்பு" (சசூர்: 1959). ஜோனாத்தான் போன்றே ஹாரிஸ், ஜாக்கப்ஸன் எனப்பலர் சசூரின் குறியியல் புரட்சியை வரலாற்றில் குறிப்பிடத்தக்க ஒன்றாகக் கருதினர். ஆனால் சசூருக்குப் பிறகான மொழியியல் குறியியலை ஒரு கருதக்கூடியதாக வளர்த்தெடுக்கவில்லை என்பார் டான்பை. (Tonby). சசூர், தருக்கம் சார்ந்த மொழியணுகுமுறை (Logical Oriented Language) மரபான இலக்கணிகளின் உருவாக்கமாகக் கருதினார். சசூர் தொடர்சார் மொழியியலை குறிசார்மொழியியலாக (Sign Oriented Language) மாற்றினார். மரபான இலக்கணம் குறித்த போதாமையும் அடுத்த அதன் நகர்வு குறித்த திட்டமும் சசூருக்குள் இருந்தன.

குறி - பியர்சின் விளக்கம்

சசூரின் குறிகள் தொடர்பான விளக்கத்தின் மீது பல விமரிசனங்கள் உண்டு என ஆக்டன் ரிட்சட்ஸ், சார்லஸ் சாண்டஸ் பியர்ஸ் ஆகியோர் சசூரின் குறி தொடர்பான கருத்தாக்கத்தை விமர்சித்தனர். இவர்களின் அர்த்தங்களின் அர்த்தம் (MEANING OF MEANING P: A Study of the Influence of Language upon Thought and of the Science of Symbolism – C.K Ogden and I.A.Richards) என்னும் நூல் 1923 இல் வெளியானது. இதில் சசூர் மொழிகளின் மற்றையக் கூறுகளைப் புறந்தள்ளி மொழியைக் குறிவயப்படதாகவே சுருக்கிக் காண்கிறார் என்பது சசூரின் மீது வைக்கப்பட்ட விமரிசனமாகும். (தமிழவன், தமிழும் குறியியலும், ப.34,) ஆகவே, சாண்லர்ஸ் பியர்ஸ் குறிகளை மும்முனை சார்ந்த ஒன்றாகக் கண்டார். பிரதிபலிப்பு *(Representamen)*, இடையீடு (*Interpretant)*, பொருள்(Object). குறி [Sign] என்ற மொழியின் மிகச்சிறிய ஆனால் ஆழமான இயங்கு தன்மை கொண்ட இச்சிறு கூறினைக் குறித்து பியர்ஸ் பின்வருமாறு விளக்குவார். நாம் குறிகளிலேயே சிந்திக்கிறோம் குறிகளே வார்த்தைகளாக உருவாகின்றன. குறி என்பது ஒன்றைக் குறிக்கப் பயன் படும் போதே உருவாகி விடுகின்றது. (www.Stanford Encyclopaedia of Philosophy)

சசூரும் சார்லஸ் சாண்டாஸ் இருவரும் குறியையும் அதன் இயங்கியலையும் வரையறுப்பதில் முரண்படுவர். சசூரின் படி குறி என்பது குறிப்பான்,குறிப்பீடு என்னும் இரண்டு கூறுகளால் ஆனது.

குறிப்பான் – குறிப்பீடு (Signifier and Signified) குறிப்பான் என்பது குறி மேற்கொள்ளும் வடிவம். குறிப்பீடு என்பது கருப்பொருளின் [Content) வெளிப்பாடு உள்ளடக்கம் என வரையறுக்கலாம். குறி என்பது குறிப்பான் என்னும் பருண்மையான கூறினையும், குறிப்பீடு என்ற மனப் படிமத்தையும் தனது இரண்டு பக்கங்களாகக் குறி கொண்டுள்ளது. குறிகள், குறிஉறவுகள், குறி அமைப்புகள், சங்கேதங்கள் ஆகியன குறியியலின் முதன்மையான எல்லைகளாக அமைகின்றன. குறியியல் ஆய்வுகள் மூலம் மொழி என்பது ஒரு பொருள் அல்ல வடிவம் என முன்வைக்கப்பட்டது. (Language is not substance but it is a form] சசூர் குறிப்பிடும் குறிப்பான் குறியீடு என்னும் இவை இரண்டும் பிரதி என்னும் புள்ளியில் இணையும் போது குறி தோன்றுகின்றது. குறிப்பானுக்கும். குறியீடுக்கும் இடையேயான ஊடாட்டத்தைக் குறிவயமாதல் என்பர். குறியைப் பற்றிய சசூரின் விளக்கம் பின்வருமாறு அமைகின்றது. மொழிக்குறி என்பது பொருளுக்கும் அதனைக் குறிக்கும் பெயருக்கும் இடையேயான தொடர்பு அன்று. உள்ளடக்கத்திற்கும் ஒலிக்கும் இடையேயான தொடர்பாகும். ஒலிமுறை என்பது உளவியலோடு தொடர்புடையது. இந்த ஒலிப்பு

முறை மன உணர்வுகளை வெளிப்படுத்தும் ஒன்றாக அமைகின்றது. (Course in General Linguistics.P.221)

சசூர் குறிப்பிடும் குறியியலை உளவியலோடு சேர்த்துப் பார்க்கும் ஆய்வை லெக்கான் அடுத்துக் கட்ட ஆய்விற்குக் கொண்டு செல்கிறார். சிக்மன் பிராய்ட் குறிப்பிட்ட நினைவிலி மனம் என்பது மொழியால் நிரம்பியிருக்கிறது என்கிறார் லக்கான். மொழி நடை ஆய்வின் மூலம் மனித மனம் பற்றி அறிந்துகொள்ள இயலும் என்பது அவரின் கருத்து. இக்காரணத்தினாலேயே சொல் உருவாக்கத்தின் தொடக்கத்திற்கு முந்தைய நிலையைக் குறிக்க சிமியாடிக் என்னும் சொல்லையே பயன்படுத்துகிறார். இதனைப் பெங்குயின் மெய்யியல் அகராதி பின்வருமாறு காட்டுகின்றது.
சிமியாடிக்ஸ; [Semiotics) என்னும் பதம் சிமியாடிக் என்னும் பதத்திலிருந்து முழுவதுமாக வேறுபட்ட ஒன்று. இது லக்கானின் மொழி உருவாக்கத்தின் (Pre verbal phase] முன்னிலையைச் சுட்டவே பயன்பட்டது. (Dictionary of Philosophy,P.332) குறிகளை அதன் தொழிற்படும் வகைமை கருதி மூன்றாகப் பிரிப்பர். இத்தகைய பிரிப்பு முறை பெரும்பன்மையும் சார்லஸ் சாண்டர்ஸ் பியர்சின் வகைபாடு. இது பொதுவாக ஏற்றுக் கொள்ளப்பட்ட ஒன்றாகும்.

குறிகளின் வகைகள்

உருவக்குறி	**குறியீடு**	**சுட்டுக்குறி**
(Icon)	**(Index)**	**(symbo**l)

நிஜப்பொருட்களின் சாயலாக ஆவணங்களுள் பதியவைக்கப் பெறுபவை உருவக்குறிகள். குறிப்பான் குறிப்பீடு இவைகளுக்கு இடையிலான உருவ ஒப்புமையின் அடிப்படையில் அறியப் பெறுவதாகும். இத்தகைய குறீடுகளுக்குச் சான்றுகளாகப் புகைப்படங்கள், வரைபடங்கள். சிற்பங்கள். சித்திரங்கள். நாணய உருவங்கள், விளம்பரக் காட்சிகள். போன்றனவற்றைக் கூறலாம்.

ஆப்பிள் கணினி நிறுவனம் தன் வணிக முத்திரையை உருவாக்க முடிவெடுத்த போது ஒரு கடித்த ஆப்பிளைத் தேர்வு செய்தனர். இந்த ஒரு கடியானது முதன்முதலாக ஏவாள் கடித்த அறிவுக்கனியை நினைவுபடுத்தும் விதமாக அமைக்கப்பட்டது என்பது ஸ்டீவ் ஜாப்ஸ் கூறிய விளக்கமாகும். அதாவது, முதன்முதலாக டிஜிட்டல் உலகின் அறிவுக்கனியாக ஆப்பிள் நிறுவனம் தன்னை முன்னிறுத்த கிறிஸ்தவ தொன்மவியல் வழியான படிமத்தை முன்வைத்தது. இந்திய மருத்துவக் கழகத்தின் முத்திரையும் ஹெர்ம்ஸ் என்ற ரோமானிய – கிரேக்க தெய்வத்தின் கையில் உள்ள இரண்டு பாம்புகள் எதிரெதிராகப் பின்னப்பட்ட தடியையே குறியீடாக வைத்துள்ளனர். ஹெர்ம்ஸ் குணப்படுத்தலுக்கான தெய்வம் என்பதும் வாழ்வியல்,இறத்தல் என்னும் இருநிலைக்கும் அவர் இயக்கம் கொள்பவர் என்பதும் இதன் உட்பொருளாக்கப்பட்டது. 1902 இல் அமெரிக்க இராணுவ மருத்துவமுகாம் இக்குறியீட்டைப் பயன்படுத்தியதில் இருந்து பலநாடுகளில் இது மருத்துவக் குறியீடானது. வணிக நிறுவங்கள் பொதுவாக புராணிக முத்திரைகளை மட்டுமல்லாமல், புராணக்கூறுகளையும் கதைகளையும் கூட தங்களுக்கான விளம்பர உத்திகளாகப் பயன்படுத்துகின்றனர். சான்றாக ஏவிஜி (AVG) என்ற சாஃப்ட்வேர் நிறுவனம் தங்கள் கணினிக்குள் எதிர்ப்பொருள்கள் நுழைவதை ட்ரோஜன் ஹார்ஸ் [Trojan Hourse] என்னும் பெயரால் அழைக்கிறது. ட்ரோஜன் ஹார்ஸ் என்பது கிரேக்க காவியமாகிய ஹோமர் எழுதிய இலியட்டில் வருணிக்கப்படும் எதிரிகளின் சூழ்ச்சியால் வஞ்சகமாக உருவாக்கப்பட்ட குதிரையாகும். இதனை இருபத்து ஒன்றாம் நூற்றாண்டில் ஒரு கணினியியல் சார்ந்த வணிக நிறுவனம் பெயராக மாற்றுகிறது, இதன் மூலமாக

இச்சொல்லாளுகை ஒரு வலிமையான தொன்மக்குறியாக (Mythical Sign) உருப்பெறுகிறது.

சங்கேதம் (Codes]

சங்கேதம் என்பதற்கும் குறி என்னும் மொழியின் அடிப்படை அலகிற்கும் வேறுபாடு உண்டு. குறியைத் தனியாக வைத்துப் பொருள் கொள்ள இயலாது. அதனை மற்றொரு பொருளோடும் சூழலோடும் வைத்தே பொருள் கொள்ள இயலும். ஆனால் சங்கேதம் இத்தகைய இயல்பிற்கு எதிரானது இரஷ்ய உருவவியலாளராக அறியப்பட்ட ரோமன் ஜாக்கப்ஸன் விளக்கவுரை (Interpretation) என்பது சங்கேதங்களினாலேயே ஒரு பனுவலுக்குள் சாத்தியமாகிறது என்கிறார். (ந.ம.வீ.ரவி, அரங்கக் குறியியல்) குறிகள் அர்த்தங்களைப் பெற சங்கேதங்கள் பெரும் அளவில் துணைபுரிகின்றன என்கிறார். சங்கேதங்கள் இல்லை என்றால் குறி என்னும் நிலைப்பாட்டை ஒரு பொருளோ அல்லது கருத்தோ அடைவது இல்லை என்கிறார். சங்கேதங்கள் குறித்து ஜெராய்ட் கூறும்போது, சங்கேதங்களை பரந்துபட்ட அளவில் இரண்டு கூறாகப் பிரிக்கலாம் என்பர். அதாவது, தருக்கவியல் சங்கேதம் (Logical Code) அழகியல் சங்கேதம் (Aesthetic Code) என்பன அவை. தருக்கவியல் சங்கேதம் என்பது ஒருமுகமாக அர்த்தம் அளிக்கக் கூடியது. (Mono Semic) இது நெகிழ்வற்ற இறுக்கமான, இயக்கமற்ற தன்மையைக் கொண் டிருக்கும். பொதுவாகக் கணிதம், வேதியியல் போன்றன இவ்வகையில் அடங்கும். சான்றாக, சோடியம் க்ளோரைட். சமூகச் சங்கேதங்கள் விரிந்த பார்வையில் அணுகும் போது அனைத்து சங்கேதங்களுமே சமூகச் சங்கேதங்கள்தாம். ஆயினும் அவற்றுள் காணலாகும் இயல்புகளை வைத்து பின்வருமாறு பிரிக்கின்றனர்.

மொழிவழி சங்கேதங்கள்

உடல்மொழி சங்கேதங்கள்

வணிகச் சங்கேதங்கள்

மொழிவழியிலான சங்கேதங்கள்

இவ்வகையில் மொழி என்பதே ஒரு சங்கேதம். குறிப்பாக மொழியை ஆதார சுருதியாகக் கொண்டு தொழிற்படும் சங்கேதங்கள் இதனுள் விவாதிக்கப்பட்டுள்ளன. மொழியை ஊடகமாக வைத்துத் தொழிற்படக்கூடிய, இயங்கவல்ல சங்கேதங்கள் இவ்வகையில் அடங்கும். சான்றாக. அகராதிகள். யாப்பு தொடர்பானவை, அணிதொடர்பான உவமைகள், உருவகங்கள், தொனி போன்றவை. குறியியல் இலக்கிய உத்திகளாகக் கருதக்கூடிய உவமை (Simile) உருவகம் (Metophor), ஆகிய இவற்றை சங்கேதங்களின் ஒரு பகுதியாகவே கருதுகின்றன.

உடல்மொழி சங்கேதங்கள்

கைப்பிடித்தல் என்பது தமிழிலக்கியப் பரப்பில் திருமணம் என்பதாக பொருள்படுகிறது. கைவுக்கை நெகிழாமல் (சிலப்பதிகாரம்) வந்தெனைக் கரம் பற்றிய (கம்பன்) கைத்தலம் பற்றக் கனாக்கண்டேன் (ஆண்டாள்) கைப்பிடி நாயகன் (சித்தர்கள்) வடமொழியில் பாணிறிக்கரணம் என்பது தந்தை கைப்பிடித்து கொடுக்க நடைபெறும் திருமண முறை. ஆகவே, திருமண நிகழ்வு கைப்பிடி என சங்கேதமாக மாறியுள்ளதை மொழிவழி சங்கேதம் என்பர். சிற்பங்கள்/ ஓவியங்களில் உள்ள உடல்மொழி இத்தகையன.குதிரை வீரன் ஒருவனின் சிலைவடிவமைப்பில், குதிரை இரண்டு முன்னங்கால்களைத் தூக்கியபடி இருந்தால் போர்க்களத்திலேயே அவன் இறந்தான் என்றும், ஒரு கால்மட்டுமே தூக்கியபடி வடிவமைக்கப்பட்டால், நோயில் இறந்தான் என்றும் பொருள். இங்கிலாந்தின் குதிரை வீரன் சிலை வடிவமைப்பு முறை இவ்வாறே இருபதாம் நூற்றாண்டு வரை செயல்பட்டது. (சென்னையின் ஜென்ரல் தாமஸ் மன்றோவின் சிலை குதிரையின் மீது அமர்ந்தவாறும் குதிரையின் ஒரு கால் தூக்கியபடியும் செய்யப்பட்டிருக்கும் அவர் அன்றையகால பெருந்தொற்றான காலராவில் இறந்தார்) ஆகவே இவ்வாறான சங்கேதங்களை உடல்மொழி சங்கேதங்கள் எனலாம்.

வணிக சங்கேதங்கள்

வணிக நிறுவனங்கள் பயன்படுத்தும் சங்கேதங்கள் இவ்வகையில் கூறத்தக்கன.

வண்ணங்கள். கார்களின் வடிவமைப்புகள் முதலியன. இன்றைய வணிக ஆடைகள். காலக் கட்டத்தில் ஒவ்வொரு நிறுவனங்களும் தங்களுக்குரிய தலைப்பு, பெயர் எழுதப்பெறும் முறைமை ஆகியனவற்றை அறிவுசார் சொத்துரிமைகள் கழகத்தில் பதிவுசெய்துள்ளமை. குறிக்கத்தக்கது.

அதாவது ஒரு குறிப்பிட முறைமையில் எழுதும் நடையமைவே. எழுத்துவடிவம் பதிவு செய்வதைப் பல்வேறு நிறுவனங்கள் கடைபிடிக்கின்றன. ஹெனிக்கன் குடுவைகளில் உள்ள எழுத்துக்களில் e என்னும் எழுத்து குழந்தையின் புன்னகையைப் போன்று வடிவமைக்கப்பட்டது. இது அறிவுசார் சொத்துரிமை பதிவும் செய்யப்பட்டுள்ளது. போர்க்காலங்களில், சிவப்பு நிறமான நட்சத்திரக் குறியீடு வெண்நிறமாக மாற்றியும் ஹெனிக்கன் தன்னுடைய இரக்கத்தைப் பதிவுசெய்தது.

நீல நிறம் என்பது நம்பிக்கை என்பதன் தொடர்ச்சியாக உலகம் முழுவதும் பயன்பாட்டில் உள்ளது. எண்பது விழுக்காடு வங்கிகளின் முத்திரைகளின் நீல வண்ணம் கலந்திருப்பதைக் காண இயலுகிறது. அதனோடு சேர்ந்து அந்த வங்கியின் முத்திரையும் இடம்பெற்று இருப்பது என்பது தனியாக ஆராயக் கூடியதாகும்.

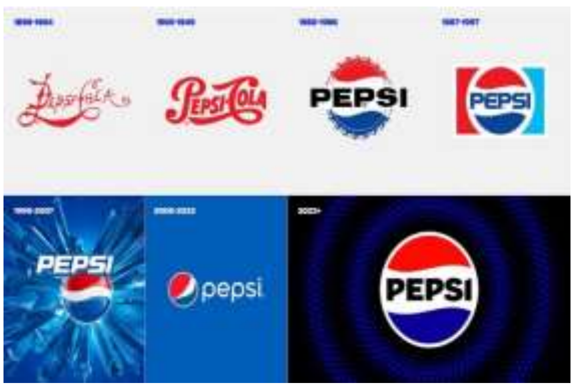
பாரத ஸ்டேட் வங்கியின் முத்திரையானது பூட்டப்பட்ட சாவி துவாரத்தைக் குறிக்கிறது. இதன் வழியாக உங்கள் பொருட்கள் வங்கியில் மிக பாதுகாப்பாக உள்ளன என்பதைத் தெரிவிக்கின்றன. பூட்டிய நிலையில் உள்ள சாவி துவாரத்தை மட்டுமே காண முடியும் .திறந்திருகையில் சாவி துவாரம் அடைபட்டிருக்கும். இதனைத் தாண்டி அந்த வங்கியின் முத்திரை ஏன் நீல நிறத்தில் வடிவமைக்கப் பட்டுள்ளது என்பதுதான் உலகம் முழுவதும் உள்ள வங்கிகளின் பெயர்கள் தாங்கிய எழுத்துகள் நீல நிறத்தில் இருப்பதற்கான காரணம் ஆகும். அதாவது நீல நிறம் என்பது மனித மனத்திற்குள்ளாக உண்மை நம்பிக்கை என்பதாக மனப்படிவம் கொண்டுள்ளது என்பதைத்தெரிந்து கொண்ட அதாவது ஆய்வின் மூலமாகத் தெரிந்துகொண்ட நிறுவனங்கள் இத்தகையதாக வண்ணங்களை வடிவமைகின்றன. இது மட்டுமல்லாது, பள்ளிக்குச் செல்லும் பிள்ளைகளின் சீருடை வடிவமைப்பில் நீல நிறம் 60 விழுக்காடு அமைந்திருக்கிறது என்பதும் வியப்பான உண்மையாகும்.

இது மட்டுமல்லால் இளஞ்சிவப்பு நிறம் என்பது பெண்களின் குழந்தைகளின் ஆடைகள் அலங்காரப் பொருள்களின் வடிவமைப்பில் பயன்படுத்தப்படும் ஒன்றாக மாறியுள்ளது; இதனை மிக இயல்பாகவே வணிக நிறுவனங்கள் கைக்கொண்டு வருகின்றன; முதன்முதலாக ஆரம்பிக்கப்பட்ட ஐரோப்பிய பெண் பாலின இயக்கமானது இளஞ்சிவப்பு நிறத்தில் கையொப்பமிட்டே தனது பயணத்தைத் தொடங்கியது. (On Monday 29 January, 1821, Anne Liste). கோகோ கோலா நிறுவனம் சிவப்பு நிற அங்கியை அணிந்த நீண்ட வெண்தாடியுடன் கூடிய கிறிஸ்மஸ் தாத்தாவை தனது விளம்பரத்திற்காகப் பயன்படுத்தியது. இந்த படிமத்தை அமெரிக்காவில் இங்கிலாந்தில் பிற நிறுவனங்கள் பயன்படுத்த சட்டரீதியான தடையைக் கோரியது. கோகோ கோலாவின் சிவப்பு, அதனைச் சூழ்ந்திருக்கும் வெள்ளை நிறம் சாண்டா கிளாஸ்ஸிற்கும் அளிக்கப்பட்டது தற்செயலானது அல்ல.

பெப்சி நிறுவனம் தனது நிறுவன முத்திரையை தொடக்கக் காலத்தில் சிவப்பு, நீலம், வெள்ளை ஆகிய வண்ணத்தில் வடிவமைத்தனர். தற்போது அதே நிறங்களுடன் சிரிக்கும் ஒரு முகமாக வடிவமைக்கப்பட்டுள்ளது. இது புவி வடிவத்தில் வடிவமைக்கப்பட்டுள்ளது.

1940 களில் பெப்சியின் லோகோவில், செவ்வகமான வெண்ணிறப்பகுதிக்குள் நீல நிறமும் சிகப்பும் கலந்த வண்ணம் இடம்பெற்றது. இது 1940 களில் நடந்த உலகப்போரில் அமெரிக்க நிலைப்பாட்டை அறிவிப்பதாக அமைந்தது. வெண்மை, நீலம் சிகப்பு அமெரிக்க கொடியின் முதன்மையான வண்ணங்கள் என்பவை மறப்பதற்கில்லை. வணிக நிறுவனங்களின் வண்ணங்களில் வாணிகம் மட்டுமல்ல அரசியல் கோணமும் பொதிந்துள்ளது. தற்போது, 2003 ஆம்

ஆண்டிலிருந்து வட அமெரிக்காவில் அறிமுகப்படுத்தப்படும் ஏழாவது முத்திரை 2014 ஆம் ஆண்டு மற்ற நாடுகளில் விளம்பரமாகும் என்கிறார் பெப்சியின் முதன்மை வடிவமைப்பாளரனா மாரோ பொர்சினி. முத்திரை வடிவமைப்பு என்பது அழகியல் என்பதைத் தாண்டிய ஒன்று என்கிறார். (Design is more than the aesthetics and artifacts associated with products – Harvard Business Review)



2023 ஆம் ஆண்டுகளில் காணப்படும் பெப்சி பெயர் மிக எளிமையானதாக இருப்பதால் ஒரு பெரிய எழுத்துருவால் ஆன பெயரைத் தாங்கியதாக 2024 ஆம் ஆண்டு அதன் முத்திரை வடிவமைக்கப்பட்டுள்ளது.

முடிவுரை

இன்றைய உலகம் நம்மைச் சுற்றி காட்சிப்படுத்தியுள்ள வண்ணங்கள், கைப்பிரதிகள், விளம்பரங்கள் என அனைத்து படிமங்களையும் அர்த்த அவிழ்ப்பு செய்வதற்குக் குறியியல் அணுகுமுறை மிக அவசியமான ஒன்று. மேற்குநாடுகளில் கல்விப் புலங்களில் குறியியல் பயிற்றுவிக்கப்படுகிறது. இந்தியாவில் குறியியல் தொடர்பான கல்விசார் பயில்வுமுறை ஏறழத்தாழ இன்னும் உருவாகவில்லை. அத்தகைய நெடும் பயணத்தின் முதலடியாக குறியியல் குறித்த ஆய்வுகள் அமைய வேண்டும்.

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தொல்காப்பிய இடையியலும் நற்றிணையில் இடைச்சொற்களும்

முனைவர் சே.சந்திரலேகா
கௌரவ விரிவுரையாளர்
இராஜேஸ்வரி வேதாசலம் அரசு கலைக் கல்லூரி , செங்கல்பட்டு.

முன்னுரை

உலக மொழிகளில் தமிழ் மொழிக்கென்று ஒரு தனியிடமுண்டு. இலக்கண அமைப்பிலும் இலக்கிய நயத்திலும் தமிழ் மொழிக்கு இணையான மொழி ஏதும் இல்லை. துமிழ் மொழியில் இலக்கண நூல்களும் எண்ணற்ற இலக்கிய நூல்களும் தோன்றியுள்ளதைத் தமிழிலக்கிய வரலாறு பகரும். காலத்தால் மிகப்பழையதாகக் கருதப்படும் இலக்கண நூல் தொல்காப்பியம் ஆகும். இந்நூல் எழுத்து சொல் பொருள் முதலான மூன்று அதிகாரங்களையும் தன்னுள் அடக்கி இன்றும் நிலைத்து வாழ்ந்து கொண்டிருப்பது தொல்காப்பியம் ஒன்றே. தொல்காப்பியத்திற்குப் பின்னர் பல இலக்கண நூல்கள் தோன்றியுள்ளன. ஆனால் அவ்வனைத்து நூல்களும் தொல்காப்பியத்தைப் பின்பற்றியே எழுந்துள்ளன என்பது அனைவரும் அறிந்த உண்மையே. இக்கட்டுரையில் தொல்காப்பியம் கூறியுள்ள இடைச்சொற்களுள் சிலவற்றை நற்றிணைப் பாடல்களுள் பயின்று வரும் விதத்தைக் காணலாம்.

தொல்காப்பியப் பகுப்பு

தொல்காப்பியர் எழுத்ததிகாரத்தில் எழுத்துகளின் தோற்றம் எழுத்துகளின் ஒலிப்பு முறைகள் அமைப்பு முறைகள் இன்னபிற செய்திகளை எடுத்தியம்பியுள்ளார். சொல்லதிகாரத்தில் சொற்கள் உருவாகும் முறை சொற்களை வேறுபடுத்தும் முறைகள் சொற்களின் நான்கு வகைகள் (பெயர் வினை இடை) இன்னபிற செய்திகளையும் இயம்பியுள்ளார்.
தொல்காப்பியச் சொல்லதிகாரத்தில் மொழிக்குப் பயன்படும் சொற்களான பெயர்ச்சொல் வினைச்சொல் இடைச்சொல் உரிச்சொல் ஆகிய நால்வகைச் சொற்களை விரிவாக எடுத்தியம்ப வேண்டும் என்ற எண்ணத்தில் தனித்தனி இயலாக வகுத்துள்ளார் எனலாம். தமிழ்மொழியைப் பொருத்தமட்டில் பெயர்சொற்கள் வினைச்சொற்;கள் ஆகிய இருவகைச் சொற்களின் பயன்பாட்டிற்கும் இணையானதொரு பயன்பாட்டினை உடையன இடைச்சொற்கள் என்று கூறலாம். பெயர்ச்சொற்களும் வினைச்சொற்களும் ஒரு தொடரில் இயல்பாக அமைந்து வரும். ஆனால் இடைச்சொற்கள் ஒரு தொடரை (இலக்கியத் தொடரை- இலக்கியத் அடியை) உருவாக்கும் புலவர்க்கு அவர்தம் பாடுபொருளுக்கு ஏற்ப இடைச்சொற்களைப் பெயர் வினைகளுடன் இணைத்து எழுதுவர்.இணைத்து எழுதிய இவ்விடைச் சொற்கள் பாடுபொருளுக்கு தகுந்தாற்போலப் பொருள் தருவனவாக அமையும்.

இடைச்சொற்களின் இயல்புகள்

இடைச்சொல் பெயர் வினைகளின் வழி "அவற்றின் மருங்கில் தோன்றும்" (தொல்;.சொல்.244) என்று கூறப்படுவதினின்று அது பெயர் வினைகளைச் சார்ந்தும் அவற்றினிடமாக வழங்கும் என்றும் கருதப்படுகிறது. மேலும்
"இடையெனப் படுப பெயரொடும் வினையொடும்
நடைபெற்றியலும் தமக்கியல் பிலவே" (தொல்.சொல்.249)
என்று தொல்காப்பியம் குறிப்பிடுகிறது.
தொல்காப்பியர் இடைச்சொல் பெயர் வினைகளைச் சார்ந்து வரும் என்று கூறியுள்ள அதே நேரத்தில்
தமக்கெனப் பொருள் குறித்து வராமையும் குறிப்பிட்டுள்ளார்.

அவையே
"முன்னும் பின்னும் மொழியடுத்து வருதலும்
தம்மீறு திரிதலும் பிறிந்தவண் நிலையலும்
அன்னவை யெல்லாம் உரிய என்ப" (தொல்.சொல்.251)

இடைச்சொல் பொருள் உணர்த்தும் தன்மை

இடைச்சொற்கள் சொல் நிலையில் குறைந்த தன்மை பெற்றவை. 'எல்லாச் சொல்லும் பொருள் குறித்தனவே'(தொல்.சொல்.155) என்று தொல்காப்பியர் குறிப்பிடுவார். அக்கருத்து இடைச்சொல்லுக்குப் பொருந்துமா? எனில் சில சாரியைச் சுட்டும் அசைநிலைகளுக்கும்

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இசைநிறைகளுக்கும் பொருள் இல்லை என்பதால் இக்கருத்து ஏற்புடையதல்ல.

(எ.கா) பல்குரை- அசைநிலை (பொருள் இல்லாமை)

இடைச்சொல் பொருள் வேறுபாடு உணர்த்தும்.

இடைச்சொல் எண்ணிக்கை

இடைச்சொற்கள் சாரியைகளாகவும், வினைச்சொற்களில் காலம் காட்டும் இடைநிலையாகவும் வேற்றுமைகளாகவும், அசைநிலையாகவும், இசைநிறைப் பொருளாகவும், குறிப்பால் பொருள் உணர்த்துவனவாகவும், உவம உருபுகளாகவும் என்று ஏழு வகைகளாக வரும் என்று தொல்காப்பியம் குறிப்பிடுகிறது.

நற்றிணையில் இடைச்சொற்கள்

தொல்காப்பியம் கூறியுள்ள இடைச்சொற்கள் நற்றிணையில் பயின்று வந்துள்ள விதத்தை இங்கு காணலாம். 'மன்' என்னும் இடைச்சொல் கழிவு(நீங்குதல்), ஆக்கம்(மிகுவளர்ச்சி), ஒழியிசை(வேறோர் பொருளைத் தருதல்) என்னும் மூன்று பொருளைத் தருவதாகத் தொல்காப்பியம் இயம்பியுள்ளது.

'சிறியகட் பெறினே எமக்கீயும் மன்னே'

இத்தொடரில் உள்ள 'மன்' என்னும் இடைச்சொல் 'எனக்கு கொடுப்பது நின்று போயிற்று' என்னும் கழிவுப் பொருளைத் தருவதாக அமைந்துள்ளது.

மன்-ஆக்கம்(மிகு வளர்ச்சி)

"நம்மொடு செல்வர்மன் தோழி மெல்ல" (நற்:125:8)

இங்கு தலைவியை மணமுடித்து பெரியமலை நாட்டகத்தே தலைவன் செல்வான் என்ற இடத்தில் ஆக்கப்பொருள் குறித்து மன் என்ற சொல் வந்ததுள்ளது.

தில் என்னும் இடைச்சொல் உணர்த்தும் பொருள்கள்(3)

தில் என்னும் இடைச்சொல் விழைவு(விருப்பம்), காலம், ஒழியிசை(எஞ்சிய பொருள் படுதல் என்னும் மூன்று பொருள் குறித்து வரும் என்று தொல்காப்பியம் இயம்பியுள்ளது.

"விழைவே காலம் ஒழியிசைக் கிளவி என்று
அம்மூன்று என்ப தில்லைச் சொல்லே" (தொல்.சொல்.253)

விழைவு (விருப்பம்)

"வார்ந்திலங்கு வையெயிற்றுச் சின்மொழி அரிவையைப்
பெறுகதில் அம்ம யானே".

இத்தொடரில் உள்ள தில் என்னும் இடைச்சொல் தலைவியைப் பெறுவதற்குரிய தலைவனின் விருப்பத்தைக் குறிக்கிறது.

நற்றிணைப் பாடல்களில் தில் என்னும் இடைச்சொல் விழைவு என்னும் பொருள் தருவதாக நான்கு இடங்களில் பயின்று வந்துள்ளன.

"பூண்கதில் பாகநின் தேரே பூண்தாழ்" (நற்.81-5)

"எமக்கே வருகதில் லம்ம விருந்தே சிவப்பாள் அன்று" (நற்.120.10)

"வாரா ராயினோ நன்றுமற்று தில்ல" (நற்.392.7)

தில்-காலம் (1)

பெற்றாங் கறிகதில் அம்ம இவ்வூரே

இத்தொடரில் தலைவியை அமைந்த காலத்தில் இவ்வூர் அறிந்து கொள்ளட்டும் எனத் தில் என்ற சொல் காலத்தைக் குறித்துள்ளது. நற்றிணையில் தில் என்னும் இடைச்சொல் காலத்தைத் தருவதாக ஒரு பாடலில் பயின்று வந்துள்ளது.

"படுகதில் அம்ம யான்நினக் குரைத்தென" (நற்.277.2)

தில்-ஒழியிசை)

"வருகதில் அம்ம எம்சேரி சேர"

எங்கள் ஊருக்கு வந்தால் இன்னது செய்வேன் வரவில்லை எனில் செய்வதற்கில்லை என்னும் ஒழிந்த பொருள் குறித்து வருவதால் இங்கு தில் என்னும் இடைச்சொல் ஒழியிசைப் பொருளைத் தருவதாக அமைந்துள்ளது. இதே பொருளைத் தருவதாக நற்றிணைப் பாடல்களில் இரண்டு இடங்களில் பயின்று வந்துள்ளன.

"வாரற்க தில்ல தோழி சாரல்" (நற்.85.7)

"வாரற்க தில்ல கடுவென" ;(நற்.151.5)

கொன் என்னும் இடைச்சொல் உணர்த்தும் பொருள்கள் (4)

கொன் என்னும் இடைச்சொல் அச்சம்(அஞ்சுதல்), பயமிலி(பயமின்மை), காலம், பெருமை என்னும் நான்கு பொருள்களைத் தருவதாகத் தொல்காப்பியம் கூறுகிறது.

"அச்சம் பயமிலி காலம் பெருமை என்று
அப்பால் நான்கே கொன்னைச் சொல்லே" (தொல்.சொல்.254)

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நற்றிணையில் அச்சம்,பயமிலி, காலம் என்னும் பொருள் குறித்த பாடல்கள் இடம்பெறவில்லை. ஆனால், பெருமை என்னும் பொருளில் அமைந்த பாடலொன்று இடம் பெற்றுள்ளது.

கொன்-பெருமை(1)

கொன்னூர் துஞ்சினும் யாம்துஞ் சலமே

என்ற அடியில் கொன் என்பது பெருமை மிகுந்த ஊர் என்னும் பொருளைத் தந்தது.

"கொன்னு நம்பும் குரையர் தாமே" (நற்.208.7)

கொன்- பயனின்மை

கொன் என்னும் இடைச்சொல் கூடிபயனின்மை என்னும் பொருள் தருவதாக நற்றிணணப் பாடல்களில் இரண்டு இடங்களில் பயின்று வந்துள்ளன.

"இனியென கொள்ளலை மன்னே கொன்னொன்று" (நற்.233.5)

"எம்விட்டு அகறிர் ஆயின் கொன்னொன்று" (நற்.266.6)

மற்று என்னும் இடைச்சொல் உணர்த்தும் பொருள்கள் (2)

மற்று என்னும் இடைச்சொல் வினைமாற்று, அசைநிலை என்னும் இரண்டு பொருள்களில் வரும் என்று தொல்காப்பியர் கூறியுள்ளார்.

மற்றுஎன் கிளவி வினைமாற்று அசைநிலை

அப்பால் இரண்டு என மொழிமனார் புலவர் (தொல்.சொல்.262)

மற்று-வினைமாற்று

மற்றறிவாம் நல்வினை யாம் இளையம்

இத்தொடரில் நல்வினையைப் பின்னர்ச் செய்வோம் என மாற்றுவதால் மற்று என்னும் இடைச்சொல் வினைமாற்றத்தின் கண் வந்தது.

வினைமாற்று என்னும் பொருள் தருவதாக நற்றிணையில் எட்டு இடங்களில் பயின்று வந்துள்ளன. அவற்றில் சில மட்டும் இங்கு காண்போம்.

"செவ்வாய்ப் பைங்கிளி கவர நீமற்று" (நற்.147.3)

"யாங்கு வல்லுந மற்றோ ஞாங்கா"; (நற்.171.7)

"அற்றே மற்றஃதறியா தோர்க்கே" (நற்.174.8)

மேலும், மற்று என்னும் சொல் எப்பொருளும் தராமல் அசைநிலையாக நற்றிணையில் ஏழு இடங்களில் பயின்று வந்துள்ளன. அவற்றில் சில பாடல்களை மட்டும் இங்கே காணலாம்.

"உண்டுகொல் அன்றுகொல் யாதுகொல் மற்றென்று" (நற்.122-7)

"புல்லல்மற்று எவனோ அன்பிலங் கடையே" (நற்.174-12)

"ஒதுக்கரும் வெஞுசுரம் இறந்தனர் மற்றவா"; (நற்.184-4)

இப்பொருளைத் தருவதாகவே நற்றிணையில் மேலும் நான்கு இடங்களில் வந்துள்ளன.

எற்று என்னும் இடைச்சொல் உணர்த்தும் பொருள்(1)

எற்று என்னும் இடைச்சொல் கழிந்து போனது என்னும் வருந்துதல் பொருளில் வரும் என்று தொல்காப்பியம் கூறியுள்ளது.

"எற்றென் கிளவி இறந்த பொருட்டே" (தொல்.சொல்263)

என்ற நூற்பா இதனை உணர்த்துகிறது.

தொல்காப்பியம் கூறியுள்ள பொருளிலே அமைந்த நற்றிணையில் எற்று என்னும் சொல் கழிந்த பொருளினைத் தருவதாக

"எற்றா வதுகொல்யாம் மற்றொன்று செயினே" (நற்.239-12)

என்ற பாடலில் பயின்று வந்துள்ளதைக் காணமுடிகிறது.

மன்ற என்னும் இடைச்சொல் உணர்த்தும் பொருள் மன்ற என்னும் இடைச்சொல் தெளிவு என்னும் பொருண்மையில் வருவதாகத் தொல்காப்பியம் கூறுகிறது.

"மன்றஎன் கிளவி தேற்றம் செய்யும"; (தொல்.சொல்.265)

மன்ற என்னும் சொல் தேற்றப் பொருளில் நற்றிணையில் ஒன்பது இடங்களில் பயின்று வந்துள்ளன. அவற்றில் சிலவற்றை மட்டும் இங்கு காணலாம்.

"வந்தோன் மன்ற குன்ற நாடன்" (நற்.114-6)

"அகன்றோர் மன்றநம் மறந்திசி னோரே" (நற்.118-6)

"மடவை மன்ற கொன்ற வயின்றோா"; (நற்.183-6)

முடிவுரை

இடைச்சொல் பெயர்ப்பொருளையும், வினைப்பொருளையும் வேறுபடுத்தி அவற்றின் வழி மருங்கில் தோன்றி அவற்றோடு இணைந்து செயல்படும். தொல்காப்பியர் காலத்தில் வழக்கிலிருந்த இடைச்சொற்கள் சில வழக்கொழிந்தும், சில புதிய இடைச்சொற்களும் தோற்றம் பெற்றுள்ளன என்பதை காலந்தோறும் பின்னர் வந்த இலக்கண நூல்களின் வழியே அறியலாம். நற்றிணையில் இடம்பெற்ற இடைச்சொற்களும் தொல்காப்பியர் கூறியுள்ள இடைச்சொற்களும் ஒரே பொருளைத் தருவதாக வந்துள்ளது என்பதை இக்கட்டுரையின் வழியே அறியமுடிகிறது.

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தொண்டை நாட்டில் வைணவம்

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இணைப் பேராசிரியர்
தமிழ்த்துறை (சுழற்சி-2)
குருநானக் கல்லூரி (தன்னாட்சி)
வேளச்சேரி, சென்னை – 600042.

முன்னுரை

பண்டையகால மக்களிடையே இருந்த வழிபாட்டு உணர்வு மெல்ல வளர்ச்சியடைந்து சமய நிறுவனங்களாக மாற்றம் கண்டது. இதன் விளைவாக தத்துவங்களும் கோட்பாடுகளும் உருவாக்கப்பட்டன. இவ்வாறு வலுவடைந்த சமயங்கள் அது பரவிய நிலச் சூழலைப் புரிந்துகொள்வது அடிப்படையானவை.அதனடிப்படையில் தொண்டை நாட்டில் வைணவ சமயம் குறித்து அறியும் நோக்கோடு இக்கட்டுரை எழுதப்பட்டுள்ளது.

தொண்டைநாடு வரலாற்றுக்கு முற்பட்ட காலத்திலிருந்தே மக்கள் வாழ்ந்த நிலப்பரப்பாக இருந்து வந்துள்ளது. அதன் தொன்மையும் சிறப்பும் இதில் விளக்கப்பட்டுள்ளது. தமிழர்களின் திருமால் நெறி வைதீகக் கலப்பால் பெற்ற மாற்றங்கள் குறித்து தெளிவுபடுத்தப்பட்டுள்ளது. வைணவ சமய மறுமலர்ச்சிக்கு காரணமான முதலாழ்வார் மூவருமான பொய்கை ஆழ்வார், பூதத்தாழ்வார், பேயாழ்வார், மற்றும் திருமழிசை ஆழ்வார், ஆகிய நால்வரும் தொண்டை நாட்டில் தோன்றியவர்கள். அதனால் தொண்டை நாட்டில் வைணவ சமய நிலை குறித்து அறிய வேண்டும் என்ற நோக்கோடு தொண்டை நாட்டின் தொன்மையும் சிறப்பும், வைணவத்தின் தொன்மையும், தொண்டை நாட்டில் வைணவம், எனும் தலைப்பின் கீழ் இக்கட்டுரை எழுதப்பட்டுள்ளது.

தொண்டை நாட்டின் தொன்மையும் சிறப்பும்

'வட வேங்கடம் தென் குமரி ஆயிடைத் தமிழ் கூறும் நல் உலகம்' எனத் தமிழ் நாட்டின் எல்லையைத் தொல்காப்பியர் தன்னுடைய பாயிரத்தில் தெரிவிக்கின்றார். வட வேங்கடம் தென்குமரிக்கு இடைப்பட்ட நிலப்பகுதியில் பாண்டிய நாடு, சோழநாடு, சேரநாடு, போலவே கொங்கு நாடு, தொண்டை நாடு, என்ற பிரிவுகளையும் தமிழ்நாடு கொண்டிருந்தது.

கொங்கு நாடு தொண்டை நாடு ஆகிய இரு நாடுகளையும் சேர சோழ பாண்டிய நாடுகளுடன் சேர்த்து தமிழ்நாடு ஐந்து பிரிவுகளைக் கொண்டிருந்தது. இந்த பிரிவுகளைகத் தண்டியலங்காரத்தில் மேற்கோள் பாடல் ஒன்று 'வியன் தமிழ்நாடு ஐந்து' என்றும். சைவ சமய நூல்களில் காலத்தால் முற்பட்ட திருமந்திரத்தில் 'தமிழ் மண்டலம் ஐந்து' என்று தமிழ்நாட்டின் ஐந்து பெரும் பிரிவுகள் சுட்டிக்காட்டப்பட்டுள்ளது.

மேலும், தமிழ் நாடு பன்னிரு சிறு நாடுகளாகவும் பிரிக்கப்பட்டிருந்தது 'செந்தமிழ் நிலம் சேர் பன்னிரு நிலத்தினும்' (நூற்.273) என்னும் நன்னூல் சொல்லதிகார நூற்பாவினால் அறியமுடிகிறது. பன்னிரு சிறு நாடுகளில் ஒன்றான அருவாநாடு அருவா வடதலை நாடு ஆகிய இரண்டு சிறு நாடுகளையும் உள்ளடக்கியது தொண்டை நாடு. தொண்டை நாடு மேற்கே பவள மலையையும் வடக்கே வேங்கட மலையும் கிழக்கே கடலையும் தெற்கே பெண்ணையாற்றையும் எல்லையாகக் கொண்டிருந்தத. தொண்டைநாடு ஆங்கிலேயர் வருகையால் செங்கை வடஆற்காடு தென்ஆற்காடு எனத் தற்காலத்தில் பிரிக்கப்பட்டது. இதுவே பின்னாளில் தமிழக அரசின் நிர்வாக வசதிக்காகச் சென்னை திருவள்ளூர் காஞ்சிபுரம் வேலூர் திருவண்ணாமலை விழுப்புரம் கடலூர் மாவட்டங்கள் எனப் பிரிக்கப்பட்டன.

சங்க காலத்தில் அருவாநாடு, அருவா வடதலை நாடு, எனப் பெயர் வழங்கி வந்த நாட்டின் நிலப்பரப்பு சங்ககால இறுதியில் தொண்டை நாடு எனும் பெயரில் அழைக்கப்பட்டது.

சங்க காலத்தில் தொண்டை நாட்டை குறும்பர் என்ற ஓர் இனமும் அருவாளர் என்ற ஓர் இனமும் ஆண்ட காரணத்தினால் இந்நாடு அக்காலத்தில் அருவா நாடு எனப்

பெயர் பெற்றது. அதன்பிறகு ஆதொண்டை சக்கரவர்த்தி என்பவர் குறும்பர்களை வென்று நாட்டை கைப்பற்றி, தொண்டை மண்டலம் என்று பெயரிட்டு நாட்டை ஆண்டு வந்தார்.

தொண்டை நாட்டை சங்ககாலம் முதற்கொண்டு அது முடியும் வரை சோழர்கள் ஆட்சி செய்து வந்துள்ளனர். களப்பிரர் சோழர்களை வெற்றிகொண்ட பிறகு தொண்டை நாட்டினை ஆட்சி செய்துள்ளனர். கி.பி.250 முதல் பல்லவர்களும் இந்நாட்டை ஆண்டுள்ளனர். ஐந்தாம் நூற்றாண்டு வரை களப்பிரர்களும் பல்லவர்களும் மாறி மாறி ஆட்சி செய்துள்ளனர்.

தொண்டை நாட்டில் வாழ்ந்த சங்கப்புலவர்கள் மற்றும் அவர்களது ஊர்களையும் தி.நா. அறிவொளி பாலாற்று வளம் எனும் நூலில் சங்க இலக்கிய நற்றிணை குறுந்தொகை புறநானூறு அகநானூறு போன்றவற்றில் சில பாடல்களையும் பெரும்பாணாற்றுப்படை மற்றும் சிறுபாணாற்றுப் படையை இயற்றியவர் களாகவும் மொத்தம் 13 ஆண்பால் சங்கப்புலவர்கள் பட்டியலிடுகிறார்.மேலும் நற்றிணை குறுந்தொகை அகநானூறு புறநானூறு நூல்களில் உள்ள சில பாடல்களை பாடியுள்ள சங்கப் பெண்பாற் புலவர்கள் அறுவரையும் இதில் இப் புலவர்களின் பெயர்கள் அவர்களின் ஊர்கள் தொண்டை நாட்டில் எங்கெல்லாம் பரவியிருந்தன என்பதனையும் அடையாளம் காணுகிறார்.சங்க இலக்கியப் புலவர்கள் வாழ்ந்த ஒரு நிலமாக இந்த தொண்டைநாடு விளங்கி வந்திருப்பதை வரலாற்றில் காணமுடிகிறது. அத்தகைய பெருமைக்குரிய நாடு என்கிற காரணத்தினால் தான் தொண்டை மண்டலம் சான்றோர் உடைத்து எனச் சிறப்பித்துக் கூறப்படுகிறது.

பல்லவர்களுக்குப் பிறகு விஜயாலய சோழனால் தோற்றுவிக்கப்பட்ட சோழ அரசு தொண்டை நாட்டை ஆட்சி செய்தனர். தங்கள் ஆட்சிக்கு உட்பட்ட தொண்டை மண்டலத்தை **ஜெயங்கொண்ட சோழ மண்டலம்** என்றே குறித்தனர்.

சோழ அரசு முதலாம் ராஜராஜன் காலத்தில்தான் சோழப்பேரரசாக விரிவடைந்து பொற்காலமானது. குறிப்பாக இவனது ஆட்சிக் காலத்தில்தான் தஞ்சை பெரிய கோயிலும் எடுக்கப்பட்டது. இவனது ஆட்சியின் கீழ் வரும் மண்டலங்களில் தொண்டைமண்டலம் (ஜெயங்கொண்ட சோழ மண்டலம்) என்பதும் உள்ளடங்கி இருந்தது.

வைணவ சமயத்தின் தொண்மை

சமயச் சிந்தனைகள் ஒரு மனிதரால் உருவாக்கப்பட்டது என்றோ ஒரு குறிப்பிட்ட காலத்தில் உருவானது என்றோ வரையறுத்துக் கூறமுடியாது. பல இனக்குழுக்களால் பல காலங்களில் உருவாக்கப்பட்டது. இவ்வாறு தோன்றிய சமயங்களில், இனக்குழுக்களின் சமயச் சிந்தனை கலப்புக் காணப்படுகிறது.

சங்ககால மக்களிடையே வழக்கத்தில் இருந்த திருமால் நெறி வடபகுதியில் தோன்றிய சமய கருத்துகளுடன் இணைக்கப்பட்டு அக்காலத்தில் தமிழர்களிடையே வைணவ சமயம் பரவிருந்தமையைச் சங்க இலக்கியங்களில் காணமுடிகிறது.சங்க காலத்திலேயே திருமால் வழிபாடு தமிழர்களிடையே நன்கு பரவியிருந்தது. மேலும் பக்தி இலக்கிய காலத்தில் வைணவ சமயம் ஆழ்வார்களாலும் அரசர்கள் உருவாக்கிய கோயில்கள் மூலமாகவும் மக்களிடையே செல்வாக்குப் பெற்று வளர்ந்தது.

திருமால் இயல்புகளை அவருடைய பெயராலும் செயலாலும் வடிவ சிந்தனையாலும் அறியலாம்.. இதில் திருமாலின் செயல்களை இலக்கியச் சுவையோடு கதைகளாக புனையப்பட்டுள்ளது.

மதுசூதனன் கோவர்த்தனத்தால் ஆயர்களைக் காத்தல் அமிர்தம் கடைதல் பெண் வடிவம் கொண்டு அசுரர்களை ஏமாற்ற பிரம்மனையும் சிவனையும் படைத்தல், அவதாரங்கள் ஜராசந்தனைப் பகைக்கு அழைத்தல், போன்ற செய்திகள் இதிகாச புராணங்களால் அறியப்படுகின்றன. இத்தகவல்கள் **Epic Mythology** என்னும் நூலில் குறிப்பிடப்பட்டுள்ளது. இவ்வாறு வளர்ச்சியடைந்து வந்த விஷ்ணு வழிபாட்டினை ஒட்டியனவாகவே சங்க இலக்கியங்களில் காணப்படும் திருமால் வழிபாடு உள்ளன.

பழங்குடியினருடைய வழிபாட்டு முறையில் இருந்து மெல்ல வளர்ந்து பல காலகட்டங்களில் மாறுதல்களையும் பெரும் வளர்ச்சியையும் வைணவ சமயம் அடைந்துள்ளது.

வரலாற்றுக்கு முந்தைய மற்றும் அதற்குப் பிற்பட்ட காலங்களில் (வேத புராண இதிகாச காலம்) பல மாற்றங்களைப் பெற்றுவந்த வைணவ சமயம் இதே

நிலையில் சங்க இலக்கியங்களிலும் முழுமையாக காணப்படுகிறது எனக் கூறமுடியாது. தமிழ் நெறியோடு வளர்ந்த வைணவ கருத்தாக்கங்களும் காணப்படுகின்றன.

வைணவ நெறியில் வேத சார்பற்ற சில செய்திகளைத் தமிழ் இலக்கியங்களில் மு.ராகவையங்கார் கண்டு கூறியுள்ளார். அவை நப்பின்னை பிராட்டி திருமணம், கண்ணன் குறுந்தொசித்தது, குடக் கூத்து முதலிய ஆடல்கள் ததிபாண்டனுக்கும் தாழிக்கும் வீடு அளித்தது சீமாலிகன் தலையறுப்புண்டது, இச் செய்திகள் தமிழ் நூல்களில் காணப்படுகின்றன. இதற்கு கண்ணனைப் பற்றிக் கூறும் பாரதம் பாகவதம் முதலிய இதிகாச புராணங்களில் ஆதாரங்கள் காண்பது அரிது எனவே திருமால் வழிபாடு இந்தியாவின் பல்வேறு இடங்களில் குறிப்பாக, அவ்விடங்களுக்கு ஏற்ப தனித்தன்மைகளோடும் வளர்ந்துவந்தது. வேதங்கள் புராண இதிகாசங்கள் வழியே வளர்ந்த சமயக்கருத்துக்களே நாடு முழுவதும் பரவியிருந்தன எனக் கூறமுடியாது என்பது விளக்கமுறுகின்றன.(ஆராய்ச்சி தொகுதி).

வேதங்கள் இதிகாசங்கள் புராணங்கள் வழியாக வளர்ந்த வழிபாட்டு சிந்தனைகளுக்கு வேறாகச் சிலவற்றை தமிழ் நூல்களின் வாயிலாக அறிகிறோம். இவற்றை தமிழர்களிடையே வழங்கியனவாகக் கொள்ளவேண்டும். இந்திய நாடு முழுவதும் சிதறுண்டு கிடந்த இனக்குழுக்கள் பலரின் வழிபாட்டு முறைகளும் கோட்பாடுகளும் காலப்போக்கில் பிணைந்து ஓர் உருக்கொண்டதே வைணவ சமயம் ஆகும்.

இருக்கு வேத காலத்திலேயே இனக் கூட்டுறவு நடைபெற்றுள்ளது. சமய வரலாற்று அறிஞர்கள், ஆரியர்களுடையன எனக் கூறமுடியாததும், பண்டைய இந்திய இனக்குழு மக்களுடையன எனக் கூறத்தக்கதுமான சில சமயச் சிந்தனைகளை எடுத்துக் காட்டுகின்றனர். (Dhandekar, some Aspects of the history of Hinduism) இவ்வாறு எடுத்துக் காட்டும் ஆரியரல்லாதவர்களின் சமய சிந்தனைகளில் சிவன் (உருத்திரன்) விஷ்ணு பற்றி கூறப்படும் கருத்துக்கள் முக்கியமானவை வேதங்களின் தொடக்க காலத்தில் தாழ்ந்த நிலையில் இருந்த சிவன் விஷ்ணு ஆகியோர் வேதங்களின் இறுதிப்பகுதியில் சிறப்பபெய்துகின்றனர். ஆரியரல்லாத தமிழருடைய இவ்விருபெரும் தெய்வங்களையும் வேத தெய்வங்களாக கொள்ளும்போது வைதீகக் கோட்பாட்டில் ஆரியர்-தமிழர் கோட்பாடுகள் கலந்துள்ளன. பல இனங்களின் வழிபாட்டு முறைகள் ஒன்றிணைந்து பிற்காலத்தில் சைவ வைணவ சமயங்களாக தோற்றம் பெற்றுள்ளன.

தமிழ் எழுத்துலகில் தொல்காப்பியத்தில் நான்கு நில தெய்வங்கள் சுட்டப்பட்டுள்ளன. மேலும் புறநானூறு அகநானூறு, பதிற்றுப்பத்து, பெரும்பாணாற்றுப்படை போன்ற சங்க நூல்களில் சிவன், திருமால், முருகன், பரசுராமன், ராமன், கொற்றவை போன்ற தெய்வங்களின் பெயர்கள் காணப்படுகின்றன.

நான்கு நிலங்களிலும் வாழ்ந்த பழந்தமிழர்கள் இறை வழிபாட்டை மேற்கொண்டு இருந்தனர் என்பது தொல்காப்பியத்தின் மூலம் தெளிவாகிறது. சேயோன், மாயோன், கொற்றவை, தெய்வங்கள் தமிழ் இலக்கியங்களின் வாயிலாக தெளிவாக அறியப்படுகின்றன. தொல்காப்பியத்தில் வடசொற்கள் பயின்று வந்துள்ளதினால், அக்காலத்தில் வடமொழியாளர்கள் தமிழகத்தில் பரவியிருந்தனர் என்பதை அறியமுடிகிறது. அவர்களுடைய வேத கொள்கைகளும் இதிகாச புராண கதைகளும் மெல்ல பரவியிருந்தன. அவை இலக்கியங்களிலும் வெளிப்படுவதை காணமுடிகிறது. மகாபாரதம் இராமாயணம் போன்ற இதிகாசங்கள் மக்களிடையே பரவலாக பரவி இருந்ததை இலக்கியங்கள் வாயிலாக அறியமுடிகிறது. சங்ககாலத்திலேயே திருமால் வழிபாடு புதுக்கருத்தாக்கங்களோடு தமிழகத்தில் பரவியிருந்ததைக் காணமுடிகிறது.

இதிகாச நாயகர்களோடு மாயோன் இணைக்கப்பட்டு ஒன்றெனத் தமிழக மக்களால் உணர பட்டார் என்பதை சங்க இலக்கியத்தின் மூலமாக அறியமுடிகிறது. இவ்வாறு சங்ககாலத்திலேயே புராண இதிகாச கருத்தாக்கங்களோடு வளர்ந்த வைணவம் அதற்குப் பிறகு உயர்ந்த இடத்தைப் பெற்றது.

பண்டை தமிழ் மன்னர்களும் திருமாலிடம் பக்தி பூண்டிருந்ததை சங்கப்பாடல்கள் உணர்த்துகின்றன. செல்வக் கடுங்கோ வாழியாதன் பதிற்றுப்பத்தில் பாடல் பெற்ற மன்னன் அவனை **மாய வண்ணனை மனனுறப் பெற்றவன் (பதிற்.9)** என்று கபிலர்

பாராட்டியுள்ளார். கோச்செங்கண்ணன் என்ற சோழ மன்னன் திருநறையூர் திருமாலிடம் அன்பு பூண்டவன். இவ்வாறு சங்க காலத்தே கி.மு. மூன்றாம் நூற்றாண்டிலிருந்து கி.பி. இரண்டாம் நூற்றாண்டு வரை தமிழகத்தில் வைணவம் நன்கு மதிக்கப்பட்ட சமயமாக தழைத்திருந்தது

சங்க காலத்திற்குப் பிறகு தமிழகத்தை ஆட்சி செய்த களப்பிரர்கள் வைணவ சமயத்தை தழுவியவர்களாக இருந்தனர்..இதே காலகட்டத்தில் அதாவது இந்தியாவின் வடபகுதியில் குப்தர்கள் காலத்தில் வைணவ சமயம் மேலோங்கி இருந்தது. அவருடைய காலத்தில்தான் வைணவ சமயம் அவதாரக் கருத்தாக்கங்களைப். பெற்று மேலும் வளரத்தொடங்கியது. வைதீக வேத கருத்துக்கள் பழங்குடி மக்களின் சமய கருத்தாக்கங்களை உள்வாங்கி அதில் தனக்கென தனித்த நிலையினை அடைந்தது.

நாராயணன், வாசுதேவன், கண்ணன், இராமன், பலதேவன், போன்ற கடவுளர்களோடு மாயோன் இணைக்கப்பட்டு அனைவரும் திருமால் எனும் ஒரே கடவுளாக உருவாக்கப்பட்டார். இவரே வைணவ சமயத்தின் முழுமுதற் கடவுளாக அனைவராலும் ஏற்றுக்கொள்ளவும்பட்டார். இவ்வாறு களப்பிரர் காலத்தில் தமிழகத்தின் வட இந்தியாவிலும் பல இடங்களில் வைணவ சமயம் வேரூன்றி வளர்ந்தது.

புராண இதிகாச நாயகர்களும் மாயோன் இணைக்கப்பட்டு சங்க காலத்தில் வளர்ந்த வைணவ சமயம் மீண்டும் வைதிக கருத்தாக்கங்களோடு புதுப்பொலிவுடன் கி.பி. நான்காம் நூற்றாண்டுக்குப் பிறகு தமிழகம் எங்கும் பரவி வளர தொடங்கியது.

தமிழகத்தில் வைணவ சமயம் பரவுவதற்கு ஏற்ற சூழலை அக்காலம் பெற்றிருந்தது. கி.பி ஐந்தாம் ஆறாம் நூற்றாண்டுகளில் சமண பௌத்த சமயங்கள் தமிழ்நாட்டில் அதிக செல்வாக்குப் பெறத் தொடங்கின சமணர்கள் கல்வி கற்பிக்கும் பள்ளிகள் மற்றும் மருத்துவ இல்லங்கள் வைத்து சமுதாயத் தொண்டு செய்து மக்களை தன் பக்கம் ஈர்த்தனர். பௌத்தமும் சங்கம் வைத்து சமுதாய கூட்டுறவை வற்புறுத்தி ஏற்றத்தாழ்வுகளை நீக்கி எல்லோரும் சமம் என்ற உணர்வும், பசிப்பிணி போக்க வேண்டும் என்னும் பேரரத்தை முன்வைத்து மக்களை கவர்ந்தது. இதனால் வைதீக சமயங்களளுக்குப் பாதிப்பு ஏற்பட்டது. பின்னர் கருத்துப் போர்கள் தீவிரமாகப் பரவின. ஒவ்வொரு சமயத்தாரும் ஆளும் மன்னனை தன் பக்கம் ஈர்க்க முனைந்தனர். அதனால் சமயமும் அரசியலில் பங்கு பெறத் தொடங்கியது. சமயம் நீடித்து வாழ்வதற்கும், பரவலாக பின்பற்றப்படுவதற்கும் அரசின் ஆதரவு தேவைப்பட்டது. அதனால் ஒவ்வொரு சமயமும் தன்னை பாதுகாத்துக்கொள்ள கருத்துப் போர் மட்டுமன்றி சமூக போர்களையும் உருவாக்க தயங்கவில்லை கிபி ஏழாம் நூற்றாண்டின் முற்பகுதியில் ஆட்சிசெய்த மகேந்திரவர்மன் என்னும் பல்லவ மன்னனும் அதே காலத்தில் மதுரையை ஆண்ட பாண்டிய மன்னன் ஆகிய நின்றசீர் நெடுமாறன் சமண சமயத்தை தழுவி இருந்தனர். சைவமும் வைணவமும் செல்வாக்கிழந்து வந்தது. மூடத்தனமான நம்பிக்கைகளை எதிர்த்து தருக்கவாதம் புரிவோர் மிகுந்தனர். பழைய நம்பிக்கைகள் சீர்குலைந்தன. புதிய கருத்துகள் தோன்றி செல்வாக்குப் பெற்றன. சைவமும் வைணவமும் மீண்டும் மறுமலர்ச்சியுறச் செய்யும் முயற்சியில் நாயன்மார்களும் ஆழ்வார்களும் முயன்றனர். முதலாழ்வார் மூவரும்தொண்டை நாட்டில் அவதரித்தவர்கள் வைணவசமய மறுமலர்ச்சிக்கு வித்திட்டு தமிழகம் எங்கும் பரவச் செய்தவர்கள். இவர்களை அடியொற்றியே ஏனைய ஆழ்வார்களும் தோன்றினர்.

இச்சூழலுக்கு ஏற்புடையதாகத் தொண்டை நாட்டில் அமைந்துள்ள காஞ்சியைத் தலைநகராகக் கொண்டு ஆட்சி செய்த பல்லவர்கள் இறைபடிமங்களையும் கோயில்களையும் தமிழகமெங்கும் கட்டத் தொடங்கினர்.

குப்தப் பேரரசு வட இந்தியாவில் உருவாக்கிய கட்டடக்கலை பண்பாட்டினை முன்மாதிரியாகக் கொண்டு பல்லவர்கள் உருவாக்கிய கட்டடக்கலை தமிழகத்தில் சமயங்கள் வளரத் துணைபுரிந்தது.

பல்லவ அரசர்களால் கட்டப்பட்ட கோயில்களில் உருவாக்கப்பட்ட இறைபடிமங்களுக்குக் காரண காரியத்துடன் புராணக் கதைகளும் புனையப்பட்டது. இக்கதையின் மூலம் சமயங்கள் வளர்க்கப்பட்டன.

புராண இதிகாசசெய்திகள் சில சங்க இலக்கியத்தில் காணப்பட்டாலும் அவை

திருக்கோயில்களோடு தொடர்புபடுத்தப்பட்ட செய்திகளாக இல்லை, திருக்கோயில்கள் புராண இதிகாசங்கள் தொடர்பு படுத்தப்பட்டு சிறப்பிக்கப்படுதல் சங்க காலத்திற்குப்பின் சமய உலகில் ஏற்பட்ட வளர்ச்சி என்றே தோன்றுகிறது. பல்லவர் காலத்தை ஒட்டி பக்தி இயக்கம் தோன்றுவதற்கு அதற்கு முன்னரே தமிழகத்தில் வளர்ந்து வந்த புராண இதிகாச வளர்ச்சியும் ஒரு காரணம் என்றே கூறவேண்டும். குறிப்பாக பாரதமும் ராமாயணமும் இக்காலத்தில் தமிழர் வாழ்க்கையை வாழ்க்கை சிந்தனைகளைப் பெரிதும் மாற்றி அமைத்தன.

புராணங்கள் கி.பி. க்கு முற்பட்ட நூற்றாண்டுகளிலேயே தோன்றியவையாகக் கருதப்பட்டாலும் புராண இதிகாசங்களின் செல்வாக்கு குப்தர்கள் காலத்திலேயே மிகுந்திருந்தது. **இந்திய வரலாறு - குப்தர்கள்** என்ற நூலில் தெரிவிக்கப்படுகிறது. பாரதம் போன்ற இதிகாச வளர்ச்சியையும் இக்காலத்தில் ஏற்பட்டதாக கொள்வர். பல புதிய புராணங்கள் தோன்றின. அவை விஷ்ணு பரத்துவத்தையும் நிலைநிறுத்த முயன்றுள்ளன. இப்புராண-இதிகாசங்களால் வைணவ சமயம் வளர்வதற்கு ஏற்ற நிலமாக தமிழகம் முழுவதும் விளங்கிற்று எனலாம். இதிகாச - புராணங்கள் கோவில்களோடு தொடர்புபடுத்தி கூறப்பட்டு அதில் தெய்வத்தன்மை கூறும் முயற்சியும் இக்காலத்தில் ஏற்பட்டது. இதனால் திருக்கோயில்களின் வளர்ச்சி தமிழகத்தில் எல்லாப் பகுதிகளிலும் பரவியது.

திருமாலின் அவதாரங்களுக்குப் பல இடங்களில் கோயில்கள் கட்டப்பட்டன. கோயில்கள் உருவாக்கப்பட்டதால் அதில் வழிபாட்டு முறையை ஏற்படுத்த ஆகமங்கள் எழுதப்பட்டன. அந்த ஆகம விதிப்படி கோயில்களில் வழிபாட்டு முறை கடைபிடிக்கப்பட்டது. ஆகமங்களை வேலியாகக் கொண்டு புராணக் கதைகளைத் துணைக் கொண்டும் கோயில்கள் மூலமாக வழிபாட்டு முறையினை செம்மைப் படுத்தினார். இந்த வழிபாட்டு நிலை வைணவ சமயம் வளர துணையாக இருந்தது.

