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IS THE CURRENT EDUCATION SYSTEM BETTER ENOUGH?**Ganesh Joshi¹ and Sarita Nemani²**¹Department of Mathematics, Maharshi Dayanand College, Mumbai²Department of Mathematics and Computer Science, Georgian Court University, Lakewood, USA

ABSTRACT

The famous writer, Mark Twain, once quoted “Don’t let schooling interfere with your education.” In this presentation, we revisit this quote in the light of the current education system. The result based on collected data of sample surveys from stake holders and teaching experience are presented. Some solutions for better education are also presented.

INTRODUCTION

In the current world attending school is very important part of life. Attending school is considered preliminary role of gaining knowledge. The study presented in this paper is motivated by Mark Twain’s quote about education, that is, don’t let schooling interfere with your education.

According to the Merriam-Webster the word schooling means instruction in school, training, guidance, or discipline derived from experience. In our opinion, the word schooling means as the word related to every aspect of current education system including educational policies, discipline, parents’ mentality, authors, books etc. Whether schooling interferes with the education of students is really a question of curiosity. The sentence does smell a humor in the argument but our experience suggests that it really means up to some extent.

SIGNIFICANCE OF THE STUDY

Music is the natural ability of every human brain. Every human can identify the frequency of sound and can respond or reproduce it. Japanese psychologist Ayako Sakakibara[6] was able to teach a group of children between three and five perfect pitch with a 100% success rate in 1999. When students were asked by their music instructor to sing a very basic tune, many of them initially found the lack of capacity to sing it properly. But then if the task was asked but this time students were accompanied by any musical instrument, they sung in the correct way; they were able to identify the tune and were able to reproduce it properly. Hence the question comes to mind how someone can miss the natural ability of music.

Sometimes a multiple-choice testing in some I.Q. or standardized tests may inadvertently lead to the creation of false knowledge [5]. It also forces students to think only in the direction of the question setter’s approach. For example, consider the question of finding next term of the series 2, 4, 8, 16. The question author thought of only one alternative of 2^x for the answer. But the Newton’s forward difference interpolation formula can be used to obtain another alternative of $(x^3 - 3x^2 + 8x)/3$ for the answer. Then answer would be 30 and not 32 for the same problem. If this choice is not included in the alternative answers of the question, brighter students may get frustration and would lose the creativity of learning new approaches. Not only are most of schools ignoring the interests of students, individual qualities and strengths but are focusing only to train students to pass tests/assessments [10].

Some of schools and universities required to upgrade the course content after every particular time period[9]. To obey this policy some of the board members/faculty members are forced to alter the curriculum content which may not be justifiable for core subject content. This is applicable in some extent for all streams of education. We are not suggesting that change is not needed. But very frequent change is not a good strategy. It should be done if the conclusion of assessment of program shows that it is required and not just because one have to change after every particular time period. We also agree with the statement in [3] which states that “There should be open forums and public debates on Teacher Education Policy, rather than leaving it to some selected committees, and commissions.”

Typing mistakes in the text books is one of the common problem which leads confusion in students’ mind. Using information from the internet without checking the reliability of sources is very crucial issue. Instead of investigating the correctness of the material students take it for granted as it was written in the text-book or was written on internet [1].

It has been a common observation that most of the time students don’t get enough time to reflect. Homework plays very important role in enhancing student achievement. However, many times due to limited time and/or given workload, many students adopt wrong learning practices, for example, instead of understanding logic and concept they try to memorize the material [8].

All parents wish their child to get good education. However, many parents give more importance to grades. Instead of paying attention to the knowledge base construction of their child, they invest time and money on coaching classes, private tuitions, crash courses etc. It is true that parents’ involvement and support for their child is important and healthy. But hovering over the child in ways that could interfere with learning and development can play very negative impact on the child’s education [7].

All these really seem to be interfering with schooling.

OBJECTIVES

The objectives of the study is given as follows:

- To find usefulness of the curriculum in terms of employment possibilities.
- To trace the truth in Marks Twain’s sentence.
- To find out students’ views of the current education system.
- To find out students’ perceptive of the relationship between grades and knowledge.
- To establish our views and to propose some remedies.

METHODOLOGY AND SAMPLING

The descriptive survey method has been used to study the validity of the statement “Is the current education system better enough?” The population of 50 students from MaharshiDayanand College (MDC) pursuing bachelor’s degree in Arts, Science, Commerce, Banking & Insurance, and Mass Media is included in the sample. The population of 50 students from Georgian Court University (GCU) pursuing bachelor’s degree in Arts, Education and Science is included in the sample. Random sampling method is used to select 50 individuals from each institutes. A Self-made questionnaire of the survey has been used.

LIMITATIONS

The present study is limited to MaharshiDayanand College (MDC) affiliated to University of Mumbai and Georgian Court University (GCU) only. The sentence of Mark Twain may have created prejudice in our mind. Though the authors are educators and not educational professors. The I.Q and E.Q of the respondents are not tested.

STATISTICS

The following table gives % of opinions about various aspects related to schooling.

Questions	Yes		No		Not Sure	
	GCU	MDC	GCU	MDC	GCU	MDC
Do you think students are being held back by the current education system?	34%	66%	50%	32%	16%	2%
Do you think that the current education system prepares you for suitable employment?	48%	42%	32%	24%	20%	34%
Do you think that any important field/area seem to have left out from the current education system?	56%	62%	32%	14%	12%	24%
Have you felt any negative impact due to frequent changes of policies in the current education system?	30%	70%	44%	22%	26%	8%
Has any natural learning style been included in the learning method?	36%	16%	18%	68%	46%	16%
Do you agree to the statement “Higher Grades = more knowledge”?	48%	6%	50%	90%	2%	4%
Do you agree to the statement “Higher Grades = more money”?	44%	8%	46%	84%	10%	8%

FINDINGS

- Almost 50% of students have been thinking that the students are held back by the current education system.
- Almost equal proportion about 45% from both the institutes have said that the education system is employment oriented but 55% denied or uncertain which shows the secular confusion about the association between employment and current education system in both the countries.
- Overall 59% students think that some important field/area have left out from the current education system which implies students have more potential or more eagerness to study some other areas that is not included

in current curriculum. They couldn't learn some important life skills in the present education system as very little provision to these skills is included in the curriculum.

- 70% students from MDC felt that frequent changes of policies have negative impact in current education system, whereas, only 30% students from GCU agrees to this statement. This could be due to the fact that most of the changes in policy occurs based on the conclusion of assessment of program shows that it is required. Also it is effective as the change is done in appropriate time period.
- 6% students from MDC agreed to the statement "Higher Grades = more knowledge" whereas 48% students from GCU agreed to that statement.
- The equations of higher grades in the questionnaire are almost rejected by MDC students which suggests either students dislike the course which they have been perusing or they felt confident that the learned knowledge would be sufficient for their materialistic needs. The grades for them are just like a payment of toll plaza to enter and drive vehicles of their lives on the highway of the career.
- The truth of Mark Twain's statement can be traced with respect to the following method; % Assertion of the statement = (sum of completely negative opinions about ideal schooling + half of the sum of not sure answers) / (sample size * total number of relative questions regarding satisfaction about the schooling in the questionnaire). The above formula gives the % assertion of Mark Twain's statement to be 72.14%.

CONCLUSIONS

- There are enough scopes in the current education system for the above average students. However, it is not the case for ordinary (average) students. There is a need of creating suitable plans and implementing them in the system.
- The assessment of demand and supply for every professional employments needs to be study in more detail. Based on the findings universities can provide educational opportunities on respective needs.
- Few courses in the curriculum need to be reduced and needed to include some vocational courses in every stream along with hands on training.
- The agriculture education should be given importance and more need of agriculture colleges [2, 4]. Industrial/Civil/Military training at the age 18 years should be made mandatory and minimum stipend should be given.

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REFERENCES

- 1) DS Brandt "Evaluating Information on the Internet", *Computers in Libraries*, 1996, 16(5):44-46.
- 2) GD Coorts "Updating today's college curriculum for tomorrow's agriculture" *NACTA J.*, June 1987, p 20-21.
- 3) DR Goel, C Goel "Teacher education scenario in India: current problems & concerns", *MIER Journal of Educational Studies, Trends & Practices*, 2012, 2(2):231-242.
- 4) AK Makwana "Agricultural education in India: challenges and prospects", *Voice of Research*, 2013, 2(3): 90-94.
- 5) HL Roediger, EJ Marsh "The positive and negative consequences of multiple-choice testing", *J Exp Psychol Learn Mem Cogn.*, 2005, 31(5):1155-9.
doi: 10.1037/0278-7393.31.5.1155
- 6) A. Sakakibara "A longitudinal study of the process of acquiring absolute pitch: A practical report of training with the chord identification method", *Psychology of Music*, 2014, 42(1):86-111. doi: 10.1177/0305735612463948.
- 7) HH Schiffrin, M. Liss "The effects of helicopter parenting on academic motivation", *J Child Fam Stud*, 2017, 26(5): 1472-1480. doi: 10.1007/s10826-017-0658-z

-
-
- 8) U Trautwein, O Köller “The relationship between homework and achievement-still much of a mystery”, Educational Psychology Review, 2003, 15(2)115–145.
doi: 10.1023/A:1023460414243
 - 9) <http://www.mum.digitaluniversity.ac/Syllabus.aspx?ID=245>
 - 10) M. Lynch “18 reasons the U.S. education system is failing”, April 3, 2017. <https://www.theedadvocate.org/10-reasons-the-u-s-education-system-is-failing/>

EMERGING TRENDS IN ONLINE EDUCATION

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ABSTRACT

Online education has radically changed the landscape of modern education. It is offering possibilities of convenience, accessibility, and personalization. Online education has produced a new set of strategies. Discussion forums, question and answer pages, chat boxes, live chats, shared documents and folders help people share ideas in a collaborative environment and create an online learning space for learners to engage with each other. Increased penetration of internet and smart phones, have led to the growth and expansion of online education. Online education modules today allow distant learners to join in virtual lectures, pose questions to professors, chat with fellow students and take virtual exams. Most of the programs are career-focused helping students to chalk a career path and set goals. Emergence of Cloud Computing, Game learning, Project-Based learning, AR and VR, Adaptive learning, Social learning, MOOCs are some of the current trends in online education.

INTRODUCTION

Online education is not a new concept. It has witnessed an upward swing in the last few years. Many institutions had been using this mode of imparting learning to its learners. Over the last decade there is rapid technological developments. Their significant impact has been brought in not only by various technological innovations but also felt in education and economy. Powerful and accessible technology enabled by the internet, has become a central part of everyday lives. Online education modules today allow distant learners to join in virtual lectures, chat with fellow students, pose questions to professors and take virtual exams. Most of the programs create opportunities for everyone to access good education and prepare for meaningful work and life. Online learning is the innovative perspective on the utility of information and communication technology. Online learning includes a plethora of alternative teaching-learning space including internet based courses, teleconferencing courses and virtual reality courses. The common link is that students come to a place and employ technology to connect them to a place to acquire knowledge. It offers a flexible, self-placed, self-centered learning experiences that better go with the time duration of the students and their perceived learning needs. Meaningful online learning can be achieved using a combination of traditional teaching and learning models. Technology made it possible for the students to download ready-made educational material. If the students wanted to collaborate with their co students in order to gain a deeper understanding, they had to use ordinary telephone. Today this has changed. The model of e learning is felt need for establishing virtual campus in order to promote the development of distance teaching and learning.

The following are the some of the emerging trends in online education:-

CLOUD COMPUTING

Emergence of Cloud Computing will be one of the major trends that we witness in India. The Cloud Computing technology enables online education providers to save significant amount of content and data on a single platform. Hence this makes it easier for users and providers to process, obtain, access and manage information from anywhere at any time.

PROJECT-BASED LEARNING

Project based learning allows students to demonstrate skills by developing apps, products etc. Product based education is the foundation of the curriculum of some online educational institutions. Students create several projects over 6 to 12 months and receive regular feedback to earn a degree.

AR AND VR

Virtual and augmented reality is currently the hottest modes of implementing training, as it provides a deeper learning experience. This technologies are expected to have a significant impact on online education in the coming years. Use of AR and VR in online learning platform have shown significant increase in engagement and improved result. Both this technologies immerse the learner in a more tangible, realistic learning experience and offer a simulated learning experience that helps to develop various skills. Virtual reality is popular in gaming. When it comes to class room based lecturers, knowledge retention is lowest. In case of audio/video/visuals, knowledge retention improves drastically. When user mind is able to see something in action its retention is better. We are not only provides opportunity to see something but also experience something. Usually the user need to wear 3D glass experience something as if the person is standing in front of that scene. VR implementations targeted to education. Their application in learning is picking up now.

SOCIAL MEDIA AND PODCASTING

Social media is noticeably becoming a part of culture. The prevalence of this type of communication is increasingly being noticed in class rooms at all levels of education. Many curriculum programs and instructors are utilizing social media outlets not only to deliver material but also to hold office hours and offer an additional sources of communication with other students to build community.

Podcasting, too, is an emerging trend in online higher education, allowing curriculum developers and instructors to record lessons and assign instructions in another way. The ability to disseminate podcasts to students more easily, combined with the personalization of hearing a voice and / or seeing someone, is often well received by students.

DIGITAL CONTENT

Online programs in higher education are increasingly attempting to streamline and make things easier for students by delivering all material, particularly text books, digitally. This enables students to down load to tablets and other mobile devices, having more access and increasing the ability to complete work anywhere and anytime.

COLLABORATION

Many online programs are placing emphasis on collaboration and utilizing collaborative tools in the class rooms. This includes other trends such as social media but also the incorporation of wikis, discussion forums and chat sessions between students within a group and entire class.

BLOCKCHAIN TECHNOLOGY

It is an emerging technology. It is going to dominate innovation across many businesses in the coming decade. Block chain technology is useful when there is need of collaboration, distributed database/ information. Block chain is useful for many areas of education including examination management, student credentials verification, certificate verification etc.

MOOC

Massive Open Online Courses (MOOCs) are one among the most prominent and emerging trends as innovative practices of teaching and learning globally. A MOOC is an online course that can be accessed by anyone who has an internet connection. MOOC depicts open access, global, free, video based instructional content, audios, problem sets and forum released through an online platform to a large number of participants to be educated. MOOCs are flexible in time and space. The meaning of MOOCs indicates- Massive (high enrolment, dispersed geographically), Open (articulated to free and accessible), and Online (web based facilitation). With the help of MOOCs, it has become easier to expand knowledge and information. Teachers, educators, professional and researchers are also expanding their knowledge and improving their skills at the low cost. Though MOOC movement in India is in development stage, it has gained momentum worldwide. India has also taken initiatives to implement MOOCs at a large scale.

Massive Online Open Courses popularly known as MOOCs have recently emerged as a vital mechanism for learning over a period of time. This concept has received wide attention throughout the world. MOOC brings together people interested in learning and experts who seek to facilitate the learning. Participation in a MOOC is completely voluntary and is dependent on the interest of individual. It is supported with course material, assessment tools such as quizzes, feedback, an examination and a certificate of completion.

There are several advantages on MOOCs. As the platform of delivery is completely online, there is no limitation on number of students. Courses are accessible to anyone with internet connection on computer or mobile. Learners from any part of the world can take this course. Majority of MOOCs courses are free. Its platform has several mechanism that facilitate peer learning by encouraging healthy discussion among various learners. The courses are featured to engage students in a big way. Students can learn at their own convenience. Since the content is digitalized, it can be stopped and re-run at any time when learner wishes to join back. It offers online facility of assessment of students. This saves several resources and preparation of final result. Cost of development of MOOCs is large only for the first time. Students of any part of the world can learn and earn certification from any institute around the world.

SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) is the most recent and comprehensive initiative taken by the Government of India under Digital India Mission. In August 2014 SWAYAM was announced by Government of India as a platform of Massive Online Open Courses. The main objective to launch this platform is to serve the education at a very large scale and to reach the unreached learners to satisfy their educational needs. UGC in India has also notified that MOOC courses are to be offered through

SWAYAM. MHRD, Government of India has initiated the 'SWAYAM' portal to digitalize the education system and to reach the remote areas all over India to achieve the objectives of education for all. SWAYAM is designed to achieve the three cardinal principals of education policy viz, access, equity and quality.

CONCLUSION

Education is the soul of any civilized society. Its importance cannot be over looked. In the present scenario MOOCs are being used globally at a large scale. MOOCs in India are in primitive stage. With its advancement, universities can resolve many challenges such as, keeping track of essential resources, develop access to information, build smarter plans and design safer campuses. MOOCs impact is going to be felt strongly on the education system in India. Awareness of MOOCs is very less. So required ICT skills are to be developed among faculty members. It will be better if some MOOC courses can be developed for sensitizing and training of faculty members on SWAYAM platform first. Despite of all limitations and challenges, increasing use of technology is being recognized at the tool for self learning, enhancing creativity and driving educational innovations. Technological innovations would pave ways for excellence of higher education in India. We should do it with conducive environment.

REFERENCES

1. [https://online.courses:nptel.ac.in/](https://online.courses.nptel.ac.in/),retrieved on 15 september, 2018.
2. GoI (2016) SWAYAM guidelines <http://sakshat.ac.in/office> Document Uploaded/2016.
3. Danial.J. (2016), Massive Open Online Courses: what will be their legacy?

SIMPLIFYING EDUCATION DELIVERY; SOME PERSPECTIVES ON THE INCORPORATION OF TECHNOLOGY FOR EDUCATORS

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ABSTRACT

Education is the buzzword of the modern day development process. Some of the methods and pedagogies have been in use for long. The changing needs of a country with a growing population base and new Education Policy, needs inputs from skill based professionals. Older methods need to be reinforced with technology and reach for the hand held devices(mobiles and tablets). This paper intends to address the manner of simplifying the education process through the use of mobile phones and the other technological inputs. The demands of the sector need to be supplemented with adequate support from the technology handlers and the Governmental Departments concerned. Studies have been made into the current use of technology by the government in the online education segment. Proper political will and civic responsibility may ensure then that the drop out ratio of the country are reduced and more students complete the minimum qualifying examinations or alterative qualifying examinations as the need may be. This would enable a simplification of the education system for the recipients of the technological support.

Keywords: Technology in education, drop out ratio, simplification of education

INTRODUCTION

The challenges of the educational system in the country is immense. Many a time attempts have been made to streamline and the Education scenario in India is by incorporating methods to manage the challenges of volume and distribution. The problems of the education section is less about discipline and physical manangement than about the need to incorporate newer manner of reaching out to the students. With a generation adept to handling technology, the manner to teaching will have to transcend towards visibility, incorporating multi level teaching methods, using web based learning and focus on hand held devices. Aakash¹, was initiated by the government and has henceforth been replaced with faster internet speed and cheaper devices along with telecom boom in the country, in the last 4 years. Hence the path that can be taken today would be easier and more effective in incorporating a technology based learning methodology.

Table 1: Percentage distribution of schools with basic facilities by school categories, India 2016-17

Facilities	Primary	Upper Primary	Higher Secondary	UPS	Secondary School	HSS
Electricity Connection	49.35	77.52	95.46	90.47	88.19	90.84
Computer	10.84	46.75	81.21	80.01	40.14	15.57
Internet Connection	0.90	4.25	67.94	60.15	40.00	9.46

Source:

As the table indicates, there is very high availability of electricity in all schools that were mapped in this data compilation. Comparatively there could be more development of computer and internet connectivity. However, the Government of India's Digital push has resulted greater penetration of telecommunication in the interiors of the country and spread of electricity. Therefore as per the India Brand Equity Foundation Reprt of Telecommunication, 2019, the country is the second-largest telecommunications market, with around 1.19 billion subscribers as of October 2018 (IBEF, 2019). If the telecom market is divided into three segments of wireless, wireline and internet, the wireless market dominates comprises 98.15 per cent of the total subscriber base, as of October 2018. Wireless subscriptions witnessed a CAGR of 19.61 per cent to reach 1,183.41 million at the end of FY18(IBEF, 2019). It needs to be added that the country is the second largest in terms of internet subscribers with 560.01 million subscribers, in September, 2018,(IBEF, 2019). There for the possibility in expanding the educational delivery segment to the country is huge and potential reach is already established.

Telephony (now called telephone) was introduced in India in 1882. The total number of telephones in the country stands at 1035.18 million, while the overall teledensity has increased to 81.82% as of 30 November 2015 and the total numbers of mobile phone subscribers have reached 1009.46 million as of May 2015. India became the world's fastest-growing market for mobile applications in the first quarter of 2018 and remained as

¹ Is a android based tablet computer promoted by the Government of India as a part of its efforts to link 25,000 colleges and 400 univerisities. It was officially launced in New Delhi on 5th October, 2011 and later upgraded April 2012

the world's fastest growing market for Google Play downloads in the second and third quarter of 2018. (Telecommunication Report,2019). The Government unveiled the National Digital Communication Policy, 2018, aiming to attract US 100 billion dollars and \$ million jobs by 2022. Internet penetration in the rural area were mapped at 58.45 %, creating more possibilities as this paper intends to focus. Interestingly, as per TRAI, private operators hold 91.58 per cent of the wireless subscriber market share whereas BSNL and MTNL, the two PSU operators held only 8.42 per cent market share.

Mobile learning is the delivery of learning, education or learning support on mobile phones, PDAs or tablets. E-learning has provided the ability for traditional learning to break out of the classroom setting and for students to learn at home. Mobile learning has enhanced upon e-learning by taking it a step further and allowing students to learn virtually anywhere a mobile signal is available. New mobile technology, such as hand-held based devices, is playing a large role in redefining how people receive information. The recent advances in mobile technology are changing the primary purpose of mobile devices from making or receiving calls to retrieving the latest information on any subject.

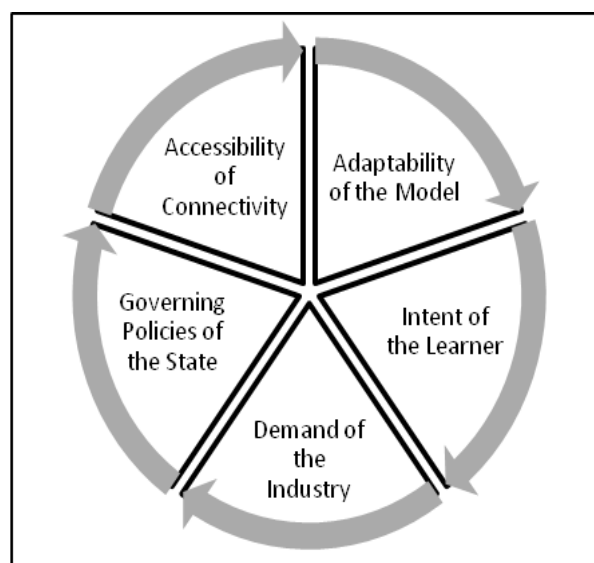
METHOD OF STUDY

The need for technological enhancement is established to take the country towards a skill oriented educational system, better adaptability in a technologically driven world, identification of talent for the requisite job, global adaptability, labour mobility, visual creation and documentation and finally orienting with the changing demands of the job markets. Employability is a bigger a challenge than unemployment. Our existing educational structures and pedagogies are faced with problems like old curriculum, lack of qualified faculty, poor quality of content, and not-so-effective examination system and outdated technical institutions. A disparity exists in the types of skills taught at colleges and those that are demanded in industry. Products of technical education: engineers, managers, architects and other professionals should have the ability to operate effectively while maintaining high professional standards and taking the country along the path of development.

