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SUSTAINABLE DEVELOPMENT GOALS AND PROGRESS OF INDIA IN SUSTENANCE TOWARDS NO POVERTY AND ZERO HUNGER

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Abstract

Sustainable Development Goals (SDG) laid down in United Nations Agenda for 2030 and Agenda for 2050 is the driving force for India to progress and move forward. The achievement of SDG during and after the pandemic crisis in the context of sustenance, the basic foundation of livelihood from India is outlined in terms of two goals.

Keywords : India, SDG, Index, No Poverty, Zero Hunger, Institute, HEIs

Introduction

India and other global countries adopted the sustainable development goals, the agenda for 2030 in September 2015 at the Sustainable development Summit of United Nations held in New York. Sustainable development goals (SDGs) are global goals that define the world as a way for sustenance and sustainability without leaving anyone behind. SDGs comprises of seventeen goals that include: 1) No Poverty; 2) Zero hunger; 3) Good health and Wellbeing; 4) Quality education; 5) gender education; 6) Clean water and sanitation; 7) Affordable and clean energy; 8) Decent Work and Economic growth; 9) Industry, Innovation and Infrastructure; 10) Reduced inequalities, 11) Sustainable credits and communities;

12) Responsible consumption and production; 13) Climate action; 14) Life below water; 15) Life on land; 16) Peace Justice and Strong Institutions and 17) Partnership for goals. In a nutshell, these 17 SDGs are a manifestation of the 5 Ps that are interlinked to maintain a balance in the ecosystem – people, planet, prosperity, peace and partnership.

Nevertheless, the undersigned plenipotentiaries felt the sustainable development goals were broad and interlinked. Hence, narrowed down actionable SDGs were readopted at United National General Assembly as SDGs Resolution on 6th July 2017 towards achieving the 2030 SDG Agenda. The 17 goals were identified with a specific set of targets and its corresponding quantifiable indicators to depict the progress of each country's rank for future betterment. The deadline for achievement was earmarked as between 2020 to 2030 for most of the targets and for a few targets the end date was not mentioned.

SDG Operation in India

SDGs Verticals look forward to accelerated adoption, implementation, and monitoring of SDG framework among key stakeholders of national and sub-national levels. They are functioning through a nodal agency called NITI Aayog, a think-tank approved by the Indian Government

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that works in collaboration with Union Ministries and States / UTs to achieve the SDGs through cooperative and competitive federalism approach. NITI Aayog through its two main hubs viz., Team India and Knowledge and Innovation worked closely with the government, civil society, private sector, academia, think tanks, research organizations and multilateral organizations to achieve the SDGs on the fast track. Team India has the mandated responsibility of promoting cooperative federalism, designing national policies and programme frameworks in cooperation with the states. Knowledge and Innovation hub maintain the futuristic resource, research repository for good governance and best practices adopted with advice and encouragement from all levels of key stakeholders of governmental organizations, non-governmental organizations, educational centers including colleges, universities and think tanks both from national and international units.

The NITI Aayog's reconstitution was approved on June 6th 2019 by the Prime Minister of India, Hon'ble Shri Narendra Modi. The Cabinet secretariat Notification of reconstitution of the governing council of NITI Aayog was released on 18th September 2021.

Chronological SDG India Index Reports

The SDG Index reports provide an in-depth monitor progress report. A rank is given for each country-specific to its progress in three dimensions of social, economic, and environmental aspects of a country. As far as India is concerned the SDG India Index

report indicates the progress of 28 States and 8 UTs in three dimensions towards SDG achievements. In India, so far, three editions of the SDG index report has been released from the first baseline report released in the year 2018 to the latest third report released in the year 2020. These monitoring reports show the countries progress towards the achievement of each of the 17 SDGs. An important point to note is targets specific to SDG got consecutively increased from each year from base 39 to 54 and a currently wider number of targets about 70 has been identified.

The latest Index of India is Version 3.0 Sustainable Development Goals - National Indicator Framework (NIF), Progress Report 2021 (version 3.0) which shows the data-based evidence of India's progress towards achieving SDG's (Ref.¹⁰). The report outlined a total of 169 targets and corresponding indicators that could potentially be mapped to 17 SDGs in the National Framework and its associated targets with their metadata. National indicators were initially aligned to SDG targets, later refinements and inclusions were made into the identified NIFs by including State and UT specific profiles. But real estimation was based on only 70 targets mapped to quantitative 115 indicators from the total of 169 targets that covered sixteen SDGs except for goal No. 17 that referred to qualitative indicators during estimation. Among 115 indicators, 76 National indicators got completely aligned with national indicators whereas out of the remaining 39 indicators, 31 indicators required refinement and 8 indicators were considered for inclusion at line ministries.

Due to data unavailability, certain NIF indicators across all states and UTs were modified in consultation with the respective ministries/departments, and States/ UTs. The Index has been designed in such a way that it is accessible to everyone - policymakers, civil society, businesses, and the general public. Sustainable Development Goal indicators should be disaggregated, where relevant, by income, sex, age, race, ethnicity, migratory status, disability and geographic location, or other characteristics, following the Fundamental Principles of Official Statistics.

SDG India Index Score as Per Version 3.0 and its Global Ranking

The SDG Index and Dashboards give attention to the internationally standardized outcome statistics. As per the 6th Edition of ‘Sustainable Development Report 2021 (SDR 2021)’ released by Sustainable Development Solutions Network (SDSN), India had been ranked at 120th position with a score of 60.1 out of 165 countries to 66.6 in 2020 - 2021. From its previous year report it has increased to 6 points considering the achievement in goals 6 and 7 namely clean water, sanitation and clean energy states NITI Aayog. A hamper in progress of SDGs was observed in most of the participatory countries including India for the 1st time, since 2015, due to COVID-19 pandemic situation. Based on the state/ UT wise score computed in SDG India Index report it was found that none of the state or UTs were achievers. They were either front runners or performers (Table 1).

Table 1. SDG India Index 3.0 of State/ UT

Front Runner (65 - 99)	Performer (50 - 64)
Kerala	Manipur
Himachal Pradesh	Madhya Pradesh
Tamil Nadu	West Bengal
Andhra Pradesh	Chhattisgarh
Goa	Nagaland
Karnataka	Odisha
Uttarkhand	Arunachal Pradesh
Sikkim	Meghalaya
Maharashtra	Rajasthan
Telangana	Uttar Pradesh
Mizoram	Assam
Tripura	Dadra and Nagar Haveli
Chandigarh	Daman and Diu
Delhi	
Lakshadweep	
Puducherry	
Andaman and Nicobar Islands	
Jammu and Kashmir	
Ladakh	

India's Progress in SDG 1 - No Poverty

It is about reducing poverty in all forms rather than only on a monetary basis. The main target of which was eradicating extreme poverty or those living with less than \$ 1.90. Despite the decrease in extreme poverty to 10 per cent of the World's population between 1990 to 2015, statistical reports still claim the existence of extreme poverty in about 700 million that needs to be eradicated to achieve the goal of no poverty. Hence, to reduce the poverty percentage to half levels as per the national definitions across different age groups of men, women and children is the need of the hour. Tendulkar Committee estimates have recorded poverty rates in India to stand at 21.92 per cent. Therefore, half of

this value i.e 10.96 per cent was considered as a target while assessing the SDG Score Index.

No Poverty Indian Index Score differed between 32 and 86 for States and between 61 and 81 for UT's. Among the States and UT's, Tamil Nadu and Delhi were found to be the top performers respectively. Seventeen states and seven UTs took front runner positions or categories with score range between 65 and 99, including both). However, six states fell behind in the Aspirants category (with Index scores less than 50)

Various policies framed at regional, national and international levels to bring out the investments, build development strategies to accelerate the poverty investment were proven to be beneficial. The appropriate national social security plans implemented with substantial coverage for the poor and vulnerable were implemented for them to get equal rights to access all economic resources, basic services, property ownership, financial service, new technologies and microfinance seemed to be beneficial in the Country's Progress in Achieving SDG Targets. Also, their resilience policies for recovery from climate-related extreme events and other economic, social, environmental shocks and disasters proved to be beneficial in progress towards ending poverty. Mobilizations from different sources were also undertaken for positive cooperation among different developing countries.

Few of such successful indicators corresponding to respective targets towards achieving SDG 1 showed 270 million Indians to be lifted out from multidimensional

poverty. 4.2 per cent of the households in rural and urban India were reported to live in *Katcha Houses* About 28.7 per cent of the household had at least one member covered under the Health Insurance scheme or Health Scheme as per National Family Health Survey - 4. 84.44 per cent of the beneficiaries in India were provided with employment under *Mahatma National Gandhi National Rural Employment Guarantee Act* (MGNREGA) that guarantees work employment for 100 days of work in the rural household every financial year to an adult member The MGNREG Act, 2005. 91.38 per cent of the eligible beneficiaries received social protection benefits under the *Pradhan Mantri Matru Vandhana Yojana*.

India's Progress in SDG - 2 Zero Hunger

It is targeted to end hunger in all forms, achieve food security and improve nutrition and promote sustainable agriculture. End hunger in all forms of malnutrition, and increasing the agricultural productivity to double times in the next 15 years would help us to progress towards this goal. Sustainable food production and agricultural practices are required for the universal sustenance of all living forms. From the year 1990 – 2016, the proportion of undernourished children was decreasing after previously reported two world hunger states. Its sudden peak for the third time after a prolonged lapse in the year 2017 to about 821 million who are chronic food deprivers made the entire global society think of the possible reasons and ways for its improvement.

As per the United Nations Report (Lee Jenny on July 9, 2019) it is threatening to note that hunger is on the rise and globally one in 9 people are not getting the proper nourishment. Hence it's essential to identify the feeding barriers and prevent them from properly feeding the world. Out of 821 million South Asians, that is about 277.2 million are undernourished people. Conditionally, if this is not improved with proactive thinking and successful implantation of plans that ensure food security and increased agricultural productivity, the proportion of hungry people would crest to extreme conditions in the year 2050 as per the FAO reports.

The current report revealed that India's rank in the global SDG index was dropped by two places to 117th rank from the previous 115th rank primarily because of hurdles in achieving SDG 2. Among the South Asian Countries, In India alone, 3 in 10 Children is found to be a stunt. Even the consumption levels of young children over 80 per cent does not even fall within the range of minimal diet diversity. It's alarming to note that 28.4 per cent of the adolescents aged 10 -19 years are anaemic. 33.4% of the children aged under five are underweight and 34.7 per cent of the children aged under five are stunted as per the Comprehensive National Nutritional Survey report 2016 - 2018. The lowest stunting rates in South Indian States are observed in Goa (19.6 per cent), Tamil Nadu (19.7 per cent) and Kerala (20.5 per cent). Further Women in the adolescent, adult and elderly stage (age range between 15-49 years) are anaemic to half per cent (50 per cent).

The total Indian workforce employment is only over 40 per cent. It is also ascertained that, if global food prices double, then India could lose up to US dollar 49 billion in GDP. The positive highlight to note in the achievement of this goal is that about a total of 99.51 per cent of the Indian beneficiaries are covered under the National Food Security Act, 2013 in 2019 – 2020 in Food Subsidy Schemes. Twelve States namely in the decreasing order of Achievers Index Score value range are Andhra Pradesh, Arunachal Pradesh, Gujarat, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Manipur, Rajasthan, Sikkim, Uttarakhand and West Bengal) and three Union Territories viz., Andaman and Nicobar Islands, Chandigarh and Delhi achieved the target of 100 per cent in 2019-20. And about half per cent of the pregnant women in the age group of 15 – 49 years are anaemic.

On an average 2,995 kg of rice and wheat is produced per hectare of land from 2018-2019. Without doubling this by 2030, it will not be possible to feed everyone in India. Except for the States Punjab and Haryana, no other is in the streamline of this target with the productivity of 4,693.24 kg/Ha of rice and 4,272.42 kg/Ha of wheat as per the 2018 – 2019 report. INR of about 0.71 lakhs of gross value is only added in agriculture per worker. But a target of 1.22 lakhs is the target goal set which is double the value obtained in 2015 -16. Six states (Goa, Punjab, Kerala, Haryana, Arunachal Pradesh and Tripura) and two UTs (Chandigarh and Delhi) have already surpassed the targeted level.

Zero Hunger goal score ranged between 19 and 80 for Indian States and between 27 and 97 for Indian UTs. The top performers among the States and the UTs, respectively are Kerala nad Chandigarh. Tamil Nadu is in 7th rank on par with Arunachal Pradesh with a score Value of 66. About seven states and four UTs bagged are in the Front Runner Category (score range between 65 and 99, including both). Alarming challenge of achieving zero hunger was noticed in eleven states and two UTs, as they fell in the Aspirants category with Index scores less than 50.

Data dearth and time delays in international reporting of SDG goals towards 2030 required national policies and commitments to be considered in determining the country’s efforts towards achieving SDGs. SDGs and their strategies were therefore integrated and transformed into six as an initiative of the World in 2050 initiative) as part of SDGs and the Paris Agreement on Climate Change call for six Transformations that include 1. Education, Gender, and Inequality; 2. Health, Wellbeing, and Demography; 3. Energy Decarbonisation and Sustainable Industry; 4. Sustainable Food, Land, Water, and Oceans; 5. Sustainable Cities and Communities; and 6. Digital Revolution for Sustainable Development.