தமிழகத்தில் கோயில்கள் கட்டப்பட்ட சூழலில்தான் தொண்டை நாட்டில் முதலாழ்வார் மூவர் தோன்றினர். பழமையான வைணவ சமய அடியார்களில் சிறப்புற்றிருந்தவர்களின் வரலாறு தெரியவில்லை. குரு பரம்பராபிரபாவம் கூறும் முதலாழ்வார்கள் மூவரும் நமக்கு கிடைத்த வரலாற்றில் முதன்மையான வைணவ அடியார்களாக தோன்றுகின்றனர். அடியார்கள் மரபு ஆழ்வார்கள் ஆச்சாரியார்கள் என்றும் இரு பகுப்பாகக் கொள்ளப்படுகிறது. ஆசாரிய பரம்பரை வரலாற்றுச் சான்றுகளுடன் கால வரையறை செய்யப்பட்டுள்ளது. ஆழ்வார்களுக்கு குருபரம்பரையில் கூறப்படும் காலவரையறை புனைந்துறையாகவே உள்ளன.

முதலாழ்வார் மூவரின் அந்தாதி பாடல்கள் மூலமாக வைணவம் சிறப்புடன் தொண்டை நாட்டில் இருந்து தமிழகம் எங்கும் பரவியது. கி.பி.ஐந்தாம் நூற்றாண்டிற்குப் பிறகு இறை அம்சமாக தோன்றிய ஆழ்வார்கள் இறைகுணத்தில் ஆழ்ந்து அறிந்த உணர்வினை பக்தியாக தமிழகமெங்கும் பரப்பத் தொடங்கினார்கள். அவர்களுடைய இறை உணர்வினை வளர்க்கும் இடமாக வைணவக் கோயில்கள் இருந்தன.

தொண்டை நாட்டில் வைணவம்

காஞ்சியைத் தலைநகராகக் கொண்டு தொண்டை நாடு பல்லவர் காலத்தில் ஆளப்பட்டது. காஞ்சி சமயங்களும் தத்துவங்களும் வளர்வதற்கான இடமாக இருந்தது. சங்க காலத்திலேயே தமிழகம் எங்கும் பரவி விட்ட சமண பௌத்த சமயங்கள் காஞ்சியைத் தலைமையிடமாகக் கொண்டு வளர்ந்துள்ளன. சங்க காலப் பகுதியில் வைதீக சமயம் தங்களுக்கான இடத்தைப் பிடித்து விட்டதை சங்கப் பாடல்கள் தெரிவிக்கின்றன. தமிழகத்தில் இருந்த மாயோனாகிய தெய்வ வணக்கத்தை வைதீக சமயம் ஏற்றுக்கொண்டு தன்னுடைய நிலையைத் தக்கவைத்துக் கொண்டது. வைணவ சமயம் போன்று சைவசமய வளர்ச்சியும் அக்காலத்தில் அமைந்திருந்தது.

பல்லவர் காலத்தில் சைவ, வைணவ, சமண, பௌத்த சமயங்கள் தங்களுடைய சமய வளர்ச்சியில் கருத்துச் செலுத்தின.. பல்லவர்களுக்கு முன் ஆட்சி செய்த களப்பிரர் காலகட்டத்திலேயே இவ்வளர்ச்சி தொடங்கிவிட்டது. களப்பிரர்கள் சமண பௌத்த சமயங்களை ஆதரித்தனர் என வரலாற்று ஆசிரியர்கள் பொதுவாக கருத்துத் தெரிவிக்கின்றனர். அவருடைய காலத்தில் சமண பௌத்த சமயங்கள் மேன் மேலும் சிறப்பு பெற்று வளர்ந்தன.

களப்பிர அரசர் அச்சுத பரம்பரையினர் என்று கூறிக் கொண்டதால் அவர்கள் வைணவ சமயத்தார் என்று கருத வேண்டியுள்ளது. என மயிலை சீனி. வேங்கடசாமி அவர்கள் கருத்துத் தெரிவிக்கின்றார். மா ராசமாணிக்கனார் களப்பிரர்கள் வைணவ சமயத்தைச் சார்ந்தவர்கள் எனத் தெரிவிக்கின்றார். களப்பிரர்கள் வைணவர்களாக இருந்தாலும் அனைத்து சமயமும் வளருவதற்கான சூழலை உருவாக்கி இருந்தனர் என்பது இதன் மூலம் தெரியவருகிறது. சமண, பௌத்த, சைவ, வைணவ, சமயங்கள் அவர்களுடைய காலத்தில் வளர்ந்துவந்ததை அறிய முடிகிறது.

இவ்வாறு வளர்ந்த சமயங்கள் பல்லவர்கள் காலத்தில் தொண்டை நாட்டில் உள்ள காஞ்சியைத் தலைநகராகக் கொண்டு சமய வாதங்களின் மூலமாகத் தங்களுடைய சமய உண்மைகளை நிலைநாட்டி வளர்ந்துள்ளன. இந்த நான்கு பெரும் சமயமும் காஞ்சியில் தங்களுடைய சமய வளர்ச்சிக்குச் செயல்களை மேற்கொண்டிருந்தன என்பதைச் சிவகாஞ்சி, விஷ்ணு காஞ்சி, சமண காஞ்சி, பௌத்த காஞ்சி, எனப் பெயர் வழங்கப்படுவதில் இருந்தே அறியமுடிகிறது. மேலும் பல்லவர்கள் தங்களுடைய ஆட்சியில் வைதீக சமய கல்வியை வளர்க்க **கடிகை** எனும் வடமொழி கல்லூரியை உருவாக்கி வைதீக கல்விக்கு வழிகோலினர். இது அனைத்துச் சமயத்தாரும் கூடி தங்களுடைய கருத்தைத் தெரிவித்துக் கொள்ளும் பொதுக் கடிகையாகவும் இருந்தது. இதில் வேதங்களையும் வடமொழி சாத்திரங்களும் பயிற்றுவிக்கப்பட்டன.

கதம்ப அரசர் மரபைத் தோற்றுவித்த 'மயூரசன்மன் வேதங்களை நன்றாகப் படித்தவன் அவன் தன் ஆசிரியருடன் காஞ்சி வடமொழி கல்லூரிக்கு மேற்படிப்புக்குச் சென்றான்' என்றும் தாள குண்டா பட்டயம் தெரிவிக்கின்றது என மா ராசமாணிக்கனார் இதனை நோக்க காஞ்சி- வடமொழிக் கல்லூரி வேதங்களைப் படித்தவருக்கு அளிக்கும் உயரிய ஆராய்ச்சி கல்வியையும் அளித்து வந்தது என்பதை நன்குணரலாம் எனத் (ப.வ.2011;215) தெரிவிக்கின்றார். மேலும் தொண்டை நாட்டில் அமைந்துள்ள சோளிங்கர் (கடிகாசலம்) மலைமீதுள்ள **கடிகை** வைணவர்களின் கலைப்பீடமாக இருந்திருத்தல் வேண்டும் என்றும் கருத்துத் தெரிவிக்கின்றனர். ஆகையால் இக்கல்லூரிகளில் வேதக் கல்வியும் புராண இதிகாசங்களும் கற்பிக்கப்பட்ட காரணத்தினால் சங்க காலத்தில் புராண இதிகாச கருத்துக்களுடன் இணைக்கப்பட்டு வளர்ந்த திருமால் நெறி மேலும் பல்லவர் காலத்தில் வலுவூன்றியதை அறியமுடிகிறது.

வேதக் கல்வியைக் கற்பிப்பதற்காக வடமொழி ஆசிரியர்களை வடநாட்டில் இருந்து அழைத்து வந்து காஞ்சியில் குடியமர்த்தியுள்ளனர். இவ்வாறு வைதீக கல்வியின் வளர்ச்சியால் வைணவ சமயம் புதுப்பொலிவுடன் தொண்டை நாட்டில் பரவியது. இதன் காரணமாகப் பல்லவப் பேரரசர்கள் திருமாலுக்கான பெருங்கோயில்களைக் காஞ்சியில் உருவாக்கித்தந்தனர். திருமாலின் அவதார கருத்தாக்கங்களைக் கோயில்களில் கற்படிமங்களாக உருவாக்கினர்.

"பல்லவ அரசருள் இரண்டாம் சிம்மவர்மன் விஷ்ணுகோபவர்மன் போன்றோர் தங்களைப் **பரம பாகவதர்** என்றும் சமயம் காப்போர் என்றும் தம்மை பாராட்டிக் கொண்டனர். பிற்காலப் பல்லவர்கள் சிம்மவிஷ்ணு நரசிம்மவர்மன் இரண்டாம் நந்திவர்மன் முதலியோர் சிறந்த வைணவ பற்றுடையவர்கள் அவர்களால் தான் பல்லவ பெருநாட்டில் பெருமாள் கோயில்கள் பல தோன்றின" என மா ராசமாணிக்கனார் (ப.வ.2011;230) தெரிவிக்கின்றார்.

பல்லவர்கள் காலத்தில் அழியா கற்கோயில்கள் கட்டப்பட்டன. அதனால் மக்களிடையே வழிபாட்டு தன்மை வளர்ந்தது. இதனுடன் வைணவ சமயமும் வளர்ச்சி அடைந்தது. பல்லவர்களுக்கு முன்பே வைணவ சமயம் சிறப்பெய்தி இருந்தது. அதன் அடையாளமாகப் பல்லவர்களுக்கு முன் கட்டப்பட்ட திருவெஃகா, பாண்டவதூதப் பெருமாள் கோயில், உலகளந்த பெருமாள் கோயில் விளங்குகின்றன. இம்மூன்று கோயில்களின் இறை படிமங்கள் சுதையினால் ஆனவை. கி.பி. ஐந்தாம் நூற்றாண்டுக்கு முன்பாக திருமாலுக்கான இறைபடிமங்கள் சுதையினால் உருவாக்கப்பட்டிருந்தது. அதன் காரணமாகச் சில வைணவக் கோயில்கள் காஞ்சியில் அழிந்துபோயின எனத் தொல்பொருள் ஆய்வாளர்கள் கருதுகின்றனர். பல்லவர்கள் அழியாத கற்கோயில்களை உருவாக்கி இன்று வரை அவை நிலைத்த தன்மையினைப் பெற்றிருக்க காரணமானவர்கள். இவ்வாறு பல்லவர்கள் தொண்டை நாட்டில் திருமால்

கோயில்களை உருவாக்கி வைணவ சமயம் வளர்வதற்கு வழிகோலினர்.

கோயில்களில் இறைவழிபாடு வளர்ச்சியுற்று வைணவ அடியார்கள் தோன்றினார்கள். அவ்வாறு தோன்றிய, வரலாற்றில் அறியக்கூடிய முதலாழ்வார் மூவரும் தொண்டை நாட்டில் தோன்றியவர்கள். இவர்களால் இறை உணர்வு மக்களுக்கு உணர்த்தப்பட்டது. அவர்களுடைய பக்திப் பாடல்கள ்வைணவ சமய வளர்ச்சிக்கு வித்திட்டது.

ஆச்சாரிய பெருமக்களில் பலர் தொண்டை நாட்டில் தோன்றியவர்கள். அவர்களில் சிறப்பானவராகக் கருதப்படும் ராமானுஜர் தொண்டை நாட்டில் அமைந்துள்ள ஸ்ரீ பெரும்புதூரில் தோன்றியவர், இவர் வைணவ சமயத்தை நெறிப்படுத்தி கோட்பாட்டினை உருவாக்கினார். மேலும் அச்சமயம் வளர்வதற்கான மடங்களையும் உருவாக்கி வைணவ சமயத்தைச் சிறப்படைய செய்த ார் இவ்வாறு வைணவ சமயம் தொண்டை நாட்டில் வளர்வதற்கான சூழ்நிலையைப் பெற்று வளர்ச்சி அடைந்தது.

முடிவுரை

வடபுல சமய கருத்தாக்கங்கள் தமிழக நிலப்பரப்பில் முதலில் பரவியதற்கு தொண்டை மண்டலமே சான்றாகத் திகழ்கிறது. வட சிந்தனை ஏற்புடையவர்களான, வட நிலத்தில் இருந்து தமிழகத்தில் படை எடுத்துவந்த களப்பிரர்களும் பல்லவர்களும் தொண்டை நாட்டையே தன்னுடைய தலைநகராகக் கொண்டு ஆட்சி செய்துவந்தனர். அவர்களே மக்களிடையே சமண பௌத்த வைதீக நெறி பரவலையும் உருவாக்கினர். வடபுல கட்டிடக்கலை மரபுகளை உள்வாங்கிக்கொண்டு கட்டடக்கலை வளர்ச்சிக்கும் துணை புரிந்தனர். இதன் விளைவாக இறை உருவங்களை உருவாக்கி வழிபாட்டு முறையினை தமிழகத்தில் வளர ்ச்சியடைய செய்தனர். கோயில் வழிபாட்டு முறையே சமய மறுமலர்ச்சிக்கு வித்திட்டது. இதன் விளைவாக முதல் ஆழ்வார்களும் திருமழிசை ஆழ்வாரும் தொண்டை நாட்டில் வைணவ சமய பெருமைகளை மக்களிடையே எடுத்துச் சென்றனர். ஆழ்வார்கள் பாடிய பாடல்களைக் கொண்டு இறை மெய்மைகளைத் தொண்டை நாட்டில் தோன்றிய இராமானுஜர் உணர்த்திச் சென்றுள்ளார். வைணவத்தின் மறுமலர்ச்சிக்கும் வளர்ச்சிக்கும் பெரும் பங்கு வகித்த நிலமாக தொண்டைநாடு இருந்துள்ளதை அறிய முடிகிறது.

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सुशीला टाकभौरे की कहानियों में 'स्त्री-अंतर्मन' की संवेदना

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सुशीला टाकभौरे जी हिंदी दलित साहित्य की अग्रणी महिला साहित्यकारों में से एक है। इनकी आत्मकथा 'शिकंजे का दर्द' काफी चर्चित है। सुशीला जी ने कहानी,उपन्यास,कविता,नाटक आत्मकथा जैसी विभिन्न विधाओं में अपना बहुमूल्य योगदान दिया है। सुशीला जी के लेखन का प्रमुख विषय दलित और स्त्री विमर्श हैं। एक दलित और स्त्री होने के नाते उनके जीवन का अनुभव और संघर्ष को हम उनकी रचनाओं में भली-भांति देख सकते हैं।

सुशीला जी के चर्चित कहानी संग्रहों में से एक है 'अनुभूति के घेरे' जो उनका पहला कहानी संग्रह है जो 1997 में प्रकाशित हुआ। इस कहानी संग्रह की भूमिका में लेखिका लिखती है कि इसमें रचित कहानियां उनकी खुद की *अनुभूतियों और वेदना संवेदना की उपज है।*[(1)] इस कहानी संग्रह में कुल 13 कहानियां हैं जिसकी केंद्र पात्र नारी है। हर कहानी में नारी जीवन के विविध पहलुओं को दर्शाने की कोशिश की गई है। नारी को एक सहेली,प्रेमिका,पत्नी,बहू,मां,बहन जैसे विविध भूमिकाओं को निभाते हुए उसके जीवन संघर्ष,उसकी अपनी पहचान, उसकी अपेक्षाएं तथा अतृप्त इच्छाएं आदि पर चिंतन करते हुए सुशीला टाकभौरे जी ने बारीकी से एक एक पात्र को पिरोया है।

जहां नारी पुरानी मान्यताओं के आधार पर क्षमा, त्याग, करुणा, ममता, दया,परोपकार आदि सदभावों से परिपूर्ण आदर्श रूप है,वहां उसके पास अधिकार नहीं, केवल कर्तव्य ही कर्तव्य है। जिन्हें पूरा करते-करते वह इतनी थक जाती है कि जीवन की आखिरी घड़ी तक वह अपने विषय में कुछ सोच नहीं पाती। नारी कितनी भी शिक्षित हो जाए,नौकरी करें, पुरुष के बराबर समाज और परिवार में योगदान दें तब भी स्त्री को वह दर्जा नहीं मिलता जो एक पुरुष को दिया जाता है।एक स्त्री होने के नाते उसे एक ही समय में कई सारे कर्तव्यों को निभाना पड़ता है। उसे अपने परिवार की हर छोटी छोटी बातों पर ध्यान देना पड़ता है चाहे वह धर्म का पालन करना हो, खाने पीने का हो, साफ सफाई हो या कुल की मान मर्यादा का ही पालन क्यों ना हो। सब कुछ करने पर भी स्त्री होने के कारण उसकी भावनाओं को दबा कर रखती है। वह खुद को कभी इतना स्वतंत्र समझती ही नहीं की वह बेझिझक अपनी बातों को सबके सामने रख सके।
'अनुभूति के घेरे' इस कहानी संग्रह में लेखिका स्त्री के अंतर्मन की अनुभूतियों और संवेदनाओं को यथार्थ कसौटी पर प्रकट करने की कोशिश करती है। कहानी संग्रह की हर एक कहानी में लेखिका ने नारी को विभिन्न परिस्थितियों और समस्याओं का सामना करतेहुए और हर समस्या का हल ढूंढते हुए दर्शाया है।

अव्यक्त प्रेम से उत्पन्न मोहभंग

इस कहानी संग्रह की **'प्रतीक्षा'** कहानी में लेखिका अव्यक्त प्रेम से उत्पन्न मोहभंग को प्रकट करती है। इस कहानी में लेखिका ने स्त्री जीवन की एक अनुभूतिपरक स्थिति को सही दिशा देने की कोशिश की है। इस कहानी में अपने प्रेमी जैसे हमशक्ल को देखकर सुमन के मन में हुए अंतर्द्वंद को दिखाया गया है। सुमन अपनी युवावस्था में अपने प्रेम को व्यक्त ना करके जिंदगी भर उस व्यक्ति के प्रति प्रेम भाव में लीन रहती है। अविवाहित सुमन जब उसके प्रेमी जैसे हमशक्ल विमल को ऑफिस में क्लर्क की जगह पर पदस्थ देखती है तो सहसा चौंककर अपनी जिंदगी की बीती घड़ियों में खो जाती है। विमल के घर के कार्यक्रम में जाने पर विमल के साथ सुमन अपने प्रेमी की तस्वीर देखती है जिसे

विमल उसका पिताजी बताता है तब वह हैरान रह जाती है। सुमन आज तक अपने अतीत से बाहर निकली ही नहीं थी और इस घटना के बाद वह पूरी तरह टूट जाती है। अफसोस और पश्चाताप के अलावा उसके पास कुछ नहीं बचता। इसके बाद वह निर्णय लेती है कि वह सूरज से विवाह करेगी जो कई सालों से उसकी प्रतीक्षा कर रहा है। सुमन कहती है *''मैं प्रकाश की कल्पना नहीं, स्वयं सूरज उसका हमसफर होगा।''*(2)

इस प्रकार इस कहानी के माध्यम से लेखिका स्त्री के समर्पण भाव को व्यक्त करती हैं। इसी के साथ स्त्री की यथार्थता को स्वीकारते हुए उसकी गलती का एहसास कराती है और परिस्थितियों से राज़ी होकर देर से ही सही विवाह करने का निर्णय लेती हैं। स्पष्ट होता है की लेखिका सुमन पात्र के माध्यम से अव्यक्त प्रेम से उत्पन्न मोहभंग की स्थिति से गुजरने वाली एक कामकाजी नारी के अंतर्मन का आविष्कार यथार्थ के धरातल पर करती है। स्त्री को अपने जीवन का उद्देश्य खुद निश्चित करना होता है। इस कहानी का

उद्देश्य भी यही है कि स्त्री को अपने जीवन का मार्ग और लक्ष्य दोनों को प्रकाशमय बनाना होगा ताकि वह दूसरों को प्रकाश दे सके।

नारी मन का अंतर्द्वंद

इस कहानी संग्रह की एक कहानी है **'कैसे कहूं'** जो स्वयं लेखिका का ही अनुभव है। इसमें लेखिका ने नारी मन के द्वंद्व का चित्रण किया है। कहानी में दर्शाया गया है कि भारतीय नारी कितनी संवेदनशील है, वह छोटी-छोटी बातों पर कितना विचार करती है। उसमें इतना साहस नहीं होता कि वह अपनी बात सीधे कह सके। कहानी की नायिका कुसुमांजलि है जो खुद एक साहित्यकार है।उसके जीवन में द्वंद्व तब आता है जब एक पाठक का प्रेम पत्र आता है। इस पर वह इतना डर जाती है कि इस बात को अपने पति और सहेली से भी कहने से डरती है। यह डर उसके चरित्र को लेकर उसके माता-पिता के दिए हुए संस्कार पर सवाल उठाने का था। सहेली से बताने से भी इसीलिए डरती है कि कहीं वह उसे गलत समझ सकती है और उसके चरित्र को शंका की दृष्टि से देख सकती है जिससे अनावश्यक संकट उत्पन्न हो सकता है। यह विडंबना सिर्फ कुसुमांजलि की ही नहीं है बल्कि कई स्त्रियों की यही दशा है। भारतीय नारी चाहे जितनी भी शिक्षित हो, आधुनिकता का गुणगान करती हो या अपने कर्मक्षेत्र में किसी भी उच्च स्थान पर विराजित हो, उसके लिए इस प्रकार की छोटी सी बात भी द्वंद्व उत्पन्न करके आत्म संघर्ष का विषय बन जाता है जिससे उसका मन बेचैन हो जाता है। कुसुमांजलि चिंतन मन से सोचती है *"किसी को पता चला तो?लोग मुझे ही दोष देंगे, परिवार की मान मर्यादा, माता-पिता के दिए हुए संस्कार, पति का विश्वास,बच्चों के समक्ष अपने चरित्र की छवि सब कुछ पल भर में धूल में मिल जाएगा। यह सिर्फ चरित्रहीन होने की बात नहीं मेरे लिए अपमान की बात है।"*(3)

इस प्रकार लेखिका कुसुमांजलि पात्र के द्वारा यह बताने की चेष्टा कर रही है कि पढ़ी-लिखी होकर स्वतंत्र रूप से जीवन बिताने वाली नारी को इस प्रकार के अंतर्द्वंद के कारण कुंठा का अनुभव करना पड़ता है। ऐसी स्थिति में नारी के सामने द्वंद्व के सिवाय और कोई रास्ता ना होने के कारण उसे कभी-कभी अपने जीवन के सहज आनंद से भी वंचित होना पड़ता है।

लिंग भेद पर परिवर्तन

इस कहानी संग्रह की एक और कहानी है **'सही निर्णय'** जिसमें लेखिका ने बेटियों को गोद लेती पात्रों के माध्यम से समाज में आए हुए परिवर्तन और बेटियों के प्रति समाज में बदलती सोच को व्यक्त करने की चेष्टा की है। अधिकतर लोग बेटे को ही महत्व देते हैं। बेटों को ही अपना वंश समझते हैं जबकि बेटी को पराया धन। इस कहानी में लेखिका ने तीन नारी पात्रों का रूपायन किया है जिनकी अलग अलग परिस्थितियां हैं, लेकिन सब की एक ही कमी है कि वे सभी निःसंतान है। और वे तीनों बेटियों को गोद लेती है जबकि वे बेटे को भी ले सकती थीं । लेकिन उन्होंने ऐसा नहीं किया क्योंकि इन के माध्यम से लेखिका यह स्पष्ट करना

चाहती है कि बेटियां बेटों से कम नहीं है अर्थात वह दूसरे शब्दों में लिंग समानता की ओर इशारा करना चाहती है, जब आधुनिकता के मोह में और बेटों को पाने की लालसा में कोख में ही बेटियों की भ्रूण हत्या करने के लिए भी तत्पर हो रही है। इस प्रकार लेखिका समाज में व्याप्त एक अंदरूनी रूढ़ी परंपरा बालिका भ्रूण हत्या के खिलाफ अपनी कहानी के माध्यम से चेतना प्रदान करने का भरसक प्रयास किया है। " *वह जमाना कब का बीत गया है,जब बेटा ही कुलदीपक कहलाता था। अब बेटा और बेटी में कोई फर्क नहीं किया जाता। यदि बेटियां है तो उन्हें ही खूब पढ़ा लिखा कर बहुत ऊंचाई तक पहुंचाया जाता है। इस तरह बेटियां भी अपने माता-पिता का नाम रोशन कर रहीं हैं।"*[(4)] यह कथन लेखिका की आधुनिक भाव बोध को दर्शाता है कि समाज में लिंग समानता के आधार पर ही प्रगति हो सकती है और सामाजिक संतुलन भी बनाए रख सकते हैं।

निष्कर्ष के रूप में कह सकते हैं कि 'अनुभूति के घेरे' कहानी संग्रह नारी के अंतर्मन की संवेदनाओं को सक्षम रूप से व्यक्त करती है। लेखिका खुद एक नारी है तो उन्होंने नारी की भावनाओं को अच्छे से समझ कर उजागर किया है। लेखिका कहीं-कहीं नारी के कमजोर पक्ष को भी उजागर करती है और इसी कमजोरी के कारण उत्पन्न उसके मोहभंग को भी दर्शाती है। जहां नारी को कमजोर दिखाया गया हैं वहीं नारी के सबल होने की दिशा भी दिखाई गई है। आज के दौर में भी शिक्षित होने के बावजूद भी नारी अपने परिवार में आत्मसंघर्ष करती हुई दिखाई देती है। आज के संदर्भ में बेटा और बेटी में कोई अंतर नहीं है,दोनों समान रूप से अपने माता-पिता का साथ दे रहे हैं। 'अनुभूति के घेरे' की कहानियां नारी के आगे बढ़ने की, स्वतंत्र जिंदगी जीने की और अपने सम्मान को पाने की सीख देती है।

इस प्रकार लेखिका सुशीला टाकभौरे ने अपनी कहानियों में वैविध्यपूर्ण जीवन के पात्रों के सृजन के द्वारा नारी के अंतर्मन की गहराइयों को छूने का प्रयत्न किया है साथ ही नारी जगत को एक प्रज्वलित चेतना भी प्रदान करने का योगदान भी किया है। इसलिए कह सकते हैं कि सुशीला टाकभौरे की कहानियां नारी अंतर्मन की संवेदनाओं को दर्शाती ही नहीं हैं अपितु नारी में प्रेरणा जगाने का महत कार्य भी करती हैं। समकालीन लेखिका के रूप में सुशीला टाकभौरे की यह महत्वपूर्ण उपलब्धि है।

संदर्भ ग्रंथ सूचि

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भाषा और संस्कृति

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हिंदी प्रवक्ता –द्वारकादास गोर्वधन दास वैष्णव महाविदयालय

भाषा मानव मन की भावनाओं को अभिव्यक्त करने का साधन है, साथ ही एक दूसरे को जोड़ने का माध्यम भी है। परस्पर सुख-दुख ,आशा-आकांक्षाओं, आचार-विचार, वेश-भूषा, ज्ञान–विज्ञान, कला, भावनाएँ, आध्यात्मिक विरासत, संस्कृति तथा समस्त चिंतन भाषा में निबद्ध होता है।

वैदिक, लैटिन एवं ग्रीक भाषाएँ विश्व की अत्यंत प्राचीनतम एवं समृद्ध भाषाएं मानी जाती हैं। जिस भाषा में ज्ञान –विज्ञान, वाड्:मय, शिल्प एवं समस्त कलाओं की अभिव्यक्ति की गहन क्षमता होती है, वह भाषा संपन्न मानी जाती है। गुरूदेव रवीन्द्रनाथ ठाकुर ने अपने एक गीत में स्पष्ट बताया है इस देश में आर्य भी आये, अनार्य भी आए, द्रविड़, चीन , शक-हूण, मंगोल ,पठान, मुगल सभी यहां आये, लेकिन कोई भी अलग नहीं रहा, सब इस महासागर (संस्कृति) में विलीन होकर एक हो गये।

निश्चय ही भारत एक महासागर है और भारतीय संस्कृति भी एक महासागर है, जिसमें विश्व की तमाम संस्कृतियाँ आकर समाहित हो गई हैं। आज जिसे लोग हिंदू संस्कृति मानते हैं वह वस्तुत: भारतीय संस्कृति है। यह सिंधुघाटी की सभ्यता, प्राग्वैदिक एवं वैदिक संस्कृति का विकसित रूप है। इसने अनेक धर्मों, सभ्यताओं एवं संस्कृतियों को आत्मसात कर लिया है, यही कारण है कि भारतीय संस्कृति सामासिक संस्कृति कहलाती है ।

भारतीय संसकृति की अन्य विशेषताएँ भी हैं, यह प्रगतिशील है, सांप्रदायिकता से परे तथा सहिष्णुता की भावना से ओतप्रोत है। भारत को धार्मिक, सामाजिक, सांस्कृतिक एवं ऐतिहासिक स्तर पर एक सूत्र में गूंथने की एकीकृत भावना ने बदरीनाथ-केदारनाथ से लेकर कन्याकुमारी को, काशी से रामेश्वरम को , द्वारका से पुरी को जोड़ रखा है । जगदगुरू श्री आदिशंकराचार्य ने भारत की चारों दिशाओं में चार पीठों की स्थापना की थी। तुलसी के अयोध्यावासी राम ने रामेश्वरम में शिव की उपासना की थी।

धार्मिक स्तर पर भी समन्वय की भावना हमारी संस्कृति की महान उपलब्धि है। भारतीय वाड्:मय भी संस्कृति परक है। डॉ. वी. राघवन ने अपनी पुस्तक 'भारतीय साहित्य रत्नमाला' में बताया है – *'भारत की प्रादेशिक भाषाओं में उत्कृष्ट साहित्य के प्रथम प्रयास संस्कृत के अनुवाद मात्र ही थे यह सभी भाषाएँ शब्द राशि, दार्शनिक एवं धार्मिक पृष्ठभूमि ,विषय वस्तु और साहित्यिक शैलियों के लिए संस्कृत पर ही पूरी तरह आश्रित थीं ।'*[1]

यह कथन सर्वथा सत्य है कि हमारे देश की प्राकृत, अपभ्रंश, ब्रज, अवधी, मैथिली, राजस्थानी भाषाएँ ही नहीं अपितु बंगला, मराठी, गुजराती, तेलुगु, कन्नड, मलयालम

आदि इतर भाषाएँ भी अपनी भाषिक और साहित्यिक संपदा के लिए किसी न किसी रूप में संस्कृत पर आधारित रही हैं, अर्थात समस्त भारतीय भाषाएँ संस्कृत वाड्:मय से अनुप्राणित हैं। महर्षि वाल्मीकि कृत आदि काव्य रामायण से लेकर व्यास प्रणीत महाभारत, भागवत इत्यादि काव्य ग्रंथों के साथ भास, बाणभटट, कालिदास आदि के द्वारा विरचित साहित्य भारतीय भाषाओं में रूपांतरित हैं और उसके विभिन्न उपाख्यानों के आधार पर ये भाषाएँ अपने वाड्:मय भंडार को संपन्न कर रही हैं। यह क्रम आज भी अनवरत जारी है।

इसके अलावा संस्कृत में भारतीय दर्शन, वेदांत, उपनिषद, तर्क, व्याकरण, न्याय, रसायन, चिकित्सा, अर्थशास्त्र, नीतिशास्त्र, ज्योतिष, गणित, धनुर्वेद, मीमांसा, पुराण इत्यादि ज्ञान विज्ञान संबंधी समस्त साहित्य उपलब्ध है जिसका रूपांतरण लगभद समस्त भारतीय भाषाओं में हुआ है। प्रारंभ में यह सभी क्षेत्रीय भाषाएँ उपरोक्त वाड्:मय के लिए केवल संस्कृत पर आधारित रहीं जिसमें हमारी संपूर्ण सांस्कृतिक परंपरा अक्षुण्ण है। अर्थात् संस्कृत भारतीय संस्कृति की स्त्रोत भाषा रही है और संस्कृत साहित्य उसका मूलाधार रहा है ।

वस्तुत किसी देश की सभ्यता एवं संस्कृति के विकास में उस देश या राष्ट्र की भाषा अहम भूमिका रखती है। वैदिक युग से लेकर मुगल एवं अंग्रेजों के आगमन तक भारत का इतिहास भव्य रहा है। इस महान देश की सभ्यता की तूती सारे विश्व में बोल रही थी, भारत सभी क्षेत्रों में अग्रिम पंक्ति में था। व्यापार वाणिज्य के क्षेत्रों में रोम, ग्रीक आदि देशों के साथ भारत का गहरा संपर्क था। बौद्ध एवं जैन धर्मों के समय में भारत की शिल्पकला, स्थापत्यकला, चित्रकला एवं काव्य कला चरम सीमा पर पहुँच चुकी थी। विदेशों से विदयार्थी यहां के तक्षशिला, नालंदा, तथा विक्रमशिला

विश्वविदयालयों में शिक्षा पाने हेतु आया करते थे। यहाँ के राज दरबारों में विदेशी राजदूत नियुक्त थे। मेगस्थनीज, टालमी, अब्दुल रजाक, प्लीनी आदि विदेशी यात्रियों ने हमारे देश का भ्रमण करके जो यात्रा वृत्तांत लिखे हैं, उससे हमारे देश के वैभव एवं प्राचीन संस्कृति का भली भाँति पता चलता है। ईसा पूर्व पांचवी शती से लेकर 10वीं शताब्दी तक भारत आर्थिक, सामाजिक, राजनैतिक, सांस्कृतिक एवं कला विज्ञान के क्षेत्रों में स्पृहणीय विकास प्राप्त कर चुका था । *"इस प्रकार हमारे देश के चतुर्मुखी विकास में भाषा एवं साहित्य अग्रणी भूमिका निभा रहे थे। दो हजार वर्ष पूर्व भारत में जहां न्यायी एवं पराक्रमी सम्राट विक्रमादित्य का वैभवपूर्ण शासन था, चंद्रगुप्त जैसे प्रतापी और चाणक्य जैसे कुशल राजनीतिज्ञ विश्व के इतिहास मे दुलर्भ हैं, महामात्य चाणक्य ने राज्य व्यवस्था चलाने के लिए अर्थशास्त्र नाम से एक अद्‌भुत राजनीति शास्त्र का प्रणयन किया था। जिससे भारत की शानदार राज्य व्यवस्था का पता चलता है। परंतु यवनों के आक्रमण के पश्चात क्रमशः हमारे शास्त्र, वाङ्‌मय एवं कलाओं के विकास का मार्ग अवरूद्ध हुआ। अंग्रेजों के आगमन के साथ हम अपने धर्म-कर्म को भी भूल बैठे और पाश्चात्य रंग में रंगने लगे।''* [2] लार्ड मेकाले ने भारत में शासन तंत्र एवं शिक्षा का माध्यम अंग्रेजी को बनाने की सिफारिश करके भारतवासियों को इंग्लैड का बौद्धिक गुलाम बनाया। आज हम उसी भाषा के चश्में से दुनिया को देखते हैं और अपनी अस्मिता को खो बैठे हैं। हमारे देश की सम्पन्न भाषाओं पर हमारा विश्वास ही नहीं रहा।

भारतीय पाश्चात्य सभ्यता के प्रवाह में बहते हुए भाषा के स्तर पर पराश्रित बन गए हैं। कुछ लोगों को विश्वास है कि विश्व का समस्त ज्ञान विज्ञान एवं प्रतिभा कौशल केवल अंग्रेजी भाषा में सुरक्षित है। यह उनकी गलत धारणा है। पुरात्वक, कला, संगीत, चित्रकारी अत्यादि विषयों पर फ्रेंच भाषा में जैसा समृद्ध साहित्य उपलब्ध है वैसा साहित्य अंग्रेंजी में नहीं है, फिर हम लोग अंग्रेजी की बैसाखी पर चलने में गौरव तथा गर्व का अनुभव करते हैं जबकि यथार्थ में रूसी, जापानी, जर्मन, फ्रेंच एवं फारसी भाषाएँ भी कम समृद्ध नहीं हैं। इन भाषाओं में भी प्रचुर मात्रा में ज्ञान-विज्ञान का साहित्य रचा गया है और महत्वपूर्ण अनुसंधान हुआ है। उनकी सांस्कृतिक परंपरा इन भाषाओं में अक्षुण्ण है और आज वैश्विक स्तर पर ये देश व्यापार, वाणिज्य, कला, संस्कृति तथा विज्ञान के क्षेत्रों में अग्रिम पंक्ति में हैं। ये देश किसी भी दृष्टि से अंग्रेजी के मोहताज नहीं हैं फिर भारत क्यों अंग्रेजी का मुखापेक्षी है? यह हमारी मानसिक दासता का प्रतीक है।

"प्रजातंत्रीय राष्ट्र के चार अनिवार्य तत्वों में संविधान, राष्ट्रध्वज तथा राष्ट्रगीत के साथ राष्ट्रभाषा भी नितांत आवश्यक है। साथ ही किसी भी राष्ट्र पर किसी विदेशी भाषा को थोपना आधुनिकता के मूलभूत सिद्धांतों के विरूद्ध है।'' [3]

वास्तव में यदि किसी राष्ट्र पर जब कोई विदेशी भाषा हावी होने लगती है तभी राष्ट्र की संस्कृति का ह्रास होने लगता है। किसी जाति के पूर्वजों द्वारा विचार एवं कर्म के क्षेत्र में अर्जित श्रेष्ठ संपत्ति उसकी संस्कृति होती है। वह संस्कृति उस जाति की भाषा के माध्यम से जीवित रहती है। सदियों से कोई भी जाति अपने जो मूल्य एवं आदर्श अपने अनुभव, श्रम, निष्ठा, चिंतन, मेधा, समझ, विवेक द्वारा स्थापित करती है वह उस जाति की संस्कृति मानी जाती है। भाषा संस्कृति की वाहिका होती है। अर्थात संस्कृति की आधारशिला उस जाति की भाषा होती है और इसलिए संस्कृति भाषा पर आश्रित है। इस प्रकार भाषा और संस्कृति का अविभाज्य संबंध है।

आज हमारे देश और विदेशों में भी हमारी संस्कृति खतरे में फँसी हुई है। क्योंकि हम अपनी विरासत को भूल बैठे हैं, और अंधाधुंध पाश्चात्य भाषाओं, साहित्य, कला, रहन-सहन, आचार-विचार, संप्रदायों का अनुकरण करते आ रहे हैं। पाश्चात्य सभ्यता के आदर्श एवं मूल्य भौतिक सुख-सुविधाओं पर टिके हुए हैं और बौद्धिक विकास को प्रश्रय देते हैं। जबकि भारतीय आदर्श एवं मूल्य विशुद्ध अध्यात्म परक हैं जो भारतीय भाषाओं में सुरक्षित हैं। संप्रति में विदेशों में बसे प्रवासी भारतीय अपनी भाषा संस्कृति आदर्श एवं मूल्यों के प्रबल समर्थक होते हुए भी विदेशी भाषा को अपनी आजीविका तथा वैज्ञानिक उन्नति का स्त्रोत एवं साधन मानकर उसकी उपासना में लगे हुए हैं। ऐसी स्थिति में उन्हें आत्म विश्लेषण करना होगा कि हम मूलत: भातीय हैं और भारतीय गणतंत्र की राजभाषा, संपर्क भाषा एवं राष्ट्रभाषा हिंदी की उपेक्षा करना उचित नहीं है। यह जागृति व चेतना हिंदी के उत्थान में सहायक सिद्ध होगी।

हमारे देश के मनीषी विद्वान स्वर्गीय सर्वपल्लि राधाकृष्णन ने सही कहा था कि *"भारतीय वाङ्‌मय एक है और यह विभिन्न भाषाओं में सृजित है। यह हमारी एकात्मकता का द्योतक है।.......हमें भारतीय अध्यात्म को पूर्ण रूप से बनाये रखत हुए पश्चिम के वैज्ञानिक उन्मेष को भी अपनाना होगा, तभी हमारा भौतिक एवं आध्यात्मिक स्तर पर समग्र विकास संभव है।"*[4] आज हम भारतीयों में कथनी और करनी

में बहुत बड़ा अंतर आ गया है। परिणामस्वरूप हम इस संक्रांतिकाल से गुजर रहे हैं। इस ओर हिंदी के महाकवि, कामायनीकार श्री जयशंकर प्रसाद ने संकेत दिया था। *"ज्ञान दूर कुछ क्रिया भिन्न है इच्छा क्यों पूरी हो मन की, एक दूसरे से न मिल सके यह बिडंबना है जीवन की। आइए, हम इस बिडंबना पर विजय प्राप्त करें तथा महात्मा गांधी के इस कथन को सार्थक बनाने का संकल्प करें और उसे पूर्ण रूप में आचरण में लावें।"*[5]

एक राष्ट्रभाषा हो भारत की
एक हृदय हो भारत जननी।

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THE INCANDESCENT CUSTOMIZING OF THE CHARACTER RIYA SOMANI AND THE INCESSANT ENDEAVOR ARRAYED IN THE CHARACTER OF MADHAVJHA BY CHETAN BHAGAT IN HIS NOVEL, "HALF GIRLFRIEND"

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Abstract: Present-day women are no longer stereotypes. They enjoy real freedom by expressing their inner self without any hesitation. Such women who are economically independent make bold decisions, unmindful of the feelings and emotions of their male counterparts. This article analyzes the women protagonist character RiyaSomani in Chetan Bhagat's novel "Half Girlfriend" which best fits in shape establishing the conferment of contemporary India. The young woman of the present generation respects her family, ready to sacrifice her aspirations and discretion for the sake of the family. But she is bold enough to decide when the sacrifice does not deserve her caliber anymore, she walks her mind. The male protagonist Madhav Jha is a middle-class young man who speaks English of the layman and leads a bachelor life in the city of Delhi. The novel develops when he struggles to win the heart of Riya Somani, the female protagonist who remains as a consecration of her affluent family. This article brings out two major discussions in the novel, "Half Girlfriend" written by Chetan Bhagat which was published in 2013.

1. Are women in the present scenario free to decide with whom they can travel to their destination?
2. Whether the man of the present generation is responsible enough to have any goal in life apart from the untiring venture of caressing his girlfriend?

The study involves the primary source of the novel "Half Girlfriend" by Chetan Bhagat and the secondary sources, such as the articles and the journals are used and quoted in the reference.

Keywords: Perseverance, Hardship, Realization, Self-determination, Sacrifice

INTRODUCTION

Indian Writing in English has been blessed with eminent writers from Rabindranath Tagore, Salman Rushdie, Vikram Seth, Amitav Gosh, Arundhati Roy, Kiran Desai, and many more writers. Each Indian writer has a style and there exists a lot of Indianism in the writings. Each Indian writer has a message to convey to the readers. Moreover, each writer constantly adheres to his or her style of writing. In pace with the same series, the author Chetan Bhagat started to venture into the Indianness bubbling in the knee jerks of Indian youth. In his attempt to entertain the young India, Mr. Chetan has displayed the perfect outlook of awareness in tailoring the characters of contemporary India. One such special feature of the author Chetan Bhagat is transcending the essence of novel writing to the next level. In a way, he is trying to recreate the real middle-class life situation and its attempt to compete with the elite society. Sayoni Basu, opines "I think he is the JK Rowling of India, in that he has got completely unlikely people to pick up a book and read." (Forbes, India)

Bhagat grew up in a conventional Hindu family. As his parents were engrossed in the Government sector, he was well acquainted with the lifestyle of the middle class of loans and commitments. His debut writing flourished during his school days when he felt delighted to envision his writing published in the school magazine. Later, in 2009, he quit his bank job to nourish his writing skills as a full-time author. His popularity reached its peak when he published his Novel "Five Point Someone" a true portrayal of life in Engineering Institutes like IIT. Chetan married Anusha Surya Narayanan whose love- cum- arranged marriage was beautifully depicted in his Novel "Two States". He weaved out his own experiences of love life in IIT and the family reunion and traumas of tradition and customs. Chetan has made a remarkable status of best-selling author grabbing the nuances of young blood. Chetan Bhagat is the author of bestselling novels, *Five Point Someone* in 2004, *One Night @ the Call Center* in 2005, *The 3 Mistakes of My Life* in 2008, *2 States* in 2009, *Revolution 2020* in 2011, *What Young India Wants* in 2012 (speeches and columns), *Half girlfriend* in 2014, *Making India Awesome* in 2015 and *One Indian Girl* in 2016. He was honored with various awards and recognitions:

· Society Young Achiever Award (2004)
· Publisher's Recognition Award (2005)
· In Time Magazine's List of World's 100 Most Influential People 2010
· Filmfare Award for Best Screenplay in 2014 for '*Kai Po Che'*
· CNN-IBN Indian of the Year in Entertainment (2015)

The incessant endeavor arrayed in the character of Madhav Jha

The protagonist Madhav Jha comes from Bihar to study in a Delhi College. Initially, during the interview, he faced a lot of challenges as his English was not up to the mark. This element of English fluency for a Bihari boy was well established in the climax episodes of the novel *Half Girlfriend* where the protagonist speaks explicitly well in front of the Chief Guest Bill Gates and that became his victory for which he struggled throughout. Moreover, Madhav Jha is a typical Bihari boy who comes from a rural background. The rural youth grapple a lot to cope with the sophisticated life pattern in the city that is generally looked down upon by many. Chetan Bhagat likes to address the audience by opening up his mask and showcasing himself as an author. The beginning of the novel is rather mystical when he meets Madhav Jha in a hotel. Their conversation becomes so thrilling that the author aspires to weave Madhav's flashback into a love story. The title of Bhagat's novels has a numerical connection to streamline his image in the genre. Madhav Jha details how he struggled to speak in English to get admission to Saint Stephen's College under the sports quota. The protagonist is displayed as a Bihari boy who aspires to relinquish his dream college in Delhi. Immediately after the interview, he meets Riya Somani at the Basketball court. It was a love at first sight for Madhav. He was self-determined with both his profession as well as his attributions. He never felt inferior to approaching a girl from an affluent family and persuading her to be his girlfriend. This proves the fact that Indian youth are ready to face the consequences to achieve their dream whether it is a career or a girlfriend. He overcomes his complex of speaking in English through diligence and meticulous effort. This can be considered as the success of the character MadhavJha who remains an inspiration for the young boys among the readers who stumble to speak good English. So, this is the crucial point which one cannot deny with the fact that he showcased a wonderful message that through a little practice and prudence anyone can learn any language after all English is just another language and there should not be any disparity shown in the way of speaking the language as there exists a lot of dialects in the way English is spoken. Even in India, each State has a dialect of its own in pronouncing the global language and there is nothing wrong with it. The talents of the youngsters should not be looked down upon because he/she might not speak American or British English. The Native speakers are just speaking their mother tongue but we learn a foreign language and equally compete with their grammar and verbal skills. Chetan Bhagat is well ahead of the problems of the youngsters here in India. Here comes the wonderful message that no child should be underestimated just because she/he can't speak English fluently. Chetan Bhagat in a way has tried to construct the positivity and credibility wiring in the minds of youngsters in rural villages as far as the language accuracy is concerned in a disquieted manner. The victory of Madhav Jha was well established when he was about to make a speech for Bill Gates who was coming on a visit to India to sponsor organizations working for the society's betterment. Finally, he succeeds in presenting the speech in front of the delegates and he convinces Gates Foundation to provide him the grant. Even though the protagonist keeps begging his lady love not to forsake him, the character is keen on his self-improvement. Madhav Jha at one point had a massive metamorphosis when Riya Somani got married. Though not fully recovered from his heartbreak, he went back to his village to help his mom in running a village school which was started by his mother to provide free education to the poor. He meets the divorced Riya again and she offers him help with his English as he had to make a speech for Mr.Bill Gates who was coming on a visit to India to work for the society's betterment. He needed a speech that convinced the Gates Foundation to provide him with the grant. These specific instances in the novel best fit into the depiction of the rural schools and the condition of the toilets which have to be reformed for the betterment of small and innocent children. Here, the author himself has become socially responsible in bringing into light the conditions of the rural schools in India which need a lot of financial help to improve at various levels.

The Incandescent customizing of the character Riya

Riya, the female protagonist is well-portrayed as a self-centered person who would listen to her perspective and not others. First, she liked Madhav for congruous reasons of being friends but she could not think of starting a life with him. She was judgmental about his weird behavior of being obsessed with kisses and so on. Riya felt that Madhav was quite immature. Moreover, she cannot think of moving against her affluent family members. So, she did not respond much to his crazy impressions of her. But there is this transformation in Riya's character when she breaks up the marriage with Rohan., She discerns that she had made a big blunder in selecting the life partner. In a way, she had failed to imbibe the true affection and cognizance of MadhavJha who was undeniably her true love. The moment she realizes that the same love she denied years back has the rejuvenation of nurturing itself, she has taken the bold decision to live together with Madhav Jha. Riya does not want to experience any more failures as she is all the more shattered by the loggerheads of life. The previous episodes of life taught her to be mature enough to pick what she needs.

At the first encounter, she could not open up to Madhav as she was latched in between the entanglement of her family and the hierarchic royalty. But at their second encounter, she felt free and her mind was as clear as the sky to make love with Madhav. Of course, she had the freedom to continue with the life that she had plumped up for her.

The dissatisfaction with the married life with Rohan and her youth love for Madhav were two dynamic phases of Riya's life. The prudent value of love and care which she lost when she lived with Rohan was symbolically represented in her picture of a divorcee. But the brilliant notion of her demeanor was well accomplished by the author that as an educated woman in the society, she need not prolong with the life of immaterial values in which the true love that she expected was never fulfilled, so at one point, she needs to be bold enough to choose the life that she is yearning for. This was niched by the author on the second encounter of Madhav and Riya.

'You don't want to be with me?'

'I didn't say that.' 'Well, are you, my girlfriend?'

'No.'

'What are we then?'

'Friends.'

'You allow friends to hold you like this.' I had not let her go. She gently moved away.

'Okay, I'm your half-girlfriend.' (Half Girlfriend by Chetan Bhagat)

Thus, the expertise of the intensity of self-control in the character Riya is well established by the author. She is a girl who wants to resist her own emotions and feelings. Only when she breathes the trust and warmth from Madhav, does she reciprocate the future precipitation of their relationship. She is a self-centered woman who never adheres to any of the protocols of his beloved boyfriend Madhav. In a way, she is facilitating Madhav to cling to his patience and molds him to act ethically.

Conclusion

Thus, the findings in the novel are well-accomplished by the author Chetan Bhagat in the characters of Riya and Madhav. Yes, women in the present scenario are free to decide with whom they can travel to their destination. The men of the present generation are responsible enough to have any goal in life apart from the untiring venture of caressing their girlfriends. Both the characters have traversed a lot of hardships in the past but finally, out of their perseverance and determination to attain their goals, they remain a successful couple at the end of the novel. The novel is as entertaining as it delivers this social message of self-evaluation, hard work, and patience that revolves around the social issues of love, life, and marriage.

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ISSUES RELATED TO WORK FROM HOME DUE TO COVID-19

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Abstract: Due to the outbreak of COVID-19 in March 2022, many companies have been forced to work from home for their benefit and the benefit of their employees. In this situation, it is not easy to talk and communicate face to face between the employees working in the organization and this creates a situation where the relationship breaks down. Work from home method Some of the employees working in an organization may be more experienced employees some may be new to the job and most of the employees may be working from home for the first time. For them, juggling their daily life tasks and corporate tasks at the same time is a difficult task that can lead to physical and mental stress.
Key Words: Work from Home, Covid-19, Employees Health and Income

INTRODUCTION

Working from home may also be an option for many as it provides flexibility to the employees who work from home. Working from home provides employees with a good work-life balance as they juggle their corporate work and at the same time take care of their home. It not only increases efficiency but also helps the organization to achieve its goal while on the other hand it reduces social interactions and constant accountability processes. It can be a good thing or a bad thing according to their situation depending on their work environment and cultural priorities. Working from home can indeed play an important role in your life or the lives of those you live with! Doing office work from home may be a boon (blessing) to some but abhorrent to others. Due to the Covid-19 pandemic, many companies have directed their employees to work from home.

WORK FROM HOME (WFH) AND COVID-19 (DECLARED PANDEMIC)

Indeed, government institutions, factories, schools, colleges, employers, employees, manufacturers, vendors, and workers have all been severely affected by the spread of the COVID-19 virus and its continuation. The work-from-home regime was brought in to contain the spread of COVID-19 and bring business to a standstill. Working from home is not a novel idea. The COVID-19 pandemic has disrupted all of our lives, including the way we work daily. Due to the COVID-19 virus, employees were considered an involuntary benefit and IT companies were concerned about how IT employees could work from home or how communication would be provided.

THE OBJECTIVE OF THE STUDY

To determine the impact of COVID-19 on the socioeconomic challenges lifestyle faced by women working from home in private companies in Chennai.

METHODOLOGY

The following methodological procedures were used to conduct this present study.

(I) The sampling Design

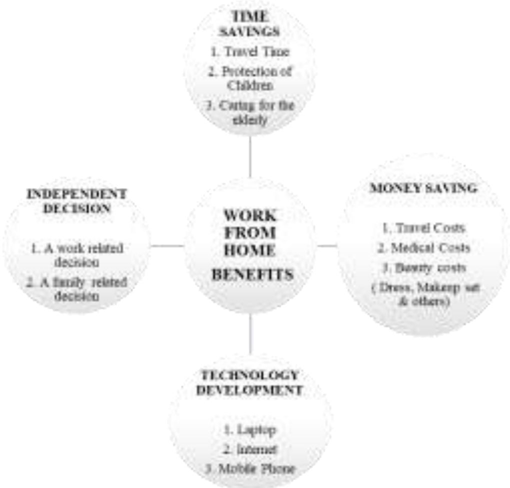
The present study was conducted in the area of Perambur with a selection of work-from-home employees. A convenient sampling method was adopted for a more accurate and simple study. A sample of 10 Male and 5 female workers working from home was selected for primary data collection.

(II) Data collection methods

Primary data was collected through structured questionnaires, discussed with employees who work from home, and personal observations secondary data was collected from books, magazines, journals, articles, published reports, newspapers, the Internet, and unpublished reports.

EMPLOYEE BENEFITS OF WORKING FROM HOME

Working at home saves the expense of traveling costs. This includes indirect costs such as travel costs, vehicle fuel, road taxes, and vehicle parking costs.



TIME SAVINGS

Employees who work from home can spend more time taking care of the welfare of the elderly and children in their homes while the employees carry out their office duties. Reduction in commuting and commuting time will increase motivation in office work.

SAVE MONEY

Working from home employees means doing their office work from their home. During office hours, you get dressed and ready to go to the office and face the crazy traffic jams. by working from home there is no need to go to the office so money is saved and travel time reduces to some extent the cost of transportation and other expenses.

TECHNOLOGY DEVELOPMENT

Technology-based tools such as online meeting platforms, team collaboration, and communication platforms are necessary for telecommuting. And operating such tools requires technical knowledge, which ultimately results in developing skills that aren't used in a typical workplace.

INDEPENDENT DECISION

As employees carry out their office work from home, they are free to make their own decisions in their home and office decisions.

EMPLOYEES EFFECTS OF WORKING FROM HOME

As the world is facing a major crisis, the employees who were working in various companies had to work from home to deal with it. Working from home has advantages but also disadvantages Working from home is a boon for many, but it's not for everyone, putting small business owners at a disadvantage. As employees work from home, the income of small business owners is affected.

STRESS

When doing office work from home, there is a doubt whether their office will function permanently. Due to doing work at home and office work at the same time, there is a lot of stress and the mood of employees working from home is affected a lot.

FAMILY VIOLENCE

While working from home increases productivity and eliminates office distractions, screen interruptions and distractions from kids, family, pets, work, relatives, friends, and neighbors don't end even if your health suffers when you work from home.

Working from home means we can no longer go to the office at nine and leave at five. Time spans from early morning to late evening and our entire life revolves around our work, so there is a chance of increasing stress and anxiety.

EXPENSE

While working from home, the daily household expenses are higher. While working in the office, snacks, tea, and other expenses during working hours depend on the company, but while working from home, all the other expenses have to be covered by their income Apart from that, other expenses like mobile phone, laptop internet, electricity usage etc. also add up, thereby spending a large amount of savings.

INCOME PROBLEMS

Working from home is not possible with a team, direct communication between team members is difficult, and thus solving doubts and problems at work is not clear. As a result, the production efficiency in the manufacturing sector decreases, and the monthly income of the employees received by the company decreases due to the decrease in production besides, it is difficult to get promotions and bonuses because of working from home.

ISOLATION

Employees who work from home are isolated from interacting with co-workers and the lack of social interaction and interaction during office hours can be a negative as working from home can lead to reduced motivation in their work.

MAJOR FINDING OF THE STUDY:

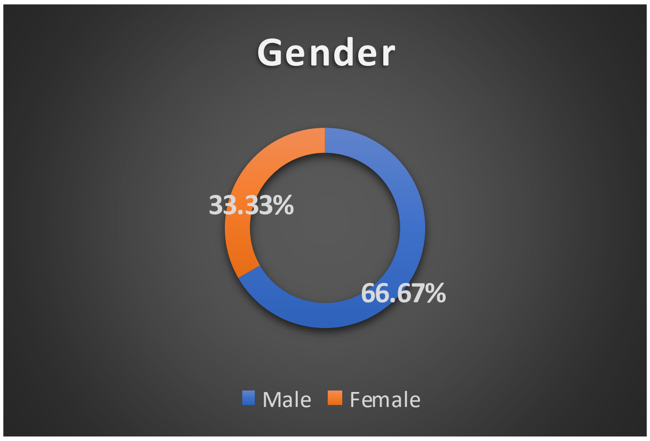
Respondent' Profile

In this research work, an attempt has been made to study a private company employee working from home in Chennai. The survey covers 15 samples selected by respondents from the Perambur (New Kamaraj Nagar) Area.

1. **Gender**

The majority of the respondents are 10 males i.e., sixty-six point six- seven percent females and 5 i.e., thirty-three-point thirty-three percent are working from home.

Gender	No. Of Respondents	%
Male	10	66.67
Female	5	33.33
Total	15	100

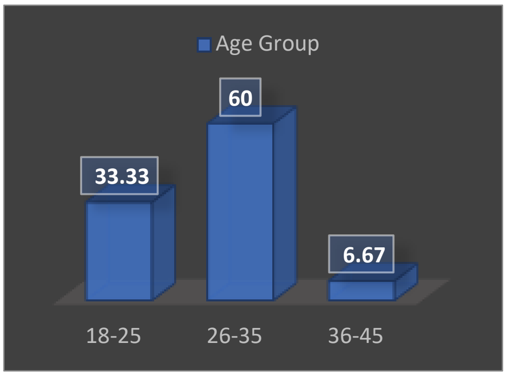


2. Age Group

Age	Male	Female	Total	%
18-25	1	4	5	33.33
26-35	8	1	9	60
36-45	1	-	1	6.67
Total	10	5	15	100

Source: Primary data

Sixty percent of workers aged 26 to 35 work from home, thirty-three-point thirty-three percent of workers aged 18 to 25- and six-point sixty-seven percent of workers aged 36 to 45 work from home, according to the survey.

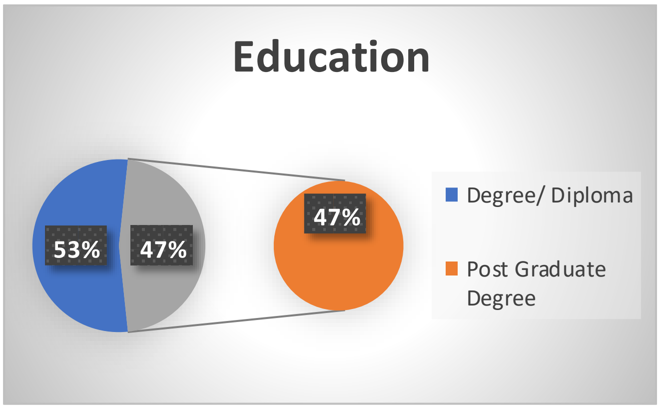


3. Education

Education	Male	Female	Total	%
Matric	-	-	-	-
Degree/ Diploma	6	2	8	53.33
Post Graduate Degree	4	3	7	46.67
Total	10	5	15	100

Source: Primary data

According to the survey of the number of home workers, fifty-three-point thirty-three percent have completed a bachelor's degree or diploma, followed by forty-six-point sixty-seven percent with a master's degree.

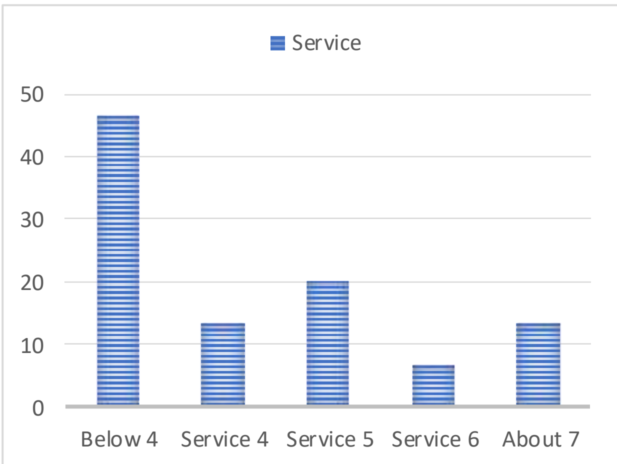


4. Service Level

Service	Male	Female	Total	%
Below 4	3	4	7	46.67
Service 4	1	1	2	13.33
Service 5	3	-	3	20
Service 6	1	-	1	6.67
Service 7	-	-	-	-
About 7	2	-	2	13.33
Total	10	5	15	100

Source: Primary data

According to the survey, the tenure of the employees working from home is less than four years, forty-six-point sixty-seven percent of the employees are working from home, the next level is five years, twenty percent is four years, and more than seven years, thirteen-point thirty-three percent is six years, and six-pointsixty-sevenn percent of the employees are defined by the survey.

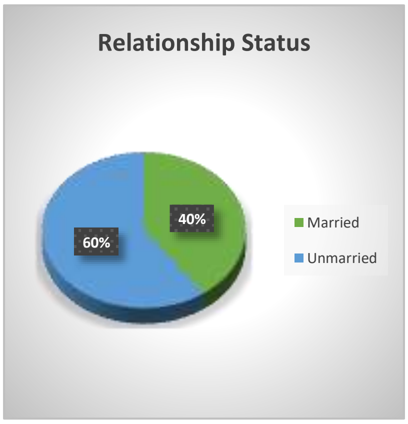


5. Marital Status

Marital Status	Male	Female	Total	%
Married	5	1	6	40
Unmarried	5	4	9	60
Total	10	5	15	100

Source: Primary data

A survey of the number of people working from home found that forty percent were married and Sixty percent were unmarried.

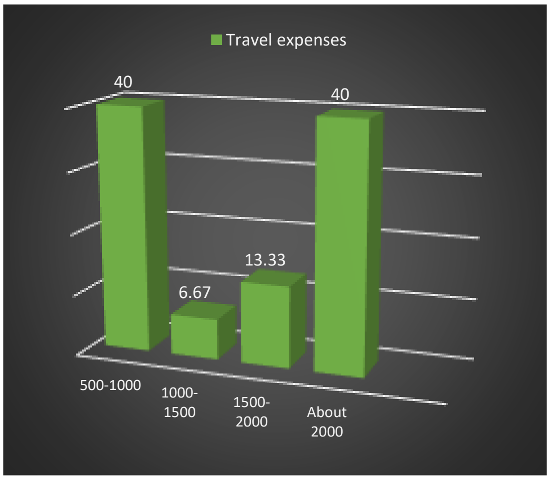


6. Money spent on Travelling (One Month)

Money spent (Travel)	Male	Female	Total	%
500-1000	2	4	6	40
1000-1500	1	-	1	6.67
1500-2000	2	-	2	13.33
About-2000	5	1	6	40
Total	10	5	15	100

Source: Primary data

According to the survey of people who work from home, the number of people who spend more than two thousand rupees per month on transportation while working in the office is forty percent, the number of people who spend between 500 to 1000 rupees, forty percent, the number of people who spend between 1500 to 2000 rupees, thirteen- point- thirty-three percent, the number of people who spend up to 1500- and six-point sixty-seven percent are known according to the survey.



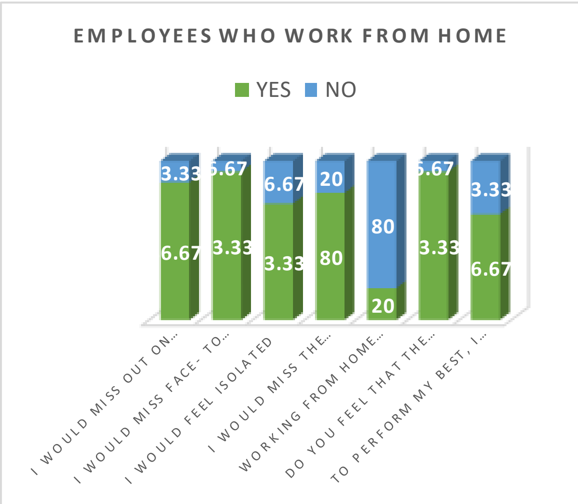
7. Employees who work from home:

S. N	Employees who work from home	Yes	%	No	%
a.	I would miss out on opportunities to be mentored	13	86.67	2	13.33
b.	I would miss Face- to Face contact with co-workers	14	93.33	1	6.67
c.	I would feel isolated	11	73.33	4	26.67
d.	I would miss the Emotional support of co-workers	12	80	3	20
e.	Working from home allows me to perform my job better than I could when I worked in the office	3	20	12	80
f.	Do you feel that the travel savings to and from the office will offset costs you will incur for expenses at home if you are allowed to work from home?	14	93.33	1	6.67
g.	To perform my best, I need to work independently	10	66.67	5	33.33

Source: Primary data

Eighty-six-point sixty-seven percent said that employees in various companies are working from home due to the coronavirus pandemic. Ninety-three-point thirty-three percent pof eople say that working from home makes them less likely to interact face-to-face witcolleague's seventy-three-point thirty-three percent say that working from home makes them feel lonely eighty percent say they don't get emotional support from co-workers

Eighty percent of respondents said that some people do their office work better at home than at their office. Ninety-three-point-thirty-three percent say that they save their travel expenses to their office and use it to cover their household expenses. According to the survey, sixty-six-point-sixty-seven percent of the respondents expressed their opinion that they can work better and independently by working from their own homes.

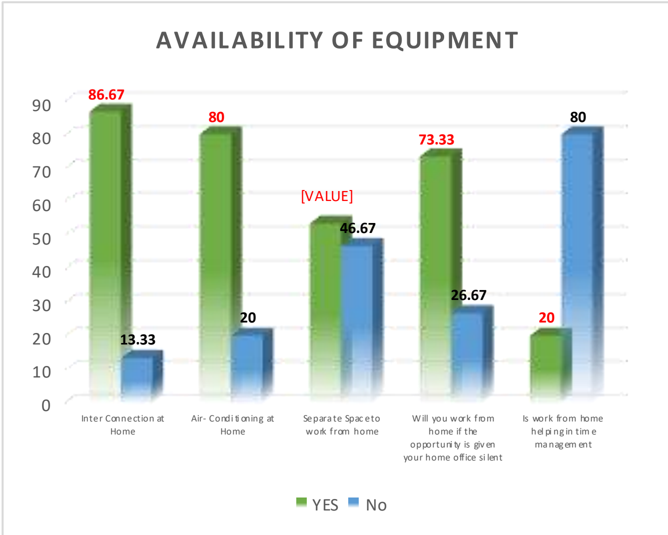


7. Availability of Equipment

Equipment	Yes	%	No	%
InterConnection at Home	13	86.67	2	13.33
Air-Conditioning at Home	12	80	3	20
Separate Space to work from home	8	53.33	7	46.67
Will you work from home if the opportunity is given your home office silent	11	73.33	4	26.67
Is working from home helping in time management	3	20	12	80

Source: Primary data

As per the survey of home workers internet connection at home of employees is eighty-six-point sixty-seven percent. The percentage and number of employees who have access to a private room for corporate work fifty-three-point-thirty-three percent of employees say that their home is quiet when they do their corporate work from home Seventy-three-point thirty-three percent say that working from home helps in time management. twenty percent of employees say they work from home.