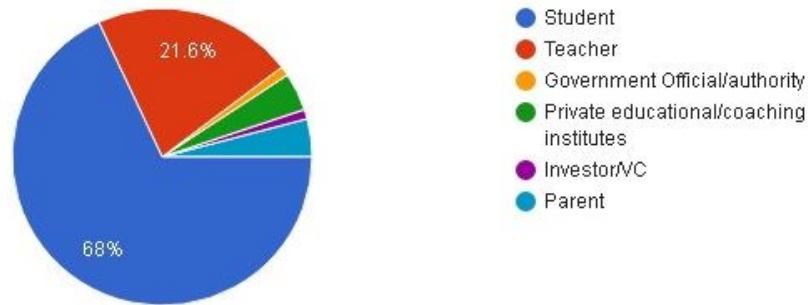
The study incorporated a secondary review of materials available on the existing educational systems, mobile network availability and the identification of the space to demonstrate a digital learning platform and define the necessary requisite for it. For the assessment of the possible solutions a digital survey of the literate youth were undertaken to ascertain the trends and the needs of the digital platform. About 300 respondents have been reached out to and the conclusions achieved.

FINDINGS AND DISCUSSION

As mobile phones become more accessible and affordable and conventional education expensive. To manage this gap in skill sets and ability to adapt the learners need to be reached out to. The study pointed to the following reasons for the choice of the learners both active and passive have, changing demands of learners, readiness to adapt, employers demand for better-trained individuals, need for mobility and changing needs of the times. When devising a learners model for the learners, the following needs to be borne in mind, accessible, educational focus, connectivity, acceptance of the model, demand from employers and finally governing policies at the time.



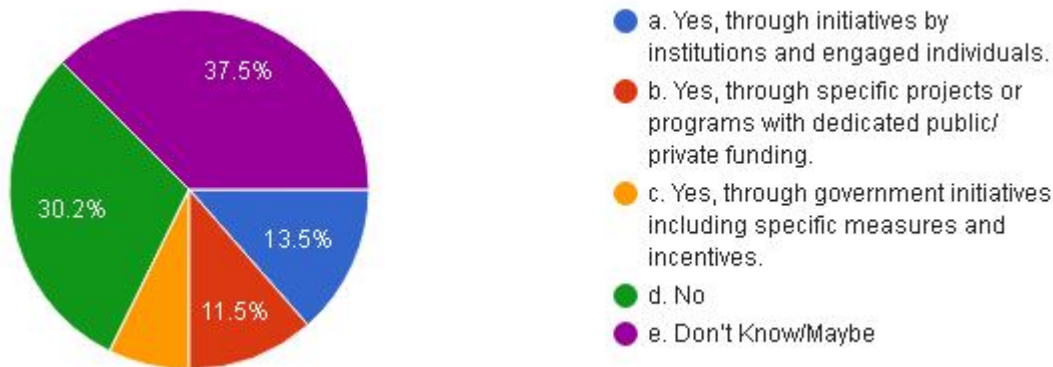
The model is based on the data collected from 300 respondents and their usage and need has been mapped. Among the respondents, over 68% were students as the need was to be mapped from them.



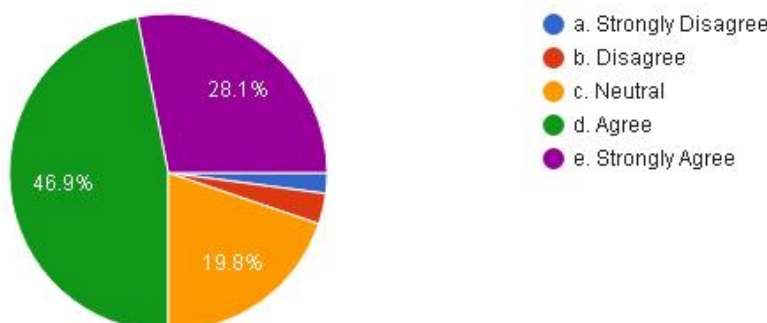
Among the respondents, the most common reason for opting for mobile apps are, saves time, convenient, remaining connected, interactive, easy access to information and entertainment. The students use some apps already which are, Khan Academy, Udemy, Byju, e-pathshala, ed X, coursera and tree house. The highest use is of coursera, which is a advanced skilling option.

Name of the App	% Users
Khan Academy	13.7
Udemy	12
Byju	14.3
E pathshala	5.2
ed X	15.3
Coursera	24.5
Treehouse	15

Interestingly, identification of the frequency of usage of the m apps in a day shows a very high usage of over 59.2 % over 5 hours which could be possibly used for converting into learning space. The respondents were asked if the Government has adequately supported the technological inventions.



On a scale of 5, where 1 is the lowest and 5 is the highest, respondents were asked to rank their satisfaction levels with the existing educational apps and make suggestions. Over 56% were not satisfied with the apps and among the suggestion, the most important one for more diversity in information followed by lack of credibility of multiple sources.



The above graph, shows the people opinion on the ability of mobile apps to revolutionize the education sector and less than half the respondents have agreed to it.

Based on the above study only some of the highlights have been shared in the paper, a model proposal has been made. The learner model, would involve the setting up of a skill based, sector based and academic stage based learning portal for any learner in the country at no additional cost. There have been multiple learning portals which are accessible post payment of charges. The portal could connect the learner to e resources and the faculty on a direct teaching mode as and when the contact hours are decided and proposed. The proposed portal could be a national level one, connecting education in the entire country irrespective of rural or urban slabs. Therefore ability to translate the material and subtitles would be an added feature.

Given alongside are some of the key characteristics that highlight the portal proposal:

1. Availability of wider, state-wise curriculum and skill based learning modules
2. Tutorials at the end of teaching programs
3. Ability to translate and vernacular languages use
4. Assessment and certification of performance by Governmental and Skill Sector
5. Ability to harness problem solving & real-world skills
6. Lower dependency on teachers
7. Establishing lifelong learning behaviour
8. Can be accessed anywhere and at the convenience of the learner
9. No costs involved, except the internet data pack payments.

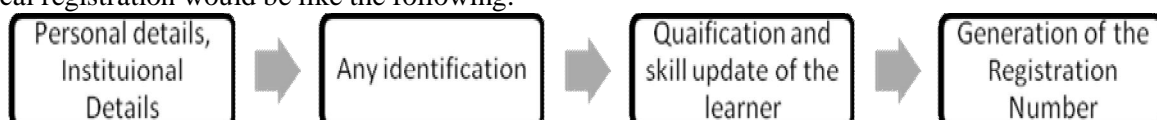
The manner of management of the app would be the following:-



Therefore a student can register, one a national portal only once and he will be allocated a docket number, which will enable him to log in anytime he desires to complete the course. Due to intermittent availability of internet data in some parts, an auto saving mode would be built in to enable the learner to continue from where he exited last. There will be options of taking multiple courses, however he would be required to complete the requisite modules for each to move to the next stage of assessment and evaluation. Attempts would be made to have skill sector to certify the learner and in classical academic disciplines, have a governmental agency to certify the course.

Reach is a major challenge. The modules will be available through the app downloading services and also via the institutions like a school downloading it in larger numbers for groups of learners. In that event, the institutions would complete the registration formality under a faculty.

A typical registration would be like the following:-



There would be options to interact directly with the faculty who have created and uploaded the modules, through face time, emails or internet based calls. As more participation occur in a subject or a module, feedback at the end of a session would help the creators to remove the difficulties in the next updated modules.

There is a zone in the same for the faculty desirous of connecting with a larger audience. The faculty can create any module and upload on the portal. Based on the number of visits of the subject matter created, the faculty can be reimbursed subsequently.

Who can this reach out to:

- Students- School and College
- Skilled workers needing to upskill
- Unskilled workers needing to learn
- Specially abled learners
- Housewives and women unable to reach formal education points

This portal/ app concept can succeed due to the demand for the newer forms of education. It could be flexible and the learner can do it in the best times suited to him. It could be interactive learning, visually appealing, and chances of higher retention of the subject matter.

CONCLUSION

The need of the times in to reinstate the educational system with technological backup. Keeping this in mind this study has devised a manner to reach to all kinds of learners, active and passive to arrive at a unified portal and app based to allow the person to learn at his convenience. The challenges of rural- urban gaps, internet availability, changing pace of technology will always need to be considered. Government has created a mammer to reach for the school based learning, but this is model intends to bring the learning through an easy app based methods through digitisation.

REFERENCES

- Report on Highlights on Telecom Subscription Data, as on 30th November 2018
- S MahendraDev, India Development Report, 2015.
- Census of India, 2011
- Pedró, F. (2006). 'The new millennium learners: challenging our views on ICT and learning'. Paris: OECD-CERI.
- Prensky, M. (2001). 'Digital natives, digital immigrants. On the Horizon', 9(5), 1-6.
- SamsiahBidin, Azidah Abu Ziden, (2013) Adoption and application of mobile learning in the Education Industry.t
- Tapscott, D. (1999). 'Growing up digital: the rise of the net generation'. New York: McGraw-Hill.
- UNESCO Report : ' Turning on Mobile-learning in Asia', 2012..
- World Bank Report 2013 and 2014.

CORPORATE SOCIAL RESPONSIBILITY AND HIGHER EDUCATION

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ABSTRACT

Corporate Social Responsibility (CSR) is a concept whereby companies integrate social and environmental concerns in their business operations as well as in their interaction with the stakeholders. The debate on CSR has been helpful in raising awareness about the non-financial responsibilities of companies. The rise of CSR to prominence in the 1990s and 2000s is one of the most striking developments of the recent decades. Tackling the complex issues of contemporary globalised societies demands participatory collaborative engagements. The need for governments to engage with non-state, civil society actors like corporate entities and NGOs in achieving social and developmental goals, such as improving access to education, promoting goals of higher education has been increasingly highlighted. India is first country in the world to have created statutory provisions mandating CSR initiative. The Companies Act 2013 provides for mandatory contribution towards CSR, with education being specified as an eligible activity. The higher education sector is expected to be a major beneficiary of this mandatory CSR provision resulting in improved funding for the institutions. The idea of social responsibility of business is not new to India, due to the efforts of many well renowned business organisations like the Tata Group. In a highly competitive environment today, both business entities and higher education institutions can collaborate to build their capacities and to facilitate continuous improvement in the field of research and education. The paper seeks to examine the role of CSR in higher education and highlight some initiatives therein. The topic under consideration is treated as purely descriptive one and therefore only secondary sources of data are used.

Keywords: CSR, Initiatives, Higher Education.

INTRODUCTION

Right to quality education is a basic human right and a basic human need. Provision of quality education and access thereto is a major thrust area for the Government of India. An educated society can increase the human development index of a country and contribute towards building up of a progressive society. Higher education plays the role of a catalyst for all developmental processes in societies across the world. Sustainable human development cannot be achieved without access to education. Quality education for the masses is not a simple technological issue or a mere problem of finance. The challenge facing government and public administrators in the twenty-first century is that it can do the jobs by the book and still not get the job done (Kettl, 2002).

The traditional model of government agencies administering multiple programmes by themselves is giving way to collaborations—within agencies; between agencies; between levels of government; and between the public, private and non-profit sectors. The idea of businesses working for the welfare of the societies in which they operate is not new, and has been in existence since centuries. Kautilya, one of the greatest Indian philosophers, also preached the importance of practising ethical principles for businesses. The field of knowledge that encompasses what amounts to socially responsible actions by business entities has been described in the paper as Corporate Social Responsibility (CSR).

CSR is understood in the context of business and society relationship and their inter-dependence. The government institutions and business organizations address the real needs of the society and both are therefore held responsible and accountable to the people and the society at large. Since, both government and business address the real needs of the society, the relationship has an important element of 'trust', which defines and shapes this relationship differently in different social contexts depending on the values, ethics, and norms of each society across the world. Over the years the Corporate Social Responsibility agenda has gained substantial ground and become more main stream for business and public policy. David Vogel (2005) in his work "The Market for Virtue-The Potential and Limits of CSR" observes that growing awareness and increasing interest in CSR, both as a concept and as a movement has been an outcome of the process of globalisation.

CSR implies an active contribution of business to sustainable development and poverty reduction through initiatives in areas where companies can make valuable contributions (Utting, 2007). Such CSR initiatives may be related to core business operations, but this is not necessary. Examples of such initiatives are corporate philanthropy, community investment, cause-related marketing, and partnerships with governments or NGOs for the implementation of development projects. Bottom-of-the-pyramid type initiatives (Prahalad, 2002) and other social ventures also have the typical features of a broader goals perspective. Higher Education becomes a very

critical factor in the development of human capital and subsequently the development of a nation. Thus, CSR engagements in Higher Education could facilitate greater human resource development in a country, more so in a country like India, with a growing percentage of young population.

CONCEPT OF CORPORATE SOCIAL RESPONSIBILITY

The rise of Corporate Social Responsibility (CSR) to prominence in the 1990s and 2000s, is one of the most striking developments of recent decades. Although business responsibilities have long existed throughout the world, in USA the concept of CSR emerged as a basis for reflection on its relation to the wider purpose of the firm in the context of institutions of governance.

CSR encompasses many dimensions of business activity ranging from social and environmental to economic and developmental issues. In the past, profit making was assumed as the basic objective of any business activity. This conventional role of business, confining it to private profit has undergone a radical change in the modern times. Today, business is regarded as a social institution, forming an integral part of the social system, performing a social mission and having a broad influence on the way people live and work together. The increasing influence and role of businesses in society means that businesses have to endeavour to become responsible actors in society, and could help promote inclusive and sustainable development.

Under increasing influence of globalisation, the CSR agenda has gained substantial ground and become more mainstream for public policy and business. In employing the collaborative governance approach, the government can utilise the capacity of private sector entities, the business houses in contributing towards the social development under the CSR mandate. This could help in building governance capacity through CSR engagements.

Kotler and Lee (2005) stated simply that CSR was about 'doing good'. H. R. Bowen, who is often regarded as the father of CSR, defined the social responsibilities of businessmen as their obligations to 'pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society' (Bowen, 1953). Philanthropy has continued as the most noticeable manifestation of CSR. William C. Frederick (1960) observed that 'social responsibility in the final analysis implies a public posture toward society's economic and human resources, and a willingness to see that those resources are utilised for broad social ends and not simply for the narrowly circumscribed interests of private persons and firms'.

Clarence C. Walton (1967) in his book entitled 'Corporate Social Responsibilities' presents a number of different varieties, or models, of social responsibility. The fundamental definition of social responsibility as extended by him was, "in short, the new concept of social responsibility recognises the intimacy of the relationships between the corporation and society and realises that such relationships must be kept in mind by top managers as the corporation and the related groups pursue their respective goals". Peter F. Drucker observes that 'the concept of social responsibility demands that business take responsibility for social problems, social issues, social and political goals, and that it become the keeper of society's conscience and the solver of society's problems' (Drucker, 1986: 220).

CORPORATE SOCIAL RESPONSIBILITY INITIATIVES IN HIGHER EDUCATION

The debate on CSR has been helpful in raising awareness about the non-financial responsibilities of companies. It looks at the mutual interdependence between the business and societal interests. In past few decades business firms have started to increasingly engage in activities that have traditionally been regarded as actual governmental activities. The business corporations are engaging in public health, education, social security and protection of human rights. India is perhaps the first country in the world to make mandatory provisions on Corporate Social Responsibility (CSR). The Government of India had incorporated provisions relating to CSR in Section 135 of the Companies Act, 2013. Schedule VII of the Companies Act lays down the activities, areas or subjects that may be included by companies in their CSR policy. Clause (ii) in Schedule VII of the Act, lists "promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly and the differently abled and livelihood enhancement projects" as item that can be included in the CSR policy. It is thus evident that promoting education at all levels and enhancing employability is a key focus for the government and to achieve this objective, the government is encouraging support from the corporate sector.

In line with the above, there are many corporates that support education and, in particular, higher education and vocational skill development through their CSR initiatives. Some of the CSR initiatives undertaken by corporate entities in India are enumerated below.

TATA MOTORS LIMITED

Tata Motors Limited (TML) believes education is the cornerstone of one's cognitive, psychological and intellectual faculties. TML's CSR programme 'Vidyadhanam' for education, provides support to young learners by ensuring holistic development in education infrastructure and services. The education initiative 'Vidyadhanam' focuses on improving the academic performance of college going students, engaged in disbursing scholarships to the needy and meritorious students, while facilitating them with special coaching classes. The company sanctioned 9,612 scholarships and supported 28,078 students with special coaching in Financial Year 2017-18. The infrastructure improvement initiatives continue to enhance the learning environment for the students.

The employability initiative 'Kaushalya' aims to address high rate of unemployment by skilling people in automotive, non-automotive, agricultural & allied trades.

WIPRO LIMITED: AZIM PREMJI FOUNDATION

Azim Premji University in Karnataka was founded as part of a larger strategy to contribute to the Education and Development sectors in the country. As an institution, it exists to make significant contributions through education towards the building of a just, equitable, humane and sustainable society. This is an explicit commitment to the idea that education contributes to social change.

INDIAN OIL CORPORATION LIMITED

Indian Oil's key Corporate Social Responsibility (CSR) thrust areas include 'Safe drinking water and protection of water resources', 'Healthcare and sanitation', 'Education and employment-enhancing vocational skills', 'Empowerment of women and socially and economically backward groups', etc.

Indian Oil has established an Institute of Chemical Technology at Bhubaneswar in March 2018 which will offer first-of-its-kind programmes viz. 5-year integrated M. Tech. (for experimental design projects to promote entrepreneurship and start-ups) and 2-year Executive M. Tech. for industrial personnel, in addition to Ph.D courses. The institute would evolve into a Research and Development and innovation hub to carry out research in chemical engineering, petrochemicals, textiles, pharmaceuticals and energy. It aims to become a world-class Centre of Excellence in Chemical Engineering & Technology.

'Assam Oil School of Nursing' offers a 3-year Diploma course in General Nursing and Midwifery (GNM) and a 4-year B.Sc. (Nursing) course to 60 young girls every year.

Indian Oil 'Gyanodaya Scheme' in government ITI's and Polytechnics was launched with the aim to provide scholarships on merit-cum-means basis to students pursuing 2-year regular courses in Government ITI's and 3-year regular courses in Government Polytechnics to incentivize them to perform well.

Indian Oil Multi-Skill Development Institute (iMSDI), Digboi, provides vocational skill training to local youth in various industry-linked skills and competencies.

BHARTI AIRTEL LIMITED: BHARTI FOUNDATION

Bharti Foundation, which is the CSR arm of Bharti Airtel Limited, in partnership with Indian Institute of Technology (IIT), Delhi has set up Bharti School of Telecommunication Technology and Management at IIT Delhi. The School has been set up with the vision "to develop telecom leaders through excellence in education and research". 132 students were enrolled in the M.Tech, MS(R), MBA and PhD programs during 2017-18.

The 'Bharti Centre for Communication' set up in partnership between Bharti Foundation and the Indian Institute of Technology (IIT), Bombay aims to promote research in communication theory and systems and foster technical collaboration between the research and user groups. It houses state-of-the-art laboratories and infrastructure that enables a rich research environment and attracts the best faculty and students.

Bharti Institute of Public Policy was set up in a partnership between Indian School of Business and Bharti Enterprises with the Fletcher School of Law and Diplomacy, Tufts University (USA) as its partner school. The institute is an independent think tank with the key objectives: to promote high quality research to guide policy formulation and implementation, to train students- both through degree and short-term programmes, to better appreciate, formulate and implement public policies, to engage with and inform policy formulation and implementation, particularly in developing country setting.

Bharti Foundation has announced setting up of the 'Satya Bharti University', which will be a multidisciplinary world class university with a special focus on Artificial Intelligence, Internet of Things, Financial technology, Efficient Energy Systems and Robotics. This will extend to the meritorious and deserving under-privileged youth of India and of the globe. The Foundation continues to supplement school level education with Higher

Education and Research Programmes. It has partnerships with Indian and global institutions of repute for knowledge sharing and academic research.

VEDANTA

Vedanta has launched 'Young Achievers Scholarship Programme'. The programme aims to assist Odisha's meritorious students from economically weaker sections in pursuing graduate courses. It will provide financial assistance to a total of hundred students of B.Tech/B.E., Medical (MBBS/BDS/BPT/B.Pharma) and B.Sc.

INFOSYS LIMITED

With the objective of encouraging students to pursue further studies and research across disciplines, especially in mathematics and science, Infosys Foundation, the philanthropic arm of Infosys Limited, has partnered with Chennai Mathematical Institute (CMI). The Foundation gives grants to build capacity of the institution to develop its infrastructure and certain basic necessities for the students. The 'Infosys Foundation' started the Spark-IT programme, specifically for engineering students. The three-month course seeks to provide technology and communication skills training to those who consistently perform well academically. Infosys also partnered with Tata Institute of Social Sciences to build a hostel for students at its Mumbai campus.

HINDUSTAN ZINC LIMITED

The 'Unchi Udaan' project of Hindustan Zinc Limited (HZL) is built on the base created by the Shiksha Sambal project. The programme identifies and trains young meritorious students from the government schools in communities around the area of operation of Hindustan Zinc Limited. The CSR initiative of HZL gives wings to children's dreams of studying in IITs and other institutions of national repute. The project provides to all students who pass in the qualifying exams, free hostel based schooling at Vidya Bhavan, one of Udaipur's leading schools and IIT coaching from 'Resonance', one of Rajasthan's leading coaching centres. Another programme 'Yashad-Sumedha Scholarship for Higher Education' is aimed at providing the much needed sponsorships to the engineering students enrolled in government engineering colleges in Rajasthan, whose families are economically weak and thus unable to provide financial support to the deserving children to pursue their higher education.

CONCLUSIONS

In the contemporary world, the engagements between business and societies is increasingly going beyond the economic domain to intervene into the societal concerns, the local communities as well as lives of the people. The numerous CSR initiatives undertaken in the domain of Higher Education in India seek to address various socio-economic challenges and contribute to the education and development sectors in the country. Some of the CSR activities of business entities like the Tata Motors Limited, Wipro Limited, Indian Oil Corporation Limited, Bharti Airtel Limited, Vedanta, Infosys Limited, Hindustan Zinc Limited, as highlighted in the current paper, address issues such as high rate of unemployment by skilling people, multi-skill development institutes established as part of CSR initiatives provide vocational skill training to youth in various industry-linked skills and competencies, setting-up independent think tanks with the key objectives to promote high quality research, provide scholarships, build Research and Development and innovation hubs, initiate partnerships with Indian and global institutions of repute for knowledge sharing and academic research, inter alia.

CSR practices can be a key to organizational success, while also making a positive impact on the social and economic environment. The government has a role in promoting CSR activities for the benefit of all. Prior to the Companies Act, 2013 coming into effect in India, there was no mention of the concept or practice of CSR in government policies. This emphasises the fact that the idea of CSR is gradually gaining currency in India and the government is also acknowledging the increasing role and scope for the engagement of the private sector in public sphere, such as in the domain of higher education. The social performance of companies in a globalized world today is considered as an important indicator of the business's growth and sustainability. Thus, CSR initiatives in higher education can be promoted to make significant contributions towards the building of a just, equitable, humane and sustainable society.

REFERENCES

A) Books

- Bowen, H. R. (1953). *Social Responsibilities of the Businessmen*. New York: Harper and Row. Cambridge University Press.
- Drucker, Peter F. (1986). *Management: Tasks, Responsibilities, Practices*. New York: Truman Talley Books.

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- Frederick, William C. (1960). The Growing Concern over Business Responsibility. *California Management Review*. Vol. 2: 54-61.
 - Giddens, A. (1990). *Consequences of Modernity*. Cambridge: Polity Press.
 - Kettl, D. F. (2002). *The Transformation of Governance*. Baltimore: Johns Hopkins University Press.
 - Kotler, Philip. and Lee, Nancy. (2005). *Corporate Social Responsibility: Doing the Most Good for Your company and Your Cause*. Hoboken, NJ: John Wiley and Sons, Inc.
 - Prahalad, C. K.: (2002). Strategies for the Bottom of the Economic Pyramid: India as a Source of Innovation. *Reflections: The SOL Journal*. Vol. 3(4): 6–18.
 - Utting, P. (2007). CSR and Equality. *Third World Quarterly*. Vol. 28(4): 697–713.
 - Vogel, David. (2005). *The Market for Virtue: The Potential and Limits of Corporate Social Responsibility*. Washington: Brookings Institution Press.
 - Walton, Clarence C. (1967). *Corporate Social Responsibilities*. Belmont, California: Wadsworth Publishing Co, Inc.