All these transformations lacked the government operational plan. Sachs *et al.* (2019), the SDSN project director and his colleague’s proposed how these transformations can be worked with the principal government line ministries. He further identified these six societal SDG Transformations as modular building-blocks of SDG achievement in each country and their government, business and civil society stakeholders and they prepared an action agenda for science to provide knowledge for its operation, design, implementation and monitoring within different government structures respecting strong interdependencies across the 17 SDGs addressing trade-offs and synergies. These transformations were also recommended to recover better from COVID-19 with build back in all dimensions of SDGs (Sachs, Schmidt-Traub, Kroll, et al., 2020; Schmidt-Traub, 2020). They were based on the twin principles of “*leaving no one beyond*”, “*circularity and decoupling*”. Substantial progress could be made by following these two principles.



Figure 3. SDG transformations
(Source: USDEA report and Sachs *et al.*, 2019)

Conclusion

The Sustainable Development Goals Set for the Year 2030 or 2050 could be achieved In India only when we work united — across state / UT and international borders and backgrounds respecting the shared behaviour to build a fair future for our people and planet as a whole controlling the inward

and outward spill over index. With COVID Crisis at its pinnacle, it becomes essential to build resilience, mobilize finance, investors, increase the leverage of science, technology and innovation and advance cooperation among international countries to reach out and help the most vulnerable people achieve the principle of leaving no one behind.

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BAD BANK: A WAY TO EXIT FROM FINANCIAL CRISIS

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Abstract

The bad bank, a good business operating model was identified as a way to exit from the financial crisis that happened due to COVID -19 pandemic. It helped the Indian banks encumbered with high Non Performing Assets (NPAs) to tackle their toxic assets efficiently with a jump in profitability. India considered bad banks as the best solution for the persisting, twin balance sheet problem despite implementing multiple beneficiary schemes. In layman language, if said, it is splitting of the bank into two categories of good and bad. The discrimination avoids contamination of the good assets by bad. It helps the banks to extend their future health lending with transparency.

Keywords: Bad Banks, India, Twin Balance Sheet, Pandemic, Crisis

Introduction

COVID-19 has devastatingly hit the global economy with large scale implications that range from the cessation of industrial activities to job loss. As a result of the financial crisis, a multitude of cash flow activities are impeded with the stoppage of financial obligations that include interest payments, loan repayments and tax payments.

India ranks fifth out of 39 major world economies with bedeviled credit history ranking as per Economic Survey (2020 -2021) CARE ratings. Reports also state it to be one of the tumbling economies that ranks fifth based on the Non Performing Assets (NPA) accumulated by Indian Lenders and the economic activities had stalled due to the spread of COVID-19, resulting in large-scale cessation of industrial activities and job losses. The businesses have got affected adversely due to low or stoppage of cash flow with the impact of financial obligations including interest payments, loan repayments, and tax payments.

The mounting of NPAs cautioned to form 'bad banks' as a strategy to deal with bad loans/NPAs. In the Union Budget of the financial year 2021-2022, the Finance Minister proposed to set-up to an Asset Reconstruction Company (ARC) or a bad bank to clean up NPAs of banks, in an effort to provide financial stability to the banking sector. Such banks will be formed to purchase stressed assets from banks to restructure them and in turn, sell them to investors and to resolve the problem of bad assets over time (Jaimini Bhagwati, 2017). In the process, So that the banks selling such non-performing assets will be able to clear their balance sheets to use their capital optimally.

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Purpose of Bad Banks

A bad bank forms a corporate body. The bad banks segregate illiquid and high-risk assets held by banks and financial institutions. So that banks can clear off their balance sheets by transferring bad loans to bad banks and focus on core business and lending activities (Raghavan, 2013). The bad bank was created in India mainly (a) to clean the balance sheets of banks, (b) to enable the banks to attain the required level of capital adequacy by mobilising fresh capital from the market, and (c) to boost investment and ultimately economic growth with a focus on credit growth. Thus bad banks would fundamentally help the Indian banks to trim losses and concentrate on their core business of lending.

With the initial investment from the government, the Indian Bank Association (IBA) has proposed to set up a bad bank. The Government of India announced an economic stimulus package of INR 20 lakh crore, in the pandemic bailout. Out of which INR 8.01 lakh crore of liquidity measures were announced by the Reserve Bank of India (RBI) to ease the financial stress faced by the business due to COVID-19 (Yadav, 2014). These include moratoriums on term loan instalments, deferment of interest on working capital facilities, and easing of working capital financing.

Bad Bank Models

Bad banks have been successful in several countries namely the US, Sweden, Finland, Belgium, and Indonesia (Gandrud

& Hallerberg, 2013). The banks have been institutionalised. The first bad bank was established in the US by Mellon Bank in 1988 to hold its “toxic assets”, named Grant Street National Bank (GSNB). It was formed by a private sector bank as separate management, without capital contribution by the Government. It worked on the recovery of bad loans. The bank was dissolved in 1995 after meeting its objectives. In contrast, the bad banks in India are to be created with initial investments to be made by the government (Meier & Servases, 2020).

The basic models for bad banks were outlined by McKinsey, namely:

- An on-balance-sheet guarantee which the bank uses to protect part of its portfolio against losses, otherwise a government guarantee,
- A special-purpose entity (SPE), where the bank transfers its bad assets to another organization, typically backed by the government
- A more transparent internal restructuring, in which the bank creates a separate unit to hold the bad assets which do not fully isolate the bank from risk
- A bad bank spinoff, where the bank creates a new, independent bank to transfer the bad assets which fully isolates the original bank from the specific risk.

The IBA has given guidelines on the valuation of stressed assets, that the bad bank should buy it at book value, net of minimum regulatory provisions. Therefore, the bad bank may purchase bad assets at the price

desired by banks which may lead to distortion in the pricing of the bad assets. Another issue is finding potential buyers for distressed assets can be a significant challenge. Selling stressed assets to potential buyers is difficult when economic conditions are deteriorating and the Insolvency and Bankruptcy Code (IBC) is suspended (Ramesh, 2019). To deal with the large NPA, some structural reforms are required which includes good governance and supervision while lending, early detection of distress signs through stringent monitoring of loans and improving price discovery process allowing market-driven platforms to sell bad loans. The RBI has provided various forms of financial assistance and relaxation to borrowers.

Bad Banks in India

The government-owned Canara Bank will be the lead sponsor of National Asset Reconstruction Company Limited (NARCL) or a bad bank with a 12 per cent stake in the entity. Nine banks were identified including the State Bank of India (SBI), Punjab National Bank (PNB) and Bank of Baroda (BoB) and two non-bank lenders to put in Rs 7,000 crore mutually as initial capital in the proposed bad bank aiming to help extract funds stuck in non-performing loans. The shortlisting of NPA's by public sector banks revealed that 28 loan accounts are to be transferred to National Assets Reconstruction Company. The approval process is completed for 22 such loan accounts with a loan due of Rs. 82500 crores. Of which 80 percent accounts for loan dues of borrowers OVL (Rs. 22532 crores), Amtek

Auto (Rs. 9014 crores), Reliance Naval (Rs. 8943 crores), Jaypee Infratech (Rs. 7950 crores), Castex Technologies (Rs. 6337 crores), GTL (Rs. 4866 crores) and Visa Steel (Rs. 3394 crores). Various public sector banks (PSBs) have earmarked a significant portion of their NPAs to be transferred to NARCL.

The Way Forward

In the present scenario of a pandemic-affected economy, the transfer of NPA's from a bank's books could provide banks with the much-needed relief. This process would help in the following ways:

- To look after the lending instead of the recovery of loan
- To be able to use efficiently the availability of additional capital, since provision for bad loans would not be required
- To have improved credit ratings
- To have an overall improvement in the banking business as investors, depositors and borrowers are more likely to engage with profitable banks.
- To have transparency in the sale of stressed loans by banks and improvement of price discovery would happen due to the participation of private banks
- To lesser burden on the exchequer due to part ownership by government banks
- To incentivise private banks to capitalise NPA's with the backing of a sovereign guarantee
- To widen the capital pool by permitting AIFs to invest in the bad bank

The mounting of Non-Performing Assets (NPAs), becomes a huge financial strain for the Indian banks. Banks are custodians of the savings of their customers. The failure of private banks led to distrust among common people. Those banks were taken over by the Government of India and people started trusting government banks. But the incidence of government promoted bank lending to a few industrialists and refrain from lending to small businesses and priority sectors, resulting in the mounting of NPA's (Khanna, 2012). Further, the persistent economic slowdown at the global level exacerbated by COVID-19, the business projects are facing cost overruns, delays in obtaining various clearances and human resource issues etc. The Trends and Progress Report 2020, released by RBI indicates that "gross non-performing assets (GNPAs) of Indian banks reached 8.2 per cent (equivalent to ` 9 lakh crore) at the end of March 2020; credit growth coupled with the absence of robust credit appraisal and sound monitoring standards and wilful defaults; massive write-offs of NPA's reflecting incipient stress in the sector".

Further, the asset quality of Indian banks may deteriorate sharply in the near

future. To resolve this issue the economic survey suggested recapitalisation of banks along with cleaning of their balance sheets. Till now, the process of recovery by Indian Banks were very slow as neither banks nor Asset Reconstruction Companies were ready to bear the losses (Olekar & Vanaki, 2013). The Indian banking sector is crippled with in a vicious cycle that higher provisioning for NPA's caused lower capital adequacy and subdued profitability. This led to checking on the growth in lending capacity which leads to NPAs. Banks have the expertise to lend but do not have the required level of legal expertise in resolving problems of bad assets. Instead, the priority of banks is to be on capacity building and re-skilling personnel in loan recovery, risk management, etc.

Conclusion

In the present scenario, a bad bank appears to be a good idea. A bad bank with a good business model would serve the twin purpose of balance sheet issues and capital adequacy of Indian banks. The success of the bad banks lies in the valuation of the NPAs by recognised, professional, and independent institutions.

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IMPACT OF MEDICAL TOURISM OF AYURVEDIC TREATMENT IN COIMBATORE DESTINATION

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Abstract

Medical tourism in India is a potential segment in the Tourism industry, and it has developed over time. The medical tourism service providers of India understood the needs of the medical tourist and were quick to cash upon the medical services. Tamilnadu is one of the destinations famous for the medical tourism facilities like affordable package rate, the authentic treatment style, professional doctors and availability of the equipment's, etc. This paper explores the Impact of Medical tourism of ayurvedic treatment in Coimbatore destination by analyzing the different frequencies of demographic factors of medical tourism in yurvedic treatment and the age, gender, marital status, difference towards the element of medical tourism in ayurvedic treatment. The study reveals that the different demographical factors have different opinions towards the aspects of medical tourism. Retaining and attracting the Medical tourism customers in post Covid-19 scenario is crucial for India.

Keywords: Tourism, Medical Tourism, Ayurveda, Impact, Demographical factors, India

Introduction

Indian medical tourism is a growing segment of the tourism industry, and it has high potency in receiving international tourists from many parts of the world. The attractive factors include the availability of alternative medical treatment, comparatively less cost, different therapies, various surgeries, availability of treatment slots without waiting for a period, etc. (Gautam & Bhatta, 2020). Tamilnadu has a high potential in the medical tourism segment with existing medical tourism products and services. The government of Tamil Nadu assertively promotes medical tourism. Comparatively, the state is a more suitable and tranquil place for medical treatment. Intense competition in all business segments leads to accomplishing sophisticated management techniques to survive in the business in every stage of its development. The medical tourism segment might be transmuting in every time in its demand and supply nature. These rapid changes will reflect the medical tourism destinations, especially the Hospitals and Medicare centers.

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There are many studies that have been done in the medical tourism segment that conclude with a new outcome. In some of the researcher's views, social media highly influence the perception of medical tourists, word of mouth, and the author added that destination image of a medical tourism centre and revisit intention of tourists, perceived value is associated with each other (Cham *et al.*, 2021). Readiness to medical tourism is remarkably influenced by the communication quality and information quality of telehealth, telemedicine and their satisfaction level. Medical travel is also influenced by the possible value and possible cost of medical services (Gu, *et al.*, 2021). The medical tourism industry is facing many challenges like undeveloped technology and technical infrastructure, the presence of different political and cultural conditions, various decision-making powers; these challenges pull back the medical tourism segment from the development ladder (Hadian *et al.*, 2021). In India Medical tourism is a golden segment in the tourism industry that identified an important development in recent years, the reasons are varied as mentioned above, and it is not only because of the high cost of the treatments in their own country (Parekh *et al.*, 2021). The author has added some of the factors that inspired the medical tourist to use the medical services, different medical

treatments, including the exploration of culture, the hospitality of different places, and to experience other tourist attractions in the host place. (Darwazeh *et al.*, 2021). Medical tourism can be promoted using various marketing techniques, including booklets, websites and flyers. The Indian medical tourism industry is using different marketing systems to attract more customers in multiple medical conditions. (Kapoor, 2021). The researcher has analyzed the present situation of the medical tourism segment of India. The government of India has started a new action plan for developing and promoting the niche tourism product "medical tourism" in India, and those action plans are pointed out in this paper. In conclusion, the author states that to make India the best of every medical tourism destination, there is a need for excellent and high health guidelines. The medical tourism stakeholders should work hard to collaborate with the medical council and government. (Manpreet Kaur, 2014). Ayurveda tourism in India has a long history, and it is practiced traditionally and authentically. Ayurveda is used not only for curing but also for maintaining a person's wellbeing (Varghese & Zacharias, 2020).