8. Violence and Harassment by family

Violence and Harassment by family	Yes	No	Total
The Number of Respondents	9	6	15
%	60	40	100

Source: Primary data

Due to the spread of coronavirusirus, employees in various companies are working from home. For this, Sixty percent of the survey reveals that the employees are given full support from family members at home, but forty percent say that they are unable to do office work from home due to the hassle of family members.

CONCLUSION

Employees who do their office work from home get benefits in various ways such as spending time with family, reducing expenses on transportation and office clothing, etc., and saving for household expenses. Employees are told that the physical and mental health of employees is improved by having more leisure time during their working hours. That is, it is said that working from home affects the promotion of employees, and the friendly circle of conversation with colleagues is reduced and spending time with friends is reduced due to working from home.

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A STUDY ON FINANCIAL SKILLS AND CAPABILITIES OF WORKING WOMEN IN CHENNAI CITY

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Abstract: Finance occupies a centrifugal force in the activities of an individual. The finance can be spent, saved, and invested leading to the formation of capital. Proper financial discipline will take one to greater heights. This goes by the name of personal finance. corporate finance, public finance Due to empowerment women enters the economic scenario indulging in economic activities. This necessitates proper financial discipline which calls for possessing financial skills and capabilities by women. This paper studies the demographic factors and also studies about the financial skills and capabilities for women and provides suggestions. This paper uses primary data gathered from working women The results were tabulated and analysed
Key Words Financial Discipline Financial Skills And Capabilities.

INTRODUCTION

Finance plays a vital role in the micro and macro levels of an economy. An individual requires finance to meet the basic requirements of food clothing and shelter. The financial needs may vary from person to person according to age, gender, occupation, income, and anticipation of changes in income. Lifestyle This calls for concern as there are multiplicity of wants, a scarcity of means or resources that are capable of being put into alternative users. This gives rise to the terminology of opportunity cost or the next best alternative forgone. Money can be spent, saved, invested, or accumulated so as to acquire satisfaction, and gain A rupee spent gives satisfaction while a saved brings about income. Savings assume greater importance as it is essential for the Nation's development. As finance constitutes the lifeline of all activities it is imperative for all citizens of a country to possess financial skills for responsible financial behavior. India requires a high degree of saving and investment to become a developed Nation. The term financial behavior means the different ways of money management and the ways how an individual deals with financial issues involved to take financial decisions. The influencing factors of financial behaviour are the way in which one is brought up, culture, the type of personality the level of income, the capacity to earn higher income, qualification and experience. If a person possesses financial skills and capabilities, he can manage finances well and have a surplus irrespective of whatever be his earnings. Proper policies on spending, saving, and investing can be framed to pursue financial goals. which enables long-term investment rather than just speculation to facilitate orderly growth of the capital market. The financial behavior of people is affected by financial attitude, financial planning, financial education, financial skills and financial emergencies A proper financial attitude enables financial behavior to prevent financial stress. Financial distress may come to an individual at any time if proper financial planning is not done due to shortage and crisis. Financial indebtedness may affect the financial wellbeing of any person. Good financial behaviour entails proper budgeting, proper saving, proper investing, proper wealth management, and debt management. People with good skills do not fall a prey to financial frauds. In this world, everything including people has become materialistic. People always contemplate about how to earn more money, what kind of sources will yield more money and how to obtain a satisfying life by spending little money. With this kind of money-oriented mind and behaviour, despite having formal and regular education at various levels of life, people are still less aware with respect to financial aspects. It is important for every individual to have required knowledge about his or her monetary and economic needs, a correct understanding of the functioning of a country's economy, the knowledge about the market scenario, investment platforms, rate of returns from major investment platforms.

Study of women

Women comprises nearly half of the population. Enhanced female labour participation has led to women contributors to familial income. Gone are the days in which women were confined to four walls. The term women empowerment has brought immense changes to the education, employment, social economic factors. Dynamic changes have made women tech savvy, vibrant income earners The advent of more focus on MSME has led to rise of homepreneurs, and sharpeners. With purchasing power in the hands of the women, proper financial awareness and knowledge is required to make right use of the funds earned so that they may not lose

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their money and become financial paupers. But in realty, women are subordinated by men in making financial decisions.

NEED FOR THE STUDY

Financial skills is viewed as a significant assistant in supporting financial inclusion and consequently, for achieving financial stability. Both developing and developed nations, hence, are focusing. on projects for financial proficiency or training. In India, the requirement for financial literacy is considerably more significant. thinking as low degrees of general proficiency succumb enormous part of the population, which actually stays out of the formal financial sphere. With regards to financial consideration, the extent of financial education is generally more extensive and it gains more noteworthy importance since it very well may be a significant factor in accessing the excluded financial groups.

REVIEW OF LITERATURE

- **Abdul L.K and Sunitha (2016)**[1] assessed the level of financial literacy in their research "The Perception-Reality Gap in Financial Literacy: Evidence from the Most Literate State in India," and examined the effect of demographic and socio-economic attributes on financial literacy among Kerala's educated young adults. They discovered that about 50 percent of the respondents overrated financial literacy. The study concluded that 89 percent of respondents in Kerala require financial education while calling for an effort to promote financial literacy among young adults.
- **Coealbe (2016)**[2] analyzed the level of financial literacy of working women measured in "The financial literacy of professional women in the district of Kochi, Kerala". This research aimed to study whether women lacked financial expertise and trust in the management and expenditure of personal finance, hampering their activities to achieve financial objectives. to analyze, primary and secondary data were used. .and interpreted.

OBJECTIVES

To study the demographic factors

To analyze the financial skills and capabilities of women

To suggest measures to bring about financial skills and capabilities among women

METHODOLOGY

This paper is based on primary data collected from working women in various categories. women belonging to various age, incomes qualifications and experiences were selected and questionnaires were distributed to elicit responses. The responses were tabulated and analyzed.

Demographic Classification of the Respondents

The following Tables depict the summarized data of percentage analysis of the Socio-demographic variables that are considered in the present research

Table No 1

Age Classification of the respondents

Financial Variable	Category	Percentage
Age	Below 25 years	25.6
	26 - 35 years	52.7
	6 - 45 years	13.8
	Above 45 years	7.9
	Total	100.0

Source primary data

. The table displays that out the majority (52.7%) of respondents fall in the category of 26 - 35 years followed by (25.6%) of respondents are below 25 years, (13.8%) of respondents fall in the category of 36 – 45 years of age group, and with a minority (7.9%) of respondents belongs to above 45 years

Figure 1: Age Classification of the respondents

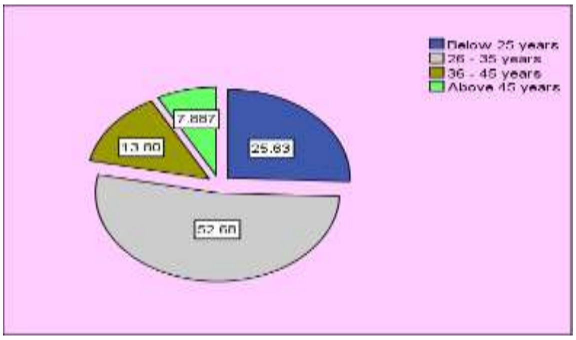

Table No 2

Education Classification of the Respondents

Variable	Category	Percentage
Education	High School	11.8
	Diploma	3.9
	Graduate	42.8
	Post Graduate	17.7
	Professionals	15.8
	Others	7.9
	Total	100.0

Source – primary data

Educated respondents have more access to knowledge and information about financial avenues and instruments. The Survey unveils that the majority of the respondents about 42.8% completed graduation

Figure No 2
Education Classification of the respondent

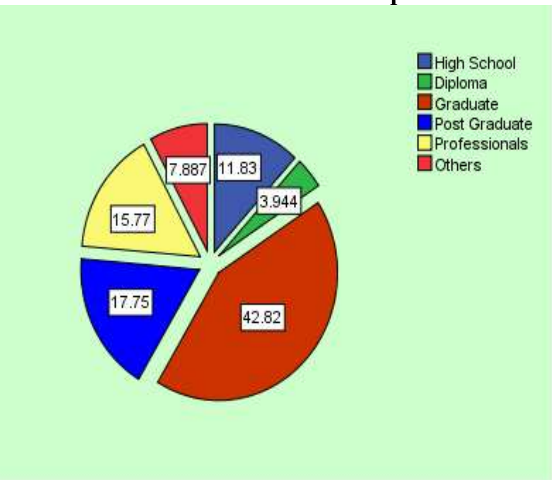

Table No 3
The family Income of the respondents

Variable	Category	Percentage
Family Income	**Up to Rs. 10000**	15.8
	Rs. 10000 - Rs. 15000	3.9
	Rs. 15000 - Rs. 20000	3.9
	Rs. 20000 - Rs. 25000	15.8
	Above Rs. 25000	60.6
	Total	**100.0**

Source – primary data

Every individual investment planning depends only on his earnings. The following data is the classification of respondents based on their income. According to the survey, a sizeable number of 15.8% of the respondents' family monthly income ranged up to Rs. 10,000 and only 3.9% respondents' monthly earning comes in between Rs.10000 – Rs.15,000 and Rs.15,000 – Rs. 20.000. 15.8% earn between Rs.20,000 – Rs. 25,000 per month and the majority of respondents (60.6%) earn above Rs.25,000 as their family monthly

Figure No 3
Family Income of the Respondents

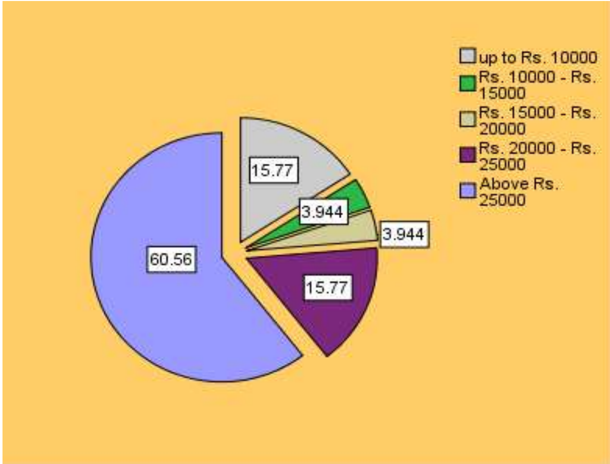

Table 4
Experience of the respondents

Variable	Category	Percentage
Experience	Below 5 Years	26.2
	5 - 10 Years	67.6
	Above 10 Years	6.2
	Total	**100.0**

Source – primary data

The following data is the classification of respondents based on their experience. According to the survey, a considerable number of 26.2% of the respondents' experience is below 5 Years, majority of the respondents' (67.6%) work experience ranges between 5 – 10 Years and only 6.2% respondents' work experience is above 10 years.

Figure 4
Experience of the respondents

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TABLE 5
Financial Skills & Capabilities
Analysis of Financial Skills & Capabilities

I feel that my financial situation is in my control						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	2.1	12.7	37.6	38.9	8.7	**100**
I prepare budget every month						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	2.0	15.9	36.5	35.4	10.3	**100**
I feel that my future income is capable to achieve my financial goal						
Options	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**
Percentage (%)	2.7	5.2	25.4	49.6	17.2	**100**
I feel that I am capable of handling my financial future						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	4.1	19.0	36.1	26.5	14.4	**100**
I can easily understand fixed and variable interest						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	4.1	10.7	22.3	47.9	15.1	**100**
I plan on substantially increasing my income						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	3.4	8.6	29.3	35.6	23.1	**100**
I have retirement plan						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	1.4	22.0	27.3	35.1	14.2	**100**
I take insurance so that it will help to meet unforeseen contingencies						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	3.7	21.7	34.1	25.8	14.8	**100**
I set long term financial goals and strive to achieve them always						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	9.7	16.3	37.5	24.9	11.5	**100**
My financial situation limits my ability to do things that are important to me						
Options	**SA(Strongly Disagree)**	**DA(Disagree)**	**N(Neutral)**	**A(Agree)**	**SA(Strongly Agree)**	**Total**
Percentage (%)	7.9	22.1	31.3	28.7	10.0	**100**

Analysis and Interpretation:
"Financial Skills & Capabilities

The study wanted to know if respondents' **financial situation is in their control.** The response given by the survey participants was that (38.9%) agreed, (37.6%) were neutral and (12.7%) disagreed. The individual participants were asked if they **prepare budget every month** and it was agreed by (35.4%), disagreed by (36.5%) and (15.9%) salaried women who all took part in the survey. When asked to respond to the question whether their **future income is capable to achieve their financial goal,** (49.6%) responded by saying yes, (17.2%) responded by saying no and (25.4%) chose to remain neutral. The respondents when asked if they are **capable of handling their financial future.** It was mentioned by (26.5%) that they had the capability to handle their financial future. While (19%) disagreed to this, (36.1%) neither agreed nor disagreed to this question. It was asked whether they **can easily understand fixed and variable interest.** This question was completely accepted by (47.9%) individuals, rejected by (10.7%) and about (22.3%) of them chose to be moderate.

The next question to the participants was if they **plan on substantially increasing their income.** This question was agreed by (35.6%) of them, disagreed by (8.6%) and neutralized by (29.3%) of the respondents. With respect to **retirement plans**, the respondents counting to (35.1%) agreed while (22%) of them disagreed. Nevertheless, (27.3%) of them remained uncertain. With regards to insurance plans, the participants were questioned if they **take insurance so that it will help to meet unforeseen contingencies**. About (25.8%) of them agreed, individuals as high as (34.1%) were not sure of the question while (21.7%) chose to disagree. The respondents were asked if they **set long-term financial goals and strive to achieve them always.** This was agreed by (24.9%), disagreed by (16.3%) and neither agreed nor disagreed by (37.5%). The question about **financial situation limits my ability to do things that are important** was asked among the salaried women who took part in this research survey. It was observed that (28.7%) accepted this and (22.1%) failed to accept that their ability to do things is limited by their financial situation. Perhaps, (31.3%) of them were neutral.

INFERENCE

The financial skills and capabilities among salaried women were measured based on the above results. It was found that the financial situation is under their control and their future income is capable of achieving financial goals. They understand fixed and variable interest, plan on substantially increasing their income, and have retirement plans. An average number of salaried women were found to prepare a budget every month and are capable of handling the financial future on a moderate level. Few of them take support of insurance to meet unforeseen contingencies set long-term financial goals and work towards achieving them. At the same time, some of the respondents were found to have the ability to do important things by controlling the finance.

CONCLUSION

As the financial skills and capabilities plays a vital role in determining financial wellness care should be taken to enhance and enrich them. A Financially well and strong and knowledgeable Nation is a developed Nation.

SUGGESTIONS

To provide financial literacy training to women so that they will be aware of the interest rate and possess long-term goals for investment.

To bring about several investment schemes to cater to safety liquidity and profitability of funds

To formulate policies to prevent financial fraud

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A STUDY OF THE DIGITAL ECONOMY OF STREET VENDORS IN CHENNAI

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Abstract: A digital payment is known as an electronic payment, and has taken steps to promote and support digital payments. They are quite useful for this digital payment in any financial transaction. The street vendors are selling our product in the platform also. They often operate near public locations like as railway stations, movie halls, bus stops, temples, and so on, and street sellers are also wary of transactions with this digital payment, and the government then elaborates on the programs of cashless payment classes for a longer period of time. Street sellers are being encouraged to accept digital payments as well.

INTRODUCTION:

The Indian government started the Digital India project in July 2015. A digital payment is called an electronic payment. This means both parties, the payer and payee, use electronic means to exchange money. In India, efforts have been made to promote and encourage digital payments. That means the government reduces faceless, paperless, and cashless payments because digital payments want to increase. As a result of technological innovation and globalization, the traditional and digital economies are merging. Popular digital payment methods include bank cards, mobile and internet banking, UPI, Mobile wallets, etc. The first online payment platform in India was Bill Desk, which launched in 2000. A street vendor is a person who offers goods for sale to the public at large without having a permanent, built-up structure from which to sell. They generally operate near public places such as railway stations, cinema halls, bus stands, temples, etc. There are different types of vendors: those selling clothes, vegetables, handbags, fruits, foods, etc. And they are going to different places to sell our products. Some street vendors do not have permits to use the platforms. Street vendors get training to accept digital payments. Since 50% of the street vendors do not use smartphones, they are being provided with a system. And enabling the acceptance of digital payments in their account. They are selling food items, fruits, and other items. They have signed up for the loan scheme and digital onboarding. The corporation is also planning to provide houses to homeless street vendors under the Life Project. 25% of the street vendors do not have a house of their own. On the street, vendors are afraid of using a digital payment because they don't know how to use this device. But the government helps street vendors; they arrange workshop classes to use for developing businesses. Then many street vendors are using digital payment in business.

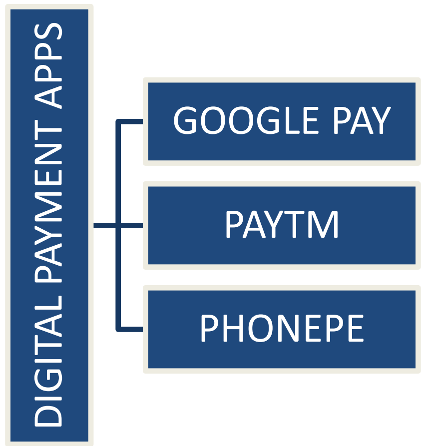
OBJECTIVES:

To understand the Feasibility of an Electronic payment system among street vendors in Chennai city.

METHODOLOGY:

PRIMARY DATA: The present study is based on primary data. The primary data is collected through a questionnaire and discuss how far digital payment is from customer to vendors secondary data is collected from books, magazines, article, published report, newspaper and Internet etc.

DIFFERENT TYPES OF DIGITAL PAYMENT APPS:



GOOGLE PAY:

It was being launched by Google Incorporation in 2015. Google Pay is the most commonly used digital payment application that is easily available on Android. It can be used by small shopkeepers, wholesalers, and even large business organizations to make or receive payments.

PAYTM:

PAYTM is an Indian-origin digital payment service for third-party mobile and computer-based applications. The application has a specialization in areas of e-commerce, financial technology, and digital Wallets. In this Paytm app, we serve the facility of making and receiving payments. It also fulfills the needs of several customers, such as Paytm Mall, Gamepind, Paytm Money, etc.

PHONEPE:

Phonepe is another Indian-based startup that launched in 2015. It's a privately owned, multilingual, mobile, and computer-based system. And headquarters in Bangalore city, in the Karnataka region of India. Like PAYTM, the app also has 11 languages for users from India.

IMPORTANCE OF DIGITAL PAYMENT :

ACCESSIBILITY AND CONVENIENCE

Digital payment methods are relatively simple to use. Online payments can be completed in a split second. For a contactless transaction, you must hold your card in front of the payment device. Any mobile device can be used to access it.

EASY TRANSACTION:

The online payment gateway will securely send the important transaction details. There is no specific time for making an online transaction, you can do it whenever you want.

TRACE EVERYTHING

The fact that you can track your transactions is the best feature of using digital payment methods.

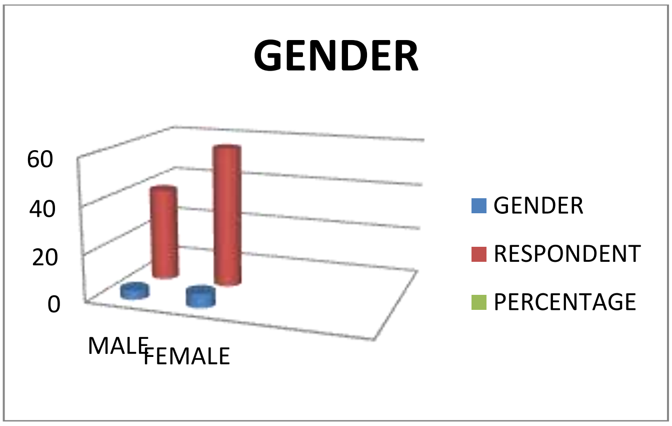
ANALYSIS AND DISCUSSION OF FINDING:

1. GENDER:

GENDER	RESPONDENT	PERCENTAGE
MALE	4	40
FEMALE	6	60
		100

Sources: Primary Data

Majority of the respondents are 6 females i.e sixty percentage and 4 male i.e forty percentage are digital economy of street vendors.

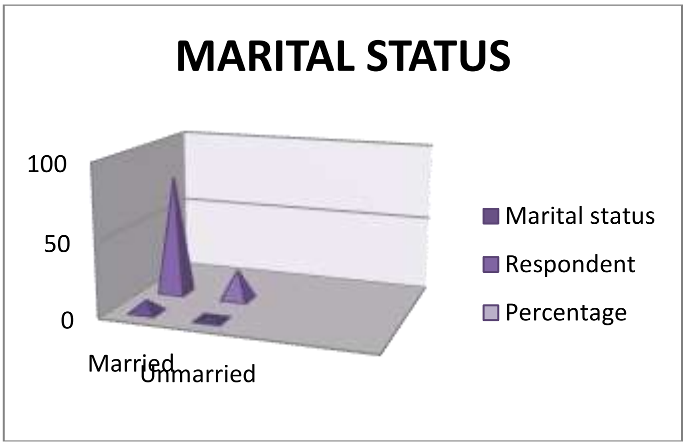


2. MARITAL STATUS:

S.NO	MARITAL STATUS	RESPONDENT	PERCENTAGE
1.	MARRIED	8	80
2.	UNMARRIED	2	20
			100

Sources: Primary Data

In a survey of people from street vendors are 80 percent of the respondents of married, and 20 percent of unmarried

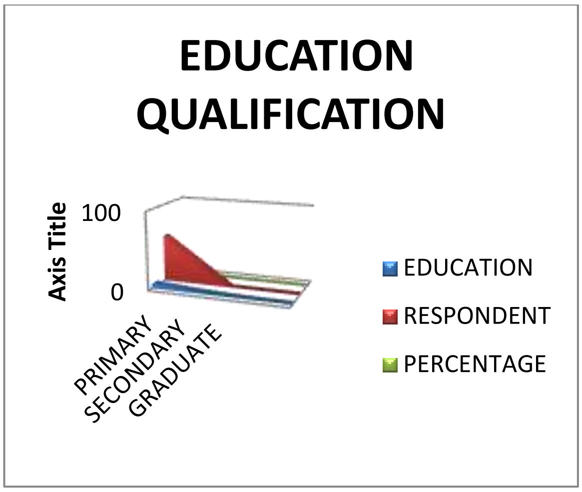


3. EDUCATION QUALIFICATION:

S.NO	EDUCATION	RESPONDENT	PERCENTAGE
1.	PRIMARY	6	60
2	SECONDARY	3	30
3	UNDER GRADUATE	1	10
			100

Sources: Primary Data

An according to the survey of the people in street vendors majority sixty percentage of the respondent completely only the primary level and 30 percentage of secondary level and one percentage of under graduate

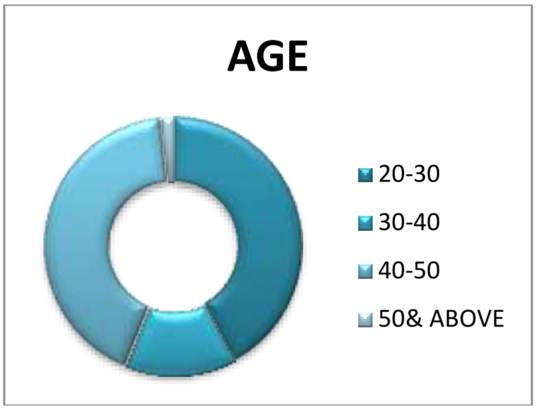


AGE:

S.NO	AGE	RESPONDENT	PERCENTAGE
1	20-30	3	30
2	30-40	2	20
3	40-50	3	30
4	50-ABOVE	2	20
			100

Sources: Primary Data

According to the survey thirty percentage age of the respondent 20-30 group and the 40-50 age group are thirty present and 30-40 and 50& above are the same twenty percentage.

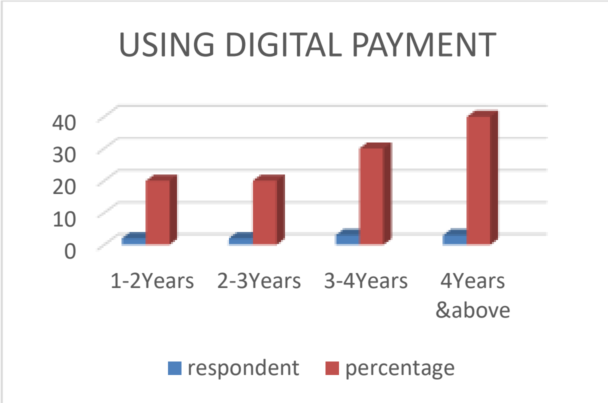


4. **USING DIGITAL PAYMENT:**

S.NO	USING DIGITAL	RESPONDENT	PERCENTAGE
1.	1 -2 YEARS	2	20
2	2-3 YEAR	2	20
3	3-4 YEAR	3	30
4	4 YEAR &ABOVE	3	30
			100

Source: primary Data

An survey of respondent of street vendors 3 -4 years are Thirty percentage and 1-2 years using digital payment 20 percentage are using and 2-3years are using Twenty percentage and 4&above are using Thirty percentage the payment.

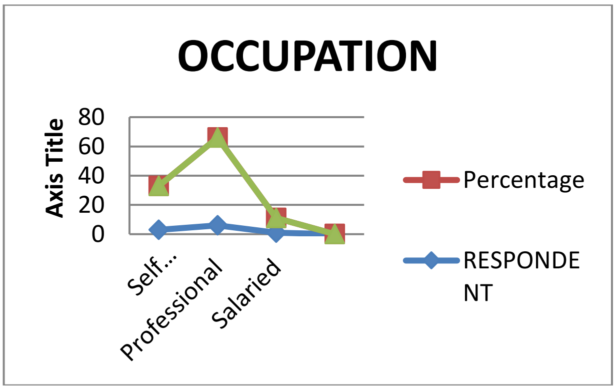


5. **OCCUPATION:**

	OCCUPATION	RESPONDENT	PERCENTAGE
1	SELF EMPLOYED	3	30
2	PROFESSIONAL	6	60
3	SALARIED	1	10
			100

Sources : Primary Data

According to the survey data are majority sixty percentage of professional occupation and thirty percentage of self employed are street vendors followed 10 percentage of salaried jobs .

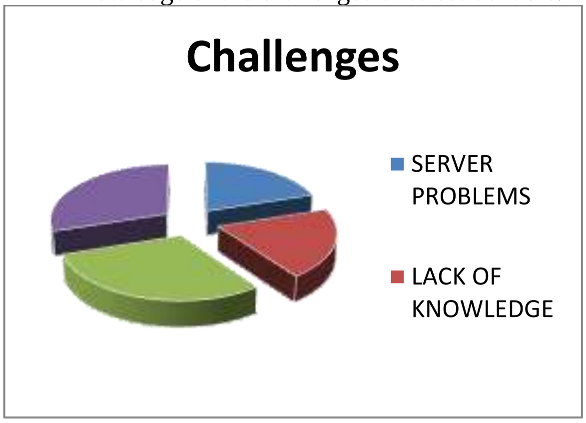


S.NO	CHALLENGES	RESPONDENT	PERCENTAGE
1	SERVER PROBLEMS	2	20
2	LACK OF KNOWLEGDE	2	20
3	LACK OF UP TO DATE INFORMATION	3	30
4	LOSING MONEY	3	30
			100

7. CHALLENGE FACED BY THE CUSTOMER

Sources: Primary Data

In this survey, thirty percentage of respondent lost money twenty percentage had server problems thirty percentage, lack-to-date information and twenty percentage, lacked knowledge of the challenges of street vendors.

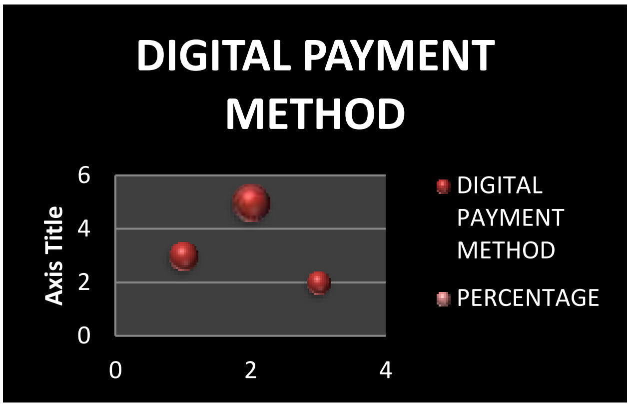


8. DIFFERENT DIGITAL PAYMENT METHOD

S.NO	DIGITAL PAYMENT METHOD	RESPONDENT	PERCENTAGE
1	GOOGLE PAY	3	30
2	PAYTM	5	70
3	PHONEPE	2	20
	TOTAL		100

Sources: Primary Data

The majority of street vendors use PAYTM for transactions, with fifty percent using PAYTM. Thirty percent use Google Pay, and twenty percent use PHONEPE.



CONCLUSION:

In the digital economy, digital payments are extremely beneficial. This tool saves time while also ensuring the security and convenience of money transfers to recipients. Initially, street merchants were apprehensive about using this program. The government, on the other hand, has provided information on these digital payment schemes. Street vendor dealers that use this software and attend this scheme's workshops are quite comfortable.

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UNDERWATER DOMAIN AWARENESS IN THE INDIAN OCEAN REGION

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Abstract: The 21st-century world order largely revolves around the maritime domain which led to the emergence of the concept of Maritime Domain Awareness (MDA). With the proliferation of technology, the rivalry between nation-states has expanded not only above space but also deep down the oceans. This critical aspect of MDA gave rise to another sub-domain called the Underwater Domain Awareness (UDA). Unlike MDA, UDA is more inclusive, comprehending the aspects beyond maritime security such as marine environment, science and technology, and disaster management. Over the years, the narrative on the engagement of global powers in the Indian Ocean Region (IOR) has become the focal point of discussion. It remains to be a crucial region for the world powers to have strategic leverage in order to enhance their geopolitical influence and thereby alter the discourse of international politics. The research will be descriptive and analytical in approach. The sources used for this research paper are primary and secondary in nature. It overlooks upon the qualitative and quantitative aspects as the underwater capabilities of the nation-states in the IOR is assessed. This paper aims to examine the strategic relevance of the Underwater Domain of the IOR. Eventually, it also seeks to analyse the contribution of India to the UDA of IOR, to counter-balance the presence of extra-regional powers in the region.

Key words: China, Indian Ocean Region, Submarines, Strategy, Underwater Domain Awareness and US

Introduction:

In this globalized world, the sea is the physical equivalent of world-wide web. Freedom of navigation and peace remain to be the vital priority of every state in the international system. The global order of the 21st century is increasingly centered on the maritime domain which led to the emergence of Maritime Domain Awareness (MDA) focusing more on the surface level developments of the sea. However, it failed to look beneath the surface of the sub-surface levels - which consist of enormous natural resources. This led to the emergence of another subdomain under MDA, called the Underwater Domain Awareness (UDA). Unlike MDA, UDA is more comprehensive and inclusive in nature. It not only focuses on maritime security, but it also includes marine environment, science and technology, and disaster management. From the security perspective UDA is about defending the Sea Lanes of Communication (SLOCs), coastal waters, and diversified marine assets from the submarines and mine capabilities of the extra-regional powers. In the contemporary world, the Indian Ocean Region (IOR) evidences an extensive strategic engagement among the nations within the region and the extra-regional powers. Being the 3rd largest ocean, IOR serves to be the economic hotbed, entwined by the control of world's major SLOCs, one-third of world's trade and two-third of world's oil. Besides, the region is filled with enormous unexplored and unexploited undersea natural resources, which reveals the prominence of global power play witnessed in the region by the major powers like US, China, Japan, and so on. India, being a pivotal part of this region, needs to play a dual role substantially, by safeguarding itself and providing potential security to the region. This paper aims to examine the strategic relevance of the Underwater Domain of the IOR. It also seeks to analyze and assess the contribution of India to the UDA of IOR, in order to counter-balance the presence of extra-regional powers in the region.

Concept of Underwater Domain Awareness:

The maritime lexicon holds few words that are as important as that of maritime domain awareness (MDA). Within the greater scope of MDA, underwater domain awareness is a not new but a re-emerging concept, that has become a watchword in security and governance debates. From the security perspective, UDA means protecting the Sea Line of Communication (SLOCs), coastal waters and maritime assets from the submarines that limit the access to the seas. On the other hand, surveying the undersea geophysical activity has a lot of significance, as it monitors the undersea activities, to predict the natural calamities such as tsunami. Commercially, underwater domain is filled with enormous resources that should be explored and exploited in a suitable way for the economic gains of the nation. Thus, the UDA is a comprehensive framework, that encompasses the aspects of security, corporate, biological, and civil. (Finch, 2011)

At the outset, it is important to understand the physics that governs the undersea capabilities. During the Cold War era, the prominent method used was the Sound Surveillance System (SOSUS). Another method of that kind is the Sound Navigation and Ranging System (SONORS). This system detects and locates the underwater objects by the sound waves radiated by the respective object. There are two types of devices, namely Active and Passive Sonar devices. Active Sonars send a subsurface wave and listen to the returning echoes. The Passive Sonar system listens to the radiated signals transmitted by a marine object. The operational capabilities of the sensing capabilities are based on the variations in the water depth, salinity, and temperature of the undersea domain. This system is used to trace the submarines, and mines, detect the underwater depth, commercial fishing, find precautions before diving, and for communication purposes.

UDA is the combination of all the above aspects. But in reality, the data collected under each of these spheres despite operating undersea, are not integrated into a single model of UDA. For instance, in the effort to tract the submarines, the naval acousticians will classify the identity of an acoustic signal and disregard all the other data that are of non-submarines. Even the corporate sector does the same, restricting their data surveillance on the relevant resources accumulated in the sea bed. Similarly, the organization focusing on biological conservation identifies the data of the population of underwater species and excludes the information either on resources or submarines. Nonetheless, the only, commonality between these varied fields, is that they all operate within the same place filled with oceanographic constraints. (Finch, 2011)

Among the four entities of UDA. The Security or Defence UDA is massively dedicated to collecting data related to national security. The methodology used to asses the activities related to the security of the undersea are based on Search, Detect, Classify, and Localize to attack (SDCL-A). This model is universal and is associated with all other three entities that work for the development of underwater information systems. The keenness to explore undersea from the security perspective means the protection of SLOCs, coastal waters, and varied maritime assets from the extensive proliferation of submarines and mine capabilities which restricts access to high seas and littoral waters.

Dr.Arnab Das, provides a dual construct called the vertical and horizontal construct to understand the conceptual framework of the UDA. The hierarchical vertical part has three levels namely, the ground level, mid-level, and the top level. The ground level involves the primary sensing of the threats present in the undersea. The mid-level, based on the sensed data, will prepare the security strategies and plans for resource conservation and utilization. The final level will formulate and monitor the regulation framework at the local, national and international level. The horizontal part focuses on the availability of resources in terms of technology, infrastructure, capability, and the capacities specific to the stakeholders- say for instance military capacity, geo-physical capacity, etc. In this way, the UDA framework can address the multi-faceted challenges. (Das, 2021)

With regard to IOR, the littoral waters have a unique acoustic challenge due to the ever-changing medium characteristics. As mentioned above, Sonars are used to observe the underwater. But the IOR medium is more complex and adversely affects the efficiency of sonars, due to the varied salinity and temperature of the IOR.

Strategic significance of the Underwater Domain of the Indian Ocean:

The geostrategic and geopolitical significance of the IOR will drive the 21st century as an era for Asian states. Indian Ocean Region (IOR) holds significant relevance not only for the nation-states in the region but also for the other countries of the world. It connects seven seas of the world namely the Mediterranean and Red Seas, the Indian Ocean, the Persian Gulf, China Sea and the West and East African Seas. The export of major petroleum resources from the Gulf had urged the major powers of the world to position themselves strategically in the Indian Ocean. About 36 million barrels per day, that is, 40 percent of the world's oil and 64 percent of the world's oil trade occurs through the choke points of the Indian Ocean namely- Malacca Strait, Strait of Hormuz and the Bab-el Mandeb. It is the third largest water body that connects the four continents of the world. The region is densely populated with two billion people from various countries of the region. However, the underwater sphere of the Indian Ocean is highly relevant in terms of both commercial and military aspects. Commercially and economically, the Indian Ocean is known for its rich natural resources. About 40 percent of the world's offshore oil production takes place in the Indian Ocean basin. About 15 percent of the world's total fishing is from the Indian Ocean Region.

With regard to the deep sea minerals, the Central Indian Ocean Basin (CIOB) is filled with a large amount of polymetallic nodules. These nodules are filled with economically valuable metals such as Copper, Cobalt, Nickel, and Manganese, that are located 5000-6000m deep (Anon., n.d.). In addition, the ocean earths of the Indian Ocean are filled with enough quantity of rare earth metals. Since 1987, India has been exploring and extracting deep-sea mineral resources. Till now, about four million square miles have been explored and two mining sites have been established in the Indian Ocean.

Among various countries of the IOR, India holds a pivotal position, as the most populous littoral country of the region. The strategic location of India is centered in the IOR, having about 7,500 km of coastline. Contemporarily, 68 percent of the trade value of and 95 percent of the trade volume of India comes via the Indian Ocean. According to the Indian Navy, 93 percent of India's offshore oil production, and 45 percent of the natural gas and petroleum exports are highly dependent on the Indian Ocean. With respect to fishing, India is the sixth largest country to capture 4,1 million tonnes of fish, in the year 2008.

In terms of military, in recent years, IOR has emerged as a strategic hub of navies of various regional and external countries. With regard to Maritime Security, the large utilization of SLOCs in the warm waters of IOR will lead to global competition, which will eventually affect regional stability. Half of the world's container traffic and one-third of the world's cargo traffic crosses IOR. For instance, one of the major reasons for the active military presence of USA in the IOR is to counter-balance the control of China and its rivalry with Iran (Qayyum, n.d.). The region is also a hotbed of piracy, illicit maritime trafficking, and maritime terrorism. In order to ensure freedom of navigation of ships, the sound system of surveillance is important and that would be provided by the underwater capabilities of the Indian Ocean.

Underwater Developments of Regional and Extra Regional Powers in the IOR:

The littoral states of the Indian Ocean have procured and developed underwater capabilities to anticipate and counter the emerging threats in the subsurface of the Indian Ocean. Prominent technologies include Submarines, Submersibles, Tornadoes, mines, and Anti-Submarine warfare capabilities. IOR being important for both regional and world powers, has witnessed various underwater developments. A few of the littoral states, that have underwater capabilities in the IOR are;

India: The geostrategic location of India is centered in the IOR, and is vulnerable to threats that affect its maritime security. Militarily speaking, India's submarine fleets are based in Vishakhapatnam and Mumbai, on the eastern and western coast, respectively. India's urge to build indigenous nuclear submarines started in the year 2015, with the approval of the Indian Government to build six nuclear-powered attack submarines. Nuclear submarines are considered as strategic nuclear weapons, that come under the no-first-use policy of nuclear doctrine. The nuclear submarines are classified are, SSN and SSBN. SSNs are the fast attack submarines known as Submersible Ship Nuclear. While SSBNs are the Submersible Ship Ballistic Missile Nuclear. Despite having the nuclear feature in common, SSNs and SSBNs widely vary according to their operational capacity. SSBNs carry out long-range attacks using their missile capability. SSNs are used for short-range attacks and have a surveillance mechanism to gather intelligence (Anon., 2022).

INS Arihant (SSBN) is known as India's first nuclear-powered submarine. It was commissioned in the year 2016. The Arihant-class submarines are the nuclear-powered ballistic missile submarines (SSBNs)of the Indian Navy, that carry shorter-range K-15 and larger-range K-4 ballistic missiles. On the other hand, India had one SSN called the INS Chakra-II (Sharma, 2022) The biggest advantage of the nuclear-powered submarines is its ability to remain submerged indefinitely. This submarine is an Akula class SSN leased out from Russia for a period of 10 years. In addition, India also has 16 diesel-powered submarines, such as the Sindhughosh, Shishumar and Kalvari-class, that can remain submerged in the ocean for a limited period of time between 45-50 days. (Anon., 2022) exceptionally, INS vela is the indigenously built diesel-powered submarine, that was deployed underwater in the Indian Ocean for about 8.5 months. Similarly, it is also important to have enough combat facilities to tackle the threat from the submarines of the adversary. Indian Navy has launched its first indigenously built anti-submarine warfare (ASW) vessel, INS Arnala that facilitates anti-submarine operations in coastal waters and subsurface surveillance in the littoral waters (Saballa, 2022)

The underwater developments (other than submarines) of Indian Navy is at its infancy. It is developing various plans to acquire the Autonomous Underwater Vehicles (AUVs) or the Unwater drones to develop its offensive capabilities in the IOR. Nevertheless, India has launched its first manned submersible called Matsya-6000, under the Samudraayan Mission to undertake deep-sea exploration (Anon., 2022) . This submersible can explore the underwater marine environment of about 6000m in depth. India, also has set its listening posts for the maritime surveillance, that also monitors the deep-sea activities. India's listening posts are set in the Reunion Islands, Andaman and Nicobar Islands and Duqum port in Oman. These posts cover up the underwater surveillance of northern, south-western and the eastern Indian ocean (Sykes, 2021) India is at the pace of enhancing its maritime capabilities in order to serve as the net security provider in the IOR, countering the heightened presence of China.

Other regional littorals: Albeit India being the only country to have nuclear submarine capability in the Indian Ocean region, there are other countries that possess conventional submarine capabilities. Pakistan, Iran, Singapore, Indonesia, Malaysia and South Africa are the other regional countries in the IOR, to have conventional submarines as their underwater capabilities. Interestingly, Iranian Navy's Islamic Revolutionary Guard Corps, has developed its uncrewed underwater drones. It uses long-range and has a slow-running approach, similar to that of torpedo (Sutton, 2022) But it can't attack the moving targets rather it attacks the stationed targets. However, the growing influence of China in the region has expanded the scope of the regional countries like Myanmar, Thailand and Pakistan to acquire more submarines, worsening the underwater completion in the region.

China: Beijing has shown and continues to show its presence in the IOR since 2009, as part of anti-piracy operations in the south-eastern Indian Ocean. Albeit being a non-littoral country, it holds a significant position in the Indian Ocean, with its rising investments in the countries of IOR as part of its BRI project. Since 2012, there has been a movement of Chinese submarines in the waters of Indian Ocean in particular in the Bay of Bengal region. these submarines enter the Indian Ocean through the Straits of Malacca, Lombok, and Sunda. Beijing claims its legitimacy over the movements of submarines in the IOR, by protecting the vulnerable supply chains that are vital for it energy and economy.

These Chinese submarines were majorly stationed in the ports of Sri Lanka and Pakistan during its previous visits. This has a serious strategic implication for the security of IOR. Once after entering the IOR, it was not necessary for a Chinese submarine to return to china to get rearmed, as it had developed its naval bases in the Indian ocean region. Moreover, the infrastructure projects of China in the IOR in Gwadar of Pakistan, Kyaukpyu in Myanmar, Chittagong in Bangladesh, Bagamoyo in Tanzania, Hambantota in Sri Lanka and more important PLA base in Djibouti, has the capability to station these submarines effectively (Sutton, 2020)

Apart from submarines, China has enhanced its underwater surveillance capability in the IOR. According to Namrata Gowswami of IDSA, China has built SIGINT electronic listening stations in the Andaman Sea at the Manaung, Hainggyi, Zadetkyi and the Coco islands in Myanmar (Goswami, 2014). In addition, China has deepened its underwater presence in the eastern waters of the IOR. In the year 2020, dozens of Chinese UUVs or underwater drones called as sea wing gliders were found along the waters of Indonesia. These gliders were developed as a part of its 2010 project. This was confirmed with the untraced movement of the Xiang Yang Hong 06, a survey ship, from which the gliders were launched. The Chinese gliders called the Haiyi gathers the oceanography data such as salinity, underwater temperature and the oxygen levels. The South China Morning Post, reported that these AI- simulated underwater drones are capable of identifying the, tracking and attacking an enemy submarine without the interference of human beings (Sutton, 2020)

More recently, in January 2023, China's deep-sea manned submersible called the Fendouzhe has reached the deepest point of the Diamantina Trench situated in the south-eastern

Indian Ocean, reports the Global Times. This development of China explores the deep sea resources of the IOR. In this way, China has continued to show significant presence in the IOR nor only over the surface but also in the subsurface.

USA: Washington is one of the non-Asian country, that holds larger stakes in the IOR. Surprisingly, US does not have a separate fleet command in the Indian Ocean, as in the case of Atlantic and Pacific Ocean. But, whenever warships are deployed in the Indian Ocean it comes under the jurisdiction of the Fifth Fleet. It looks after the operations in the western part of the Indian Ocean. In the year2022, US has conducted a naval training exercise called IMX2022. It is the largest unmanned exercise in the world, where about 80 unmanned from 10 nations were participating. It had also developed a drone task force that will invariably use the unmanned platforms in the region to counter the operational threats in the IOR. In addition to this, US has docked its submarine USS West Virginia (SSBN) in its base in the Diego Garcia. The remote location of this island, facilitated the undetected movement of submarine, as it is located south of the equator. This submarine belongs to the Ohio Class, that are renowned for their stealth capabilities. The acoustic signature of these submarines are extremely, making it difficult to detect the movement of it. Their size, range and stealth capacities make them a formidable weapon system to project the strategic deterrence and counter-balance China. (Anon., 2023)

Underwater threats in the IOR:

The underwater threats prevailing in the IOR can be classified into two broader aspects of traditional and non-traditional threats. The underwater non-traditional threats include, smuggling, harmful underwater mines and torpedoes and environmental degradation. While, the traditional underwater threats include the underwater capabilities of the extra regional powers that affects the intelligence networks of the littoral states of the Indian ocean.

Non-traditional underwater threats:

Indian ocean is well known for its maritime routes that are vulnerable to smuggling of drugs and illicit arms. Drug smugglers not only use illegal boats, in addition, they also use the hulls of the commercial vessels and cargos to smuggle drugs. These contraband goods are smuggled in externally mounted pods below the waterline of the hulls of the ships. The inspection of hulls is done either before the arrival of ship into the port or while the vessel is stationed in harbour. But examination of hulls is a time consuming process and an operationally limiting exercise, that is commercially expensive. It is done at the expense of lives of divers, who has to operate in near-zero visibility, even in dangerous conditions. Smugglers use these drawbacks to their advantage to traffic the illicit goods. In addition, drug traffickers use the improvised semi-submersible vessels, that can penetrate into the conventional coastal and surveillance detection systems. These developed submersibles are known as narco-subs, that comprises of light-weight and low detection materials that are more reliable and performs with high efficiency (Anon., 2010). There are high potential of terrorists using these devices to employ chemical, biological and radiological weapons. They also covertly insert or lay down mines and improvised explosives to attack the urban targets and critical infrastructures. The simplest and less expensive way to incapacitate a vessel or submarine, is to attack the underwater hull using the explosives. Through this, the hull gets flooded with seawater, that would eventually lead to the sinking. Commonly, torpedoes and mines are used to attack the hulls of the ship.

Despite security issues, the rising anthropogenic underwater noise emissions from the vessels, oil and gas exploration, sonar transmission for military and commercial applications, deep sea mining, pile driving dredging in the waters of Indian ocean poses a major threat to the existence of marine animals, affecting the sound scape of the underwater environment. The sound radiated from the ships on a long-term basis due to shipping traffic will affect the behaviours of marine animals that includes mating, communal interaction, feeding, cluster cohesion and foraging. The Maharashtra Maritime Board, reported that about 30,000 large ships and vessels navigate along the Indian coastline. Besides, studies found that western Indian ocean is noisier due to high density of ship trafficking (Das, 2019).

Illegal, Unregulated and Unreported (IUU) fishing pose a major threat eroding the ocean floor affecting the sponges and coral reefs in the region. There are reports are coral reef degradation in the western Indian ocean. (Kanodia, 2022) Reefs of north Seychelles and east African coast are vulnerable to the collapse due to overfishing, threatening the livelihoods ad food sources for the coastal population. (Greenfield, 2021) There are also evidences of Chinese marine transgression made by its trawlers in the western Indian ocean in the east coastline of Africa (Sibal, 2022)

Besides IUU Chinese also pose serious security implications due to its underwater presence in the Indian ocean. Especially, the US-China competition is intensified extending to the underwater sphere. Visits of Chinese submarines to the countries in Indian ocean, for example, in 2014, a Chinese Submarine was deployed in the port of Colombo that affected the security o Indian Ocean. Chinese deployment of a fleet of underwater sea gliders had a serious strategic implication over the IOR. UUVs were navigating in the busiest choke Point-Strait of Malacca. These deployment of drones in the strategic location signifies a complete reconnaissance activity carried out by the PLAN. Both the underwater drones and survey vessels like Xiangyanghona, collects the oceanography data that are critical for its underwater operations. This increased underwater presence of china in the waters of Indian Ocean heightens the underwater competition between India and China.

Evolving Underwater Strategies of India:

In the year 2015, Indian Navy has proposed a strategy in the name of "Ensuring Secure Seas: Indian Maritime Security Strategy." According to the chapter on Maritime Domain Awareness, "involves being cognizant of the position and intentions of all actors, whether own, hostile or neutral and in all dimension-on, over and under the seas." It emphasizes on the situational awareness that is possible through surveillance and monitoring. Bay of Bengal in the eastern Indian ocean is more suitable for submarine operations due to its deep and temperate waters Strait of Malacca is one of the important choke which is proximate to India and also serves as the entry point for Chinese underwater submarines, vessels and unmanned vehicles. Nonetheless, the Andaman Nicobar Islands has the real advantage to conduct underwater surveillance over these critical waters. If these capabilities are not detected at the harbour, it would be difficult or impossible to track in the open seas. Having this critical position, Andaman along with Malacca can help India to track the movements of Chinese submarines into the waters of Indian Ocean. Along with this, India also developed Anti-Submarine warfare capacities namely, P8(I) Neptune aircraft in the year 2019; INS Kavratti an Kamorta class Corvettes. With all these developments India is also in its journey to develop its underwater Sound Surveillance Sensors (SOSUS) chain, with Japanese assistance. (Anon., 2015)

One of the renowned maritime analyst, had shed light over the Undersea web of India. India had started strategic engagements with the countries of eastern Indian ocean – Indonesia, Australia; with island nations of Southern Indian Ocean region such as Mauritius, and French territories across the Indian Ocean. This hints the Indian Navy's "double Fish hook strategy" that will be complemented with the Japan-US fish hook strategy. the preliminary planning of the developments that are pre-requisite for this strategy has commenced on Japan-financed project laying undersea optical cable from Chennai to Port Blair and construction of undersea network of seabed sonar sensors from the tip of Sumatra to India point.

In June 2020, India has signed a Mutual Logistics Support Agreement (MLSA) with Australia to provide logistics support for undersea reconnaissance. These logistics arrangements will be employed in the islands of Andaman and Nicobar and Coco islands of Australia. India also signed a port development project with Indonesia to develop military facilities in Sabang port. This first eastern fish hook will end at the Diego Garcia. In a similar way, the western fish hook chain starts from the Al- Duqm port of Oman where, in 2018 India has planned to have listening posts (Valiathan, 2020). India's engagements with the Reunion islands of France, where both countries jointly work for the surveillance system. India also has agreements with Mauritius having developed a strategic intelligence outpost in the northern Agalega islands, ending the western fish hook (Bashfield, 2021). This fish hook strategy is used to counter the Chinese presence in the IOR, through enhanced surveillance of the undersea (Sengupta, 2015). More importantly, India also launched the vision SAGAR in 2015. The crus of this will be to ensure safety from natural disasters, security from manmade threats and sustainable growth of economy and maritime ecology. Maritime Domain Awareness is the important component behind this SAGAR vision. However, it witnesses a gap lacking the underwater tenet limiting the growth of tropical littorals. In order to counter the undersea threats and have sustainable development, a strategy or program that integrates all the stakeholders say military, ecology and commercial promoting an integrated approach is essential.

Conclusion:

With rapid global technological transformations, the rivalry between nation-states is expanded into various grounds- from the outer space to sub-surface of oceans. Indian ocean being a hub for maritime trade is witnessing the undersea challenges both traditionally and non-traditionally. Indian ocean is emerging as an undersea battle grounds for the US-China competition. These challenges and scopes can be understood through the comprehensive Underwater Domain Awareness (UDA) framework. UDA is multi-dimensional domain, inclusive of the sectors of military, undersea environment and commercial. However, UDA in the Indian ocean lacks an integrated approach between these sectors. Apparently, India being a rising power, plays a pivotal role in the entire Indian Ocean Region. In fact, India is the only regional littoral state to possess undersea nuclear capabilities. The presence of extra regional powers like China has been extended even beneath the surface of sea, threatening the national security of India. The underwater military presence along with the technological advancements challenges the intelligence networks of India. Besides, due to presence of supply chains crucial for trade connectivity between states, Indian ocean witnessed huge amount of trafficking of ships, that also degrades the maritime environment. Deep sea exploration of resources, coupled with increased noise shift the acoustic and ecological habitat of the undersea domain, depleting the lifespans of marine organisms. Nevertheless, the evidences of smuggling activities, piracy and terrorism pose a serious threat to the security environment of IOR. With the increased capabilities and loop holes, there are instances where the non-state actors use the undersea domain to their advantage. Adjacently, there are steps taken by both national and international organization and engagements to overcome the gap of lacking UDA strategies. India having a centred location in the Indian ocean, has taken a series of efforts to understand the UDA framework and develop its strategy accordingly. However, India is at its infancy with regard to the strategies and capabilities to counter balance the emerging underwater challenges. Though India being the only country in the region to have nuclear submarines, it needs to go a long way, developing its underwater capabilities to attain the status of net security provider.

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THE MANDALA LIVES ON: A DESCRIPTIVE STUDY ON THE RELEVANCE OF KAUTILYA'S ARTHASHASTRA TO THE INDIAN FOREIGN POLICY

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Abstract:This paper focuses on drawing parallels between the relevance of Kautilya's Arthashastra to the present-day Indian Foreign Policy. The paper especially focuses on the Rajmandala theory and the Shadguna principles postulated by the great philosopher and political strategist of India, Chanakya also known as Kautilya. The Mandala theory envisages the establishment of a welfare state under the able leadership of the vijigishu who is the sovereign leader. It is the responsibility of the vijigishu to establish a peaceful international order and a secure neighborhood for the welfare of the common man. This paper positions India as the vijigishu and analyses its various foreign policy priorities in accordance to the Mandala theory. This is a Descriptive study done using the analysis of qualitative data in the form of secondary resources.

Keywords : India's foreign policy, Mandala theory, international order, welfare state, leadership.

INTRODUCTION

The formulation of foreign policy is a complex affair since it is obliged to take into account, the nation's national interest, internal and external environment, and the nation's principles and values. The statesmen and policymakers are the most important actors responsible for framing and implementing the foreign policy of any nation (N. Jayapalan, 2001). The foreign relations of India before 1947, were linked to and governed by the interest of the British empire. The reason why India could keep up certain pre-independence precedents was that the Britishers had tactfully accepted India as a quasi-independent entity in International politics before 1947. The anti-racialism, and anti-apartheid content of Indian Foreign policy as such had its origin in the pre-independent period. (N.Jayapalan, 2001)

Indian participation in International organizations had its beginning in the interwar period. India signed the Treaty of Versailles and other peace treaties and became an original member of the League of Nations. India also became a member of the International Labor Organization and a permanent member of the International Court of Justice. It could subscribe to the convention of Trafficking of women and children and the slavery convention. The defense and security policy of India too started taking shape during the pre-independence period. Indian Foreign policy got oriented toward the security of India as a wider part of India's national interest. India's role in IR from 1919-1946 period helped the foreign policy making in the era of independence (N.Jayapalan, 2001).

The History of Indian Foreign Policy can be traced back to the establishment of the Indian National Congress as the first political party, that the formulate of foreign policies were created. These historic declarations from the Congress were based on anti-cold War, anti-colonialism, anti-racialism, good neighborhood policies, and anti-power politics. Philosophically, truth, universal brotherhood, unity in diversity, secularism and non-violence formed the premise of India's foreign policy. Non-alignment, anti-imperialism, and anti-war principles were considered practical, egalitarian and realistic principles guiding the foreign policy of India. In terms of ideologies, India's foreign policy derived its basis from Gandhism, Liberalism, Democratic Socialism, and Internationalism. In these are included the ideologies of Secularism, Nationalism, anti-imperialism, and Anti-Racialism (N. Jayapalan, 2001).

A general idea of the foreign policy of India can be derived from some of the statements made by Jawaharlal Nehru and other Indian leaders on various occasions. According to Nehru, "India does not seek domination over others and our sole objective is to be left in peace to ourselves to solve our problems and where possible to help and cooperate with others. In doing so, we try not to be swept by passion and anger and so maintain the temper of peaceful approach." The basic objective of Indian foreign policy has been the maintenance of friendly relations with all nations of the world. India will follow an independent policy keeping away from the power politics of groups aligned one against another. She will uphold the principles of freedom for dependent peoples and will oppose racial discrimination wherever it occurs. She will work with other peace-loving nations for international cooperation and goodwill without the exploitation of one nation by another. (N.Jayapalan, 2001)

The Panchasheel is the basis of India's foreign policy. Panch means 'five' and sheel means rule of conduct. The Panchasheel of Nehru was first embodied by a treaty signed by India and China on the issue of Tibet on 29th May 1954 (N.Jayapalan, 2001).

The five principles mentioned therein are :

- Mutual Respect for each other's territorial integrity and sovereignty
- Nonaggression
- Non-intervention in other's domestic affairs
- Mutual benefit and equality
- Peaceful Coexistence

In the year 2015, under PM Narendra Modi leadership the *Panchamrit* foreign policy ideology was introduced entitled five main principles such as " *samman*" (dignity), "samvad" (dialogue), " *samriddhi*" (shared prosperity), "suraksha" (regional and global security) and "*sanskriti evam sabhayata*" (cultural and civilizational links) (Correspondent, 2015). Irrespective of political governance, the Indian foreign policy has a comprehensive framework prioritizing peaceful coexistence and respect for sovereignty. Though the present foreign policy of India is challenged at times due to external aggression and due to the volatile situations prevailing in the international arena, from a geostrategic point of view, India's eminence in the international system is on an upscale since its 75 years of independence.

Browsing through the ancient repository of knowledge, from the Indian traditional literature, to trace the references for the Indian foreign policy, one cannot overlook "Arthashastra" written by Kautilya (also known as Chanakya and Vishnu Gupta). This masterpiece was written 2000 years ago by a master strategist who was well versed in vedas and adapts at creating intrigue and devising political strategies. Arthashastra has 15 books covering varied topics such as revolts and rebellions, the structure of the state, consumer property laws, criminal investigations, the penal system, prevention of conspiracies and oligarchies, duties of the king, foreign policy, defense and war, etc. A complete treatise of statecraft, the Arthashastra is a testimony of Kautilya's genius and foresight (Muralidharan, 2020)

The Arthashastra advised the rulers to promote the welfare of their people as they were the source of strength of a nation. The use of diplomacy and political guidance was propagated in preference to outright war. It also talked of how every resource or element of national power should be utilized by a ruler. With most modern nations looking at issues through a similar prism, it is evident that the Arthashastra is relevant in the 21st century (Muralidharan, 2020).

The Arthashastra and its tenets will continue to be followed by nations as it deals with topics as diverse as politics, interstate relations, military organizations, war-fighting, intelligence, economy, trade practices, shipping and even gender relations. The Mandala theory of the Arthashastra speaks about the state and its concentric circles concept where every state has its own perceived circle of friends and enemies surrounding them. This brings us to the fact that in the times of the current modern IR system, warfare is not the only means of conflict dissolution rather peace is better achievable through economic, diplomatic, and political negotiations (Muralidharan, 2020).

Therefore it is very true to believe that Arthashastra can be considered as a perfect guide to conducting inter-state relations and diplomacy and hence the basic tenets and the journey of India's foreign relations can be studied concerning the principles of Kautilya's Arthashatra. Furthermore, the ancient text can also be utilized to derive potential solutions and reforms to be brought to India's Foreign Policy to develop a better comprehensive framework.

FOREIGN POLICY ACCORDING TO THE MANDALA THEORY

The Arthashastra has two overlapping points: (1) Protection of the state implies inner security and general prosperity of subjects by great administration and by the rule of peace and law; (2) Obtaining of the regions from others by extension through amazing code of international strategy. The most fundamental understanding of the Kautilyan foreign policy is that (i) every state that is immediately adjacent to it is an enemy, and (ii) a neighbor is a friend. The state is not viewed as a single entity but rather as one of the six essential components—the king, ministers, fortified cities, countryside, treasury, and army—that make up the state. The hypothetical examination of the Kautilyan international strategy considers the lord's advantage as the public interest since the ruler exemplifies every one of the constituents of the state. Reasonably, the ruler who wishes to overcome is the 'vijigshu', the prompt adjoining lord is the foe, and different rulers are either Center lords or Unbiased rulers. Kautilya involves power as the main determinant to make sense of his hypothesis. Through the examination, the differentiation about respective relations is the power condition, the two rulers perhaps similarly solid or one more grounded or more vulnerable than the other. The policy directive states that the king must wage war on a weaker king while making peace with a king who is equally powerful or stronger. (L.N, 2002)

The Mandala hypothesis shapes the premise of Kautilya's international strategy. To put it another way, it is a world-conquering theory. He has made it possible for Vijigishu, also known as "the king who is desirous or aspirant to world conquest," to learn how to be a Chakravartin, also known as a world conqueror. The Mandala hypothesis depends on the international and geo-key supposition that all adjoining states are adversaries and the's foe is the regular partner. There are 12 kings in this circle of kingdom, each with an explanation for the possible ways they interact with one another. In this text, international strategy is predominantly talked about from the angle of Vijigshu and world victory, and it is summarized with the Shadguna hypothesis for example "six overlap strategy or six proportions of international strategy" which resembles a recipe to get the capability of Vijigishu for world victory. This equation is related to the assumed Mandala hypothesis. Shadguna's hypothesis comprises of six vital positions that can be utilized according to the interest of circumstance, and one who will utilize them appropriately as the right position on the perfect opportunity would turn into a world vanquisher". The hostile and friendly states make up the first two circles of states. The types of neighbors, the types of allies, and the types of vassals were a more precise classification of the same. Kautilya doesn't account for power just regarding assets but rather likewise considers the force of good order and decision-making (L.N, 2002). The core values which oversee the Kautilyan hypothesis of international strategy are

- a ruler will foster his state, and expand its assets and power to empower him to leave on a mission of outcomes.
- the adversary will be killed
- the people who help are companions
- a reasonable course will constantly be taken on Harmony is to be liked than war

- a ruler's conduct in triumph and overcome ought to be simple.

The state's position is determined by how far along it is in comparison to its neighbors. The most significant of a lord's neighbor is the foe. The adjoining states additionally incorporate the unfriendly states, the vassal expresses, the partners, and the cradle states. Anyway, the primary objective of the winner ought to be the adversary. Allies are regarded as significant. They are referred to as the state's constituent parts. A coalition depends on assisting. Indeed, even a foe what helps' identity is fit to be with aligned with. A partner who disregards a deal moves over to a foe, and afterward returns back is to be decided with the most extreme watchfulness. Both reckless bravery and spineless submission are opposed by Kautilya. Subsequently, harmony is to be liked to war. When the king's adversary's relative power is unlikely to shift as a result of any action and both remain at their current level, peace is advantageous. The winner with his partners and vassals, the foe with the comparable circle of lords alongside the closely involved individuals like the Center and Impartial rulers these are the entertainers in the show of discretion and war. This timeless truth of Kautilya's science of politics, or Arthshastra, was the principle of foreign policy that states that nations should act in their own political, economic, and military interests. Kautilya is generally renowned for framing the Mandala hypothesis or the circle of the states which comprises 6 realms:

- Vijigishu: Burning for or would be, world vanquisher
- Ari: whose region is infectious to Vijigishu, is a characteristic foe.
- Mitra; is a partner of Vijigishu whose domain is promptly past the adversary or ari.
- Arimitra; adversaries partner in a roundabout way is foe, who is a prompt past partner.
- Mitra and Mitra: are all within a short distance of the enemy's ally.
- Mitra-Mitra Ari: It is a partner of the adversary's partner arranged at quick past Mitra - Mitra.

The apparatuses are the six techniques for international strategy. For understanding the extensive breadth of Kautilyan international strategy, taking note of the implications understood in these six words is fundamental. ' Samdhi', burying the hatchet, is characterized as going into a concurrence with explicit circumstances, ie, finishing up a deal. The point of harmony empowers the lord to safeguard his acquisitions, advance the government assistance of the state and make unions. ' Vigraha, or hostilities, is another foreign policy tool. It is arranged into three sorts: undeclared war, secret war, and open war. The battle, with regards to international strategy, subsequently incorporates all that from undertaking political hostility to taking on a conflict. ' There are two strategies utilized in connection with both peace and war: "Asana," or remaining silent, and "Yana," or preparing for war. The last two of the six techniques are extraordinary cases. ' Samsraya' is looking for insurance from a more grounded ruler when compromised. ' Dhvaidhibhava' is the strategy of burying the hatchet with an adjoining ruler to seek after, with his assistance, the arrangement of aggression towards another (L.N, 2002).