B) Websites

- <https://azimpremjuniuniversity.edu.in/SitePages/origin-and-purpose.aspx>
- <https://www.tatamotors.com/programs/education/>
- <https://www.tatamotors.com/programs/employability-skill-development/>
- <https://www.tatamotors.com/wp-content/uploads/2018/07/06111347/annual-csr-report-2017-18.pdf>
- <https://www.iocl.com/aboutus/corporatesocialresponsibility.aspx>
- <https://www.bhartifoundation.org/page/higher-education>
- <https://www.bhartifoundation.org/uploads/bhartifoundation/files/1542007566-bharti-foundation-annual-report-2017-18.pdf>
- <http://www.vedantaaluminium.com/empowering-jharsuguda-education.htm>
- <http://www.hzlindia.com/csr/csr-programs/education/unchi-udaan/>
- <http://www.hzlindia.com/csr/csr-programs/education/yashad-sumedha-scholarship-for-higher-education/>
- <http://www.hzlindia.com/csr/csr-programs/education/higher-education-support-for-girls/>
- <https://www.infosys.com/infosys-foundation/initiatives/education/>

META UNIVERSITY- A PARADIGM SHIFT IN HIGHER EDUCATION

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ABSTRACT

With the widespread use of Information and Communication Technologies (ICT), the Meta University concept brings the most needed paradigm shift in Higher Education. Traditionally, education is a very socially oriented activity associated with high degrees of personal contact between teachers and learners. The use of ICT in education lends itself to more student-centred learning settings. It empowers students to engage in the learning process and gives them an control in their personal education. The new choice based credit system (CBCS) introduced in the Higher Education by UGC is a step in the right direction developing synergy in the different domains of the higher education. The Meta University concept combines the best in traditional systems with the new opportunities for knowledge enhancement. This paper is an attempt to evaluate the concept of meta university in the context of Indian education system. This would include the need, its scope, applicability and feasibility of the same. This research is carried out with the secondary data for the comparative analysis and in addition use of primary data with the limited sample analysis is made to support the prospect of the concept.

Keywords: Meta university, higher education, ICT, CBCS.

INTRODUCTION

India's Higher Education sector has witnessed a tremendous increase in the number of Universities & Colleges since independence. India's higher education system is the third largest in the world, next to the United States and China. According to a latest All India Higher Education Survey (AIHES) released by HRD Ministry, Government of India, the Gross Enrolment Ratio (GER) in higher education of India has registered an increase from 25.2% in 2016-17 to 25.8% in 2017-18. The country has set an aggressive target of achieving 30 per cent GER in higher education by 2020.

Total enrolment in higher education has been estimated to be 35.7 million with 19.0 million boys and 16.7 million girls. Girls constitute 46.8% of the total enrolment. About 79.4% of the students are enrolled in Undergraduate level programme. Maximum numbers of Students are enrolled in B.A. programme (38%) followed by B.Sc. (16.7%), Engineering and Technology (14.7%) and B.Com. programmes (14.1%). The educational institutions in the public sector and also those in the private sector are now growing at a faster pace. There is a tremendous challenge of regulating and managing these institutes to attain the set goals. This requires entire education system to undergo drastic changes.

India has potential to develop as the world's top destinations for education. Demographically India is a youthful nation. India needs to address the skill challenge by adopting initiatives that are learner-centric, inspire innovative thinking, and encourage lifelong learning. India can become a Knowledge Super Power within the next decade or two by empowering youth education to develop highest level of their competencies and capabilities through the tools and technologies of the age to enable them to participate in developments taking place all over. This can be achieved only through a right system of education for all.

Globalization and modernization have made competence as the cardinal principle of success in international operations. We are in the period of transition from industrial society to information society which is developing new social and economic order. The Internet has immense potential to improve the quality of education, which is one of the pillars of sustainable development. Now information is handy with the wide spread ICT use. ICT will enable access to a variety of information sources, information forms and types. New curricula should be developed for student-centred learning based on information access and inquiry which will develop problem solving and encourage inquiry-based activities. The broadband Internet with grid network will enable linking of Educational institutes which will enable educators and educational institutions to create new paradigms of education.

NEED OF PARADIGM SHIFT

Conventional teaching has emphasis on content. Curricula are written around textbooks. Teachers teach through lectures and tutorials. There are set patterns of examinations. Memorization is the key to success. Courses have rigid boundaries. There are separate domains of knowledge. Traditionally, educational institution provide little choice for students in terms of the method and manner in which programs are delivered. Students have typically been forced to accept what has been delivered without any choice. For instance, a Physics graduate student cannot opt for a course in economics or music or a student with a history major cannot opt to study accountancy

or music. A learner should complete prescribed courses in a year to be promoted to next level. The syllabi are almost unchanged from inception and are not compatible with changing needs and students choice.

Globally, research & development activities and innovations are increasingly becoming multidisciplinary and collaborative. The wide spread penetration of ICT and globalization of education requires a new alternative to traditional universities which can cater to the ever increase demand of new skill and technological competence to enhance the employability of students. It is high time to develop new applied courses which are the required to meet the demands of the new market economy.

Choice Based Credit System(CBCS)

The CBCS allows students to take courses of their choice with an interdisciplinary approach to learning bringing out the inherent interest and aptitude by crossing the artificial boundaries of varied academic disciplines. They learn at their own pace. Students have greater choice of subjects within a maximum number of credit points. They can undergo additional courses and acquire more than the required credits. Students can take less or more credit per semester. An undergraduate degree would require the student to gain prescribed number of credits to complete the graduation program. The students can go beyond institutional boundaries by way of transferring credits across accredited institutions. The concept of students completing all three years of an undergraduate degree or two years of a masters degree in the same university will also change with an inter-university transfer policy in place. It will provide a much needed a multidisciplinary approach for research and innovation which will help to develop human resources to suit a wide range of career opportunities.

What is meta-University?

Charles Vest, president-emeritus at America's Massachusetts Institute of Technology was first to talk of the emergence of the meta-university. It is a interconnected web-based platform network for higher education that will allow students the flexibility to design their own curriculum and combine subjects of their choice. It will also enable students and teachers to access and share teaching material, scholarly publications, research, scientific work and virtual experiments. The internet will provide the communication infrastructure, while a network of universities will offer courses in various disciplines, facilitating more collaborative and multidisciplinary learning. The meta-university would enable for example, a science student enrolled in a college or university to take up a course in literature at any other college or university of his choice. This will enable students fulfill their interest and unleash their potential which will create a new mindset for innovative research and productivity.

Meta-University and India

Government of India as a significant step towards ushering in a knowledge revolution in the country with connectivity to all the knowledge and research institutions in the country using a high-speed fibre-based broadband network established National Knowledge Network (NKN) at an outlay of Rs 5990 Crore. NKN with its multi-gigabit capability aims to connect all universities, research institutions, libraries, laboratories, healthcare and agricultural institutions across the country to address such paradigm shift.

The Massive Open Online Courses (MOOC) platform Swayam (Study Web of Active Learning by Young and Aspiring Minds) initiated by Government of India is providing a platform for the delivery of free courses. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. More than 1,000 specially chosen faculty and teachers from across the Country have participated in preparing these courses. University students can register for the courses free of cost. The assessment of the student can be done through proctored examination. The marks/grades secured in this exam could be transferred to the academic record of the students. UGC has already issued the UGC (Credit Framework for online learning courses through SWAYAM) Regulation 2016 advising the Universities to identify courses where credits can be transferred on to the academic record of the students for courses done on SWAYAM.

The HRD ministry has taken initiative to implement the meta college from the academic session beginning 2012 in Delhi University as pilot project. A unique Masters of education dual degree in collaboration with Jamia Millia Islamia designed on the basis of the Meta University concept. DU also introduced B.Tech Innovation with Mathematics & Information Technology and B.Tech Humanities.

Difficulties in developing meta-university

Many central universities that do not follow the credit system will have to change and will also have to standardise the credit system within their respective departments, a move that will make it easier to compare different universities and courses within them.

However, practical problems that have prevented the implementation of previous similar proposals will still have to be addressed. In 2009, the government approved connecting 18,000 colleges and 419 universities. So far, however, only 11,600 colleges now have internet connectivity.

Implementation of the meta-university would also require all participating institutions to have a similar credit and grading system, which is not currently the case.

A flexible credit system would mean recruiting more teachers, since students could be distributed in a large number of small groups. Shortage of faculty has often been the most important. As fluid credit system adopts an interdisciplinary approach to learning, efforts in appropriate curriculum designing is tremendous challenge.

The University Grants Commission has framed guidelines for credit transfer framework for online learning courses keeping in mind the HRD Ministry's massive open online courses (MOOC) platform Swayam (Study Web of Active Learning by Young and Aspiring Minds). The transfer policy does not include private universities or the yet-to-be-established innovation universities. But government sources indicated that any new university established with government involvement could be brought into the new system.

REFERENCES

1. AISHE portal (<http://aishe.nic.in/aishe/reports>): All India Survey on Higher Education 2017-18
2. National Knowledge Network: <http://nkn.gov.in/about-us>
3. UGC portal: (https://ugc.ac.in/pdfnews/8023719_Guidelines-for-CBCS.pdf)
4. 4. Multidimensional Impact of Globalization on Higher Education in India by Smita Deshmukh, Conference Paper, July 2017 Conference: 37th non government principal forum conference at Dhanwate College Nagpur, At Nagpur.
5. Globalization and its Impact on Higher Education in India by Dr. Pramod Kumar Naik, International Journal of Humanities and Management Sciences (IJHMS) Volume 3, Issue 6 (2015) ISSN 2320–4044 (Online)
6. The role of ICT in higher education for the 21st century: ICT as a change agent for education, Ron Oliver, Edith Cowan University, Perth, Western Australia
7. <http://timesofindia.indiatimes.com/articleshow/23113845>.

IMPACT OF SMART PHONES ON ACADEMIC BEHAVIOUR OF COLLEGE STUDENTS

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ABSTRACT

In this paper, the study of correlation between the duration of usage of smartphone and academic performance of college students have been carried out. The deductions are on the basis of survey conducted on first year, second year and third year BCOM, BMS and BSC students. Majority of

respondents admitted that it has affected their studies adversely. Their deteriorating academic performance and grades prove this point beyond any doubt.

Further the impact of frequency of mobile usage on the psychological health of college students has been observed. An alarming finding of the survey is that the frequency of mobile usage results in change in moods. Since the holder is hooked to the gadget, addiction is natural outcome and anything one is addicted to, is bound to cause mood swings. Creativity and self confidence, on the other hand are two positive outcomes of the usage of SMF.

INTRODUCTION

A smart phone is a mobile phone with an advanced mobile operating system and additional software functions. Smart phones are major extensions to cell phones. Modern smart phone currently includes all the features of a laptop such as large screen, web browsing, WIFI connectivity and an operating system capable of running advanced third party applications.

IBM, in 1992, came out first with Simon personal communicator. It was mainly targeted at entrepreneurial world with features such as mailing, texting, faxing etc. Nokia was the next to enter the smart phone space in 1996. It released Nokia 9000 communicator with smart applications such as web browsing and word processing facility. Next, Ericsson released GS 88 which was lightweight flip phone, thus intensifying the competition in smart phone market further. With Apple announcing its series of I phones in this decade, sheer volume of handsets and convenience of on demand internet from practically everywhere in the world- has changed the face of mobile market completely, making it a household reach. After being introduced in late 90's, smartphones have come a long way to define the way people connect to the rest of the world. In this century, young generation is the most loyal user of this gadget. As far as college scenario is concerned, it is observed that smartphone is ever present on the college campuses. It is an integral part of college life and culture. College students are seen frequently using their phones during class time despite rules against doing so.

Several recent studies, using a variety of methods, identify a negative relationship between multitasking and academic performance. First, Wood et al. (2012) measured the influence of multitasking with an array of electronic media on students' ability to learn from typical, university classroom lectures. Emailing, MSN messaging, and Facebook use via computer were all investigated as was cell phone texting. Results showed that multitasking with any of the technologies was associated with lower scores on follow-up tests compared with students who did not multitask. Second, Junco and Cotton (2012) used a hierarchical regression to determine the power of multitasking to predict actual cumulative college GPA. Results showed that Facebook-multitasking and texting-multitasking were significantly and negatively related to college GPA after controlling for sex, actual high school GPA, time preparing for class, and a student's Internet skills. Finally, Rosen et al. (2013) observed the study behaviours as well as study settings of a sample of middle school, high school, and university students. Participants were observed for 15 min with on-task and off-task behaviour recorded every minute. Results showed that participants typically became distracted by media such as Facebook and texting after less than 6 min of studying. Furthermore, measurements of daily Facebook use and daily texting behaviour predicted off-task behaviour during study periods as well as self-reported GPA.

Global research shows that excessive use of smartphone addicts its user. As cellphone technology continues its rapid development, modern smartphones offer large benefits to the students in their studies. It gives immediate access to collection and retrieval of data and sharing as well as interacting the same with others. However, many college students perceive their smartphones primarily as a leisure device for social networking, surfing the net, watching videos and playing games, thus constantly hooked to their prized possession.

There are potential academic as well behavioral risks associated with high frequency smart phone users. Therefore, researchers propose to take up the topic for scientific investigation of the phenomenon.

In this paper, the correlation between the duration of usage of smartphone and academic performance of students have been done by using the descriptive research design. The Universe for the research purpose chosen for the study is degree college students of the University. Total numbers of respondents covered under the survey are 409. Method of sampling used was convenient sampling method.

Secondary data was collected through reference books, academic journals, periodicals as well as internet sources. Primary data was generated through structured questionnaire.

Data processing, analyses and interpretation was done by applying suitable statistical techniques such as percentage analysis, correlation analysis.

Furthermore, investigation of the relation between frequency of mobile usage and physical and psychological health of college students has also been carried out.

ANALYSIS OF DATA : TABLES AND GRAPHS

2.1.CLASSWISE DISTRIBUTION OF RESPONDENTS

No.	Class	Frequency	%
1	T.Y.B.Com/BMS	225	55
2	S.Y.B.com/BMS	184	45
	TOTAL	409	100

Source: Compiled from Primary data

Above table display profile of respondents selected for the purpose of survey. Total sample size selected was 409, out of which boys were 40.10 percent and girls 59.90 percent. Since the main purpose of survey was to find out the impact of smart phones on the overall behavior of college students, researchers concentrated mainly on degree college students as the chances of possessing the smart phones were found to be more with degree college students. Among Degree College students, third year and second year students were contacted out of which third year constituted 55 percent and second year students chosen were 45 percent.

2.2.ACADEMIC PERFORMANCE OF THE RESPONDENTS

No.	Std	Gender	>70%	>60%	> 55%	> 50%	>45%	>40%	<40%	Ttl
1	10th	Boys	96	52	10	03	03	-	-	164
		Girls	157	73	09	04	01	01	-	245
2	12th	Boys	88	59	11	02	04			164
		Girls	98	112	26	07	02	-	-	245
3	F.Y.B	Boys	02	29	35	44	43	10	01	164
		Girls	15	49	45	73	55	08	-	245
4	S.Y.B	Boys	04	13	27	22	16	04	01	87
		Girls	11	26	30	48	20	02	01	138

Source: Compiled from Primary data

Out of 409 respondents interviewed, around 60 percent were girls and 40 percent were boys. All respondents chosen were above the age of 18 years. The percentage of girls from third year was 56 whereas from second year was 43 percent. On the other hand, boys from third year were 53 percent and from second year around 47 percent.

Since all respondents chosen were from senior college, above 18 years were 24 percent respondents, above 19 years- 39 percent, above 20 years- 30 percent and less number of students were chosen from above 21 years age category, thus were 6 percent.

As far academic performance was concerned, the research shows that both boys and girls show descending level of academic performance since 10th standard. In 10th standard, 59 percent boys scored above 70 percent, the same percentage is meager in S.Y.B.Com; whereas there is astronomical increase in lower percentage group. There were only 4 percent boys in less than 55 percent category, which has risen to 54+ percent. As far girls are concerned, around 64 percent girls were securing above 70 percent in 10th standard, but in second year, the same percent has come down to 6, which is quite noteworthy and alarming.

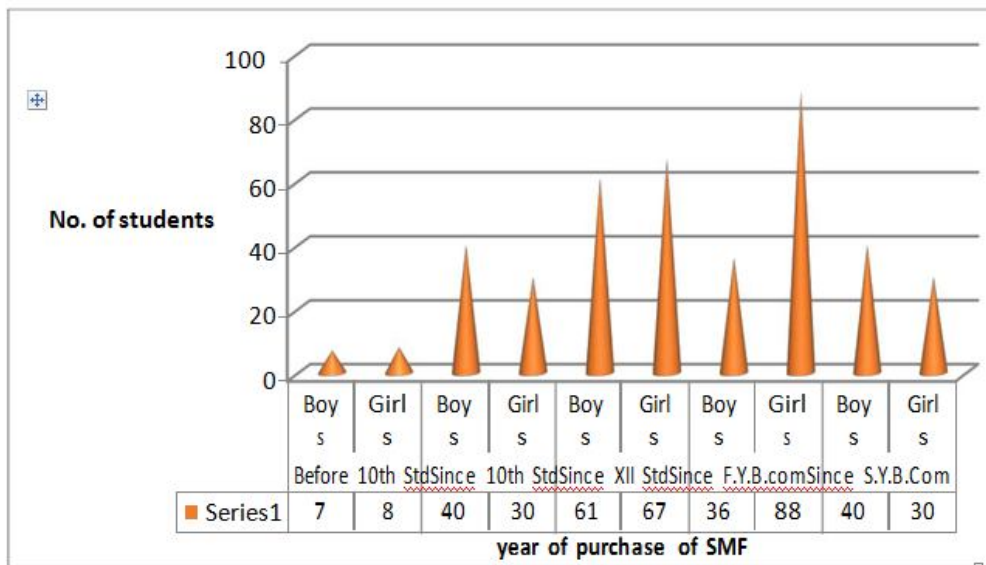
2.3.PERIOD OF USE OF SMARTPHONE

No.	Period of Use	Gender	%	Ttl %
1	Before 10 th Std	Boys	4.26	3.67

		Girls	3.26	
2	Since 10 th Std	Boys	24.39	17.11
		Girls	12.24	
3	Since XII Std	Boys	37.19	31.29
		Girls	27.34	
4	Since F.Y.B.com	Boys	21.95	30.31
		Girls	35.91	
5	Since S.Y.B.Com	Boys	24.39	17.62
		Girls	12.24	
		TOTAL	100	100

Source: Compiled from Primary data

GRAPH 1 PERIOD OF USE OF SMARTPHONE



Most of the students bought their SMF after passing their 12th standard examination (80%). Only 21 percent of the students surveyed were possessing the gadget before 12th standard . Percentage of boys buying the phone before 12th standard was found to be higher (29%) than the girls (21 %) during the same period. More percent of girls appear to have bought SMF since F.Y.B.Com (56%) than boys (34%)

It thus, appears from the above data that boys were more attracted towards SMF in their early adolescent age compared to the girls.

2.4.DAILY TIME SPENT IN USE OF SMARTPHONE

No.	Daily time spent	Gender	Freq.	%	Ttl %
1	--- 3 Hours	Boys	73	44.51	50.12
		Girls	132	53.87	
2	--- 5 Hours	Boys	47	28.65	26.65
		Girls	62	25.30	
3	> 5 Hours	Boys	44	26.82	23.23
		Girls	51	20.81	
	Total		409	100	

Source: Compiled from Primary data

2.5.PATTERN OF USAGE OF SMARTPHONE

No.	Pattern	Rank	Boys	%	Girls	%	Ttl %
		1	66	40.24	102	41.63	41.07
		2	69	42.07	90	36.73	38.87
		3	29	17.68	53	21.63	20.04
		1	17	10.36	39	15.91	13.69

		2		44	26.82	81	33.06	30.56
		3		103	62.80	125	51.02	55.74
	Social	1		81	49.39	104	42.44	45.23
		2		51	31.09	74	30.20	30.56
		3		32	19.51	67	27.34	24.20

Source: Compiled from Primary data

2.6.RANKWISE PREFERENCES OF STUDENTS

No.	Rank	Gender	Entertn.	%	Acadmcs	%	Social Ntw	%
1	Rank 1	Boys	66	40.24	17	10.36	81	49.39
		Girls	102	41.63	39	15.91	104	66.93
2	Rank 2	Boys	69	42.07	44	26.82	51	31.09
		Girls	90	36.73	81	33.06	74	30.20
3	Rank 3	Boys	29	17.68	103	62.80	32	19.51
		Girls	53	21.63	125	51.02	67	27.34

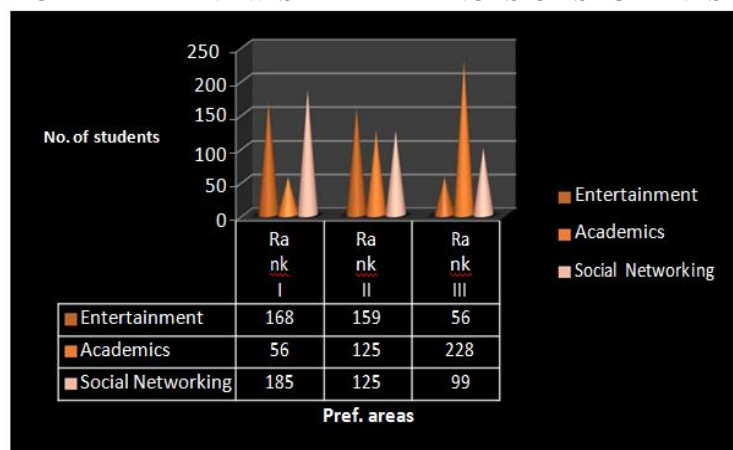
Source: Compiled from Primary data

2.7.CONSolidATED TABLE SHOWING RANKWISE PREFERENCES OF STUDENTS

No.	Rank	Ent	%	Academics	%	Social	%
						netw	
1	I	168	41.07	56	13.69	185	45.23
2	II	159	38.87	125	30.56	125	30.56
3	III	82	20.04	228	55.74	99	24.20

Source: Compiled from Primary data

GRAPH 2 RANKWISE PREFERENCES OF STUDENTS



Three tables along with graph posted above offer the glimpses of pattern of usage of SMF. Total 41 percent students said to be using the phone for entertainment purpose and 45.23 percent use the same for social networking. Only 13.69 percent said to be using the SMF for academic purpose. The preference of both the genders was quite obvious and clear in this aspect. Entertainment and social networking are two main areas of liking of the young generation of SMF holders. Study, academics, references etc is last on their minds as very less number of students use it for academic purpose.

Getting connected with the friends, like minded groups or even with strangers on social networking sites seems to be the favourite past time of students. Surfing on You tube, Facebook, whatsapp and other networking sites appear to give them a sense of belonging to others. As far academics, the use of SMF is restricted to taking photocopies of notes delivered in the class room, for the purpose of examination study.