In widespread, not many studies investigations were done on this situation region, Coimbatore in the advertising field. However, some descriptive research performed within the field of journey and

tourism makes a special attention of customer perception and their desire for the services that the medical tourism in ayurvedic treatment provides based on comfort factors. This research aims to examine the psychology of the marketplace observed in the back of the customer towards the medical ayurvedic treatment influential factors in tourism; the consequences of this will outline how ayurveda can assist medical tourism. This project came up with two objectives to analyze the different demographic factors such as age, gender, marital status and their influence towards medical tourism factors in ayurvedic treatment.

Methodology

The study includes random sampling of respondents who travel more in and around Coimbatore in general for receiving ayurvedic treatment. Respondents who voluntarily consented to participate from the selected ayurvedic centres of Coimbatore were included (n=201). The study respondents were divided into strata's based on demographical factors viz., gender, marital

status, annual income, age group), Hence, the sampling technique used was Stratified random sampling. The data were collected using a five-point Likert-scale questionnaire, and the statistical analysis, independent t test, Analysis of Variance; ANOVA was done with the software, SPSS 20 version.

Results and Discussion

The study was analyzed using different medical tourism influencing factors in Coimbatore districts and how they vary based on the demographics are explained from the perspective of ayurvedic treatments. From table 1, it is clear that there is no significant difference in opinion existed among male and female respondents for the factors of treatment given, safety infrastructure, location of a hospital, registry and database, travel facility, price and payment, testing facilities, patient satisfaction. Hence, the null hypothesis is accepted for the factors of treatment given such as safety infrastructure, location of the hospital, registry and database, travel facility, price and payment, testing facilities, patient satisfaction.

Table.1. Analyzing gender& marital status difference towards the impact of medical tourism of ayurvedic Treatment in Coimbatore destination

Factors	Demographics	F Value	p Value
Treatment Given	Gender	0.121	0.729
	Marital Status	1.101	0.295
Safety infrastructure	Gender	0.192	0.662
	Marital Status	2.678	0.103
Location of Hospital	Gender	0.888	0.347
	Marital Status	0.427	0.514
Registry and database	Gender	0.111	0.739
	Marital Status	0.683	0.410
Travel Facility	Gender	0.075	0.785
	Marital Status	2.17	0.142
Price and Payment	Gender	0.057	0.811
	Marital Status	3.178	0.076
Testing facilities	Gender	0.01	0.920
	Marital Status	2.601	0.108
Patient satisfaction	Gender	0.025	0.874
	Marital Status	2.489	0.116

*p value denotes significance at 5% level

From the table 1, it is clear that there is no significant difference of opinion exists among the different marital status respondents for the factors of treatment given, safety infrastructure, location of the hospital, registry and database, travel facility, price, and payment, testing facilities, patient satisfaction, service quality. Hence, the null hypothesis is accepted for the factors of treatment given, safety infrastructure, location of the hospital, registry and database, travel facility, price and payment, testing facilities, patient satisfaction.

From the table 2, it is clear that there is no significant difference in opinion existed

within the age group of respondents for the factors of safety infrastructure, location of the hospital, registry and database, travel facility, price and payment, testing facilities, patient satisfaction. Hence, the null hypothesis is accepted for the factors of safety infrastructure, location of the hospital, registry and database, travel facility, price and payment, testing facilities, patient satisfaction, but there is a significant difference in opinion existed among the age group of respondents for the factor treatment given. Hence, the null hypothesis is not accepted for the study construct of treatment given.

Table 2. Analyzing age group& annual incomes of respondent's differences towards the impact of medical tourism of ayurvedic treatment in Coimbatore destination

Factors	Demographics	F Value	p Value
Treatment Given	Age Group	2.447	0.035*
	Annual income	5.045	0.002**
Safety infrastructure	Age Group	0.304	0.888
	Annual income	2.708	0.046
Location of Hospital	Age Group	1.346	0.247
	Annual income	2.927	0.039*
Registry and database	Age Group	0.882	0.494
	Annual income	2.292	0.079
Travel Facility	Age Group	0.653	0.660
	Annual income	2.576	0.055
Price and Payment	Age Group	0.556	0.734
	Annual income	2.695	0.047*
Testing facilities	Age Group	0.616	0.690
	Annual income	2.457	0.064
Patient satisfaction	Age Group	0.591	0.707
	Annual income	2.564	0.056

* denotes significance at 5% level; ** denotes significance at 1 % level for ANOVA

From the table 2, it is also clear that no significant difference in opinion existed among the annual income group respondents for the factors of registry and database, travel facility, testing facilities, patient satisfaction. Hence, the null hypothesis is accepted for the factors of safety infrastructure, location of the hospital, registry and database, travel facility, price and payment, testing facilities, patient satisfaction. But a significant difference of opinion existed among the different annual income groups of respondents for the treatment factor's given, safety infrastructure, location of the hospital, price and payment. Hence, the null hypothesis is rejected for the elements of treatment given, safety infrastructure, hospital location, price and payment.

Summary and Conclusion

The study on the impact of medical tourism on ayurvedic treatment in Coimbatore destinations has led to some significant findings regarding the Coimbatore medical tourism segment. Here are some suggestions that may be taken into account for future strengthening of medical tourism ayurvedic treatment services with particular reference to facility development in medical tourism.

- 1 Ayurveda is a compressive cure that balances the body, while western medicines almost always focus only on symptoms management or one-dimensional cure.

- l Western medicines are chemicals that has pharmacological effect, while that every ayurvedic drug acts on principle of rejuvenation or immunity enhancement
 - l Ayurveda is a way of life in combination with food
 - l Ayurveda treats all diseases as a psychosomatic disorder, while Western medicine sees all physical illnesses as independent of the mental state
 - l Ayurveda is a simple and affordable yet effective medication, while western medical treatments are, most of the time, too heavy on the patients' pockets
 - l Ayurveda has a proven history of medical use since, thousands of years
 - l Many ayurvedic medicines have stood the test of scrutiny from scientific research
 - l Western medicines are disconnected from spiritual health; whereas ayurvedic treatments are biological and spiritual in its effect
 - l The government of Bharat should act as a regulator to institute an identical grading and enfranchisement system for hospitals to create consumer trust. It should conjointly act as an assistant to encourage non-public investment in medical infrastructure
 - l The government of India should join together to develop the medical tourism
 - l Ease in getting a Visa for medical tourist would promote medical tourism
 - l For sharing data and online transactions, the stakeholders can make an online portal for medical tourism.
- At present, there is no direct government support / Initiative to promote medical tourism in India. Medical tourism indirectly supports other forms of tourism and hence makes considerable earning of foreign exchange. There is a visible lack of coordination among the various stakeholders. If there is a 'one-stop medical tourism facilitator,' it will go a long way in attracting more - international patients. Medical tourism operators should be given due to the importance of the hospitals. There is a wrong perception about India in the minds of the foreigners of various countries concerning neatness, sanitation, hygiene standards, the prevalence of contagious diseases, etc. The government alone could change this scenario by improving the public health system. Accreditation and regulation systems for hospitals should be made compulsory. At least all tourism hospitals should have NABH accreditation and JCI as optional. A regulation system on the pricing and coordination of other such institutions has to be made in force.

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CONSUMER ATTITUDE TOWARDS ONLINE SHOPPING

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Abstract

In the technology-driven digital era, assessing the online shopping behavioral attitude of the consumers in the purview of their personal feelings, preferences, perceptions would help the marketers to demarcate the influential factors for online and direct shopping. Early adulthood's adept at using online technologies are able consumers. With the temporary closure of many shop outlets and sway in coronavirus infection rate around the globe, online shopping is the only possible mode to sustain the business during a pandemic crisis. The current global economic crush requires understanding the various behavioral determinants in online shopping behaviour beyond utilitarian and hedonic factors.

Keywords: online shopping, smart phones, e-commerce, online shoppers.

Introduction

Consumer behaviour deals with the process adopted by an individual or group of buyers to opt, purchase, use or dispose of a product, good, service or ideas that could maximally satisfy their need with further impact on society. Today everyone

has entered the arena of the smartphone with an upward trend in online shopping. Consumers can easily download any shopping applications from the google play store for their smartphones to do hassle-free online shopping. Besides these, there is also a wide range of other utility and hedonic applications available on smartphones deployed from chatting platforms or playing games to maintaining fitness.

Facts indicate that the utility shops add on 20,000 applications every month for the easy buying benefit of the consumer. With these online utility applications, consumers can purchase goods, products or services at their doorstep anytime, at ease with a wide choice of different shopping outlets offering an easier-economic platform for the seller to reach the customer and vice-versa.

In 2020, a total of over 80 per cent of consumers across the globe shopped online: reaching nearly 90 per cent each, and one among the leading regions were Asia (Tighe, 2020). According to Coppola (2021), over two billion people have purchased goods or services through online retail shops in the year 2020, and the e-sales has surpassed 4.2 trillion U.S. dollars worldwide. Thus the number of digital buyers keeps increasing every year.

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According to Clement 2019, the majority of the online purchased items included garment apparel and accessories and electronic gadgets. Besides these, the pandemic crisis has driven a swift demanding change in human behaviour with digital commerce as the primary channel rather than a pre-existing secondary channel. The online shopping boom during the pandemic, with the extensive shift in consumers' behaviour, necessitates a study to understand the influence of online shopping among consumers.

Hence, the study assessed the consumer behaviour towards online shopping integrating different dimensions of sociology, anthropology psychological and economic factors among early adulthoods. The study objectives included the assessment of the above dimensions among early adulthood consumers through assessment of specific factors such as the socio-economic profile, their attitude based on personal, preferential and perceptual factors towards online shopping with an emphasis on its impacts.

Methodology

In the present study, Consumers with prior online shopping experience constituting early adulthoods (n =100) aged from 18 to 35 years irrespective of gender were surveyed at random for their behaviour towards online shopping from chosen areas of Coimbatore District. The data was collected from the voluntarily consenting respondents using an open-ended interview schedule. Before the study was conducted, its protocol and design were approved by the institution's

Human Ethics Committee since it involved human participants. The characteristics of the study respondents were understood from their demographics and socio-economic pattern. Consumer behaviour was observed as an overall summation score of personal, preferential and perceptual factors. The accumulated facts were systematically consolidated, coded as 5 points Likert scale ranging from strongly disagree to strongly agree was used to assess each dimension of consumer behaviour. The data was tabulated and interpreted in a Microsoft Excel Spreadsheet. Based on their highest frequency of response or the central tendency measure, mode, the consumer behaviour for each attitude attribute was interpreted and the overall consumer behaviour was interpreted based on the central tendency measure of the overall personal, preferential and perceptions attributes. Stack bars were used to display the consumer behaviour attributes as per cent.

Results and Discussion

Demographics of the Respondents

According to Wu (2003), consumer purchases are influenced by personal, social, cultural and psychological factors. Demographics are external factors that have proven to influence online shopping behaviour in many ways. The demographics of the consumers are represented in table 1. The identical distribution of gender (half per cent) indicates homogeneity of the consumer population while studying their attitude towards online shopping. Among demographics, age is one of the important factors that influence the consumer behaviour

of shopping products or goods. Respondent's age ranged from 18 to above 28 years. Age-wise categorization of the consumers' showed a majority of them (42 per cent) were in the age group between 24 – 27 whereas only thirty-five per cent of them were in the age range of 18 -23 years. Twenty three per cent of the respondents had an age of about 28 years or above. Hence, the respondents were mainly in the early adulthood stage, a stage of high knowledge and self-confidence in making decisions while buying the products.

Table 1. Demographics of the Respondents

Consumer's Demographic Variables		Respondents (N = 100) Per cent
Gender	Male	50
	Female	50
Age (years)	18-23	35
	24-27	42
	28 - 35	23
Marital status	Married	31
	Unmarried	69
Education	Primary	6
	Secondary	10
	Graduate	47
	Postgraduate	34
	Diploma	3
Family type	Joint family	47
	Nuclear	46
	Extended	7
Community Area type	Urban	53
	Rural	47

From an Indian context or traditions, married consumers are even influenced by their partners other than their children. Irrespective of the gender, the majority of the married consumers that is about sixty-

nine per cent showed interest to participate in the survey. Education is yet another important determinant factor of consumer behaviour. As education plays an important role while making a decision of purchasing and is directly proportional to their consumer knowledge while purchasing a product. About eighty-one per cent that is greater than three fourth of the well-read, informed and educated respondents also voluntarily consented to participate in the study showed their awareness, interests and knowledge levels of online shopping digital platforms. Howbeit, it was astonishing to find that about six per cent of the primary graduates were also interested to participate in an online shopping survey. This indicates that even less educated consumers also prefer online shopping. Thus educational differences do not play a role in online shopping behaviour or other words the online shopping retailers have won even the minds of the uneducated or less educated people through their marketing strategies.

Buying a product for the need is a unanimous decision of the family members at many instances whereas youth while traversing the adulthood stage become more independent and decisive that further gets increased while becoming an earning member of the family through their employment. Thus, family dynamics is essential to understand the need for online shopping among consumers.

Comparable representation of both joint (47%) and nuclear family (46%) respondents with meagre extended families shows the unvarying consumer population distribution for the survey. Location is another factor that

could also positively influence consumer behaviour. Proportionate distributions of the study respondents were found to be more in urban (53%) than in local areas. Nevertheless, the rural locality is also on par with the e-shopping accessible retail stores in recent days.