Arthashastra is one of the prototypical compositions on political theory and 'realpolitik'. The Mandala hypothesis is at the center of Kautilya's conceptualization of state undertakings, which is the hypothesis of power. The interesting conversations on Rajmandala for example 'the circle of realms', on the hypothesis of Shadguna, for example, the sixfold approach or six measures, and on discretion, incredibly include practically every one of the parts of international strategy, which can be tracked down significant even today. Kautilya's international strategy is as yet legitimate in the circle of world legislative issues, because the essential standards of international strategy expressed by him, similar to battle for power, public interests, collusions, aggression and discretion stay unaltered unto the apocalypse. Accordingly, he is important even in the period of 'trans-current worldwide society. (Karad, 2015)

APPLYING THE MANDALA THEORY TO INDIA'S FOREIGN POLICY

In contemporary global relations, India is viewed as one of the significant powers. India's rise as a key worldwide entertainer depends on its global political posing, becoming stronger, powerful social impact and an intense military machine. Gifted by these resources India hypothesizes itself as a characteristic worldwide pioneer. India's projection of power, on the other hand, is not solely based on these inheritances. There is a painstakingly developed key vision that drives this expansionist stance. The fundamental standards of Indian international strategy are believed to be motivated by the international strategy standards propounded by Kautilya. (Misra, 2015)

Principle of Anti-Colonialism - States that when a country is under foreign rule, its wealth is taken away, it is impoverished, and it is simply treated as a "commercial article." India has consistently maintained the standards of autonomy and has enrolled the enemy of expansionism as one of its essential international strategy needs. Since Freedom, it has battled effectively for decolonization in Asia, Africa and different areas of the planet. India has likewise challenged the semi-provincial way of behaving of forceful neighbor China has on numerous occasions encroached on the regional sovereignty of Asian nations like the Phillipines, Indonesia, Vietnam in the South China Ocean. It likewise featured how different exercises of China, including its related ventures and different supporting practices, could drive different nations of Asia into an obligation trap, which could prompt neo-imperialism. (Chatterjee, 2021)

Panchsheel - It involves the five standards of serene conjunction, which was endorsed on April 29, 1954 between the states of the Tibet district of China and India on tranquil concurrence. These are the standards of shared regard of every others' regional uprightness and power, shared peace, shared non-obstruction in one another' inward undertakings, fairness and shared benefit alongside quiet conjunction. Arthashastra likewise underlines on the public safety of the country state and talks about the foundation of a government assistance state. Additionally, it upholds the principles of universal sovereignty and freedom. (Chatterjee, 2021)

Directive Principles of State Policy- The order standards of the state strategy as set down in Article 51 of the Indian Constitution specifies that the state will endeavor to keep up with global harmony and security, adhere to worldwide regulation and deal commitments and keep up with fair and decent connection with different countries. A crucial component of kautilya's foreign policy is the welfare state. He accepted that homegrown and worldwide harmony ought to be focused on over war and annihilation quickly. (Chatterjee, 2021)

The Principle of Non-Alignment Since its independence, India has adhered to the non-alignment principle, which states that during times of peace, it will not serve as a military base for any other nation or be aligned with their military blocks. As such, it expects a place of positive lack of bias. During the Cold War, India was one of the first nations to establish the Non-Aligned Movement. It has forever been in the essential interest of India that the country ceases to favor one side during global debates, rather it keeps a nonpartisan unprejudiced assessment for a long-term benefit. (Chatterjee, 2021)

Foreign Economic Aid - India believes in supporting one another's economic development. In the Arthashastra, Kautilya describes four upayas—political tools—that are universally applicable: sama, which means reconciliation; daan, which means assistance or gifts; danda, which means punishment; and bhed, which means disagreement. In the context of international relations, the term "daan" refers to foreign aid, and one of the fundamental tenets of India's foreign policy is to provide economic assistance to countries in need. Financial assistance is a great way to strengthen relationships with these nations. (Chatterjee, 2021)

The Nuclear Deterrence Policy - Kautilya sorted strength into three wide regions specifically astuteness, sovereignity and depository. To keep up with its solidarity, India wouldn't sign Atomic Peace Settlement as it just permitted countries which have made and detonated atomic weapons before Jan 1, 1967 to hold those in the wake of marking the arrangement. It disagreed with the discriminative idea of the arrangement and effectively led atomic tests, Pokhran II in 1998, subsequently joining the rundown of atomic power nations. In any case, in the wake of turning into a true atomic power country, India thought of its Atomic Convention, which depends on No first use, under which India won't utilize its atomic power first, until and except if constrained the accompanying two principal subjects, which mirrors the shades of shrewdness upheld by Kautilya : Credible minimum deterrence, in which deterrence theory is applied and only the weapons necessary to prevent an advisory from attacking are used, is used to avoid an unnecessary arms race. (Chatterjee, 2021)

The Rajmandala theory forms the foundational basis for Kautilya's foreign policy analysis of welfare. Applying the principles of the Mandala theory to India's Foreign policy, it is important to notice that India has always strived to position herself as the *'vijigshu'* who is consistently striving to achieve the status of self-sufficiency and welfare for its subjects. India as the *vijigshu* encounters geostrategic challenges and threats to its political sovereignity and integrity from its immediate neighbors such as China and Pakistan who act as the 'Ari'. Scholars of International relations have reiterated the fact of India's dominance and eminence in the South Asian region time and again. Territorially, politically, and economically India has been the forerunner for South Asian civilization and stability. In this background, it is quite evident for the neighboring powers such as China and Pakistan to consider India as a potential threat and competition to their geostrategic goals. Following the principles of the Mandala theory, India has been prompt enough to ensure its 'Mitra' circle which include the South East Asian neighboring countries, such as Japan, Singapore, Malaysia, Indonesia, Phillipines, Vietnam, Laos, Cambodia, and the Koreas. The India – ASEAN relations date back over three decades and India has been a significant trading, summit level, and dialogue-level partner to the ASEAN. The India-ASEAN bonhomie is indeed strategically significant for India to ensure a secure Indo-Pacific from Chinese intrusion into the region. Another significant geopolitical strategy adopted by India is its membership in the QUAD (Quadrilateral Dialogue) with the United States, Japan, and Australia. The QUAD is an economic and political grouping that ensures the overall development of the Indo-Pacific region. India's membership in the QUAD is by Arthashastra's principle maintaining 'Mitra' with the extended neighbors who act as neutral states for the vijishu.

The present Indo-Russian equation can be understood in terms of the relationship between the vijishu and Ari – Mitra. Russia has been a historical ally of India since Indian independence. Though the growing friendship between China and Russia is a security threat to India, the Indo–Russia cooperation on domains such as military and defense equipment, and energy resources ensures for a sustainable Indo–Russia friendship. Despite India being criticized for its neutral stand on the ongoing Russia-Ukraine conflict which is the aspect of 'Asana' under the Arthashastra, India has consistently reiterated its opinion to establish peace in the region. The European powers, the Middle East, and the Americas can be considered as the outermost circle to India's sphere of strategic influence. But even then, India has been prompt in collaborating with these countries on important areas such as technology, energy, green initiatives, defense, economy, soft power, etc. The strong presence of the Indian diaspora in the above-mentioned regions also adds to India's influence in the international system. The Arthashastra places special emphasis on treaties signed between welfare states. The importance of concluding treaties can be understood as per the principle of 'Samdhi'. In this context, India has been historically successful in signing Peace and friendship treaties and bilateral economic agreements with its immediate neighbors as well as with significant world powers. Treaties form the basis of International cooperation and regularize global governance as well. The India-China military standoff at disputed areas such as the Galwan Valley, Doklam, Aksai Chin, and Tawang can be considered as the manifestations of the concept of 'Yana'.

CONCLUSION

According to Chanakya, foreign policy is a tool at the hands of the King who strives to be the conqueror or the *'vijigshu'*. Speaking in lines of this principle, all the Prime Ministers of India have displayed different leadership styles in leading the country's foreign policy. India has now shifted from an idealistic leadership to a realistic one. It is also noteworthy that India's foreign policy is largely influenced by its leadership and all the leaders have customized India's foreign policy according to the changing international environment and foreign policy challenges. The foreign policy under the present Prime Minister Narendra Modi is realistically motivated since the ultimate foreign policy goal now is to project India as a potential world power in all aspects by ensuring her national power and status in the international forum. The visible way forward for the Indian foreign policy is that India must invest increased attention in balancing the threat from the two-fold enemies in the South Asian region by improving and sustaining her relations with the rest of her South Asian neighbors and at the same time keep her ties with the world powers intact as well. It is also pertinent to note that the Arthashastra lays significant emphasis on ensuring a secure welfare state for the subjects. Therefore it is imperative for India at the moment insulate to herself from the internal disturbances and conflicts within the nation which are largely a result of structural issues such as unemployment, poverty, and ethnic and religious polarization. India's foreign image can only be of relevance when the homeland is put in order at the earliest before it is too late.

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TEACHER PERSPECTIVES ON PROMOTING BILINGUAL COMMERCE AND MANAGEMENT IN DISTANCE AND ONLINE LEARNING

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Abstract: This study explores the perspectives of teachers on promoting bilingual Commerce and management in distance and online learning and examines the associated challenges and opportunities. Recognizing the diverse linguistic backgrounds of students, Commerce, and management is considered a means to enhance learning experiences. The study aims to investigate teachers' attitudes, beliefs, and experiences regarding the integration of Commerce and management in distance and online learning environments. It also provides potential remedies or suggestions for the difficulties teachers have putting multilingual approaches into practice. The research methodology employed exploratory research, and data was collected through an online questionnaire distributed among teachers in autonomous, affiliated, and university institutions in Chennai. The sample size consisted of 100 teachers. The primary data collected through the questionnaire was supplemented with secondary data obtained from published and unpublished research articles. The analysis of the collected data revealed a high level of internal consistency for the scale used in the study, as indicated by a Cronbach's alpha value of 0.822. An analysis of variance (ANOVA) was conducted to examine the relationship between teachers' perspectives and their employment status. The results showed a significant relationship between teachers' employment status and their recognition of the value and importance of promoting Commerce and management in distance learning, as well as the challenges they face in integrating bilingual Commerce and management.
Keywords: Commerce & Management, teachers' attitude, learning, teaching, bilingual.

INTRODUCTION

The advent of distance and online learning, accelerated by technological advancements, has revolutionized the educational landscape. As we navigate the ever-evolving field of education, it is crucial to consider the diverse linguistic backgrounds of students and embrace Commerce and management as a means to enhance their learning experiences. The National Education Policy (NEP) 2020 in many countries recognizes the importance of multilingual education and emphasizes its integration into distance and online learning settings. In this article, we delve into the perspectives of teachers regarding the promotion of Commerce and management in distance and online learning and explore the challenges and opportunities associated with this approach.

RECOGNIZING LINGUISTIC DIVERSITY IN COMMERCE AND MANAGEMENT SUBJECTS

One of the primary benefits of Commerce and management in distance and online learning is the recognition and validation of students' diverse linguistic backgrounds. Teachers play a pivotal role in creating an inclusive and supportive learning environment that values the languages spoken by their students. By acknowledging and incorporating multiple languages in instructional materials, assignments, and interactions, teachers can foster a sense of belonging and enhance students' confidence in expressing themselves in their native tongues.

ENHANCING LANGUAGE PROFICIENCY

Promoting Commerce and management in distance learning also presents a unique opportunity to develop students' language proficiency across different languages. Teachers can leverage various digital tools and platforms to provide resources in multiple languages, encourage collaborative language learning among students, and offer language-specific feedback. By doing so, they can support students' language development and facilitate effective communication skills across linguistic boundaries.

CULTURAL ENRICHMENT AND GLOBAL UNDERSTANDING

Commerce and management in distance learning goes beyond language acquisition; it offers a gateway to cultural enrichment and a deeper understanding of the world. By incorporating diverse cultural perspectives and resources in different languages, teachers can broaden students' horizons, foster intercultural competence, and promote global awareness. This can help students develop a more nuanced understanding of various cultures, breaking down barriers and promoting mutual respect and appreciation.

CHALLENGES AND STRATEGIES

Implementing bilingual Commerce and management in distance and online learning does come with its share of challenges. Teachers may face constraints in terms of resources, language proficiency, and curriculum alignment.

However, by adopting innovative strategies, these challenges can be overcome. Collaborating with language experts, utilizing open educational resources (OERs) available in multiple languages, and establishing partnerships with bilingual communities can provide valuable support. Furthermore, professional development programs and training sessions can equip teachers with the necessary skills and knowledge to effectively implement multilingual approaches.

STATEMENT OF THE PROBLEM

The promotion of Commerce and management in distance and online learning is a topic of growing importance in the field of education. As the educational landscape becomes increasingly diverse, it is crucial to understand teachers' perspectives on this approach and the challenges and opportunities they encounter in integrating Commerce and management into distance and online learning environments. This study aims to explore teachers' viewpoints regarding the promotion of Commerce and management in distance and online learning and to identify the key factors that influence their ability to effectively implement and support multilingual approaches.

OBJECTIVE

The objective of this study is to examine teachers' perspectives on promoting Commerce and management in distance and online learning and to understand the challenges and opportunities associated with this approach.

Specifically, the study aims to:

- Explore teachers' attitudes, beliefs, and experiences regarding the integration of Commerce and management in distance and learning environments.
- Investigate the challenges and barriers faced by teachers in implementing bilingual approaches and identify potential solutions or recommendations.

RESEARCH METHODOLOGY

Types of research	Exploratory research
Sample Size	100 and equal questionnaires distributed among teachers in autonomous, affiliated university in Chennai
Data Collection	Questionnaire (Online Form)
Primary and Secondary Data	Primary data was collected through a questionnaire and secondary data was procured from research papers, unpublished articles,

Hypothesis

Based on preliminary research and theoretical frameworks, the following hypothesis is proposed for this study:

H1: Teachers recognize the value and importance of promoting bilingual Commerce and management in distance and online learning and believe that it enhances students' learning experiences and cultural awareness.

H2: Teachers face challenges in integrating bilingual Commerce and management into distance and online learning, including limited resources, language proficiency barriers, and curriculum alignment issues.

Data Analysis

Table 1
Reliability Statistics

Cronbach's Alpha	N of Items
.822	5

we can see that Cronbach's alpha is **0.822**, which indicates a high level of internal consistency for our scale.

Table 2
ANOVA

	Autonomous Institution		Affiliated Institution		University		F	Sig.
Dimension	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**		
Teacher's Ability	3.406	1.1031	2.853	1.0768	3.000	1.3904	3.482	0.000
Teacher's attitude	3.000	1.4368	2.500	1.0517	2.774	1.3835	3.687	0.000
Teacher's value	3.219	1.3133	2.824	1.1670	3.323	1.3263	1.676	0.000
Teachers Beliefs	2.750	1.2952	2.676	1.3421	2.742	1.4135	.703	0.000
Teacher's experience	2.813	1.1483	2.706	1.3149	2.613	1.4301	2.022	0.000
Challenges and Barriers	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**F**	**Sig.**
Language learning Issue	2.844	1.0809	2.706	1.1942	3.000	1.1255	3.359	0.000
Communication issue	3.219	1.2632	3.118	1.2001	3.323	1.0766	1.684	0.000
High cost of learning teacher's language skill	3.219	1.2111	2.529	1.2848	3.194	1.3018	4.510	0.000

Source: Primary Data

There is a significant relationship between teachers' employment status Teachers recognize the value and importance of promoting bilingual Commerce and management in distance and online learning and believe that it enhances students' learning experiences and cultural awareness. There is a significant relationship between teachers' employment status Teachers face challenges in integrating Commerce and management into distance and online learning, including limited resources, language proficiency barriers, and curriculum alignment issues.

FINDINGS

The findings support the hypothesis that teachers recognize the value of promoting bilingual Commerce and management in distance and online learning and believe it enhances students' learning experiences and business awareness. Additionally, the study confirms that teachers face challenges in implementing multilingual approaches, including limited resources, language proficiency barriers, and curriculum alignment issues. These findings highlight the importance of addressing these challenges and providing support to teachers in promoting Commerce and management in distance learning. Further research and interventions can focus on providing professional development programs, collaboration with language experts, and utilization of open educational resources in multiple languages to address the identified challenges.

CONCLUSION

Teachers are at the forefront of fostering bilingual Commerce and management in distance and learning environments. By recognizing the linguistic diversity of students, enhancing language proficiency, and promoting cultural enrichment, teachers can create inclusive and engaging learning experiences. The NEP 2020 acknowledges the importance of multilingual education and encourages its integration into distance learning. While challenges may arise, teachers can leverage strategies, resources, and professional development opportunities to ensure the successful implementation of Bilingual Commerce and management in distance and online learning. By doing so, we can empower students, celebrate their linguistic identities, and nurture a more inclusive and interconnected educational landscape.

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CHALLENGES IN ENTREPRENEURSHIP

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Abstract: This article reviews various contributions from different parts of the world at different times on challenges in Entrepreneurship. Various aspects like skill sets needed, environmental factors, Pandemic, Innovation, Research and Development, Influence of Gender on entrepreneurship are discussed. Styles of decision-making and its impact are also reviewed.

Keywords: Entrepreneurship, Skills, decision-making, Pandemic, Innovation

Introduction:

Entrepreneurship is a pivotal factor in the development of the economy of any Nation. There are many challenges in starting a business venture and to survive in the highly competitive world. There is no guarantee that customers will be loyal and the needs of the customers wont change. These external factors add to the challenges of internal factors like the development of skills needed to operate a business enterprise.

Review of literature

Nugroho, L., Badawi, A., & Hidayah, N. (2022) examines the conditions and success tips of micro and small women entrepreneurs during the Covid-19 pandemic. Their main findings of are as follows: Micro and small women entrepreneurs face constraints in various areas such as capital, production, marketing, and bookkeeping. The majority of these entrepreneurs operate within the food and beverage sector, and the author suggests that they can enhance their sales turnover amidst the Covid-19 pandemic by adopting E-Commerce platforms. Micro and small women entrepreneurs face the dual responsibility of managing their businesses and households, which presents a significant challenge. The study highlights the importance of family support in addressing this issue. Additionally, it reveals that a considerable number of micro and small women entrepreneurs, specifically those in the age range of 25-35, have attained an education level beyond senior high school.

Abrhám, J., Bilan, Y., Krauchenia, A., & Strielkowski, W. (2015) investigate the applicability of the Intertemporal Substitution Hypothesis (ISH) within the context of small businesses in Belarus. The existing research literature suggests that similar to findings in the US, UK, Ivory Coast, and Poland, there is no empirical evidence supporting the ISH in the case of Belarusian SMEs. Moreover, sector-specific variations indicate that the ISH mostly holds true for businesses where there is a potential substitution between labor and leisure. Interestingly, the analysis reveals that female labour supply elasticity tends to be higher than male labour supply elasticity. However, the presence of negative wage elasticities raises concerns about the validity of the life cycle approach to labour supply analysis. Furthermore, the study highlights that the weak implementation and enforcement of existing laws and regulations in Belarus are likely to restrict the successful functioning of private Small and Medium Enterprises (SMEs).

Papulová, Z., & Mokroš, M. (2007) emphasize the significance of managerial skills and knowledge acquisition for small enterprises. Small enterprises play a crucial role in driving economic development, thus warranting encouragement and support. The successful operation of any enterprise relies on the possession of managerial skills and knowledge. Acquiring these skills can be accomplished through both theoretical understanding and practical experience. However, small entrepreneurs often face resource limitations that hinder their ability to invest in learning these essential skills.

Chesbrough, H., & Crowther, A. K. (2006) delve into the concept of Open Innovation and its applicability across industries beyond high-technology sectors. Innovation is recognized as a crucial factor for success, especially in response to evolving market requirements and intensified competition. It is worth noting that Open Innovation concepts are already being utilized in a diverse range of industries, and it should not be solely seen as a strategy for outsourcing research and development (R&D) activities. Instead, the concept of Open Innovation holds value as a broader framework for driving industrial innovation, extending beyond the realm of high-tech sectors.

However, it is important to consider specific environmental conditions that may facilitate the diffusion of Open Innovation concepts. Additionally, organizational inertia could present challenges in implementing and embracing changes associated with Open Innovation. Understanding and addressing these sources of inertia is crucial when operating in an Open Innovation context.

Austin, J., Stevenson, H., & Wei–Skillern, J. (2006) critically examine the distinctions between social entrepreneurship and commercial entrepreneurship, and put forth a modified framework for social entrepreneurship. The authors argue that the driving factor behind the framework for social entrepreneurship should be the social purpose itself. They suggest that financial and human resources should be viewed as separate and distinct variables within this framework. Additionally, it is crucial to take into account contextual forces when analysing social entrepreneurship. However, the authors caution against a potential trap where the sole focus becomes furthering the organization's own goals, sometimes at the expense of creating social value. They propose that social value creation can often be more effectively achieved by looking beyond the boundaries of the organization.

Austin, J., Stevenson, H., & Wei–Skillern, J. (2006) also highlight the need for an adapted framework that places the social purpose as the central driver, acknowledges the distinct roles of financial and human resources, and takes into consideration the contextual forces influencing social entrepreneurship. They also emphasize the importance of prioritizing social value creation over organizational goals and recognizing opportunities outside of organizational boundaries for generating social impact.

McMullen, J. S., and Shepherd, D. A. (2006) examine the influence of uncertainty on economic theories of entrepreneurship and introduce a two-stage conceptual model of entrepreneurial action. They highlight the importance of considering knowledge and motivation together in economic theories of entrepreneurship. They argue that theories at the systemic level should be reinterpreted and applied to the individual level of analysis.

Additionally, the authors emphasize the need for future theoretical development and empirical testing to give equal attention to both knowledge and motivation in order to advance the understanding of entrepreneurship. However, the proposed two-stage model of entrepreneurial action may not be universally applicable to all contexts. Furthermore, reconciling the ontological assumptions inherent in economic theories of entrepreneurship could present challenges.

Howells, J. (2006), in an examination and synthesis of the literature on innovation intermediation, propose framework and typology outlining the various roles of intermediaries in the innovation process. The author highlights that intermediaries offer a broader, more diverse, and comprehensive range of services to their clients in the innovation process than previously acknowledged. Over time, the scope of services provided by intermediaries has expanded. Moreover, intermediaries can contribute significant systemic value in terms of policy within an innovation system. However, caution is advised when classifying and describing an organization solely as an "innovation intermediary". It is important to consider that the success of intermediaries within the larger scientific system may create institutional inertia, potentially leading to challenges in sustaining the strength and dynamism of the system in the long run.

Dhanaraj, C., & Parkhe, A. (2006) discuss the role of hub firms in creating and harnessing value from their networks by managing knowledge mobility, innovation appropriability, and network stability. The authors find that hub firms fulfil distinct roles compared to peripheral actors within a network. They argue that network theory should shift its focus from position and structure to action and process, in order to capture the dynamic nature of networks. Additionally, network stability should be incorporated into the analysis of networks to obtain a more comprehensive understanding.

However, there are counterarguments to consider. Some argue that the dichotomy between orchestrators and peripheral actors may oversimplify the complexity of network dynamics. Furthermore, the framework presented in the study may not adequately address issues of reverse causality, whereby the actions and decisions of peripheral actors may influence the role and behaviour of hub firms.

Gassmann, O. (2006) explores the concept of open innovation along with its associated trends and streams. The author highlights several key insights. Firstly, drivers of open innovation include globalization, the intensity of technology, technology fusion, the emergence of new business models, and the leveraging of knowledge. Open innovation encompasses various perspectives such as the global spread of innovation, R&D outsourcing, early integration of suppliers, user innovation, and the external commercialization and application of technology. Additionally, companies can reap the benefits of open innovation by accessing external sources of knowledge and innovation, establishing differentiated relationships with suppliers, and exploiting intellectual property externally.

However, counterarguments exist in relation to open innovation. It is contended that not all industries lend themselves well to open innovation, as some industries require the safeguarding of technology and the restriction of knowledge proliferation. Additionally, open innovation can be challenging to manage, as it necessitates strong relationships with suppliers and the ability to embrace outside thinking.

Covin, J. G., Green, K. M., and Slevin, D. P. (2006) examine the impact of strategic process variables on the relationship between entrepreneurial orientation and the growth rate of firm sales. Their findings indicate several important insights. Firstly, the positive relationship between entrepreneurial orientation and sales growth rate is strengthened when firms employ autocratic decision-making and adopt an emergent strategy formation process.

It is observed that effective entrepreneurial firms tend to have a strategic process that leans towards autocracy rather than consensus. Additionally, it is recommended that entrepreneurial firms adopt an emergent approach to strategy formation, as it enables them to fully realize the benefits of their innovative nature.

However, it is worth noting that the failure of a firm to learn from its strategic mistakes can have a more detrimental impact on the future performance of conservative firms compared to entrepreneurial firms. Further research is encouraged to delve into the phenomenon of learning in entrepreneurial firm contexts, particularly where innovation failures may be common.

Ahl, H. (2006) examines the limitations of existing research on women's entrepreneurship, and proposes new avenues for research to encompass a broader and more comprehensive understanding of women's entrepreneurial endeavours. Their findings suggest that current research on women's entrepreneurship often perpetuates the notion of women as secondary to men and portrays women's businesses as less significant.

To overcome these limitations, the article suggests pursuing new research directions that do not reinforce women's subordination, but instead encompass a wider range of perspectives on women's entrepreneurship. The article adopts a social constructionist or post-structuralist feminist stance and utilizes the term "gender" in its original sense, referring to its socially constructed nature.

Importantly, the article does not assume inherent differences between men and women; rather, it posits that gender is a performative aspect rather than an inherent characteristic. Furthermore, the article does not assume that differences between men and women necessarily have social consequences. It highlights that the assumption of significant sex differences lacks substantial scientific evidence, but has significant and far-reaching implications for power dynamics between men and women.

West and Gallagher (2006) explore the difficulties associated with implementing open innovation and how firms can leverage open-source software to support their innovation strategies. The main findings of the article can be summarized as follows: Firstly, firms must possess a certain level of intellectual property (IP) in order to target a valuable segment of the market or engage in trade with other firms. Additionally, firms need to foster an open culture that embraces external innovations and fosters trust between collaborating organizations.

Furthermore, it is recommended that firms have a combination of legally protected IP and absorptive capacity to effectively pursue open innovation initiatives. However, they highlight that the growing conflict over patents can pose challenges for firms, as patent litigation can significantly impact those without defensive patents. Additionally, firms with lower levels of research and development (R&D) intensity and internal innovation may not be actively pursuing open innovation strategies.

Weerawardena, J., & Mort, G. S. (2006) presents a comprehensive review of the existing literature on social entrepreneurship and propose a bounded multidimensional model to capture the essence of social entrepreneurship. The authors emphasize that social entrepreneurship encompasses several dimensions, namely innovativeness, proactiveness, and risk management. They argue that social entrepreneurs should prioritize proactive and responsive environmental management strategies while continuously monitoring governmental policy initiatives.

Furthermore, social entrepreneurial organizations should cultivate a culture that promotes innovativeness, proactiveness, and effective risk management. The authors suggest that the proposed model would benefit from further refinement and empirical testing, preferably through the inclusion of diverse samples from various countries and sectors. Additionally, they express concerns about the potential negative impact of increased marketization and the adoption of market-based management models on the fundamental ideals and values of social enterprises.

Conclusion

With the dynamic world scenario and unexpected changes happening in the environment, it becomes unavoidable to get equipped through the investment of time, money, and labour in developing managerial skills and in research and Development to come up with innovative and creative solutions to business problems.

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GREEN HOUSE GAS EMISSIONS AND GLOBAL WARMING

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Abstract: Emerging challenges related to the environment and exploitation of resources has remained largely focused on increasing profitability, raising the growth of GDP, increasing the availability of goods and services to consumers and improving the living standards of people. Greenhouse gas (GHG) Emissions play a crucial role in raising the temperature of our earth. Carbon dioxide (Co2) emissions are main driver of global climate change. To avoid the dangerous impacts of climate change, the world needs to immediately reduce the CO2 emissions. The responsibility needs to be shared between individuals, regions and countries. This article tries to provide some insights on GHG, and ways in which Carbon dioxide emissions are compared by year, country and sector. All these led the world to open carbon markets.

Key Words: Green House Gas (GHG), Climate Change, Carbon di oxide (Co2), Global Warming.

Introduction

Emerging challenges related to environment and exploitation of resources has remained largely focused on increasing profitability, raising the growth of GDP, increasing the availability of goods and services to the consumers and improving the living standards of people. When the needs got intensified in greater magnitude towards goods and services there is no need to intensify the marketing efforts, which resulted in creating new products and services and to make them marketed. To put it differently, the marketing concepts developed in the west were one of the reasons for increased business activity. As a result of the market capitalism, new products, new services, new style of delivering the goods and services have emerged. This led to global warming.

Review of Literature:

AL.Gore made the subject of global warming to be felt as a reality in his documentary on 'An Inconvenient Truth'. Rajendra Pachaury, headed the IV Inter Governmental Panel on Climate Change (IPCC) in the United Nations and the report was published in 2007 and it made to address the issue of global warming - An urgent international agenda. The net result of climate change would be human peace and it is justified in getting the Nobel Peace Prize. One more master piece in the subject was Economics of Climate Change by Nicholas Stern, who outlined the impact of climate change on the economies.

An Inconvenient Truth (2006) American documentary film directed by Davis Guggenheim and it was about former United States Vice President Mr.Al Gore. The director educated citizens about pollution and global warming by his own experience and portrayal made in the film. He had documented his ideas of his efforts which coincided with the thinking of the producer on the opening of The Day After Tomorrow.

T**he Hindu** (2016) reported that Car-pooling is one of the best ways to reduce carbon Emissions due to vehicles. He also added that the school and college Students Suggested Ways to Reduce Global Warming. He stated that if global warming continued to increase at a faster rate, we might be under big trouble.

The Bruntland Report (1987) on sustainable development UNWCED report of the World Commission on Environment and Development highlighted about the Per capita annual tonnes of carbon emissions and the variability (CO_2e t/person). USA was ranked first in terms of emission of GHG (2002, 24.09).

Douglas Dockery., et All (1993) reported the association between air pollution and mortality rates. This Journal stated the problem of air pollution and its direct linkage between various ailments. The GHG emissions and the impact on people in USA were discussed in this journal.

Jayanta Ghosh Roy.,et All (2007)worried about the concentration of carbon in the atmosphere and its devastating consequences in general and melting Himalayan glaciers in particular. They identified four major areas of source of emissions namely energy, transport, agriculture and Industry and recommended the de-carbonisation in each of the four sources and opined that constitutional provision is the need of the hour.

Environment & Lsquo (2012), a Hollywood Film released to reduce Carbon Footprint. The film is about neutralizing the greenhouse gases /carbon emissions and they made their film by greening their sets. They had taken measures in buying carbon credits, using alternative fuel such as solar power and reduced or recycled their production waste.

Schapiro (2014) in his book *Carbon Shock,* explained about the carbon, ever-changing world, and the greenhouse gases. He also explained about the rules and disrupts, and to find new ways to reduce the GHG emissions.

The Hindu (2015) reported the ways through which India could display bold leadership by imposing the penalty i.e., penalising the carbon emitters by way of imposing carbon tax on all fossil fuels in proportion to carbon dioxide emissions. He also reported that the rise in oil prices was almost 60 per cent in 2015. This created a positive impact for oil-importing countries like India. But Russia and Iran were hit being oil-producing nations.

Rajagopalan and Deepa, (2017) the authors explained that how Global Warming had increased the Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which trapped the heat that would otherwise escape from Earth and how the United Nations had adopted the Kyoto protocol. Amid this back ground, this paper endeavours to study the overview of the flexibility mechanism available for the developed world and an analysis of the activities in the carbon markets and the transaction in carbon credits and exercise done by the World Bank.

Brown (2017) reported that the China is engaged in converting coal into natural gas and allied works. This conversion of coal into natural gas could prevent tens of thousands of premature deaths every year. He reported that at the same time, it might undermine efforts to rein in carbon/greenhouse gas emissions.

United Nations Framework Convention on Climate Change summit (2017) on Emission Trading, the report stated that the limits set by the Kyoto Protocol on greenhouse gas emissions are a way of assigning monetary value to the earth's atmosphere which is shared by all nations.

World Bank Report (2022) stated that there are a total of 68 Credit Pricing Initiatives in the world which includes 34 ETS and 37 Carbon Taxes which are implemented by the countries. Carbon credit markets went upto 48% in 2021 and the total number of credits issued went from 327 million to 478 million.

Statement of the Problem

The World is facing the biggest challenge of Global warming resulting in Climate change. As stated in World Bank Report (2022), all the developing countries are facing various issues such as pest invasions, severity of floods, high variations in temperature etc. In order to minimise these issues, the study on the carbon emissions has become necessary for the researcher. Only then a solution can be obtained to reduce emissions.

Objectives of the Study

1) To study the Green House Gas Emissions year wise.

2) To analyze the Carbon di oxide emissions year-wise, country wise and sector-wise.

Scope of the Study

The scope of the topic is multidisciplinary in nature and the study is restricted to GHG emissions and concentrates only on Carbon dioxide Emission year, sector, and country-wise to understand the cause of the rise in temperature.

Study Period

The period of the study for GHG is from 1990 to 2020 December.

Methodology

The study is centered on secondary data only, to cover the Greenhouse gas emissions and carbon dioxide emissions with countries, sectors, and years. A simple and descriptive analysis was made with the help of Simple averages and Percentage analysis.

Global Warming:

Global Warming is the increase of Earth's average surface temperature due to the effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which trap heat that would otherwise escape from Earth. Global Warming has the dooming effects of melting the polar ice caps, thermal expansion of water leading to an increase in the average sea levels, depletion of the ozone cover and natural calamities. Sea Levels have risen by 20 cm over the last 130 years and are expected to rise by 1ft to 5ft in the next 100 to 300 years, which could send parts of countries like Bangladesh, Maldives, Egypt, and Kiribati, Tuvalu or even cities like Shanghai, Tokyo, Mumbai, London and New York under water. Scientists have identified the cause as increase in Green House Gas emissions, depletion of Forests, Fossil Fuel and Industrial Emission.

Green House Gases:

Greenhouse gases are simply gases in the atmosphere, that serve to warm the earth by trapping and re-emitting long wave radiation that is emitted by Earth and such a warming effect is called Greenhouse effect. Carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) and ozone are the major GHG. Carbon dioxide (CO_2) plays a vital role in the greenhouse effect on earth. Without the normal proportion of 0.03 percent, our planet would be 33 degrees cooler than the mean average temperatures but the real concern is increased concentration of CO_2 and the resultant Global warming and Climate change. When the natural phenomenon of Greenhouse effect is intensified by more gasses, especially Carbon dioxide, with the trapping and reemitting the earth becomes warmer. It is proved beyond doubt that human activities were dominant factor in contributing to the warming effect of earth. The GHG emissions from 1990 to 2019 is presented in the Table-1.

TABLE-1
GLOBAL GREEN HOUSE GAS EMISSIONS

Year	Total Green House Gas Emissions (kt of CO2 equivalent)	Year	Total Green House Gas Emissions (kt of CO2 equivalent)
1990	3,06,14,250	2005	3,89,37,990
1991	3,07,61,180	2006	4,00,66,990
1992	3,06,78,770	2007	4,13,87,310
1993	3,08,19,730	2008	4,17,06,170
1994	3,11,05,680	2009	4,12,64,330
1995	3,18,90,420	2010	4,33,87,310
1996	3,24,67,960	2011	4,46,37,130
1997	3,28,55,850	2012	4,51,64,500
1998	3,30,88,070	2013	4,58,50,350
1999	3,32,82,050	2014	4,61,43,840
2000	3,41,64,520	2015	4,60,85,310
2001	3,45,45,850	2016	4,62,64,070

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2002	3,49,86,570	2017	4,70,31,820
2003	3,62,58,310	2018	4,79,80,470
2004	3,77,46,000	2019	4,81,16,560

Source: Collected from data available in Climate Watch Historical GHG Emissions, 2022, Washington DC: World Resources Institute. The World Bank.

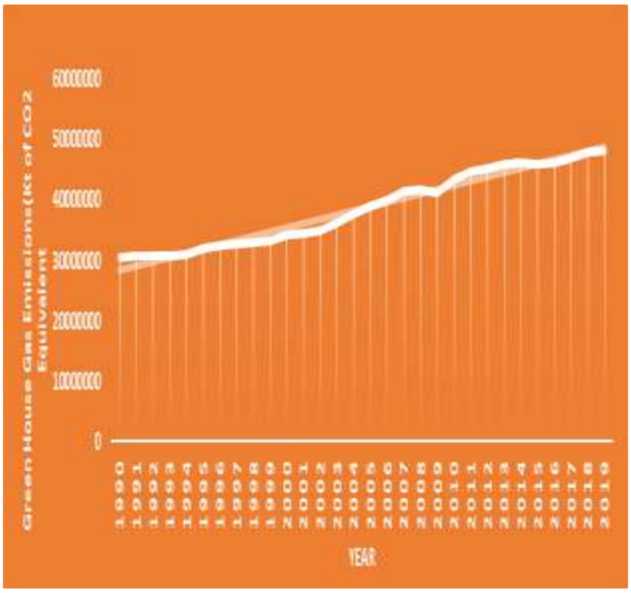

Figure: 1 Global GHG Emissions (Tonnes of CO2 Equivalent, thousands) (Source: Table-1)

It is to be understood that the Green House Gas emissions during 1990 were 3,06,14,250 Thousand Tonnes of CO_2 equivalent. After a decade, it was 3,41,64,520 Thousand Tonnes of CO_2 equivalent, in 2000. In 2010, it stood at 4,33,87,310 thousand Tonnes of CO_2 equivalent. In the year 2019, it went up to 4,81,16,560 Thousand Tonnes of CO_2 equivalent. Out of all the GHG Emissions, the Carbon dioxide Emissions are the major source of global warming. Global carbon dioxide emissions from 1990 to 2019 are listed below for the purpose of a clear understanding of CO_2 emissions trend each year and is presented in the below Table-2 and Figure-2.

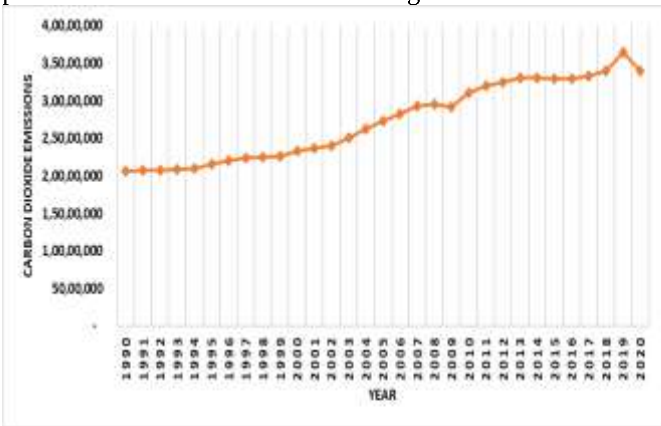

Figure: 2 Global Carbon Dioxide Emission (Kt) (Source: Table 2)

TABLE-2
Global Carbon Dioxide Emission

Year	**World CO_2 emissions (Kt)**	**Year**	**World CO_2 emissions (Kt)**	**Year**	**World CO_2 emissions (Kt)**
1990	2,06,07,832	2001	2,37,07,262	2012	3,24,44,192
1991	2,07,99,343	2002	2,40,54,448	2013	3,30,53,847
1992	2,07,41,661	2003	2,51,43,944	2014	3,30,85,192
1993	2,08,74,105	2004	2,63,19,528	2015	3,29,43,428
1994	2,09,83,787	2005	2,73,25,257	2016	3,29,40,650
1995	2,15,82,843	2006	2,82,23,539	2017	3,33,51,608
1996	2,20,39,447	2007	2,93,12,213	2018	3,40,41,046
1997	2,23,94,055	2008	2,95,74,921	2019	3,64,41,387
1998	2,25,09,780	2009	2,92,53,758	2020	3,40,40,000
1999	2,26,15,863	2010	3,10,31,799		
2000	2,33,11,806	2011	3,20,04,028		

Source: Collected from data available in CAIT Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute & The World Bank.

It is to be noted that the CO_2 emissions across the globe was 2, 06, 07,832 Kt in the year 1990 and after a decade it increased to 2, 33, 11,806 Kt in the year 2000. There is a constant increase in emissions over a decade. In the year 2010, the CO_2 emissions stood at 3, 10, 31,799 Kt which stated the gradual increase in emissions which in turn heated up the earth's temperature leading to global warming. After a decade, in 2020, the emissions stood at 3, 40, 40,000 Kt which is the result of the rise in temperature of our planet Earth.

Increased economic activity, commercial activity, and exponential growth through market mechanisms with the help of mechanisation and industrialization made excessive requirements for energy. Energy-driven development drives the demand for fossil fuel which resulted in more carbon emissions. In this context, it is very helpful to know about the global sectoral carbon emissions in all these years and is presented in the following Table 3 and Figure. 3.

TABLE -3 Global Carbon Emission by Sectors (2020)

S.No	Sectors	Percentage %
1	Power	44.4
2	Industry	22.4
3	Surface Transport	20.6
4	Homes	5.6
5	Building	4.2
6	Aviation	2.8

Source: Collected from data available in CAIT Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute & The World Bank.

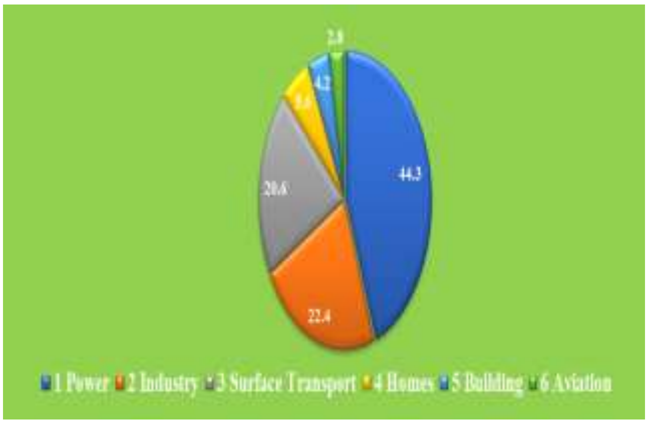

Figure: 3 Global Carbon Emission by Sectors % (2020) (Source: Table 1.4)

It is observed that the Power sector is the dominant sources of emissions (44.3%) and non-energy sectors accounted for the balance of 65.7%. Next to power sector, Industrial sector is at 22.4% and Surface Transport is at 20.6%. The remaining sectors such as Homes are at 5.6%, Building at 4.2%, followed by Aviation at 2.8 %. It is well evidenced from the above that carbon emission intensity is a man made one. Since it is a global phenomenon, a wise mind would normally search for emission details among countries regarding carbon dioxide emission and is presented in Table 4 and Figure 4.

Countries	CO_2 Emissions	Percentage %
China	10,17,46,81,100	28%
United States	5,28,46,96,657	15%
EU-28	3,28,67,84,536	9%
India	2,61,64,48,820	7%
Russia	1,67,83,66,791	5%
Japan	1,10,66,64,426	3%
Other Countries	12,29,37,45,250	34%
World	**36,44,13,87,580**	**100%**

Table 4: CO_2 Emissions by the Countries (2019)

Source: Collected from data available in CAIT Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute & The World Bank.

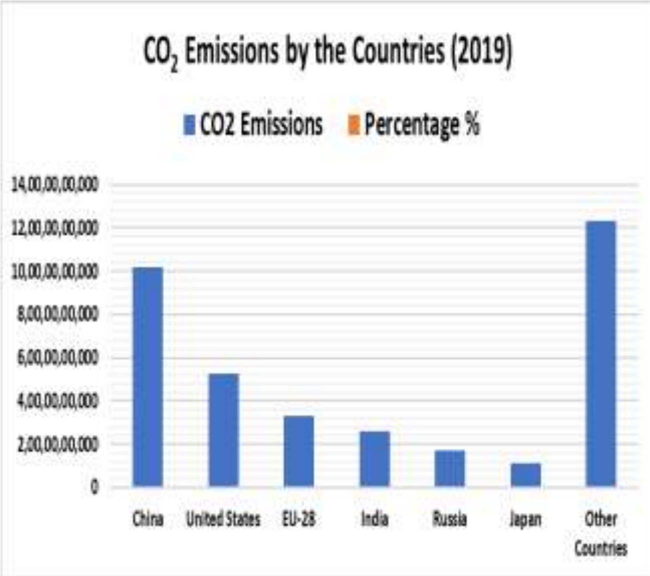

Figure: 4 CO2 Emissions by Countries (Source: Table-4)

It is observed that the total of carbon dioxide emissions of the world in 2019 were 36,44,13,87,580 million metric tonnes. One more interesting phenomena noticed is that in the 20th century the emission of carbon started accumulating in a greater magnitude.28% CO_2 emissions are done by China, 15% of emissions created by the United States, 9% by the EU-28, 7% by India, 5% by the Russian Federation, 3% by Japan, and 34% by other countries indicating that these countries were responsible for the warming of Earth to a greater extent. , It is the endeavor to focus on the dominant greenhouse gas carbon-dioxide which constituted more than 80 per cent in the gases, which ought to be normally at 0.03 percent. The increased proportion of carbon in the atmosphere was cited as the vital culprit for the warming of earth.

It is to be observed that there was a gradual increase in Greenhouse gases all these years from 1990 to 2018, slowly increasing the temperature of our planet leading to global warming. In the year, 2020, after COVID-19 pandemic situation, the crisis in the climate changed because of Covid 19 and the Emissions stood at

3,40,40,000 Kt of Carbon Emissions. The COVID has caused a decrease in GHG emissions in the year 2020, which is again a temporary one only because of lockdown due to Covid 19. All these Emissions made countries to deal with carbon markets. Global Commerce has included a wholly new business that is expected to develop into a very big commodity market. This led to the rise of carbon markets.

Conclusion: Global warming has led to drastic change of climate in many countries. the Green House Gas emissions during 1990 were 3,06,14,250 Thousand Tonnes of CO_2 equivalent which was the growing stage of countries towards development and industrialization and it peaked in 2019. The Carbon emissions across the globe also peaked in 2019 which went up to 4,81,16,560 Thousand Tonnes of CO_2 equivalent. After COVID-19 pandemic situation, the crisis in the climate changed because of Covid 19 and the Emissions stood at 3,40,40,000 Kt of Carbon Emissions in 2020. The Power sector is the dominant sources of emissions (44.3%) and non-energy sectors accounted for the balance of 65.7%. being the Aviation at 2.8 % at its lowest. Among the countries, 28% CO_2 emissions are done by China which is the highest and 3% by Japan. Carbon di oxide emissions have a strong link between prosperity and standard of living of people. People must be aware about rise in temperature and must work together. The carbon emissions need to be stabilized to reach net zero emissions.

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INVESTMENT OUTLOOK: THE CURIOUS CASE OF GENERATION Z

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Abstract: Generation Z, the population cohort born in between 1997 – 2012, was in line to inherit a strong economy with record-low unemployment. But it has become implausible since COVID-19 has reshaped the country's social, political, and economic landscape. Rather than looking ahead to a world of possibilities, Gen Z now peers into a volatile future. Similar to the millennials who came of age during the Great Recession generation Z is also arming themselves to face the recession that is brewing. This being one side of the coin there's a plethora of investment knowledge and avenues now being made available with a touch of the screen on the other side. This article proposes to unravel the important conundrum that Gen Z face that has the power to shape the rest of their life. How financially informed are they? How do they perceive risk and return and more importantly how and where are they going to invest or save their money?

Key Words: Generation Z, Financial Literacy, Investment Perception and Investment Choices.

INTRODUCTION

Gen Z generally about the generation born between 1997 – 2012 has a unique demographic contour. These Digital Natives live their lives online and don't know life before the internet. They're linked with different characteristic traits similar to being self-driven, seeking a diverse community, largely cooperative, sociable, and facing psychological challenges. Financial mindedness is another core idiosyncrasy of Generation Z. Most of them grew up watching the millennial generation struggle financially during the Great Recession and having themselves lived through the pandemic, this generation is driven by pragmatism and security.

Gen Z quantum to roughly 1/ 3rd of the World's population and is anticipated to represent 27 percent of the pool by 2025. At the work front, they demand further autonomy, diversity, flexibility, and meaning from work. They are in a constant hunt for a positive work culture. Though they consider salary as the most important factor in deciding on a job, they under-prioritize pecuniary benefits more than any other generation and highly value recognition. In light of these developments, it's important to understand how Generation Z - the workforce of the future, manage their finances to survive this unpredictable future and fulfill their aspirations.

REVIEW OF RESEARCH AND DEVELOPMENT IN THE SUBJECT:

Novia Utami, Marsiana Luciana Sitanggang, (2021) "The Analysis of Financial Literacy and Its Impact on Investment Decisions: A Study on Generation Z in Jakarta" This study aims to understand financial literacy and investment behavior of Gen Z in Jakarta, Indonesia. The relationship between financial literacy and investment decisions was analyzed using statistical techniques and it was concluded that financial literacy significantly influenced the investment decisions of Gen Z in Jakarta.

Riska Rosdiana (2020) "Analysis of Investment Interests, Motivation, Social Environment, Financial Literacy (Comparative Study of Generation Z and Millennial Generation)". The results of this study indicate a significant difference between financial literacy, motivation, social environment, and investment interest in Generation Z and Millennial Generation.

Amit Kumar Nag & Janil Shah (2022) "An Empirical Study on the Impact of Gen Z Investors' Financial Literacy to Invest in the Indian Stock Market" This study used Attitude toward investment and perceived behavioral control as the mediating factors related to investment, while social factors and subjective norms were considered as independent factors. It was concluded that financial literacy had the highest positive effect on investment intention in the stock market.

Kavya Clanganthuruthil Sajeev, Mohd Afjal, Cristi Spulbăr, Ramona Birău, Ion Florescu (2021) "Evaluating the Linkage between Behavioural Finance and Investment Decisions Amongst Indian Gen Z Investors Using Structural Equation Modeling". Structural equation modeling was employed to analyze the behavioral biases such as financial literacy, risk attitude, herding, and information search to study the linkage. The results indicate that biases such as financial literacy, risk attitude, and information search have a positive and significant impact on the decision-making of investors.

SIGNIFICANCE OF ANALYSING GEN Z BEHAVIOUR

Knowledge of how Gen Z allocates their wealth will be of paramount interest to several entities such as employers in determining the compensation packages, financial institutions and decision-makers in designing innovative financial instruments, Regulatory authorities in undertaking policy decisions, Financial Intermediaries in improving financial information and trust in the investment market and the Economy as a whole by way of capital formation.

INVESTOR PERSONAE

The financial tendencies of Generation Z were primarily shaped by the effects of COVID-19 and the consequent inflation. As such they are very practical and realistic when it comes to decision making. The majority are in the early stages of their career graph and have limited disposable income. They are not only tech savvy but also money savvy leaning largely towards risk aversion. They are highly confident of their ability to multiply their earning to meet all their future needs and ambitions. They strive for stability through job permanence, healthy spending habits, and smart investment choices. They are excellent team players who also prefer to showcase their entrepreneurial abilities as individual contributors.

FINANCIAL LITERACY

This first generation of digital natives has abundant information available at their fingertips which they can use for self-paced learning and acquisition of financial know-how. But they seem to rely more on parents for financial information and advice. This is slightly alarming since their parents/parental figures are probably millennials who took huge financial hits during the Great Recession. Gen Z is expected to have the highest-ever purchasing power when compared to millennials. The changing dynamics of the financial markets, sophisticated investment choices available, and the complexity of investment decisions that Gen Z face today are difficult to surmount by the knowledge boasted by their predecessors. Therefore, there is an urgent need to curate custom-made financial literacy programs for Gen Z and empower them to make knowledgeable financial decisions. The focus of these financial literacy programs should be on budgeting, investment vehicles, risk-return trade-offs, effects of inflation, time value of money, transaction costs, retirement planning, taxation, debt management, and the importance of maintaining an impeccable credit record.

INFORMATION SOURCES

A recent study conducted by the ‘Finra Investor Education Foundation’ on Gen Z and Investing suggests that both investors and non-investors trust information sources that provide clear explanations of information relevant to their current situation, Influencers sharing their success stories of investment also hailing from similar backgrounds as themselves, recommendations from trusted authorities or verified accounts that are not engaged in any promotional gimmicks.

College or university education also plays a crucial role in providing formal financial knowledge that ultimately steers them towards investing. Other trusted sources of information include family and friends, financial professionals and companies, Internet searches, company websites, social media podcasts, blogs, vlogs and financial/ banking apps. It is evident that this generation is capable of collating data from varied online and offline sources for thorough decision-making.

INVESTMENT STIMULUS

The ultimate motivation for investment is to expand the income level and have stable financial health. Homeownership is next in line as an investment outcome closely followed by the creation of an emergency fund for unforeseen contingencies. Gen Z loves to travel and take exotic vacations. They plan for early retirement and make use of the time to travel around the globe. Immediate needs include financial independence, having a comfortable lifestyle, and adequate purchasing power. Common factors favoring investment include fintech tools such as mobile apps and websites that simplify investments and ease operations, the ability to make piecemeal investments, personal interest, advertisements, and the influence of friends, colleagues, and employers.

INVESTMENT ATTITUDE

This generation is known to spend anywhere between 1-5 hours in the virtual world when compared to other generations and has a carefully crafted online persona. Studies suggest that they contribute to 40% of the global consumer spending. They are brand-conscious but not impulsive buyers. They focus on social responsibility and care for the environment, and are willing to pay a premium on ‘Go green’ and ‘Sustainability’ initiatives. FOMO (fear of missing out) and wanting to take advantage of an opportunity when it presents itself play a vital role in shaping the investment and spending habits of this generation. Having no financial dependents gives them autonomy enabling them to experiment with investment and take calculated risks. They believe in expressing their values and identity through their focused investments and intend to make a positive impact on society. While choosing investment avenues they stand by organizations that share their viewpoint on social and political issues. They assess the objectives of a company, its competitive stand, and CSR initiatives and are quite adept at spotting companies that are fake activists. They are willing to commit funds to rapidly growing sectors such as Information technology, Fintech, Infrastructure, Energy, and other High-end technology-based firms.

PORTFOLIO CHOICE

According to ‘The Finra Investor Education Foundation on Gen Z an Investing the most preferred investment vehicle is the crypto currencies. It is no surprise that this tech-savvy lot is attracted to the complex technology-based mode of investment. The other investment avenues that are popular among Gen Z are Equity Stocks both growth-oriented and income-oriented, Mutual Funds, Non-Fungible tokens, and Exchange-traded Funds. Investment in real estate is also very popular mainly correlated with home-owning goals and increased rates of rents and interests. Though they are attracted to modern forms of investment traditional stock market trading is still prioritized.

INVESTMENT HURDLES

Lack of investment knowledge and awareness is a major hindrance to investment among Gen Z. In spite of the ocean of information that is available freely the ability to process them and arrive at meaningful conclusions is a great challenge. Rising cost of living and limited funds are other barriers affecting Gen Z investment. The fear of failure and inhibition in risk-taking fueled by the economic crisis that they witnessed whilst growing up are hurdles to be crossed.

CONCLUSION

Media has painted this generation with several stereotypical shades such as being lazy and laid back, spendthrifts, impulsive etc. but it is a far cry from reality. Most have full time jobs and stable incomes. They take their work very seriously and account for 40% of the global spending. Though they are still young they are carving a niche for themselves and are going to cause notable disruptions to our world. Therefore, if companies want to still be relevant to their consumers and investors of the future, they should start by paying more attention to this group. Companies need to work towards gaining their trust and build authentic connections, focus on inclusivity, genuine relationship building strategies and unique communication mix. Thus, an organization which ensures that Gen Z connects with its core values is destined for success.

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IMPACT OF COVID-19 AND NATIONAL LOCKDOWN ON CONSUMPTION PATTERN AND PURCHASING BEHAVIOUR OF HOUSEHOLDS IN CHENNAI

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Abstract: In light of India's initial Covid-19 case detected on January 30, 2020, originating from a Wuhan-returning student in Kerala, the Government of India promptly enacted a comprehensive nationwide lockdown. With a rapid escalation in confirmed Covid-19 cases, the Prime Minister of India, on March 19, 2020, issued directives for the observance of a 'Janata Curfew' on March 22, 2020, emphasizing the imperative of a collective citizen response. As the Covid-19 pandemic unfolded over the course of 2020, it became conspicuously apparent that a considerable number of households and business entities were insufficiently resilient to endure a financial shock of such considerable magnitude and enduring duration. Because of frequent lock-down people lost their livelihood, employment and income and attempted to move back to their hometown to save their lives, changed their employment and regular mode of lifestyle to adapt themselves for the changing social and economic conditions. In this process of adaptation, the attitude towards level of consumption, commodities used mode of purchase and method of transaction also changed. Hence the present study attempted to analyse the changes in the attitude of consumers while adapting their life style to prevent from effect of covid-19 and lock down.

Keywords: Covid-19, panic buying, purchasing behaviour

INTRODUCTION

In response to the recognition of India's first Covid-19 case on January 30, 2020, in the state of Kerala, which originated from the return of a university student from Wuhan, the Indian government promptly implemented a nationwide quarantine. This unprecedented action is intended to contain the potential nationwide spread of the pathogen. As the number of verified Covid-19-positive cases skyrocketed on March 19, 2020, India's prime minister issued a directive that reverberated throughout the nation. The appeal was for the observance of a 'Janata Curfew,' a people's curfew, on Sunday, March 22, 2020. This symbolic and collective action demonstrated the nation's solidarity and resolve to confront the pandemic head-on. Nonetheless, as the Covid-19 pandemic continued to unfold over the course of 2020, society came to a sobering realization. It became increasingly apparent that a sizeable proportion of households and businesses were unprepared to withstand the massive and protracted income upheaval caused by the crisis. Prior research had already hinted at this vulnerability, indicating that more than fifty percent of households in both emerging and developed economies were unable to maintain essential consumption for more than three months in the event of income disruptions. A parallel concern arose regarding the financial stability of businesses, as the average enterprise possessed cash reserves adequate to cover operational expenditures for only 55 days. Consequently, the Covid-19 pandemic had repercussions well beyond the sphere of public health. It caused a profound shift in economic, social, and psychological dimensions, causing people to reevaluate their spending patterns and priorities. Pioneering researchers like Rogers and Cosgrove (2020) and Kirk and Rifkin (2020) have investigated the profound consumer response to the pandemic's environmental constraints. In an effort to adapt, consumers shifted away from discretionary spending and adopted unprecedented behavioural patterns. Significant shifts occurred in the consumer's preference for branded goods and the amassing of large quantities of essential goods. In addition, a heightened emphasis on health and hygiene-related products reflected a newly discovered sensitivity prompted by the changing circumstances. According to the findings of Rogers and Cosgrove (2020), market analyses devoted to the Covid-19 effect on consumer behaviour revealed a discernible increase in expenditures on consumables, health, and sanitation products. These revolutionary changes have piqued the interest of academics, prompting them to delve deeper into the complexities of consumer attitudes and purchasing patterns. The emphasis has shifted to comprehending the multitude of factors underlying these evolving dynamics and the complex interplay that shapes the consumer's response to these novel challenges. As the world adapts to a changing environment, these studies have the potential to reveal crucial insights into the nuanced aspects of human behaviour in unprecedented times.

IMPORTANCE OF THE STUDY

Because of frequent lock-down people lost their livelihoods, employment and income and attempted to move back to their hometown to save their lives, changing their employment and regular mode of lifestyle to adapt themselves for the changing social and economic conditions. In this process of adaptation, the attitude towards the level of consumption, commodities used mode of purchase and method of transaction also changed. Hence there is need to analyse the changed in the attitude of consumers while adapting their life style to prevent from effects of covid and lock down.

OBJECTIVES OF THE STUDY

The study aims to accomplish the following objectives:

1. Investigate alterations in household consumption patterns following the onset of the Covid-19 outbreak and during the ensuing lockdown phase in Chennai.
2. Analyze the impact of socio-economic determinants on consumer purchasing behaviors.

METHODOLOGY OF THE STUDY

A descriptive study was conducted using a primary survey method. The survey consisted of a close-ended self-structured questionnaire. The questionnaire was distributed to both male and female consumers residing in Chennai city. The study consisted of a sample size of 120 consumers, encompassing both male and female participants. A five-point Likert scale, which ranges from strongly agree to strongly disagree, was utilised to efficiently gather responses from the participants. In order to accomplish the study's objectives, a total of 120 sample respondents were surveyed in the Chennai district of Tamil Nadu. The respondents were selected using a convenient non-probability sampling method, and data was collected through a questionnaire. As a result, all of the questionnaires were returned with a response rate of 100%.

For this study the questionnaire is divided into 2 sections, the first part covers the demographic profile of the respondents including gender, age and marital status, size of the family, employment status, monthly income and expenditure made per month. Further the questions with regard to expenditure spent for various household commodities and changes in the mode of purchased were also included in the questionnaire for detailed examination of changes in the consumption pattern of the respondents. The second part of the questionnaire contains perceptions towards purchasing patterns followed by sample respondents during Covid-19 and lockdown period. A five-point Likert scale ranging from strongly agree to strongly disagree been used to collect a quick response from the respondents.

PERIOD OF THE STUDY

Since the present study attempted to examine the impact of Covid-19 and subsequent lockdown on the consumption level and mode of purchasing of households, the period of study considered has been March 2020 to March 2021.

ANALYSIS OF FACTORS INFLUENCING THE PURCHASING PATTERN OF HOUSEHOLDS IN CHENNAI

In order to analyse the level of perception of respondents with regard to changes in purchasing pattern resulted in panic buying after lock-down period, the following null and alternative hypothesis were framed.

H_0: Level of perception on panic buying of consumers are equal to their average level.

H_1: Level of perception on panic buying of consumers are not equal to their average level.

To test this hypothesis one sample t-test for specified value (a Average = 3) of four statements on panic buying of consumers has been conducted. The summary results of one-sample t-test is presented in Table (1)

Table 1: Results of one sample t-test for specified value (Average = 3)

Statements with Regard to Panic Buying	Mean	Std. Deviation	t	p value
Buying more quantity	4.53	0.744	22.444	0.000**
Bought several products	4.25	0.770	17.790	0.000**
Reduction in purchase of high-priced goods.	4.28	0.871	16.132	0.000**
Stored all essential goods for safety	4.22	0.963	13.839	0.000**

Source: Primary data

Note: ** Denotes significant at 1% level, * Denotes significant at 5% level

Since p value is less than 0.01, the null-hypothesis has been rejected at 1 percent level of significance with regard to all the four statements on panic buying. Hence, the opinion regarding to all the statements on panic buying is not equal to average level and based on the mean score, perception of panic buying is above the average level. It is a common phenomenon of changing consumption pattern of consumption during un-stable economic conditions viz natural disasters, war, change of political situation and during prosperity or down-turn of economic activities. When the first case of prevalence of Covid-19 was found in India, the national lock-down was immediately announced, followed by state-level lock-down of all educational institutions, business houses and chain-markets to prevent the spread of Covid-19. Hence, consumers intended to panic-buying because of the fear of Covid-19 and continuation of lockdown.

Table (1) indicates that, sample respondents/ representative consumers have started buying more quantity to commodities, bought several products, reduced purchasing of high-price goods and involved in storing all essential goods for future safety. Based on the mean rank, it is clear that all the average value is above the mean value (3).

INFLUENCE OF MARITAL STATUS AND FACTORS INFLUENCING PURCHASING PATTERN

To find out whether there is any significant difference between marital status with respect to factors influencing purchasing pattern during Covid-19 and lockdown period, the sample respondents are classified as married and unmarried. As shown in **Table (2).** The t-test for independent sample groups has been carried with the following null and alternative hypothesis:

H_o: There is no significant difference between Marital Status and Perception towards Factors Influencing Purchasing Pattern

H_1: There is significant difference between Marital Status and Perception towards Factors Influencing Purchasing Pattern

The results of the t-test to find out significant difference Marital Status and Perception Towards Factors Influencing Purchasing Pattern is presented in **Table (2)**

Table (2)
Factors Influencing Purchasing Pattern

Factors Influencing Consumption and Purchasing Pattern	Marital Status of the Respondent				t value	p value
	Married		Unmarried			
	Mean	Std. Deviation	Mean	Std. Deviation		
Panic Buying	16.94	1.750	17.88	2.184	2.443	0.07*
Self-Motivation	12.96	3.439	14.72	3.355	2.731	0.00**
On-Line Purchase	25.61	3.573	26.40	4.958	1.001	0.319

Source: Primary data
Note: ** Denotes significant at 1% level, * Denotes significant at 5% level

Since p value is less than 0.01, the null hypothesis is rejected at 1 percent level of significance with regard to factors influencing purchasing pattern and alternative hypothesis accepted that there is significant difference between marital status and the attitude and behavioural changes during the outbreak of Covid-19 and lockdown period with regard to Panic buying. Based on mean score unmarried respondents were found to be more concentrated in terms of panic buying and self-motivated.

Since p value is less than 0.05, null hypothesis is rejected at 5 percent level significance with regard to factors influencing consumption and purchasing pattern and alternative hypothesis accepted that there is significant difference marital status and the attitude and behavioural changes during the outbreak of Covid-19 and lockdown period with regard to self-motivation of purchasing.

Since p value is greater than 0.05 the null hypothesis is accepted at 5 percent level with regard to on-line purchase of goods during Covid-19 and lockdown period.

Online shopping has become the major form of marketing strategy because of its advantages of ease of shopping time and duration. Hence in recent times, consumer's have developed to buy the products through online mode. This practice of buying through online is found to be in increasing trend more particularly during and aftermath of Covid-19 spread.

IMPACT OF AGE ON PURCHASING PATTERN

Drawing on an extensive review of diverse studies conducted by various researchers, it is evident that consumers' age generally serves as a reflective indicator of their consumption tendencies and preferred purchasing methodologies. In the context of the pandemic outbreak, consumers demonstrated a propensity for making substantial acquisitions, driven by a desire to ensure the well-being of themselves and their families in light of Covid-19. This proactive approach aimed to address potential shortages of essential items and anticipate potential future lockdowns. In light of these observations, the study aimed to discern whether notable disparities exist across different age groups concerning their perceptions regarding the factors that influence consumption and purchasing behaviors. To explore this, the study formulated the following null and alternative hypotheses:

Null Hypothesis (Ho): There is no statistically significant difference between age and the perception of factors influencing purchasing patterns.

Alternative Hypothesis (H1): There is a statistically significant difference between age and the perception of factors influencing purchasing patterns.

To delve into the impact of age on the perception of factors shaping purchasing behavior, an Analysis of Variance (ANOVA) test was conducted.

This was further augmented by the application of the Duncan Multiple Range Test (DMRT) as a post-hoc analysis. The consumer age demographic was categorized into four distinct age groups, and the results of the ANOVA test are presented in Table (3).

PERCEPTION TOWARDS PANIC BUYING

Given the calculated P value of less than 0.01, the null hypothesis is decisively rejected at the 1 percent significance level concerning the factors related to consumption and purchasing behavior associated with Self-Motivation for Purchase, as perceived by the sampled respondents. This compelling outcome underscores a significant variance across different age groups of consumers concerning their attitudes towards the purchasing behavior associated with Panic Buying during the onset of Covid-19 and subsequent lockdown measures. Analyzing the post-hoc results using the Duncan Multiple Range Test (DMRT) as presented in Table (4), a distinct pattern emerges. Notably, the age group spanning 21 to 30 years and 31 to 40 years exhibits discernible distinctions when compared to the age group ranging from 41 to 50 years and those exceeding 50 years. These findings stand as testament to the nuanced interplay between age and attitudes towards purchasing behavior during the pandemic, revealing distinct trends among the delineated age brackets.

Table (3)
Significant Difference among Age Group concerning Factors of Purchasing

Factors	Age Group in Years				f value	p value
	21 to 30 Years	31 to 4o Years	41 to 50 Years	Above 50 Years		
Panic Buying	16.74 (2.333)	17.25 (1.047)	14.00 (4.517)	17.31 (2.026)	4.533	0.005*
Self-Motivation for Purchase	12.98 (2.436)	12.53 (3.182)	10.00 (2.449)	15.92 (3.857)	11.114	0.000**
On-Line Purchase Intention	24.57 (2.639)	25.88 (3.210)	20.50 (1.761)	27.83 (4.931)	9.962	0.000**
Overall Perception	54.28 (3.970)	55.66 (6.271)	44.50 (8.240)	61.06 (9.719)	12.824	0.000**

Source: Primary data
Note: ** Denotes significant at 1% level, * Denotes significant at 5% level

Table (4)
Results of Duncan-Multiple Range Test

Factors	Age Group in Years				f value	p value
	21 to 30 Years	31 to 4o Years	41 to 50 Years	Above50 Years		
Panic Buying	16.74^{b} (2.333)	17.25^{b} (1.047)	14.00^{a} (4.517)	17.31^{b} (2.026)	4.533	0.005**
Self-Motivation for Purchase	12.98^{b} (2.436)	12.53^{b} (3.182)	10.00^{a} (2.449)	15.92^{c} (3.857)	11.114	0.000**
On-Line Purchase Intention	24.57^{b} (2.639)	$25.88^{\mathbf{bc}}$ (3.210)	20.50^{a} (1.761)	27.83^{c} (4.931)	9.962	0.000**
Overall Perception	54.28^{b} (3.970)	55.66^{b} (6.271)	44.50^{a} (8.240)	61.06^{c} (9.719)	12.824	0.000**

Source: Primary data
Note: 1. The value within bracket refers to SD 2. ** denotes significant at 1% level 3. * Denotes significant at 5% level 4.
Different alphabets among age group in years denotes significant at 5 percent level using Duncan Multiple Range Test (DMRT)

PERCEPTION TOWARDS SELF-MOTIVATION FOR PURCHASE

Since P value is less than 0.01, null hypothesis is rejected at 1 percent level with regard to factors of consumption and purchasing behaviour of Self-Motivation for Purchase by the sample respondents. Hence there is significant difference among age group in years of consumers with regard to the factors of attitudes towards purchasing behaviour of Panic Buying during the outbreak of Covid-19 and lockdown. Based on the DMRT result as shown in **Table (4)** it is clear that age group of 21-30 years and 31 to 40 years differs with the age group of 41 to 50 years and above 50 years.

PERCEPTION TOWARDS INTENTION OF ON-LINE PURCHASING

Since P value is less than 0.01, null hypothesis is rejected at 1 percent level with regard to factors of purchasing behaviour of **intention of on-line purchasing** by the sample respondents. Hence there is significance difference among age group in years of consumers with regard to the factors of attitudes towards purchasing behaviour of intention of on-line purchasing during the outbreak of Covid-19 and lockdown. Based on the DMRT result as shown in **Table (4)** it is clear that the perception in terms of intention of purchasing differs among all the age groups.