2.8. IMPACT OF SMARTPHONE ON STUDENTS (BOYS)

No.	Impact areas	Increase	%	Decrease	%	No	%
						Change	
1	Sleeping hours	12	0.06	75	45.73	77	46.95
2	Study hours	19	11.58	96	58.53	49	29.87
3	Direct communication	89	54.26	40	24.39	35	21.34
4	Social connectivity	138	84.14	07	4.26	19	11.58
5	Memory	94	57.31	31	18.90	39	23.78
6	Creativity	119	72.56	15	9.14	30	18.29
7	Interest in reading	74	45.12	44	26.82	46	28.04
8	Self confidence	97	59.14	15	9.14	52	31.70
9	Health	23	14.02	52	31.70	89	54.26
10	Change in moods	90	54.87	14	8.53	60	36.58

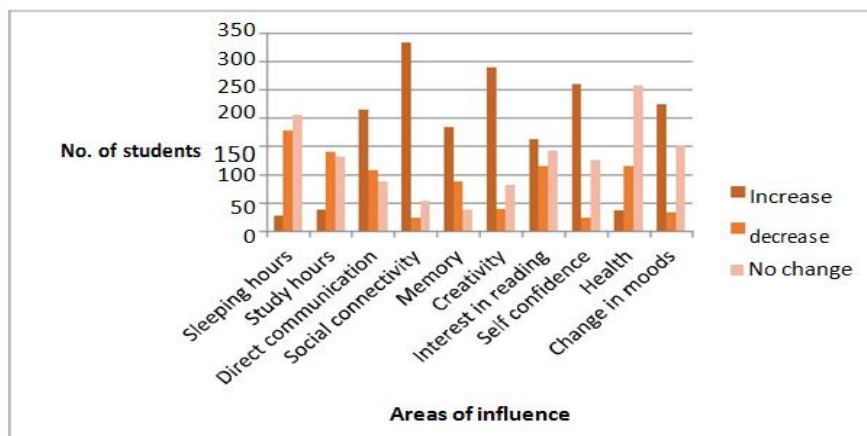
Source: Compiled from Primary data

2.9 IMPACT OF SMARTPHONE ON STUDENTS-(GIRLS)

No.	Impact areas	Increase	%	Decrease	%	No	%
						Change	
1	Sleeping hours	15	6.12	102	41.63	128	52.24
2	Study hours	19	7.75	143	58.36	83	33.87
3	Direct communication	125	51.02	67	27.34	53	21.63
4	Social connectivity	194	79.18	17	6.93	34	13.87
5	Memory	89	36.32	57	23.26	99	40.40
6	Creativity	170	69.38	24	9.79	51	20.81
7	Interest in reading	88	35.91	71	28.97	86	35.10
8	Self confidence	163	66.53	08	3.26	74	30.20
9	Health	14	5.71	63	25.71	168	68.57
10	Change in moods	134	54.69	19	7.75	92	37.55

Source: Compiled from Primary data

GRAPH-3 IMPACT OF SMF ON RESPONDENTS



The three tables posted above show the likely impact of SMF on respondents. More than 45 percent students admitted that it has affected their sleep adversely. Around 30+ percent students said that their studies have been affected negatively due to the use of their gadget. Though SMF has contributed in connectivity, it appears that physical communication has been neglected as a result of virtual communication facility that is available 24 x 7. Memory, creativity, self confidence are some of the areas showing positive influence. On the other hand, more than 50 percent students admitted that SMF has contributed in their mood swings too.

ANALYSIS BY USING KARL PEARSON COEFFICIENT OF CORRELATION

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. For example, height and weight are related; taller people tend to be heavier than shorter people. The relationship isn't perfect. People of the same height vary in weight, and you can easily think of two people you know where the shorter one is heavier than the taller one. Nonetheless, the average weight of people 5'5" is less than the average weight of people 5'6", and their average weight is less than that of people 5'7", etc. Correlation can tell just how much of the variation in peoples' weights is related to their heights.

Correlation Coefficient The main result of a correlation is called the correlation coefficient (or "r"). It ranges from -1.0 to +1.0. The closer r is to +1 or -1, the more closely the two variables are related. If r is close to 0, it means there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other gets larger. If r is negative it means that as one gets larger, the other gets smaller (often called an "inverse" correlation).

3.1 To study the correlation between the duration of usage of smartphone and academic performance of students

We have considered Table 2.2 and table 2.4 and have taken gender wise data as follows:

Daily time spent	Gender	Freq.	Std % > 60	Gender	frequency
		(x)			(y)
1 --- 3 Hours	Boys	73	UG	Boys	48
			FY/SY		
			10		
3 --- 5 Hours	Girls	132		Girls	101
	Boys	47	12th	Boys	147
> 5 Hours	Girls	62		Girls	210
	Boys	44	10 th	Boys	148
	Girls	51		Girls	230

Coefficient of correlation between duration of usage of smartphone and academic performance of boys $r_b = -0.99635$

Coefficient of correlation between duration of usage of smartphone and academic performance of Girls $r_g = -0.99982$

Interpretation: Both the correlations are negative which shows that more duration of usage of SMF affects negatively on the performance of students in exams.

MAJOR FINDINGS OF THE STUDY

- a) . Out of total participants chosen for the survey, boys were 40 percent and girls were 60 percent. More % of students were from Third year, as third year students are presumed to be more mature than others and also aware of what they are doing. Academic performance is observed on the descending scale, both age and sex wise. In 10th standard, total number of students above 70 percent were 37.40 which has reduced to mere 6 percent in second year of their graduation. % of students between 45 and 59 percent were 12 which has increased to 72.12 percent. Number of students securing less than 45 percent was 0.29 percent in 10th standard, which has increased to 5 percent in second year. Similar trend was noticed among both boys and girls in 4 years. With each passing year, their qualitative performance shows descending order.
- b) Girls use smf more for academic purpose compared to boys. Chatting, connecting, games, music, movies, photo clicks are the main purposes for which the gadget is used across both genders.
- c) SMF has certainly impacted the study hours of both the genders alike. Majority of respondents admitted that it has affected their studies adversely. Their deteriorating academic performance and grades prove this point beyond any doubt.

- d) Creativity and self confidence, on the other hand are two positive outcomes of the gadget. As it opens up the world in their hand, (“Kar lo duniya Mutthi me”), it has given unparalleled exposure to them. Possibly, this exposure and instant connectivity has increased their confidence and creativity levels.
- e). Addiction to SMF is reflected in their habit of checking it several times a day. This obsessive compulsive disorder has resulted in tension and fear of losing the smf too. The very thought of malfunctioning or losing their prized possession gives them tension. They do not want to part with their SMF and many keep it by their bedside in the night which is very dangerous habit.
- f). Change in moods is another alarming finding of the survey. Since the holder is hooked to the gadget, addiction is natural outcome and anything one is addicted to, is bound to cause mood swings.

CONCLUSION

Smartphone is finely integrated with college culture. Young generation is perennially hooked to their phones everywhere- at home, in transit, in the college, when alone or in the groups. It has become super intrinsic part of their life. High frequency smart phone users seems to have developed addiction related symptoms- both at physical and psychological level. Our study will also lead to understand association of students with usage pattern of smartphones, academic inclinations, health hazards and behavioral changes (social and personal).

This study is expected to be useful to academicians, administrators, policy makers as well as principals and teachers to understand students psychology and issues involved in it. This knowledge is expected to enhance teaching learning process that shall benefit all stake holders.

REFERENCES

1. Klomegah R.Y (2007), Predictors of academic performance of University Students, *College Student Journal*, 407-415.
2. Chester, J., & Montgomery, K. (2008). No escape: Marketing to kids in the digital age, *Multinational Monitor*, 29(1), 11-16.
3. Sanchez- Martinez M. (2009), Factors associated with cell phone use in adolescents in the community of Madrid, *Cyber psychology and Behaviour*, 12,131-137.
4. Chen S.Y et al (2010), College female and male heavy internet users profiles of practices and their academic grades and psychosocial adjustment, *Cyber psychology and Behaviour and Social Networking*, 13, 257-262.
5. Jacobsen W.C et al (2011), The wired generation- Academic and Social outcomes of electronic media use among University students, *Cyber psychology and Behaviour and social networking*, 14, 275-280.
6. Junco R. et al (2011), perceived Academic effects of instant messaging use, *Computers and education*, 56,370-378.
7. Reginald L. Bell et al (2011), young consumers in the new marketing Ecosystem: an analysis of their usage of Interactive technologies, *Academy Of Marketing Studies Journal*, Volume 15, no 2, 23-43.
8. Karpinski A.C et al (2013), An exploration of social networking site use, multitasking an academic performance among US and European University students. *Computers on Human Behaviour*, 29, 1182-1192.
9. Jain K, Katkar N (2013), Mobile phone addiction among youngsters, *Scholar Research Journal of Interdisciplinary Studies*, 8, 473-479.
10. Sonu Subba et al. (2013), Ringxiety and mobile phone usage pattern among students in medical college in South India, *Journal of Clinical and diagnostic Research* 2013, Feb 7(2),205-209.
11. Hejab M, Alfawareh et al.(2014), Smartphones usage among University students-Nagran University Case, *International Journal of Academic Research*, 03/2014, volume 6 (Issue 2),321-326.
12. Abir S.et al (2014), The Impact of social networking: A study of the influence of smartphone on college students, *Contemporary issues in educational research*, Volume 7, No.2.
13. Al-Arthy L.S (2015), Goals, Efficacy and metacognitive self-regulation- A path Analysis, *International Journal of Education*, 2(1) E2.

DISTANCE LEARNING IN PSYCHOLOGY- ADVANTAGES AND CHALLENGES

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ABSTRACT

Education is the most essential right of an individual. It should be easy, accessible and available to everyone. Keeping in mind the various needs of people, Government of different states are trying their best to implement strategies so that education can reach every corner of the society. The most popular mode is regular or full time courses, but many people cannot pursue them due to various reasons like location, medical issues, work timings, affordability, etc. Open universities are a boon for such students. Open universities give advantage of flexible scheduling, alternative teaching methods like online lectures, easily accessible notes, minimal traveling constraints, etc.

In the recent past Psychology degree has been in great demand with many schools, hospitals, voluntary welfare agencies and correctional institutions and many other fields. Thus more and more students wish to pursue both Bachelors and Masters Degree in Psychology. The number of Institutes offering these courses are limited and with restrictions for admission. Thus the demand for Open Universities is on a rise. These Universities have certain benefits as well as limitations. This paper aims at understanding the benefits and limitations of distance learning in the field of Psychology. A small survey will be conducted taking a sample of 50 students studying Masters in Psychology to understand the same.

INTRODUCTION

Education cannot be a right for few chosen ones; it's a necessity for all. Many people are deprived of this necessary right due to various problems. Students who are forced to work or are unable to meet certain criteria are forced to stop learning. However, Open Universities have opened the doors of knowledge to every section of the people. Those days are gone when a person would have to fill out the criteria's to study further in a university. Many problems such as cut off marks, high fees, entrance examinations, increasing competition all contributed to the number of people discontinuing education. The name says it all, Open University is for everyone where people can work and study side by side. The aged can study without being alienated and the poor can study at the same level of the others. Hence Open University seems to be a boon for the Indian Educational System.

Open and Distance learning (ODL)

Open and Distance learning (ODL) is a system where teacher and learners don't need to be present at the same time or place. It has flexibility for creating a better experience through online learning and self learning process. In addition the learning time also solely depends on the learner as he has the option available to learn whenever and wherever he wants. The admission process of these universities are simpler but without compromising the necessary quality considerations. Thus ODL is becoming more and more significant in recent time for continuing education, skill updation and quality of education for people living at location which are educationally disadvantageous.

However this kind of learning doesn't come without the shortcomings. Often students of ODL lack the face to face interactions with teachers like the normal college setting. It is too dependent on the technology as most of the activities including filling out admission forms to submissions of assignments are online. Sometimes it becomes difficult even for a good faculty to provide best of education to their students without personal interactions. Particularly in practical subjects like Psychology learning the subject matter online may present certain disadvantages.

Indira Gandhi National Open University (IGNOU)

One of the most popular and older Universities providing Open and Distance courses is the Indira Gandhi National Open University (IGNOU). IGNOU was established in 1985 by an Act of Parliament with the dual responsibilities of enhancing access and equity to higher education through distance mode and promoting, coordinating and determining standards in open learning and distance education systems. Since then, the IGNOU has undergone rapid expansion and has

emerged as an international institution in the field of Open and Distance Learning. IGNOU provides a flexible and open system of education in terms of method and place of learning, combination of courses and eligibility for enrolment, age for entry and methods of evaluation etc. The University has adopted an integrated strategy

for imparting instruction. This consists of providing print materials, audio-video, tapes, broadcast on radio and educational TV Channels, teleconferencing, video conferencing as also the face to face counselling, at its study centers are located throughout the country. The University has adopted the method of continuous assessment and term-end examination for evaluation of the performance of its students enrolled in various subjects.

IGNOU has a large number of programs, ranging from purely academic to technical, professional and vocational at various levels leading to award of Competency Certificates, Diplomas, Bachelor's, Master's and Doctor's degree to successful candidates. Many of these programs are modular in nature.

OBJECTIVES

1. To study the benefits of Distance learning in Psychology.
2. To study the challenges of Distance learning in Psychology.
3. To study the problems faced by students learning Psychology through Distance education.
4. To study the benefits and issues of the M. A. Psychology program of the IGNOU.

HYPOTHESES

1. There is no difficulty in the learning of the concept of Psychology through the distance learning program of M. A. Psychology in IGNOU.
2. There is no difficulty faced in the learning of the practical knowledge of Psychology through the distance learning program of M. A. Psychology in IGNOU.
3. There are no challenges faced by the students of M.A. Psychology program in IGNOU.

METHODOLOGY

Sample: The sample constituted of 50 students doing M. A. Psychology program from Indira Gandhi National Open University (IGNOU). The sample constitute of students studying in Part 1, Part 2 of M.A. Psychology program from different study centers in Mumbai. Few students passed out from the M.A. Psychology program of IGNOU are also a part of the sample.

TOOLS

A self developed questionnaire is used to study the issues faced by students pursuing M.A. Psychology from IGNOU. The multiple choice questionnaire consists of questions based on learning process, admission process, conceptual and practical knowledge acquired, job prospects, benefits and challenges faced by the students. Few open ended questions are included to get detailed opinion of students about the learning experience of M.A. Psychology program of IGNOU.

PROCEDURE

A small survey is conducted for the study. The questionnaire was filled by the sample. The scoring and analysis of the data was done by the percentage of sample responding to a particular question.

Results and Discussion: Distance learning courses in Psychology are now conducted in various Universities. IGNOU is one of the leading Universities offering Graduates and Post Graduate courses in the subject of Psychology. Psychology is a subject gaining more and more popularity among the students in recent years. The regular courses for Psychology conducted by the Universities with limited number of seats are unable to cater to the growing need of students aspiring to get their Masters Degree in Psychology. This can be seen from the data which shows that almost 78% of the students pursuing M.A. Psychology from IGNOU have chosen it as they could not get admission in Full time courses. With the ease and convenience of learning offered by IGNOU, it is gaining more popularity among female students (71%) and male students (29%) as seen in the data. The data also shows that though maximum students fall in the age group 20-30 years (44.4%), people from various age groups are also opting for such courses as seen in the data, 31-40 years (26.7%), 41-50 years (24.4%) and 50 years & above (4.5%), which clearly show that the flexibility of lectures offered by IGNOU allows people from all ages to pursue

education. Another important advantage offered by IGNOU is that students not having a background of Psychology in Bachelors Degree can also pursue M.A. in Psychology. The data collected shows the percentage of students from various fields of Bachelor Education pursuing M.A. Psychology. Students from psychology background (35.6%), Professional fields (22.2%), Commerce (20%) and other fields like engineering, finance, management studies etc. (22.2%). The results show the growing interest and demand for the field of Psychology and the demand of the subject in various professional fields today. Thus M.A. Psychology in

IGNOU is a choice of many because of its repute, ease of admission and learning process, convenience of time and an opportunity for any student to learn Psychology.

Digitization in the field of learning offered by IGNOU is one of the best advantage for the students as getting admission, to filling exam forms to getting notes has become very convenient for the students. Thus students staying far away from the study centers are also able to do the course. However students not comfortable with technology, living in rural areas with problems of electricity and internet facilities still find it difficult to continue learning. Although it is advantageous, technology cannot replace the presence of human as a teacher. Thus the M.A. Psychology of IGNOU is gaining popularity but it is not without the challenges. The major disadvantage is that though it allows people from any field to learn Psychology in Masters, no special efforts are made in the syllabus to fill in the gap of the knowledge of Psychology missed in the Bachelor's program. Almost 80% of students were either unsure or agreed that they have to self learn the concepts that are taught in the B.A. Psychology course. Psychology being a very abstract subject needs clear understanding of the concepts which is easier with the physical presence of teacher. Self learning such concepts simply by reading the notes may lead to lack of understanding or misinterpreting the meaning and essence of the ideas. These students agreed that no compulsion of attendance permit students to not meet the Academic Counsellors and learn only by notes and assignments. Also as many students are working while studying, the undivided attention required to learn a subject is not achieved. 70% of students accepted that due to easy online availability of reading material, the assignments are more often passed on or copy pasted than being self written. Thus assignments become more of a mechanical work than understanding of the concepts which is its actual purpose. 45% of students believe that these assignments offer only an introduction to the concepts and not a detailed understanding.

Another important challenge of M.A. Psychology through IGNOU is about the practical knowledge of the subject. Psychology is a field which is more applied than theoretical. Thus practical knowledge is the soul of the subject. IGNOU does make arrangement for such practical understanding through internships; these are not under the Guidance of a Instructor. When compared to the full time courses where the student is been under observation of the Teacher or a Teaching Assistant, students in IGNOU are working with the professionals in the field who may not be in a position to devote much time to the students to make them understand and to correct them when they go wrong on the field. Also students are more often exposed to the initial case history taking or Mental Status Examination session and to Psychological Testing session. They are rarely exposed to the in depth interview or therapy/ treatment sessions as the cases may not be comfortable in the presence of these stranger observers. It is very essential to get accurate knowledge and experience in the practical field especially in the subject of Psychology as any mistakes made by the professionals can have extremely adverse effect on the mental health of the client which may become irreparable.

It is practically difficult to give exposure to Experimental Psychology which is one of the important practical subject in Psychology through distance learning programs, whereas students doing regular courses learn Experimental Psychology as one full subject in their M.A. Part I and also design their own experiments which give a very clear understanding of research methodology. Thus around 51% of respondents feel that the knowledge about the field of Psychology gained through Distance learning is just enough. This may also pose a challenge in securing jobs after the course. Job prospects becomes difficult as people always doubt that distance/open leaning students do not have much exposure and practical knowledge as compared to regular course students. However not everyone wish to learn Psychology for securing a job. As many as 81.8% of respondents agreed that learning Psychology helped them in their day to day life. They also believed that it changed their perspective towards themselves, others and situations and that they are benefitting from the learning process in their lives through this subject. Thus Institutes like IGNOU are making a difference in people's life by offering Distance learning in the subject like Psychology. With certain changes in the curriculum, the Distances Learning courses can be very beneficial.

FOLLOWING ARE FEW SUGGESTIONS

1. Certain number of contact hours with the Academic Counsellor should be made compulsory.
2. IGNOU can collaborate with certain hospitals, industries, NGOs and counselling Centers to ensure that certain amount of exposure to different cases is given to the student.
3. The assignments should have applied questions so as to refrain students from blindly copying the matter from the websites.
4. Workshops could be conducted and role plays can be used to teach the counseling skills, therapies to the students.

5. Some aspects of experimentation should be introduced at the first year.
6. Students should be given exposure to individual as well as group testing and counselling as both involve different skills.

CONCLUSION

Recent years has seen a drastic increase in the interest of people and demand for the courses of Psychology. The regular courses offering M.A. in Psychology are not enough to meet the demand. IGNOU is one of the old and reputed institutes which are trying to meet the need of people to learn Psychology. With the many advantages of learning Psychology in IGNOU, there are quite a few disadvantages and challenges. Thus with certain changes in the pattern of teaching and the curriculum, distance learning can prove to be a boon to many who wish to learn Psychology but are unable to attend regular course due to various reasons.

LIMITATION OF THE STUDY

1. The sample size is small.
2. The sample is taken only from the study centers of Mumbai.
3. Comparison is not made between students of IGNOU and those learning Psychology through full time courses.

REFERENCES

- <https://globalopenuniversity.wordpress.com/2012/08/04/advantages-of-studying-in-one-of-the-open-universities-in-india/amp/>
- <http://mhrd.gov.in/technology-enabled-learning-3>
- <http://www.indiaeducation.net/online-education/articles/advantages-and-disadvantages-of-distance-learning.html>
- <http://www.ignou.ac.in/ignou/aboutignou/school/soits/programmes/detail/506/3>

PHILOSOPHY OF YOGA AS A THERAPY IN MODERN PSYCHOLOGY**Vaishali Dabke and Rina Patel**

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ABSTRACT

Psychology as an independent branch of knowledge existed in India in the last century. The impact of Western thought has however ruled the Indian Psychology. However mind has been an integral part of study in various branches of knowledge in ancient India. For instance the nine systems of Philosophy especially Vedanta and Yoga refer to various aspects of Mind. Mind was recognized as the cause of sufferings as well as the means to liberate oneself from the same. However it was never an independent branch of knowledge.

Mind has been an important aspect of study of Psychology. However the contribution of ancient Indian Philosophy to study mind has been recognized and accepted in Psychology off late, not only as a theory but also as a therapy.

The present paper tries to throw light upon the commonalities and complementary virtues between the two branches of knowledge namely Ancient Indian Philosophy and modern Psychology.

Keywords: Yoga, therapy, mental health

INTRODUCTION

Modern Indian Psychology- Psychology in India as a modern discipline has a short history span of about a century. Psychology as understood today is a study of human behavior. Psychology as a discipline was first established in Calcutta had a strong influence of Euro-American tradition. The pioneers of Psychology in India were trained in and were highly influenced by the Western thought regarding the psychological concepts.

The early focus of research in Psychology in India was experimental Psychology, Psychoanalysis and Psychological testing. However this scene changed gradually and Psychology expanded its scope. Thus today Psychologists not only pay attention to problems related to cognitive processes, personality processes and human development but also try to study the challenges faced by the society such as prejudices, discrimination, morality, changing life style and its impact on the individual person's mind and overall well-being.

Thus the focus of Psychology today is to enhance mental health and quality of life by understanding the inner processes. However this pursuit to understand mind and its function dates back to the Indian Philosophical literature. The vast literature pertaining to Veda, Upaniṣads, Philosophical systems like Vedānta, Yoga have tried to study and understand mind. Text like Patanjali's Yoga-Sūtra offers extensive analyses of the themes of mind-body relationship.

Sanskrit philosophical literature - Sanskrit philosophical literature comprises chiefly Vedas, Upaniṣads, six Vedic and three Non-Vedic systems of philosophy and Bhagavadgītā, Purāṇa Literature etc. Present paper deals especially with Yoga system, one of the Vedic schools of Indian Philosophy. History of evolution of Indian philosophy and of course the Yoga System can be traced back to Vedic literature especially to Upaniṣads. The theories in the Upaniṣad literature were then compiled and systematically arranged in the form of the fundamental text of Yoga system titled 'Yoga-sūtra' by Patañjali whose date is c.2nd B.C. Treatise of Yoga-sūtra comprises 195 aphorisms divided into four chapters namely Samādhi, Sādhanā, Vibhūti and Kaivalya. The first chapter deals with meditative absorption which is the culmination of Yoga. The second deals with means to the said end namely 'Aṣṭāṅga Yoga', the third with supernatural powers resulting due to practice of Yoga and the fourth with liberation. The meaning of word 'Yoga' means union with the Ultimate Principle.

OBJECTIVES

1. To find the similarities in the understanding of mind in the Yoga system and Modern Psychology.
2. To understand the importance of Yoga as a therapy for mental health issues.