Studies have shown demographics as a deterministic factor that have been extensively studied by researchers to differentiate online from non-buyers while studying online shopping behaviour (Naseri and Elliott (2011); Nampoothri *et al* (2021). Thus the observed comparable representation of consumer's demographic variables in the current study shows a kind of homogeneity in the demographic factors such as gender, age, education, family type, marital status and community area while studying consumer behaviour towards online shopping. Thus the concept of Fishbein's attitude theory and its extensions that claim demographic variable as an important influencing factor of attitude towards behaviour is ruled out in contrast to previous studies (Hashim *et al.* (2009).

Socio Economic Status of the Respondents

A number of factors have been reported to affect the consumer online purchase behaviour. One of the most important that have been reported to positively influences the consumer's online shopping behaviour is socio-economic factors (Awal *et al.*, 2019). In the current study consumers surveyed constituted near middle class or middle class respondents correspondingly to about thirty two per cent and thirty seven per cent with

annual income between 2-2.5 lakh per annum (Table 2). High income consumers were less to about sixteen per cent who had annual income of 3 Lakh or above whereas low income consumers to about fifteen per cent participated in the online shopping behaviour study. Consumers were employed to about seventy seven per cent. Their mothers' were mostly housewives (65 %) and their father employed in private sectors (41 %) or public sectors (3) adds up to a total of 44 per cent. Consumers' fathers were either doing business or involved in some form of work other than regular employment. The socio-economic factors also influenced consumer behaviour of early adulthood online shopping trend. This shows government bodies and online marketers to devise various ways to improve and enhance online marketing strategies.

Table 2. Socio-economic status of the Respondents

Consumers' Socio-Economic Variables	Description	Respondents N = 100 (%)
Monthly Income (Rs.)	Below10000	15
	10000-20000	32
	21000-25000	37
	Above 25000	16
Respondent's Occupation	Employed	77
	Self employed	10
	Others	13
Mother's occupation	House wife	65
	Employed	16
	Others	19
Father's occupation	Private sector	41
	Public Sector	3
	Others	56

Online Shopping e-commerce Portal

From Table 3, it was understood that, Coimbatore residents especially early adulthoods preferred more of multinational e-commerce platforms for online shopping to an account of fifty five per cent in contrast to about only forty five percent Indian e-commerce shopping platforms (45 %). Albeit these, the respondents in Coimbatore District shows, Flipkart, as the preferred Indian e-commerce platform that was in equal proportion to the American based multinational E-commerce platform Amazon.

Table 3. Online Shopping Portal

Particulars	Category	Nation	Percentage (N=100)
Online sites	Flipkart	India	30
	Myntra	India	11
	Snap deal	India	3
	Shop clues	India	1
	Amazon	America	30
	Club factory	China	11
	Others	Multinational	14

Online Shopping and their Components

Ninety per cent of the respondents interviewed from Coimbatore district said they love to do online shopping. Among which the frequent buyers were only nineteen per cent whereas monthly buyers were more to about sixty five per cent. There were also few weekly buyers to about six per cent. Study respondents revealed that they spent varying amount from few thousands to above three thousand rupees. Forty three per cent of the respondents said they spent an

amount between thousand to two thousand rupees per month to purchase various items through online shopping portal. Respondents who spent below thousand rupees were comparatively less to about thirty two per cent on the contrary to those who spent about three thousand rupees were less to about only four per cent.

Table 4. Component of online shopping

Particulars	Category	Percentage (N=100)
Online shopping lover	Yes	90
	No	10
Purchase period	Weekly	6
	Frequently	19
	Monthly	65
	Never	10
Amount spent for purchasing per month (Rupees)	Below 1000	32
	1000-2000	43
	2000-3000	21
	Above 3000	4

Consumer Attitude towards Online Shopping

Attitude, perceptions and motivations are consumers' psychological factors that are indirectly linked to the success and failure of online marketing strategies (Wu 2003). Many theories on attitude and behavioral decisions have been put forward based on Fisbein model (Fisbein 1962, 1963, 1965 1967^{a,b}) and their extensions with their measurement effect in implementation science (Fishman *et al.*, 2021). Personal feeling is a attitudinal factor developed as a result of combined internal and external life experiences (Wu, 2003).

Personal Feelings towards Online Shopping

The personal feelings and their corresponding attitude attribute towards online shopping among the study respondents are represented in Figure 1. The above table depicted that out of 100 respondents, 41 per cent of the respondents strongly agreed that they used online shopping and only 3 per cent of the respondents strongly disagreed that they were not using online shopping. Among the selected respondents forty-eight per cent of respondents agreed that child behaviour influenced the parent’s online purchase. Forty-eight per cent of the respondents agreed that online shopping is quite easy and one per cent of the respondents strongly disagreed that online shopping is an easy method. Among the selected respondents, 42 per cent of the respondents strongly agreed that the products

purchased online were very cheap and best and only 2 per cent of the respondents strongly disagree that the products purchased through online shopping are cheaper, 41 per cent of the respondents agreed that advertisements influence their behaviour and only 2 per cent of the respondents strongly disagree and felt that the advertisements eventually influence the behaviour. Among the selected respondents 48 per cent of the respondents agreed that the quality of the product was good and only 4 per cent of the respondents strongly disagreed that the product brought through online shopping appears good in quality. From Table 5, it could be interpreted that most of the respondents agreed that the shift to online shopping is because of personal opinion factors such as preference, influence by children, advertisements, photography, easy and economic access.

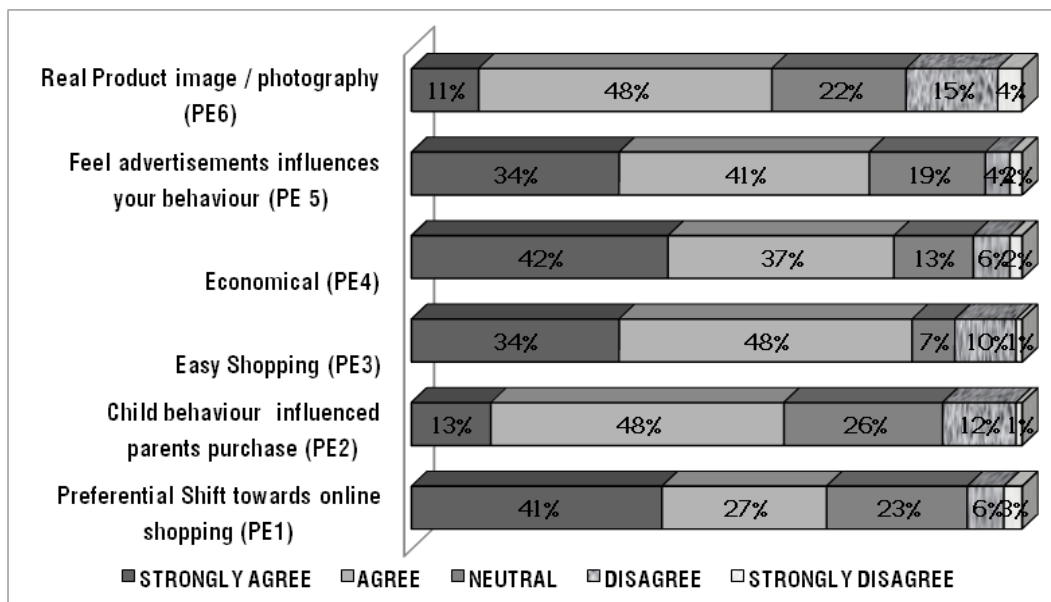


Figure 1. Personal feelings towards online shopping

Table 5. Personal Feeling Response towards Online Shopping in Likert Scale

Personal feeling Variables	Respondents (N =100)					Interpretation
	SD	DA	NE	AG	SA	
PE1	3	6	23	27	41	SA
PE2	1	12	26	48	13	AG
PE3	1	10	7	48	34	AG
PE4	2	6	13	37	42	SA
PE5	2	4	19	41	34	AG
PE6	4	15	22	48	11	AG
Overall Personal feeling towards Online Shopping						AG

SA- Strongly Agree, AG- Agree, NE- Neutral, DA-Disagree, SD- Strongly Disagree

Preferential Attributes towards Online Shopping

Different independent preferential attributes influence consumers’ online purchase. In this study researcher considered ten consumer attitude attributes that include convenience, ease of purchasing, easy comparison between similar products,

discounts or offers, trendy products immediate availability or non-available direct store products, worthwhile without bargain, branding, timely delivery and product assurance, product return and money refund policy to assess the overall consumer preferences.

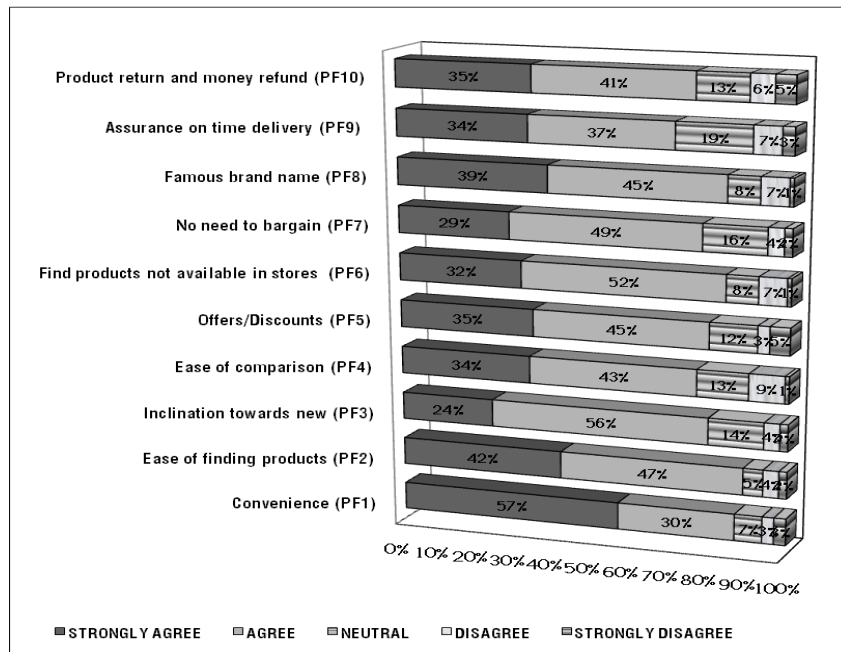


Fig 2. Preferential Attributes towards Online shopping

Consumers’ preferential Likert scales for online shopping are depicted in Fig 2. From hundred respondents, it was found that only 57 per cent of the respondents strongly agreed and 30 per cent agreed to convenience in online shopping. Among the selected respondents 47 per cent of the respondents agreed that they have ease at finding products while doing online shopping against 2 per cent of the respondent’s disagreement. Greater than half per cent (56 %) of the selected respondents agreed that they were curious to buy the products online due to immediate availability of the latest trendy product against 2 per cent of disagreement.

Forty-three per cent of the respondents agreed the product comparisons are easy in an

online purchase rather than direct purchase. About 45 per cent of the respondents agreed that they bought the products based on product discounts and offers in contrast to 3 per cent of the respondent’s disagreement. Among the selected respondents, 52 per cent of the respondents agreed that they could get the unavailable products through online shopping and only one per cent of the respondents disagreed the attribute.

From Table, 6 it could be understood that interviewed consumers personally preferred online shopping due to the high frequency of these agreed influencing preferential attributes.

Table 6. Personal Preference towards Online Shopping in Likert Scale

Preferential Variables	Respondents (N =100)					Interpretation
	SD	DA	NE	AG	SA	
PF1	3	3	7	30	57	SA
PF2	2	4	5	47	42	AG
PF3	2	4	14	56	24	AG
PF4	1	9	13	43	34	AG
PF5	5	3	12	45	35	AG
PF6	1	7	8	52	32	AG
PF7	2	4	16	49	29	AG
PF8	1	7	8	45	39	AG
PF9	34	37	19	7	3	AG
PF10	5	6	13	41	35	AG
Overall Personal Preference towards Online Shopping						AG

SA- Strongly Agree, AG- Agree, NE- Neutral, DA-Disagree, SD- Strongly Disagree

Personal Perception of the Consumers

Perception differs from each individual and it can also vary over a time based on each individual's interpretation from the world's experience and its brain mapping. It is a psychological variable that could influence consumer behaviour while making decision for purchasing a product. Positive perceptions of consumers are required for a sustainable online purchase and to build a loyal customer base. A total of twelve personal perception factors were considered in the current study. Perceptions for not shifting to online shopping include lack of options to assess the actual product, associated health discomforts such as back pain and eye strain, personal and bank data theft through credit card misuse, loneliness or its associated social isolation, brand performance and assurance, unnecessary tensions, poor products, online purchase show off, uncomfortable and bodily discomfort noticed with fashion apparels.

The Table 7 showed that out of 100 respondents, majority about 58 per cent of the respondents strongly agreed that while doing online shopping they do not have possibilities to assess the actual products. 37 per cent of the respondents agreed to the fear of credit card misuse and personal data theft. Thirty nine percent of the respondents agreed to cause of

backache and 39 per cent also agreed to eye strain due to long screen hours spent. Forty five percent of the respondents agreed that they had experience of getting unnecessarily tensed while shopping online. Forty three percent of the respondents agreed about fear of social isolation as part of online shopping behaviour.