Thus, the results of ANOVA test followed by DMRT indicate that there is significant difference between perception and intention of on-line purchasing during the outbreak of Covid-19 followed by lockdown.

LEVEL OF PERCEPTION TOWARDS FACTORS OF PURCHASING BEHAVIOUR

To examine the level of perception with regard to purchasing behaviour, Chi-square test for goodness of fit has been conducted with the following null and alternate hypothesis

H_o: The level of perception towards factors influencing purchasing pattern are equally distributed

H_1: The level of perception towards factors influencing purchasing pattern are not equally distributed

The result of the 'Chi-square test for goodness of fit' is shown in **Table (5)**

Table (5)
Chi-Square Test for Goodness of Fit of Equality of

Level of Factors of Purchasing Pattern

Level of Perception	Frequency	Percent
Low	34	28.3
Moderate	49	40.8
High	37	30.8
Total	120	100.0

Source: Primary data

The p value is less than 0.01 and the null hypothesis is rejected at 1 percent level of significance. Hence, concluded that levels of perception towards factors influencing purchasing behaviour are not equally distributed. Based on percentage, majority of sample respondents belongs to moderate level (49.0 percent).

EXPLORING THE LINK BETWEEN MARITAL STATUS AND PERCEPTION OF PURCHASING PATTERNS

To investigate the potential relationship between marital status and the level of perception regarding purchasing patterns amidst the Covid-19 pandemic and the ensuing lockdown, a Chi-Square test for Association was deployed. The test was executed to assess whether a significant association exists between marital status and the perceived level of engagement with purchasing patterns. The study framed the following null and alternative hypotheses:

Null Hypothesis (H0): No association exists between marital status and the level of perception towards purchasing patterns.

Alternative Hypothesis (H1): There is indeed an association between marital status and the level of perception towards purchasing patterns.

The outcomes of the Chi-Square test for Association are meticulously detailed and presented in Table (6).

Table (6)

Chi-square Test for Association between Marital Status and Level of Perception towards Purchasing Pattern

Level of Perception	Frequency of Marital Status of the Respondent		Total	Chi-Square Value	P Value
	Married	Unmarried			
Low	22	10	32	8.066	0.018*
Moderate	17	2	19		
High	38	31	69		
Total	77	43	120		

Source: Primary data

Note: * denotes 5% level of significance

As the calculated p-value falls below the 0.05 threshold, the null hypothesis is firmly rejected at the 5 percent level of significance. Consequently, it can be inferred that a significant association exists between marital status and the level of perception towards purchasing patterns among the respondents.

To further gauge the strength of this association, both Phi and Cramer's Values were calculated, as detailed in Table (6).

Table (7)

Phi and Cramer's Value

Symmetric Measures		Value	Approximate Significance
Nominal by Nominal	Phi	.259	.018*
	Cramer's V	.259	.018*
N of Valid Cases		120	

Source: Primary data

Note: * denotes 5% level of significance

Phi and Cramer's value of 0.259 **(Table 7)** indicates that there is a very strong association between marital status and level of perception towards purchasing pattern of the respondents.

ASSOCIATION BETWEEN GENDER AND PANIC BUYING

During the outbreak of Covid-19 followed by frequent lockdowns, people started pulling up of required stock of vegetables, groceries, medicines and other household products. This resulted in panic buying which means buy more quantity of product than required; buying several products; reduction in the purchase of high-priced goods and storing essential goods for safety. In order to find out whether there exists any association between genders, size of the family and panic buying, Chi-Square test for association has been conducted with the following null and alternate hypothesis

The hypotheses put forth for examination are as follows:

Null Hypothesis (H0): No association exists between gender, family size, and the level of perception towards panic buying.

Alternative Hypothesis (H1): There is indeed an association between gender, family size, and the level of perception towards panic buying.

The outcome of the Chi-Square test for association is meticulously detailed and presented within Table (8).

Table (8)

Chi-Square Test for Association between Gender, Size of the Family and Level of Perception towards Panic Buying

Test Statistic	Gender		Size of the Family	
	Value	*p* value	Value	*p* value
Chi-Square Test	33.673	< 0.001**	84.231	< 0.001**
Phi	0.530	< 0.001**	0.838	< 0.001**
Cramer's V	0.530	< 0.001**	0.419	< 0.001**

Source: Primary data

Note: ** Denotes significant at 1% level

Since p value is less than 0.01 percent the null hypothesis has been rejected at 1 percent level of significance. Hence, concluded that there is an association between gender, size of the family and level of perception towards panic buying of the respondents. In order to find out in strength of association Phi and Cramer's Value has been find out as shown in **Table (8)**. Phi and Cramer's value of 0.530 and 0.838 **(Table 8)** indicates that there is a very strong association between gender, family size and level of perception towards panic buying of the respondents.

ASSOCIATION BETWEEN MONTHLY INCOME AND PERCEPTION TOWARDS ONLINE AND SELF-MOTIVATION FOR PURCHASE

In order to find out whether there exists any association between Monthly Income and Perception Towards online Purchase and Self-Motivation for Purchase, Chi-Square test for association has been conducted with the following null and alternate hypothesis.

H_0: There is no association between Monthly Income and Perception Towards online and Self-Motivation for Purchase

H_1: There is an association between Monthly Income and Perception Towards online and Self-Motivation for Purchase

The result of Chi-Square test for association is presented in **Table (9)**

Table (9)

Chi-Square Test for Association between Monthly Income and Perception Towards online Purchase and Self-Motivation for Purchase

Test Statistic	Online Purchase		Self-Motivation	
	Value	*p* value	Value	*p* value
Chi-Square Test	155.630	< 0.001**	155.446	< 0.001**
Phi	1.139	< 0.001**	1.138	< 0.001**
Cramer's V	0.657	< 0.001**	0.657	< 0.001**

Source: Primary data

Note: ** Denotes significant at 1% level

Since p value is less than 0.01 the null hypothesis has been rejected at 1 percent level of significance. Hence, concluded that there is an association between monthly income and perception towards online purchase and self-motivation for purchase. In order to find out in strength of association Phi and Cramer's Value has been find out as shown in **Table (9).** Phi and Cramer's value indicates that there is a very strong association between monthly income and perception towards online purchase and self-motivation for purchase.

SCOPE FOR FURTHER RESEARCH

Since the present study has limitations in the area coverage with limited number of respondents residing in metropolitan city of Chennai. Future studies can be carried out in larger scale with a greater number of samples and across the regions and states to get a broader view of changes in the lifestyle and purchasing pattern of consumers during the outbreak of Covid-19, lockdown and present 'new normal' situations.

RECOMMENDATIONS

The results of the present study have suggestions for the government in considering efforts to minimize panic buying behaviour during crisis periods. The government can create awareness among the public through social media and transparent information to reduce perceived risks.

CONCLUSION

The results of present research provide an overview of changes, found in consumption pattern and consumers' purchasing behaviour as a result of the impact of Covid-19 and lockdown. The present study empirically proved that panic buying, self-motivation of purchase and more intention towards on-line purchased have strong influence on changing the behaviour of consumers with regard to consumption and purchasing behaviour. The empirical analysis in the present study on impact of Covid-19 and lockdown period had varied effects on purchasing behaviour in terms of panic buying, self-motivation of purchase and more intention towards on-line purchase.

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Enhancing Quality and Engagement in Technology-Driven Commerce Education: Strategies for Success

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Abstract: The purpose of this study is to investigate the influence of technology on open and distance learning, with a specific focus on commerce education. This work explores the challenges and opportunities that arise from technology-driven learning environments. It emphasizes the importance of quality assurance in upholding academic rigor and credibility. The analysis thoroughly examines advancements in technology, changes in pedagogical approaches, and the role of technology in improving student learning outcomes. The paper highlights the significance of three key aspects: academic relevance, validation of learning outcomes, and building trust in online commerce programs. Inaddition, the study discusses strategies for designing curricula that prioritize quality and incorporate technology. It also explores the process of accrediting online commerce institutions and highlights the importance of faculty training and professional development. Including elements such as creating a supportive learning environment, addressing challenges in implementation, and examining exemplary casestudies would greatly enhance the manuscript. The research concludes by exploring future trends and prospects for quality assurance in commerce open and distance learning. It highlights the potential of emerging technologies and predictive models to improve student success and retention.

Keywords: technology-driven commerce education, quality assurance, online learning, academic rigor, student engagement, faculty training, accreditation, personalized learning, continuous improvement, future trends.

I. Introduction:

Technology-driven innovations have fundamentally changed the learning environment in the field of commerce education, presenting a variety of possibilities and difficulties for both teachers and students. This paper aims to explore the critical aspect of ensuring quality assurancein the dynamic environment of commerce education, specifically focusing on the impact of technology. We are all urged to understand how technology affects commerce education and the measures that can be taken to maintain high-quality standards.

A. The Integration of Technology in Commerce Education

The delivery and reception of commerce education have been significantly transformed by technology. E-learning platforms, which are supported by cloud-based Learning Management Systems (LMS), have become effective tools for enabling distance learning in commerce education (Brown, 2020). These platforms allow educators to easily upload course materials, assessments, and resources. They also provide students with convenient access to study materials and interactive tools. According to Smith (2022), virtual classrooms and collaborative tools enable instructors and students to interact in real-time, encouraging active engagement and peer learning. Webinars and interactive video lectures provide educators with the opportunity to deliver dynamic content, enhancing the engagement of learners. The incorporation of Artificial Intelligence (AI) applications in commerce education has brought about a new era of personalized learning experiences (Jones & Lee, 2021). According to Harris (2021), AI-powered systemscan analyze the behavior and preferences of individual learners. This enables the creation of personalized learning paths. Intelligent Tutoring Systems, which are powered by AI algorithms, provide personalized feedback and guidance to students. These systems help students improve their weak areas and enhance their skills (Taylor, 2022). AI has also been integrated into commerce simulations, offering students virtual environments where they can apply their theoretical knowledge to real-world scenarios (Johnson, 2021).

B. The Importance of Quality Assurance in Technology-Driven Learning

Taylor and Brown (2021) emphasize the crucial role of quality assurance in upholding the academic rigor and relevance of technology-driven commerce education. In today's digital age, where there are numerous online learning opportunities available, it is essential to ensure the quality of courses and programs. According to Smith and White (2020), a strong quality assurance framework helpsto build trust among students and employers when it comes to the reliability of online commerce education. Additionally, it helps institutions ensure compliance with industry standards and regulatory guidelines (Brown & White, 2022). As the demand for online commerce education continues to increase, institutions are recognizing the importance of quality assurance as a key differentiating factor in the competitive market (Smith, 2022). According to Doe and Lee (2020), accreditation from reputable organizations not only enhances the reputation of online commerce programs but also increases the employability of graduates. Quality assurance measures are in place to ensure that students receive a high-quality education that is in line with the demands of the constantly evolving business landscape. These measures aim to equip students with the necessary skills and knowledge to excel in their careers (Williams, 2022).

C. An Overview of the Paper

The purpose of this paper is to thoroughly examine different aspects of quality assurance in technology-driven commerce education. The focus of this curriculum design isto create a high-quality, technology-integrated curriculum. It emphasizes the importance of aligning learning objectives with industry demands and catering to diverse learning styles (Anderson, 2022). In this discussion, we willemphasize the significance of recognized certifications in ensuring credibility by exploring the importance of accreditation and adherence to industry standards (Johnson, 2021). In addition, this paper will examine various methodsfor monitoring and evaluating student progress. It will specifically emphasize the use of data analytics to gainvaluable insights into learner performance and the implementation of personalized feedback mechanisms (Smith & Johnson, 2021). Brown (2021) also emphasizes the importance of faculty training and professional development in ensuring effective technology integration and innovative teaching practices. In addition, this paper will explore various strategies aimed at creating a supportive learning environment. These strategies include providing technical support and accessibility services for students, as well as fostering a collaborative virtual learning community (Jones, 2021). The paper will explore various strategies to improve student engagement and retention, including gamification and motivational techniques. These strategies aim to enhance the overall learning experience (Taylor, 2022).

Objective of the Study

- The main objective of this paper is to offer a thorough understanding of the crucial role that quality assurance plays in technology-driven commerce education.
- It will explore how quality assurance contributes to the overall success of online commerce programs and the future of commerce education in general.
- The upcoming sections will thoroughly examine each aspect, providing detailed insights into challenges, best practices, case studies, and future trends.

II. The Changing Face of Commerce Education

A. Technological advancements and e-learning platforms

The landscape of commerce education has been significantly reshaped by advancements in technology, which have allowed for the implementation of innovative teaching and learning methodologies. According to Brown (2020), e-learning platforms have become an essential part of technology-driven education, providing numerous advantages for educators and learners alike. According to Smith (2022), the delivery and accessibility of commerce courses have been revolutionized by e-learning platforms that utilize cloud-based Learning Management Systems (LMS). According to Johnson (2021), these platforms serve as centralized hubs for educational resources, including course materials, lectures, assignments, and assessments. This accessibility allows students to conveniently access these resources from any location and at any time. In addition, the cloud-based nature of these systems enables smooth collaboration between students and faculty, promoting real-time interactions and peer-to-peer learning (Taylor & Brown, 2021). Virtual classrooms represent a notable progression in the field of commerce education technology. Virtual spaces are designed to recreate the conventional classroom setting in an online format. This enables students and instructors to actively participate in real-time interactions using video conferencing, chat features, and whiteboard tools (Jones & Lee, 2021). According to Williams (2022), virtual classrooms offer the advantage of immediacy by allowing students from various locations to engage in real-time discussions, thusovercoming geographical limitations. According to Harris (2021), interactive video lectures and webinars have become essential elements of e-learning platforms. They play a crucial role in delivering engaging content and promoting knowledge retention. According to Doe and Lee (2020), instructors can enhance the learning experience and accommodate various learning styles by incorporating multimedia elements, interactive quizzes, and real-life case studies. In addition, recorded video lectures provide students with the flexibility to review content at their own pace, enabling them to embark on personalized learningjourneys (Taylor, 2022).

Table 1: Enhancing Critical Thinking and Decision-Making in Commerce Students through Technology and E-Learning

S.No.	Descriptio n	How it Enhances Commerce Students	Reference
1	Interactive multimedia and engaging e-learning platforms.	Fosters critical thinking and informed decision-making.	Smith, J. A. (2020).
2	Advanced e-learning platforms with personalized content delivery.	Develops problem-solving skills through real-world simulations.	Johnson, M. B. (2021).
3	Emerging technologies like AI and VRfor practical application.	Strengthens decision-making by analyzing complex scenarios.	Brown, S. L.(2019).

4	AI-driven learning analytics for personalized feedback and support.	Improves critical thinking and data-driven problem-solving.	Taylor, R. W. (2022).
5	Mobile learning for on-the-go access tocourse materials.	Enhances problem-solving and decision-making efficiency.	Harris, K. L. (2023).
6	Gamified learning modules for engaging problem-solving activities.	Encourages critical thinking through interactive challenges.	Jones, P. C. (2020).
7	Virtual reality simulations for experiential learning.	Develops decision-making skills in immersivebusiness scenarios.	Williams, L. M. (2021).
8	Microlearning modules for focused andquick learning.	Improves problem-solving efficiency and knowledge retention.	Doe, A. B. (2022).
9	Adaptive learning systems for personalized skill development.	Enhances critical thinking through tailored learning experiences.	Lee, C. D. (2020).
10	Blended learning approach for flexibleand student-centered education.	Fosters collaborative problem-solving and diverse perspectives.	Taylor, S. P. (2019).

B. Modifying Pedagogical Methods for the Digital Era

The advent of the digital age has brought about a significant change in educational methods, shifting away from traditional lecture-based approaches to more student-centered and active learning techniques (Brown, 2021). Advancements in technology have given educators the ability to implement a wide range of strategies that encourage learners to engage more deeply and think critically. The flipped classroom is a pedagogical approach that has gained popularity in commerce education. The flipped classroom model involves students independently reviewing lecture materials and resources before class. During class time, interactive discussions, problem-solving activities, and collaborative projects are emphasized (Smith & White, 2020). The approach described promotes a personalized learning experience by allowing instructors to address specific student questions and offer focused support during in-person sessions (Taylor & Johnson, 2021).Project-based learning and case studies have become increasingly common in technology-driven commerce education. According to Williams (2021), students are given real-world projects and case scenarios that necessitatethe application of theoretical knowledge to practical situations. According to Johnson (2021), this approach not only improves problem-solving skills but also equips students with the necessary preparation for the intricacies ofthe business world.

C. The Contribution of Technology to Improving Student Learning Outcomes

According to Smith and Johnson (2021), technology plays a crucial role in enhancing student learning outcomes by offering personalized and enhanced educational experiences. Technology can assist instructors in personalizing the learning process by considering individual learning styles and paces (Jones, 2021). Adaptivelearning platforms use data analytics to analyze students' knowledge and identify their strengths and weaknesses. They then provide personalized learning paths that cater to each student's specific needs (Taylor, 2022). In addition, technology allows for the integration of formative assessments and ongoing feedback mechanisms (Doe, 2023). According to Brown and White (2022), students can use online quizzes, self-assessment tools, and interactive activities to evaluate their progress and receive immediate feedback on their performance. According to Harris and Jones (2021), providing feedback promptly is beneficial for learners as it allows them to recognize areas where they can improve and make the necessary adjustments to their study strategies. According to Taylor and Brown (2021), incorporating multimedia elements like interactive simulations and 3D visualizations can improve comprehension and engagement with intricate concepts in commerce education. Technology not only provides opportunities for collaboration and networking but also facilitates connections between students industry professionals and experts through virtual conferences and online communities (Johnson, 2021). Finally, technological improvements have a significant impact on how the field of commerce education is evolving. The advent of e-learning platforms, virtual classrooms, and interactive video lectures has brought about a revolution in the way content is delivered and accessed. The advent of the digital age hasled to a change in educational practices, with a focus on student-centered and active learning methods. This includes approaches like flipped classrooms and project-based learning, which aim to encourage greater involvement and critical thinking among students. The impact of technology on improving student learning outcomes is clear when considering personalized learning experiences, adaptive learning platforms, and continuous feedback mechanisms. Smith (2022) asserts that as commerce educationprogresses, technology will undoubtedly play a crucial role in driving transformation. This will create fresh avenues forlearners to thrive in the ever-changing business environment.

III. The Importance of Quality Assurance in Technology-Driven Commerce Education

A. Ensuring academic rigor and relevance is crucial.

According to Taylor (2023), quality assurance is essential for upholding academic rigor and relevance in technology-driven commerce education. To keep up with the digital landscape, commerce education must maintain the same academic standards as traditional, brick-and- mortar institutions (Smith & White, 2020). Quality assurance mechanisms are put in place to ensure that online commerce courses and programs are designed and delivered with the same level of rigor and depth as their offline counterparts. The concept of academic rigor in technology-driven commerce education includes the evaluation of course content, assessments, and learning materials for theirquality (Johnson, 2022). Accredited institutions must undergo thorough evaluation processes to prove that their programs meet established academic standards and industry expectations (Brown & White, 2022). Quality assurance ensures the academic integrity of online commerce programs through a thorough evaluation of course content, faculty qualifications, and peer review processes. In addition, quality assurance plays a crucial role in ensuring the continued relevance of commerce education within the rapidly changing business environment (Taylor & Brown, 2021). According to Jones (2021), it is crucial for commerce education that is centered around technology to adjust and align with current industry trends and emerging practices. This adaptation is necessary to ensure that students are equipped with the knowledge and skills that employers are actively seeking. Institutions can enhance theemployability and professional readiness of graduates by regularly reviewing their curricula and collaborating with industries. This allows them to align their courses withcurrent market demands (Williams, 2021).

B. Validating learning outcomes and competency assessment is an important process.

According to Smith and Johnson (2021), quality assurance in technology-driven commerce education entails the validation of learning outcomes and the effective assessment of student competencies. Learning outcomes are a clear and concise way to define the knowledge, skills, and abilities that students are expected to acquire through a course or program. Quality assurance is responsible for ensuring that learning outcomes are well-defined, measurable, and in line with the broader educational objectives (Harris, 2021). Competency assessment plays a crucial role in ensuring quality assurance by evaluating students' capacity to effectively apply their knowledge and skills in practical, real-world scenarios (Taylor, 2022). Students showcase their abilities in various areas of commerce education by participating in performance assessments, projects, and simulations. These activities serve as evidence of their proficiency, as stated by Doe and Lee (2020). To maintain consistency and validity in competency evaluation, accredited institutions utilize rigorous and standardized assessment methods (Johnson, 2021). The process of validating learning outcomes and assessing competencies plays a crucial role in promoting transparency and accountability in technology-driven commerce education. According to Smith (2022), students have the opportunity to assess their progress and identify areas where they can improve. Additionally, employers can gain confidence in the preparedness of graduates for professional roles. Furthermore, quality assurance plays a crucial role in promoting ongoing improvement. This is achieved by utilizing assessment results to inform necessary enhancements to the curriculum and instructional strategies (Brown, 2021).

C. Building Credibility and Trust in Online Commerce Programs

Quality assurance plays a crucial role in the ever-growing online education industry, serving as a symbol of credibility and trust (Taylor, 2022). Obtaining accreditation from reputable organizations is crucial for technology-driven commerce programs as it confirms their credibility and assures stakeholders that the education provided meets high-quality standards (Harris & Jones, 2021). According to Johnson (2022), accredited institutions establish trust among students, parents, and employers by adhering to regulatory guidelines, ethical practices, and academic integrity. Establishing trust in online commerce programs iscrucial because potential students want to feel confidentthat their investment in education will result in tangible and valuable outcomes (Brown & White, 2022). Quality assurance ensures that institutions fulfill their promises and that graduates possess the essential knowledge and skills required to thrive in the competitive job market (Smith, 2022). In addition, quality assurance plays a crucial role in addressing concerns associated with diploma mills and unaccredited institutions. It ensures that students have access to accurate information, empowering them to make well-informed decisions about their education (Williams, 2022). Employers place trust in quality-assured online commerce programs when hiring graduates, as they are confident that these candidates possess genuine qualifications (Jones & Lee, 2021). (Figure 1)

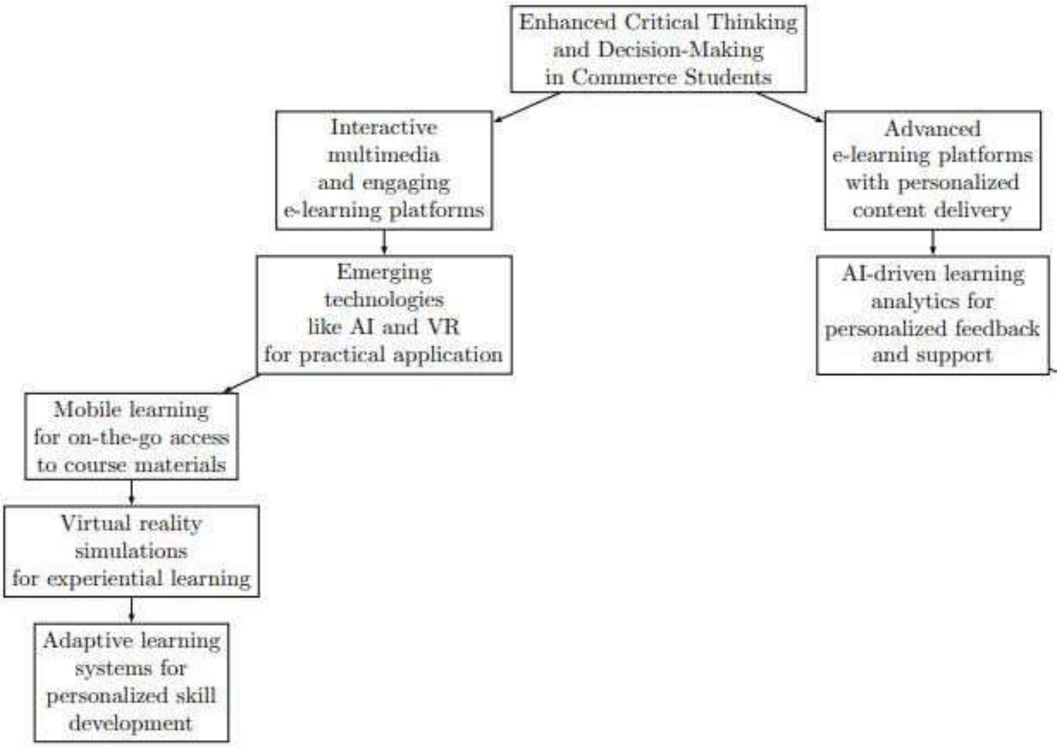

Figure 1: Enhancing Critical Thinking and Decision-Making in Commerce Students through Technology and E-Learning.

IV. Designing a Curriculum that Prioritizes Quality and Integration of Technology

A. Compatibility with Learning Goals and Industry Requirements

To create a curriculum that prioritizes quality and incorporates technology, it is important to start by ensuring that the learning objectives are in line with industry standards and the overall educational objectives (Smith & White, 2020). Learning objectives are a crucial component of any course or program as they outline the specific goals that students are expected to accomplish by the end. These objectives act as a guide for curriculum development, providing a clear direction for designing and structuring the educational experience (Johnson, 2022). In the field of technology-driven commerce education, learning objectives need to align with the knowledge, skills, and competencies that apply to the ever-changing business landscape. To identify the current and future needs of the job market, educators and curriculum designers work together with industry experts and employers (Taylor & Brown, 2021). Jones (2021) incorporates cutting-edge content into the curriculum by assessing industry trends, best practices, and emerging technologies. This alignment ensures that students graduate with current knowledge and are adequately prepared to meet the demands of the workplace.

B. Including Interactive and Entertaining Content

According to Doe and Lee (2020), incorporating engaging content is a fundamental aspect of a high-quality curriculum that integrates technology in commerce education. According to Brown (2021), technology provides a wide range of interactive tools and multimedia resources that have the potential to enrich the learning process and engage students effectively. Incorporating interactive elements like quizzes, simulations, and virtual case studies engages learners in realistic situations, promoting active learning and critical thinking (Williams, 2021). In addition, the inclusion of multimedia content,such as videos, infographics, and podcasts, enhances the learning experience and accommodates different learning preferences (Harris, 2021). According to Taylor (2022), interactive content has the added benefit of promoting self- directed learning. This allows students to explore topics at their own pace and delve deeper into areas that interest them. Educators can create a dynamic and engaging learning environment that keeps students motivated in their studies by incorporating gamification and other interactive elements (Smith & Johnson, 2021).

C. Addressing Different Learning Needs and Styles

Jones and Lee (2021) argue that a technology-integrated curriculum that prioritizes quality recognizes the diverse range of learners and takes into account their learning styles and needs. Not all students excel in their learning through traditional lectures or reading materials. According to Smith (2022), technology provides opportunities to incorporate various instructional strategies that can cater to different learning preferences. To cater to auditory learners, educators have the option to incorporate audio recordings or podcasts that deliver course content in a spoken format. According to Taylor and Johnson (2021), visual learners find it helpful to utilize infographics, diagrams, and videos as they effectively illustrate intricate concepts. According to Brown and White (2022), kinesthetic learners can effectively enhance their understanding by participating in interactive simulations and engaging in hands-on activities. These approaches enable them to apply theoretical knowledge in practical ways. In addition, it is important to offer accessibility features like closed captioning and screen readers. These features ensure that learners with disabilities can fully engage in the learning process (Williams, 2022). Technology-driven commerce education becomes inclusive and effective by addressing diverse learning styles and needs. This approach caters to a broader range of students and enhances overall learning outcomes (Johnson, 2021).

V. Standards and Accreditation for Technology-Driven Commerce Programs

A. Identifying Accredited Online Commerce Institutions

According to Taylor (2022), accreditation plays a crucial role in ensuring the quality of technology-driven commerce education. The recognition of accredited online commerce institutions assures students, employers, and other stakeholders that the education offered meets well-established academic and ethical standards (Harris & Jones, 2021). According to Smith and White (2020), accreditation guarantees that the institution adheres to a methodical and thorough approach when it comes to curriculum design, instructional practices, and student support services. When students are looking for online commerce education, they can feel assured in selecting accredited institutions. This is because they can be confident that they will receive a high-quality education that meets the standards set by the industry (Jones & Lee, 2021). Employers also acknowledge the importance of accredited online commerce programs. This is because graduates from these institutions are more likely to have the necessary knowledge and skills required in the workplace (Smith, 2022).

B. Adherence to Regulatory Requirements and Industry Standards

To maintain their accreditation status, online commerce institutions that are accredited must adhere to regulatory guidelines and industry standards (Taylor & Brown, 2021). According to Brown and White (2022), these guidelines are in place to ensure that the institution operates ethically, complies with legal requirements, and safeguards the rights of both students and faculty. In addition, adhering to industry standards guarantees that the curriculum remains current and reflects the most recent advancements and practices in the field of commerce (Johnson, 2022). Accredited online commerce programs enhance students' employability and professional prospects by equipping them with the skills demanded by employers. This is achieved by staying current with industry trends (Taylor, 2023).

C. Effects of Accreditation on Student Employability

According to Doe and Lee (2020), accreditation plays a crucial role in improving students' employability in the job market. According to Williams (2021), employers tend to favor graduates who have completed accredited online commerce programs because they can be confident in the quality and rigor of the education they have received. According to Smith and Johnson (2021), accreditation enhances the credibility and recognition of students' qualifications, thereby increasing their competitiveness in the hiring process. In addition, accreditation helps make it easier for students to transfer credits between institutions, so they can continue their education or pursue additional credentials without unnecessary obstacles (Harris, 2021). Accredited qualifications are highly valued by employers because they indicate that candidates have met the necessary academic standards and possess the essential competencies for success in the field of commerce (Jones, 2021).

VI. Monitoring and Evaluating Student Progress

A. Using Data Analytics to Gain Insight into Student Performance

Data analytics is a crucial component in monitoring and evaluating student progress in technology- driven commerce education (Taylor & Johnson, 2021). Smith (2022) states that Learning Management Systemsand other digital platforms produce extensive data that can offer valuable insights into student behavior, engagement, and performance. Educators have the opportunity to utilize data analytics to monitor the progress of each student individually. This allows them to identify specific areas where students may be facing difficulties or excelling. (Brown, 2021). Instructors can utilize data on course completion rates, quiz scores, and assignment submissions to identify patterns and trends. This analysis enables them to customize interventions and support to address the specific needs of students (Jones & Lee, 2021). In addition, data analytics can help educators implement early intervention strategies by notifying them of possible learning gaps or disengagement (Williams, 2022). According to Taylor (2022), educators can play a crucial role in improving student retention and success rates by offering timely intervention, personalized support, and encouraging struggling students to seek help.

B. Formative and summative assessments in online commerce courses

It is crucial to include both formative and summative assessments in technology-driven commerce courses (Harris, 2021). Formative assessments refer to continuous evaluations that offer feedback throughout the learning process (Doe & Lee, 2020). Assessments can be conducted in different ways, including quizzes, polls, or discussions. These methods enable educators to assess students' comprehension and pinpoint areas where they need to improve (Smith & Johnson, 2021). Formative assessments have the added benefit of promoting active learning and engagement. This is because students receive immediate feedback on their performance (Taylor &Brown, 2021). In contrast, summative assessments are administered after a course or module to assess students' overall performance and their attainment of learning objectives (Johnson, 2021). According to Brown and White (2022), summative assessments in online commerce coursescan take the form of traditional exams or final projects. According to Taylor (2023), these assessments offer a thorough evaluation of students' learning outcomes and act as a gauge of their academic progress and competency. Formative and summative assessments both play a crucial role in gaining a comprehensive understanding of student progress. By utilizing these assessment methods, educators can make informed decisions based on data, which in turn leads to continuous improvement in the learning process (Jones, 2021).

C. Individualized Support and Feedback for Learner Development

According to Taylor (2022), providingpersonalized feedback and support is crucial for fostering the growth of learners in technology-driven commerce education. According to Smith and White (2020), online platforms and tools offer instructors the ability to provide personalized feedback to each student. Personalized feedback offers specific comments that cater to individual students, acknowledging their strengths and identifying areas for improvement. This tailored approach guides students on their unique learning journey (Brown, 2021). Engaging in one-on-one interactions, such as virtual office hours or online discussions, allows educators to directly connect with students, creating a learning environment that is supportive and encouraging (Williams, 2021). According to Jones and Lee (2021), personalized support recognizes the individual challenges and learning preferences of every student, fostering a sense of belonging and motivation. In addition, commerce education that utilizes technology can make use of AI-powered chatbots or virtual assistants. These tools can provide immediate responses to common questions and offer guidance on resources and study strategies (Harris & Jones, 2021). According to Taylor and Johnson (2021), this personalized support system not only enhances learner autonomy but also empowers students to take control of their learning experiences.

VII. Training and Development for Faculty Members

A. Providing educators with the necessary skills to excel in technology.

To effectively integrate technology into their teaching practices, educators must receive faculty training and engage in professional development (Brown & White, 2022). According to Smith (2022), while many instructors have significant experience in traditional classroom settings, they may need assistance in adjusting theirteaching methods for the online environment. According to Johnson (2022), technology competence training provides educators with the necessary skills to effectively navigate learning management systems, create engaging multimedia content, and facilitate virtual classrooms. According to Taylor and Brown (2021), faculty members can enhance their technological proficiency by participating in workshops, webinars, and online courses. This will enable them to confidently utilize digital tools in their teaching.

B. Promoting Effective Online Teaching Practices

According to Doe and Lee (2020), there are distinct differences between effective online teaching practices and traditional classroom pedagogy. Therefore, faculty development programs must prioritize the cultivation of these specialized skills. To effectively teach online, instructors must develop a structured and organized course framework that includes explicit instructions and clear expectations for students (Jones, 2021). In order to effectively engage students in the virtual environment, it is essential to prioritize active learning. Faculty development initiatives should focus on promoting interactive activities, collaborative projects, and discussion forums. These strategies are key to fostering meaningful interactions among students. (Taylor, 2022). According to Smith and Johnson (2021), instructors need to promote peer-to-peer learning and offer timely feedback to foster continuous improvement among students.

C. Promoting Constant Learning and Improvement

According to Williams (2022), it is important for faculty training and professional development to cultivate a culture of ongoing learning and improvement among educators.
The field of online teaching is constantly changing, with new technologies and best practices emerging all the time. Instructors need to keep themselves informed and up to date with the latest trends and advancements to provide the best possible education to their students (Harris, 2021).
Encouraging faculty members to actively engage in conferences, webinars, and research related to technology-driven commerce education is crucial for keeping them up-to-date on emerging pedagogies and innovative instructional strategies (Taylor & Johnson, 2021). According to Smith (2022), faculty members can utilize collaborative learning communities and peer mentoring initiatives as a platform to share experiences and learn from one another.

IX. Student Retention and Engagement Techniques

A. Promoting Conscious Participation and Communication

To increase student engagement and retention in technology-driven commerce education, active involvement and interaction are essential (Taylor, 2022). Through a variety of interactive activities including group discussions, online debates, and peer evaluations, instructors may encourage participation in online courses (Jones & Lee,2021). While breakout spaces in virtual classrooms allow small-group conversations, supporting active learning, collaborative projects promote cooperation and communication skills (Smith, 2022).

B. The Use of Gamification and Motivational Strategies in Business Courses

Student participation in online commerce courses may be dramatically impacted by gamification and incentive strategies (Johnson, 2021). Teachers may foster a feeling of success and rivalry among students by introducing game-like features like leaderboards, badges, and awards (Brown, 2021). Instant feedback and applauding accomplishments help pupils feel more driven to succeed (Harris & Jones, 2021).

C. Improving peer collaboration and social learning

Technology-driven commerce education that promotes social learning and peer cooperation fosters a feeling of belonging and support among students (Taylor & Brown, 2021). Learners may share ideas, experiences, and support one another via discussion forums and online study groups (Williams, 2022). In order to encourage a positive learning environment and encourage connections among students, faculty should also enable peer evaluations and group tasks (Doe & Lee, 2020).

X. Mechanisms for Continuous Improvement and Feedback

A. Gathering Faculty and Student Feedback for Course Improvement

To increase the quality of technology-driven commerce courses, continual improvement must be implemented, which entails getting faculty and student input (Smith & White, 2020). Survey results and course evaluations may provide light on students' perspectives and experiences (Taylor, 2023). To find out what aspects of teaching strategies and course material need to be improved, instructors may also ask students for feedback (Johnson, 2022).

B. Executing program evaluations and reviews

The overall efficacy of technology-driven commerce education is ensured by conducting regular program assessments and evaluations (Harris, 2021). In order to determine areas that need development and places where there are strengths, these assessments look at course results, faculty performance, and student satisfaction (Jones, 2021). Program evaluations provide organizations the chance to make data-driven choices and put specific improvements into place to better serve the needs and expectations of their students (Taylor & Johnson, 2021).

C. Considering Industry Feedback to Ensure Curriculum Relevance

The continued relevance of technology-driven commerce education is ensured by incorporating industry input into the curriculum development process (Brown & White, 2022). To discover new trends and the competencies needed in the labor market, businesses and industryspecialists should be regularly consulted (Smith, 2022). Thecurriculum is made more practically applicable via industry partnership, which also promotes internship possibilities, guest lecturers, and real-world case studies (Williams, 2021).

XI. Quality assurance implementation challenges and solutions

A. Reducing Access Barriers and the Digital Divide

Addressing the digital divide and access obstacles is one of the difficulties in establishing quality assurance in technology-driven commerce education (Taylor, 2022). Not all students may have equal access to gadgets or high-speed internet for online learning (Johnson, 2021). To guarantee that all students have equal access to educational resources, institutions may lessen this problem by offering support services like technology loans or internet subsidies (Smith & Johnson, 2021).

B. Reducing concerns about academic integrity and cheating

In technology-driven commerce education, maintaining academic integrity in online examinations is an issue (Harris, 2021). Institutions may use remote proctoring, plagiarism detection software, and a variety of assessment methods to reduce cheating (Taylor & Brown, 2021). It also helps in fostering a feeling of responsibility to encourage a culture of academic honesty by outlining clear regulations and informing students of the value of integrity (Jones & Lee, 2021).

C. Overcoming Technology Integration Resistance

The effective deployment of quality assurance intechnology-driven commerce education might be hampered by resistance to technology integration (Doe & Lee, 2020). Faculty members and students could be wary of using new technology or worry that the online format would undermine the educational process (Williams, 2022). In order to overcome opposition and instill trust in technology-enhanced learning, it is important to support faculty training and professional development as well as provide continuing technical assistance (Taylor, 2023).

XII. Case Studies: Models of Quality Assurance in Technology-Driven Commerce Education

A. Case 1: A program to certify accountants using technology

This case study examines the implementation of a technology-enhanced accounting certification program at a renowned commerce institution. Together with business professionals, the curriculum is created to be current with accounting procedures. The curriculum includes case studies and real-time simulations, enabling students to apply their learning to actual accounting situations. Students' learning progress is ensured through ongoing feedback and individualized coaching, and data analytics help professors keep track of and improve the program's efficiency.

B. Case 2: Using AI to Develop Personalized Business Skills

In this instance, a forward-thinking online commerce institution uses learning analytics driven by AI to provide individualized business skill development. The university examines students' learning preferences and habits using AI algorithms. Based on this research, customised learning routes are developed, taking into account each person's skills and potential for growth. Regular evaluations andfeedback systems encourage continual progress, while gamified aspects and interactive material further increase engagement.

Case 3: Industry Collaboration for Learning from Real-World Case Studies

In this instance, a program for internet commerce works closely with business partners to provide learning opportunities via real-world case studies. Industry experts provide students with real-world business problems and situations so they may assess them and suggest solutions. Through company-sponsored projects, students are exposed to real-world problems and get feedback on their solutions from business professionals. Through this partnership, curricular relevance is ensured, students' problem-solving abilities are improved, and beneficial industry contacts are fostered.

XIII. Future Trends and Prospects for Quality Control in Commerce ODL

The incorporation of cutting-edge technologies like Virtual Reality (VR) and Augmented Reality (AR) will shape quality assurance in technology-driven commerce education in the future (Harris & Jones, 2021). While AR may add virtual information to the real world, VR can provide immersive learning experiences. These new technologieswill make learning more engaging and useful, increasing student interest and understanding even more. Learning analytics will continue to rely heavily on artificial intelligence (Smith & White, 2020). In order to provide even more individualized learning routes, AI systems will grow increasingly proficient at interpreting learner data.Intelligent tutoring systems, which provide students with rapid feedback tailored to their current situation, will spread more widely (Taylor, 2022). To foresee students' academic difficulties and retention issues, predictive analytics will be used (Johnson, 2021). Institutions may act early to give specialized help to students who are in danger by examining historical data and learner behavior. Predictive models will aid in boosting student achievement rates and enhancing overall learning outcomes (Brown & White, 2022).

XIV. Conclusion

Quality control is still crucial in technology-driven commerce education, to sum. In order to provide students with a high-quality educational experience, it makes sure that online commerce programs retain academic rigor, relevance, and reputation. Students, businesses, and other stakeholders are reassured of the value of their investments in education through accreditation and continual improvement systems, which sustain the standards of technology-integrated curriculum. Maintaining quality in commerce education requires embracing technologicaldevelopments. In order to improve student engagement and learning outcomes as technology develops, institutions mustbe proactive in using cutting-edge tools and practices. Utilizing cutting-edge tools like VR, AI, and predictive analytics has the potential to transform the learning process by accommodating various learning preferences and encouraging ongoing development. The cooperation of educators, business experts, legislators, and technology suppliers will determine the success of online distance learning in the future. Institutions may assure curricularrelevance and real-world application by working with industry partners, enabling them to better prepare students for professional success. In order to address concerns about the digital divide and provide accessibility for all students, policymakers have a critical role in fostering an atmosphere that supports technology-driven commerce education. To create and execute efficient tools and procedures that support student engagement, retention, and academic performance, educators and technology providers must collaborate. The foundations of sustained learning excellence in technology-driven commerce education are quality assurance, embracing technology, and cooperation. The future of commerce ODL may be shaped by institutions by keeping high standards of quality, using technology breakthroughs, and encouraging collaborative efforts. This will enable learners to succeed in the dynamic and constantly changing business sector. Technology- driven commerce education will continue to play a crucial role in training people for successful jobs and assisting in the expansion of the global economy with a dedication to continual development and a student-centered approach.

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CHALLENGES ON USING ICT IN SECONDARY SCHOOLS: TEACHER'S PERSPECTIVE WITH SPECIAL REFERENCE TO CHENGALPATTU

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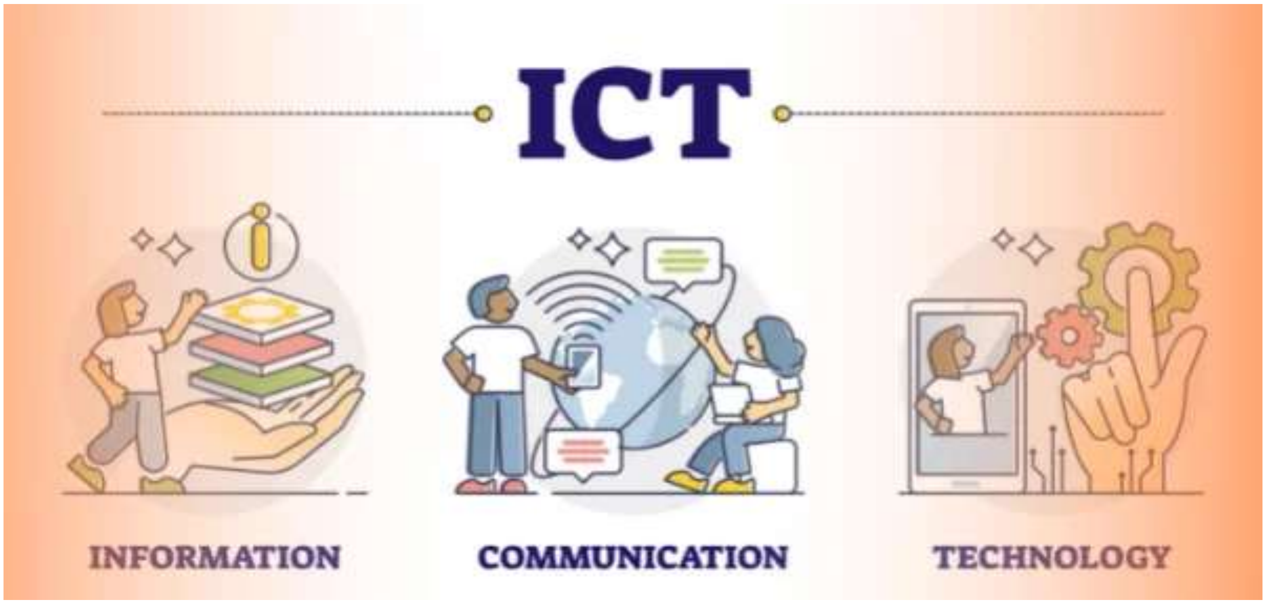
ABSTRACT
Information and Communication Technology (ICT) is essential in the digital age, but its significance was particularly felt during the COVID pandemic. The modern educational field is now grappling with the issue of ICT integration in classroom instruction. ICT offers the chance for student involvement and contributes more as a supplementary instrument in the teaching and learning process. Despite the fact that information and communication technology is developing quickly, very few institutions have adopted it. In this article, the use of information and communication technology by teachers is analyzed. Some obstacles, such as a lack of resources, education, internet access, infrastructure support, etc., have been identified as the cause of the slow pace of ICT adoption in schools. A well-structured survey was made among the secondary school teachers for this analysis through a Google Form.
Key words: Barriers, ICT, Integration, Pandemic, Questionnaire.

INTRODUCTION
ICT stands for Information and Communication Technology. Information and communications technology (ICT) is an abbreviation for information technology (IT) that emphasizes the importance of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as the essential enterprise software, middleware, storage, and audiovisual that allow users to access, store, transmit, understand, and manipulate information. The ICT tools for teaching and learning consist of digital infrastructures such as computers, laptops, tablets, mobiles, scanners, projectors, etc.; they also use software tools like Google Meet, Google Classroom, Spreadsheets etc. Various platforms and technologies have been developed and improved over time to make ICT teaching and learning more participatory. Innovative ICT tools are utilized in classroom instruction to support instructors' subject integration for teaching-learning and evaluation. ICT resources for teaching, learning, and assessment are widely available on both online and offline platforms, many of which are free or inexpensive and subject-specific.

"Technology use and integration" is the goal of NEP 2020, which aims to provide students with a roadmap for turning India into a globally competitive knowledge economy and a society with widespread access to the internet. Additionally, people in rural areas of the nation now have access to education because of the incorporation of ICT. Therefore, it is crucial to research secondary school teachers' attitudes toward the use of ICT in teaching and learning and how they perceive its integration into the classroom.

REVIEW OF LITERATURE
"We need technology in every classroom and in every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world." – David Warlick



ICT DEVELOPMENT IN INDIA

The quick and broad development of ICT in India since the commencement of the reform process has drastically altered the ways in which individuals communicate and businesses conduct business. Mobile telephony, IT-enabled services, and wireless networking have all resulted in significant developments in the world of computing. However, as ICT in India grows and personal computers and notebook PCs become popular equipment for students, homes, and professionals, the issue of computer security will become increasingly important.

Educational institutions have been quick to accept new wireless technology and portable laptops. Students using notebook computers or tablet PCs can access information from any location on a networked campus. This leads to cost savings for college or school administration because they can optimize their IT infrastructure by supplying students and faculty with pocket computers.

NEED AND IMPORTANCE OF ICT IN EDUCATION

Today's classrooms are brimming with technologically savvy students. Institutes can improve student learning chances by combining audio-visual learning tools with the traditional blackboard.

Electronic devices have become a way of life for today's kids. Children can be eased into education by using resources they are already familiar with in the classroom and utilizing ICT.

Aside from making learning more enjoyable, ICT has a wide range of effects on education, such as:

- **Everyone Deserves an Education**

All pupils benefit from the flexibility and accessibility of learning materials provided by ICT. While all resources are available in classrooms, students can also access them outside of school. This is especially beneficial for individuals who are slow learners or have learning impairments. Such students can go through the teachings as many times as they need to in order to fully grasp their courses.

The availability of learning tools also helps students who cannot afford to attend classes every day. Low-cost electronic devices designed specifically for education are offered to students with budgetary constraints.

- **Effective Teacher Education**

ICT in school management is intended to educate not only students but also teachers. Regular teacher training programs are vital, and ICT assists in training them in their own institutes via online learning.

Teachers can complete their training in their leisure time by storing training modules on devices that can be accessed at any time. They can continue training without missing classes, which benefits both students and teachers. This course also shows how to use ICT efficiently in the classroom and for remote learning.

- **Increased Knowledge Preservation**

For students, visual learning is more successful than traditional chalk and talk. This is due to the fact that our brain processes and retains images and movies more quickly than text. ICT enables audio-visual teaching methods, which increase learner retention and interest levels.

However, the use of ICT in education is not restricted to resource-based instruction. Educators can also use ICT to create interactive on-screen and off-screen projects. This enables pupils to engage in enjoyable physical and mental activities while learning. Educational games, interactive museum tours, and virtual labs are just a few of the activities that may be accessible through ICT resources.

- **Promotes Collaboration**

ICT allows you to collaborate with any institute around the globe. And they can do so in the privacy of their classrooms. This saves time and money while providing access to collaborations with some of the greatest institutes.

They can also work with many institutes at the same time, plan meetings and conferences, and share their knowledge with colleagues all around the world. Only ICT in school management allows for such worldwide knowledge sharing.

- **Enhances Openness**

One of the benefits of ICT in education is that it allows for a more transparent attendance and grading procedure. The information can be shared with school officials, students, other teachers, and parents. With the data as a reference, any issue with a student, such as absence, declining grades, or bad behavior, can be handled with the concerned parties.

Data stored through ICT can also be used as evidence for any action taken by the institute. Because all actions are based on evidence, this removes awkward questioning and accusations.

- **Approach Focused on the Learner**

The need for ICT in education is to provide a student-centered learning environment. ICT tools bridge the gap between learner-centered and teacher-centered environments. Because ICT provides access to a vast spectrum of material, all pupils' individual educational needs are satisfied. Quizzes and exams can be used by teachers to test students' usage of such material.

For kids who demand extra attention, teachers can discover suitable supplementary material on the internet. Teachers can use ICT to distribute those materials to the entire classroom or to individual students. In any case, thanks to ICT, every student has a personalized learning experience.

- **Modern Teaching Techniques**

ICT allows institutes to implement new teaching methodologies. One such method is the "flipped classroom," in which students learn their topics at home and practice them in class through practical exercises. Students can effectively learn at home by watching videos, and at school, ICT engages them in fun learning activities. Teachers can also experiment with various learning strategies and directly assess their effectiveness by tracking students' grades using ICT.

COMMON ICT TOOLS EMPLOYED IN EDUCATION

GOOGLE CLASSROOM

Classroom is a free application accessible to schools, non-profits, and anybody with a Google account. Classrooms facilitate connections between students and teachers both within and outside of the classroom. Classrooms save time and paper while making it simple to create classes, give homework, communicate, and keep organized.

INTERACTIVE WHITE BOARD

An interactive whiteboard, also known as an interactive smart whiteboard or electronic whiteboard, is an educational technology instrument that allows teachers to project their computer screen or the screen of a mobile device onto a whiteboard fixed to a wall or movable cart.

ANIMATION

Educational animations are animations created specifically to promote learning. It is linked to educational technology because of the way it helps teaching and learning by utilizing technological tools to ease learning and improve performance.

MICROSOFT TEAMS

A digital hub that brings meetings, content, and apps together in one place. Educators can create collaborative classrooms, connect in professional learning communities, and communicate with school staff.

TRELLO

Trello is a visual collaboration tool used by educators worldwide for easier coursework planning, faculty collaboration, and classroom organization.

THINGLINK

A solution for classes with a wide range of linguistic and reading abilities. ThingLink makes it simple to develop audio-visual learning resources that can be accessed through an integrated reading tool. Immersive Reader can read any text description in picture or video hotspots in over 60 languages.

SPREADSHEET

Spreadsheets can be programmed to numerically solve complex systems of equations, identify trends in data, or determine the best solution to a problem. Spreadsheet exercises, on the other hand, can be used in any lesson that presents data in a table to improve numeric literacy.

MICROSOFT POWERPOINT

PowerPoint could enhance teaching sessions by giving a roadmap, reinforcing what teachers say, and allowing the use of images and other multimedia to clarify concepts and accommodate different learning styles.

MICROSOFT ONENOTE

OneNote assists teachers in organizing and sharing educational content with their students. Students can use OneNote to work individually or in groups to interact with the materials and with one another. Teachers can present to the entire class or share items with only those pupils who require them.

RESEARCH METHODOLOGY

The current study has a descriptive focus and used a non-probability sampling method to acquire data, which was collected after constructing a structured inquiry and distributed to secondary school teachers at Chengalpattu. For information gathering, just 50 people were chosen using a suitable sample procedure.

Data analysis: The questionnaire has 10 multiple-choice questions, and percentage calculations are employed to analyze the results.

Sources of Tables and Diagrams: Data received through the questionnaire was tallied, and graphs were displayed using the percentage approach.

OBJECTIVES OF THE STUDY

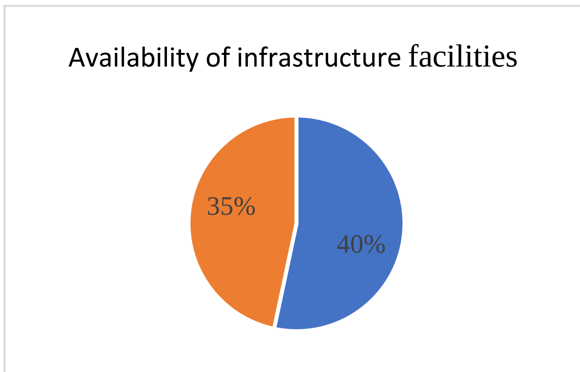
1. To investigate secondary school teachers' competence in information and communication technology.
2. To understand the issues and difficulties that teachers face when using ICT tools.

DATA ANALYSIS AND INTERPRETATIONS

The acquired data are subjected to data analysis and interpretation, and percentage analysis has proven to be an effective statistical tool in this regard. Only a few questions from the questionnaire that had a significant impact on this study were taken and presented here.

Table 1: The current state of the facilities accessible in schools.

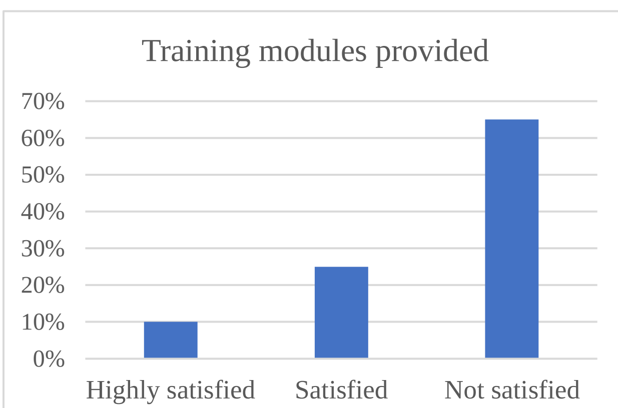
Question	Yes	No
Do you believe your school has the necessary infrastructure to integrate ICT tools?	40%	60%



Inference: According to Table 1, many schools are under-resourced in terms of ICT tools in their teaching and learning process.

Table 2: Training modules provided to the teachers.

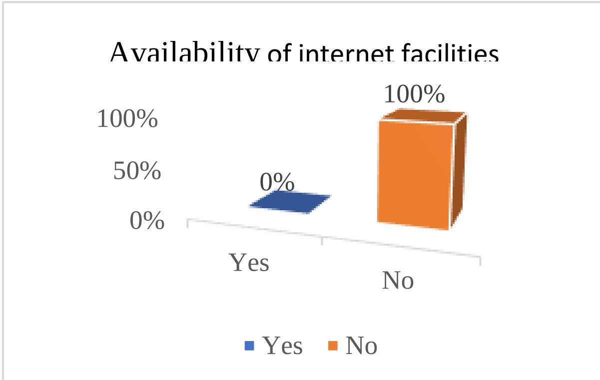
Question	Highly Satisfied	Satisfied	Not Satisfied
How pleased are you with the training you underwent prior to applying ICT tools?	10%	25%	65%



Inference: From the above table and diagram, it is inferred that most of the teachers are not satisfied with the training program given to them before adopting ICT tools.

Table 3: Internet access in the classrooms.

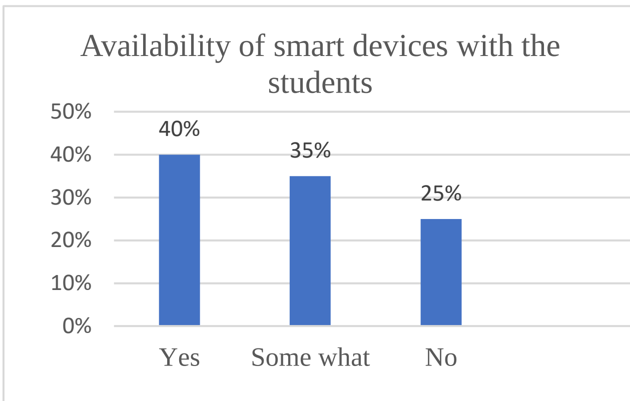
Question	Yes	No
Have you offered adequate internet access to use ICT tools in classrooms?	0%	100%



Inference: As a result, it is evident that there are no internet services, such as Wi-Fi connections or LANs, to enable higher technology utilization in classrooms.

Table 4: Availability of smart gadgets with the students.

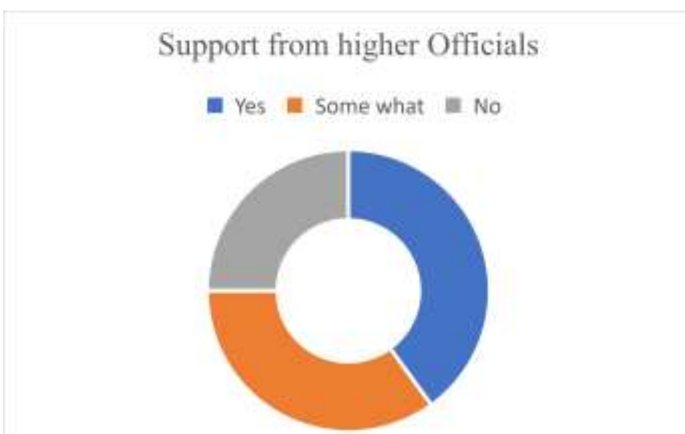
Question	All	More	Few	None
Whether all students have smart devices for e-learning?	0%	70%	20%	10%



Inference: It is clear from the table that many students have smart devices such as mobile phones, Laptops, etc., and some of them do not have any of these devices.

Table 5: Support from higher-level officials in learning and implementing ICT tools.

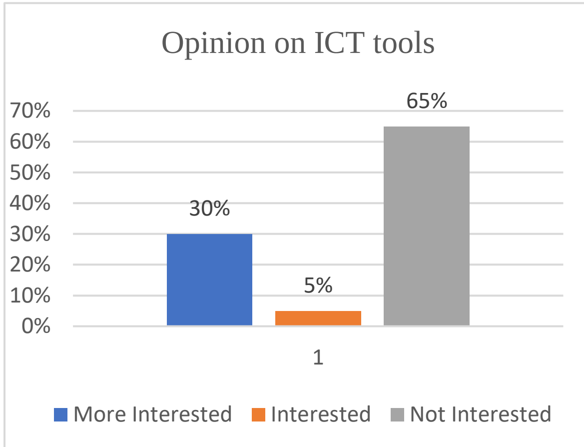
Question	Yes	Some what	No
Whether you were provided enough time and help to understand and utilize ICT tools in your classes?	40%	35%	25%



Inference: Only 40% of instructors were given time to study and deploy ICT tools in their classrooms. Most teachers did not have enough time to learn or get help from their superiors.

Table 6: Teachers' opinion on ICT.

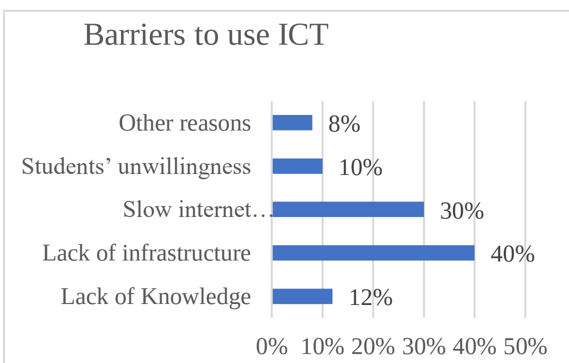
Question	More Interested	Interested	Not interested
Your opinion on the integration of ICT technologies in school education.	30%	5%	65%



Inference: It was deduced that many teachers are unwilling to implement ICT tools in their classrooms due to many reasons. Only a few people want to use it.

Table 7: Impediments to using ICT

Question	No. of respondents	percentage
Which of the following, in your opinion, is the cause of teacher's reluctance to use ICT?		
A) Lack of Knowledge	6	12%
B) Lack of infrastructure	20	40%
C) Slow internet connection	15	30%
D) Students' unwillingness	5	10%
E) Other reasons	4	8%



Inference: According to the table and graphic above, the most major barrier to ICT integration is a lack of infrastructure. The next element is a slow internet connection, and the third one is teachers' lack of technical competence. Students' reluctance also has an impact on ICT uptake in secondary schools.

FINDINGS

Respondents are keen to learn about and incorporate information and communication tools into their teaching methods. However, there are several valid reasons for the slow pace of technology application in the education sector. Nonetheless, many schools lack the necessary infrastructure to implement e-learning. Other than computer teachers, other instructors are not well prepared to use technology. There is no high-speed internet connection; even some isolated communities are not connected to the internet. Government schools are not yet financially secure enough to implement ICT in their classrooms. Even many teachers who are just interested in the traditional way of teaching believe that learning and using technology for teaching are too difficult.

SUGGESTIONS:

- ❖ Government schools must be modernized in order to use ICT tools in their educational procedures.
- ❖ Non-computer teachers must be properly trained to use the technology.

- ❖ High-speed internet connections should be made available to improve ICT utilization.
- ❖ They must ensure that all students have at least one of the gadgets, such as a desktop computer, laptop computer, mobile phone, and so on.
- ❖ Schools should work with teachers to give them enough time to implement technology in the classroom.
- ❖ Teachers must be prepared to accept and learn about technological changes, as well as recognize their significance.

CONCLUSION

With the help of technology, 21st-century schools are rapidly transforming. ICT has changed the way the education industry operates. However, while it is immensely advantageous, effective ICT use is also critical. ICT is extremely important in the education industry, and it will soon be an integral part of all educational systems. Along with installing the technologies, educators must be trained to realize the full potential of ICT. Digital literacy among teachers and students changes the way we learn using technology. We can use ICT to create school systems that are more efficient, cost-effective, and inclusive of all students. Technology is assisting in the transformation of a teacher's function from that of an instructor to that of a guide who assists students in making their learning process easier and more enjoyable.

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A STUDY ON HUMAN RESOURCES MANAGEMENT

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Abstract: Human Resource Management is concerned with the facilities and needs of the human workforce in terms of their working procedures and career advancement. It is a bidirectional process flow that expands the workforce and senior management and interacts with everyone's needs in a solution area to help the organization generate a better and value-added service, outcome for its customers, and clients. New technologies are launched on a regular basis to make a more productive and efficient human resources department, making things easier and more contemporary. The adoption of a Human Resources Management System is one of the most recent human resource technologies. This integrated system is designed to aid in the provision of information necessary in human resource decision-making processes such as administration, payroll, hiring, training, and performance assessment. The results of the bibliometric analysis show. Improving organizational performance is one of the primary purposes of human resource management. However, few studies have explicitly addressed the multidimensional character of performance and associated human resource practices to several outcome dimensions. As a consequence, this research adds to the body of knowledge by connecting human resource practices to three outcome dimensions: financial, organizational, and human resource outcomes. Furthermore, we will look into how human resource practices influence these outcome characteristics, with a focus on the mediation function of job satisfaction. Keywords: **Employee Job Satisfaction, Long-Term Organisational Performance, Human Resource Management Practices, Organizational Innovation.**

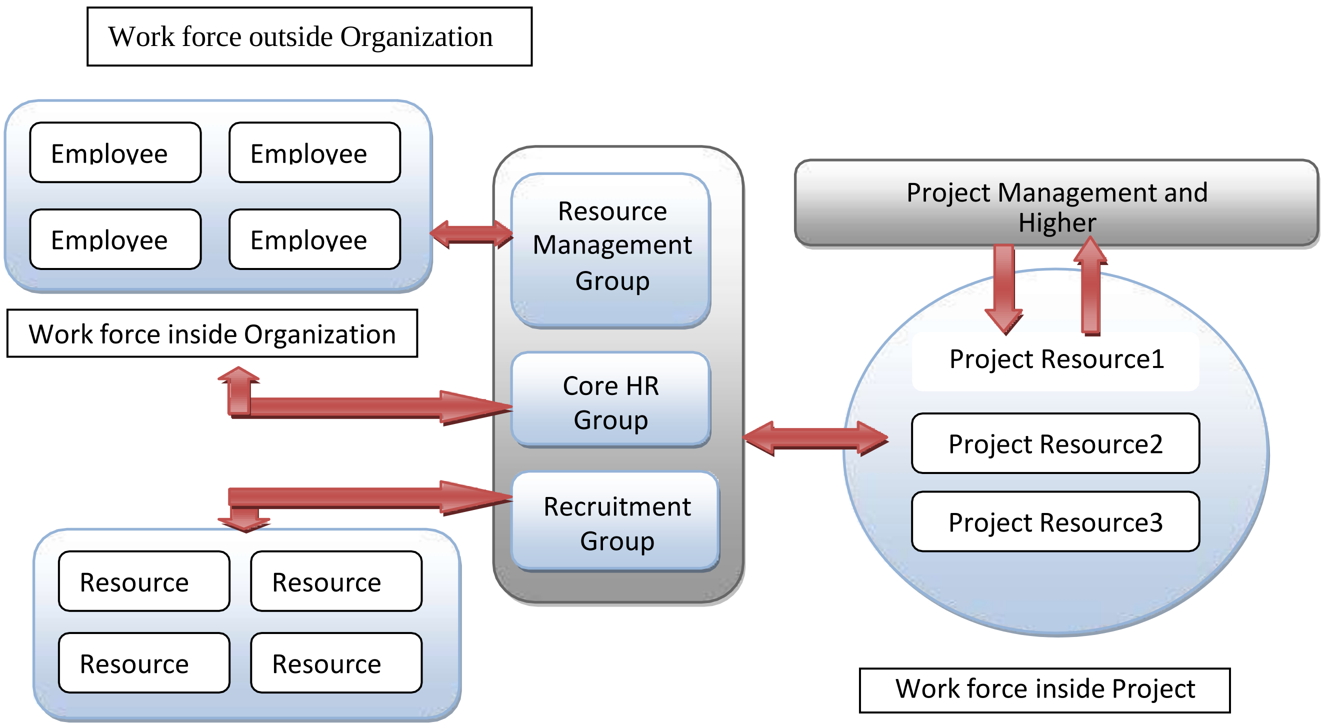
1. INTRODUCTION

Human Resource Management delivers the most effective approaches and solutions for managing human resources. Optimized and mapped the unique skill set in the Spitalfields field, such as in the Production Field, by delivering trained and relevant human resources to develop a product in line with market demand and market competencies with the required time limit and quality in the project field.

Service and operational sectors supply qualified and adequate human resources whose skill sets and competences are mapped towards identifying a solution space and resolving it within a time period for a client, customer, or self-business demands; Sales disciplines such as Promotional Product Branding and finding market prospects; customer engagement and sales dealing; or any other areas inside such as preparing or maintaining essential infrastructure for organizations.