Yoga as a therapy for Mental health- Patañjali in his Yoga-sūtra, defines Yoga as tranquilizing mind by arresting all thought-waves which requires a reversal of its natural tendency to run after the objects in the external world. Patañjali has mentioned five general conditions of mind namely tossed, distracted, confused, pointed and restrained. He has classified the mental states which can be called as the faculties of mind such as valid cognition, misinterpretation, imagination, sleep and memory which are further classified and explained. After explaining the nature of mind and the aim of Yoga, Patañjali proceeds to the means to attain the thought-free state of mind, the final stage of the life. This is the core of his practical teaching, which has been accepted

by almost all the schools of Indian philosophy and is popular even today in India and out of India as well. This part of practical Yoga consists of eight limbs or stages namely 1) Yama 2) Niyama 3) Āsana 4) Prāṇāyāma 5) Pratyāhāra 6) Dhāraṇa 7) Dhyāna and 8) Samādhi. The first two stages constitute the moral self discipline which helps in detachment and purification of heart. The next is mainly physiological in nature and aim at physical health which is required for arduous practice of Yoga. The last three are psychological and spiritual in nature. Prāṇāyāma is the bridge connecting physical and spiritual stages. Thus consistent practice of the eight steps of Yoga, which are known collectively as 'Aṣṭāṅga Yoga' helps to gain health at physical, emotional, mental and spiritual level. However today common man practices Yoga for physical fitness and mainly for relieving stress and not for spiritual purpose. Because of this limited purpose, not all the stages but only two stages of yoga namely Āsana and Prāṇāyāma are practiced by most of the aspirants today. However, consistent practice of merely these two stages of Yoga can bestow some positive emotions like patience, endurance, stability, love, compassion, happiness etc. in humans. Thus Yoga is also proving to be helpful for curing some psychological disorders like depression, psychosomatic disorders like hypertension, diabetes and certain stress related disorders, etc.

This has been proved by a study conducted by Morgan (1999). The study compared three independent groups, a control group, and two treatment groups, a cognitive-behavioral (CBT) based stress management group and a Sahaja-Yoga meditation group. Both treatment groups consisted of six, two hourly sessions conducted once per week. The severity of symptoms was measured at pre and post-treatment using the Hospital Anxiety and Depression scale (HADS) and the General Health Questionnaire (GHQ-12). The results showed that, compared to controls, the participants in the Sahaja-Yoga group reported significant reductions on all measures of symptoms. Surprisingly, the CBT based group showed no such reductions in symptoms.

Āsana – Patañjali does not state different types of yogic postures. By the word Āsana, he meant the posture which aspirant may be able to maintain comfortably for sufficiently long period required for practice of Prāṇāyāma and the further stages in Yoga. Later works on Yoga state various types of Āsanas. They can be classified into three types i. e. Meditative Āsanas, Āsanas beneficial for the flexibility of body and Āsanas for relaxation. They are performed in four ways namely sitting, standing, supine and prone. Today Āsanas beneficial for the flexibility are more popular and practiced in daily exercises. These Āsanas are mainly designed for the flexibility of backbone where the 66% muscles of the body are located. Thus Āsanas are for strengthening of the spine. They are forward-bending, backward-bending, sideward-bending, twisting, vertically-stretching, topsy-turvy and balancing in nature. These Āsanas are performed in a very systematic manner having followed the specific steps. These steps broadly can be stated as follows: 1) Preparatory stage 2) progressing towards the final posture of Āsana 3) attaining final posture Āsana and maintaining it 4) reverse marching 5) reaching primary stage. The stages mentioned are to be performed in every Āsana in the same order steadily, slowly without making any haste and as per one's own capacity. One is expected to observe, experience with total understanding i. e. with awareness the changes occurring in the body like stretch, pressure, bend, twist etc. at every stage mentioned above. Thus these steps involved in Āsanas improve physical health by increasing flexibility, endurance, steadiness, improve functioning of digestive, respiratory, especially endocrine system, decrease breathing rate, increase awareness in general and awareness about oneself in particular. The Āsanas not only have physical but also psychological benefits. They may prove beneficial in developing various faculties of intellect viz. grasping, memorizing, logical sequencing. The talk with oneself required to perform Āsanas can improve body-mind coordination and can divert mind from dysfunctional thoughts and worries.

During the third stage i.e. while maintaining the final posture, the performer should relax in each and every part of the body. There should be no strain at all anywhere in the body. Thus the process of making body effortless and completely relaxed in the perfect physical posture consciously it is called as 'Prayatnaśaithilya'. When the final posture is attained as mentioned above, the mind is diverted to some object of infinite dimensions and an attempt is made to merge mind into it and let it become one with it. In other words, one is supposed to think and visualize in the mind anything like sky or ocean which has no finite dimensions. This phase of visualization is akin to meditation. As people learn to visualize they can use it as a technique of distracting themselves during stressful situations. Also visualization is a powerful tool to relax mind during stress. Research shows that meditation increases the activity in the left frontal lobe, which is associated with the positive emotions like happiness, content, etc. which helps in reducing depression and anxiety.

Consistent practice of Āsanas as mentioned by Patañjali results in immunity towards dualities especially psychological conflicts. Psychological stress and physical stress affect each other creating adverse impact on body-mind complex. Regular practice of Āsanas as mentioned by Patañjali helps one to preserve the state of

relaxation at both the levels even in disturbing situations. Thus the positive effects of Āsanas does not remain merely on the physical level but goes beyond it and progresses one to spirituality.

Prāṇāyāma - Prāṇāyāma is defined by Patanjali as the break or regulation in the natural pace or movement of inhalation and exhalation. It is emphatically said that Prāṇāyāma should be practiced only after acquiring mastery over Āsanas. Prāṇa is a vital energy in the body and breathing is a gross manifestation of the same. The main purpose of Prāṇāyāma is to control breath and to control mind through it. It is well known that breath and mind have close relation. Both are interlinked and impact each other. In Haṭhayogapradīpikā, a famous work on Yoga, it is clearly mentioned that when the breath speeds up mind becomes turbulent and when it is steadied mind calms down and vice versa. System of respiration is semi-controllable whereas mind is extremely difficult to control. One cannot practice Prāṇāyāma without concentrating on breathing. Prāṇāyāma when practiced with complete awareness helps to control breathing and when breathing is controlled consciously it helps to control the mind running wayward. This controlling of breath can be then used to stay calm during challenging and stressful situations. When one focuses on breathing all other thoughts in the mind recede. Thus, mind becomes calm and collected.

THE FIVE STAGES OF PRACTICING PRĀṆĀYĀMA ARE AS FOLLOWS

1. Cleansing of Respiratory track by Kapālabhāti or Neti.
2. Normalizing the breathing rate with the help of deep breathing exercise.
3. Controlling inhalation and exhalation by practicing various kinds of Prāṇāyāma under the guidance of able Yoga teacher. It is advisable to begin with simple types of Prāṇāyāma like deep breathing (by counting numbers), Bhrāmarī, Śitalī.
4. Balancing breathing through both nostrils, by practicing Anuloma-Viloma, Suryabhedana and Candrabhedana. These practices bring about balance in the functioning of right and left hemispheres of brain.
5. All the above stages should be practiced with complete awareness.

Prāṇāyāma, when performed consistently in above mentioned manner for a longer duration, helps in gradually fading away the external transitory world and expanding the inner awareness. Prāṇāyāma has proved to show positive psychological effects as well. It connects body with mind, works as the bridge between body and mind, improves concentration which results in improved grasping and retaining capacity, increases the power of discrimination between good and bad. It develops clarity of thoughts, calms down the thoughts, increases positivity and confidence.

Śavāsana- Śavāsana has been mentioned in Haṭhayogapradīpikā. Patañjali has not mentioned it at all. It is defined in Haṭhayogapradīpikā as lying down like a dead body in supine posture on the ground. It removes fatigue and gives rest to the mind. In a way it is a technique of removing stress on physical as well as mental level. Śavāsana is practiced after performing Āsana-s and Prāṇāyāma.

STEPS TO BE FOLLOWED WHILE PRACTICING ŚAVĀSANA ARE AS FOLLOWS

1. Lying down on the carpet with clean towel on it, in supine position keeping comfortable distance between both the legs.
2. Hands to be placed beside the body with palms facing ceiling and fingers half opened.
3. Mouth should be closed, jaws relaxed, eyes gently closed. Facial muscles should be relaxed
4. Awareness of physical relaxation – Creating awareness on physical level with deliberate auto suggestions to relax each and every part of the body. One has to take mind to the each part and rotate the awareness. This step of Śavāsana leads to complete relaxation and focusing on mind
5. Once the body is relaxed, the breathing rate reduces automatically and becomes rhythmic. Awareness of breath can be experienced in various ways e.g. awareness about breathing in and breathing out, awareness of our respiratory path, from nostrils to lungs etc.
6. Awareness of mind – Relaxation of Body and mind respectively results into peaceful and concentrated mind. Once the conscious mind is relaxed and stable, subconscious mind is awakened and starts participating in the process. This is the time to make resolve with assertive and affirmative statements. Resolves made in such a mental state are rooted firmly. Resolve should be repeated two or three times.

7. While releasing Śavāsana, one should be again aware of breath and completely relaxed physical posture, make gentle movements in toes and fingers, legs, hands, head. Giving gentle jerk to the body one should turn to left and should get up gently with closed eyes and sit in Sukhāsana.

Thus Śavāsana helps in attaining a state of mind which is very relaxed. . Relaxed and alert mind is very powerful. It's receptivity at this level is at the best. It is ready to accept positive suggestions and work on it. This step can be extremely useful in therapy to teach self talks used to reduce anxiety.

CONCLUSION

Yoga has proved to have powerful impact on the physical health. But the ideology and logic used in practicing yoga are beneficial in attaining mental health as well. Research has proved the effects of Yoga on reducing the symptoms of psychological disorders especially anxiety, depression and psychosomatic disorders. Research has also shown the positive impacts of Yoga on reduction in symptoms of Schizophrenia and Alcohol dependence Disorders. Apart from reducing symptoms, yoga helps in enhancing positive mood states, life satisfaction, sense of wellbeing, openness, extroversion and in developing useful strategies for coping with stress.

REFERENCES

1. Ciccarelli S. , White J. (2017). Psychology (5th Ed). Pearson Publication
2. Morgan, A. (1999). Sahaja Yoga: an ancient path to modern mental health?
3. Sinha, D. (1965). Integration of modern psychology with Indian thought. Journal of Humanistic Psychology, 5(1), 6-17.
4. Valente, V. G., & Marotta, A. N. T. O. N. I. O. (2011). Prescribing yoga to supplement and support psychotherapy. Spiritually oriented interventions for counseling and psychotherapy, 251-276.
5. Karambelakar, P.V. (1986). Pātañjala Yoga Sutra , (2012 Ed). Kaivalyadhama, Pune.
6. Vyavahare, S.V. (1987). Anandayoga (2012 Ed.), Ghantali Mitra Mandal, Thane.
7. Vyavahare, S.V. and Natu U. (2006) H3 Yoga, Yoga for Health, Healing and Harmony (3rd Ed.) Ghantali Mitra Mandal, Thane.

A RESEARCH ON HYPNOTHERAPY AS AN INNOVATIVE THERAPEUTIC TREND TOWARDS MENTAL AND PHYSICAL HEALTH

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ABSTRACT

Hypnosis has been a therapeutic treatment for centuries. In the modern psychology today, Hypnotherapy is considered as one of the mind–body therapies and innovative therapeutic trend that help in improving mental (emotional) and physical health.

The purpose of this article is to provide an understanding of Hypnotherapy and its clinical applications. To support the efficacy and in-depth understanding of Hypnotherapy, an insight about Neuropsychology and Freudian Psychoanalytic Theory of Personality has been discussed with the goal of increasing exposure and utilization of Hypnotherapy within medical settings. Although its use within medical settings varies considerably.

Keywords: Hypnosis, Hypnotherapy, Mental and Physical Health

INTRODUCTION

Hypnotherapy is considered as one of the Mind–body therapies that help in improving mental (emotional) and physical health. Other Mind–body practices include meditation/relaxation training, yoga, etc.

For therapeutic purposes, Hypnotherapy, when performed well, with different forms of psychotherapy can be an effective modality for changing habits such as eating disorders, weight loss, substance abuse, alcohol addiction, cigarette smoking cessation, etc. It helps in changing the way one feels about self like efficacy, confidence, motivation, etc. It also helps in changing the way one responds to the environment like stress, anxiety, depression, panic attacks, phobias etc. Hypnotherapy does not have the side effects that tablet medication could have.

OBJECTIVE OF STUDY

To have an in-depth understanding about Hypnotherapy as an innovative therapeutic trend in the field of Psychology towards mental and physical health.

REVIEW OF LITERATURE

Several studies are done in the past on benefits on Hypnotherapy. Some relevant literature is as follows:

1) The effectiveness of Hypnotherapy in the treatment of Chinese Psychiatric patients

A study was done on patients suffering from anxiety and depression attending a hypnotherapy clinic for 8 weeks. Participants were assessed with various clinical scales and randomly assigned to either the study or control group. The study group received 5 to 7 sessions of hypnotherapy through the 8-week period, whereas the control group received conventional psychiatric treatment. All patients' clinical conditions were reassessed at the end of the 8th week. Comparing study and control groups at the end of the 8th week, there was improvement in the study group in the scores of an array of clinical scales. Such satisfactory results illustrate the effectiveness of hypnotherapy in relieving anxiety and depressive symptoms.

2) Hypnosis today

I. In one study, Montgomery and colleagues tested the effectiveness of a 15-minute pre-surgery hypnosis session versus an empathic listening session in a clinical trial with 200 breast cancer patients. In a 2007 article in the Journal of the National Cancer Institute (Vol. 99, No. 17), the team reported that patients who received hypnosis reported less post-surgical pain, nausea, fatigue and discomfort. The study also found that the hospital saved \$772 per patient in the hypnosis group, mainly due to reduced surgical time. Patients who were hypnotized required less of the analgesic lidocaine and the sedative propofol during surgery.

II. In a 2009 article in Health Psychology (Vol. 28, No. 3), Montgomery and colleagues reported on another study, which found that a combination of hypnosis and cognitive-behavioral therapy could reduce fatigue for breast cancer patients undergoing radiation therapy.

III. Research has also shown the benefits of hypnosis for burn victims. In a 2007 report in Rehabilitation Psychology (Vol. 52, No. 3), Shelley Wiechman Askay, PhD, David R. Patterson, PhD, and colleagues at the University of Washington Medical School found that hypnosis before wound debridements significantly reduced pain reported by patients on one pain rating questionnaire.

THEORITICAL OVERVIEW ON HYPNOTHERAPY

Western scientists first became involved in hypnosis around 1770, when Franz Mesmer (1734–1815), a physician from Austria, started investigating an effect he called "animal magnetism" or "mesmerism". Hypno is originated from a Greek word 'hupnos' which means 'Sleep'. Hypnosis is a natural state of heightened awareness of the mind. It is associated with deep relaxation and focused inner attention. It is a natural state which one experiences everyday like being really absorbed in watching a movie or reading. It is what people use the term 'being in the zone' mean, or in music or the arts they talk about the 'muse' that place between being awake and asleep.

Therefore, Hypnosis can be defined as a trance state of mind in which the person is in a higher receptive state of mind. During hypnosis, the person is not unconscious and is in complete control of self, does not lose control of one self, and does not do things under hypnosis that one would be unwilling to do otherwise.

Hypnosis when used for curative purpose is called 'Hypnotherapy'. It is a combination of hypnosis and therapeutic intervention. The therapist facilitates the person towards positive change through talk therapy while that person is deeply relaxed in trance state of mind.

During therapy, main elements are client's imagination and subconscious state which helps bring about positive changes to their thoughts, feelings or behaviour. Together the hypnotherapist and client focuses on a singular issue and decide on the desired changes to work on before starting the therapy. Hypnotherapy involves both short and long course of treatment. For a particular issue only a few sessions are needed in some instances.

NEUROPSYCHOLOGY AND HYPNOTHERAPY

Neuropsychology is a branch of Psychology that is concerned with how the brain and the rest of the nervous system influence a person's cognition and behaviors. Professionals in this branch of Psychology often focus on how injuries or illnesses of the brain affect cognitive functions and behaviors.

Hypnotherapy bridges the gap between the two (mind and body) by focusing on balancing the autonomic nervous system (ANS) and activating the parasympathetic branch of the ANS to reduce the sympathetic physiological response to stress and by regulating the hypothalamic pituitary adrenal axis, both of which are indicators of stress. This reduction of stress on the mind and body may help control or reverse certain underlying disease processes. Evidence suggests that the mind and body have constant bidirectional communication through neuro-endocrine, neuro-chemical, immunological, and neuro-pathways.

Glucocorticoid receptors which are found in the amygdala, hippocampus, and prefrontal cortex; when exposed to stressful experiences, lead to increase in glucocorticoid, which may alter the size and neuronal architecture of these areas as well as lead to functional differences in learning, memory, and other aspects of executive functioning of all age groups. Through Hypnotherapy, stressful experiences can be reduced and the condition can be reversed to normal.

Also, chronic stress is associated with hypertrophy and over-activity in the amygdala and orbitofrontal cortex, and can lead to loss of neurons and neural connections in the hippocampus and medial prefrontal cortex. The prefrontal cortex turns off the cortisol response and regulates the autonomic balance (i.e., sympathetic versus parasympathetic effects), it also plays an important role in the development of executive functions, such as decision-making, working memory, behavioral self-regulation, and mood and impulse control. The consequences of structural changes in the brain include more anxiety related to both hyper activation of the amygdala and less control as a result of prefrontal cortex atrophy, impaired memory and mood control due to hippocampal reduction.

Hypnotherapy again, can help develop appropriate connections between the relevant prefrontal structures, thereby stabilizing arousal and reducing harmful risk-taking behaviours. They may reduce the impact of stress-related conditions, lessen depression and anxiety, reduce pain, increase emotion regulation and improve overall quality of life.

Higher cognitive centers and limbic emotional centers are capable of regulating virtually all aspects of the immune system and therefore have an intense effect on mental and physical health. The mental conditions which influences the physical body is termed as 'Psychosomatic' (Psycho means Mind and Soma means Body) meaning physical condition/illness caused by mental factor due to internal conflict or stress within the mind. The study of the interaction between psychological processes, the nervous and immune systems of the human body is called Psychoneuroimmunology (PNI), also referred to as psychoendoneuroimmunology (PENI).

PSYCHOANALYTIC THEORY AND HYPNOTHERAPY

As per Sigmund Freud's (1856–1939) (An Austrian neurologist who became known as the founding father of psychoanalysis) Psychoanalytic Theory of Personality, human mind is divided into three levels of awareness: the conscious, preconscious mind, and unconscious.

The Conscious Mind is an individual's state of awareness of their environment, thoughts, feelings, or sensations. Prefrontal cortex, an area of the brain is heavily involved in consciousness.

The Preconscious Mind is the storage point for current information of day to day such as ones current recurring (automatic) thoughts, behavior patterns, habits, feelings and recent memories needed for quick recall, such as telephone number or name of a person one just met. It is in this zone of mind that Dr Aaron T Beck's - Cognitive Behaviour Therapy (CBT) has proven great results in resolving issues like Anxiety, Bipolar Disorder, OCD (Obsessive Compulsive Disorder), Social Phobia, etc. along with other medications.

The Unconscious Mind is the underground library or storehouse of a person's deep seated emotions, memories and past experiences that have been programmed since birth. These are repressed memories that are simply been consciously forgotten and is not part of automatic thoughts. It is from these memories and experiences that our beliefs, habits, and behaviors are formed.

When a person faces difficulty in changing a habit (eg smoking or over eating) it is because of a conflict between the conscious and unconscious mind.

If there is a conflict between the conscious and unconscious mind, the unconscious mind acts dominant. Therefore, Freud's Psychoanalytic theory teaches that it is in this zone of mind that necessary change can occur through the use of Hypnotherapy. During Hypnotherapy one can communicate directly with the unconscious mind, without letting logical, intellectual conscious thoughts interfere. By resolving issues of the unconscious mind during hypnotherapy one can bring about the desired change for betterment. Also, different techniques and therapies are used by professionally trained therapist during the session to resolve issues, relieve emotional burdens and achieve desired goals.

APPLICATIONS OF HYPNOTHERAPY

Hypnotherapy can be applied to improve, and in many cases entirely remove, any symptom or challenge that may be caused by emotions, habitual conditioning, behavior, psychological issues, accumulated stress, etc. Even unresolved events in past can be accessed and re-program complexes which are being sustained and remain active at the unconscious level, causing disturbances in present life.

Hypnosis, when using proven therapeutic procedures, can be a highly effective form of treatment for many mental, psychosomatic, and physical disorders.

For example, through the use of regressive techniques, an adult patient may mentally voyage back to a point in youth that was particularly troublesome, allowing the healing of old emotional wounds. Another patient can be led to understand that emotional pain has been converted to physical pain, and that the pain can be eliminated once the source has been addressed. There are a number of techniques for correcting dysfunctional behaviors such as self-destructive habits, anxiety disorders, and even managing side effects of various medical treatments and procedures.

Hypnotherapy has been used to stop self-destructive and addictive habits like smoking. It has also been used to curb the urge to eat for overeaters, to stem the disruptive actions of tics, cure insomnia, stop bed-wetting, and minimize anxiety. Excessive stress can be generated from any number of sources and can be the springboard for anxiety. Some of the more prominent sources of anxiety and stress for which people seek hypnotherapy are: public speaking, test taking, and job stress. Hypnotherapy also works well for other anxiety disorders such as phobias and has proven to be an effective treatment for mild to moderate depression. In one study, hypnotherapy was used in conjunction with traditional cognitive therapy, to assist persons who had severe aversion to needles. The treatment was necessary, because it was essential that each participant receive periodic medical injections. However, the participants would have become non-compliant without the adjunct intervention of hypnotherapy. In another case, involving care for terminally ill cancer patients, it was concluded that hypnotherapy was more effective at enhancing quality of life and relieving anxiety and depressive symptoms, when compared to others who received traditional care.

CONCLUSION

After understanding Psychoanalytic Theory of Personality, having an insight on Neuropsychology and application of Hypnotherapy in varied situations, it can be concluded that mind and body are interconnected and

that physical symptoms are (Psychosomatic) influenced by disturbances at various areas and levels of the mind. Therefore, Hypnotherapy can be considered as a valuable tool and an asset in the treating mental and physical health in a medical setting, as it taps various areas and deeper levels of mind and influences and heals the causal reason that are resulting to physical symptoms. Here is a list of areas of applications presented (Annexure 1) below where Hypnotherapy can be effectively applied.