Fifty three percent of the respondents agreed that they had doubt about product or brand. and only 2 per cent of the respondents strongly disagreed unnecessary tension while shopping online. Fifty eight per cent of the respondents agreed feared of choosing poor products from online shopping. About 33 per cent of the respondents agreed that online purchasing is still considered as a showoff to friends and relatives. 43 per cent of the respondents agreed that they felt uncomfortable while shopping online. Among the selected respondents 39 per cent of the respondents were neutral in response while purchasing apparels as at times they don't have bodily fit apparels.

From Table 7, it could be understood that still many negative perceptions do exist among the consumers despite booming online shopping trend. Marketer's dependent negative perception factors must be improvised further to increase the consumer's positive behaviour towards online shopping.

TABLE 7. Personal Perception towards Online Shopping in Likert Scale

Perception Variables	SD	DA	NE	AG	SA	Interpretation
No possibilities for assessing the actual product	2	2	4	34	58	SA
Suffering from backache problem due to long online shopping	1	15	34	39	11	AG
Fear of misuse of credit card	0	11	36	37	16	AG
Fear of developing eyestrain problem	0	22	29	39	10	AG
Fear of personal information being sold or rented without consent	0	12	30	40	18	AG
Fear of experiencing unnecessary tension due to shopping online	2	9	24	45	20	AG
Fear of social isolation	0	17	32	43	8	AG
Doubt about the performance of the product or brand as expected	2	5	17	53	23	AG
Fear of choosing poor product/service	1	7	20	58	14	AG
Worry that friends would think that trying to show off by purchasing	2	11	33	33	21	NE / AG
Uncomfortable feeling on thought of purchasing online	3	16	21	43	17	AG
Bodily discomfort due to poor fitting while purchasing apparels	6	13	39	34	8	NE
Overall Perception towards Online Shopping						Agree

SA- Strongly Agree, AG- Agree, NE- Neutral, DA-Disagree, SD- Strongly Disagree

Conclusion

Online shopping has influenced the lives of consumers and has brought an impact in a short period. Using this efficient method customer's knowledge base is permanently maintained to increase and improve business. It acts as a display forum for new products, services and price updates. Data protection and secured online payments, return policies, easy documentation, exciting discounts could help and attract consumers to disapprove the negative consumer perception towards online shopping. Consumers of the Coimbatore district prefers online shopping as more advantageous from the overall personal

feelings and preferential characteristics despite the negative perceptions. This advanced technology use by consumer for purchase was the only possible option during the COVID-19 lockdown. Online purchase has become the primary option to sustain in the prevailing increase rate of coronavirus infections. Thus the current study provides a close watch about the characteristics of the consumers in Coimbatore District and their online shopping behaviour. The current information might serves as a knowledge base for both the online retail marketers and e-commerce platform services and providers for their future business.

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INCULCATING PRONUNCIATION IN FRENCH LANGUAGE BEGINNER'S CLASSROOM

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Abstract

In the current scenario, learning a foreign language plays a vital role in the modern educational environment. The language competencies focus on four modalities: speaking, listening, reading, and writing. Phonological awareness is essential for reading and spelling. When an adult develops their knowledge in phonetics, they improve their reading and spelling development. The reading ability will give them confidence in developing their communicative skills. This article intends to provide practice in matching the French graphemes with their phonemes. The teacher enforces the knowledge on French phonemes through some activities proposed in verbo tonal and articulatory method

Keywords: French, phonology, methods, theories pronunciation

Introduction

In today's world, awareness of learning foreign languages is widely omnipresent in society. The current pedagogical system in foreign languages emphasizes communicative approaches. Pronunciation plays a vital role

to communicate effectively in any language. It is essential to master pronunciation in the learning process of any language when learning French as a foreign language in a culturally different background like India, which has a multi-language background. As a young learner of a foreign language, how does an Indian pedagogical system affect the foreign learning process, particularly in pronunciation? Moreover, French is an unphonetic language, the students must be given practice on matching the correct sounds to the French spelling, and surprisingly, spelling instruction could help the learners in better reading.

According to, Conrad, (2008) spelling and reading should be coordinated to benefit the pronunciation ability of a student. Hence the above said reasons forced to ask.

How to create phonological awareness in a foreign language pronunciation?

How to inculcate the pronunciation in a foreign language classroom?

I realize that developing pronunciation skills among adults is not a complex

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scenario in the process of learning a foreign language. It should teach along with other language components. According to Lord, (2005). in most foreign language programs, the foreign language classroom is forced to acquire knowledge on Grammar and lexical development. He proved that specific phonetics instruction in the language class helped improve their pronunciation effectively in their communication. In another study, the role of pronunciation in a foreign language program, Pardede (2010) states that to succeed in phonetic competencies in a language, the content of the course should be integrated into communication classes and the teacher should act as a facilitator to the students.

According to Thomson (2011), a study concludes that computer-assisted pronunciation training will make the students understand different accents of a foreign language. In another study, Weinberg & Knoerr (2003) finds that computer base tools will help learners to develop phonetics, intonation and pronunciation. Thus, this study will help the learner identify the sounds and improve the students' second language pronunciation competencies.

Methodology

Research Design used for the study is Descriptive Research Design. This article must state that there is an ignorance of phonological awareness among adult learners, mainly caused by the pedagogical environment. The pronunciation of a foreign language can be improved by the

teachers' motivation and instruction among the students. The descriptive paper includes the importance of teaching pronunciation to upgrade our communicative skills. At the same time, on observing the current approaches of learning a foreign language, communicative skills on great demand. Good pronunciation will help to communicate better in language. It is essential to train the students in pronunciation from the first day of their learning. This article focuses on how to inculcate the reading ability of a student in a different linguistic environment.

Theories and Practices Teaching / Learning of the Pronunciation

Natural Method and Direct Methodology

In this method, the learner acquires a foreign language pronunciation like a child by imitation (acquiring mother tongue). This approach may include the activities and tasks on imitation of sounds. The learners will be trained to better articulate foreign language (theoretical play, salient features of other people's accent in speech, suprasegmental features, foreign and regional accents, listening exercises, and repetition). In this theory, pronunciation is practiced in the class systematically on a more or less phonetic basis. The competencies of the language are developed through oral activities. Listening to foreign dialects of a language improves phonology. Natural phonology is based on a set of universal phonological processes that interact with one another; active and suppressed are language-specific.

Natural Phonology is a functional theory relating language to other domains

of human life. According to the hypothesis that language is not an autonomous cognitive faculty has implications for representing linguistic knowledge and processes governing language use.

The Phonetics and Linguistic Structure

In this method, the learner practices the pronunciation through auditory and articulatory to distinguish the sounds of foreign and mother languages. This method provides the knowledge of articulation points and the air passage in producing sounds in a foreign language. Learner improves his pronunciation through phonetic transcription exercises, auditory training and speech practice with correct rhythm, intonation, and dictation.

Behaviorism and Contrastive Analysis

Behaviorism is a psychological approach to learning a language through behavior and the simulated environment of a learner. This theory develops automatism by listening to audio and regularly repeating them. A branch of linguistic, contrastive analysis points out the differences and similarities between languages or dialects. In pronunciation, this approach helps the students to compare the sounds of pre-acquired language with new languages. The activities concentrate on identification exercises, discrimination, and repetition in the language lab. The contrastive analysis examines and analyses the errors and interferences even within the language.

The Verbo tonal Method

This method was developed by Guberina (2013) for phonetic correction, which

implies the perfection in the pronunciation by discrimination of the different sounds of the language under study. This method's emphasis on intonation, rhythm, and body language, and VTM allows the learners and the language teachers to be more active in acquiring the sounds and pronunciation of a foreign language. The VTM proposes pronunciation correction exercises in facilitating contexts and nuanced sounds of a foreign language.

Awareness, Warm-ups, and Relaxation

The development of body awareness, breathing, and gestural images to stimulate and promote rhythms, accents, and melodies are essential factors in pronunciation. The importance of relaxation and well-being in a pleasant and comfortable environment: reducing anxiety, eliminating psychological blockages, and constructing confidence are some of the other essential factors in verbotonal methods to improve the pronunciation of language.

Activities provided involve breath awareness: inspiration and expiration; sensations and visualizations; interactions between the body and the voice: vocal warm-up: knowledge and perception of one's voice, accuracy, color and auditory discrimination (vocal warm-up (nm): the action of preparing one's voice by exercises before start singing). Introduction of relaxation techniques; breathing exercises; use of music; song practice; association of speech with other senses and with mental images are also provided for language pronunciation improvement.

Learning/ Teaching Pronunciation, CAPT, and the Internet

Computer-Assisted Pronunciation Teaching (CAPT)

The application of ICT and web tools: visualization, synthesis, and speech recognition systems and technologies (automatic speech recognition, ASR); software and virtual characters (talking heads); tutoring and remote support on the web. The development of speaking competencies and pronunciation correction further enhanced using podcasts and educational, social networks.

The activities and tasks envisage the audiovisual resources in real communication situations and tools and tasks for the comprehension and oral production of FFL learners. The Correction of pronunciation in communication and collaboration in virtual environments (teaching platforms,

social networks, and weblogs) According to Rogerson-Revell (2021), emphasis on the digital technologies were insisted provide a great potential to develop the pronunciation in foreign language foe non-native speakers.

Results and Discussion

The Activities to Enhance the Pronunciation in Foreign Language

Learning French Alphabet and Phonics

Before the communication and listening skills, a learner should learn to pronounce a language correctly. It is necessary to understand how each letter sounds. The French alphabet consists of 26 letters as in English but slightly different pronunciation. The 26 letters of the French alphabet produce seven phonic sounds in which the students could be trained in such a way to enhance their pronunciation from the first day of a foreign language learner. Information of learning French phonology is given in table1.

Table 1. Learning French Phonology

1	2	3	4	5	6	7
[a]	[e]	[ø]	[ɛ]	[i]	[o]	[y]
A (ah)		E (eh)	F (eff)	I (ee)	O (oh)	Q(kqu)
H (ash)	B (bay)		L(ell)	J (zhee)		U (u)
K (kah)	C (say)		M (emm)	X (eeks)		
	D (dhey)		N (enn)	Y (ee-grek)		
	G (zhay)		R (err)			
	P (peh)		S (ess)			
	T (teh)		Z (zed)			
	V (veh)					
	W (doo-blah- veh)					

After teaching the French alphabet, students were trained to imitate the teacher’s facial expression and observe the point and mode of articulation while producing the sounds of a foreign language. Here, when a student learns table 1, they gain knowledge of French phonemes and were able to distinguish

the difference between his first language and French.

The Teaching of French Accent Marks to improve Pronunciation

Information of learning French accent marks is given in table 2.

Table 2. French accent marks

French accent marks			
French Accents			
Accent	Used on		Sound
Acute accent	E	Ecole	/e/
Grave accent	è, à, ù	Père, mère	/ɛ/
Circumflex	â, ê, î, ô, û	forêt (forest), plâtre (plaster), île (island), tôt (early), août (August)	
Diaeresis	ë, ï, ü	Noël (Christmas), naïve (naïve), aiguë (acute)	
Cedilla	Ç	garçon (boy)	/s/

A French accent mark is used to change the sound of a letter, the meaning of a word, and differentiate the old French and modern French lexique. An accent acute is used above the letter E and produces the sound /e/-ay- (table 1, column 2). An accent grave may be used on è, à, ù, but grave accent above the letter denotes the change of sound [ɛ] -ai- (table 1, column 4). At the beginning of foreign language learning, the facilitator can provide implicit knowledge of French accents where the students need to focus on pronunciation. These phonemic sounds helped the students to avoid making mistakes in writing the correct accents.

Teaching the Sound of Silence

Unlike English, the French language has many silent letters. There are three categories of silent letters in French.

E muet /elision/ Schwa

The most popular unpronounced letter is E which is termed in French as mute/schwa/elision. It occurs mainly in an unstressed syllable and monosyllabique words like - ce, de, je, me, le, ne, que, etc.,

When another vowel follows a single syllable word, elision occurs. The E mute dropped out

Ex: ce est → c’est, le ami → l’ami

H must and aspirated

In most cases, the letter H is silent in French. Some words begin with aspirated H, which has the impact of prohibiting linking and elision in the language. The aspirated H will produce the air from the lungs through the mouth, whereas the mute H will be silent, and in a word, the followed vowel will be sounded. Ex: l’hôtel, l’horlogue etc.

Some of the common words which display aspirate H are the following: huit, le héros, hors d'oeuvre, le hall, etc.

Final Consonants

The fundamental rule of French pronunciation insists that the final consonant is not pronounced whereas the student will find a lot of many exceptions. The letters B, C, F, K, L, Q, and R are usually sounded at the end of a word. Since the words ending with B, K, Q are infrequent to see, some studies find it comfortable to use the word CaReFuL to remember the pronounced final consonants in French. Information of learning French final consonants is given in table 3.