In this situation, the Resource and Facility Management Team or someone from outside the organization, such as communicating with clients or consumers and identifying and crystallizing their relationship; is the finest example of an outside entity whose expertise and operation may be mapped and managed by the Human Resource Department is consultants. Human Resource Management is concerned with the facilities and requirements to which the Human Workforce has access and which they require for their working process and career advancement. It was utilised as a bidirectional process flow to raise the Workforce and Senior Management and coordinate everyone's demands in a solution area in order to give a better value-added extra service or outcome to the organization's customers or clients.

New technologies are launched on a regular basis to make a human resources department more effective and efficient, making things easier and more contemporary. A Human Resources Management System is one of the most contemporary human resource technologies. This integrated system is designed to help in the transmission of information required in human resource decision-making processes such as administration, payroll, hiring, training, and performance assessment.



2. THE BENEFITS OF THE HUMAN RESOURCE SYSTEM

1. The Human Resource Management System assists employees in achieving Job Satisfaction.

Human Resource Management Systems were once built around a single criterion: employee job satisfaction. This causes the Human Resource System to gather any first-specific employee needs as well as any second-specific organizational employee expectations. This technique includes "Higher Management" as well to handle employee demands, which reduces the extra pressure from Higher Management and provides the customer with a job-satisfactory environment.

2. Human Resource Management is used to match the proper workforce with the correct skill set.

Most organizations utilise Human Resource Management to keep their human resources up to date. It is the Human Resource Management group's obligation to maintain all Employee Details up to date. The Human Resource Management team will search the Employee Record set for skills that match a new project need. If the talent is not found within the organization, it will be discovered outside the organization via the application of technical and management knowledge. To achieve this purpose, the Human Resource Management team has several branches, including:

- Data is easily accessible.
- The new system is easier to use, more reliable, and more adaptable. and data changes are simple.
- The project is simple to maintain.
- Reduced manual labour.
- Reports are generated on time.

3. Importance of the Study

An organization cannot form a superior team of specialists unless it has good Human Resource Management. The Human Resources Management team's primary responsibilities include recruiting personnel, training, suitable performance assessments, motivating and inspiring employees, workplace engagement, workplace safety, and much more. The benefits of these services are discussed in further detail below:

1. Recruitment and Training

Recruitment and training are two of the most important roles of a human resource staff. Human resource managers have developed suitable plans and effective tactics for recruiting the right individuals. Human Resource Recruiters create the criteria that are best appropriate for that specific job description. Their other responsibilities are also connected to recruiting, which includes establishing an employee's duty and the scope of tasks allotted to them.

2. Performance Appraisals

Human Resource Management also assists organizations in encouraging employees to perform to their full capacity and providing feedback that might help them grow. The team communicates with their employees on a regular basis, providing any required ideas or criticism on their performance while also allowing them to define their unique duties.

3. Maintaining the Work Atmosphere

This is a critical part of human resource management since an individual's performance in an organization is heavily influenced by the work environment or workplace culture that exists at the firm. A better working environment is one of the primary benefits that employees may anticipate from an effective human resource management team.

4. Managing Disputes

There are various issues in an organization that might lead to disagreements between employees and recruiters. Conflicts, on the other hand, are nearly inescapable. In such a circumstance, a human resource department that functions as a consultant and mediator is required to effectively solve those challenges.

5. Developing Public Relations

To a large measure, the dependability of building strong public relations depends on human resource management. They are in charge of organizing business meetings, seminars, and other formal events on behalf of the firm in order to establish partnerships with other business sectors. The human resources department can also play an important role in the preparation of business and marketing strategy for organizations.

6. Managing laws and regulations

Because the legal environment in which human resource management functions is continuously changing, the human resources department must be kept informed of any changes and must also keep the whole management organization up to speed. Labour law, wage legislation, employee benefits, workplace discrimination, and healthcare law are all examples of human resource management laws.

5. OBJECTIVES OF THE STUDY

- **Societal Objectives**

Human Resource Management entails creating programs that meet the economic, psychological, ethical, and social demands of employees. Compensation and benefits programs, equal opportunity programs, community relations programs, disability employment programs, community relations programs, and so forth are examples. These programs are designed to help employees achieve social goals while also inspiring and keeping productive personnel.

- **Organizational Objectives**

One of the most important goals of human resource management is to have the right amount of people in the right position with the right abilities. This assists an organization in achieving its goals and objectives within the time frame specified.

- **Functional Objectives**

Human resource management's functional goal is to establish organizational policies in accordance with provisional/territorial and federal legislation concerning human rights, occupational health and safety, employment equality, labor relations, and employment standards. This assists organizations in maintaining the quality of life at work and ensuring ethical employee behavior.

- **Personal Objectives**

The purpose of personal human resource management is to recruit, develop, utilize, and retain efficient individuals in an organization. This is feasible if people fulfil both organizational and individual goals. Employees should get adequate training and performance feedback to do this. This supports personnel in identifying and fixing areas for improvement.

The primary goal of this article is to decrease administrative efforts in recording everyday occurrences such as payroll, employee performance, and personnel information. It consists of six components. They are as follows:

1. Employee Information
2. Payroll
3. Training
4. Performance
5. Resignation
6. Tracking resumes.

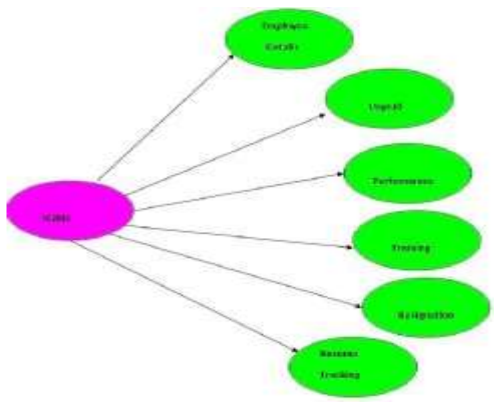


Fig 1: Overview of Human Resource Manageme Systems

2. Employee Information

The Employee Details module is used to handle employee details such as adding new workers, changing current employees, and deleting current employees. When a new employee is picked from the resume tracker, all essential information must be entered and preserved in the database.

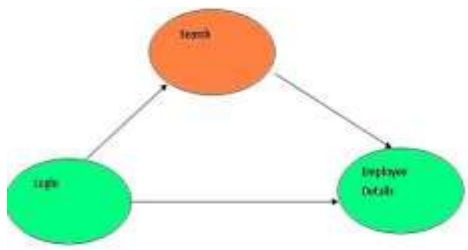


Fig 2: Employee Information Overview There a three types of information in the employme details.

1. Personal Information
2. Contact Information

3. Employment Situation

Personal information comprises information such as the employee's name, employee ID, country, and so on. The contact information contains the employee's address, phone numbers, and so forth.

3. PAYROLL

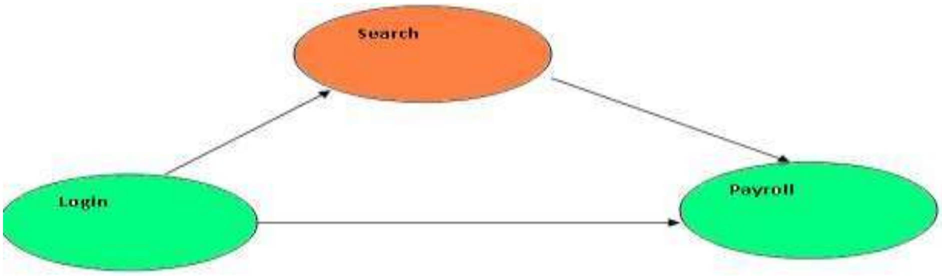


Fig 3: Payroll Details Overview

The payroll module contains information about the employee's salary, such as basic pay, allowances, and deductions, as well as the computation of gross pay and net pay from the specified allowances and deductions.

All employee salary information is kept on file by the human resource management. This payroll module's primary job is to track employee pay information.

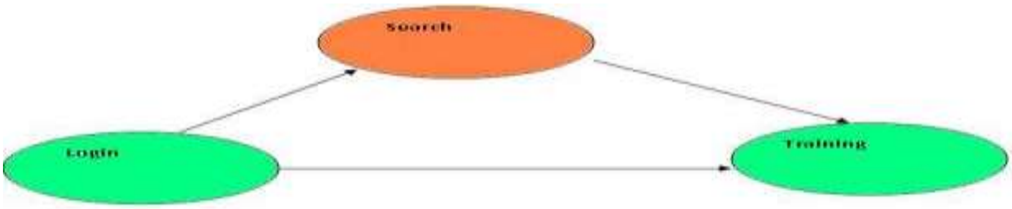


Fig 4: Overview of Training Module

4. TRAINING

This training module comprises the employee's schedule for the training that was done in the organization for the individual employee. The database will keep track of the employees' previous training experiences. The module provides information about personnel who are in training or have finished their course. These details will be used in the payroll calculation.

5. PERFORMANCE

This module contains information on the employee's current status within the organization. This module provides information about the employee, such as his or her name, ID, Division, workgroup, evaluation date, evaluator, and assessment duration.

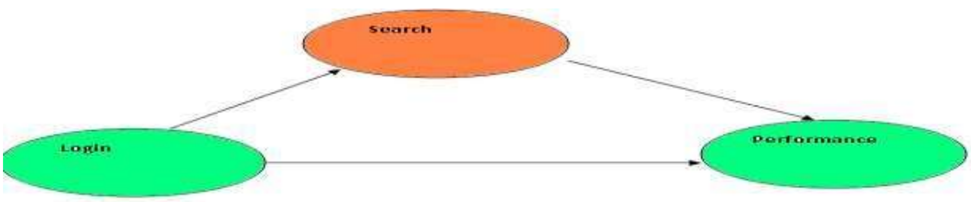


Fig 5 : Employee Position Performance

This module is designed to keep track of employees' work performance and organizational involvement.

6. RESIGNATION

This module offers information on prior workers of the organisation. Department, position, supervisor, current contact information, and joining and parting dates are examples of information. This information is used to notify former workers in the event of an emergency involving a project on which they previously worked.

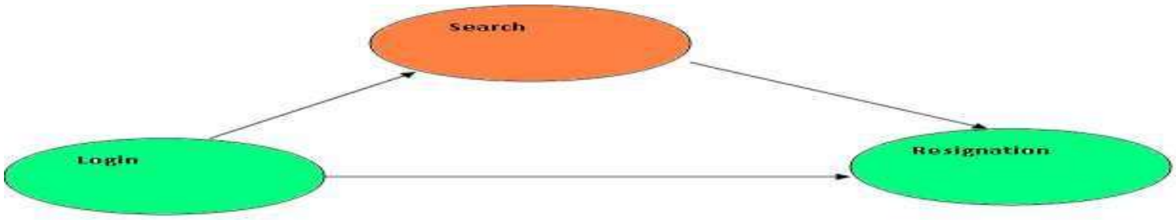


Fig 6 : Ex-Employee Information

7. Tracking resumes

This module provides applicant information such as their Curriculum Vitae, contact information, job experience, area of specialization, and area of interest.

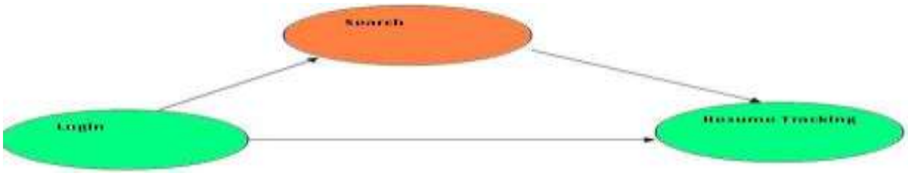


Fig 7 : Tracking Resume

The candidate can register their résumé online, and their information is saved in the organization's database. If the information submitted by the candidates satisfies the needs of the organization, they will be contacted for the next phase.

6. SCOPE OF THE STUDY

Human resource management comprises all operations that fall within the purview of human resource management. The following are the activities.

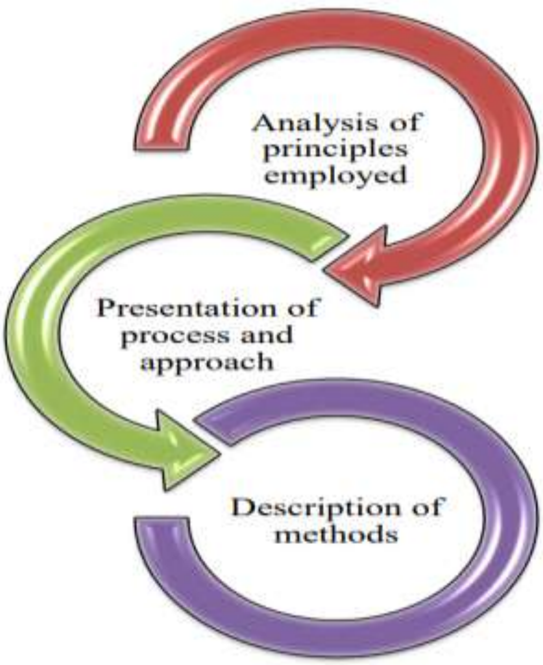
- **Human resources planning**
  Human resource planning, also known as Human Resource Planning, refers to the process by which a firm determines the number of available jobs, whether it has an excess of personnel or a lack of workers, and how to cope with this surplus or shortfall.
- **Job analysis design**
  Job analysis is another key aspect of Human Resource Management. position analysis provides a full overview of each position in the firm.
- **Recruitment and selection**
  The firm creates adverts and publishes them in newspapers based on information gathered from employment research. This is the process of recruiting. After the advertising is published, a large number of applications are received, interviews are held, and the best candidate is chosen, making recruitment and

selection yet another vital aspect of human resource management.

- **Orientation and induction**
  After the personnel are chosen, an induction or orientation program is held. This is yet another critical aspect of Human Resource Management. workers are told about the company's history, explained about organizational culture, principles, and work ethics, and introduced to other workers.
- **Training and development**
  Every employee goes through a training program to assist him to perform better on the job. Existing employees with extensive expertise are also given training. This is known as refresher training. The corporation spends a lot of money on training and development.
- **Performance appraisal**
  After about a year of employment, the employee is subjected to a performance review, in which the Human Resources department evaluates the person's performance. Future promotions, bonuses, and pay increases are determined based on these evaluations.
- **Compensation planning and remuneration**
  There are different regulations for compensation and other perks. The Human Resources department is in charge of salary and compensation planning.

7. RESEARCH METHODOLOGY

Figure3.1 –Research Methodology Scope



1. Research Questions A Research Question is the nucleus of the entire research process.

A Research Question stimulates the researcher's thinking. It allows researchers to stay focused on the study issue at all times. The researcher's attention is drawn to the connections that exist between various variables in the study topic. Research questions pave the way for the development of a framework, model, or theory to address the present research challenge. Writing research questions requires a high level of ability. There is no one-size-fits-all method for creating an ideal research question. However, the guidelines that follow illustrate some of the characteristics of good questions that have been embraced for this compendium.

2. Recommendations for Research Questions

The figure above demonstrates the significance of regressive thinking in defining proper and targeted research topics. This serves as the foundation for establishing the issue statement and hypothesis. The above-mentioned approach aided the researcher in developing the study question.

3. Statement of the Research Problem and its Description.

In the sea of research, a problem statement is like a lighthouse. Its nature is prescriptively descriptive. It always aids the researcher in concentrating on the study subject. A problem statement does not enable the researcher to deviate from the path. Any detour from the path taken by the researcher will result in the problem of not addressing current challenges. The research statement is the fundamental thread of this study.

A study of Human Resource Information Systems procedures and performance in large-scale organizations in Western India to determine their efficacy. The study issue statement tries to investigate Human Resource Information Systems procedures and performance, as well as their impact on organizational effectiveness, in large-scale organizations in Western India using a descriptive research design framework.

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8. REVIEW OF LITERATURE

Hofstede (1980) showed that national and regional cultural groupings have an impact on organizational behavior.

Deal and Kennedy described culture as "a system of informal rules that spell out how most people behave most of the time." Deal and Kennedy defined culture in 1982 as "the way we do things around here."

Uttal 1983 describes behavioral norms as "a system of shared values and ideas about how things work that combine with a company's employees, organizational structures, and control systems to generate behavioral norms or the way we do things around here."

9. ANALYSIS AND INTERPRETATION OF THE DATA

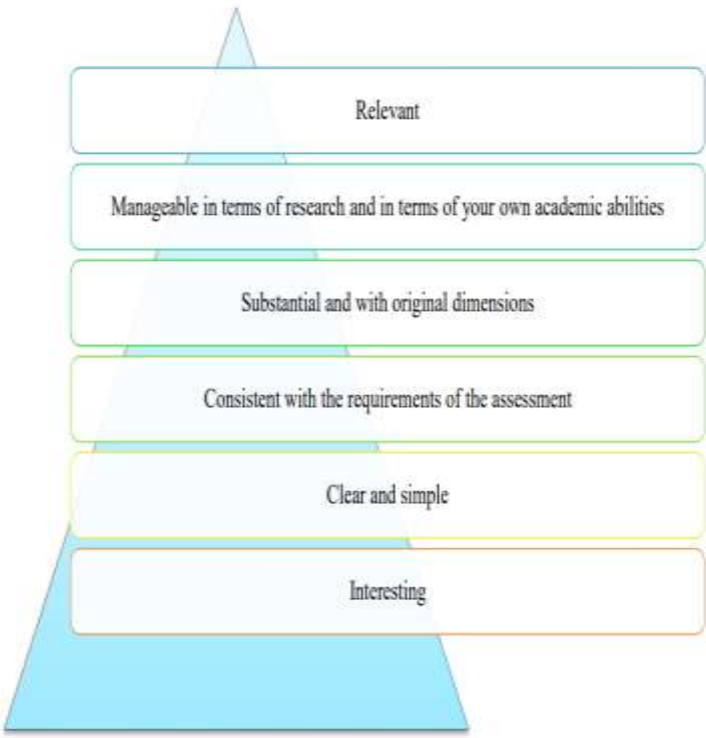
Human resource data analytics may be utilized to improve practically every aspect of human capital management. We've included five examples of human resource data analytics applications below to show how this practise may be utilized to improve various human resource procedures.

1. Recruitment If you haven't heard, recruiters are having a terrible time. We are witnessing a growing talent shortage, making it more challenging than ever to find and hire exceptional staff. Data analytics can help you find areas in your recruiting process that could be improved.

Some philosophers separated several levels, as opposed to the distinction between visible and concealed levels. **Schein 1985**, one of the foremost experts in the topic, outlines the following steps. The culture inside an organization. As a result, he offers the formal definition of organizational culture as follows.

Many cultural conceptions place a premium on cognitive aspects such as assumptions, ideas, and values. Others widen the concept to include behaviors and artifacts, resulting in a common distinction between visible and hidden layers of organizational culture - a distinction that fundamentally corresponds to the climate/culture division noted above **Kotter and Heskett 1992.**

Huselid 1995 examined eleven human resource management practices in his famous article "The Impact of Human Resource Management Practises on Turnover, Productivity, and Corporate Financial Performance": personnel selection, labor management participation, incentive Compensation, performance appraisal, grievance procedures, information sharing, job design, attitude assessment, recruitment efforts, promotion criteria, and employee training.



For example, you might set recruiting goals and track your progress towards them, or you could compare your time-to-fill and cost-per-hire metrics to those of other industries or organisations, and then see how your results change after making changes to important aspects of your recruitment strategy.

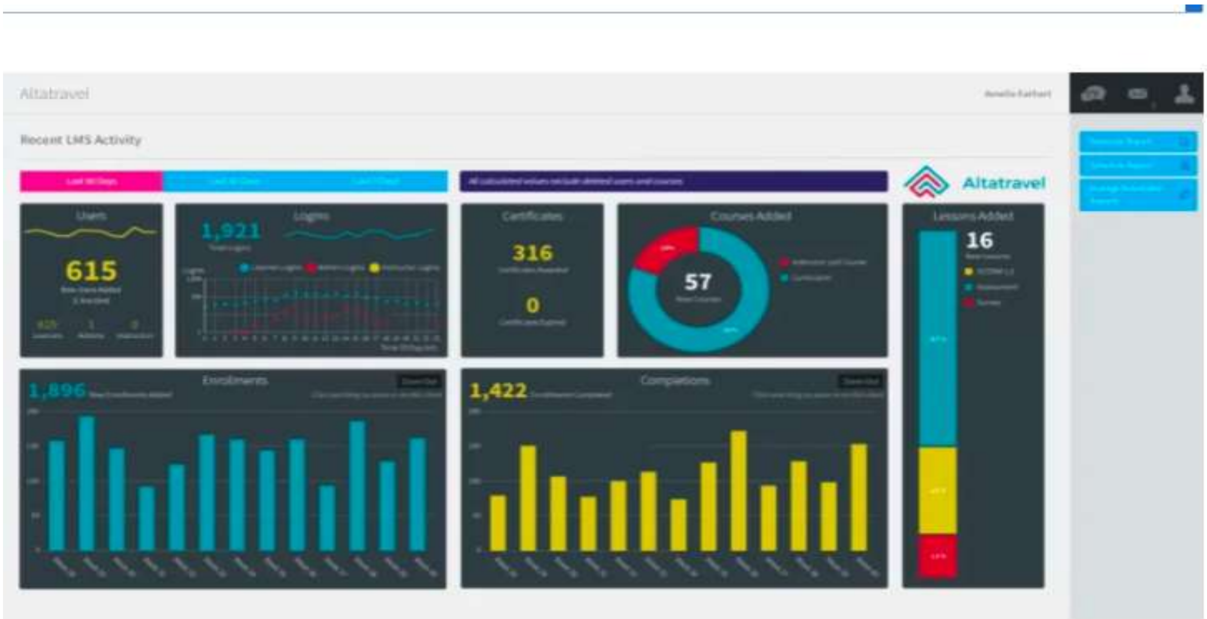
Keep track of the important recruiting statistics for your company. To assist you with this, some recruitment software systems include configurable dashboards as part of their analytics feature

According to the source, a dashboard in Lever converts critical recruitment data into easy visualizations.

2. Development and Training

That is a critical problem for human resource managers to address, but without a system for analyzing results, there is no way to tell if your team's resources and efforts on a training initiative were in vain. Soliciting employee feedback via a survey or one-on-one meetings with management, as well as collecting and analyzing data on program completion and comprehension, is an effective method for monitoring the effectiveness of training and development programs.In certain cases, predictive analytics may be used to create personalised learning paths for employees and even tailor training content to different learning types.

Examine your employees' participation in and understanding of training programmes. Learning management systems, which are used to conduct staff training programmes, are often designed to measure learners' completion rates, time spent training, individual assessment scores, and other data



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According to the publication, an Absorb LMS dashboard provides learner logins, enrollments, and course completions.

3. Attrition and retention

According to Capterra's Recruiting Strategy Survey, July 2021, 50% of employees with recruiting responsibilities have a larger-than-normal number of job opportunities for which they are actively recruiting. Talent scarcity is to blame in part, but persistent, record-high levels of turnover are also important contributors to the oversupply of unfilled posts. Recognizing the causes of turnover is a top concern for human resource directors. And data, predictably, is one of the finest methods to do it. Exit interviews and questionnaires, for example, can be used to collect information from departing workers, and then analytics tools can be used to detect commonalities among the results.

To reduce turnover, you must first understand the factors that contribute to it. Human resource analytics systems may be useful in this regard by gathering data on employee turnover, such as voluntary and involuntary turnover rates, average employee duration, and staff retention rates.

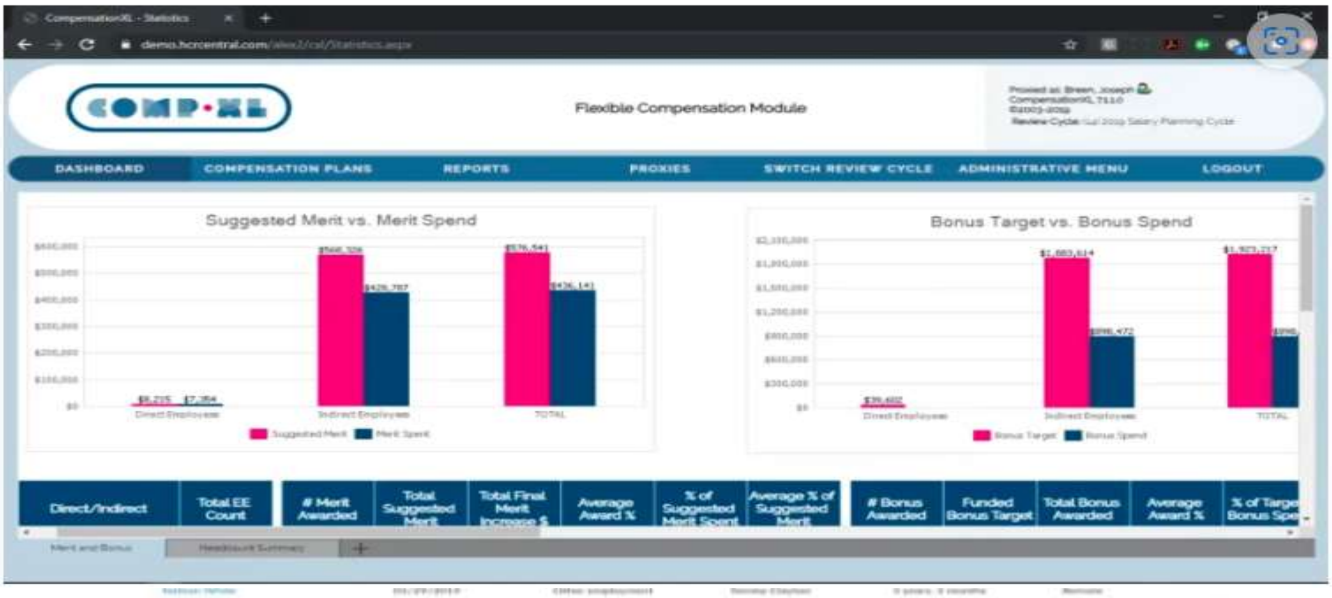
Bamboo human resource staff's tenure and termination reasons are shown on a dashboard, according to the source.

4. Compensation and benefits

Employee compensation is one of the most expensive parts of any organization. This, along with the fact that we are currently in an inflationary market, has made pay analytics a more crucial discipline for human resource managers than ever before.

According to our Recruiting Technique Survey, just 12% of businesses are not contemplating boosting compensation as a technique to attract job seekers. So, if you're having difficulty hiring excellent individuals and are in the minority, it's time to adopt a more strategic approach to wage planning.

Inquire with your payroll software vendor about the capabilities of their reporting and analytics solutions. You may not be using analytics elements that might influence your compensation approach.



Compare your estimated merit spend in Compensation XL Source to proposals based on industry trends.

5. Employee productivity

According to the human resources department, productivity refers to how efficiently resources like as talent, money, and time are utilized. Data analytics is very useful for analyzing productivity; nevertheless, the type of productivity data you should analyze is determined by your aim.

Many metrics, such as revenue per full-time employee, are valuable for gauging overall workforce productivity, whilst others, such as project completion rate, are more useful for analyzing the success of a team or person. You may also look at the adoption rates of certain tools or perks to see how effectively resources are being deployed.

Encourage department heads to report on their employees' productivity. Most firms nowadays utilize a collaboration tool or project management platform, and these solutions typically include reporting capabilities that track everything from employee communication to missed deadlines.

Asana Source organizes the status, progress, and prioritization of different organizational goals.

utilise your organization's data to make better decisions and achieve your objectives.

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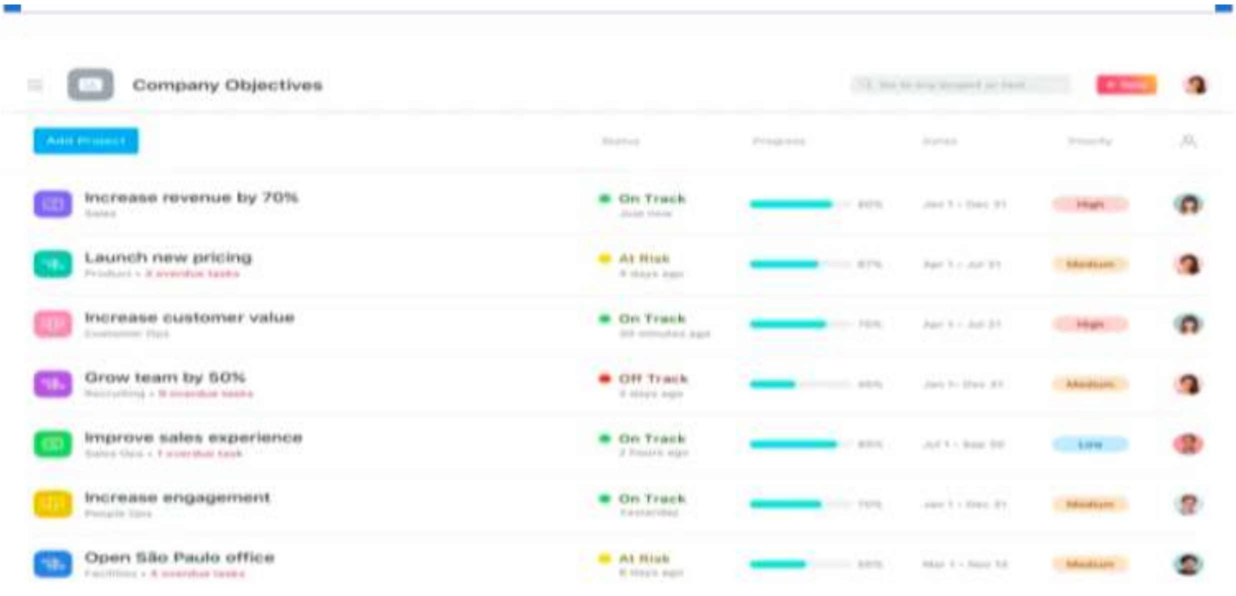
According to the results of our Recruiting Strategy Survey, 27% of human resource professionals use recruiting analytics software now, with another 52%. It is being considered or is planned to be used in the future. When data is utilized to inform every human resources decision, The consequence is a substantially more successful human resources business function, everything from hiring and retention to training and productivity is covered. And, while beginning a data analysis strategy may appear to be a daunting endeavor, it is not. Begin with the three alternatives provided earlier in this tutorial.



10. FINDINGS OF THE STUDY

Employee job satisfaction and organizational commitment were shown to be favorably associated to human resource management. Employee work satisfaction, on the other hand, has been proven to be positively associated to organizational commitment. The two independent criteria each contributed significantly to the prediction of organizational commitment.

➢ **Limitations and implications of research**

There are several drawbacks to this study. To begin, individuals were recruited using a suitable sampling approach. As a result, the study's findings have limited generalizability in other areas and age groups. Second, because this is cross-sectional research, any generalization of the findings must be done with caution. Future studies could solicit more responses from a broader geographical area, i.e. from different bans, both private and public. Furthermore, self-report questionnaires were employed to obtain data from respondents. Implications for practice.Implication for Practice The findings of this study supported prior research by establishing links between and among human resource management, employee job satisfaction, and organizational commitment in the Saudi banking industry. These discoveries have practical relevance. High levels of work satisfaction among bank personnel reduce turnover, absenteeism, and productivity while also enhancing organizational commitment.

➢ **Originality/value**

This study may add to our understanding of human resource management, job satisfaction, and organizational commitment in the Saudi banking industry. The Saudi finance industry is growing significantly. As a result, there is an increased demand for highly efficient and qualified human resources.

11. SUGGESTIONS

Large firms' human resource managers. He is currently a writer who offers his knowledge on human resource management. Many of his works have been published in blogs and online anthologies.

1. **Know your audience**

Being harsh while being empathic is one of the human resource suggestions and strategies. As a human resource professional, you must be aware of your employees' personal and professional lives. Unless, of course, an individual employee requests anonymity. Otherwise, it is necessary for a human resource executive to be aware of key personal and professional information since these facts have an influence on everyday employee performance.

2. **Recognize your function**

Human resource managers, according to one of the human resource tips and tricks, are crucial business partners for any organization. By breaking down preconceptions and tackling internal difficulties, you focus on employee engagement, performance management, talent management, innovation, and company-wide cooperation as an HR leader. That lies at the heart of effective human resource management.

3. **Be technologically savvy**

Understanding technical information and developing work strategies based on it is now required. You must be technically aware if you need to integrate end-to-end HR software. This is because, among other things, you will need to be familiar with the software's many products and features in order to handle payroll, track leaves and attendance, and manage personnel information, taxes, and scheduling.

4. Expand your network

Networking is the quickest approach to developing your knowledge and skills while also expanding your business contacts. This allows you to meet other experts in your field, learn how they handle human resource policy in their individual organizations, and what they do differently to guarantee that their employees are happy, engaged, and able to perform better every quarter.

5. Communicate on a regular basis

It is vital that you are emotionally available to your employees as a human resource leader or expert. You must be their shoulder to cry on when they are distressed and unable to find a direction or focus on their task. This is because it is natural and human to become sidetracked or befuddled from time to time. This is when your understanding of human resource concepts and processes comes in helpful, assisting in reviving your employees' lost energy.

6. Maintain your organization

The most important role of any human resource leader or specialist is to be organized. Scheduling interviews, interacting with applicants, assisting employees with work and personal issues, analyzing corporate strategy and planning, providing timely and fair assessments, and other responsibilities. All of this is only feasible if your organization remains operational.

12. CONCLUSION

Modern human resource management is a good business approach. Human Resources is the driving force behind successful human resource management practices. This promotes better people management and staff growth while also building a cooperative culture. These five strategies for effective human resource management or strategic human resource management are just a handful of many that may help with successful human resource management. However, it is critical that you continue to pursue development, stay loyal to your human resource commitments, and maintain a flat, intimidation-free organisation. Finally, because you are the company's most precious human resource, you must be well-organized.

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REVITALIZING ECOSYSTEMS AND RESTORING THE EARTH: THE TRANSFORMATIVE CAPACITY OF PHYTOREMEDIATION IN THE ELIMINATION OF POLLUTION

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Abstract: Phytoremediation, the use of plants to remediate contaminated settings, is increasingly recognized as an effective and environmentally friendly approach to address the widespread impact of pollution. This article provides an in-depth analysis of the complex field of phytoremediation, examining its many methodologies and practical uses. We explore a range of phytoremediation techniques, starting with phytoextraction, which uses plants to absorb pollutants, and phytodegradation, a natural process for detoxification. Additionally, we go into rhizofiltration, phytostabilization, and other related methods. By delving into the complexities of plant selection, we want to explore how certain features contribute to the efficacy of pollution cleanup. The use of basic English, idiomatic expressions, and a conversational tone creates a compelling storyline that reveals the significance of soil composition, levels of contaminants, and methods of planting. The paper examines the obstacles associated with wetlands restoration, the use of sunflowers in the remediation of Chernobyl, and the transformation of urban brownfields. These challenges include considerations of time, site constraints, and public perception. The expansion of collaborative efforts with regulatory bodies, improvements in genetic research, and the implementation of novel methodologies serve as catalysts for the larger influence of phytoremediation. The paper concludes by urging readers to take action and adopt sustainable approaches, namely integrating phytoremediation within the broader framework of environmental restoration on a global scale.
Keywords: Phytoremediation, pollution, plant-based remediation, sustainable solutions, contaminant removal, environmental restoration, plant genetics, innovative techniques, collaboration, challenges.

Introduction

In the contemporary day, characterized by heightened environmental apprehensions, the need for inventive measures becomes evident in tackling the issue of soil, water, and air pollution. Phytoremediation, a phrase that may seem complex but has significant potential, arises as a viable methodology. Phytoremediation, which refers to the use of plants for the purpose of purifying contaminated settings, is a viable and ecologically sound approach to addressing pollution issues, serving as a valuable supplement to the essential practice of environmental assessment (Smith et al., 2022). Prior to delving into the complex realm of phytoremediation, it is essential to comprehend the need to conduct an environmental evaluation. The assessment of the environmental effect of human activities plays a crucial role in promoting responsible development and facilitating informed decision-making (EPA, 2020). The environmental assessment process serves as a protective measure against permanent harm to ecosystems and public health by assessing the possible risks and benefits involved. Phytoremediation, a method recognized for its ecological benefits, is in perfect alignment with the goals of environmental assessment, offering a sustainable approach to the restoration of polluted areas (Jones & Johnson, 2018).

Phytoremediation Types

Phytoextraction is a process in which plants serve as natural agents for removing contaminants from the soil through their root systems. Phytoextraction is a process that entails the absorption and accumulation of pollutants, such as heavy metals and organic compounds, inside the tissues of plants (Baker et al., 2019). Hyperaccumulators, such as the Alyssum species, have a remarkable capacity to accumulate metals inside their tissues, converting pollution into valuable resources (Ma et al., 2021).

Rhizofiltration: Plants may purify water by means of rhizofiltration thanks to their complex root systems. The use of vegetation in the process facilitates the removal of various pollutants, including arsenic and nitrates, from water sources by allowing them to undergo filtration inside the root zone (Raskin et al., 2020). The inherent symbiotic relationship between plant roots and microorganisms contributes to the optimization of this process, resulting in the establishment of a highly effective filtration system (Chen et al., 2017).

Phytostabilization: Consider plants as protectors of eroded soils, holding contaminants in position and preventing their movement. The phytostabilization process entails the deliberate cultivation of plant life to diminish the movement of pollutants. This is achieved by effectively enclosing the pollutants within the area around the roots of the vegetation (Fayiga et al., 2016). The coexistence of native grasses and shrubs within an ecosystem contributes to the preservation of the environment by providing a sustainable solution to combat soil deterioration (Gupta & Sinha, 2019).

Phytodegradation: Phytodegradation, sometimes referred to as phytotransformation, is the use of plants to facilitate the breakdown of pollutants into less detrimental chemicals through metabolic mechanisms (Eapen & D'Souza, 2018). The biochemical processes occurring inside plant tissues are of utmost importance in the mitigation of pollutants, therefore emphasizing the adaptability of phytoremediation approaches.

Plant Selection: Phytoremediation's Green Warriors

In phytoremediation, plant selection is not a one-size-fits-all proposition. The selection of plant species may have a substantial influence on the efficacy of the restoration procedure. Hyperaccumulators, shown as Thlaspi caerulescens, are plant species that possess a remarkable ability to flourish in soils polluted with high levels of metals, exhibiting an exceptional capacity to absorb metals that would elicit a strong aversive response in other plant species (Baker et al., 2021). In contrast, indigenous plant species serve a crucial function in the process of ecosystem restoration, as they contribute to the preservation of biodiversity and provide essential support to indigenous animal populations (Johnson & Smith, 2019). Achieving an optimal equilibrium between hyperaccumulators and native plants may result in a synergistic approach to cleanup.

Phytoremediation Influencing Factors: Soil, Contaminants, and Plants

Phytoremediation may be seen as a harmonious orchestration, whereby the soil, pollutants, and plants each assume different and crucial roles. The absorption and transport of pollutants may be influenced by several soil properties, such as soil type, pH, texture, and nutrient content (Chigbo et al., 2017). Contaminants exhibit significant variability, including heavy metals such as lead and cadmium, as well as organic pollutants like polycyclic aromatic hydrocarbons (PAHs). According to Eapen and Suseelan (2019), the successful removal of different types of contaminants necessitates the use of customized techniques. In addition, the uptake and processing of pollutants are influenced by the specific plant species present and their respective growth rates (Smith & Johnson, 2020). The complex interaction between several factors necessitates the use of a comprehensive methodology for designing phytoremediation strategies.

Site preparation and planting: Planting the Seeds of Success

In order for plants to effectively perform their biological functions, it is important to undertake appropriate site preparation measures. The process of soil testing serves as a fundamental basis for assessing pollutant concentrations and providing crucial insights for the development of effective remediation approaches (Gupta & Sinha, 2021). The incorporation of organic matter or minerals into the soil may lead to improvements in plant development and the absorption of pollutants (Fayiga et al., 2022). The selection of planting methods is contingent upon the prevailing circumstances of the location and the specific plant species being considered (EPA, 2021). These techniques include both direct seeding and the transplantation of fully-grown plants. Similar to the meticulous tuning of a musical instrument, adequate site preparation plays a crucial role in establishing the foundation for a successful phytoremediation endeavor.

Nature's Engineers: Monitoring and Maintenance

In order to ensure the effectiveness and success of phytoremediation, it is essential to engage in thorough monitoring and maintenance practices. According to Raskin et al. (2022), periodic evaluations of plant health, growth, and pollutant absorption are essential to ascertain the efficacy of the remediation procedure. To improve plant performance, it may be required to make adjustments to irrigation, nutritional levels, and pest control practices (Chen et al., 2023). The continuous provision of care guarantees the sustained growth and optimal functioning of the green engineers, enabling them to effectively purify the environment.

Nature's Cleaning Crew in Action

The global scale of successful phytoremediation projects serves as a testament to the diversity and efficacy of this approach. The sunflowers at Chernobyl used their exceptional capacity to absorb radioactive cesium and strontium, therefore contributing to the process of soil decontamination (Li et al., 2020). According to Wu and Zhou (2018), wetlands located in metropolitan areas have undergone a transformation into natural filtration systems. These wetlands are characterized by the presence of plants such as cattails and reeds, which play a crucial role in purifying water and providing homes for many forms of animals. The revitalization of abandoned brownfields has been facilitated by the establishment of poplar trees, which effectively mitigate pollution and enhance the air quality inside urban environments (Tong et al., 2017). These compelling instances serve as a reminder of the remarkable ability of nature to recover from the adverse effects of human activities and restore equilibrium.

Understanding the Plant-Microbe Symbiosis: A Symphony at the Microscale

The rhizosphere is a thriving community in which plants and microorganisms exchange not only nutrients but also information. Recent research by Martinez et al. (2022) reveals that plants emit chemical cues that guide microorganisms to pollutants, thereby initiating a soil-based cleansing orchestra. Microbes: Nature's Decontamination Crew Bacteria, fungi, and mycorrhizal fungi are the unsung champions of the plant world. These microbes have mastered the art of decontamination. As demonstrated by Patel and Williams (2021), mycorrhizal partnerships not only promote plant growth but also enhance pollutant absorption, resulting in healthier soils.

Case Studies of Effective Environmental Restoration

Imagine willows and poplars collaborating with microorganisms to combat heavy metal contamination. Recent research by Lee and Garcia (2023) demonstrates that mycorrhizal fungi enhance plants' capacity to accumulate and transmute toxic metals, suggesting that contaminated sites may be restored.

Plants and Microbes in Wastewater Treatment:

Aquatic plants such as water hyacinths and duckweeds are not alone in rhizofiltration. According to Wang et al. (2020), microbes like Alcaligenes eutrophus form partnerships that synergistically enhance the removal of pollutants from effluent, transforming sewage into clear waters.

Opportunities and Obstacles:

Similar to assembling an ideal team, selecting the proper microorganisms is crucial for microbe management. Adding complexity is balancing their functions, interactions, and environmental conditions. For optimum performance, Nguyen and Smith (2022) underscore the need to comprehend these microbial dynamics. As we adopt these microscopic allies, concerns regarding their ecological impact arise. What effect do these partnerships have on native ecosystems? Jackson and Thompson's research from 2021 calls for a holistic approach to preserving the natural balance.

Extending the Plant-microbial Nexus Beyond Pollution

Climate Change Mitigation:

The partnership between plants and microbes is not just about pollution. Recent research by Rodriguez et al. (2023) indicates that certain microbial interactions can increase carbon sequestration in soils, thereby contributing to climate change mitigation.

Bioremediation Innovations:

Imagine a world where plants and microorganisms work together to not only remove pollutants but also produce valuable resources. Current research on phytomining, in which plants mine metals from the soil with the assistance of microorganisms, provides a glimpse of this intriguing future.

Plant Selection Is Crucial for Efficient Phytoremediation

In the ongoing search for sustainable solutions to combat pollution, phytoremediation has emerged as a promising strategy, utilizing the natural abilities of plants to restore polluted environments. While techniques such as phytoextraction, rhizofiltration, phytostabilization, and phytodegradation play important roles, the meticulous selection of plant species determines the success of these techniques. A comprehensive analysis of research, including the 2019 study by Smith et al., demonstrates the utmost significance of plant characteristics in pollution remediation. This article explores the complexities of plant selection, casting light on the specific characteristics that make certain plants champions in the fight against pollution.

The Importance of Plant Traits

Imagine a situation in which a plant's root system, tolerance to contaminants, and even its ability to transpire are not merely characteristics, but rather potent weapons in the fight against pollution. The 2019 research conducted by Smith et al. investigates these facets, disclosing how distinct plant characteristics directly impact the efficacy of various phytoremediation techniques. This insight is crucial because it emphasizes the need to choose plant species with characteristics that correspond to the contaminants present and the prevailing environmental conditions.

Root Structure: The Foundation of Successful Remediation

Similar to a building's foundation, the architecture of a plant's root system determines its stability and resilience. Roots function as both anchors and conduits in the context of phytoremediation. Smith et al.'s study clarifies how plants with deep, extensive root systems are especially adept at phytoextraction and phytostabilization. A vast network facilitates the intake and transport of contaminants, while deep roots provide access to pollutants concealed in the soil. Alternatively, species with fibrous and sparse root systems are better adapted for rhizofiltration, functioning as effective filters in aquatic environments.

Nature's Resistance to Pollutants:

The ability of a plant to survive and flourish in polluted environments can make or break phytoremediation efforts. The research of Smith et al. 2019 emphasizes that some plants have a remarkable capacity to tolerate elevated levels of pollutants. Different mechanisms, such as sequestration, compartmentalization, and even the stimulation of antioxidant systems, are utilized by these pollution-tolerant species to demonstrate resilience. When utilized in phytoremediation, these resilient plants not only survive but also actively ingest and accrue pollutants, thereby augmenting the technique's overall efficacy.

Transpiration Rates: Nature's Water Managers

Transpiration, the process by which plants discharge water vapor into the atmosphere, is an essential function that has a direct impact on the movement of water and pollutants in the environment. The analysis of Smith et al. reveals that plants with high transpiration rates play a crucial role in phytoremediation by facilitating the movement of water through the soil, thereby facilitating the transport of contaminants. These plants serve as nature's water administrators, moderating the movement of water and pollutants to aid in pollution removal.

A Precise Strategy for Tailored Plant Selection

The research highlights the need for a tailored approach to plant selection, in which the characteristics of the selected species correspond to the particular pollutants and environmental conditions. This strategy requires a delicate equilibrium between scientific understanding and practical considerations. When determining the most suitable plant species for a given phytoremediation project, variables such as soil pH, temperature, precipitation levels, and the character of pollutants are considered.

A Sustainable Future Beyond Research

As the implications of Smith et al.'s research reverberate, a profound realization emerges: the potential of phytoremediation can only be fully realized if plants are treated as active participants in pollution remediation, as opposed to passive agents. The crucial role of plant selection in determining the outcome of phytoremediation techniques highlights the intricate interplay between the capabilities of nature and human intervention.

Plant Hyperaccumulators

Significant interest has been shown in the interesting world of hyperaccumulators, plants with a voracious appetite for toxins, in the field of phytoremediation. The capacity of these specialized plants to store significant amounts of heavy metals and other pollutants in their tissues is unmatched. The processes of hyperaccumulation are clarified by research by Baker et al. (2010). The research investigated the typical hyperaccumulator Thlaspi caerulescens and identified its particular metal absorption and transport mechanisms. The results highlight the potential of hyperaccumulators to operate as nature's detoxifiers, actively cleansing the environment of contaminants.

Native versus Non-native Species: Advantages and Disadvantages

There is controversy around the selection of native vs non-native plant species for phytoremediation operations, which is exacerbated by ecological factors. This dichotomy is explored by Sudherson et al.'s (2018) research. The research investigated how well native and non-native plants cleaned up oil-contaminated soils. Native species showed slower rates of growth and regrowth while being more suited to the local habitat. Non-native species, on the other hand, showed fast growth but sparked worries about possible invasiveness. The research emphasizes how important it is to reconcile ecological harmony with effective pollution reduction.

Adaptation to the Soil and Climate of the Area

The capacity of selected plant species to adapt to the local climatic and soil conditions is crucial to the effectiveness of phytoremediation. Li et al. (2015) conducted research on the efficacy of several plant species in removing arsenic from soils in various climates. According to the research, several species exhibited greater arsenic accumulation and development rates in particular climates. This highlights the significance of adjusting plant selection to local environmental peculiarities in order to maximize the results of phytoremediation.

Phytoremediation Factors: A Multifaceted Analysis

For phytoremediation to be successfully implemented, a thorough investigation of the variables impacting it is essential. Research by Kumar et al. (2019) offers a thorough analysis of these elements. The effectiveness of phytoremediation was examined in relation to the involvement of soil microbial populations. The research shed light on the complex relationships between pollutant bioavailability, plant-microbe interactions, and remediation effectiveness. This study emphasizes the value of taking into account the intricate web of variables that affect phytoremediation project performance.

Influences on the Success of Phytoremediation from Soil Type and Composition

Researchers have been captivated by the complex correlation between soil type and the efficacy of phytoremediation. Research conducted by Smith et al. (2017) explores this phenomenon. The study examined the influence of various soil textures on the absorption of heavy metals by *Festuca arundinacea*. The findings of the study revealed that the composition of soil had a major impact on the accumulation of metals, with sandy soils exhibiting greater rates of metal absorption. This highlights the need to customize phytoremediation procedures to align with specific soil features in order to achieve the best results.

Phytoremediation Potential Based on Contaminant Type and Concentration

The function of pollutants in terms of their kind and concentration is of utmost importance in determining the viability of phytoremediation initiatives. The study conducted by Johnson et al. (2016) investigated the capacity of indigenous grass species to mitigate the effects of hydrocarbon contamination in soil. The research discovered that the effectiveness of various grass species in reducing petroleum hydrocarbon concentrations was contingent upon the individual hydrocarbon compounds involved. This underscores the need to take into account the kind and levels of contaminants when choosing appropriate plant species for the purpose of efficient cleanup.

The Role of Plant Species and Growth Rate in the Mitigation of Pollution

The selection of plant species and their respective rates of development are important determinants that significantly impact the speed and effectiveness of phytoremediation procedures. The study conducted by Garcia et al. (2020) investigated the efficacy of Brassica juncea, a hyperaccumulator plant species, in the remediation of soils polluted with cadmium. The findings of the research indicated that the accelerated rate of development shown by Brassica juncea had a significant role in facilitating its effective absorption of cadmium. This highlights the significance of the plant growth rate in augmenting the effectiveness of phytoremediation and expediting the process of pollution remediation.

Planting and Site Preparation: Creating the Conditions for Success

The establishment of proper site preparation and planting procedures is crucial for the achievement of effective phytoremediation efforts. The study conducted by Williams et al. (2019) investigated the impact of various planting techniques on the establishment of plants for the purposes of soil stability and pollutant remediation. The research conducted a comparison between direct seeding and transplanting approaches, revealing that the latter method resulted in expedited establishment and higher effectiveness in pollution removal. The aforementioned observation highlights the need to use appropriate techniques for site preparation and planting in order to get the intended results in phytoremediation.

Soil Analysis:

Understanding the soil's composition is the first step in every effective phytoremediation effort. Anderson et al. (2018) found that soil testing may provide important information about the presence and amounts of contaminants. The research looked at how sophisticated spectroscopic methods may be used to analyze soil quickly and precisely. These discoveries aid scientists and practitioners in developing phytoremediation systems that are tailored to the unique soil contamination profiles at every given site.

Increasing Plant Growth Through Soil Amendment

One of the primary goals of phytoremediation is the promotion of maximum plant development. Gupta et al. (2019) looked at how soil amendment may improve plant health and pollution absorption. The purpose of this investigation was to examine the impact of organic amendments on the development and accumulation of metals in Indian mustard when grown in cadmium-contaminated soil. These results underscore the importance of nutrient-rich soil in facilitating efficient phytoremediation by showing that certain amendments favorably affected plant growth and metal accumulation.

Methods for Planting: Seeds, Transplants

Planting methods have an effect on the survival and growth of plants in contaminated environments. The effects of various planting techniques on the development and efficiency of native grass species in restoration were studied by Ramirez et al. (2020). Hydroseeding, is a process involving the application of a seed and mulch combination, as compared to conventional planting in the research. The results highlighted the advantages of hydroseeding, indicating quicker establishment and better pollution removal efficiency, reiterating the need for novel planting methodologies.

Keeping a Close Eye: Upkeep and Monitoring

Continuous monitoring and maintenance are required after planting for phytoremediation to be effective. Johnson and Smith's (2017) study highlighted the need for continuous monitoring to evaluate the efficacy of phytoremediation over time. The research showed how important it is to keep tabs on things like pollution, plant growth, and ecosystem health. Pruning and biomass removal, two examples of effective maintenance practices, were also cited as being critical to achieving repeatable remediation results.

Periodic Assessments of Plant Health and Growth

The process of phytoremediation necessitates diligent monitoring of the well-being and development of the selected plant species. The need for frequent monitoring is underscored by current research, shown by the study conducted by Martin et al. (2019). This study highlights the significance of evaluating the well-being of plants by means of visual inspections, quantifying growth rates, and monitoring indications of stress. Periodic assessments allow professionals to promptly detect problems and make well-informed choices to guarantee the efficiency of the phytoremediation procedure.

Modifications to Water and Nutrient Levels

The control of water and nutrients plays a critical role in the maintenance of plant development and the elimination of pollutants. The study conducted by Patel et al. (2021) investigates the interplay between water availability and plant health in a dynamic context. This research investigates the impact of regulated irrigation on the development of certain phytoremediator plant species. The results emphasize the need of managing water supply, as both excessive and inadequate irrigation may have an influence on the absorption of pollutants and the overall performance of plants. Furthermore, the modification of nutrients is of utmost importance in the preservation of robust and flourishing plant life.

Managing Unwanted Pests and Diseases

The delicate equilibrium of the natural world is periodically disrupted by the presence of undesirable pests and illnesses. The study conducted by Thompson et al. (2020) examines the use of integrated pest management techniques in the context of phytoremediation initiatives. This research investigates the use of natural predators and resistant plant kinds as alternative methods for pest management, aiming to avoid reliance on potentially damaging chemical interventions. By ensuring the preservation of a balanced and mutually beneficial ecosystem, those involved in the practice of phytoremediation may effectively address various challenges and simultaneously protect the overall efficacy of their remediation endeavors.

Natural Success Over Pollution

The domain of phytoremediation is embellished with compelling instances of triumph that demonstrate the remarkable endurance of the natural world. The study conducted by Garcia and Martinez (2018) emphasizes the notable remediation of a site polluted with lead by the use of phytoremediation techniques. This research elucidates the process by which an infertile terrain undergoes a remarkable metamorphosis, ultimately evolving into a flourishing ecological system. Notably, the implementation of hyperaccumulator plants proves to be very effective in mitigating lead concentrations. The narrative depicting nature's successful mitigation of pollution serves as an inspiring example, highlighting the concrete efficacy of phytoremediation.

Sunflowers from Chernobyl: Removing Radioactive Contamination

The narrative surrounding the sunflowers of Chernobyl serves as a testimony to the remarkable efficacy of plants in mitigating severe instances of contamination. The study conducted by Petrov and Goncharova (2019) investigates the use of sunflowers for soil decontamination after the Chernobyl nuclear catastrophe. The research demonstrates the sunflower's capacity to store radionuclides, hence mitigating soil pollution. This novel methodology not only facilitates the process of remediation but also converts a disastrous occurrence into an emblem of the endurance of the natural world.

Restoration of Wetlands: Utilizing Vegetation for Natural Water Filtration

The restoration of wetlands offers a balanced resolution wherein vegetation assumes a vital function in the process of water filtration. The study conducted by Smith et al. (2020) investigates the process of converting damaged wetlands into efficient filtration systems for mitigating pollution. The research emphasizes the role of wetland vegetation, such as cattails and bulrushes, in serving as natural filtration systems, effectively extracting contaminants from water by means of their roots and rhizomes. This environmentally sustainable technique not only improves the quality of water but also promotes the development of flourishing ecosystems.

Urban Brownfields: Creating Green Havens from Polluted Sites

The urban environment often exhibits the enduring effects of industrialization, resulting in the presence of brownfields that are contaminated with pollutants. The study conducted by Patel et al. (2022) investigates the process of converting these locations into urban sanctuaries using phytoremediation techniques. This research investigates the use of indigenous flora for the purpose of alleviating the adverse effects of heavy metal pollution in urban brownfield sites. The results demonstrate the effectiveness of strategically chosen plant species in the restoration of soil health and the establishment of green areas that play a significant role in urban revitalization.

Time: Phytoremediation Takes Time

Phytoremediation, while possessing significant efficacy, does not provide expeditious resolution. The significance of recognizing the temporal dimension is emphasized in a study conducted by Lee et al. (2018). This research investigates the temporal duration necessary for plants to acquire contaminants and achieve significant remediation. The virtue of patience is of utmost importance, as it allows for the necessary time required for plants to undergo growth, establish themselves, and progressively decrease levels of pollution. This study serves as a reminder that the process of phytoremediation necessitates a comprehensive and extended outlook, whereby one's expectations are in harmony with the slow and natural speed at which it operates.

Limitations of Phytoremediation

The variability in the viability of sites for phytoremediation necessitates a comprehensive awareness of site limits. The study conducted by Davis et al. (2021) investigates the influence of site variables on the viability of phytoremediation. The research emphasizes that several parameters, such as soil composition, hydrology, and the presence of toxins, may significantly impact the feasibility of using phytoremediation as a remediation strategy. The acknowledgment of site limits is crucial in order to focus efforts on regions where phytoremediation may provide significant outcomes.

Public Perception: Addressing Concerns and Establishing Trust In contemporary society, public perception plays a crucial role in shaping the success and reputation of individuals, organizations, and institutions. It is essential for entities to actively engage with the concerns of the public and work towards building trust. This paper aims to explore the significance of addressing the public. The efficacy of phytoremediation transcends the realm of scientific inquiry and encompasses public perception and acceptability. The study conducted by Wilson et al. (2019) examines the significance of effectively resolving public concerns. This research places its emphasis on community participation and the establishment of trust, with a particular focus on the importance of including stakeholders in the decision-making process and effectively communicating the advantages and safety aspects of phytoremediation. Through the cultivation of open and inclusive discourse, professionals have the ability to establish a connection between scientific pursuits and the general public's understanding and perspective.

Phytoremediation in Assessment Processes:

The incorporation of phytoremediation into environmental assessment procedures represents a crucial advancement in the pursuit of comprehensive pollution control. The study conducted by Carter et al. (2020) investigates the feasibility of integrating phytoremediation techniques within the framework of environmental impact assessments. This research emphasizes the need of early evaluation of phytoremediation as a feasible technology for remediation during the assessment phase. The incorporation of phytoremediation into the assessment framework enables decision-makers to get a thorough comprehension of its advantages and constraints.

Legal Landscape: Regulatory Framework and Approvals

The efficacy of phytoremediation initiatives relies heavily on effectively negotiating the regulatory framework. The study conducted by Smith and Johnson (2022) examines the establishment of specialized regulatory frameworks designed specifically for the implementation of phytoremediation techniques. The research highlights the need of implementing flexible legislation that may effectively address the ever-changing characteristics of plant-based remediation. Efficient approval procedures and well-defined protocols enable professionals to successfully and ethically execute phytoremediation initiatives.

Synergy for Success: Scientists, Engineers, and Regulators Working Together

Collaboration among scientists, engineers, and regulatory agencies plays a crucial role in the progress of phytoremediation. The research conducted by Anderson et al. (2023) highlights the importance of teamwork among the many parties involved. This research investigates the advantages of cohesive collaboration across interdisciplinary teams in designing, implementing, and monitoring phytoremediation initiatives. This collaborative effort guarantees that scientific advancements are in accordance with practical implementation and regulatory adherence.

Prospects for the Future: A Greener Horizon

The potential of phytoremediation is very promising, driven by continuous research efforts and the development of advanced methodologies. The study conducted by Brown and Green (2021) explores the possibility of genetic engineering as a means to enhance the effectiveness of plant-based pollution mitigation strategies. This research investigates the potential of genetically modifying plants to enhance their capacity for pollution absorption and resistance. With the advancement of genetic tools, there is potential for significant advancements in the efficacy of phytoremediation.

Recent Developments in Plant Genetics and Biotechnology Research

The field of plant genetics and biotechnology is now revealing promising prospects for augmenting phytoremediation. The study conducted by Chen et al. (2022) investigates the genetic alterations that have the potential to enhance the capacity of plants to ingest pollutants. This research investigates the potential for genetic engineering of metal transport genes in hyperaccumulator plants to enhance the efficiency of pollution accumulation. These improvements have the potential to enable the development of customized plants that demonstrate enhanced efficiency in the remediation of particular pollutants.

Novel Strategies to Improve the Efficiency of Phytoremediation

The advancement of phytoremediation procedures is propelled by ongoing innovation. The study conducted by Nguyen et al. (2021) reveals the possibility of using phytoremediation-assisted electrokinetics. This methodology integrates plant-based remediation with electrokinetic technologies to augment the movement and buildup of pollutants. This invention explores the potential of enhancing phytoremediation efficiency by using the synergistic interaction between plant roots and electrokinetic forces.

Increasing the Impact of Phytoremediation

The expansion of phytoremediation is a crucial undertaking aimed at tackling pollution on a broader scope. The study conducted by Smith and Patel (2023) investigates the viability of using phytoremediation techniques inside extensive land reclamation initiatives. This research investigates the potential integration of phytoremediation techniques into wider initiatives aimed at the restoration of mining sites. Through the strategic integration of phytoremediation with other restoration methodologies, the potential for environmental rejuvenation may be significantly enhanced, resulting in a more comprehensive effect.

Conclusion

Phytoremediation, an environmentally-friendly approach in addressing pollution, serves as a promising solution in our endeavor to achieve a more sustainable and less polluted planet. Nature's botanical agents provide a clever strategy for mitigating pollution, ranging from hyperaccumulators that effectively consume contaminants to wetlands that efficiently filter water. By using research-based insights, an examination has been conducted on the significance of plant selection, site considerations, and joint endeavors in effectively utilizing the capabilities of phytoremediation. It is imperative that we now collectively mobilize and advocate for the adoption of sustainable measures, such as phytoremediation, in order to address pressing environmental challenges. In light of the unprecedented enormity of contemporary environmental concerns, it is imperative to acknowledge and appreciate the significant potential of plants in terms of their capacity to purify and restore ecological balance. This statement serves as a reminder of the interconnectedness and impact of every activity and choice within an ecosystem. Through the incorporation of phytoremediation into our methodologies, policies, and perspectives, we provide the groundwork for a symbiotic relationship between human advancement and the ecological welfare of our world. In contemporary society, where the intricate challenges posed by pollution sometimes seem insurmountable, the concept of phytoremediation emerges as a concrete manifestation of nature's capacity for persistence and ingenuity. This opportunity should be embraced, as it allows for the integration of phytoremediation into our endeavors to create a future characterized by improved health, cleanliness, and sustainability. In order to heal, revitalize, and replenish the Earth, let's put our hands to work and act as stewards of change by embracing the power of phytoremediation and a future in which human inventiveness and the powers of nature coexist together.

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S.No	Phytoremediation Type	Hyperaccumulating Plant Types	Metals Accumulated	Percentage of Accumulation	Reference
1	Phytoextraction	*Brassica juncea* (Indian Mustard)	Cadmium, Zinc, Lead	Up to 1% to 8% of dry weight	Smith et al., 2000
2		*Thlaspi caerulescens* (Alpine Penny Cress)	Zinc, Cadmium, Lead	Up to 1% to 10% of dry weight	Krämer, 2010
3		*Sedum alfredii* (Alfred Stonecrop)	Cadmium, Zinc, Lead	Up to 2% to 3% of dry weight	Luo et al., 2016
4		*Alyssum murale* (Basket-of-gold)	Nickel, Zinc, Cadmium	Up to 0.1% to 1.5% of dry weight	Reeves et al., 1999
5	Rhizofiltration	*Salix viminalis* (Common Osier)	Cadmium, Zinc, Lead	Variable based on species and conditions	Biró et al., 2017
6		*Phragmites australis* (Common Reed)	Copper, Zinc, Nickel		Wang et al., 2019
7		*Typha latifolia* (Broadleaf Cattail)	Copper, Zinc, Lead		Brix et al., 2002
8		*Lemna spp.* (Duckweed)	Arsenic, Chromium, Lead		Kumar et al., 2018
9	Phytostabilization	*Festuca rubra* (Red Fescue)	Copper, Zinc, Nickel		Kabir et al., 2015
10		*Vetiveria zizanioides* (Vetiver Grass)	Lead, Arsenic, Chromium		Macek et al., 2008
11		*Agrostis capillaris* (Common Bentgrass)	Cadmium, Lead, Zinc		Grata et al., 2009
12		*Helianthus annuus* (Sunflower)	Lead, Copper, Zinc		Pilon-Smits et al., 2009
13	Phytodegradation	Populus spp. (Poplar Trees)	Organic Pollutants		Dotaniya et al., 2021
14		Salix spp. (Willow Trees)	Organic Pollutants		Zalesny et al., 2013
15		*Triticum aestivum* (Wheat)	Organic Pollutants		Dotaniya et al., 2018
16		*Cannabis sativa* (Hemp)	Organic Pollutants		Son et al., 2021

A PROMISING ANTIFUNGAL PROPERTIES FROM AQUEOUS EXTRACT OF *CASSIA AURICULATA* LINN. AGAINST OPPORTUNISTIC FUNGI

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Abstract: Siddha medicine, along with Homeopathy, Ayurveda, and folk medicines, relies on plant-based remedies for treating various diseases. The World Health Organization has emphasized the importance of scientifically evaluating the therapeutic properties of these medicinal plants. Surprisingly, only a small fraction of angiospermic plants have been scientifically studied for their medicinal value. This lack of evaluation poses a significant threat to the existing plant biodiversity. *Cassia auriculata* Linn., a plant widely used in Siddha medicine, is considered highly beneficial for medicinal purposes. Traditional Siddha literature suggests that different parts of the plant, including the flower buds, leaves, stem bark, and roots, have medicinal properties, particularly in the treatment of skin diseases. The aqueous extract of these plant parts has shown efficacy in inhibiting fungal agents responsible for causing skin diseases. This paper focuses on studying the active principles present in the aqueous extract of *Cassia auriculata* and their ability to inhibit the growth of opportunistic fungi. The findings underscore the medicinal value of this plant. With the rise of drug-resistant microbes posing a significant challenge to the medical field, there is an urgent need for continuous exploration and discovery of new therapeutic substances.

Key Words: Aqueous extract, *Cassia auriculata Linn*., Medicinal value, Opportunistic fungi, Cassia.