REFERENCES

- 1) Sawni1 A, and Breuner2 CC, McClafferty H (Academic Editor)
- 2) Clinical Hypnosis, an Effective Mind–Body Modality for Adolescents with Behavioral and Physical Complaints

WEBSITES

- 1) <https://chpa.ie/what-is-hypnotherapy/>
- 2) <https://welldoing.org/what-is-hypnotherapy>
- 3) <http://www.minddisorders.com/Flu-Inv/Hypnotherapy.html#ixzz2rK2NufAw>
- 4) <https://hypnosis.edu/help/>
- 5) <https://possiblesolutionshypnotherapy.co.uk/clinical-applications-of-hypnotherapy>
- 6) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5406678>
- 7) <http://journalpsyche.org/understanding-the-human-mind/>
- 8) <https://courses.lumenlearning.com/boundless-psychology/>
- 9) <https://www.britannica.com/science/hypnosis>

ANNEXURE 1:- HERE IS A LIST OF 134 AREAS WHERE HYPNOTHERAPY CAN BE APPLIED:-

1.Abandonment	51 Immune System	101 Restlessness
2.Addictions	52 Impotency	102 Sadness
3.Age Regression	53 Improve Health	103 Self-Awareness
4.Agression	54 Improve Sales	104 Self-Blame
5.Agoraphobia	55 Indecision	105 Self-Confidence
6.Anesthesia	56 Inferiority	106 Self-Control
7.Anger	57 Inhibition	107 Self-Criticism
8.Anxiety	58 Insecurity	108 Self-Defeating Behaviors
9.Assertiveness	59 Insomnia	109 Self-Esteem
10 Attitude Adjustment	60 Irrational behaviour	110 Self-Forgiveness
11.Bed Wetting	61 Irrational thoughts	111 Self-Hypnosis
12.Biofeedback	62 Irritability	112 Self-Image
13.Breathing	63 Jealousy	113 Self-Mastery
14.Career Success	64 Lack of Ambition	114 Sexual Problems
15.Change Habits	65 Lack of Direction	115 Shame
16.Child Birth	66 Lack of Enthusiasm	116 Skin Problems
17.Chronic Pain	67 Lack of Initiative	117 Sleep Disorders
18.Communication	68 Lower Blood Pressure	118 Smoking
19.Concentration	69 Medication Side Effects	119 Social Phobia
20.Controlling	70 Memory	120 Stage Fright
21.Cramps	71 Mistrust	121 Stress
22.Cravings	72 Moodiness	122 Study Habits
23.Creativity	73 Motivation	123 Stuttering
24.Death or Loss	74 Nail Biting	124 Stubborn
25.Discouraged	75 Nausea	125 Substance Abuse
26.Dreams	76 Negativism	126 Surgical Recovery
27.Exam Anxiety	77 Nightmares	127 Tardiness
28.Exercise	78 Obsessions	128 Thumb Sucking
29.Fear of Animals	79 Obsessive-Compulsive	129 Tics
30.Fear of Death	80 Overeating	130 Trauma
31.Fear of Dentist	81 Overly Critical	131 Ulcers

32.Fear of Failure	82 Pain Management	132 Victimization
33.Fear of Flying	83 Panic Attacks	133 Weight Loss
34.Fear of Heights	84 Passive-Aggressive	134 Worry
35 Fear of Loss of Control	85 Past Life Regression	
36 Fear of School	86 Perfectionism	
37 Fear of Success	87 Performance Anxiety	
38 Fear of Surgery	88 Pessimism	
39 Fear of Water	89 Phobias	
40 Forgiveness	90 Postsurgical	
41 Frustration	91 Premature Ejaculation	
42 Gagging	92 Pre-surgical	
43 Gambling	93 Problem Solving	
44 Guilt	94 Procrastination	
45 Headaches	95 Public Speaking	
46 Helplessness	96 Reach Goals	
47 Hopelessness	97 Rejection	
48 Hypochondria	98 Relationship Enhancement	
49 Hostility	99 Relaxation	
50 Hypertension	100 Resistance to Change	

CHALLENGES IN HUMANITIES-A NEED TO HAVE POSITIVE MINDSET

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ABSTRACT

After spending 18 years in higher education, I have realized now there is lot of trends are taking place in education system. The tradition delivering lectures, chock-blackboard started losing, flip classroom, virtual classrooms are taking precedence which is mere outcome of Globalization and its side effect. The education and related issues are core issues for any country. People from various fields like politics, media, press, social organizations have become authority to talk about education and education policy and more than that fashion to copy foreign countries are creating big dilemma in minds of people. Information explosion created breed of Google Scholars, aptitude tests and career counseling is one of fastest growing business now a days. The field like Social Sciences and Humanities need in dept study which percolated through higher grade studies like Post-graduation, M.phil, PhD and Post-Doctoral Studies. Any professor put at least more than 10 years after graduation to get expert in that subject. But today they are losing importance. Students are encouraged to ask questions, used readymade answers, rather using references and books guides and sometimes notes written by someone are the popular option. Crossing the statement of professors or arguing without understanding concepts are consider as smartness. The practice of spoon feeding in field of other profession started getting roots in Social Sciences and Humanities also. Many a times, students kept themselves so much busy in extra – curricular activities that they totally forget to attain the classes. A professor, for every lecture put lot of efforts, prepare blue prints about topic or concept in mind, do required library work, sometimes visit the specific location so he /she could deliver in that given time quality lecture. Student fraternities most of the time even do not notice this. After getting poor grades or lower grades they simply make the subject categories as “Hard Subject” or “Tough Subject” and then mouth publicity of this subject take more students away from class. A professor is chain between students and ocean of knowledge. The policy makers have to keep it in mind that studding so much and getting expert in any field and then choosing noble profession like teaching is really patriotic gesture. In Indian movies or television serials teachers or professors are always presented in whimsical way and untidy attire. And no one bother. Scholars from Humanity and Social Sciences have great responsibilities and duties to perform. We have to make this world loveable and livable. Our research variables are humans. Dealing of variety of socio-economic-political systems, studying them, improving them, practicing them is done through the academicians of Humanities and Social Sciences. There is need that from policy makers to common citizens, all must have gratitude towards these fields. Only professional studies will not serve the purpose to have flourish society, one need to have Humanities and Social Sciences.

INTRODUCTION

After spending 18 years in higher education, I have realized now there is lot of trends which are taking place in the education system. The tradition of delivering lectures, chucks and blackboard started losing its importance, flip classroom, virtual classrooms are taking precedence which is a mere outcome of Globalization and its side effects. The education and related issues are core issues for any country. People from various fields like politics, media, press, social organizations have become authority to talk on education and education policy and more than that fashion to copy foreign countries are creating big dilemma in minds of people. Information explosion created breed of Google Scholars, aptitude tests and career counseling is one of fastest growing business now a days. The field like Social Sciences and Humanities need in depth study which percolated through higher grade studies like Post-graduation, M.phil, PhD and Post-Doctoral Studies. Any professor put at least more than 10 years after graduation to get expert in that subject. But today they are losing importance. Students are encouraged to ask questions, used readymade answers rather using references and books guides and sometimes notes written by someone are the popular option. Crossing the statement of professors or arguing without understanding concepts are consider as smartness. The practice of spoon feeding in field of other profession started getting roots in Social Sciences and Humanities also. Many a times, students kept themselves so much busy in extra –curricular activities that they totally forget or overlook to attain the classes. A professor, for every lecture put lot of efforts to prepare blue prints about topic or concept in mind, it also requires library work, sometimes visit the specific location for the first hand information so that he /she could deliver in that given time quality lecture. Student fraternities most of the time even do not notice this. After getting poor grades or lower grades they simply make the subject categories as “Hard Subject” or “Tough Subject” and then mouth publicity of this subject take more students away from class. A professor is chain between students and ocean of knowledge. The policy makers have to keep it in mind that studying so much and getting expert in any

field and then choosing noble profession like teaching is really patriotic gesture. In Indian movies and television serials the characters of teachers or professors are always been presented as absent minded professor typecast and whimsical way and untidy attire. And no one bothers of this picturisation . Scholars from Humanity and Social Sciences have great responsibilities and duties to perform. We have to make this world loveable and livable. Our research variables are humans .Dealing of variety of socio-economic-political systems, studying them, improving them, practicing them is done through the academicians of Humanities and Social Sciences. There is need that from policy makers to common citizens, all must have gratitude towards these fields. Only professional studies will not serve the purpose to have flourish society, one need to have Humanities and Social Sciences.

Aim-The aim of research paper is to have positive outlook towards Humanities and Social Sciences.

CONCEPT-HUMANITIES



The humanities can be described as the study of how people process and document the human experience. Since humans have been able, we have used philosophy, literature, religion, art, music, history and language to understand and record our world.

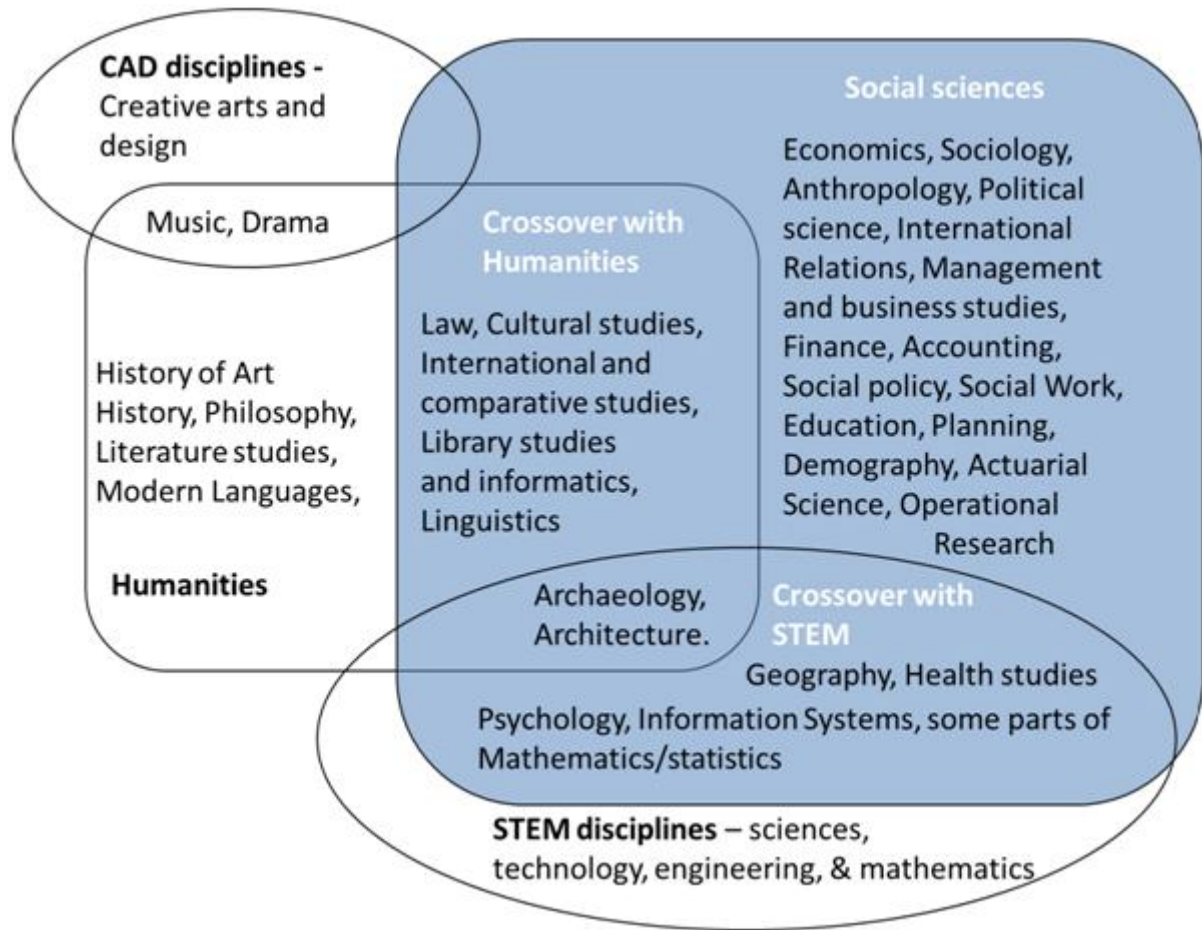
CONCEPT-SOCIAL SCIENCES

Social sciences are a group of academic disciplines that examine society and how people interact and develop as a culture. Social science as a field of study is separate from the natural sciences, which cover topics such as physics, biology, and chemistry. Economics, political science, history, law, and geography are considered social sciences.



HYPOTHESES

More the world study and focus on Humanities and Social Sciences, more the world become livable and loveble.



CHALLENGES

There are number of challenges, humanities and social sciences faced today, but intent research paper focus on following:

- 1) Government Policy :- India is a developing country, we have to achieve much in coming period in areas of education, health, irrigation, facility, employment opportunities, sustainable resources, safe and drinkable water to all population.

The education is considered as Human Development Index. All that boosts up human life to live with grace and dignity will come under the wider spectrum of education.

Humanities and Social Sciences deal with values, ethics, political – social- and economic systems. All these study required in-depth knowledge which can no achieve in any crash course. To learn certain subject aptitude of learner matter. The trend today is every parent wants his / her child should be IITan, Doctor or Engineer [professional careers].

If a child failed to get admission to B.Sc, B.Com, B.AMM, BCA, he/she unwillingly take admission to BA. This is trend nowadays.

There are number of Common Entrance tests for Professional Courses. Some are conducted by Central Government, some are conducted by Sate Government and some are conducted by Private Institutions. And Government is happy about it. A huge fee for application forms, prospectus, web of coaching classes who can dare to advertise 100% passing rate of admitted student. The picture is very rosy.

But in Humanity and Social Science, no common entrance tests. The government thinks there no need to have CET for such studies.

First, Government has to take tests in development of Humanities & Social Sciences, and accordingly the planning should be done at higher level. The outcome of Humanities & Social Sciences should not be measured only in terms of numbers, grade or salary packages.

Due importance should be given to all faculties through proper ‘Research & Development Skills’. What you can give the students and professors, the treatments, the benefits, the monetary support, inclination for research all this will enhance quality of Humanities & Social Sciences.

Having just social order is achieved through a flourish civil society. A compassionate and empathetic attitude towards all needy or under privileges is inculcated through Humanities & Social Sciences.

It is great responsibility of the academics and student fraternity of Humanities & Social Sciences to reach unto the last. Make everyone accountable as life is precious. , Valuing life gives more progressive society.

I am lifelong student of Foreign Policy & Diplomacy with special reference to India. What the best I ever feel about our principles of Foreign Policy that it is based on “Panchsheel, Live & Let Live”. I am fascinated by the moral message behind it. How worth it is ! Excellent explanation of Indian Philosophy in one line “Live and Let Live”.

Another important feature has occupied my thinking last so many years that “Whenever diplomacy failed, war takes place”. To avoid war, one needs trained, well-read, bright diplomats who understand the Indian values well and narrate it to whole world with cyst and eager.

All this professions are by product of Humanities & Social Sciences. War, any war is bad. Killing people, taking life is not civilized act. We are not educated to be uncivilized. We are learning to make this life more worth living. This idea, these thoughts are by products of Humanities & Social Sciences.

Government policy makers have to take in consideration this side of Humanities & Social Sciences. Without this type of studies and research, we cannot introduce, replace or do repair to present social political economic systems.

2) Students Apathy:- These two major points needs to be discussed:-

i) Students who are forced to Humanities & Social Sciences.

ii) Over-smart students.

i) Students who are forced to Humanities & Social Sciences :

(a) The anger of not getting their favorite stream or study area, in makes many emotionally vulnerable. They keep on cropping about futility of Humanities & Social Sciences with their peers.

(b) The most of the student bunk or purposely miss the classes by giving number of excuses which indicate their apathy towards the subject or stream.

(c) As in the beginning of academic year, every teacher in class explains the methodology of subject, what is important of subject and forthcoming career options. But due to lack of willingness to sit in class many stunts miss this.

(d) Library work- for Humanities & Social Sciences, lot of library work for general awareness needed, a keen speculation of day to day happening is consider as variables in Humanities & Social Sciences. Because the study of Human system is prime goal. One can't escape any step of study to reach the final destination of any subject. The quality student put himself / herself upto the scale by studying well through references, newspapers, by participating in seminars and conferences, patiently hearing someone's thoughts is enriching experience. A student fraternity has to consider it as day to day activity of learning process. But now day's big chunk is busy in flaunting on social media.

ii. Over-smart Students:

a. This is ‘Hybrid Student’s they have all information from “Google”, but they do not have knowledge. Much of the energy they put to asked irreverent or relevant questions to teachers, not respecting prescribed curriculum is another quality, not doing homework or assignment, as they know all so why they have to write.

My humble request to all teaching fraternity, please give home work or assignment, In India, our entire education system based on writing skills. The day of exam, the student has to write answers to questions paper in prescribe time, I teach in under graduate level. The mostly time span is 3 hours. While supervision duty, I have realized many students give up because they feel tiered, hungry, sleepy, uneasy and etc.. etc... That concentration is withering away from our young generation. We have to do something collectively for this.

3. Picturizations of teachers / professors in media- Media means all that have much information on irrelevant issues and less on facts. The Indian film industry has seriously torn the images of college professors. They present professors and scientists are shown in media and movies in very whimsical way. Why? I really don't know and nobody object. This needs serious thinking. As having pared-songs, dream songs, etc.. People have accepted, but having seriously work out on role of teachers, professor scientist is denied.
4. Press:- The press have to be transparent in dealing with all business. But what the press is doing? They are now circulating is big joke. Lesser one talk about it, bigger the circulation of newspaper, bigger the fake new or manage news. Making havoc in minds of people, giving shock- through crime – cum-story telling, discussing personal life of all film and serial people is prime agenda of press now a days. Les press talk or work about glamorous profession, more we get manageable young generation.
5. Role of Parents:- I am working in Attendance Committee of my college, last so many years. My observation is that in a day with student we spend 48 minutes or less than that also. Not even with individual student also. In a week average three to four hour in particular class. That to be we have to teach our syllabus plus attendance plus class control. In a parents meeting, many parents easily say that we have admitted him / her to your college, now you should take care of him/her. I feel pity for those parents, for such a melodrama statement. The entire life span of your child you have spend together, what the good bad you have inculcate in you ward is reflect when the ward goes outside house. In a day, a teacher –professor who spend less than 48 minutes divided into 30 to 120 [Average students strengthen class less is 30 and 120 maximums, both the number are assumption because in my entire life I won't find 120 students present even for final exam]. Still parents want education institute should take care of overall development of their ward.

No parents even bother to know how much work his /her child is putting in class or completing assignment or using library. Many parents have hidden agenda for a girl child, of she become graduate, she will get good husband [Future Investment].

What our ward is learning, in which subject he / she is doing honours / masters many parents don't know. Plus, they have strong opposition of having further studies in Humanities and Social Science on a ground that, would they will get good job.

Parents have to change their mindset first. More the Graduate – Post – Graduate we will have in our society in field of Humanities and Social science, less we need day care caters for Children's and Old Age Homes for aged

REFERENCES

1. Frontline magazine, August 2018.
2. Trowbridge, S., Waterbury, C. & Sudbury, L. (2017). Learning in burst. London: Routledge.
3. New Trends and Issues Proceeding on Humanities and Social Sciences, Volumn 4, Issue (2017) 150-158.
4. Lage, M., Platt, G. & Treglia, M (2000). Inverting the Classroom: A gateway to creating an inclusive learning environment. Journal of Economic Education, 31(1), 30-43.

ENGLISH LANGUAGE TEACHING AND NEW TECHNOLOGY: AN ANALYSIS

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ABSTRACT

The present paper attempts to study and investigate the possibility of teaching English language with the help of latest technology to improve the learners' language skills by giving them exposure to various techniques and make them aware of the latest advances in technology. Present net savvy generation can be motivated to learn second language especially English language by providing them enjoyable activities. Use of various multimedia tools help learners use various learning styles and develop creativity and critical thinking skill which has become a survival skill now. Hence these should be used in English language classroom liberally in urban area.

INTRODUCTION

Web-based technologies have revolutionised the concepts and practices of second language learning/teaching in our country. These technologies have totally changed the face of communication in the academic world. One of the objectives of modern education is to make students confident, creative and productive users of new technologies and understand the impact of those technologies on society. According to Warschauer (2003), the introduction of new technology automatically brings results which are referred to as 'technological determinism'. It can be viewed as new processes or outcomes. It brings about pedagogical changes which should be examined from broader perspectives and not only from the classroom point of view. Technology in the first place creates new social contexts, which determines new teaching-learning ways. He states that students who use new media can develop a wide range of literacies and identities and these skills must be taken into account in English teaching/learning at undergraduate level.

Technology can make learning interesting for learners by engaging and in some cases making learning challenging for them. Also, teaching with the help of latest technology enables the teachers to improve their learners' skills by giving them an exposure to various techniques and make them aware of the latest advances in technology.

The role of technology is significant in second language teaching, especially in English language teaching. The use of technology enables English language teachers to make the learning experience motivating for learners by providing them enjoyable activities. In addition, use of various multimedia tools helps learners use various learning styles and develop creativity and critical thinking. They make them acquire and practice the language skills. Some of them also promote collaborative learning. They provide authentic examples of the target language and culture.

We have been bestowed by advances in technology with new tools which can help making English teaching/learning more engaging and motivating. Some of the latest web-based technological tools that can be used to assist and enhance English teaching are discussed below. The aim of this article is to present some of the computer-aided technologies which have been very popular in the field of language pedagogy and to see how they can be implemented in a classroom situation especially in an urban area where students are net savvy.

A. Podcasts

A Podcast is a series of video or audio files that is updated regularly. These files can be played on a number of devices such as Desktops and MP3 players and are distributed via the internet.

Podcasts are short, portable and easy to use and access. For example, i-Tunes has a podcast section, where podcast providers distribute their audio and video files free of charge. Podcasts can be downloaded individually or the user can subscribe to them to receive new installments of a series automatically.

Podcasts can be used to provide the learners with interesting and up-to-date language resources. The teachers can facilitate the learners to listen to audio files or watch videos on topics they are interested in. It provides contexts of language use. It provides the teacher the real-setting of language use. EFL teachers and learners can also make their own podcasts.

Many broadcasters from all over the world release their materials as podcasts. Although primarily intended for native speakers of the language, these are of enormous value to language teachers and learners as resources. A language teacher can use these podcasts for giving exposure to native speakers' pronunciation and other speaking skills, listening skills or vocabulary. The language teacher can also use podcasts

especially made for language learning. Sample activity: an interview podcast from the BBC to introduce phrases that are used to begin a conversation, to agree with somebody, to disagree, to finish a conversation (formal), etc.

B. Digital Storytelling

Digital storytelling allows one to tell stories electronically by combining text, audio, music, video, photos, etc. Digital storytelling activities are easy to use for teaching writing and speaking skills. It also aids comprehension. It is a good way to motivate the learners to teach composition and use the language. Digital storytelling can be very effective in the lower level as pictures and music help learners to communicate when they do not yet have the necessary language to communicate exclusively in writing. Moreover, it makes storytelling fun.

Digital storytelling requires first to capture/record a story and then to make it available to others. The story created needs to be transferred to a computer. Many tools are available for creating digital stories that will let one include pictures, audio, and video files and share these online, for example, Movie Maker of Microsoft, iMovie of Apple, Slidestory.

In summary, in digital storytelling the focus is on producing and sharing a story. Digital storytelling gives a lot of scope for improving oral skills, such as intonation, stress, rhythm and pacing related to the presentation of the story in interesting ways.

C. Word -clouds

Word-clouds are used to depict visually frequency of words in any written material. In word-clouds, font size or colors is used to indicate frequency of a particular word. The more frequently used word appears in a bigger font in the word-cloud. Word-clouds could be very helpful in teaching reading and writing skills. Besides, it may be used to summarize research interviews.

Word-cloud refers basically to a visual representation for text data, typically used to depict keyword metadata (tags) on websites, or to visualize free-form text. Tags are usually single words, and the importance of each tag is shown with font size or colors. This tool gives a list of the most prominent words and for locating a word alphabetically to determine its relative prominence. For example, Wordle allows its users to create word-clouds.

D. Blogging

A blog has been defined as a Web page that serves as a publicly accessible personal journal for an individual. Blogs are updated daily or quite frequently, and they often reflect the personality of the author. However, blogs are interactive as they allow others to leave comments. They can also be utilized to develop reflective thinking. Blogs can be used to generate motivation and interest for writing in English, as blogs give an opportunity to get feedback from an authentic audience.

E. Video conferencing

It is an application that supports bi-directional audio and visual conversations involving two groups of people or several individuals or groups. With this tool a language teacher can prepare tasks on turn taking, interrupting, etc.

F. Collaborative real-time editor

It is a type of collaborative software application that helps several people to edit a computer file using different computers. Different users can edit the same file simultaneously in real-time collaborative editing. It can be used to encourage learners to edit their writing assignments collaboratively.

G. Mobile Phone Technology

Mobile phones have greater market penetration as compared to other devices like i-pad, kindle etc. It supports anytime, anywhere learning mechanism. Mobile phone provides facilities to download and store learning modules and applications. There are free and paid apps. The focus area of these apps is enhancing vocabulary, grammar, listening, speaking, reading and writing skills.

PREPARATIONS NECESSARY TO ADOPT THE LATEST TECHNOLOGY

Firstly, English teachers should be made aware of the latest technologies available. Secondly, efforts are necessary to convince the teachers about the benefits of the application of the latest technology in teaching pedagogy. Next, appropriate training must be provided to the EFL/ESL teachers. In order to bring about this change in the realm of teaching, the government has to play a vital role, particularly in the development of required infrastructure.