Table 3. French Consonant Sounds

Letter	Final Pronounced Consonants	Exceptions
B	Un club	Le plomb
C	Un truc	Un estomac, le porc
F	Actif	Les oeufs, une clef
K	Un look, un anorak	
L	Avril	Gentil, un oeil
R	Bonjour	
	Final silent consonants	Exceptions
D	Froid	David
G	Long	Le grog
M	Parfum	Forum
N	balcon	Amen
P	Un drap Beaucoup	Un cap Un slip
S	Trois Vous	Un fils Le tennis
T	Abricot	Sept, ouest
X	Deux Un prix	Six, index
Z	Chez Le riz	Le gaz

The Learning of Nasal Sounds

The French nasal sounds are much difficult to learn among the nonnative speakers. A nasal sound is produced together through the mouth and nose. In spelling, nasal vowels are written by vowel letters followed by m or n and these letters become silent in a word.

Ex: an, am, en, em, aen, aon peuvent [s]: chant, Champagne, vent, Caen, paon

aim, ain, eim, ein, im, in, ym, yn [s] : daim, vain, Reims, teint, timbre, vin, sympa, Jocelyn

um, un [œ̃] : humble, brun,

om, on [õ] : nom, non

However, In some cases certain words don't produce the nasal sounds

Ex: ennui, s'ennuyer, emmener, femme etc.,

The teaching of composed and Semi-vowels

The French composed vowels are the composition of two vowels.

/i/+ /u/ à /y/

In the spelling , /y/ is represented by U
Ex: mur, bu, sur

/e/ +/ø/ à /ø/

In the spelling /ø/is represented by EU (end of the syllable) Ex: bleu, Vieux, queue

/ε/+ /ø/ à /œ/

In the spelling, /œ/ is represented by EU
Ex: soeur, veux, heure

The vowel sounds /i/, /y/, and /u/ are converted to the semi-vowels /j/, /H/, and /w/ when followed by another vowel. The sound /j/ often referred to as the 'yod' may occur in the final position, spelled -ille or -il

The semi-vowel [H]: In French, the combination of the letters u + i does not look like

no English sound. To produce the sound, you have to purse your lips as if you were going

whistle and make the sound [y] followed by [i]. We must avoid pronouncing the sound [w].

The semi-vowel [j]: In French, the letters i + lle at the end of a word or the letter i +

vowel or y + vowel resemble the sound in the English word yes.

The semi-vowel /w/ is more substantial, unlike English, and when another vowel OI precedes it produces /wa/ sound in French.

Ex: oui, ouest, noir, mois etc.,

The Teaching of Liaison and Enchainment

Liaison, the linking of French words by pronouncing or silent consonant when the following word starts with vowel sound. The learner can observe in spoken liaison in spoken French. The most common consonants for liaison are – S, N, D, T. While reading, these letters will produce different sound s → sounds as “z” in la liaison. Ex: Mes enfants

n → sounds like “n” Ex: mon amid and t → both sound like “t” in la liaison. Ex: Mon grand ami, Mon petit ami

Enchaînement is when the consonant sound at the end of a word is transferred to the beginning of the word that follows it. Unlike liaisons, which cause otherwise silent letters to be pronounced, with enchaînement, the consonant would be pronounced whether or not it was followed by a word beginning with a vowel or mute H.

sept [set] sept enfants [se ta(n) fa(n)]

avec [a vek] avec elle [a ve kel]

elle [el] elle est [e le]

entre [a(n)tr] entre eux [a(n) treu]

Conclusion

Language is meant to communicate clearly and effectively. The pronunciation plays a vital role in communication. If pronunciation goes wrong, the purpose of communication will be lost. Thus the study provides a tool for pronunciation which could be used in a language classroom along with the other components of language like Grammar and civilization among the adult learners in higher education. This phonological knowledge develops the interest in reading among the beginners. The reading will improve the vocabulary and enhance the self-learning. This study suggests a further research on how phonological awareness could improve orthographic skills in adults.

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CHESS GAME AS THERAPY FOR EDUCATORS

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Abstract

The ancient chess game is viewed as a therapy not only for students but also for the educators in the current digital stressful environment to manage students effectively in an environment of inclusive education that consists of students who are able and disabled. It paves way for leading a healthy life in a recreational way both for the students and their teachers.

Keywords : Chess, Therapy, Students, Teachers, India, Stress

Introduction

Chess is an exceptionally old and smart game that was created in India around 2000 years back. In the earliest reference point, just Indian rulers played this game. Rather than doing battle two Indian shahs (rulers) simply set down with the chessboard among them and chose whose land is whose and who is more grounded. Thus they spared their armed forces and the lives of thousands of guiltless individuals. The round of chess was known as the round of rulers. The competitive world of Education urges the parents to look for an aid to sharpen their children's minds.

During the Gupta Period in North India, the antecedents of chess game originated, known as Chaturanga in the 6th

century. During its emergence, the game had four divisions namely infantry, cavalry, elephantry, and chariotry, represented by the pieces that later evolved into modern pawn, knight, bishop, and rook, respectively.

Surprising Health Benefits of Playing Chess

Grows Dendrites

Dendrites are nerve cell appendages through which impulse is received and transmitted to other cells at synapse. Learning, practicing and playing chess invigorate dendrites growth thereby enhancing the neural communication in a recreational way. The processing power of the brain is improved by playing chess regularly.

An exercise to activate both sides of the brain

The benefit of the physical workout is attained only while exercising on both sides of the body (i.e) left and right side. Chess is a mind game that stimulates the player's brain as a whole both on the left that deals with object recognition, as well as the right hemisphere, that deals with pattern recognition.

Prevents Alzheimer's Disease

A healthy cognitive, social, and psychological state during the aging process is reported to be created with regular practice

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of a chess game, a cognitive stimulation activity (Ciberira *et al.*, 2021). Chess game has proven to improve cerebral perfusion and the processing speed through regular practice and training in dementia patients (Edwards *et al.*, 2017; Chen 2021). Board games such as colorful chess could improve the depression state in elderly with mild cognitive impairment conditions (Xue *et al.*, 2021).

Helps Treat Schizophrenia

Chess is recommended as therapeutic game in numerous disorders such as to reduce panic attacks (Barzegar and Barzegar, 2017), to train future social pedagogues (Romanova *et al.*, 2018) for insane people treatment (Pakenham-Walsh, 1949), dementia patients (Eichhorn *et al.*, 2021), attention deficit hyperactivity syndrome (Rodrigo-Yanguas *et al.*, 2021) and obsessive compulsive disorders to improve acceptance and commitment (Philip & Cherian, 2020).

Improves Children's Thinking and Problem-Solving Skills

Introduction to chess game play at a young age is likely to do better in school for their future (Zapounidis, 2021). Numerous studies claim for proven cognitive and intellectual development in Children (Vlad-Ionuț *et al.*, 2021) with the play of Chess games. The game has also proven to be effective in improving cognition, mood and quality of life even in older adults other than children (Ciberia *et al.*, (2021). The mathematical ability of the students also got improved once when chess game activities are

merged with mathematical ability and they got motivated to be productive in problematic areas (Dvoryatkina & Simonovskaya, 2021).

Builds Self-Confidence

Chess skills is claimed to be a reliable proxy measure of student academic achievement and that it mediates fluid intelligence (Gao *et al.*, 2021). It is reported to influence individual's behaviour in a positive manner with respect to identity, sense of self, confidence, empathy, intuition (Smith *et al.* (2021)

Helps with Rehabilitation and Therapy

Chess could help to rehabilitate patients affected by stroke, autism or an physically debilitating accident or other developmental disabilities. Movement of chess pieces across the board help to fine-tune a patient's motor skills, while the mental effort applied improves cognitive and communication skills. It vitalizes deep concentration, focus, calmness, and even relaxation to anxiety affected patients.

Using Chess to Support Students with Special Needs

The learners must be motivated and given appropriate quality opportunities to learn and live a normal life in an inclusive learning environment. The chess classroom should be accessible all learners and assistance by chess educator is crucial to support the child with a disability. Parents play an important role to inform the chess educator about the strategies they use at home to help their children learn and develop.

Chess can be taught to learners with physical disabilities, learning difficulties, for them to communicate and socialize various other disabilities or impairments for :

- ADD (Attention Deficit Disorder), ADHD (Attention Deficit Hyperactivity Disorder), dyslexia, dyspraxia, learning disabilities, Asperger syndrome, autism, emotionally disturbed, epilepsy, hearing impaired, NVLD (non-verbal learning disability), paraplegia, visually impaired.
- Other physical disabilities (eg. hemiplegia).
- Intellectual Disability (eg. Down syndrome).
- Playing chess can help the learners to learn various physical, mental and social skills.

The chess game can be utilized

1. As methods for improvement and empowering the thinking ability of the future educators
2. As systems for averting dementia and methods for re-socialization of groups.

3. A system for adjusting to new states of life and pacifying pressure
4. As means for the advancement of mental forms, methods for mingling school kids with extraordinary necessities

The educators must understand that chess is an effective therapeutic tool for both normal and special children and not just the pieces or a game played to while away the time. Reports have proven that chess raise IQ, increase creativity, improves memory, problem-solving skills, concentration, and its further extension prevents brain deteriorating diseases such as Alzheimer’s disease.

Conclusion

Playing chess helps educators to take-up superior path and to tackle both normal and special children in an inclusive study environment. While other games focus on muscle strength and coordination, chess helps to build cognitive power of the educators and their students to improve their characteristics and also promotes them as well.

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RESEARCH ABSTRACT

EFFICACY OF *Azospirillum*, PHOSPHOBACTERIA AND SPENT MUSHROOM COMPOST ON THE GROWTH PARAMETERS OF *Solanum lycopersicum* L.

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Abstract

Bio-fertilizers are substances containing living organisms. In the present study, the vegetable crop *Solanum lycopersicum* L. was taken and growth studies were carried out on the 15th, 30th and 45th day after sowing using different biofertilizers. The parameters tested were shoot length, root length, number of leaves and diameter of leaves. Initially, the shoot length was found to be significantly higher in plants grown in Spent Mushroom Compost and the root length in Phosphobacteria treated tomato plants. On the 30th day, *Azospirillum* treated plants showed higher shoot length. On the 45th day, only control plants showed a significant increase in the growth parameters tested. This shows that field trials are necessary to effectively utilize the biofertilizers and increase the growth as well as yield parameters of the test crop.

Keywords: *Azospirillum*, Biofertilizer, Phosphobacteria, *Solanum*, Spent Mushroom Compost

Introduction

The organic farming method is not a new practice in agriculture; it is practiced in India

since ancient times. It is the main method of farming system directed at cultivating the land and raising crop to manage the soil condition in good health by the use of organic wastes (crop, animal waste) and also biological materials along with the biofertilizers, to release nutrients to crops to produce an eco-friendly organic product. The basics of organic farming deal with environmental, social and economic sustainability.

The common name of *Solanum lycopersicum* L. is tomato. It is an annual crop belonging to the family Solanaceae. Fruit contains vitamins, a large quantity of water, minerals and low amounts of proteins, fats and carbohydrates. It also contains carotenes, such as lycopene that gives the fruit its red colour and Beta- carotene which gives the fruit its orange colour. Tomatoes could be preserved due to their acidic nature in the home canning method, in pieces, as tomato sauce or paste. The fruit could be dried in sun and preserved and sold either in bags or in jars with oil.

Biofertilizers are assumed to be an alternative to chemical fertilizers to reduce pollution in the environment. Biofertilizers

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form an eco-friendly, cost-effective and useful method of the farming system. Biofertilizers are important and favourable for soil due to the use of microorganisms. It possesses the ability to convert the nourishment elements from a non-usable form to an easily available form of nutrient for balancing the soil fertility to increase the crop yield (Kumar *et al.*, 2002). Some of the common biofertilizers are *Azospirillum*, phosphobacteria and Blue-green algae.

Bacteria and fungi play a major role in decomposing organic material and without these powerful decomposers earth could have been completely covered with organic materials. Spent mushroom compost (SMC) is a substance which we get after harvesting the mushroom that could be potentially used for the growth of plants. It contains a simple form of a protein-rich compound, lignocellulosic materials, lignin, hemicellulose, fungal mycelium and its products that form the compost by the activities of the microbes. It also possesses rich organic matter, a moderate level of nutrients required for the growth of crops, neutral pH and also beneficial microbial population that makes the Spent mushroom compost a suitable growth medium that could retain the nutrients for the growth of crops (Ahlawat *et al.*, 2011). The addition of spent mushroom compost to garden soil acts as a very good soil conditioner that has been found to greatly increase the yield of tomatoes plants (Iwase *et al.*, 2000). SMC is found to be rich in macro and microelements that are necessary for growing plants. It helps to increase the soil.

Materials and Methods

The plant taken for the present study was tomato (*Solanum lycopersicum* L. PKM-1). It belongs to the family Solanaceae. Growth studies were carried out under different treatments of biofertilizers namely *Azospirillum*, Phosphobacteria and Spent Mushroom Compost against untreated control at different stages of growth of the plant.

Collection of the seeds

Seeds of *Solanum lycopersicum* L. PKM-1 were obtained from Tamil Nadu Agricultural University, Coimbatore.

Collection of biofertilizers

The biofertilizers namely *Azospirillum* and Phosphobacteria were obtained from TNAU, Coimbatore. The Spent Mushroom Compost was collected from the Mushroom cultivation at the Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore. *Trichoderma viride* was added as a biocontrol agent for controlling the disease. The application of *Trichoderma* is beneficial as it helps in reducing the fertilizer application as well as increases the yield of the crop.

Azospirillum

Azospirillum helps in fixing atmospheric nitrogen and benefit the host plants by the supply of vitamins and growth hormone. The growth, nitrogen uptake and yield in the number of crops are found to increase due to the inoculation of *Azospirillum*. The

recommended dosage of *Azospirillum* is 5kg/ hectare.