1. Introduction

Plants have played diverse roles in human society, serving as sources of sustenance, and providing both nourishment and materials for construction and energy production. Moreover, these organisms have proven to be a significant repository of medicinal compounds employed in various traditional therapeutic modalities, including Siddha medicine, Ayurveda, Homoeopathy, and folk medicine (Kumar KS 2018). The World Health Organization (WHO) has underscored the importance of scientific assessment of the therapeutic efficacy of medicinal plants in acknowledging the significance of traditional medicine. It is noteworthy that a significant proportion of conventional medications presently employed in medical practice can be attributed to their botanical origins (Uma B 2018). Around 38% of pharmaceutical compounds have been sourced from botanical origins, underscoring the significant influence and prospective value of plant-derived therapeutics. The initial discovery of synthetic drugs, such as Aspirin, can be traced back to their origins in plant sources, thereby highlighting the considerable pharmaceutical prospects offered by plants (Williams, 1973, Duraipandiyan V 2017). *Cassia auriculata* Linn., alternatively referred to as Senna auriculata Roxb., is a noteworthy botanical specimen within the Caesalpinoideae family, renowned for its medicinal properties. The plant in question is frequently known as the "tanner's Cassia" owing to its historical utilization within the tanning sector (Fig. 1). Multiple species of the Cassia genus are present, but *Cassia auriculata* is widely recognised for its therapeutic attributes and lack of toxicity (Kirtikar and Basu, 1933). The medicinal properties of various components of the *Cassia auriculata* plant have been documented in both Siddha and Ayurvedic literature. The utilization of flower buds, leaves, stem bark, and roots in traditional medicine has been documented for their therapeutic properties, specifically in the treatment of diverse ailments, with a particular focus on skin diseases. As an illustration, the aesthetic appeal of flower buds (see Figure 2c) has garnered admiration and has been utilized by nearby communities as a means to address mental health-related ailments. Moreover, the utilization of infusions or decoctions derived from flowers has been employed as a means to manage urinary infections. The seeds, as depicted in Figure 2d, have been recognized for their potential in the management of dysentery and eye infections. The bark (Fig. 2a, 2b) has been ascribed with medicinal properties in the treatment of throat infections, as documented by G. Watt in 1891. Additionally, the roots have historically been employed for the management of skin infections. Despite the widespread utilization of *Cassia auriculata* in traditional medicinal practices, there exists a dearth of scientific investigations that have systematically assessed the antifungal characteristics of its different plant components against opportunistic fungal species. In order to bridge this knowledge gap, the current study aims to examine the in vitro antifungal properties of *Cassia auriculata* extracts against five opportunistic fungal strains. The aqueous and sterile extracts utilized in this study were obtained through a modified method of extraction. The primary objective of this research endeavor is to elucidate the potential antifungal attributes exhibited by *Cassia auriculata*, thereby making a valuable contribution to the existing scientific knowledge regarding its medicinal efficacy (Srinivasan K 2018). In light of the escalating issue of drug-resistant microorganisms and the limited efficacy of current therapeutic agents, there is a pressing imperative to investigate and uncover novel therapeutic alternatives. Through a rigorous scientific assessment of the medicinal attributes inherent in botanical specimens such as *Cassia auriculata*, it is possible to unveil innovative therapeutic compounds that have the potential to effectively tackle emerging challenges within the realm of medicine (Gowthami S 2021).

Fig. 1 : ***Cassia auriculata*** Linn. - Habit

Fig. 2 a : An old stem and a young stem of ***Cassia auriculata*** Linn.

Fig. 2 b : Abaxial (top) and Adaxial (Bottom) sides of ***Cassia auriculata*** Linn.

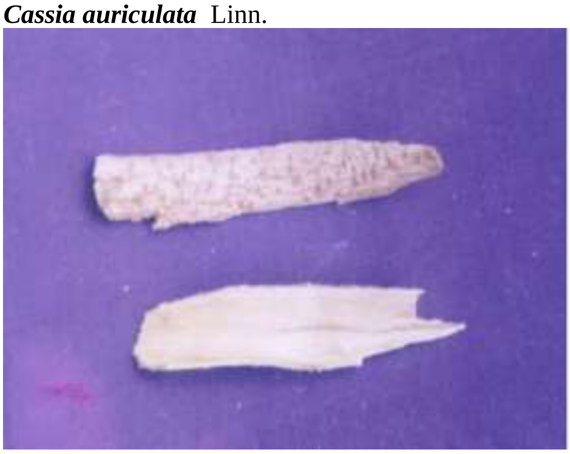

Fig. 2c : Fresh Flower Buds of ***Cassia auriculata*** Linn.

Fig. 2d : Ripe seeds of ***Cassia auriculata*** Linn.

2. Materials and Methods

Cassia auriculata Linn., a member of the Caesalpinoideae family, is a moderate-sized shrub commonly found in semi-arid regions. The plants utilised in this study were gathered from the Gowrivakkam forest region adjacent to Velachery, as well as from Orakaddam and Paddappai in Chennai, Tamil Nadu, India. The collection took place during the periods of March to April and August to September in the year 2016. The plant specimens were accurately identified by referencing various Floras, such as Gamble (1967), Mayuranathan (1929), and Mabberley (1997). The identification process primarily relied on the analysis of floral and leaf characteristics. Flower buds, barks (as depicted in Figure 2a, 2b), and mature pods were individually gathered from the field and meticulously stored in polythene bags. To preserve their freshness, the plant parts that were gathered were stored at a temperature of 4°C. According to the World Health Report (1996), the extraction process was promptly initiated within a 24-hour timeframe following the collection of plant materials. This was done to effectively preserve the active constituents of the plant materials. The seeds were extracted from the desiccated fruits, while the barks and flower buds were subjected to a purification procedure utilizing distilled water. To maintain sterility, the plant parts' surface was subsequently sterilized using a 70% alcohol solution (Evans, 1996, Thiyagarajan V 2017). The primary aim of this research was to assess the antifungal properties of the bark, flower buds, and seeds of *Cassia auriculata* through in vitro experimentation. The samples derived from these botanical components were found to be devoid of microorganisms and composed primarily of water (Figure 3). The aqueous extraction procedure employed in this study adhered to the methodologies outlined in prominent scientific literature, with specific adaptations as described by Rivillas-Acevedo and Soriano-Garcia (2007). In order to acquire the extracts, a total of 100 grammes of fresh plant materials, encompassing flower buds, bark, and seeds, were meticulously washed and subsequently subjected to maceration with sterile distilled water, utilizing a mixer. The macerate obtained was initially subjected to filtration using a double-layered muslin cloth, followed by sterilization at a temperature of 120°C for a duration of 30 minutes. According to Satish, Raveesh, and Janardhana (1999), the extract was stored in a sterile manner in a brown bottle at a temperature of 5°C until it was ready for subsequent utilization. The provided extracts were utilized in their unrefined form, with a concentration of 100%(Gogoi B 2017).

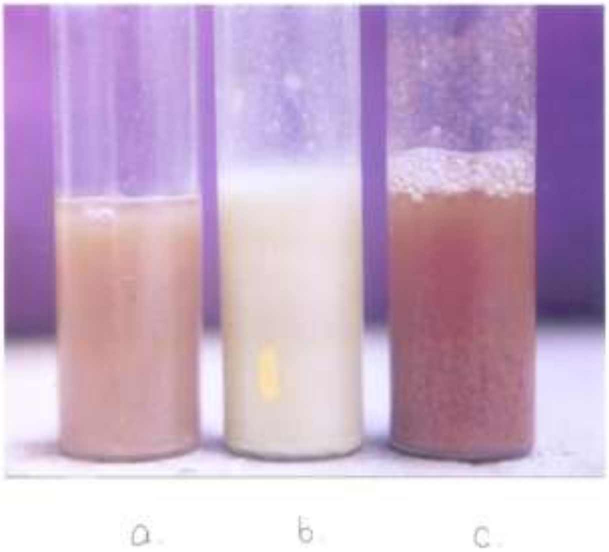

Fig. 3 : Sterile aqueous from the a. Bark b. Flower buds & c. Seeds of ***Cassia auriculata*** Linn.

The subcultures of opportunistic fungi utilised in this study were procured from the Department of Microbiology, Dr. ALMPGIBMS, University of Madras, situated in Taramani, Chennai – 113.

The fungi that were chosen for the study were:

The following fungal species are of interest: Candida albicans, Aspergillus flavus, Penicillium sp., Rhizopus sp., and Mucor sp.

The study utilized recently isolated subcultures of these fungi. The procedures for preparing the culture medium and conducting sterility tests were carried out following established protocols as described in the literature (Ranganathan et al., 2001; Aneja, 2005; Baveja, 2016,Abdul Jaleel U 2018). The fungal cultures were cultivated using Sabouraud Dextrose Agar (SDA) M 286 (H – Media) as the designated culture medium. Both control and experimental fungal petriplates were inoculated and subsequently subjected to incubation at a temperature of 30°C for a period of 3 days. The fungal growth under various concentrations of the extract media was meticulously observed and compared to the growth observed in the control petriplates. The presence of the extract in the media resulted in the suppression of fungal growth, which was observed and represented symbolically at three distinct levels. The presence of a lack of inhibition is indicated by a rating of (+++). The observed inhibition level was found to be 0%. A minor degree of inhibition was observed. A 25% reduction in activity. The observed phenomenon can be characterised as marked inhibition, with a positive effect resulting in a 50% reduction in activity. The phenomenon of complete inhibition is characterized by a negative effect on a particular process or activity, resulting in its complete cessation. The observed effect resulted in complete inhibition, with no activity detected.In the study, the assay medium utilised was Sabouraud Dextrose Agar (SDA), while the standard antifungal agent employed was Amphotericin B (Arseculeratinae, Leslie Gunatilake, and Panabokkeand, 1981). The experimental protocol was replicated using synthetic pesticides, specifically Bavistin and Thiram, at a concentration of 2% as advised by Hee Youn Chee (2002).

3. Observations

Cassia auriculata Linn., also referred to as the tanner's Cassia, is a vertically elongated and extensively branched shrub. The foliage exhibits a paripinnate compound arrangement, characterized by the presence of 8-12 pairs of leaflets that assume an oval shape. The leaflets exhibit a complete absence of serrations and possess a rounded shape that lacks sharpness. The flowers exhibit a significant size, with an approximate diameter of 3 cm, and are organized in terminal and auxiliary racemes. The length of the pedicels, which are the stalks that support the flowers, measures between 2 and 2.5 centimetres. The calyx, which is the outermost whorl of the flower, exhibits a glabrous characteristic, meaning it lacks hair. Additionally, the segments of the calyx are characterized by their leathery texture and concave shape. The petals possess elongated appendages with pointed ends, and their edges exhibit a crimped or undulating pattern. The petals exhibit a vibrant yellow hue accompanied by orange veins. The floral structure consists of a total of ten stamens, wherein the uppermost trio of stamens exhibit a reduction in functionality, rendering them as staminodes, which are essentially sterile stamens. The pistil, which is the female reproductive organ, is typically solitary and positioned in a superior manner, located above the stamens (Rajendran SD 2018). The seeds of *Cassia auriculata* exhibit a dark green coloration and possess dimensions of approximately 1-1.2 cm in length and 0.7-0.8 cm in width. Each seed is comprised of 8 to 10 individual seeds. The plant's bark exhibits a notable breadth, measuring up to 2.2 cm in width.

Figure 2 and 3 (unavailable) probably illustrate the visual characteristics of the bark. The surface of the stem exhibits a slight roughness or coarseness as a result of the presence of warty projections. The stem exhibits a light grey hue on its upper side (adaxial) and a reddish-brown coloration on its lower side (abaxial). The stem's wood exhibits a pale white coloration and possesses a high level of hardness, displaying an absence of any pathological infections. The barks utilized for extraction exhibit a thickness that spans from 0.5 mm to 1 mm.The pH of the extract derived from *Cassia auriculata* was assessed utilising Qualigens pH paper (Table I, not included). The provided text did not specify any particular pH values. To conduct a thorough analysis, additional information pertaining to the pH measurement is necessary (Bharathi A 2019, Mahesh A2020). The flower buds of *Cassia auriculata* exhibit a phytochemical composition that includes β-sitosterol, kaempferol, and proanthocyanidin dimer. In contrast, the botanical fruit of the plant is composed of various phytochemical compounds, including β-sitosterol, chrysophenol, emodin, rubiadin, and non-arosan-6-one. The identification and reporting of these compounds have been previously documented in studies conducted by Asolkar, Kakkar, and Chakre (1992) as well as Lalitha et al. (2013), Mahesh A 2020.

Table I. Characteristics of *Cassia auriculata* extracts

S. No.	Extract	pH	Colour	Taste	Viscosity
1.	Bark	6	Yellowish brown	Slightly bitter	Non-viscous
2.	Flower-bud	7	Light yellow	Slightly bitter	Slightly viscous
3.	Dried seeds	7	Dark brown	Slightly bitter	Highly viscous

The present study assessed the in vitro antifungal properties of extracts derived from the bark, flower buds, and seeds of *Cassia auriculata* . The samples were subjected to testing at three distinct concentrations, specifically 10%, 20%, and 30%. The quantification of plant material per millilitre of each extract was determined in milligrammes. The experimental design incorporated a control group consisting solely of SDA medium, while the standard antifungal agent Amphotericin B was employed for comparative purposes (Mishra AK 2020).

Table – II : Concentration of plant matter in mg/ml for different % of extract medium

S. No.	Extract	The concentration of extract in the media both in % & mg/ml		
		10%	20%	30%
		mg/ml		
1.	Bark	112	256	439
2.	Flower-bud	3	7	11
3.	Seed	84	191	329

Antifungal activity of medium at 10 % Bark extracts concentration

The aforementioned study evaluated the antifungal properties of extracts derived from *Cassia auriculata* against a range of fungal species (Ranjan R 2021). Based on the findings presented in Table III, it can be observed that the growth of Candida albicans was effectively suppressed when exposed to a 10% concentration of the extract (Fig. 5b). This outcome serves as a clear indication of the extract's potent antifungal properties. The presence of the extract resulted in significant growth inhibition of Rhizopus sp., whereas Mucor sp., Aspergillus flavus, and Penicillium sp. exhibited normal growth. (Fig. 4b) (Raghavendra MP 2020).

Table – III : Antifungal activity in Bark extract of *Cassia auriculata* Linn.

S. No.	Fungi	Conc. of flower bud extract in the SDA medium in mg / ml & %			Control
		112 mg / ml	256 mg / ml	439 mg / ml	
		10%	20%	30%	
1.	*Candida albicans*	-	-	-	+++
2.	*Aspergillus flavus*	+++	++	++	+++
3.	*Pencillium* Sp.	+++	++	++	+++
4.	*Rhizopus* sp.	+	-	-	+++
5.	*Mucor* sp.	+++	-	-	+++

Antifungal activity of medium at 20 % and 30 % Bark extracts concentration

The research findings indicated that the bark extract derived from *Cassia auriculata* displayed significant antifungal properties when tested against *Candida albicans*, Rhizopus sp., and Mucor sp. Complete inhibition of fungal species growth was observed when exposed to a 20% concentration with a plant matter concentration of 256 mg/ml and a 30% concentration with a plant matter concentration of 439 mg/ml (Figures 4a-f). Nonetheless, a mere modest suppression of the proliferation of Aspergillus flavus and Penicillium sp. was observed. The control group, which utilized SDA medium without bark extract, exhibited typical fungal growth, suggesting that the observed inhibitory effects were solely attributable to the extract's presence.

Fig. 4 a : Growth of 1. *Rhizopus* sp. and 2. *Mucor* sp. on SDA after 24 hours of incubation (Control)

Fig. 4 b : Growth of 1. *Rhizopus* sp. and 2. *Mucor* sp. on 10% Bark extract SDA medium after 24 hours of incubation. Note the marked inhibition in the growth of *Rhizopus* sp. and normal growth of *Mucor* sp.

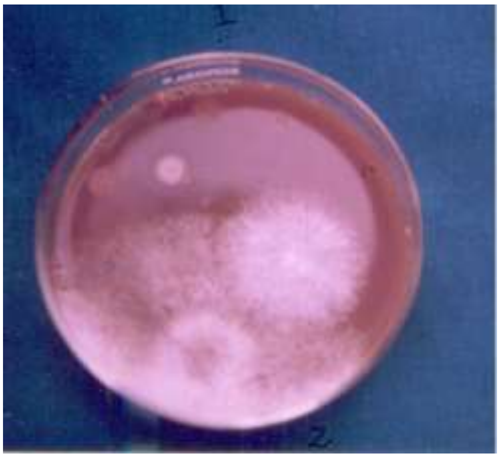

Fig. 4 c : Growth of 1. *Rhizopus* sp. and 2. *Mucor* sp. on 20% Bark extract SDA medium after 72 hours of incubation. Note the complete inhibition in the growth of *Rhizopus* sp. and *Mucor* sp.

Fig. 4 d : Growth of 1. *Rhizopus* sp. and 2. *Mucor* sp. on 30% Bark extract SDA medium after 72 hours of incubation. Note the complete inhibition in the growth of *Rhizopus* sp. and *Mucor* sp. Water soaked vesicular projections are due to the presence of gummi substance in the extract.

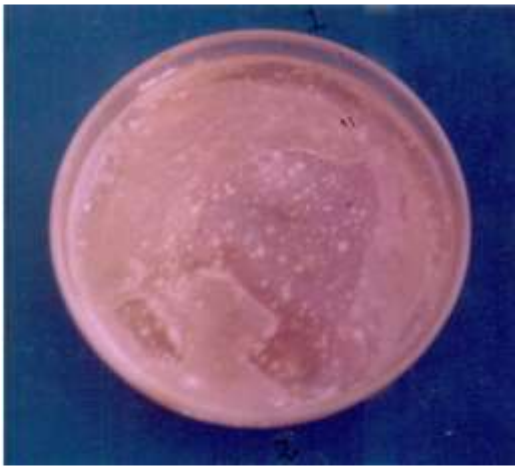

Fig. 4 e : Growth of 1. *Rhizopus* sp. and 2. *Mucor* sp. on 10% flower bud extract SDA medium after 24 hours of incubation. Note the marked inhibition in the growth of *Rhizopus* sp. and slight inhibition in the growth of *Mucor* sp.

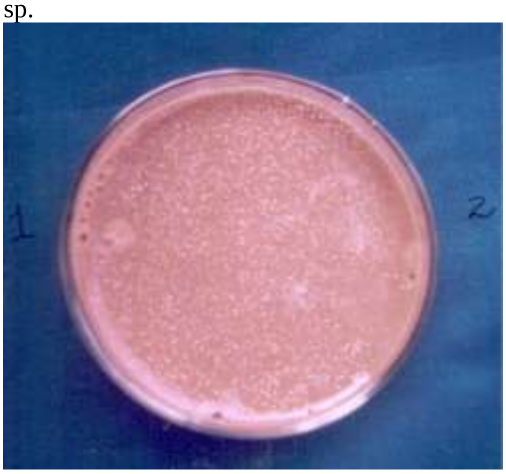

Fig. 4 f : Growth of 1. *Rhizopus* sp. and 2. *Mucor* sp. on 10% seed extract SDA medium after 24 hours of incubation. Note the marked inhibition in the growth of *Rhizopus* sp. and normal growth of *Mucor* sp. Water soaked vesicular projections are due to the presence of gummi substance in the extract

Antifungal activity of medium at 10 % Flower Bud extracts concentration

The growth of the *Candida albicans*, *Aspergillusflavus* and *Pencillium* sp., were completely inhibited at 10% concentration with 3 mg / ml plant matter (Fig. 5d). The growth of the *Rhizopus* sp., was markedly inhibited, while *Mucor* sp. (Fig. 4e) exhibited moderate growth shown in Table – IV(Mishra AK 2020).

Fig. 5 a : Growth of 1. *Candida albicans*, 2. *Aspergillus flavus* and 3. *Pencillium* sp. on SDA after three days of incubation (Control).

Fig. 5 b : Growth of 1. *Candida albicans*, 2. *Aspergillus flavus* and 3. *Pencillium* sp. on 10% Bark extract SDA medium after three days of incubation. Note the complete inhibition in the growth of *Candida albicans* and absence of inhibition in the growth of *Aspergillus flavus* and *Pencillium*.

Fig. 5 c : Growth of 1. *Candida albicans*, 2. *Aspergillus flavus* and 3. *Pencillium* sp. on 30% Bark extract SDA medium after three days of incubation. Note the complete inhibition in the growth of *Candida albicans* and slight inhibition in the growth of *Aspergillus flavus* and *Pencillium sp.*

Fig. 5 d : Growth of 1. *Candida albicans*, 2. *Aspergillus flavus* and 3. *Pencillium* sp. on 10% Flower Bud extract SDA medium after three days of incubation. Note the complete inhibition in the growth of *Candida albicans*, *Aspergillus flavus* and *Pencillium sp.* Water soaked vesicular projections are due to the presence of gummi substance in the extract

Fig. 5 f : Growth of 1. *Candida albicans*, 2. *Aspergillus flavus* and 3. *Pencillium* sp. on 30% seed extract SDA medium after three days of incubation. Note the complete inhibition in the growth of *Candida albicans, Aspergillus flavus* and *Pencillium sp.* Water soaked vesicular projections are due to the presence of gummi substance in the extract

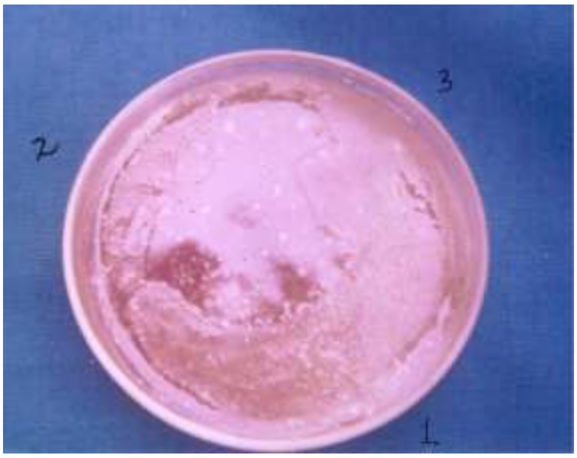

Table – IV : Antifungal activity in Flower Bud extract of *Cassia auriculata* Linn.

S. No.	Fungi	Conc. of flower bud extract in the SDA medium in mg / ml & %			Control
		3 mg / ml	7mg / ml	11 mg / ml	
		10%	20%	30%	
1.	Candida albicans	-	-	-	+++
2.	Aspergillus flavus	-	-	-	+++
3.	Pencillium Sp.	-	-	-	+++
4.	Rhizopus sp.	+	-	-	+++
5.	Mucor sp.	++	-	-	+++

Antifungal activity of medium at 20 % & 30 % Flower Bud extracts concentrations

The growth of the five organisms was completely inhibited at 20 % and 30 % concentration with 7 mg/ml and 11 mg/ml plant matter respectively (Fig. 5e). The flower bud extract-free SDA medium i. e. control showed normal growth when compared to extract containing medium(Raghavendra MP 2020).

Fig. 5 e : Growth of 1. *Candida albicans*, 2. *Aspergillus flavus* and 3. *Pencillium* sp. on 20% Flower Bud extract SDA medium after three days of incubation. Note the complete inhibition in the growth of *Candida albicans, Aspergillus flavus* and *Pencillium sp.* Water soaked vesicular projections are due to the presence of gummi substance in the extract

Antifungal activity of medium at 10 % seed extracts concentration

The research aimed to assess the antifungal properties of *Cassia auriculata* extracts against various fungal strains, including Candida albicans, Aspergillus flavus, Pencillium sp., Rhizopus sp., and Mucor sp. Based on the data presented in Table V, it can be observed that when exposed to a concentration of 10%, the growth of Candida albicans, Aspergillus flavus, and Penicillium sp. was entirely suppressed, thus suggesting a pronounced antifungal effect. This inhibition was observed in the presence of 84.1 mg/ml of plant matter. The presence of the extract resulted in significant growth inhibition of Rhizopus sp., whereas the growth of Mucor sp. remained unaffected and exhibited normal growth.

Table – V : Antifungal activity in Seed extract of *Cassia auriculata* Linn.

S. No.	Fungi	Conc. of flower bud extract in the SDA medium in mg / ml & %			Control
		84.1 mg / ml	191 mg / ml	329 mg / ml	
		10%	20%	30%	
1.	Candida albicans	-	-	-	+++
2.	Aspergillus flavus	-	-	-	+++
3.	Pencillium Sp.	-	-	-	+++
4.	Rhizopus sp.	+	-	-	+++
5.	Mucor sp.	+++	-	-	+++

Antifungal activity of medium at 20 % and 30% Seed extracts concentration

The present study aimed to assess the antifungal efficacy of seed extracts derived from *Cassia auriculata* against a panel of five opportunistic fungi. Based on the given data, it can be observed that the growth of all five opportunistic fungi was entirely suppressed when exposed to a 20% concentration containing 191 mg/ml of plant matter, as well as a 30% concentration containing 329 mg/ml of plant matter (Fig. 5f). This finding suggests that the seed extract derived from *Cassia auriculata* exhibits potent antifungal properties against the aforementioned fungi. The experimental group, which utilized SDA medium devoid of seed extract, exhibited typical fungal growth, thereby suggesting that the suppressive impacts were exclusively attributable to the existence of the seed extract.

4. Discussion

The current study aimed to examine the antifungal properties of extracts derived from *Cassia auriculata* against opportunistic fungi. The findings of the study indicate that the extracts derived from both the bud and seed displayed significant antifungal activity against Candida albicans, Aspergillus flavus, and Penicillium sp. The extract derived from the bud exhibited notable inhibitory effects even at a relatively low concentration of 10%, containing 3 mg/ml of plant matter. Conversely, the extract obtained from the seed demonstrated inhibition at a concentration of 10%, which contained 84 mg/ml of plant matter. The bud extract exhibited a greater degree of inhibition compared to the seed extract, as it was able to completely inhibit the growth of the fungi at a concentration as low as 3 mg/ml. In contrast, the seed extract necessitated a higher concentration of 84.1 mg/ml in order to achieve complete inhibition. In contrast, the bark extract exhibited relatively diminished activity against the opportunistic fungi.

The aforementioned findings underscore the prospective utilisation of *Cassia auriculata* as a reservoir of antifungal agents. Nevertheless, additional research is required in order to ascertain the precise bioactive compounds that are accountable for the documented antifungal properties. The chemical characteriszation and isolation of these compounds would yield significant insights into their mechanisms of action and potential applications in the advancement of antifungal therapies. Regarding safety concerns, it is imperative to undertake further investigations in order to evaluate the toxicity and potential adverse reactions associated with the utilisation of *Cassia auriculata* extracts. The utilisation of animal models in safety assessments can aid in determining the appropriateness of these extracts for both topical and systemic therapeutic uses. It is imperative to ascertain that the extracts are devoid of any detrimental effects that may curtail their therapeutic efficacy. Numerous research studies have been conducted to examine the antifungal properties of extracts derived from *Cassia auriculata* , thereby corroborating the results obtained in the current study. An investigation conducted by Gupta et al. (2018) examined the efficacy of *Cassia auriculata* in inhibiting the growth of different fungal pathogens, such as Candida albicans, Aspergillus flavus, and Penicillium sp. The findings of their study provided evidence of notable antifungal properties, thereby supporting the effectiveness of *Cassia auriculata* extracts in combating these opportunistic fungi. In a separate investigation conducted by Prabakaran and Kalaichelvan (2019), the antifungal properties of various components of *Cassia auriculata* , such as its flowers, leaves, and stems, were examined. The researchers discovered that the aqueous extracts derived from these specific plant components demonstrated significant antifungal properties when tested against Candida albicans, Aspergillus flavus, and Penicillium sp. The results of this study provide evidence that aligns with the historical utilisation of *Cassia auriculata* for the management of fungal infections, thereby substantiating its therapeutic efficacy. In summary, the current study presents empirical support for the fungicidal properties of *Cassia auriculata* extracts against pathogenic fungi. The extracts derived from the bud and seed exhibited noteworthy inhibitory effects, with the bud extract displaying superior activity. Nevertheless, additional investigation is imperative in order to ascertain the precise bioactive compounds accountable for the documented antifungal properties. Furthermore, it is imperative to conduct safety assessments in order to ascertain the appropriateness of utilising these extracts for therapeutic purposes. The results of this investigation make a valuable addition to the expanding corpus of scholarly literature concerning the medicinal attributes of *Cassia auriculata* , as well as its prospective utilisation in the realm of antifungal treatments. In the year 2021, Ranjan R conducted a study.

Conclusion:

The current investigation examined the antifungal efficacy of extracts derived from *Cassia auriculata* against opportunistic fungi. The results indicated that the extracts derived from the buds and seeds of *Cassia auriculata* demonstrated notable inhibitory properties against Candida albicans, Aspergillus flavus, and Penicillium sp. The findings of this study provide support for the longstanding utilisation of *Cassia auriculata* in traditional medicine as a remedy for fungal infections. The antifungal properties exhibited by extracts derived from *Cassia auriculata* , specifically the bud extract, demonstrate significant potential for the advancement of innovative antifungal treatments. The observed inhibitory effects, even at low concentrations, indicate the presence of highly potent bioactive compounds in these plant extracts. However, additional research is necessary in order to determine and separate the precise bioactive compounds that are accountable for the antifungal activity that has been observed. Gaining knowledge about the chemical components and their respective modes of operation will yield significant insights that can be utilised in forthcoming endeavours related to the development of pharmaceutical substances. Furthermore, the observed differential inhibitory effects between the extracts derived from the bud and seed suggest the existence of distinct concentrations and compositions of active compounds in different anatomical components of the plant. Additional investigation is necessary to examine the phytochemical compositions of various botanical components and ascertain the most effective techniques for extracting bioactive compounds with the highest possible output. Safety assessments are of utmost importance in order to ascertain the appropriateness of utilising extracts derived from *Cassia auriculata* for therapeutic purposes. It is imperative to conduct animal studies in order to evaluate the potential toxicity and adverse effects that may be linked to the utilisation of these extracts. The acquisition of this data will be of utmost importance in ascertaining the optimal dosage and administration methods for forthcoming clinical trials. The results of this investigation make a valuable addition to the expanding corpus of information regarding the medicinal attributes of *Cassia auriculata* and its prospective utilisation in antifungal treatments. Nevertheless, it is crucial to recognise the constraints inherent in this research endeavour. Additional investigation is required in order to substantiate the results within more extensive sample sizes and varied demographic groups. Furthermore, it is important to note that in vitro studies offer initial indications, and it is imperative for forthcoming research to incorporate in vivo and clinical examinations in order to establish the effectiveness and safety of *Cassia auriculata* extracts in the treatment of fungal infections. In summary, the findings of this investigation offer significant contributions to the understanding of the antifungal properties exhibited by extracts derived from *Cassia auriculata* against opportunistic fungal strains. The results of this study provide empirical evidence that aligns with the historical utilisation of *Cassia auriculata* in traditional medicinal practises, thereby substantiating its efficacy. Furthermore, these findings also present promising prospects for the advancement of novel antifungal pharmaceuticals. Ongoing research endeavours are currently directed towards the identification of bioactive compounds, refinement of extraction techniques, and comprehensive safety assessments. These efforts are expected to facilitate the future application of *Cassia auriculata* as a natural antifungal agent.

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DIRECT EMBRYONIC DEVELOPMENTAL OF *POLYPEDATES MACULATUS*, COMMON TREE FROG EMBRYOS

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Abstract: This research explores the embryonic development of *Polypedates maculatus*, a Common tree frog, within the realm of developmental biology. Studying the developmental processes of organisms is imperative. By observing the developmental stages of these frog embryos, we gain valuable insights into the respective genes that orchestras organogenesis. Amphibians like *Polypedates maculatus* are particularly suitable for such studies due to their ease of maintenance in laboratory settings, simple nutritional requirements, and manageable life cycles. This research not only enhances our understanding of embryonic development but also provides a platform to investigate teratogenesis. The methodology involved collecting frog eggs from stagnant water bodies within Guru Nanak College's campus and carefully transferring them to laboratory conditions. The development stages were meticulously observed and recorded over 14 hours, followed by observation during the next morning. The study revealed rapid and minute-by-minute embryonic development, making *Polypedates maculatus* an excellent model for such research. In conclusion, this study underscores the significance of using amphibians like *Polypedates maculatus* as models for embryonic development research. It sheds light on the intricate processes involved in the creation of life, offering valuable insights into this fundamental biological phenomenon. This research contributes to our understanding of embryonic development and its broader implications for fields such as neurobiology, cancer biology, physiology, anatomy, and more.
Keywords: *Polypedates maculatus*, embryonic developmental, egg, embryo.

Introduction

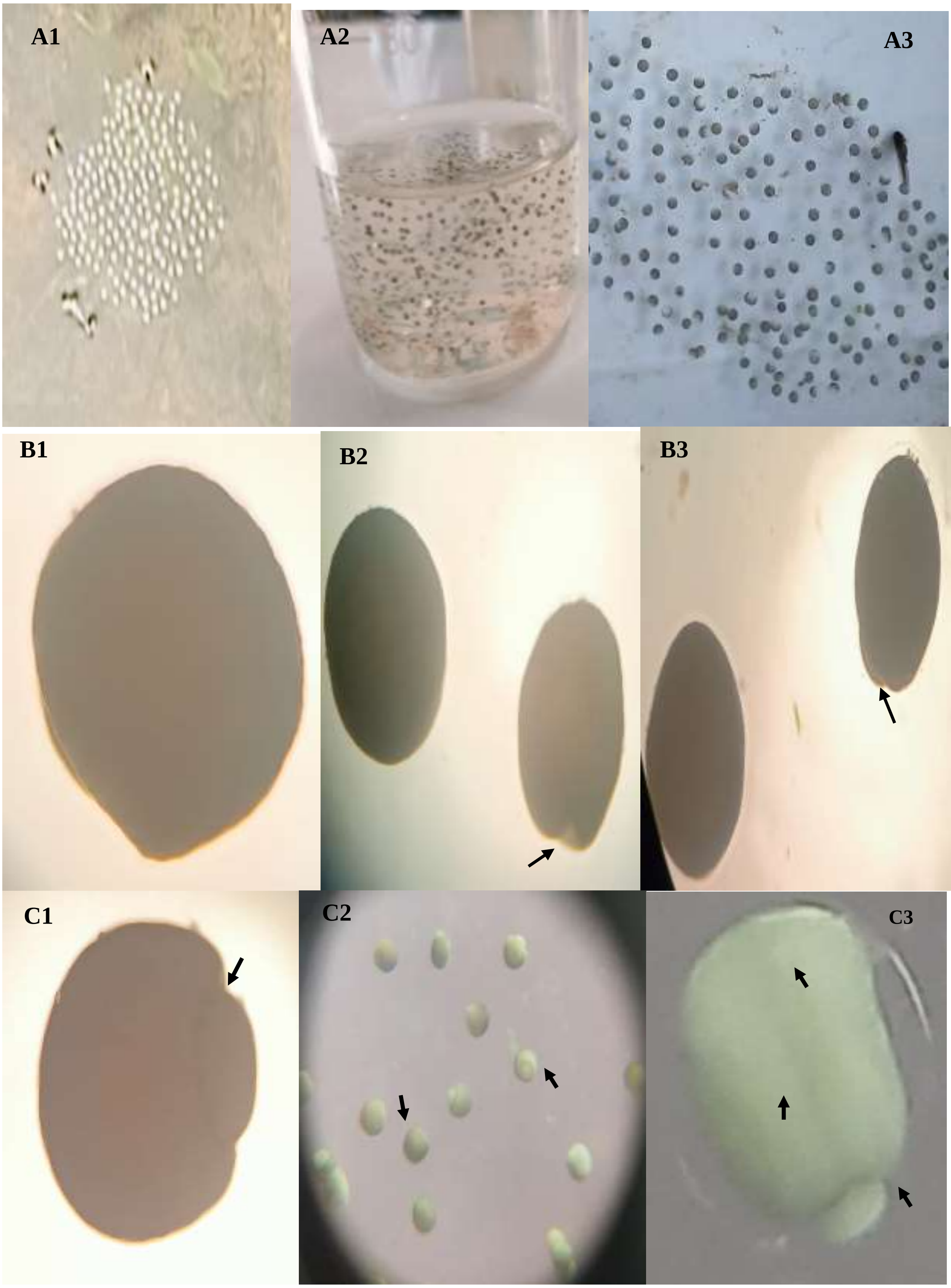
Developmental biology gives insight into the process involved in the development of single-fertilized eggs into the well-developed organism. The field of molecular developmental biology, provides deeper insight into the role of genes and their time-controlled protein expression, resulting in the development of the organism (Elinson and Beckham 2002). The study of the developmental biology of any organism paves the way for the deeper correlation of gene expression involving cell division, and cell differentiation leading to the development of life forms. After the fertilization process, the single diploid cell undergoes a beautiful journey of cell division and cell differentiation, which leads to the formation of the life form (Duellman, 1994). Any mistake related to the gene expression, leading to the inexpression or non-expression of protein, results in improper organ formation, leading to deformities, and organ dysfunction. There is a requisition of study about the organism's development. Dag ala and Ned Arnnie. (2015), has confirmed that the embryonic layers play an important role in the organogenesis of frog embryonic development. There are numerous studies focusing on the embryonic development of amphibians (Sayim and Kaya, 2008). The developmental biology field helps us to understand neurobiology, cancer biology, physiology, anatomy, allometry, cell biology, evolution, and ecology better (Nirav *et al*., 2015). Evolutionary evidence confirms that the organisms in the lower order of the phylum share certain genetic similarities with the higher order of mammals. Thus, concentrating on the lower order of animals as the experimental life forms for understanding the gene expression in the higher orders. The *in-vitro* maintenance of lab animals of lower orders is easy to maintain, studying their life cycle is easy, the nutritional requirements are simple, and the animals are easy to handle while performing the experiments. Observing the developmental stages, especially during the embryonic stages, could pave the way to understanding the teratogenesis also.

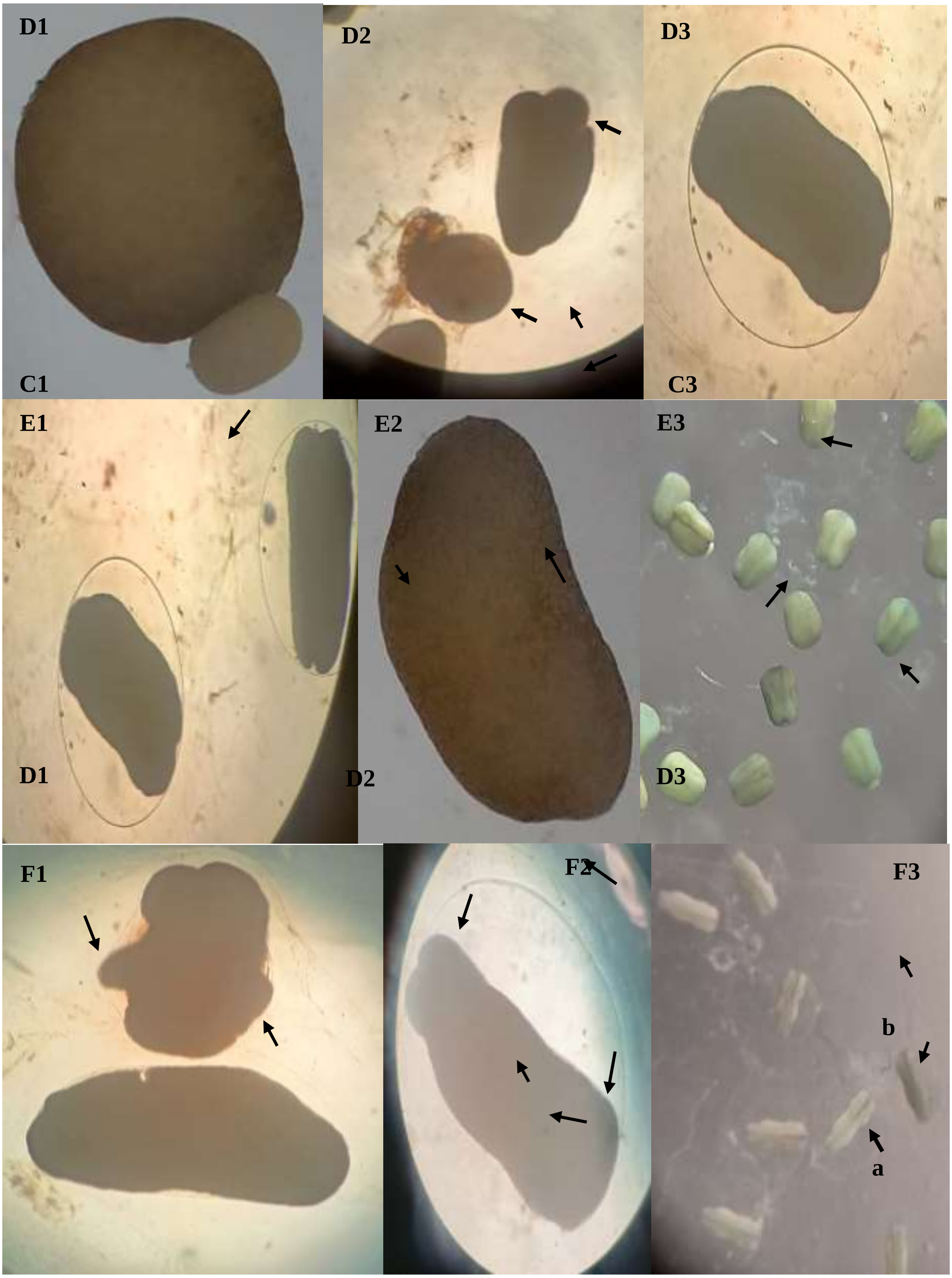
Methodology:

In this present research, the embryonic stage development of *Polypedates maculatus*, Common tree frog embryos were used(https://indiabiodiversity.org/observation/show/340099?lang=en). The frog eggs were collected from the stagnant water bodies within the Guru Nanak College campus, in the early morning (7.00 a.m.), preferably before the environment temperature became warmer, in a clean beaker. The eggs were carefully collected so as not to disturb the vitelline membrane. The eggs were immediately transferred to lab conditions and the embryonic developmental stages were observed. The eggs were teased out from the coop and were transferred into the watch glass, with tap water. The eggs were focused under the dissection microscope and the stages were recorded. The development stages were observed for 14 hrs and then from the next day morning at 8.00 am onwards. The organ development after the hatching was also observed.

Result:

The embryonic development in *Polypedates maculatus* took place in minutes or on an hourly basis. Thus, it is a suitable model to study embryonic development. The eggs after transferring into lab conditions, were placed under the dissection microscope and formation of dorsal lip stage was observed. When the eggs were observed, they exhibited an intact vitelline membrane and clear pigmentation, as the animal pole and the vegetal pole were observed. The animal pole appeared as a grey to black segment and the vegetal pole appeared as white to cream coloration. By 12.00 pm the dorsal-ventral differentiation was initiated. By 5.00 p.m. the complete tadpole was observed, within the next day by 8.00 a.m., the tadpole started to hatch.

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G
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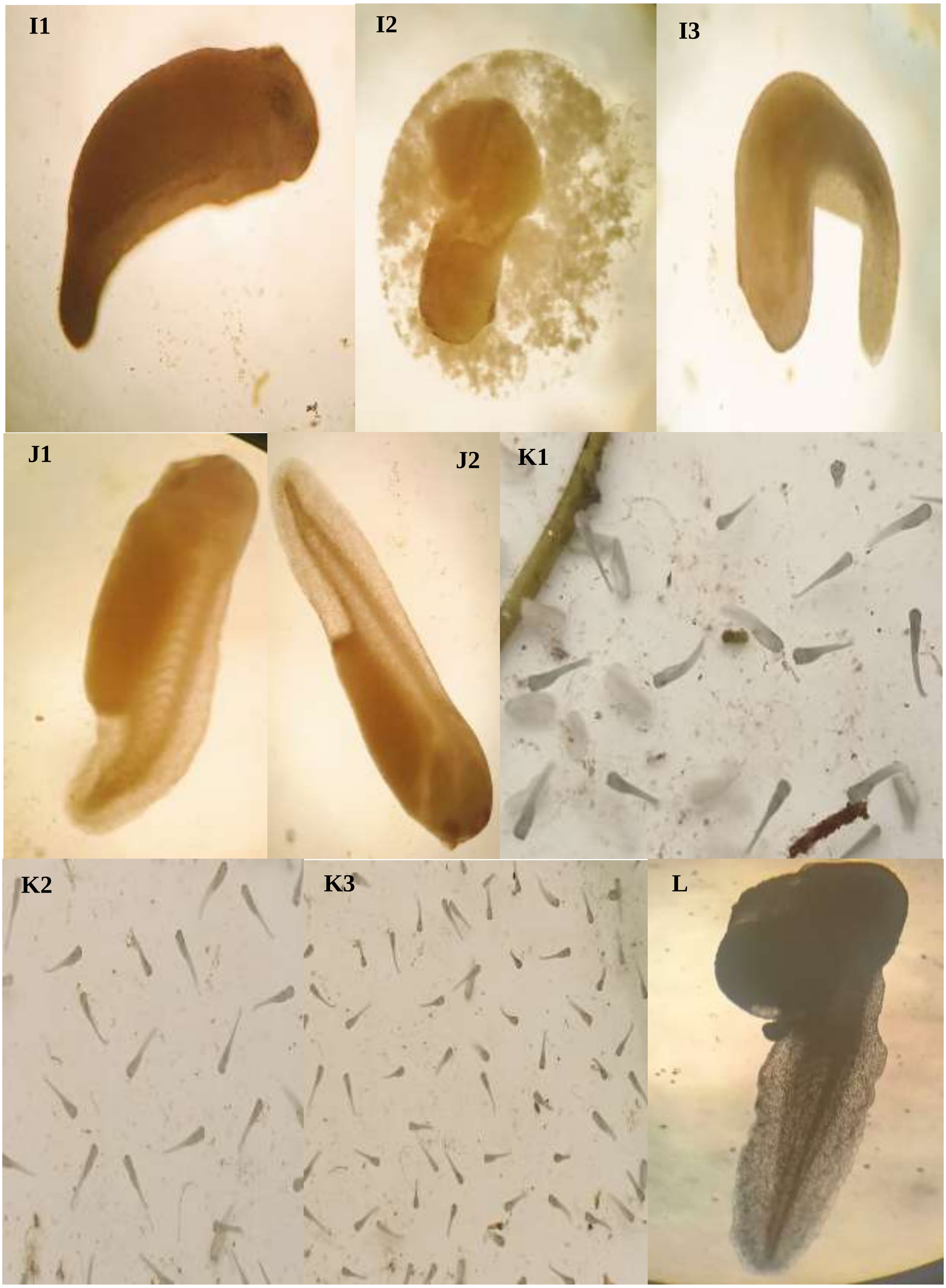
H1


H2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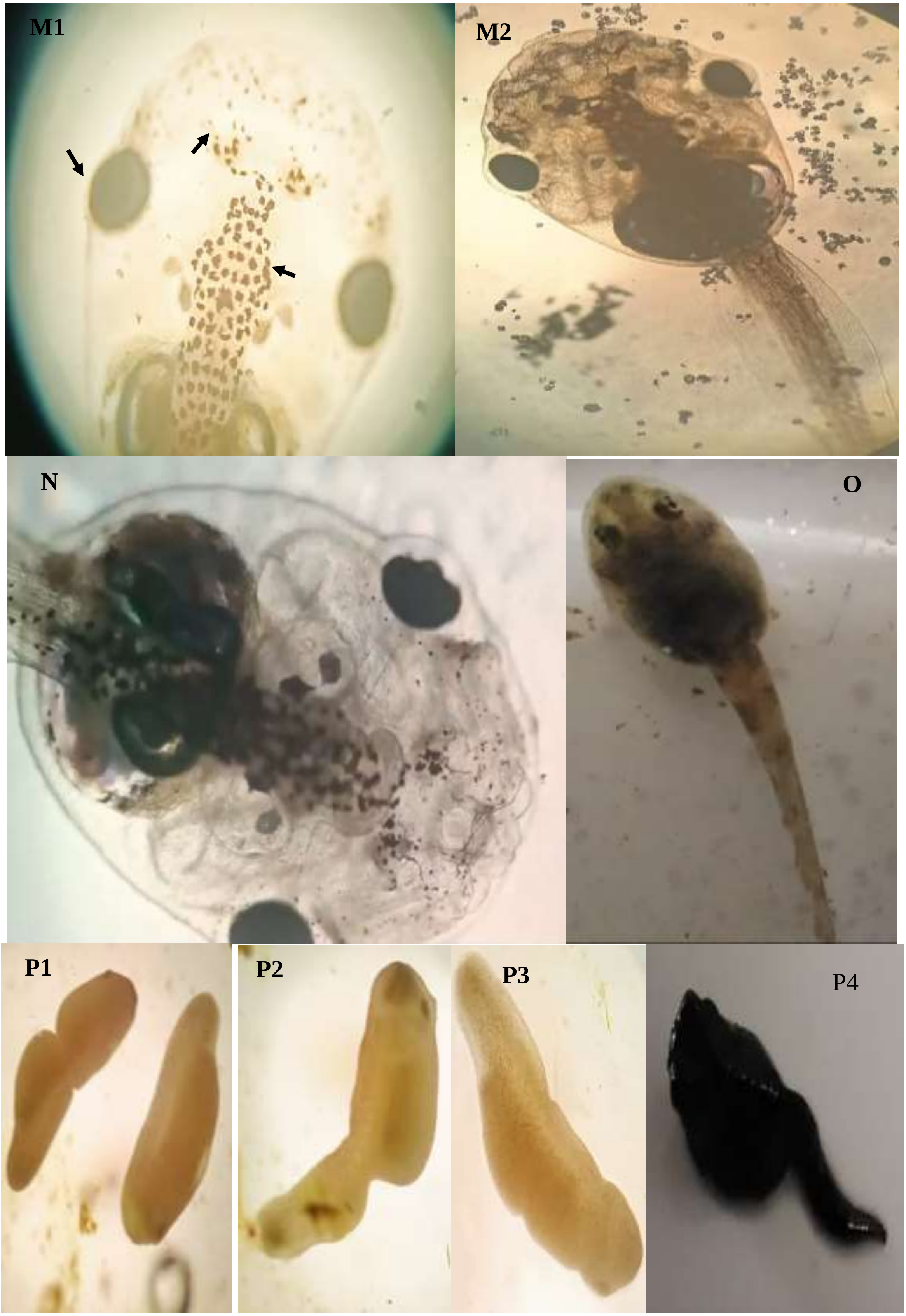
K3
L


M1
M2
N
O
P1
P2
P3
P4

A (1-3): Frog eggs at Guru Nanak College campus, transfer to lab condition
B (1-2): Appearance of the dorsal lip, Invagination, and deepening of the dorsal lip.
B3: Appearance of Notochord
C (1-2): Well-established notochord and embryo elongating horizontally
C3: Well establishment of the primitive streak (future central nervous system)
D (1-3): Appearance of the optic cup, anterior-posterior axis establishment
E (1-2): Establishment of Head and Tail segment, the embryo has a pronounced Primitive streak and well dorsoventral differentiation
F(1-2): Well-established head segment with optic cup
F(3): a. Dorsal view-Primitive streak, b. ventral view, Body patterning
F4: An elongated embryo-body plan has been established
G: Embryo will eye and mouth parts
H (1-2): Embryo will tail segment
I (1-3): Embryonic view from various orientation
J (1-2): Embryonic stage with spinal cord
K: a. Newly hatched embryo, b. empty embryonic case, c. 1 hour old embryo
L: Tadpole with forelimb
M (1-2): 4 day old tadpole- 1. Ventral (Fore, mid, and hindbrain, optics), 2. Dorsal
N: Dorsal view with mouthparts
O: 8-day-old tadpole
P (1-3): Mutated tadpole with body deformities
P4: 8-day-old tadpole exhibiting body deformities

Discussion:
Amphibians are good models for embryonic development, as they are large in size, and rapid development (Spemann and Mangold, 1924). Worldwide about 6500 frogs and toads biodiversity are present (https://amphibiaweb.org/), there are about 6500 other recorded species of frogs and toads with tremendous diversity, but there is almost no information on their development. *Polypedates maculatus*, common tree frog embryos, fertilization as external and thus makes it a suitable model for the study of embryonic development. Ana *et al*., 2016; has confirmed the embryonic development of the species *Adelophyrne maranguapesis*, a native Brazilian frog, is complete within 24 hrs.

Conclusion:
The observation of the tadpole’s development gives a clear embryonic development.

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PRODUCTION OF SUSTAINABLE BIOFABRIC USING BACTERIAL CELLULOSE FROM *ACETOBACTER SP*

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Abstract: This research delves into the utilization of bacterial cellulose as a sustainable biofabric within the textile industry. While the textile industry has reached remarkable heights in fashion innovation, it has also contributed to environmental concerns, primarily through the use of toxic chemicals and unsustainable practices. Bacterial cellulose, sourced from bacteria in an environmentally friendly manner, has emerged as a promising biomaterial to address these issues. Bacterial cellulose offers unique properties, surpassing those of plant cellulose, including high tensile strength, biodegradability, and biocompatibility with mammalian cells and tissues. Its fibrous network structure enables exceptional water-holding capacity, making it an ideal candidate for various textile applications. The research methodology involved the isolation of Acetobacter bacteria from ripe pineapple, followed by morphological and biochemical characterization. The antimicrobial properties of bacterial cellulose against Escherichia coli and Staphylococcus aureus were also investigated, showing its potential as a natural antimicrobial agent. Furthermore, tensile strength testing demonstrated the material's ability to withstand stress, a crucial factor for textile applications. Cytotoxicity assays on VERO cell lines confirmed the biocompatibility of bacterial cellulose, making it safe for human contact. Scanning electron microscopy revealed the intricate fibril network of bacterial cellulose, which contributes to its unique properties. The production of a bacterial cellulose fabric showcased its potential for sustainable textile development. In conclusion, this research presents bacterial cellulose as a promising sustainable biofabric with numerous applications in the textile industry, combining fashion innovation with eco-conscious practices. The introduction of biotechnology into textiles offers a pathway to more environmentally friendly and sustainable products, revolutionizing both the fashion and biotechnology sectors.

Keywords: Bacterial cellulose, biofabric, textile industry, sustainability, biotechnology, eco-friendly, biomaterial, fashion, environmental pollution, biocompatible, tensile strength.

1. INTRODUCTION:

The availability of textile fibres encourages people to find ways and means to come up with new fashion ideas. Though the textile industry reached its great height but still on the other side it remains questionable for the environment aspect. This leads to unsustainability which furthermore causes the accumulation of toxic chemicals on land that are all difficult to degrade. The fashion industry, responsible for a good part of the emissions of greenhouse gases, and the consumer culture that involves it, needs to rethink its productive chain, starting with the raw materials used in the manufacture of its products. Due to the high demand for textiles, production the usage of chemicals and other harmful substances increases which directly or indirectly leads to "Environmental Pollution". The textile industry stands as a major factor in causing a threat to the environment. Therefore research and various inventions to control the threat and to bring sustainability in water consumption, effluent treatment, and energy demand are the focus of research to minimize the harmful effects on sustainability (Jain and Gupta, 2016). The quest to make the textile industry more sustainable has increasingly directed designers and scientists to focus on biomaterials, such as bacterial cellulose (BC), and their biocompatible properties. The textile industry combined with biotechnology paved the way for the introduction of bacterial cellulose obtained from bacteria in a natural process and environmental friendly. This led to breakthroughs in textiles and welcomed biomaterial-based products without toxicity (Costa A.F.S *et al.*,2017). Bacterial Cellulose has more versatile properties than Plant cellulose, it has a high tensile, ductile, and water-holding ability. It is produced by certain bacterial species like *Acetobacter*, *Sarcina ventriculi*, and *Agrobacterium sp.* Bacteria that produce cellulose include Gram-negative bacteria species and rod-shaped aerobic and acetic acid-producing bacteria(AAB). Cellulose is a linear polymer connected with a polymer of glucose molecules connected with β- 1,4 linkages by a glucosyltransferase with individual glucose chains. The natural binding capacity of cellulose is due to the binding of strong intra and intermolecular hydrogen bonds that form layer of sheet (Ullah et al.,2016). Bacterial cellulose must possess biodegradable capacity since cellulose is a natural biomaterial produced by bacteria. The degradation ability is high due to the presence of matrix polymers like lignin, and hemicellulose to facilitate degradation (Iqbal H.M.N et al .,2015). Bacterial cellulose is biocompatible without producing any toxic or allergic effects, especially towards mammalian cells and tissue (Klemm D et al.,2001).BC does not induce toxicity in the living cells rather it offer protection, support, and tensile strength for the growth of cells (Khan et al., 2015). The presence of hydrogen bonding between the third oxygen of one glucose unit and the fifth oxygen of the preceding glucose unit. This leads to high viscosity and a tendency to be crystallize. Due to the fibrous network, biocompatibility supports the tensile strength of the BC getting higher (

Tang W *et al* .,2010). Bacterial cellulose naturally possesses water-holding capacity (WHC) because of its fibrous network structure, pore size, and its structuralism. This property stands out due to the water molecules easily trapped inside the pores of the fibrils (Gelin *et al.,* 2007). The hydrogen bonding arrangement which helps in trapping molecules in turn becomes the hydrophilic nature of BC (Dahman, 2009).

1. MATERIALS AND METHODS:

1.1 SAMPLE COLLECTION:

A ripened pineapple was taken mashed and stabilized as a thick fluid and kept for 3-4 days to facilitate *Acetobacter sp* growth. They are acetic acid bacteria (AAB) that can produce acid from glucose and alcohol.

Fig .1Rotten pineapple pulp

1.2 CULTURE MEDIA :

Ideal designing of the culture medium is essential for optimum bacterial growth and cellulose production**.** For the isolation and growth of *Acetobacter sp* HS media (Hestrin Schramm) a synthetic complex medium most commonly used for culture (Zakaria, J.and Nazeri, M., 2012).

I. HS MEDIA COMPONENTS :

Glucose	2g
Peptone	0.5g
Citric acid	0.2g
(NH4)SO4	0.27g
KH2PO4	0.3
MgSO4.7H2O	0.3g
Distilled water	80ml

Parameters play a vital role in deciding the quality of the medium. Temperature, pH, carbon source, and sample concentration were maintained in a standard for the production of Bacterial cellulose(Bae, S.O. and Shoda, M., 2005)The optimum pH of BC production was 7 and the optimum of temperature for production BC was 30 °C.

1.2.1 PROCEDURE :

- The medium was prepared and autoclaved at 121°C and plated
- 80 ml of media poured into four Petri plates each containing 20ml of media
- The pineapple sample was added and plates were incubated for 5-7 days at 32C bacteria take 3 to 7 days to grow

1.3 MORPHOLOGICAL CHARACTERIZATION:

1.3.1 BACTERIAL ISOLATION & COLONY:

Acetobacter colonies appear as Creamy, White, Smooth, Simy, and cloudy colonies with coherent consistency. The *Acetobacter* colonies alone were isolated using the streak method and allowed to grow on a specific medium called GYC medium (yeast extract -1g,d-glucose-2g, calcium carbonate-1.5g). Bacterial culture was streaked onto the plates and incubated for 7- 14 days for *Acetobacter* growth and it is subcultured using the same GYC medium

2.3.2. DIFFERENTIATION OF ACETOBACTER FROM GLUCANOBACTER:

Both *Acetobacter* and *Glucanobacter* are differentiated using a selective media called Carr's medium. *Acetobacter* changes the color of the medium from yellow to green in the presence of Bromocresol green while *Glucanobacter* turns green to yellow. Carrs's media composition include (Yeast extract 3%,Agar 2%,Bromocresol green 0.002%, Ethanol 2%, Distilled water 40ml)

Fig.2 Colour differentiation between *Acetobacter* and *Glucanobacter*

1.3.2 GRAM STAINING:

Gram staining technique was used to differentiate Gram-positive and Gram-negative bacteria based on their cell wall constituents. The bacteria were identified as "Gram-negative rod-shaped".

Fig.3 Gram Negative Rod-shaped bacteria were observed

1.3.3 MOTILITY:

Motility was checked to determine the movement of the bacteria based on its flagella arrangement. It was observed to be Motile using peritrichous movement

2. BIOCHEMICAL CHARACTERISATION:

2.1 INDOLE TEST:

Tryptophan hydrolyzed to tryptophanase to produce indole, which is detected by Kovac's reagent to produce red colored compound.5ml of tryptone broth was added to a test tube containing culture, and 1ml of Kovac's reagent was added.No formation of indole ring and the test tube remain yellow indicated a Negative result

2.2 METHYL RED TEST

The culture medium contained acid produced by bacteria turning methyl indicator red (Cowan S.T.,1953) using 5 ml of MR-VP broth, and 2-5 drops of Methyl indicator was added. The formation of a ring indicated a Positive result

2.3 VP TEST:

Using MR-VP broth and VP reagent I - Barritt's reagent A: 5% (wt/vol) a-naphthol in absolute ethanol and VP reagent II - Barritt's reagent B: 40% (wt/vol) KOH in deionized water (McDevitt S,2009). The change in color of the broth to yellow indicated Positive

2.4 CARBOHYDRATE FERMENTATION TEST :

The biochemical method was evaluated by the drop in pH and production of the acid in different sugars with organisms. This confirmed that the carbohydrate fermentation test resulted in a Positive test for the sucrose and glucose

2.5 CATALASE TEST:

Catalase an enzyme act as a catalyst by breaking down hydrogen peroxide into oxygen and water (Cheesebrough,2005). A drop of 3% of hydrogen peroxide was placed over the culture and the formation of bubbles showed positive results for catalase activity.

2.6 OXIDASE TEST

Cytochrome Oxidase oxidizes tetra methyl –p-phenylene di-amine color less reagent to indophenols by forming purple color (Shields *et al.*,2010) using oxidase disc. No color change was observed indicating a Negative for oxidase test.

2.7 GELATIN LIQUEFACTION :

The gelatin medium remains the same indicating no degrading capacity and there was no liquefaction of the medium indicating a Negative result

2.8 CITRIC ACID UTILIZATION TEST:

It is done to check the ability of the organism to utilize citrate as a source of carbon (Cheesebrough,2005) using 5ml of Simmons citrate agar. No change in color since the media pH does not change

3. ANTI-BACTERIAL ACTIVITY:

The isolated was used for antimicrobial activity tests against the pathogenic bacteria *Escherichia coli* for Gram-negative and *Staphylococcus aureus* for Gram-positive. The disc diffusion method was applied to perform the antimicrobial bioassays, using sample (BC)films. The zone of inhibition observed around the disc and the sample was measured

S.No	Zone of Inhibition	
Culture samples	Methicillin	Bacterial Cellulose film
E.coli	0.4cm	0.7cm
S.aureus	0.3cm	0.6cm

Table 1. The Zone of inhibition measured around the Antibiotic disc (Methicillin) & the Bacterial cellulose film

Fig.4 Shows the zone of inhibition difference between *E.coli and S.aureus*

4. TENSILE TESTING

Bacterial cellulose film was subjected to Tensile strength testing using the UTM (Universal Testing Machine) –INSTRON MODEL. 3369/J7257 On given stress, the film showed its tensile ability with increased stress level up to 43.27 MPa with a thickness of 0.15mm. This test helps to determine the tensile strength holding capacity of the BC film.

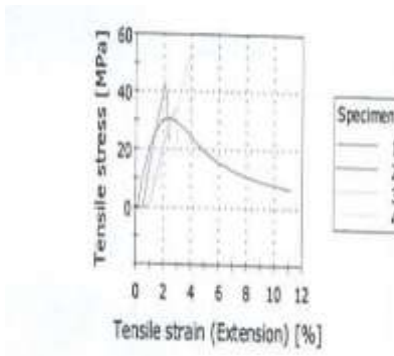

Fig.5 Graph indicating peak value of Tensile strength at Tensile stress for BC film

Table.2 Tensile Strength values are tabulated

S.No	Maximum load	Tensile Strength	Elongation at Maximum Load (mm)	Extension at Maximum Load (mm)	Thickness	Sample Id
1	64.90	43.27	2.14	1.07	0.15	FILM
2	43.10	30.78	2.17	1.08	0.15	FILM
3	50.79	33.86	2.67	1.34	0.15	FILM
5	78.04	52.03	3.50	1.75	0.15	FILM
MEAN	59.21	39.99	2.62	1.31	0.15	FILM

5. CYTOTOXICITY:

Cytotoxicity was determined using an MTT assay to find whether the sample was toxic to humans or cell lines. The VERO cell lines were obtained from King's Institute Guindy Chennai. Minimal Essential Media was primarily used to maintain cells with appropriate atmosphere and CO2 at 37C. The % cell viability was calculated using the following formula:

%cell viability = A570 of treated cell/A570 of control cells ×100 Cell viability of %cell viability 80.6% was obtained

Fig.6 Well containing VERO cells & media

6. SCANNING ELECTRON MICROSCOPE:

Structure and texture characterization was done by morphological examination of the film which was performed by SEM (TESCAN VEGA3XMU).The resolution of 1.2nm gold particle separation and high magnification of 5X to 1000,000 X.was observed and scanned under 20µm indicating the fibril networks as Bacterial cellulose.

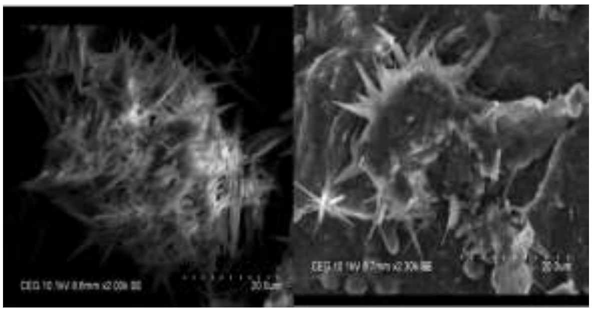

Fig.7& Fig 8 SEM Image of Cellulose fibril network under 20µm

7. PRODUCTION OF BACTERIAL CELLULOSE FABRIC :

From the Isolated culture media after the Incubation period of 7-15 days a thin layer of bacterial cellulose layer was formed (Fig.7&8). This was considered as a "Biofabric" which can be further tested to find its property and efficiency

Fig.9a&9b Formation of BC Film

8. RESULT AND DISCUSSION:

The results are consistent with other research and studies about bacterial cellulose. From the microorganism, the production of fabric ensured prominent results showing its capacity and productivity to fully form into a biofabric. The SEM analysis shows a three-dimensional structure of the cellulose film and the tensile strength also reveals its tearing ability and withstand processes concerning temperature and stress. There are also many other potential ways of using biofabrics to control environmental sustainability

9. CONCLUSION:

The mission of the project was to develop a biofabric that could pave the way for future research and development in the textile industry which emerge as a global sensation in fashion and textiles. The bacterial cellulose film was considered a film-like structure that was used as a biofabric in textiles. To remediate the production of Sustainable "Biofabric" forms a basic outline for introducing microorganisms into the textile world. The introduction of biotechnology into the industry enlightens new concepts to develop sustainable products for the environment. Further extension of the product in a large-scale biofabric produced from bacterial cellulose which could develop as a couture and could lead to evolution in the textile and biotechnology sector.

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ENERGY-EFFICIENT LOAD BALANCING OPTIMIZATION TECHNIQUES WITH REAL-TIME ISSUES AND SOLUTIONS IN CLOUD COMPUTING

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Abstract: Cloud computing is a relatively new technology that is utilized as an online service for quick access, adaptable resources, data analytics, and technological innovation. In a cloud environment, load balancing spreads traffic and workloads to prevent any one node or computer from being overloaded, under-loaded, or just idle. To enhance overall cloud performance, load balancing optimizes a variety of performance metrics measured using execution time, response time, waiting time, turnaround time, latency, availability, system stability, and throughput by enlightening complete cloud performance. Functionality, quality, as well as user knowledge of cloud amenities, are measured by cloud performance metrics. This paper's main objective is to impart comprehensive knowledge on cloud computing technology. Since the invention of technology, IT organizations have been paying money to shift their operations to the cloud. By 2024, anticipated more than 45% of IT investments in system infrastructure, software infrastructure, and application software would move to the cloud. Working from home is becoming the new norm for all employees in the wake of the COVID-19 pandemic. People may communicate with customers, create goods, and work together with colleagues as if they were physically present in an office. Origins of many modern success stories originate in cloud computing. The load for a cloud computing environment is optimized by means of a variety of load-balancing techniques, however, it is unable to offer optimum results. This research paper explores cloud computing architecture, its evolution, and load-balancing strategies in the cloud context using several static and dynamic load-balancing techniques. Furthermore, this research helps in the comparison of algorithms to find an optimum approach to load optimization in a cloud computing environment.

Keywords - Cloud Computing, Load Balancing, Internet-of-Things (IoT), Optimization, Resource Scheduling, Weighted Round Robin(WRR)

I. INTRODUCTION

"Cloud Computing" refers to Internet-based computing that bids a pool of customizable computing resources, such as networks, storage, servers, and applications, besides services, without requiring users to communicate with service providers and with the least amount of management work possible. Additionally, clients are given resources in the form of several service models. ***Resources may be offered as software as a service (SaaS), platform as a service (PaaS), or infrastructure as a service (IaaS) models.*** Cloud computing is one of the crucial modern technologies that has brought about significant change in this field, and it has become a term in today's IT sector. Technology introduced in cloud computing environment as services. It enables the most cost-effective and secure use of servers, storage, and applications at any time using a variety of computers or cell phones.