The application of technology in teaching English is imperative. The adoption of technology in English teaching will go a long way in making the process of teaching more pragmatic. All the institutes, universities and individuals responsible should make necessary arrangements for raising the level of awareness and providing training to the teachers in using the latest technology effectively in their pedagogy so that they can use the technology not only to assist language teaching but also to enhance it.

REFERENCES

- Brett, P. (1995).multimedia for listening comprehension: The design of a multi-media –based resources for developing listening skills.system, 23(1), pp.77-85
- Crystal, D. (2001).Language and the Internet.Newyork: Cambridge University Press.
- Graves, K. (1997). Teachers As course developers. Cambridge University Press.
- Hope, W.C. (1983) The next step: Integrating computers and related technologies into practice. Contemporary education, 69(3), pp.137-140.
- Richards, J.C. and Rodgers, T.S. (2001) Approaches and methods in language teaching. Cambridge University Press

ANALYSIS OF RUDYARD KIPLING'S POEM 'IF': AN INTERDISCIPLINARY APPROACH

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ABSTRACT

This paper attempts to explore how poems lend themselves to an interdisciplinary approach with specific analysis of Rudyard Kipling's celebrated poem 'If'. This will be highlighted with special reference to the Bhagavad Gita and other Indian philosophical texts. A comparative analysis has been attempted in the exploration of the poem 'If'. Moreover, the concurrence of the poem with various philosophical texts and some modern scientific notions have been highlighted to explore the essential aspects of 'self', which have to be cultivated with constant vigilance to attain to the realm of higher Self. Rudyard Kipling's 'If' has been regarded as a guiding light to tormented hearts and an in-depth analysis reflects the influences of Indian philosophical texts on Kipling. This paper thus, argues that literature of various ages derives implicit and explicit influences from various texts of yore and cannot be read as isolated pieces of mere aesthetic pleasure.

Keywords: Interdisciplinary, Bhagavad Gita, Indian philosophical texts, self

INTRODUCTION

Swami Vivekananda in his essay "What is Religion" affirms "To be more free is the goal of all our efforts, for only in perfect freedom can there be perfection. This effort to attain freedom underlies all forms of worship, whether we know it or not." (Vol 1, 333)

In an attempt to see Rudyard Kipling's poem "If" in the light of the above statement, my paper will attempt to investigate as to what extent the poem has blended itself with the eastern philosophical thought in its endeavour to highlight some of the prominent attributes of an ideal man. Rudyard Kipling, as a poet has been acclaimed for his literary genius but there has been mixed reviews about his philosophy as a writer.

George Orwell avows, "It is no use pretending that Kipling's view of life, as a whole, can be accepted or even forgiven by any civilized person". (Hosking 75). However, in recent days a significant chunk of reading has been done on Kipling's writing and we as readers have reached a state to perceive Kipling's ambivalent philosophical stance and this is attempted with an intent to see if we can look at Kipling, piercing through the label of him being a downright imperialist.

East is East, and West is West, and never the twain shall meet,
Till Earth and Sky stand presently at God's great Judgment Seat;
But there is neither East nor West, Border, nor Breed, nor Birth

When two strong men stand face to face, tho' they come from the ends of the earth... (Kipling 245)

These are oft-repeated lines from Kipling's 'If'. The last three lines which usually go unnoticed give us an opportunity to view Kipling from the spectrum of inclusiveness. This gives the background to locate the poem 'If' through an inclusive approach, investigate the aspects of self and the possibility of finding Kipling's idea of life acceptable in the broader rubric of Indian philosophy.

SIMILARITY BETWEEN BHAGVADGITA AND 'IF'

This paper will explore the manner in which the poem 'If' can be juxtaposed with the Bhagavad Gita and other Indian philosophical texts. The entire text of Gita expounds nature of life in context of reincarnation, types of men, nature of man, his false ego being identified in the body mind complex and the final attainment of liberation with complete identification with the absolute Self.

The lines below from the Bhagavad Gita, chapter five resonate with 'If':

Absorbed in Brahman He overcomes the world even here, alive in the world. Brahman is one, Changeless, untouched by evil: What home have we but Him? The enlightened, the Brahman-abiding, Calm-hearted, unbewildered, is neither elated by the pleasant nor saddened by the unpleasant.... Because his heart knows Brahman. All Consumed are their imperfections, Doubts are dispelled, their senses mastered, their every action is wed to the welfare.....

(Chp v Shloka 19 - 21 qtd in Swami Prabhavananda 109)

If you can keep your head when all about you

Are losing theirs and blaming it on you,
If you can trust yourself when all men doubt you,
But make allowance for their doubting too;
If you can wait and not be tired by waiting,
Or being lied about, don't deal in lies,
Or being hated, don't give way to hating, (Kipling 605)

First few lines of the poem 'If' have distinct resemblance with that of an ideal man mentioned in the Bhagavad Gita. The paper while trying to trace this symmetry would cover the aspect of inherent paradox which deeply reverberates in the Gita. The poem 'If' too presents a perplexing notion of men as the poem tends to debunk the dichotomy of good and bad by hinting at a stage of transcendence which is gained only after realization of equanimity .

The Gita came as a source of inspiration to Arjuna, atypical man engaged in the warfare of life in the battlefield of Kurukshetra and we find that the poem 'If' also has Boer war as a backdrop. The backdrop of battlefield in both the texts brings about the prototypical description of man caught in the battle of life.

Any analysis of this kind is not possible without discussing the context in which these are placed and in the whole process one must first locate the vantage point from where the definition of a human and his/her evolution can be traced. It is said that the text of the Gita comes to be pronounced at the battlefield and Arjuna confronting his friends, relatives and all those he would not want to kill even he is endowed with the kingdom of heaven.

Action without the expectation of the fruit is one of the central themes of The Gita. In Kipling it resonates strongly in the lines:

If you can dream—and not make dreams your master;
If you can think—and not make thoughts your aim;...
If you can bear to hear the truth you've spoken
Twisted by knaves to make a trap for fools,
Or watch the things you gave your life to, broken,
And stoop and build 'em up with worn-out tools (Kipling 605)

It is said to realize one's Self, a person needs to work on three levels that is physical, spoken and psychological plane. The above mentioned lines from the poem 'If' also indicate that in the order of thought, speech and action, Kipling is exhorting us to attain a state of equanimity.

ELEMENTS OF VEDANTA, SCIENTIFIC RESONANCE AND 'IF'

To see the poem in the light of the Vedantic philosophy, a discussion of the idea of self is of considerable urgency. Vedas are regarded as the inspired revelation to the seers of India. These celestial revelations bear the testimony of eternal truth as they are heard (Shruti) in deepest state of meditation and does not attribute to any single human personality (Apauresheya). There is another aspect to the Vedas that deals with the Smriti (memory) which changes with the passage of time.

Swami Ranganathananda in his luminous work "The message of the Brhadaranyaka Upanishada" expatiates the subject of self in the light of modern scientific needs, citing Nuclear Physicist Sir Arthur Eddington who has summarized the 19th century Newtonian physics, quotes "We are complicated physical machinery- puppets that strut and talk and laugh and die as the hand of time turns the handle beneath." (24) but Eddington exhorts us to remember "We are that which asks the question." (24) He further says that the orientation of modern physics today is turning from the observed to the observer.

'This (universe) indeed consists of three things: name, form, and action...'

(Chp I Shloka 1.6.1 qtd in Swami Ranganathananda 115)

Swami Ranganathananda in the earlier mentioned work on Brhadaranyaka Upanishada discusses above mentioned verse and draws a parallel with the Relativity of modern science. Einstein defined relativity by joining the time and space to create space-time continuum. While defining the universe it is said as 'something' caught in the network of relativity.(116).

The necessity of this discussion is owing to a need to place Kipling's poem within the ethos of Indian Philosophy and additionally contextualise it with modern scientific thinking. The relative and the absolute can be compared with Vedantic concept of Maya and Brahman, and acknowledging the need of one to reach the higher is reinforced in Brhadaranyaka Upanishad in statements like 'Satyasah Satyam' that is Truth of all truths. (151)

There is another prayer which says, "From the unreal lead me to the real, from the darkness lead me to the light, from death lead me to immortality." (35)

Kipling's lines:

If you can dream—and not make dreams your master;

If you can think—and not make thoughts your aim;

resonates with the idea as in the establishment in this ground of 'singularity' would alone solicit what Kipling terms as 'Will', an attribute of pure awareness, which can will(desire) without being caught in its own web of expectations. In a similar vein, Krishna says in The Gita,

He who sees inaction in action, and action in action, he is wise among men, he is a yogi and accomplisher of everything. (Chp IV Shloka 18 qtd. in Swami Chidbhavananda 289)

Further, Kipling indicates to the ways of dealing with 'triumph and disaster'

If you can meet with Triumph and Disaster

And treat those two impostors just the same;

This equally echoes in The Gita,

The self-disciplined and serene man's Supreme Self is constant in cold and heat, pleasure and pain as also in honour and dishonour. (Chp VI Shloka 7 qtd. in Swami Chidbhavananda 364)

Elsewhere Krishna says:

Treating alike pain and pleasure, gain and loss, victory and defeat, engage yourself in the battle. Thus you will incur no sin. (Chp II Shloka 38 qtd. in Swami Chidbhavananda 159)

Kipling's notion of material prosperity carries a deep sense of disenchantment with it and he, as though, discouraging this disposition of clinging to material entanglements exhorts

If you can make one heap of all your winnings

And risk it on one turn of pitch-and-toss,

And lose, and start again at your beginnings

These lines also reverberate in Krishna's explication of a perfect person in when He says:

Balanced in pleasure and pain, Self-abiding, viewing a clod of earth, a stone and gold alike; the same to agreeable and disagreeable, firm, the same in censure and praise; (Chp XIV Shloka 24 qtd in Swami Chidbhavananda 744) and it can be deduced that such kind of person revels in abounding tranquillity.

Kipling also calls for an equitable dealing with men of all kinds when he says:

If you can talk with crowds and keep your virtue,

Or walk with Kings— nor lose the common touch,

Krishna also while expounding the nature of a person established in equanimity says:

Men of Self- knowledge are same-sighted on a Brahmana imbued with learning and humility, a cow, and elephant, a dog and a eater of dogs. (Chp V Shloka 18 qtd in Swami Chidbhavananda 343)

He stands supreme who has equal regard for friends, companions, enemies, neutrals, arbiters, the hateful, the relatives, saints and sinners. (Chp VI Shloka 9 qtd. in Swami Chidbhavananda 367)

This verse majestically blends with Kipling's idea when he says

If neither foes nor loving friends can hurt you,

If all men count with you, but none too much;

Kipling finally says

If you can fill the unforgiving minute

With sixty seconds' worth of distance run,

These lines bring home a notion of part and whole, and hints at assorting the pain and tribulations in fragments or parts to attain to the whole which is intricately present in the 'now'.

The attainment of this state leads the self to revel in the promised non dual state of Self-realisation what Kipling sees as

Yours is the Earth and everything that's in it,

And—which is more—you'll be a Man, my son!

CONCLUSION

To conclude, this paper has attempted to investigate the nuances of self as expressed in Rudyard Kipling's poem 'If'. It serves as succour to the present fragmentary world. One primary reason that ascribes universality to the poem is its capacity to withstand the test of time. An analysis of 'If' through an interdisciplinary approach broadens our intellectual horizon and emboldens one's perceptions to look beyond the limits and straitjacketing of orthodox disciplines. This paper has thus explored the manner in which literature of various eons derives its influence from texts of yore and needs to be read with a comprehensive approach.

REFERENCES

- Hosking, Rick. "John Lang's Wanderings in India(1859) and Rudyard Kipling". The Shadow of the Precursor. Ed. Diana Glenn, Rezaul Haque, Ben Kooyman and Nena Bierbaum. United Kingdom: Cambridge Scholar Publishing, 2012. Print.
- Kipling, Rudyard. Collected Poems of Rudyard Kipling. London: Wordsworth Editions Limited, 1994. Print.
- Swami Chidbhavananda. The Bhagavad Gita . Tirupparaitturai : Sri Ramakrishna Tapovanam, 2005. Print.
- Swami Prabhavananda. Spiritual Heritage of India. Chennai: Sri Ramakrishna Math Printing Press, 2008. Print.
- Swami Ranganathananda. The Message of the Brhadaranyaka Upanishad. India: Trio Process, 2005. Print.
- Swami Vivekananda .The Complete Works of Swami Vivekananda, Volume 1, 2 and 4, Calcutta: Advaita Ashrama, 1999. Print.

WEB RESOURCES

- http://www.poetryloverspage.com/poets/kipling/kipling_ind.html
- <http://gaslight.mtroyal.ca/Orwell-B.htm>
- http://www.ramakrishnavivekananda.info/vivekananda/volume_4/lectures_and_discourses/thoughts_on_the_gita.htm

LITERATURE AS A TOOL OF DIDACTICISM: A STUDY OF MYTHS IN CHINUA ACHEBE'S THINGS FALL APART

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ABSTRACT

This paper will attempt an exploration of Achebe's novel Things Fall Apart by unearthing the myths and stories which fulfil this aesthetic purpose with a firm grounding in didacticism. Stories have a perennial influence on the lives and thinking processes of the individuals. Achebe's ground-breaking novel Things fall Apart challenges the deep rooted Eurocentric versions of Africa and imparts an insightful interpretation of the Igbo cultures, traditions and philosophy. This paper discusses the role of art in effacing these stereotypical notions and creating consciousness among the African communities regarding their rich cultural heritage. The stories and myths unfolded in this novel are in agreement with Achebe's philosophy of Art as an instrument of instruction and power. The concept of aestheticism receives a full flowering by focusing on humanity and making Art an agent of social change which also touches the deepest core of human consciousness.

Keywords: Art, aesthetics, didactic, stories, myths, power, humanity, consciousness.

INTRODUCTION

Chinua Achebe's integrity as a writer was established with his path-breaking novel *Things Fall Apart* which is a highly nuanced piece of art. It contests the received ideas of colonizer's philosophy and challenges the Eurocentric culture by highlighting the positive notions of Igbo philosophy. The infringement on culture is a direct corollary of colonization and this is depicted through the medium of proverbs and stories.

The portrayal of African culture by western critics is infused with the ideal of binaries and thus, the creative recreations of the Africans are pushed on the periphery. Achebe took the task of reformation as African literature had been in the mire of stereotypes and labelled as a dark continent with incomprehensible language. Achebe's didacticism is reflected through his assertion in the essay *The Novelist as a Teacher*, 'There is adequate role for me to espouse-to help my society regain belief in itself and put away the complexes of the years of denigration and self-abasement.' (44) This sets the tone for his literary and social pursuits.

DIDACTIC FUNCTION OF ART

African writers are indebted to the oral traditions because the nuanced nature of their narrative is effective in nurturing didacticism. The stories comprise an integral part of the African literary and cultural structure. Iyasere is right in his observation that "the modern African writer is to his indigenous oral tradition as a snail is to its shell. Even in a foreign habitat, a snail never leaves its shell behind." (107)

The novel *Things Fall Apart* is a narrative of protest and socio-cultural experience. This novel bears testimony to the all-inclusive nature of art and throws light on the creation of aesthetic values by the artist. Before exploring these facets of the novel, it is significant to understand the notion of art as conceived by some erudite writers and also reflect on the difference between aestheticism or 'The Art for Art's sake and the African notion of Aestheticism.

The art for art's sake movement of the Pre-Raphaelite period as the name suggests limits the function of art to pleasure. 'In the latter half of 19th century a European phenomenon namely aestheticism proposed that a work of art is the supreme value among human products precisely because it is self-sufficient and has no use or moral aim outside its own being. The end of the work of art is simply to exist in its formal perfection and to be contemplated as an end in itself.' (Abrams, 3)

This Art for Art's sake which denounces any kind of utilitarian function is strictly opposed to African aesthetics. African Aesthetics strictly adhere to the utilitarian function of art with a defined moral purpose. Giving a voice to the atrocities perpetrated against the Africans thus, demands a huge responsibility on the part of writers.

In the essay *Africa and her Writers*, Achebe avows, 'Art is and was always in the service of man. Our ancestors created their myths and legends and told their stories for a human purpose (including no doubt the excitation of wonder and pure delight) they made their sculptures in wood and terracotta, stone and bronze to serve the needs of the times. Their artists moved and had their being in society and created their works for the good of their society'. (25)

Many African writers have widened the scope of literature to incorporate meaningful stories. Achebe has often reiterated the seriousness of art. For Achebe, education of the reader is of prime significance for he considers art and education as mutually inclusive. Therefore, Art that overlooked the aspect of moral purpose was challenged by Achebe. Achebe's idea of art is in sync with humanity and he celebrates the beauty of art through his purposeful writing. Achebe believes in art which gives an expression to the agony of the human soul and enables people to understand the dilemma faced by people crumbling under oppression.

Things Fall Apart is an exposition of subversive hegemonic colonial regime which dismantled the fabric of Igbo communities. C.L. Innes adds 'The Igbo community presented to us in Things Fall Apart is one which has established a balance, though sometimes an uneasy one, between the values clustered around individual achievement and those associated with community, or between materialism and spirituality. Those groups of values tend to be identified as masculine and feminine respectively and are epitomized in the two proverbs, 'Yam is King' and 'Mother is Supreme', which dominate the first and second parts of the novel. Okonkwo prizes 'manliness' above all, and judges action and talk by that criterion, classifying everything he admires as 'manly' and everything he despises as 'womanly'. (25)

Achebe as an artist is however, aware of the loopholes in the Igbo framework and his social vision prompted him to rectify the ills of the society by providing a panacea through instructive stories. This awareness and objectivity determines the accurate meaning of art in Achebe's fiction. A writer who propagates aestheticism for social purpose views art from an objective standpoint and therefore, Achebe has also critiqued some of the inhuman tendencies of his protagonist Okonkwo.

Okonkwo is a quintessential character who confirms to the Umuofian society's dictates regarding valour and manliness. He refuses to express any tender feelings for the fear of being labeled 'Agbala'. The most tragic event in the novel is when he slaughters Ikemefuna, the boy who considers him his father. The sense of guilt envelops him but he accords highest value to bravery and manliness. This gross dependence on manliness at the cost of women and other beings in the society signals destruction. Here, is the role of stories to generate awareness and enable the characters to speculate and arrive at the truth.

The didacticism through art first works at the level of the novel for it draws attention to the inhuman treatment meted out to the Africans in the name of race, often condemning their culture and other practices. In the essay Image of Africa: Racism in Conrad's Heart of Darkness, Achebe probes the authenticity of truth exposed by Conrad about the Africans. He raises a pertinent question: how can a novel which is called a great work of art demean and disparage other cultures.

THE DIDACTIC POWER OF STORIES

The dreadful experiences of being marginalized demand reformation in society. The instructive role through stories has located the sensitive position of the artist in the society because stories are beyond mere entertainment and therefore instrumental in creating an impact on human consciousness. Achebe has elucidated the power of stories in his novel Anthills of the Savannah by pronouncing:

"[I]t is only the story that can continue beyond the war and the warrior.

It is the story that outlives the sound of war-drums and the exploits of brave fighters. It is the story...that saves our progeny from blundering like blind beggars into the spikes of the cactus fence." (Anthills of the Savannah, 124)

Stories thus, perform the didactic function of leading individuals to the right direction and serve as the beacon of hope for those who have been battered by circumstances. They also draw attention to the aspect of tranquility and peace because wars and other expressions of violence do not raise human consciousness. Stories grant solace and direct individuals to adopt correct perspectives. This is the most aesthetic manner through which didacticism is rendered in Achebe's corpus.

MYTHS IN THINGS FALL APART

In the novel Things Fall Apart, there are several tales which outline the didactic function of art. The voices of dissent get an outpouring through stories like the locust tale, the mosquito tale, the earth and the sky. The tales contest the ideas of superiority and establish the ideal of goodness. They question the idea of ultimate truth and therefore, the aesthetic rendering is well established.

The cosmic myth of the earth and the sky narrated by Okonkwo's wife to Nwoye works at several levels. Nwoye reminiscences the story of the quarrel between Earth and Sky. He remembers the way his father told him "how Sky withheld rain for seven years, until crops withered and the dead could not be buried because the hoes broke

on the stony Earth. At last Vulture was sent to plead with Sky, and to soften his heart with a song of the suffering of the sons of men. Whenever Nwoye's mother sang this song he felt carried away to the distant scene in the sky where Vulture, Earth's emissary, sang for mercy. At last Sky was moved to pity, and he gave to Vulture rain wrapped in leaves of coco-yam. But as he flew home his long talon pierced the leaves and the rain fell as it had never fallen before. And so heavily did it rain on Vulture that he did not return to deliver his message but flew to a distant land, from where he had espied a fire. And when he got there he found it was a man making a sacrifice. He warmed himself in the fire and ate the entrails. (Things fall Apart, 53-54)

Okonkwo who is staunchly against stories evoking emotions and pity is pitted against his son who enjoys the stories told by his mother. As Emmanuel Obiechina asserts 'the myth underwrites the feminine principle of creativity over sheer masculinity'. Obiechina affirms 'As a metaphor, the myth serves a number of structural, thematic, and ideological purposes in the novel. First, it brings into sharp focus the unequal relationship between Okonkwo and Nwoye. Okonkwo is pictured as an archetypal masculine figure who rules his household with a heavy hand and keeps his wives and children down and in mortal terror of him. Nwoye is crushed by his father's violence'.

If this story is viewed from an aesthetic angle as conceived by Achebe, it elucidates a moral and social function by drawing attention to the gender dynamics and emphasizing the importance of balance. Okonkwo's fatal flaw lies in ignoring the female principle which is at the core of the Igbo philosophy. The tragic end that befalls on him is due to his ignorance and denial of this female principle. Thus, the didactic function through this myth is to draw attention to the imbalance in the society as a consequence of lop-sided emphasis on manliness. The Igbo philosophy which hints at this balance is clearly expressed by Achebe through the maxim 'Wherever something stands, something else will stand beside it'. This is an expression of dual points of views and a dismissal of extremities. Art thus, accords balance and this social function if viewed positively can stabilize the society.

Another myth with an instructive purpose is the locust myth. This myth draws attention to imperialism and the way it shook the fabric of society. This myth develops insights into the politics of colonization. It also strengthens people to crusade against injustice. Mala Pandurang affirms 'What is remarkable about African fiction is that intellectual writer has not abdicated his ethical and social commitment towards a moral universe of equality, justice, and freedom, while struggling to retain a space for free self-expression. (196)

The Ikemefuna song is very striking as it lends an ironic twist to the story. Ikemefuna is the hostage who is murdered by Okonkwo, the song draws attention to the subsequent repercussions of killing Ikemefuna. The role of morality is pertinent here as the boy who called Okonkwo his father and who has deep longing for his family is brutally killed by Okonkwo only to prove that he is strong and manly. Okonkwo inwardly develops tender feelings for the boy Ikemefuna but he refuses to acknowledge it for the fear of being labeled effeminate.

These tales have received varied interpretations and this is in keeping with Achebe's philosophy. As he affirms in *What literature got to Do with it?*, "we must not see the role of literature only in terms of providing latent support for things as they are, for it does offer the kinetic energy necessary for social transition and change. If we tend to dwell more on stability it is only because society itself does aspire to, and indeed requires, longer periods of rest than of turmoil. But literature is also deeply concerned with change. (Hopes and Impediments, 167)

CONCLUSION

Achebe's aesthetic philosophy is succinctly expressed through the following lines, "Africa believes in people, in co-operation with people. If the philosophical dictum of Descartes "I think, therefore I am" represents a European individualistic ideal, the Bantu declaration "Umuntungumuntungabantu" represents an African communal aspiration: A human is human because of other humans." (Africa is People, 166)

Thus, Achebe has given a different dimension to his art by enlarging its scope and depicting the way in which can unleash the beauty and offer pleasure only through didacticism and thus raise the consciousness of human beings. The artist is committed to people and the all-encompassing nature of art affects the social, economic, cultural and political dimensions of society.