Phosphobacteria

Phosphobacteria is the organism involved in making the insoluble phosphorus available to the plants. Phosphorus is the second most important nutrient required by crop plants. Phosphobacteria enhances the phosphorus availability in soil by converting the insoluble phosphates into available form (Mallikarjuna Rao *et al.*, 2014). The recommended dose of phosphobacteria is 10 kg/hectare.

Spent Mushroom Compost

The average pH of fresh mushroom compost is 6.6, which is an excellent pH for any compost used as an organic fertilizer or soil amendment. The use of SMC helps the microbes in the soil to convert organic nitrogen to ammonium and later on to nitrate which could be easily assimilated by growing plants.

Experiment in Grow Bags

The seeds obtained from TNAU, Coimbatore were soaked in different organic fertilizers overnight. Later, the seeds were sown in Grow bags (30cm×30cm×45cm sized bags) containing garden soil and cocopeat in the ratio of 1:1. The treated bags were maintained in triplicates. The effect of different biofertilizers on the growth and yield parameters of *Solanum lycopersicum* L. PKM 1 were assessed. The growth parameters at different stages of growth of the plants were analyzed. Neem extract was sprayed at

intervals to control the growth of insects. The different organic fertilizer treatments given were:

T0 – Control

T1 – *Azospirillum*

T2 – Phosphobacteria

T3 - Spent Mushroom Compost

Growth Parameters

To measure the growth parameters, plant samples were uprooted carefully on the 15th, 30th and 45th day and the following parameters were recorded for all the treatments.

Root length (cm)

Shoot length (cm)

Number of leaves

Diameter of leaves (cm)

Root Length (Shukla and Mishra, 1986)

The plants were taken from the control bag and other treatment bags and washed to get rid of adhering soil particles. Then, the length of the roots was measured with the help of a scale from the root collar point to the root tip and expressed in centimeter. Three seedlings were randomly selected from each treatment and their root length was measured using a cm-scale and recorded in cm/seedling.

Shoot Length (Shukla and Mishra, 1986)

To measure the shoot length of the plants, the measurement was taken from the shoot collar point to shoot apex and expressed in a centimetre. Three seedlings

were randomly selected from each treatment and their root length was measured using a cm-scale and recorded in cm/seedling. Three readings were taken for statistical analysis.

Number of leaves

The number of leaves present was recorded in the uprooted plants.

Diameter of leaves

The diameter of the leaves was measured for all the treatments along with the control plants and expressed in centimetre.

Statistical Analysis

The data obtained from various morphological observations were subjected to statistical analysis as per the procedure of Panse and Sukhatme (1978).

Results and Discussion

The experiment was conducted in the tomato plant *Solanum Lycopersicum* (L) with control and three different biofertilizer treatments namely *Azospirillum*,

Phosphobacteria and Spent Mushroom Compost (SMC) on the growth parameters of the plant. The parameters such as shoot length, root length, number of leaves and diameter of leaves were measured on the 15th, 30th and 45th days after sowing. The growth parameters have been statistically analyzed and tabulated.

On the 15th day (Table 1), the shoot length was found to be higher in T3 i.e. the tomato plant that was supplemented with Spent Mushroom Compost (SMC). The reading was observed to be 5.30 ± 0.46 cm. The root length on the 15th day was higher in T2 (3.43 ± 0.59 cm). T2 is Phosphobacteria supplemented tomato plant. A significantly higher number of leaves were found in tomato plants treated with SMC and the value recorded was 4.33 ± 0.58 . The diameter of leaves was observed to be more in both control plant and Phosphobacteria treated plants on the 15th day and the values were found to be 1.63 ± 0.42 and 1.63 ± 0.45 cm respectively. The values are mean \pm SD of three samples in each group.

Table 1. Growth Parameters of *Solanum lycopersicum* (L) under control and different Biofertilizer treatment on the 15th day

Treatments	Shoot Length (cm)	Root Length (cm)	No of Leaves	Diameter of Leaves (cm)
T0	3.43 ± 0.67	1.60 ± 0.79	4.00 ± 1.00	1.63 ± 0.42
T1	4.07 ± 0.21	1.90 ± 0.70	1.67 ± 0.58	1.40 ± 0.53
T2	4.13 ± 0.61	3.43 ± 0.59	3.00 ± 1.00	1.63 ± 0.45
T3	5.30 ± 0.46	3.27 ± 0.47	4.33 ± 0.58	1.53 ± 0.32
SED	0.4223	0.5302	0.6667	0.3559
CD(P<0.5)	0.9738	1.2227	1.5374	0.8207

Values are mean \pm SD of three samples in each group

On the 30th day (Table 2), the shoot length was found to be significantly higher in T1 (21.70 ± 1.65 cm) i.e. the tomato plant that was treated with *Azospirillum*. The root length was found to be higher in the control plant that was supplied with only farmyard manure. The value was found to be 15.30 ± 2.15 cm. Similar to root length, the number of leaves formed was also found to be higher in the control plant and the reading observed

was 44.33 ± 6.81 cm. The diameter of the leaves was significantly higher in the control plant. The value recorded was 5.07 ± 0.76 cm. As far as the 30th day is concerned, the root length, number of leaves and the diameter of leaves were found to be significantly higher in the control plant rather than the tomato plants treated with *Azospirillum*, Phosphobacteria and Spent Mushroom Compost.

Table 2. Growth Parameters of *Solanum lycopersicum* (L) under control and different Biofertilizer treatment on the 30th day

Treatments	Shoot Length (cm)	Root Length (cm)	No. of Leaves	Diameter of Leaves (cm)
T0	3.50 ± 0.66	15.30 ± 2.15	44.33 ± 6.81	5.07 ± 0.76
T1	21.70 ± 1.65	6.67 ± 1.00	34.00 ± 9.54	3.20 ± 0.70
T2	17.67 ± 1.84	5.23 ± 1.11	22.00 ± 4.58	3.57 ± 0.60
T3	13.73 ± 2.14	4.47 ± 0.55	19.00 ± 6.56	2.20 ± 0.26
SED	1.3624	1.0924	5.7927	0.4994
CD (P<0.5)	3.1417	2.5191	13.3582	1.1517

Values are mean \pm SD of three samples in each group

On the 45th day, the morphological parameters were observed for the tomato plant and tabulated (Table 3). The shoot length was significantly higher in the control plant (46.67 ± 9.71 cm). The root length, number of leaves and the diameter of leaves were also found to be higher in the control plant of tomato. The root length, number of leaves and diameter of leaves were found to be 16.53 ± 1.40 cm, 83.67 ± 7.77 and 7.27 ± 1.07 cm respectively.

The present study is just a trial conducted to study the growth parameters of the tomato

plant when grown under Spent Mushroom Compost as substrate. For comparison, the other biofertilizers such as *Azospirillum* and Phosphobacteria were also selected. In the initial stage of growth, the shoot length and the number of leaves increased in SMC, but later on, the growth was slow which might be due to loss of the microorganism and usage of the same by the plants for its growth. With this simple grow bag study; we cannot conclude. We need to do further study on the growth of tomato plants as well as other vegetable crops by supplementing with the SMC.

Table 3. Growth Parameters of *Solanum lycopersicum* (L) under control and different Biofertilizer treatment on the 45th day

Treatments	Shoot Length (cm)	Root Length (cm)	No of Leaves	Diameter of Leaves (cm)
T0	46.67 ± 9.71	16.53 ± 1.40	83.67 ± 7.77	7.27 ± 1.07
T1	35.67 ± 6.03	8.63 ± 1.23	67.33 ± 4.73	4.53 ± 0.65
T2	29.37 ± 3.00	10.13 ± 1.01	52.67 ± 4.73	5.27 ± 0.83
T3	24.33 ± 2.25	8.17 ± 0.85	41.67 ± 3.51	4.37 ± 0.67
SED	4.9118	0.9339	4.4222	0.6712
CD(P<0.5)	11.3267	2.1537	10.1976	1.5479

Values are mean ± SD of three samples in each group

Among the treatments, *Azospirillum* supplemented tomato plants showed better shoot length on the 30th and 45th day, but the root length and the number of leaves, as well as diameter of leaves, showed variation between the treatments. Further study is to be carried out to prove the efficacy of the biofertilizers including the Spent Mushroom Compost on the morphological parameters of the tomato plant. The plant requires a considerable amount of phosphorus for growth which is being supplied by the phosphorus solubilizing bacteria (Phosphobacteria). So, there was an increase in the root length and diameter of the leaves on the 45th day in Phosphobacteria treated tomato plants.

Improvement in growth and yield parameters in plants treated with bio-fertilizers was due to enhanced uptake of nutrients by the plants (Borea, 1991). Bio-fertilizers such as *Azospirillum*, Phosphorus solubilizing bacteria and mycorrhiza are capable of improving the mineral nutrients of plants and enhancing the soil fertility. Phosphorus solubilizing bacteria are capable of a solubilizing unavailable form

of phosphorus into available form and make it available to plants (Veena *et al*; 2009; Shankarappa *et al*; 2012).

Earlier studies by Ghanti and Sharangi (2009) have revealed better growth, yield and quality of onion when *Azotobacter* was used in combination with *Azospirillum*. Singh (2014) studied the yield parameters of coriander and found a significant increase in plants treated with bio-fertilizers when compared to control. Application of a higher dosage of inorganic fertilizers along with the bio-fertilizers influenced the growth and yield of onion significantly (Singh *et al.*, 2017).

Studies on the effect of PSB, *Azospirillum* and *Azotobacter* by Choudhary *et al.* (2017) have indicated that the application of bio-fertilizers not only improves the quality of Knol- Khol, but also gives a maximum monetary benefit. They have concluded that the use of PSB, *Azospirillum* and *Azotobacter* could significantly increase the yield of Knol-Khol and also the net return of the crop. Bio-fertilizers are natural fertilizers containing microorganisms that enhance

crop productivity through nitrogen fixation, solubilizing of plant nutrients and producing plant growth regulators. Work done by Kumar *et al.* (2002) has proved that the potato yield could be significantly increased by the application of bio-fertilizer.

The current investigation is just a preliminary work carried out to understand the growing ability of vegetable crops when supplemented with SMC in grow bags instead of pot culture experiments. Further studies are required to prove the importance of SMC in the growth of plants.

Results and Discussion

The experiment was conducted in tomato plants in grow bags under control and three different biofertilizer treatments namely *Azospirillum*, Phosphobacteria and Spent Mushroom Compost (SMC). The parameters tested were shoot length, root length, number of leaves and diameter of leaves on the 15th, 30th and 45th day after sowing. On the 15th day, the shoot length and number of leaves were found to be significantly

higher in SMC. The root length and diameter of the leaves were found to be higher in phosphobacteria treated tomato plants. On the 30th day, the root length, number of leaves and the diameter of leaves were found to be significantly higher in the control plant rather than the biofertilizer treated plants, whereas the shoot length significantly increased in tomato plants treated with *Azospirillum* on the 30th day. Similar to the 30th day, almost all the parameters such as shoot length, root length, number of leaves and diameter of the leaves were found to be higher in control tomato plants on the 45th day.

Summary and Conclusion

In the initial stage of growth, the shoot length and the number of leaves increased in SMC, but later on, the growth was slow which might be due to loss of the microorganism and usage of the same by the plants for its growth. With this simple grow bag study; we cannot arrive at a conclusion. Further study is required to prove the efficacy of the biofertilizers as well as the Spent Mushroom Compost in the field conditions.

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NEWS MAKER

SHATTERING THE PLASTIC CYCLE, UPCYCLING OUR MOTHER EARTH

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Plastics are man-made non-biodegradable synthetic materials. They are macromolecules, formed by the polymerization and have the ability to be shaped by the application of a reasonable amount of heat and pressure or any other form of source. The used plastics are thrown mostly as such or otherwise burnt. Throwing as such leads to the possibility of consumption by animals from the trash. Burning plastics releases toxic fumes that have a drastic impact on living beings and the environment. Hence, to protect our beings and surroundings, awareness of the consequence of plastic use and its proper disposal needs to be created. 3R (Reuse, Reduce, Recycle) methods is a popular strategy applied to eradicate plastic contaminants. An alternative, emerging, imminent circular economy strategy is upscaling process. Here, huge plastics are transformed via catalytic degradation into value-added products that have extensive applications and consumer demands.

Reuse of Plastics

In this process, used plastics are reused either for the same purposes or to fulfill another function. Ex. Wrappers re-usage is to minimize the cutting of trees. In certain

instances, waste plastics are sanitized before reusing them for other desired applications. On reusing, the plastics grades get decreased due to exposure to high heat that indirectly affects the user.

Recycling of Plastics

It is a process in which the waste plastics are converted into new or fresh materials by undergoing chemical reactions. Recycling aims to sustain the environment and reduce pollution. On recycling, plastics emit toxic gases with residual plastic deposition into the environment. Even though plastics are recycled, it also has an indirect effect on living beings.

Reducing of Plastics

Plastic is a cheap and affordable material with a rapid increase in consumer demands and hence the only best way foreseen is to reduce the usage of plastic is to reduce the contamination of soil, air and water.