Task scheduling is one of the most important research questions in a cloud computing system. Maximum profit and adequate access to remote resources are two of the service providers' primary goals in light of the growing number of cloud users. Data is now far more valuable and usable because of recent developments in machine learning (ML) and cloud computing technologies. In fact, these technologies improve the quality of our lives and the services we receive. Conversely, for service offers to be more accurate and effective, ML algorithms need a lot of training data to learn. As a result, algorithm design is the most important part of ML, aside from the data itself. Furthermore, cutting-edge computational models like cloud and edge computing provide on-demand data storage, processing power, and infrastructure for machine learning algorithms.

Modern information technology (IT) has undergone a revolution with an overview of cloud computing systems. To use in many systems that demand sophisticated computation and big-scale, cloud-computing systems have an effective and powerful architecture. A platform called the cloud manages constrained virtual machines and compute servers to provide application services at a certain moment in time. Cloud is an appropriate multi-tenant computing environment that enables resource sharing between users. To distribute resources to clients in the

cloud depending on their demands, available resources are examined and planned using an effective task scheduler.
Organizations of all sizes are adopting the cloud for a variety of use cases, including data backup, virtual desktops, disaster recovery, software development, email, big data analytics, and web apps. The way that businesses see IT resources has significantly changed as a result of cloud computing. In addition to its scalability, dependability, accessibility, and security along with efficient cost-reduction strategies, cloud computing sparked a great deal of focus among scientific circles among different groups. Cloud computing is probably at the center of everything if we use any of the programs to send emails, edit documents, view movies or TV, listen to music, play games, or save data, primary benefit of cloud computing is the ability to utilize services via the Internet from any locality. It makes it possible for a large number of companies besides scientific institutions to put in place industrial cloud computing platforms enabling efficient sharing as well as financial gain. Cloud service providers use a number of servers in cloud data centers to deliver these services to customers of the cloud. This approach raises overall energy consumption as well as makes it difficult to balance the demand for cloud resources. Due to these difficulties, it is now necessary in direction of developing cloud job scheduling algorithms that are load-balancing and energy-efficient. The main goal of cloud task scheduling techniques was to upsurge energy competence while lowering costs besides making tasks last longer. To optimize the use of cloud resources, it also takes into account a number of objective factors.

In a cloud computing environment, there are three common categories of task scheduling algorithms, which are traditional algorithms, such as ***first come first serve (FCFS), shortest job first (SJF), largest job first (LJF), round-robin (RR), heuristic algorithms, such as Min-Min and Max-Min algorithms, and meta-heuristic algorithms, such as ant colony optimization algorithm (ACO) and particle swarm optimization (PSO)***. The round-robin (RR) algorithm is one of the most commonly used scheduling traditional algorithms. It is simple and depends on sharing CPU time. In the RR algorithm, jobs share CPU time by allocating a slice of time, usually between 10 and 100 ms for each job, called quantum time (QT). If the current job is over, its execution will be paused, and placed at the end of the ready queue. These steps are repeated for all jobs in the ready queue. If the job's execution is completed, it is deleted directly from the ready queue. It is obvious that the efficiency of the RR algorithm depends on QT, and hence, the choice of QT size is a critical issue for improving the overall performance of the RR approach. If QT size is too large, RR tends to become an FCFS algorithm, whereas if QT is too small, RR might perform poorly due to context switches that cause much overhead.
This paper's key contribution is known to be a unique technique, which focuses on the drawbacks of some strategies. By reducing average waiting time, average turnaround time, and average response time, the weighted round-robin approach improves the overall functionality of the conventional RR algorithm as well as compared with other techniques for task scheduling in a cloud-computing environment. The remainder of this article is structured as follows. ***Cloud architecture is depicted in Section 2. The evolution of Cloud Computing is exposed in Section 3. Load Balancing Strategies are revealed in Section 4. Evaluation and results are encompassed in Section 5. Finally, Section 6 elucidated the conclusion and future work.***

II. CLOUD ARCHITECTURE

Cloud architecture is divided into two parts: 1. Front end 2. Back end. The front end and back end are two core elements of cloud computing architecture. In this architecture, the front end serves as a client and connects with the backend via a network or internet connection as shown in Figure 1. The client-side, or front-end, of cloud computing architecture, is made visible to external entities, while the backend is kept hidden from any outside contacts but is still able to connect with clients directly via predetermined protocol
Important data is protected by the backend of cloud architecture from the demands of client-facing technologies. It reacts correctly to questions about the data that is sent to it. The backend is a crucial component of your complete computer system and a key component of the cloud idea. Backend alludes to the cloud that the service provider uses. It maintains resources and provides security measures in addition to encompassing resources as well. Huge storage, virtual computers, virtual applications, traffic management systems, deployment methods, etc. are also included.

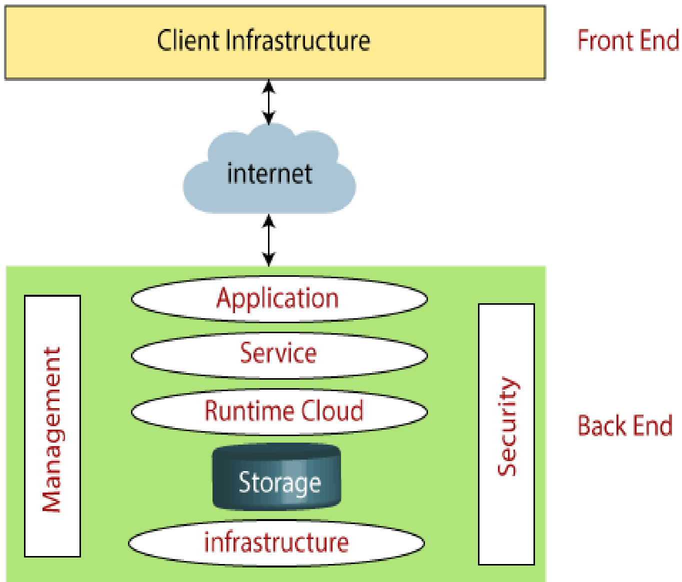

Figure 1: Cloud Computing Architecture

Advantages of cloud computing architecture include:

- ☆ Simplifies overall cloud computing system.
- ☆ Ensures data processing requests.
- ☆ Contributes to delivering excellent security.
- ☆ Increases modularity.

- Leads to improved catastrophe recovery.
- Provides good user access.
- Lower cost of operating it.
- High level of reliability provided.
- Ensures scalability.

III. DEVELOPMENT OF CLOUD COMPUTING

The use and rental of computing services over the internet is known as cloud computing. Five technologies that have been crucial to the development of this technology are service orientation, virtualization, utility computing, distributed systems and their peripherals, and Web 2.0. It largely developed from different computer technology including virtualization, parallel computing, grid computing, and utility computing. Using mainframe In the 1950s, computing enabled numerous users to use access points to connect to a central computer. ARPANET forerunner of (Advanced Research Project Agency) The 1960s saw the development of the Internet. In the beginning, meant to be a resource for communication and computation designed four colleges as sharing tool, but it transformed into the Internet as shown in figure 2.

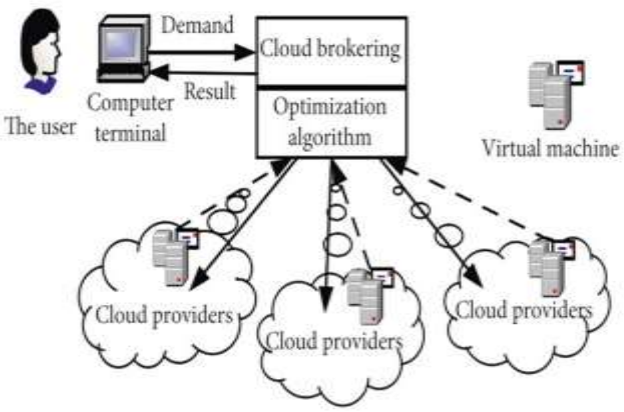

Figure 2. VM Allocation of Resources in Cloud Computing

IV. LOAD BALANCING STRATEGIES IN CLOUD COMPUTING

In two categories of static load balancing besides dynamic load balancing, there are numerous types of load balancing approaches employed in cloud computing. Before compilation, static load balancing algorithms allocate jobs amongst servers grounded on the algorithm's knowledge of all resource necessities. These standards form the basis for task distribution. For small-distributed setups through fast internet as well as negligible communication latency, static load balancing is appropriate. The algorithmic approaches that fall under the category of static are typically not appropriate for cloud computing since they function properly when systems or nodes have ignorable disparities in load. Because there are n number of users on a cloud as shown in Figure 3, load is very variable.

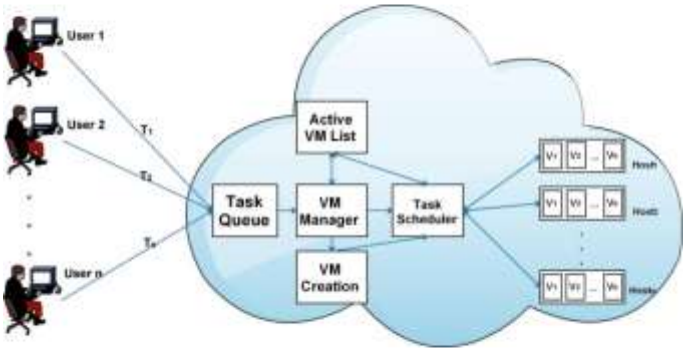

Figure 3. Model in Cloud Data Center

Dynamic algorithms operate in real-time settings where they acquire information about the server's load continuously. In light of that, it decides to distribute tasks among servers. We can therefore assign, reallocate, or remove any task from the server based on priority. In large distributed systems, Dynamic Load Balanced Algorithm seeks to reduce execution times and communication delays. These techniques or algorithms are very good at dispersing load among different resource types on their nodes in the cloud environment. Static load-balancing algorithms work in lesser-distributed contexts as opposed to dynamic load-balancing methods, which function in widely scattered systems. Dynamic algorithms are those that use meta-heuristics, whereas static algorithms are those that use methods that are more traditional.

Static Load Balancing Algorithms

Round Robin: Round Robin is one of the established ways to distribute tasks among nodes. To assign work to a virtual computer, it employs a cyclic process. If there are no tasks to complete, they divide into processes based on the order in which requests arrive. This technique has the drawback that some nodes with high computational power can stay underloaded while nodes with low computing power are severely overwhelmed.

Min-min: Min-min is a static load balancing method that arranges jobs according to the length and time required to complete them. These tasks are chosen initially and subsequent tasks are chosen in that sequence. They ordered an increasing order of tasks with minimum completion time.

Max-min: The min-min technique is very similar to the max-min approach, however in this case jobs are arranged according to their maximum completion times. The work that will take the longest to complete is given priority and subsequent tasks must wait until it is completed.

Weighted Round Robin: WRR was created to address flaws in the round-robin algorithm. Here, servers are given weights based on how well they can handle loads. Based on weight, duties are assigned. This algorithm maintains both server's capacity and load. The third work is allocated to the server with a larger weightage if two tasks are split between two distinct servers.

Least Connection: This algorithm is comparable to the least connection algorithm. Weights are assigned numerically in Weighted Least Connection, just like in Weighted Round Robin, where they are given to the server.

Dynamic Load Balancing Algorithms

Honeybee foraging: This dynamic algorithm is based on honeybee behavior, specifically how they find and gather food. A subgroup of bees known as scouts use vibrational dance to find food and communicate with others. This provides an approximation of food's amount and quality. This method is employed in load balancing to alert VMs that are under and overloaded. Underloaded machine receives duties from overburdened machines. Similar to how honeybees compared to jobs from overburdened VMs. The task will update the quantity of tasks and load of that specific VM to all other awaiting tasks after being sent to under loaded VM. Choose VMs based on workload and highest priority tasks. When high-priority task needs to be distributed to other virtual machines (VMs), a VM with the fewest high-priority tasks is chosen so that the task is completed as soon as possible. The task deleted was submitted to an underloaded VM because all VMs will be sorted in ascending order depending on load. In essence, VMs are food sources and tasks are honeybees. Task loaded into virtual machine is comparable to a honeybee hunting for food.

Particle Swarm Optimization (PSO) Algorithm: Kennedy and Eberhart first introduced PSO, a kind of meta-heuristics technique. It is an optimization method based on self-adaptive global search. There is no direct recombination of population members in the PSO algorithm, unlike other population-based algorithms such as GA. PSO develops communication amongst them by adhering to a model or patterns for social interaction, such as that of fish schools and bird flocks. PSO algorithm besides swarm intelligence optimization techniques seems to be quite similar. It primarily focuses on lowering an application's overall computing cost in a cloud computing environment.

Heuristic Algorithm: Traditional approaches to problem-solving were cumbersome and inefficient for dealing with NP-complete issues. Heuristic algorithms are made to address decision-making difficulties and aim to solve problems more quickly and effectively than previous methods. The traveling salesmen are an example. The best way to solve a problem where there is a list of places to visit and the distance between each city supplied is to visit all cities by traveling the shortest distance possible.

Ant colony optimization: ACO is a method of problem-solving inspired by how ants find the best routes from their nest to food. They cooperate to find new sources of food while some ants work in parallel to move food from source to nest. This ant behavior has motivated numerous scholars and assisted them in finding solutions to issues that actually exist in various sectors. This method involves an ant updating entries in the node's pheromone table from source to destination. The pheromone table referred to by other routing ants besides calls that use it as their destination do so. However, prices from to and from to may differ for asymmetric networks. As a result, this method of updating pheromones is only suitable for symmetric network routing.

Hill climbing: Hill climbing is a straightforward optimization process that uses an iterative approach to find optimal solutions. It chooses rising value and advances upwards or toward the summit. Peak refers to the summit of a hill or location where no nearby value exceeds peak. Once it hits the peak or halting condition, the algorithm terminates. In some cases, local rather than global optimum is reached. This approach keeps an index table for load balancing that contains the list of VMs and their states (BUSY/AVAILABLE). When a new task request comes in, a random VM ID is generated. If the state is available, the task is allocated to the VM; otherwise, a new random VM ID is generated. Accordingly, the index table updated. De-allocates VM and updates database once the task is done.

V. EVALUATION AND RESULT

This study reveals that, when compared to other significant algorithms currently in use, the weighted round-robin algorithm outperforms them all in terms of performance metrics. Weighted Round Robin(WRR) was developed to fix round-robin algorithm bugs. In this case, servers are given weights based on their ability to manage loads. Tasks are assigned based on weight. This algorithm maintains both server's capacity and load. If two tasks are distributed between two different servers, a third task is given to the server with maximum weight. ***Response time, turnaround time, dependability, scalability, availability, reliability, and processing time are a few of the performance characteristics compared.***

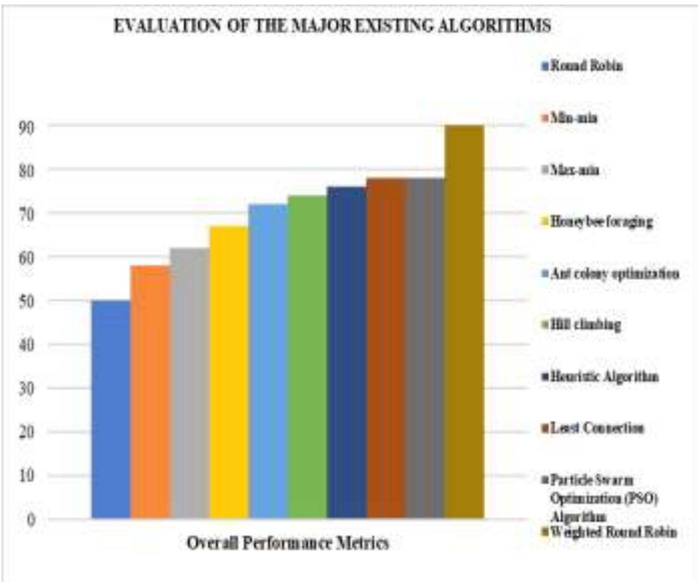

Figure 4: EVALUATION OF THE MAJOR EXISTING ALGORITHMS

Weighted round robin(WRR) outperforms all other main algorithms in Figure 4's comparison of their overall performance characteristics. A comparison of some of the most important static and dynamic algorithms with the QoS parameters is depicted in Figure 5.

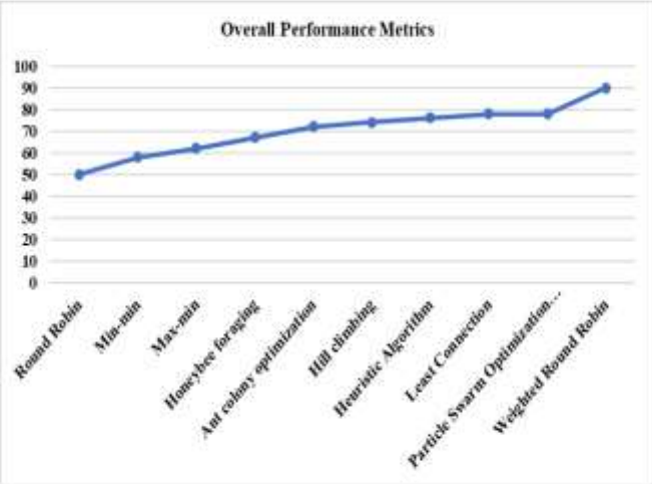

Figure 5: OVERALL PERFORMANCE METRICS

VI. CONCLUSION AND FUTURE WORK

The use of IoT devices has recently begun and is growing every day. Because they can communicate and make judgments without interacting with people, the technologies we use every day are growing smarter. The Internet of Things (IoT) helps them accomplish this complete task by giving each physical device unique identification and integrated sensors. An IoT platform is the collective name for the location where all of these sensors store data they collect. IoT platforms are cloud services that provide standard language and platforms so that data is understood as well as transferred amongst all devices. As the number of IoT devices grows, so does the amount of data that they collect, which can put a lot of strain on servers. We utilize load-balancing methods to maintain load.

Weighted Round Robin (WRR) outperforms other load balancing approaches when they compared for use in the cloud environment covered by this study. One of the main issues with cloud computing load balancing is task scheduling. Both too much and too little load should be avoided. Tasks are divided across idle nodes if the node is overwhelmed. Any node should have some work to process if it is under-loaded. Various strategies were used to resolve this issue. However, when compared to various performance criteria, this challenge performs better. ***When compared to other methodologies, WRR demonstrated superior performance.*** A few of the performance metrics that are compared include response time, turnaround time, dependability, scalability, availability, reliability, and processing time. However, the WRR approach should be improved with all other metrics by minimizing node switches, throughput, and latency in addition to data security***. Future work will involve improving the Weighted Round Robin(WRR) algorithm to produce the best results and metrics when compared to all other methods.*** The aforementioned tactics have been assessed and exposed to be improved by other performance indicators.

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ChatGPT in Higher Educational Institutions- Enhancing Learning Experiences

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Abstract

Education is one of the many sectors that artificial intelligence (AI) has transformed. The incorporation of cutting-edge AI chatbots like ChatGPT in higher education settings plays a vital role in revolutionizing the educational process. The functioning, advantages, drawbacks, dangers, and long-term effects of ChatGPT as a support tool for higher education institutions are all covered in this article.

Keywords: Analytics, Higher Education, Interface, Machine Learning, Plugins.

Literature Review

A systematic literature review was conducted to gain insights into the current use of AI technologies, specifically ChatGPT, in higher education. While the review acknowledges the heterogeneity of European universities, it highlights key literature on the implementation of AI technologies in higher education (Li and de Silva, 2021). The literature covers topics such as the implementation of ChatGPT, AI technologies in teaching and research, AI-specific digital literacy, AI-based learning systems, ethical considerations, and future scenarios in higher education (Sclater, Peasgood & Mullan, 2021).

Introduction

OpenAI created the sophisticated language model known as ChatGPT. It generates text responses that are human-like by using machine learning and natural language processing algorithms in response to provided prompts or discussions. It has the capacity to comprehend and produce logical and contextually relevant responses because it was trained on a vast corpus of text data from the internet. With the ability to simulate discussions with users and offer responses, justifications, ideas, and other text-based interactions, ChatGPT can be used in a conversational setting. It has uses in many different fields, such as tutoring, language translation, content creation, and customer service.

ChatGPT: An Aid to Higher Educational Institutions

OpenAI's ChatGPT simulates human communication using machine learning and natural language processing. ChatGPT can benefit students and teachers in higher education institutions in a number of ways, some of which are listed below (Kılıçer and Odabaşı, 2022),

ChatGPT

• **Personalised Learning**: ChatGPT provides individualized instruction, support, and feedback based on each student's needs. ChatGPT provides personalized learning experiences that increase student engagement and academic success by taking into account students' learning preferences, learning styles, and knowledge gaps.

• **Round-the-clock student assistance**: ChatGPT offers round-the-clock student support by responding to questions on the course material, assignments, and due dates. This accessibility guarantees that students can get help right away, establishing a positive learning atmosphere.

• **Virtual tutoring**: ChatGPT functions as a virtual tutor by leading students through difficult topics, explaining things, and delivering practice activities. This on-demand tutoring encourages students' individual study while supplementing regular classroom education.

• **Multilingual Education**: ChatGPT can facilitate multilingual education thanks to its linguistic capabilities. It facilitates language acquisition and fosters cultural understanding by engaging students in dialogue, offering feedback tailored to the target language, and providing interactive practice opportunities.

• **Real-time assessment and feedback:** Real-time assessment and feedback are made possible by ChatGPT's rapid data processing. It determines areas for improvement, assesses students' comprehension, and gives fast feedback. This tool improves formative evaluations and helps students continue to study.

• **Improving Collaboration and Peer Learning**: ChatGPT can help students work together and learn from one another. It makes it possible for virtual study groups, group debates, and project cooperation, encouraging active participation, information sharing, and a sense of belonging in the educational process.

• **Integration with Learning Management Systems**: ChatGPT is most effective when it is integrated with existing learning management systems (LMS). The learning process is streamlined and a centralized platform for collaboration is provided via seamless integration, which enables students to acquire personalized learning support, receive feedback, and participate in interactive discussions.

• **Augmented Reality and Virtual Reality Integration**: ChatGPT can be improved by integrating augmented reality (AR) and virtual reality (VR) technology. To encourage immersive and hands-on learning, ChatGPT can be included in AR/VR simulations, virtual field trips, and interactive learning environments.

• **Teacher Professional Development**: It's essential to give teachers the tools they need to implement ChatGPT successfully. Giving teachers the tools they need to use AI in their teaching practices, training programs and workshops may ensure successful implementation and maximize the advantages for students.

ChatGPT Plugins for Higher Education:
Let's look at the list of the top 12 ChatGPT plugins to improve the educational experience now that we have discussed the fundamentals of ChatGPT and its plugins in an educational context is shown in Fig 1.1,

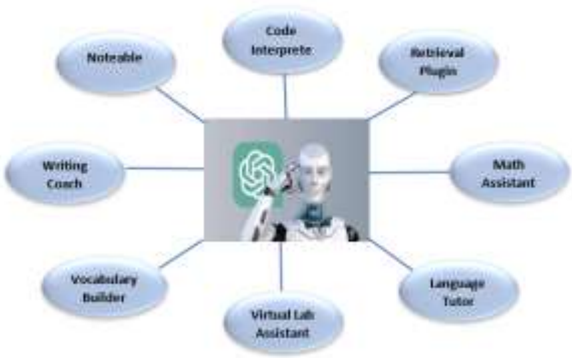

Fig 1.1 Plugins for Higher Education

• Noteable (Analytics and Machine Learning): Noteable is an effective plugin made especially for the educational community. Within their ChatGPT sessions, it enables instructors and students to create, run, and exchange Python notebooks. It is ideal for performing advanced data visualisation, code-based calculations, and data analysis. Using Noteable, instructors and students may run Python programmes, add new packages, and work together on notebooks. With the help of this plugin, non-technical audiences may interact with data in natural language and reach insightful conclusions, revolutionising the fields of analytics and machine learning.

• **Code Interpreter Plugin (Programming):** The Code Interpreter Plugin, which gives ChatGPT access to Python's capability, is another useful tool for the educational community. It allows instructors and students to run code, manage file uploads and downloads, and solve programming challenges because it functions within a safe and sandboxed execution environment. During the chat session, the plugin maintains a persistent session, making it a useful tool for instructing students about programming, data analysis, visualization, and file manipulation inside the ChatGPT interface.

• **Retrieval Plugin (Research and Information Retrieval):** Software Developers can deploy and integrate the Retrieval Plugin with ChatGPT as a self-hosted, open-source solution. With the aid of this plugin, developers can select a vector database for indexing and finding educational content. It makes use of OpenAI embeddings. It can obtain the most pertinent document fragments from a variety of sources, including files, notes, emails, and publicly available information. The Retrieval Plugin improves ChatGPT's research capabilities by enabling instructors and students to access and retrieve data from reliable educational sources.

• **Math Assistant (Mathematics):** A specialized plugin created to help teachers and students with mathematical problem-solving is called Math Assistant. It offers interactive visualizations, concept explanations, and step-by-step answers to mathematical calculations. With the addition of Math Assistant, ChatGPT transforms into an invaluable resource for math classrooms, assisting students in comprehending complicated issues and reinforcing mathematical ideas through interactive interaction.

• **Language Tutor (Language Learning):** This plugin for language learning turns ChatGPT into a customised language tutor. It provides translations, justifications, and interactive language practise sessions in order to provide customised language learning experiences. ChatGPT is a useful tool for language classrooms since it allows teachers and students to practise their language abilities through immersive discussions while also getting immediate feedback on how they are using the language.

• **Virtual Lab Assistant (Science and Experiments):** This plug-in improves the learning environment in science classes. Within ChatGPT, it offers interactive simulations, experimental direction, and real-time data analysis capabilities. With the help of the Virtual Lab Assistant, teachers and students may carry out simulated experiments, evaluate the outcomes, and gain a deeper comprehension of scientific ideas through practical application.

• **Vocabulary Builder (Language and Vocabulary):** This plugin helps teachers and students by helping them add new words to their vocabulary. It provides interactive word games, word learning activities, and examples of usage in many contexts. Through fun and tailored activities within ChatGPT, Vocabulary Builder helps learners enhance their language proficiency and vocabulary retention.

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• **Study Group Facilitator (Collaborative Learning):** The plugin for ChatGPT's Study Group Facilitator promotes smooth student cooperation. It offers resources for organizing study sessions, disseminating study guides, and promoting group conversations. Students can work together on assignments, share ideas, and encourage one another's learning with the help of the Study Group Facilitator, creating a feeling of community and improving the collaborative learning experience.

• **Writing Coach (Writing Skills):** For teachers and students looking to advance their writing abilities, the Writing Coach plugin is a great tool. It delivers immediate grammar and style recommendations, writing prompts, and editing assistance. With the Writing Coach, students can get individualized comments and direction on their writing, which will help them improve their communication abilities in the ChatGPT setting.

• **Quiz Master (Assessment and Quizzing):** Within ChatGPT, the Quiz Master plugin enables the creation and delivery of interactive quizzes and assessments. Quizzes with multiple choices, blanks to fill in, or brief answers can be simply made by teachers, and students can submit their responses right in the ChatGPT interface. The plugin automatically evaluates assignments and delivers feedback right away, enabling teachers to easily gauge student comprehension and monitor development.

• **Research Paper Assistant (Academic Writing):** The plugin known as "Research Paper Assistant" was created expressly to help students and teachers when writing research papers. It provides help with formatting, research organization, and citation management. Students can handle references, ensure proper formatting, and expedite their research process with the help of the Research Paper Assistant, which will help them write academic papers and do scholarly work in the ChatGPT environment.

These top ChatGPT educational plugins demonstrate the adaptability and potential of ChatGPT as a teaching tool. By utilizing these plugins, teachers may turn ChatGPT into a flexible platform that meets a range of educational requirements, from maths and programming to language instruction and group study sessions. The potential for enhancing ChatGPT's functionality in the educational space is limitless thanks to the community of plugin developers' ongoing growth. Explore the ChatGPT plugin marketplace, experiment with various plugins, and find the ones that best match your unique educational needs whether you're a developer or an educator.

Challenges and Risks

While ChatGPT has many advantages, there are also hazards and obstacles that need to be considered:

• **Ethical Considerations:** It is crucial to apply AI in education in an ethical manner. In addition to upholding student privacy, addressing algorithmic biases, and fostering inclusion and cultural sensitivity, ChatGPT should abide by ethical standards (Dennen, Myers, and Kowalski, 2020).

• **Academic honesty and Critical Thinking:** When using ChatGPT, upholding academic honesty is crucial. There must be initiatives taken to stop plagiarism, cheating, and the spread of false information. Independent learning is supported by using AI tools while fostering critical thinking.

• **Data Privacy and Security**: The collection and processing of student data poses issues related to privacy and security. To protect student information, educational institutions must put in place strong data protection mechanisms, get permission, and follow data privacy laws.

• Maintaining the Human Element in Education While utilizing AI technology, it's important to strike a balance with maintaining human interaction. Human educators should continue to be essential in promoting a well-rounded educational experience and providing the necessary guidance and assistance.

Conclusion

By providing individualized training, round-the-clock student support, and virtual tutoring, ChatGPT integration in higher education institutions has the potential to alter the learning experience. The advantages are further enhanced by collaboration, LMS integration, AR/VR integration, and teacher professional development. However, considerable consideration must be given to ethical issues, academic integrity, data protection, and striking a balance between AI and human engagement. Higher education institutions can use ChatGPT to build dynamic and productive learning environments by solving these issues and integrating AI responsibly.

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THE POWER OF ARTIFICIAL INTELLIGENCE: COMPUTER VISION UNLEASHED

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Abstract
This software is made by combining Natural Language Processing (NLP) with Artificial Intelligence (AI). In this article, we focus on developing human pose estimation software and robot pose estimation systems. This software is used to estimate the position of the human body in a photo or video. It is used in many computer vision applications such as robotics and autonomous systems, motion analysis, health and rehabilitation, safety and surveillance, augmented reality (AR) filters, fashion and retail, occupational safety and ergonomics, assistive technology, biological mechanics, and sports science.

KEYWORDS
Artificial intelligence, Branches of AI, Computer Vision, Applications of AI.

1. INTRODUCTION

The term "artificial intelligence" was coined by John McCarthy, who is also considered the father of wisdom. Marvin Minsky is one of the creators of artificial intelligence, along with Alan Turing, Herbert A., and Alan Newell. Artificial intelligence is a metaphor that allows computers, computer-controlled robots, or software to perform human-like intelligence. The field of intelligence includes reasoning, computer literacy, analysis, reasoning, and designing intelligent systems. In this article, we talk about intelligence and some branches of intelligence**.**

2. LITERATURE SURVEY

This section discusses some scientific literature conducted by various authors. Yeonho Kim said that intelligence estimation can be used as a method to evaluate different depth and ridge data to use 3D data of key points (Kim, Yeonho, and Daijin Kim, 2020). Arthur Samuel defines machine learning as "the work (Arthur Samuel, Geeks for geeks, March 12, 2023) that gives computers the ability to learn without being programmed". Marisa Garanhel discusses 7 branches of artificial intelligence (Marisa Graranhel, 2023). Another interesting study by Chulmo Koo shows that travel robots are very important. concluded that artificial intelligence could play an important role in future travel planning (Koo, Chulmo, et al., 2021). According to John Terra, robots help us do dangerous and repetitive tasks. The authors draw attention to the different types of robots we use in today's digital world (John Terra, Simplilearn, 2023).

3. BRANCHES OF AI

As technology continues to evolve, the future of intelligence looks bright. Artificial intelligence has capital letters or branches as shown below

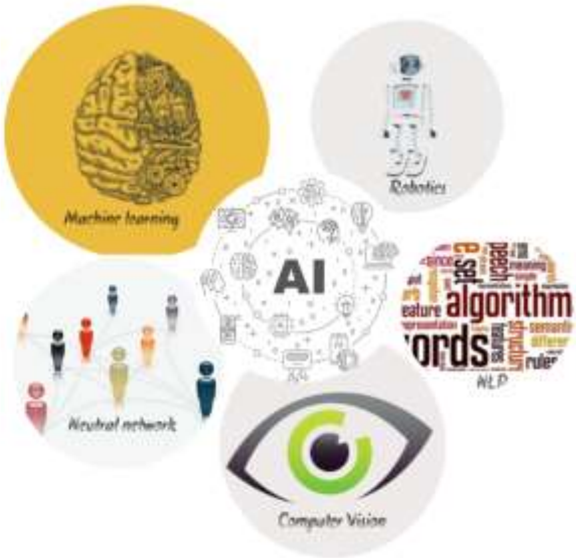

Fig 1. Branches of Artificial Intelligence

3.1 ROBOTICS

3.1 Robots

Robots are machines designed to perform complex tasks. People interact with external devices. Robots assist humans with complex and repetitive tasks. NASA uses artificial intelligence-assisted robots. Humanoid robots are the best example of revolutionary robots (Marisa Graranhel, Mar 12 2023).

3.1.1 Robot Type

A medical robot can do everything from medical treatment to surgery. He can interact with the patient and see how the patient is doing. Robots are gaining ground in the manufacturing industry. These robots are responsible for loading, welding, deburring, painting, coating and inspection. Logistics is an area where everyone wants orders to arrive as quickly as possible. It shortens the delivery and storage of goods. Similarly, space exploration robots are designed to operate in non-electrical areas. Both Sojourner and Perseverance Mars Rovers are robotic. Military robots can easily perform dangerous missions. It reduces the difficulty. Therefore, the military prefers to choose different types of robots. Travel robots provide information services such as hotel recommendations, destination selection, and travel arrangements, as well as customer service. Language development creates meaningful words, phrases, and sentences. It goes up to four levels. Unlike natural language (John Terra, Simplilearn, 2023).

3.2 MACHINE LEARNING AND ITS APPLICATIONS

Machine Learning is a branch of Artificial Intelligence (AI). Arthur Samuel coined the term "machine learning" while working at IBM in 1959. Machine learning is used to create algorithms that enable computers to learn and process data. Machine learning is used on social media to create some engaging and positive features that engage people. Product recommendations are one of the most popular tools in machine learning and the ability to focus. Today it is used by websites to track your location based on your past purchases, search patterns, and shopping cart history to make product recommendations. Amazon and Flipkart, for example, use this technology to promote their products. Image recognition, speech recognition, fraud detection, and medical diagnostics are just a few of the areas where machine learning is heavily used in today's digital age. Here are some machine learning algorithms in machine learning that involve designing and building algorithms that make predictions on data.

3.3 NATURAL LANGUAGE PROCESSING

Natural language processing supports computers in understanding both test and spoken words as humans. To understand the full meaning of human language in voice or text by combining machine learning, linguistics, and deep learning models. NLP has been deployed in various domains in recent times Language translators, Grammar checkers, Chatbots, Machine translators, and Sentiment analysis are just a few to name. The vital components of Natural Language Programming are discussed in the following section. Natural Language Understanding supports machines in understanding natural language and analyzing it by entities, emotions, keywords, etc. It is mostly used in customer care applications. Natural Language Generation produces phrases, sentences, and paragraphs that are meaningful. It is performed in four phases. Opposite to Natural language understanding (Khurana, Diksha, et al, 2023).

3.4 NEURAL NETWORK

Neural networks are also called artificial neural networks or simulated neural networks. Neural networks at the heart of deep learning algorithms are inspired by the workings of the human brain. It consists of an input method, one or more hidden methods, and an output method. Each node, called a component neuron, is connected to other neurons.

3.5 COMPUTER VISION

Computer Vision Computer Vision is an application of artificial intelligence that works on the same principle as human vision. Human vision evolves over time to distinguish objects, how far they are, whether they are moving or if they are problematic. Computer vision allows computers to interpret and analyze the virtual world. It provides computers with insight that helps them make faster, better, and more reliable decisions than humans. David Marr developed computer vision and algorithms for machines to detect angles, curves, edges and shapes in 1982. At the same time, scientist Kunihiko Fukushima introduced the mobile phone that would allow the model. The father of computer vision is Larry Roberts, who received his Ph.D.MIT thesis (circa 1960).

3.5.1 Exposure Estimation in Computer Vision Exposure estimation is a fundamental study in computer vision and artificial intelligence (AI), which refers to the use of images or videos to control and monitor the position and tilt of the human body. Key point detection is a special technique used to find important objects or bodies in an image. It shows the importance of space and content in the object. For example, the importance of our face (nose, eyebrows, lips) (Kim, Yeonho and Daijin Kim, 2020). The human pose can be defined in two ways based on the depth of difference: Discrimination uses advanced physical tools to search for human joints from visual images. Most of these experiences remember only seeing and not the whole body, which causes occlusion problems and reduces the accuracy of human estimation (Gong, Wenjuan, et al., 2016). The best way is to analyze the human joints by first adjusting the human model to the visual image. Predictive generative methods have advantages such as creating different models and dealing with missing or incorrect data. However, training can be more difficult and require more data compared to traditional discrimination methods. (Model estimates exposure directly from a given image). However, these developed methods have shown great results in creating accurate and diverse applications in various computer vision applications such as human prediction, robotics, and 3D object prediction (Andrews Cordolino Sobral, Wenjuan Gong, Xuena Zhang, Jordi Gonzalez, 2016). Exposure estimation uses pose and orientation to predict and track the position of a person or object. In this context, projection allows the software to estimate the position of the body ("exposure") in an image or video. Most pose estimation usually uses a two-step basis, observing the human body boundary line, and then measuring the pose in each box. Prediction works by finding important details about a person or thing. If we take the human example, the main components are bones such as the elbow, knee, and wrist (Kim, Yeonho, and Daijin Kim, 2020). The human estimate of the popular MS COCO dataset can capture 17 different elements (levels). Each key point is represented by three variables (x, y, z); where x and y indicate control and v indicates whether the key point is visible (Marisa Graranhel, 2023).

3.5.2 Difficulties in Estimating the Pose Predicting a person's pose is difficult because the posture of the body can change drastically due to different types of clothing, indiscriminate closures, point-of-view closures, and the background environment. It should be able to deal with real-world variations such as exposure estimation, lighting, and weather. Therefore, the image model makes it difficult to verify the integration. It is particularly difficult to track small and invisible objects (Tatariants M, 2020).

3.6 IMAGE CLASSIFICATION

In general, based on the contents in an image assigning the image to one of the pre-defined group/label/tags is known as image classification. this process may look simple at first but involves pixel-level image analysis for finding the most accurate label for the image. It is a fundamental and important task in computer vision.

3.6.1 IMAGE CLASSIFICATION SYSTEM

Image classification In general, the assignment of an image to one of the predefined groups/tags/tags based on its contents is called image classification. The process may seem simple at first glance, but it includes pixel-level image analysis to find the most accurate picture. This is an important and important task in computer vision.

3.6.1 Image Classification System: Classification by image type includes many tasks such as medical image classification, remote image classification, face classification, tissue classification, and classification of biological images. Image classification is used in medicine, biology, and remote sensing. It is important in searching for objects, reverse images and video animation. The image distribution system includes the five elements shown in Figure 2.2. The system concept is an image. Raw images collected from different scenarios may be noisy, inconsistent, and not suitable for direct analysis. Therefore, images are processed to have better stability and meet specific needs. This process is called image preprocessing. The process of extracting important information that describes the important information of the image and reduces its size is feature extraction. The assignment of an object to a particular class using a feature vector derived from a feature extractor is called classification. The output of a particular input is given as lecture notes.

3.6.2 CHALLENGES OF IMAGE CLASSIFICATION

Classification based on pixel values is very difficult due to the size of image files. Images taken in different environments and under different conditions have differences in perspective, scale, visibility, deformation, and occlusion. It is difficult to establish a method for dealing with changes in these images. Domain knowledge is essential to obtain good categorical features. However, finding and hiring experts is expensive and time-consuming.Not all image distribution methods can solve all problems, which leads to the complexity and variability of image distribution. To overcome this problem, a special training program is needed that can be changed and modified in different modes (Bi, Ying, Bing Xue and Mengjie Zhang, 2021).

4. CONCLUSION

In conclusion, AI visual intelligence is changing the way we interact with visual information and has the potential to make significant progress in many ways. However, it still requires careful consideration of ethical, social, and technological issues. As the market continues to evolve, finding a balance between innovation and responsibility will be key to tapping the potential of AI intelligence to better shape society.

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AN ARTICLE ON SEGMENTED IMAGE CLASSIFICATION FOR SMART PLANT DISEASE MONITORING SYSTEM

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Abstract: Agriculture has long been the main source of employment in our nation. Agriculture has recently been affected by urbanization and migration from rural areas. For the majority of people in India, agriculture is their primary source of income. The economy of our nation will grow as a result of the integration of IoT (Internet of Things) and image-processing technologies with agriculture. Precision farming has expanded thanks to technology-enabled farming backed by IoT and image-processing techniques for disease prediction. Deep neural networks can monitor large fields of crop and symptoms that show up on plant leaves using vision-based plant disease detection. In order to create smart agriculture systems, it wants to integrate image processing with IoT-based technology. Various sensor nodes are present in the farm Interfacing sensors, Wi-Fi, cameras with microcontrollers allows control of these parameters through remote devices or internet services.
Keywords: IoT, Sensors, GPS, Microcontroller, Wi-Fi.

Introduction

An image conveys information. It is made up of basic building blocks called pixels, where each pixel is interacted with in several ways and is represented numerically by the efforts of two agents, X and Y. A picture is made up of structured pixels arranged in columns and lines [1]. This strategy is wholly dependent on development, which can support soil preparation, planting, and weed-eating strategies. Weeds bring about the most important fundamental problems since they intensify the natural competition with the existing crop, requiring more fertilizer, water, and manual labor. Weed evaluation and eradication by hand requires more time. Regardless, mechanical applications have amazing ability to conduct weed area. It is a specific type of mechanical task [2]. The classification of weed zones using photographs taken in an open discussion setting is unusually challenging because of the unpredictable and erratic lighting. However, images are analyzed using image planning approaches including shape, evaluate, and surface highlights, which make the classification of weed extend simple. To arrange weeds in crops so that stereoscopic images can be handled, a camera-based technique is needed [3]. The image pixels are handled using several picture planning calculations that help distinguish between crops and weeds. Mechanical arms are used to remove the weed after its precise location has been mapped. There is a clear increase in interest in technology and automation to address every stage of the agricultural production cycle. A farm's production life cycle is a complicated process, with numerous variables influencing each choice. Different sensors, cameras, and IT units are used to monitor crops, taking pictures at regular intervals that are subsequently combined into imaging systems (using cutting-edge machine learning and artificial intelligence techniques) to increase production and decrease crop failure. Future technology may completely eliminate the need for humans to manually weed or check on crops thanks to the Internet of Things and image processing integration. In order to create smart agriculture systems, it wants to integrate image processing with IoT-based technology. Different sensor nodes are placed in various areas throughout the farm. Microcontrollers can interface with sensors, Wi- Fi, and cameras to provide remote or internet-based control of various parameters.

Literature Survey

The manual process of checking the parameters is the current practice and one of the best prepared methods in growing. The farmers themselves confirm all the parameters and calculate the readings in this process [1]. It focuses on developing tools and equipment to watch over, alert, and warn customers while exploiting the appeal of an inaccessible sensor orchestrate system [2]. It focuses on advancing IoT and machine learning to make agribusiness savvy. Smart GPS-based inaccessible controlled robots to carry out tasks like gardening, showering, dampness detecting, human location, and maintaining carefulness are the highlights [3]. The cloud computing tools that can create a full computing system, from sensors to apparatuses that watch data gathered from rural field pictures and from human characters who are on the ground and precisely nourish the information into the stores with the location as GPS facilitates [4]. By fusing a clever detecting framework with a clever irrigator framework, this idea suggests a fresh method for clever cultivating. It puts out a theory on how a robotized water framework system was created to maximize the use of water for agricultural crops. Additionally, an entrance unit manages sensor data. In order to grow the improvement of our agriculture, which in turn strengthens the economy of our nation; it is necessary to enable the development of the Internet of Things and picture planning with our agribusiness. The paper's main argument is that picture planning and IoT-based development should be combined to create rapid cultivating-based systems.

Digital image representation

A work f(X, Y), where X, Y facilitates are spasmodic in spatial and brightness, might be a computer-generated image. Collections of numbers that can be stored and managed by a computerized computer are used to communicate with it. It is created by combining tiny pieces of data known as pixels. These pixels are stored in a computer, making the advanced image preparation quicker and less expensive. Picture acquisition, picture capacity, picture pre-processing, communication, and picture presentation are the five crucial phases in computerized picture preparation.

Image processing procedure

Image processing is a technique applied to images to get good-quality images and is used to extract the required information from the image. Image processing operation is divided into four categories.

Image enrichment

The main goal of image enhancement is to take the input image that is provided and transform it into a better, much better output image that is more useful for a certain application. The margins and bounds of the prepared image are advanced [1]. The enhancement technique increases the energetic range of selected highlights but does not change the information's content.

Image dissection

In this method, the image is divided into a few portions [2]. The goal of division is to modify the image representation such that it is more purposeful and easier to comprehend. Advancement is required for the inquiry response.

Image compression

With this approach, the value of the picture record is reduced without lowering the image's quality. This reduction in photo storage space increases the capacity of more pictures and makes it easier to share them online.

Image restoration

Cleaning up the chaos or deteriorated focal points from the initial image is part of this approach. Degradation occurs in photos for a variety of reasons, including camera focus loss, movement that is obscured, and loudness.

Need for color image processing

Each pixel in a color image has three values, as well as information on the light's chrominance and degree of amplification. It should be precise while applying division on the color image recently. By creating a plant leaf image, the suggested method [3] differentiates plant infection. The veins and diseased patches on the plant's leaf have a unique hue. To locate vein and infection sites, a leaf is converted to a gray scale image, and then a division is linked. However, we are more concerned with the infection areas than the veins [4]. The RGB component's hue was recently altered to reduce vein proximity. Using the following three techniques, color picture management is carried out: The most common color space is the YCbCr color model. In this paradigm, chrominance is represented by Cb and Cr, while Y stands in for the brightness component. It is commonly utilized in the compression of images and videos. The HSI color model is a tool for creating a color-based image processing system. In the HSI model, I stand for intensity, which measures brightness, while H stands for hue, which defines pure color. S stands for saturation, which indicates how much pure color is blended with white. Color space is referred to as the CIELAB color model. The spectrum of colors can be expressed using mathematical operations. Color components often come in three to four different values. It is employed for printing as well as display purposes.

Feature extraction

This method simplifies the task of arranging the design by communicating the finer points of the fitting form data in a design. It is used to a certain frame of estimate diminution and design acknowledgement [5]. The feature extraction technique is useful if you've managed to cut down on the number of preparation stratagems necessary without losing important data. Include extraction can also show how much more information there is for a certain study.

Classifiers

To determine whether a leaf has a diseased area, classifiers are utilized. These classifiers only employ a few techniques for illness identification. Three techniques are employed as classifiers:

1. The infection rate
2. SVM, or support vector machines
3. A backward-propagating neural network

5. Proposed approach

In order to enhance infection finding accuracy while requiring less computing, a current process must be implemented to address the drawbacks of the previous approach. K-means clustering and SVM approaches are utilized for that; therefore the typical approach is a crossover one. With this approach, exactness may be achieved to the desired level.

Image acquisition

A camera is used to capture images. It is a crucial tool for sophisticated photo preparation. In essence, it involves several tactics including scaling, quieting uproar, and improving the image. The images of the exposed leaves were taken using high-resolution cameras with more pixels, allowing the images to be processed in a variety of ways to isolate the desired area of interest from the leaf and identify the diseased leaf with ease.

Image enhancement

A camera is used to capture images. It is a crucial tool for sophisticated photo preparation. In essence, it involves several tactics including scaling, quieting uproar, and improving the image. The images of the exposed leaves were taken using high-resolution cameras with more pixels, allowing the images to be processed in a variety of ways to isolate the desired area of interest from the leaf and identify the diseased leaf with ease.

Color image processing

The preparation of color images is extremely important for the use of large, sophisticated images on websites. By using sophisticated handling, this integrates picture handling and color modeling. In this method, the picture is linked to HSI color management to encourage an enhanced image. The color demonstrating tool is selected as HSI based on color discernment. In the HSI color tool demonstration, H talks about tint and defines real color, S talks about immersion and displays glow, and C talks about concentrated.

Image segmentation

In order to make the inspection and advanced preparation straightforward, the image in this handle has been divided into smaller pieces known as sections. Division is used to split an image. The segmentation of the image separates it into several locations or items. Depending on how complex the problem is, the image is subdivided. The two main aspects of a picture that are used in division calculations are similarity and brokenness. The main category is characterized by abrupt shifts in the focused area of the image. The object division of the image forms the foundation of the instant category. K-means clustering is eliminated by division calculations that are typically performed on plants.

Feature extraction

Using feature extraction, the picture data is compressed. Since the divided area is packed with appropriate colors and forms, studying there is quite simple. The majority of the characteristics are employed to depict a paddy leaf.

Percentage of leaf area infected (IA)

The picture is described using the methods mentioned before, and segmentation finds the leaf's sick region. Numerous distinct crops can be analyzed at one location without the need for separate analysis methodologies for each crop. Farmers may access this system with ease thanks to the provision of more GUI-based functionality. This system is expandable, so we can make it larger or smaller depending on the situation. This framework is adaptable. The prospect pool is enormous; thus, this method will become more commanding in the future. It is a quick and accurate method for identifying plant diseases. It is not a challenging procedure.

Conclusion

The detection, diagnosis, and identification of plant diseases are discussed in this work. At each stage for the kind of crop and its leaf, it is possible to adhere to the specified strategy. The most crucial activities are extracting leaf characteristics and then analyzing them. A classifier must be used in order to get accurate results. Classifier-based neural networks are among the best neural network types. The approach presented in this research is applicable to real-time applications. This approach finds the important portions of the picture using color- based segmentation. A lot of research is being done on the automated detection of diseased crops in order to obtain the highest yields.

Future scope

Using the methods and literature stated above, finding diseased leaves is insufficient. Since the aforementioned algorithms are not equally relevant to all crops, more effective algorithms will be required in the future to reliably identify plant diseases. The picture noise is eliminated using the methods above, and the plant illness is identified.

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A STUDY ON EMPLOYEE'S PERCEPTION OF LEARNING AND DEVELOPMENT IN L&T CONSTRUCTIONS HCI IC

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Abstract: Organizations have started to recognize the part Learning and Development can play in making the workforce committed and proficient, and the activities associated with the same are also rapidly being implemented. Through this research, we can understand employees' mindset about Learning and Development. Learning and Development can be very effective and can drive the organization to success if acted on properly and with the involvement of employees. Seeing things from the employees' point of view can give the organization a much clearer insight into how to implement learning activities in a way that promises benefits for all.
Keywords: Learning, Development, Perceptions, Knowledge, Satisfaction, Motivation & Commitment

NEED FOR THE STUDY

In this highly competitive corporate world, it is essential to have a workforce with advanced skills and innovation. Employees have to constantly improve and equip themselves to meet the changing demands to stay relevant in the dynamic market. This calls for continuous learning. Learning is a relatively permanent behavior change that results from experience. It is the acquisition of knowledge, skills, and information. A person has to have the drive and desire to learn for any learning and development activity to be effective. So, the organization must understand the mindset of the employees and their willingness to participate. While Learning and Development activities are something that can help engage employees, there are chances that they may harm employees who perceive Training to be a punitive action. So, understanding their perception can enable the management to alter the way they offer the programs and take the initiative to change the perspective if needed.

SCOPE OF THE STUDY

The study is confined to the employees working in the Headquarters of L&T Constructions Heavy Civil Infrastructure IC in Chennai. Only middle-level employees were studied during this research. Learning and Development initiatives are carried out on a large scale in this organization. Understanding what learning and development means to employees can help the organization offer it in more effective ways. This study will allow them to understand employee's perceptions and evaluate their preference for learning and development practices.

INTRODUCTION

This research study is an attempt to understand how employees of an organization perceive the concept of Learning and Development.

Learning is a relatively lasting change in behavior as a result of experiences. It is the process of acquiring knowledge, skills, understanding, and values. Learning is something that occurs throughout one's life.

Learning and Development is a core function of Human Resource Management that works on upskilling and reskilling of employees. It is a business strategy used by organizations to gain a competitive advantage through their workforce. Learning and Development serves as a great tool for bridging skill gaps, improving work culture, and enhancing employee engagement. It is also a good strategy for attracting and retaining talent as it increases employee morale.

Perspective can be defined as the way of considering something. Employee perspective is the way employees view various elements and situations in an organization. Taking employees' perspectives into consideration is essential to take measures to gain employee commitment.

With technological advancement happening at a faster pace and increasing expectations of consumers, organizations have to constantly equip themselves to meet the demands placed on them. Employee's needs relating to skills and competencies also keep evolving. Adaptation to the above requires effort and organizational support to learn and develop the skills of Human Resources to stay relevant in the dynamic business environment. Organizations seek to develop the competencies of their workforce and tap the full potential of Human Resources.

It is imperative to also have an understanding of the thoughts and feelings of the employees relating to the concept of Learning and Development. Understanding the perception of employees would help deliver these services in a more viable manner and design further programs to suit the development needs of the employees.

REVIEW OF LITERATURE

Schuler, Walker & Lessem (1990) said that the improvement of organisational competitiveness, productivity, and ultimately efficiency and effectiveness are the priorities of management development.

Watkins and Marsick (1996) Continuous learning opportunities, inquiry, and dialogue, collaboration and team learning, systems to capture and share learning, a collective vision, connection to the company's environment, and strategic leadership for learning are the seven characteristics of a learning organization:

Corsun and Enz (1999) suggested that employees perceive an organization's efforts to enhance resources as motivated by self-interest rather than genuine concern for employees. A reason behind this could be the low quality of employee-organization relationships and this may demotivate the employees and stop them from making use of developmental Human Resource practices in a way that benefits the organization. Employee motivation and participation in learning are influenced by individual differences and environmental factors.

Kuvaas (2008) studied the perceived organizational support, affective organizational commitment, and procedural and interactional justice perceptions. People with high perceived organizational support and resulting positive response to developmental activities have a greater belief that such Human Resource activities are opportunities to improve capability and performance. On the other hand, employees with low perceived organizational support feel less obligated to use Human Resource practices to grow and develop.

Alexandros G. Sahinidis and John Bouris (2007) The role of employee perceived training effectiveness (PTE) becomes more apparent, and its relationship to employee motivation, commitment, and job satisfaction is fairly clear, according to the discussion and implications of the study on the subject.

Matulčíková and Matulčík (2003) In most organizations, workplace learning takes a formal shape. Even if workers engage in informal learning activities at work, these activities are not frequently acknowledged as learning.

Bahn, Marx & Salinger (1973) It is more likely that skills will be transferred from the training setting to the workplace, or that trainees will use the skills they learned in the training program on the job in a supportive work environment where employees can offer encouragement and feedback.

Aharon Tziner (2007) People who have a high-performance goal orientation are driven to impress others and strive to demonstrate their competence. In contrast to people who have a high level of learning goal orientation, learning itself is gratifying. To achieve objectives, the former must be rewarded with outside recognition.

OBJECTIVES OF STUDY

1. To examine employees' willingness to learn and develop.
2. To understand employees' perceived organizational support.

DATA ANALYSIS AND INTERPRETATION

HYPOTHESIS 1

H0= There is no association between the gender of the employee and the employee's willingness to grow.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.009[a]	2	.366
Likelihood Ratio	2.034	2	.362
Linear-by-Linear Association	1.772	1	.183
N of Valid Cases	106		

H1= There is an association between the gender of the employee and the employee's willingness to grow.

RESULT

From the above figure, we infer that the significant value is 0.366 which is greater than 0.05. Hence, we accept the null hypothesis that there is no association between the gender of the employee and the employee's willingness to grow.

HYPOTHESIS 2

H0= There is no relationship between the duration worked in the organization and the perception that the organization is committed to the growth and development of the employee.

H1= There is a relationship between the duration worked in the organization and the perception that the organization is committed towards the growth and development of the employee.

Correlations

		How Long they have worked in L&T	The organization is Committed to Employee Growth and Development
How Long they have worked in L&T	Pearson Correlation	1	.135
	Sig. (2-tailed)		.169
	N	106	106
The Organization is Committed to Employee Growth and Development	Pearson Correlation	.135	1
	Sig. (2-tailed)	.169	
	N	106	106

RESULT

From the above figure, we infer that the significant value is 0.169 which is greater than 0.05. Hence, we accept the Null Hypothesis that there is no relationship between the duration worked in the organization and the perception that the organization is committed to the growth and development of the employee.

SUGGESTIONS

- It should be made sure that all employees receive a fair amount of Learning and Development opportunities.
- Employees have to be made aware of the various programs they can participate in and the various resources available for them to learn from like the Anytime Learning Portal.
- All the employees have to be encouraged to learn regardless of their age, gender, designation, experience, and field.
- Learning and Development programs can be made more engaging with fun learning activities and practical examples. It must gain the involvement of all the participants.
- Learning and Development activities should also be offered to support personal and behavioral development.

CONCLUSION

It is fascinating to see things we had learned in theory being applied on a large scale in the corporate world. The organizations direct so much effort into the Learning and Development of employees and recognize that it plays a part in making the workforce committed and proficient. Through this research, we can find that most people have a positive perception of the concept and that they just need it to be relevant to their personal and professional needs. Overall, this study paved the way to increase the understanding of employees' way of thinking and what satisfies them.

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A STUDY ON "HARNESSING THE POWER OF MINDFULNESS FOR ENHANCED EMPLOYEE PRODUCTIVITY AND EFFICIENCY IN IT INDUSTRIES

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Abstract: This Research Tries to Investigate Whether Harnessing the Power Of Mindfulness For Enhanced Employee Productivity And Efficiency In IT Industries.
Design/methodology/approach: Research Method: For this study, a descriptive research design was employed to achieve the study's objectives. A survey employing well-structured questions was conducted to collect data only from working IT professionals in Chennai Central. To uncover events connected to independent variables and workplace environments that can affect employee productivity and efficiency variables, the population of the study was limited to 50 working IT professionals who were ready to provide data.
Findings: This study's findings demonstrate how familiarity with the concept of mindfulness in the workplace has an impact on workers' productivity and efficiency in the information technology sector. Male respondents were more aware than women to be familiarity with the concept of mindfulness in the workplace
Practical Implications: Based on the study's findings, employees are advised to create awareness about the Power Of Mindfulness and their levels of productivity and efficiency in the IT industry.
Conclusion: Finally, this study concludes that the. to create a positive work environment, reduce burnout, and unlock the full potential of their employees. By embracing mindfulness, companies can empower their workforce to thrive in today's demanding business landscape and foster sustainable growth.
Keywords: Employee Productivity, Workplace Environment, Efficiency, Mental Harassment

INTRODUCTION

In today's fast-paced and demanding work environments, employee productivity and efficiency are crucial factors for organizational success. As companies strive to optimize performance, there is a growing interest in exploring innovative approaches to boost productivity. One such emerging approach is mindfulness, a practice rooted in ancient traditions that cultivate focused attention and awareness in the present moment. This article delves into the potential benefits of incorporating mindfulness techniques into the workplace and how they can positively impact employee productivity and efficiency.

1. Understanding Mindfulness:
Begin by explaining the concept of mindfulness, its origins, and its relevance in modern society. Highlight how mindfulness involves intentionally paying attention to the present moment without judgment and its potential to enhance focus, clarity, and overall well-being.

2. The Science Behind Mindfulness and Productivity:
Explore the scientific research that has examined the relationship between mindfulness and employee productivity. Discuss studies demonstrating how mindfulness practices, such as meditation and breathing exercises, can reduce stress, increase resilience, and improve cognitive functions such as attention, memory, and decision-making.

3. Cultivating a Mindful Work Environment:
Provide practical strategies for fostering a mindful work environment. Discuss how organizations can incorporate mindfulness into their culture, such as by offering mindfulness training programs, creating dedicated spaces for relaxation and reflection, and encouraging mindful practices during meetings and daily routines.

4. Mindfulness and Time Management:
Examine the impact of mindfulness on time management skills. Discuss how mindfulness practices can enhance focus, reduce distractions, and improve prioritization, leading to better time allocation and task completion.

5. Mindfulness and Work-Life Balance:
Explore how mindfulness can contribute to achieving a healthy work-life balance. Discuss how mindfulness practices can help employees detach from work-related stress, promote emotional well-being, and improve their ability to recharge and recover, ultimately fostering long-term productivity and efficiency.

6. Overcoming Barriers and Challenges:
Acknowledge potential barriers and challenges to implementing mindfulness programs in the workplace. Discuss strategies to address skepticism, resistance, and potential misconceptions about mindfulness, ensuring a smooth integration of these practices within the organizational culture.

7. Case Studies and Success Stories:
Share real-life examples of organizations that have successfully integrated mindfulness practices into their workplace and experienced tangible improvements in employee productivity and efficiency. Highlight the key initiatives, challenges faced, and measurable outcomes achieved.

REVIEW OF LITERATURE

1. J. W. Bamber and J. L. Warrick., This article is a great place to start because it gives a thorough summary of the most recent findings in the field of workplace mindfulness research. It goes on the theoretical underpinnings, measuring methods, and empirical data that support the beneficial effects of mindfulness on worker effectiveness and productivity. The authors stress the value of fostering a mindful workplace and offer doable implementation options.

2. A. M. Glomb et al. This study examines how mindfulness therapies can improve both employee well-being and performance by focusing on the relationship between the two. Mindfulness techniques have been demonstrated to positively affect employee well-being, resulting in increased productivity and efficiency. These techniques do this by encouraging self-awareness, emotional regulation, and cognitive flexibility. The impact of mindfulness practices on both individual and team performance is highlighted in the paper.

3. J K. M. Smith and L. M. Johnson., This study, which examines the connection between mindfulness and time management, reveals how mindfulness can help with job prioritization, distraction control, and time utilization in general. The study provides insightful information for businesses looking to improve their staff members' time management abilities by presenting actual proof of the favorable effects of mindfulness training on worker productivity.

4. R. N. Carney and M. J. Wells, this article examines how mindfulness techniques can increase employee productivity by enhancing focus and attention at work. It explores the neurological underpinnings behind mindfulness and covers studies showing how mindfulness training improves information processing, attentional control, and mind wandering. The authors go over the ramifications for businesses looking to develop a more attentive and focused staff.

5. L. R. Kaufman and S. A. Matheny, This study delves into the intersection of mindfulness, creativity, and innovation in the workplace. By fostering an open and non-judgmental mindset, mindfulness practices are shown to enhance creative thinking, problem-solving, and idea generation. The article highlights various mindfulness techniques and their potential to unlock employee creativity, ultimately leading to improved productivity and innovation.

OBJECTIVE OF STUDY

1. To investigate the impact of mindfulness training on employee productivity and efficiency in a corporate setting.

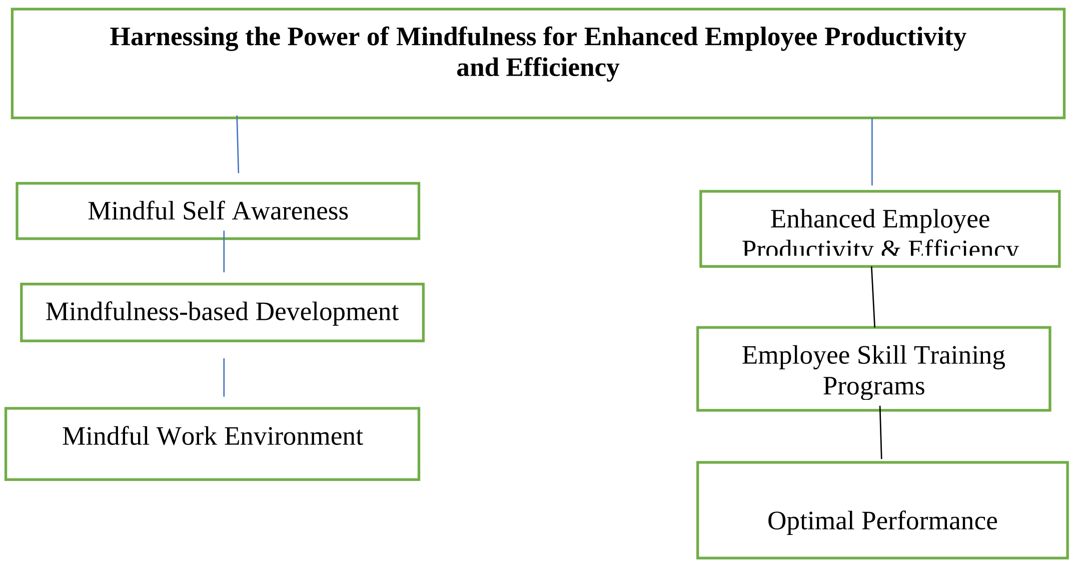
2. To identify the key mindfulness techniques that can be effectively integrated into the workplace to enhance employee performance.

3. To examine the relationship between employee well-being and mindfulness practices, and its subsequent influence on overall productivity.

4. To propose evidence-based strategies for organizations to implement mindfulness programs for maximizing employee output and reducing workplace stress.

5. To explore the long-term effects of sustained mindfulness practice on employee job satisfaction and retention rates.

CONCEPTUAL FRAMEWORK



RESEARCH TECHNIQUES:

Research Method: To accomplish the goals of the research, A descriptive research design has been used for this research. To gather data, a survey using well-structured questionnaires was carried out.

Data Sources and Types: Data that is both primary and secondary has been gathered.

The primary data was gathered using the structured questionnaire through Google Forms. **Secondary data** is gathered from numerous publications, papers, and websites.

Number of participants and sample size: Only IT professionals in the workforce have been targeted. The population of the study was collected from only 50 working IT professionals able to collect data and was used as a sample for the current study.

Sampling Technique: Convenience sampling was used for the current study's objectives.

The subject of study: To undertake this study, the Chennai IT area was chosen as used for the research

STATISTICAL ANALYSIS AND FINDINGS OF THE STUDY

Particular	Familiar	Unfamiliar	*Marginal Row Totals*
Male	25 (24.5) [0.01]	10 (10.5) [0.02]	35
Female	10 (10.5) [0.02]	5 (4.5) [0.06]	15
Marginal Column Totals	35	15	50 (Grand Total)

we conducted a study that looked at whether there is a link between gender and familiarity with the concept of mindfulness in the workplace might report the results like this:

A chi-square test of independence was performed to examine the relationship between gender and familiarity with the concept of mindfulness in the workplace. The relation between these variables was significant, The chi-square statistic is 0.1134. The p-value is .73633. Not significant at $p < .05$.

The chi-square statistic with Yates correction is 0. The p-value is 1. Not significant at $p < .05$.

Male respondents were more aware than women to be familiar with the concept of mindfulness in the workplace.

Findings: This study's findings demonstrate how familiarity with the concept of mindfulness in the workplace has an impact on workers' productivity and efficiency in the information technology sector. Male respondents were more aware than women to be familiarity with the concept of mindfulness in the workplace.

Limitations:

- The sample size is restricted to 50 due to time and sample response limitations.
- Most of the data included in the essay was gathered exclusively from workers in Chennai's IT industry.
- The investigation was conducted over a short period of time.
- Like the survey distributed using Google Forms via WhatsApp.

CONCLUSION:

Employees are urged to raise awareness about the Power of Mindfulness and their levels of productivity and efficiency in the IT business based on the study's findings. List the advantages of implementing mindfulness techniques at work to increase worker effectiveness and production. Stress the potential of mindfulness as a useful tool for businesses looking to foster a good workplace, lessen employee burnout, and maximize employee potential. Businesses may empower their workers to flourish in today's competitive business environment and promote sustainable growth by embracing mindfulness.

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