Plastic and its Disposal

Around the world, one million plastic drinking bottles are purchased every minute and over 300 million tons of plastics are produced annually, around 50% of it is single-

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use plastics. The sustainable development goal set by the UN is responsible for the consumption and production of plastics. But this goal is being exploited by uncontrolled production and consumption of plastics.

A substandard plastic bag, film, littered plastics contaminates the land and choke the drain. Garbage mixed plastics interferes in waste processing facilities and also cause landfill operations. Lead and cadmium pigments commonly used in Low Density Poly Ethylene (LDPE), High Density Poly Ethylene (HDPE) and Poly propylene (PP) as additives are toxic which affects the water living organism.



Chemical Upscaling

It is a process in which discarded plastics are converted to higher value or quality in their second life with high rising environmental value. Most of the upcycling process leads to final products as chemicals, fuels, composite materials etc.

▮ Chemicals [PET (polyethylene terephthalate) to 1,4 benzene di methanol

and ethylene glycol (EG) by Rubidium (Ru) based molecular catalyst],

- ▮ Fuels [like petroleum derived hydrocarbon],
- ▮ Other products like monomers, composite materials etc.

PET to Monomers

This process mainly centralizes polyesters especially PET, as chemolysis is comparably simple. The monomers and deconstructed partial polymers are important raw materials. This process mainly depends on the presence of free chemical bonds in the polymeric structure and it is difficult for the polymers with robust linkage. Some of this process of conversion is also titled solvolysis. Polyester plastics like polybutylene terephthalate can be depolymerized and Polyurethane by the glycolysis process.

Disadvantages

- ▮ Most of the polyether made plastics cannot be depolymerized to monomers
- ▮ The hectic reaction conditions, the use of excess solvents and depolymerizing factors also leads to production of less desired products
- ▮ The formation of by products is considered to be a main obstacle in this conversion
- ▮ The plastics with hydrolysable esters or amide bonds are difficult to depolymerize Example; Poly Ethylene Terephthalate (PET), Polyamide (PA) and selected types of UR.

PET to Chemicals

In the conversion of PET to chemicals, the plastics are deconstructed to shorten chain products with higher value products compared to deconstructed monomers. It can be achieved by direct hydrogenolysis. Mostly PET and PE are converted to chemicals. The high Thermoplastic Alloys (TPA) yields are obtained from different

waste beverage bottles, bottle caps and the catalyst can be recycled without the loss of activity. The reactant polymers mainly PET is converted to TPA, EG and P-Xylene under different conditions with catalyst Carbon (C/MoO₂) Molybdenum Oxide, Ru based catalyst, and Ru/Nb₂O₅ (Nibonium penoxide) correspondingly. The conditions, catalysts, reactant and products are listed below:

Table 1. PET to Chemicals

Reactant polymers	Catalyst	Conditions	Products
PET	Carbon supported [C/MoO ₂]	Solventless, 2600C, 1 atm of H ₂	Terephthalic acid (TPA), Ethylene
PET	Ru based catalyst	Mild temperature	1,4- benzene dimenthol and ethylene glycol (EG)
PET	Ru/ Nb ₂ O ₅	-	P-Xylene, Methylbenzene

Disadvantages

- l The conversion of reactant polymers to chemical products is highly expensive since it undergoes a various tedious process.
- l The catalytic dehydrogenation of robust PA is quite difficult because they are highly resistant to many solvents because of strong intermolecular hydrogen bonding.
- l The toxic Ruthenium (Ru) catalysts are difficult to recycle despite their highly selective and active nature.

PET to Fuels

The elementary compositions of plastics are carbon and hydrogen, it is also considered as alternative hydrogen-rich raw materials. Pyrolysis and gasification is a process in which PET is converted to fuels by undergoing tedious processes under difficult conditions Photo reforming is a process in which solar energy is used to convert the organic

molecule in plastics and water (H₂O) to fuels. Photo reforming is mainly used to convert plastics to hydrogen gas which is used as fuel in battery-operated vehicles. PE (polyethene) and PP (polypropylene) are converted to alkane by catalytic hydrogenolysis. High-density polyethene (HDPE) is converted to diesel with 79% yield using (mSiO₂/Pt/SiO₂) silicon oxide / platinum catalyst. Plastic wastes can be used as jet fuels. The HDPE hydrogenolysis using a Ru/C catalyst can provide jet fuels with a yield of around 60%.

Conversion of Plastics into CNT

The PET is catalytically decomposed into carbon nanotubes (CNT) via different catalysts. The four major different methods of production of CNT are Arc discharge, Laser ablation, Combustion synthesis, One-pot synthesis. Among these processes, One-pot synthesis is the most affordable and yields high. The liquid or gaseous decomposed products serves as a source of carbon used for

the growth of CNT on the catalyst. Different reaction conditions like temperature, catalyst composition, composition, rate of reaction lead to various quantities and qualities of CNT. One of the major challenges in the conversion of plastic into CNT is the lack of consistency and reproducible input of carbon raw materials with controlled quality.

Conclusion

Plastic waste management has assumed great significance in urbanization activities.

Various strategies are being implanted to mitigate the impact of plastic in India. Some significant challenges still exist from both technological factors and economic or social behaviour issues relating to the collection of recyclable wastes and substitution for virgin materials. The plastics which have a drastic impact either directly or indirectly on the environment when it is in use, also cause the effect when it is recycled, so it is necessary to find the best way to upcycle the plastics which will be helpful in wide applications.

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SHORT COMMUNICATION

MILLETS – A CROP OF RESILIENCE

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Millets are a range of cereal crops grown around the world which are used as grains in human food or fodder. They form a functional/agronomic group but not taxonomic.

Millets are Indian traditional food. In the earlier days, our ancestors have been consuming millets. But as the years passed by, this tradition faded away. And now due to more health awareness, millets have again emerged into the market and our food habits.

Millets grow better in dry, infertile soils and thus they are most adaptable to extreme conditions like high temperature, low & erratic precipitation, acidic and infertile soils with poor water-holding capacity.

Millet grains have astounding benefits as drought-resistant crops and are capable of growing and producing good yield even in areas of water scarcity. They mainly gained importance due to their high nutritional values, low-cost production, and ease of processing and manufacturing.

In India, there is massive production of especially eight millets species namely sorghum, pearl millet, finger millet, foxtail millet, proso millet, kodo millet, banyard millet and little millet.

Millets are referred to as both kinds of cereal as well as the plant that produces these millet grains. Even today millet is observed as the staple food in most parts of India. Four types of millets are cultivated on large scale.

According to FAO production data of 2016, sorghum ranks fifth among the major cereals after maize, paddy, wheat and barley. Every millet has a vernacular name. Finger millet (*Eleusine coracana*) is widely cultivated in India.

Millets have always been segmented for the formulation of policies and other priorities of agriculture and nutrition in India. Millets can play a major role in promoting nutrition security. They are now termed “Nutri-grains” as they are high in micronutrients such as minerals and B-complex vitamins. But on the contrary, millets are losing their pride and sheen in the production and consumption pattern in India. Hence, there is some collaborative effort towards reviving the millets in the last few years.

Further, many unique features linked with millets makes them a suitable crop that is resilient to India’s varied agro-climatic conditions. Citing these factors, the year 2018 has already been declared as the

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National Year of Millets and United Nations has declared 2023 to be the “Year of Millets”. Millets have also topped the list of 35 resilient crops declared the Prime minister of India considering its dual challenging traits which are resilience to climate and highly nutritious.

Known as C4 crops, millets are highly efficient in absorbing and using carbon dioxide. Most varieties of millets are well known for their hardiness and can withstand prolonged periods of drought, high temperatures and are still capable of producing grains as well as fodder. C4 plants are adapted to hot, dry environments, and include the important human food crops of maize, millet and sorghum

Protein extracts of Pearl millet (*Pennisetum glaucum*) hinder the pathogenic fungi growth such as *Rhizoctonia solani*, *Macrophomina phaseolina* and *Fusarium oxysporum*.

Fibre plays a major role in preventing breast cancer in women and sorghum is proven to have anti-carcinogenic properties due to the presence of tannins and polyphenols which have anti-mutagenic and anti-cancerous/carcinogenic effects. Millets are beneficial to our colon, gut and the entire digestive system as it forms a natural prebiotic when fermented and stimulate the growth of good bacteria.

Millets specifically sorghum has increased levels of phenols, condensed tannins and Flavonoids. Foxtail millet [*Setaria italica*] is one of the minor millets, containing large amounts of proteins as well

as minerals. Simple processing methods like soaking, dehulling, and cooking are reported to result in significant decreases in antinutrients and improved bioavailability of minerals like iron and zinc and also protein digestibility.

Increasing temperatures, changing monsoon and more frequent extreme climate events are posing a threat to food security in India. Compared to rice, alternative grains (finger millet, maize, pearl millet and sorghum) are significantly less sensitive to climate variability and generally experienced a smaller decline in yields under climate extremes. All these are mostly rain-dependent crops and grown during the Kharif season.

Banyard Millet is the fastest growing, producing a crop in six weeks and offering 10 times more fibre than wheat. Hence millets are considered “climate-smart”.

The agricultural finance institutions should move away from their tradition of preferring non-food-crops such as cotton and heavily irrigation-dependent crops such as rice, sugar cane etc, and give priority to millets because of their nutritional value.

India was placed at 185th position among the malnourished nations in the world, At present millets are consumed by the rich as they recognised the nutritional value of millets while the poor moved away from them. An effective campaign be launched to encourage all sections to consume millets as a staple diet said AIMS (All India Millets Sisters).

With every decade of climate crisis getting worse, familiar grains such as wheat and rice would continue to disappear from the food basket of the country and there would be nothing to offer in the food system, the AIMS network has cautioned.

Millets with their extraordinary capacity to withstand the climate change pressure might be the only grains that could be tapped for public food systems. “There

is an immediate need to recognize ‘Millets as Foods of Future’ for India and all food planning must be based on millets,” they emphasized.

Though millets are a super food, the general perception is that the millets are increasingly seen as “poor man’s food”. Therefore, it is necessary to promote the production and consumption of millets.

BOOK REVIEW

UNDERSTANDING HUMAN LEARNING AND COGNITION

Author : NABI DAR, G.H.
Year of Publication : 2021, Pp. 312
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Daryaganj, New Delhi.
ISBN : 978-93-90473-13-7

This is a classic textbook on Cognitive Processes, that any undergraduate student can use for his/her reference. The book is divided into three phases, namely introducing and basic understanding of the concepts of Thinking, Learning and Cognition, the second phase being the theoretical perspectives in Thinking, Learning and Cognition and the final phase explores the diversity and concept of inclusion in the Learning process.

The book starts with a basic explanation of the various cognitive processes such as thinking, perception, attention, learning and memory. It covers the basic nature, concepts, importance, contemporary definitions, and classifications of the cognitive concepts. The structures of the brain responsible for the various cognitive processes and their functions are described lucidly. The functional components of Cognition such as problem solving and decision making are also amply elucidated. The types of

thinking, namely convergent and divergent, are relatively analyzed within the preview of media and technological components. One of the remarkable features notable is an attempt to understand thinking and learning developmentally with ample reference to various socio cultural backgrounds.

The various theoretical foundations of Thinking, Learning and Cognition are examined effectively. Jean Piaget's theory of Cognitive Development and Learning gives many quotes from Piaget's original works. A comparison of this theory to the behaviorist approach is carried out. Piaget's contribution to education and its current perspectives is a fitting finale to this theory. Challenges and development of the Piagetian Theory is explained in the form of Post and Neo-Piagetian Theories that developed the stage theory further. The Neo-Piagetian theories of Pascual-Leone, Halford, and Fischer are briefly introduced. The theoretical framework of Bandura's Social Cognitive Theory is discussed with sufficient examples. The information processing approach to Learning, its implications to classroom learning, and current research trends are drawn out successfully. Vygotsky's Theory of Cognitive development, its socio-constructivist viewpoint and its comparisons with Piagetian concepts are ably brought forward. A fitting

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account of Carl Rogers perspective to thinking and learning is a theoretical dialogue of self actualization and congruence.

The final phase of the book is a journey of application of the said theories in bringing about inclusion and exploring and embracing diversities in the learning process. A clear explanation of the new age meaning of diversity and the learning strategies to be adapted and accommodated is detailed. The highest point in this book comes from the unambiguous analyses of the uniqueness of children and adolescents from the intelligence, creativity and motivation framework. The issues and possibilities for children with special needs discuss practical milestones that can be achieved by converting challenges into opportunities. All needs of special education including assessment, diagnostic and intervention strategies, with an outcome based model, focusing on impact of each of these stages is annotated. Also the various myths about “Gifted Children with Learning Disabilities”(GCLD) is effectively clarified.

This book is a path breaking attempt to put forth an applied point of view for all the various cognitive processes and gives a practical impetus to the concepts of Thinking, Learning and Cognition. The language followed throughout is easily understandable to the average Indian student with all concepts explained clearly. The only critique possible is the absence of summaries and key take away concept from each chapter that would have enhanced the reader’s experience and given a sense of closure to the concepts undertaken for study. A few more practical examples from the viewpoint of the Indian culture and its implicit perspectives of Cognition would have been greatly appreciated. One of the factors to be mentioned is that the pricing is also reasonable for use of students. Given the diminutive off-putting factors, that can be easily overlooked, this book is a very good attempt to give all cognitive processes under one umbrella. It is a definite fact that the author would improve these in future editions of this book.

*** Dr. S. Gayatri Devi**

Research Highlights

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