WORKS CITED

- Abrams.M.H.A Glossary of Literary Terms.India :Prism books, 1993
- Achebe, Chinua .Things Fall Apart. New York: Anchor books, 1994.
- ---, Chinua.Anthills of the Savannnah. New York: Anchor books, 1994
- ---, Chinua.Hopes and Impediments, New York:Anchor Books, 1990

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- ---, Chinua .Morning yet on Creation Day. New York : Anchor books, 1994.
 - ---, Chinua, The Education of a British- Protected Child. Penguin Books, 2010
 - Bharucha, Nilufer. World Literature. New Delhi: Prestige: 2007
 - Emenyonu, Ernest, Emerging Perspectives on Chinua Achebe, vol.one. Trenton: Africa World Press , 2004
 - Emmanuel Obiechina, Narrative Proverbs in the African Novel, Oral Tradition, 7/2 (1992): 197-230<<http://journal.oraltradition.org/issue/7ii/obiechina>>
 - Innes C.L., Chinua Achebe. Cambridge: Cambridge UP,1990
 - Khayyoom., S.A. Chinua Achebe: The Study of his Novels. Sangam Books Ltd, 1999

EFFECTS OF DIGITIZATION ON TRADE, COMMERCE AND INDUSTRY

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ABSTRACT

With the world transitioning into the fourth industrial revolution, digitization has enveloped every human endeavor.

The fourth industrial revolution is powered by digitization and propelled by information and data. The biggest effect of this can be seen in the way we conduct our trade and commerce. Both going online, the multiplier effect and the positive byproducts of these endeavors of ours has moved the humanity forward.

Tracking down the journey of data, the effect it had, has and will continue to have on the way we trade and how our policies deal with the sudden and enormous change being felt in our economy by the tremors of digital trading, the investigation brings up both the sides of the coin.

Considering the limitations of any technology the conclusion lists the measures we need to take collectively as a society.

INTRODUCTION

Internet and information have become the new industrial assets. Giving everyone equal opportunity to develop a spirit of enterprise, solve a quotidian problem and move the humanity forward, there has been a transformational effect across realms. Powered by data, through the fourth industrial revolution, digitization has helped upgrade trade, commerce and industry.

Trade refers to the activity of buying and selling of goods and services while digitization is the process of converting analogue data into digits so that they can be read by computers.

Human evolution and the need for possessing different goods led to the birth of trade and commerce while it was the human aspiration for convenience that conceptualized digitalization. Combining these two ubiquitous aspects of our life helped us create digital trade i.e., trading done over computers using internet.

Digital trade, however, is not only about buying and selling of goods over an online platform but much more about the mechanisms used to enable this trading, methods used for transporting the traded products and the tools required for transacting such electronic commerce.

It is data that underpins the concept of digitization or more specifically, it is the movement of data that enables digital trade. Data is thus a means of production as well as an asset that can itself be traded. This calls for a setup that supports internet openness without compromising on the privacy of the traders of such data.

METHODOLOGY**Aim**

Effect of digitization on trade, commerce and industry.

Objectives

1. To study the background of digitization.
2. To find the effects of digitization on trade and commerce.
3. To study the footprints of digitization on trade agreements and government regulations.

Research Methodology

This research is based on primary data and secondary data.

Primary Data: The data is collected by questionnaire method. Total 65 people were found and interviewed. This included surveying 22 office going professionals, 18 merchants, 15 college students and 10 academicians.

Secondary Data: An analytical work was done on the information available on the internet regarding effects of digitization on trade, commerce and industry.

DIGITIZATION IN THE BACKDROP

It took four industrial revolutions to evolve the concept of digital trade. It was the invention of the steam engine in the late 18th century that made way for the industrial revolution in Britain and eventually the entire world. The invention of steam engine helped in the mechanization of mills involved in manual work by laborer and led to the establishment of factories converting raw materials into finished goods.

The invention of the assembly line by Henry Ford coupled with the invention of electricity in the late 19th century resulted in the mass production of commodities in the second industrial revolution. This considerably brought down the prices of goods that were considered luxury and had a great socio-economic impact as it created a new wave of middle-class working people and moreover the workers were for the first time producing something, they could own themselves!

The third industrial revolution was powered by automation and was the result of the invention of programmable computers in the first half of 20th century which led to the development of high-quality hardware and software products resulting into a fully automated world.

The invention of data in the latter half of 20th century shifted the industry from automation to digitization. It was internet that led to the fourth and the most exciting industrial revolution. Till now machines had to be given a command to perform any task but with digitization computers have developed an intelligence of their own to accomplish any task. Is this not exciting?

If we look at the world around us, we find that almost every global technology company we have today was born out of a simple idea to change the world. Where did Uber come from? Where did Oyo, Tesla and Apple come from? They all owe their existence to people who believed that even they could solve a commonplace problem and build a company in that process.

Companies today no longer require billions of dollars in assets and scores of acres of land to operate and scale up. A company called WhatsApp was acquired for \$19 Billion and it had only 18 employees! We have companies which started in garages and have today fundamentally changed every aspect of our life. This shows that information and data are the new industrial assets in the fourth industrial revolution.

Data helps to organize flow of goods and services. It lessens our dependency on human skills for systematic work and gives accurate and efficient results without any scope for intentional mismanagements.

New technologies like blockchain which attribute their existence to digitization, along with trading, make governance, administration and management transparent and reliable.

Digitization shows that services are now being used to deliver goods. Technologies like self-driving cars and smart homes show that there has been an amalgamation of goods and services for the betterment of both. The thin line between services and goods is being made to disappear by digital trade. This will melt in such a way that technology will no longer be an option to choose from, but it will become a default possibility.

The biggest effect of trade digitalization is that it creates an open market economy. Data fosters cross border collaboration to produce goods and services, and this helps SMEs (Small and medium enterprises) in reaching global stature in a relatively fraction of the time their counterparts in the previous stages of industrialization took.

All this also has a strong bearing on government policies where Free Trade Agreements (FTAs) and cross border trade tariffs are being reworked so that the benefits can be negotiated across both the sides of the border.

One prime example of government's skepticism of digital trade is the Regional Comprehensive Economic Policy (RCEP) of ASEAN (Association of South East Asian Nations), which is being redeveloped to plug in the leakages born out of digital commerce. Countries like China having a strong supply engine can misuse the agreement's terms and conditions to flood the Indian market with cheap goods produced in labor intensive factories employing workers at lower wages, via 3rd party markets like Vietnam and Philippines.

CASE STUDY: FLIPKART

Digital trade is a new domain and companies like Flipkart having ambitions in ecommerce are relatively newer. But the magnitude of disruption they cause in an economy within a short span of time is phenomenal. Flipkart was not only a pioneer of ecommerce in India; it also helped built our startup ecosystem.

Foraying into areas which were not seen as lucrative by conventional businessmen, Flipkart transformed B grade markets into flourishing industries. With heavy investments and calculated risks, sectors such as warehouse management, logistics development and data hosting were brought to life.

Operating on a pseudo-marketplace model, creating an ecosystem where diversified goods catering to the world's fastest growing ecommerce market can be stored, transported and handling the vast amount of data thus generated became a core aspect of their business model.

Our traditional merchants did operate godowns, but none were of the scale Flipkart aspired for. A 4.5 million square feet warehouse is being setup by Flipkart in Bengaluru, which will be the largest in the East. 100 acres of land have also been acquired in West Bengal to create another logistics hub which will create direct employment for 15000 people. Ekart, the state-of-the-art logistics arm of Flipkart, handles 100 million shipments and delivers goods worth more than Rs 50,000 crores per year. The company operates out of internet via its mobile application. Storing and interpreting live data for more than 100 million customers involved comprehensive efforts.

It was digital trade which made such disruption possible, in a fraction of the time their competitors in the previous industrial revolutions would have required. Flipkart, along with its founders, has made angel investing mainstream and Flipsters alone have founded more than 200 startups! Innovations like Cash on Delivery and Big Billion Days forced its competitors to follow suit and digital trade changed the way India shopped. Apart from generating employment, Flipkart generated ideas which disrupted the industry and catapulted the economy.

Had it not been for digitization, such a massive multiplier effect would have been difficult to exemplify.

RESULTS

Findings show that digitization had a catalytic effect on all the stakeholders. Digital trade supported the formation of an open market, helped create traders of global repute and made shopping convenient. Digital commerce brought systematization and reduced the scope for human error – intentional or otherwise. Digitization led to the dawn of an era where idea became the primary asset and data the biggest resource. Innovation in every sphere was incentivized and the benefits were shared by everyone part of the entire supply chain. This led to an ecosystem where people wanted to do something for society by solving some key issues and creating an enterprise through that process.

However, not everyone backed an absolute open internet under the backdrop of breach of privacy issues and there was a strong lobby to dump digitization for conventional ways of doing things in the absence of a guaranteed assurance of seclusion of data leak.

DISCUSSIONS

That digital trade brought convenience and redefined the way we shopped was a unanimous proclamation. But this ignores the fact that too much data in every aspect of human life destroys our privacy. It was interesting to get an insight into this aspect during the investigation process. While digitization catalyzes an open market economy, it also raises concerns regarding the possible misuse of this opportune platform by economies waiting to invade and flood emerging markets via third party countries. Online traders sometimes attract customers by offering incentives at the cost of reliability which is discouraging for traders who are offline but give genuine products. Digital trading, for self-survival, thus pollutes the competition in an unhealthy manner.

CONCLUSION

Digital trade is for 21st century what steel was for 20th century. Data, in near future, will become the backbone of world economy replacing petroleum and industrialization will now be more about digitization and the flow of information.

But as digital trade has grown, so has barriers to digital trade. The enormous pace at which digital trade has multiplied itself, both horizontally and vertically put policy makers in a fix – whether to advocate for citizen privacy or to opt for open internet.

Nothing is completely black or white and everything has shades of grey in between. While outdated regulations, conservative governments and strict data localization rules have limited the scope of digital trade, instances like Cambridge Analytica have also rightfully raised the concerns of data privacy.

We need to make a recipe for the perfect combination of digital security and open internet which nurtures digital trade without compromising the Right to Privacy of every individual.

It is imperative that all the stakeholders – politicians, entrepreneurs, academicians, policy makers arrive at a conclusion to positively manipulate digital trade and enjoy the conveniences provided by these technologies which hold within them the seeds of evolution and the power to move the entire human race forward.

REFERENCES

1. Maddison, A (2003) “The World Economy.”
2. Simmons, B. (2018, October 23) Delivering the Goods. Retrieved from <https://www.weforum.org/projects/digital-trade-policy>

-
3. Clayes, S (2018, March 12) Digital Trade and International Opportunities. Retrieved from <https://www.wileyrein.com/practices-digital-trade.html>
 4. Lopez, J. (2017, July 27) Developing a Framework for Analysis. Retrieved from <https://www.oecdilibrary.org/trade/digital-trade>
 5. Meltzer, J. (2017, April 12) Market Opportunities and Trade Restrictions. Retrieved from <https://www.brookings.edu/testimonies/global-digital>

INDIA : MOVING TOWARDS CASHLESS ECONOMY**Prasanth Rajan**Assistant Professor, Department of Management Studies, V K Krishna Menon College, Bhandup, Mumbai

ABSTRACT

The Digital India programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy. "Faceless, Paperless, Cashless" is one of professed role of Digital India.

As part of promoting cashless transactions and converting India into less-cash society, various modes of digital payments are available such as Banking cards, UPI, M-banking, USSD, AEPS etc. India was an incredibly cash centric economy. Cash accounted for upwards of 95% of all transactions and almost half of the population didn't even have bank accounts.

The surprise demonetization pushed millions of new users onto the country's digital economic grid by virtual fiat. India is currently in the middle of an all out movement to modernize the way things are paid for. New bank accounts are being opened at a heightened rate, e-payment services are seeing rapid growth, cash-on-delivery in e-commerce has crashed, and digitally-focused sectors like the online grocery business have started booming. The lack of cash in the economy combined with the buzz around electronic payments systems has also sparked some very innovative solutions. These changes indicate towards a more inclusive society in the future. India is trying to improve its digital economy, which include simpler, more technologically advanced digital payment systems, increased merchant acceptance, improvements in UPI, which allows monetary transfers between any two bank accounts via a smartphone, as well as a reduction in cash-based transactions.

INTRODUCTION

The Digital India programme is a vital programme of the Government of India having a vision to remodel India into a digital and knowledge economy. "Faceless, Paperless, Cashless" is one of professed role of Digital India.

As part of promoting cashless transactions and converting India into cashless society, various modes of digital payments are available such as Banking cards, UPI, M-banking, USSD, AEPS etc. were introduced. India was a cash centric economy. Money accounted for more than 93 % of all transactions and more than half of the population didn't have bank accounts.

The shocking demonetization pushed millions of new persons into the country's digital economic path by virtual order. India is currently in the middle of modernizing the way things are paid for. New bank accounts opened, e-payment services started at a higher pace, cash-on-delivery in e-commerce payments declined, and digitally-focused sectors of business started booming. The lack of money within in the economy combined with the new trend around electronic payments systems has also sparked some innovative solutions. India is trying to improve its digital economy, by a simpler, more technologically advanced digital payment systems, increased merchant acceptance and improvements in UPI allows monetary transfers between any two bank accounts via a phone and reduce cash-based transactions.

The various methods of digital payment methods are Banking Cards, Net Banking, Unstructured Supplementary Service Data (USSD), Aadhar Enabled Payment System (AEPS), Unified Payments Interface (UPI), Mobile Wallet, Point of Sale (PoS) etc.

OBJECTIVES OF THE STUDY

The current study was conducted with the following objectives:-

1. To study the impact of digitalization in the Indian economy.
2. To understand growth of digital cash, especially after demonetization.
3. To understand various techniques of digital transactions.
4. To understand the knowledge of people regarding various online transaction methods.

RESEARCH METHODOLOGY

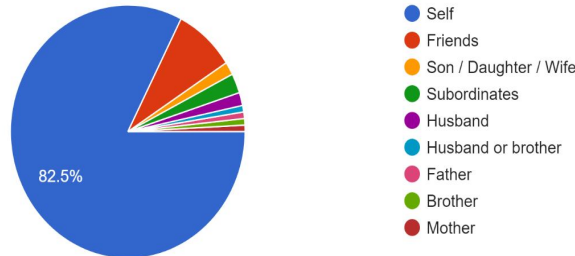
A quantitative study was carried out using a structured questionnaire. Simple random sampling technique was used for analysis of data. The population consisted of 120 individuals belonging to various age groups. Majority of them (58 %) belong to the age group of 0 to 25 followed by the age group 26 – 40 (35%). Though the population consisted of illiterate, SSC, HSC, Graduate, Post Graduate etc. majority of the respondents were

Post Graduates (42.9%). There were 53% female and 47% male respondents. Most of the respondents answered the questionnaire was service professional (51.3%) and students (42%) every though it included Business, Retired, House wife and other categories.

FINDINGS

Who is helping you for doing online transactions

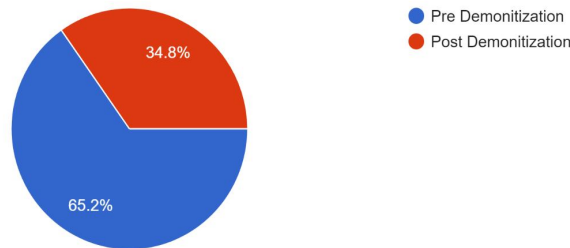
120 responses



It is found that most of the persons are doing online transactions by themselves and are aware of the technology very well. But still there are very few who are taking the help of other people for doing the transactions.

When you have started using Online financial transactions?

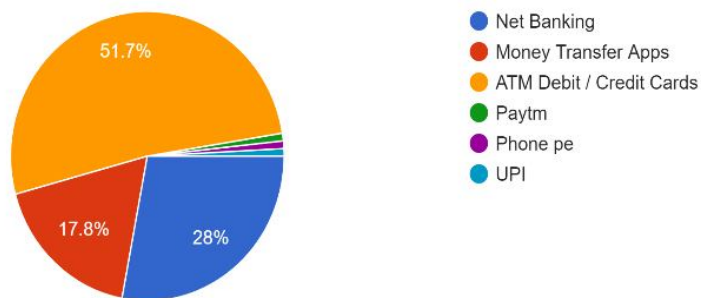
115 responses



The study found that even though there is an increased usage of online transactions after demonetization, about 65% of the respondents were using it before demonetization.

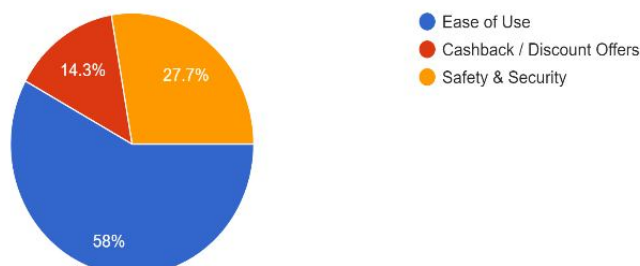
Which is your most preferred online financial transaction mode?

118 responses



What is the reason for your choice?

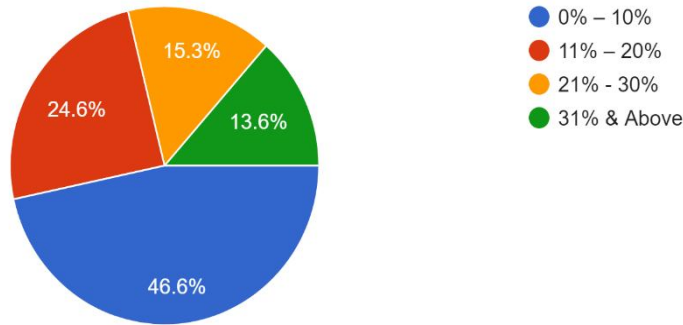
119 responses



Though there are various methods of online transactions are available, most of the respondents (51.7%) are still preferring ATM Debit / Credit cards than other money transfer applications due to its ease of use feature and security.

What % of your monthly income you are utilizing for various online transactions on an average?

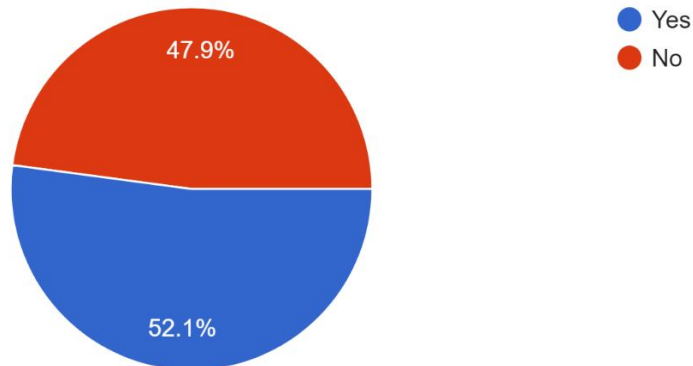
118 responses



The study found that though there are well educated young respondents, still the money spent on online transactions were upto 10% (47 % of total Respondents) of their monthly income and only 17% were spending more than 30% of their monthly income.

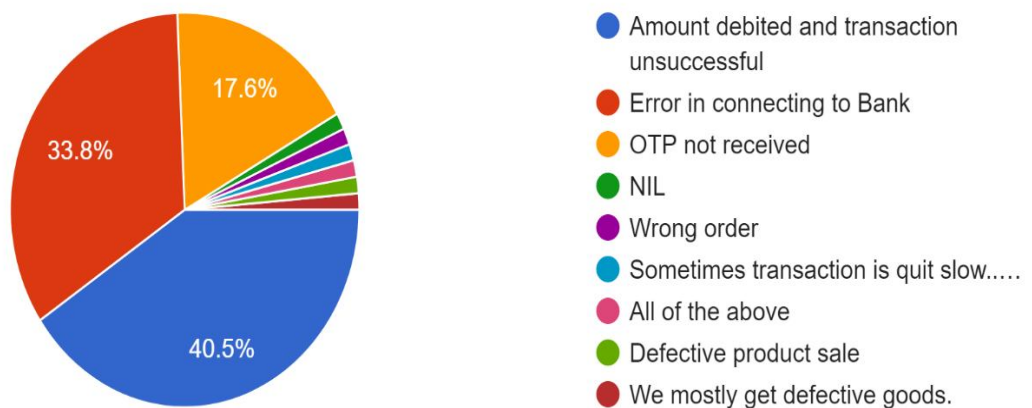
Did you face any fault in the online transactions so far?

119 responses



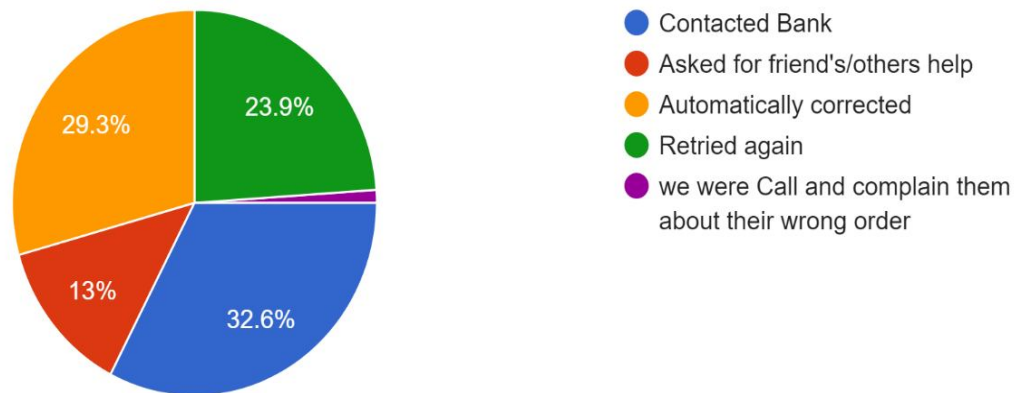
If Yes, What kind of error/ fault happened?

74 responses



How you overcome the situation?

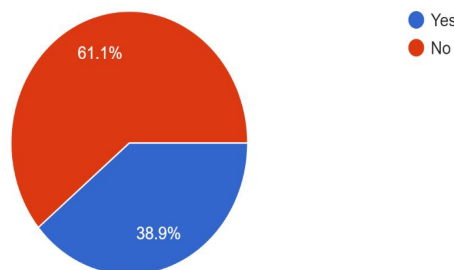
92 responses



The study revealed that around 52% of the respondents face problems while doing online transactions and most of the problems were connected with debiting amount and transaction became unsuccessful while around 34% face the problem in connecting to Bank and the situation was handled by contacting bank (around 33%), some of them got it corrected automatically (29%) while some of them retired again (24%) and very few had asked for friends help.

Is there any need for improvement in security and other features for online security?

113 responses



The study revealed that since there are more online fraud happening around and people are changing towards digital transactions, there is need for improvement in security and other features for online security. For the security they can use face detection, biometrics and other methods were suggested by them.

LIMITATIONS OF THE STUDY

1. The sample size consists of people who are educated and are living in various parts of India. A study focusing on illiterate population may bring other result.
2. The questionnaire has not checked more about security measures related to online transactions.
3. The awareness among people regarding various online transactions methods have not been studied in detail.

SCOPE OF FURTHER RESEARCH

1. The same study can be extended to larger area by dividing category of respondents as Students, Academicians, IT Professionals, Advocates, Businessman, and Banking Personnel etc.
2. The awareness level of people regarding various methods of online transactions can also be done.

CONCLUSION AND SUGGESTIONS

1. The study shows that majority of the people using digital transactions are young and well educated as it is showing a good sign for the country for achieving the goal of digitalization.
2. The study reveals that even if there are more digital transaction methods available, still people prefer ATM Debit / Credit cards due to its ease of use. Other payment methods such as UPI, M-Banking etc. has to be made user friendly and in a secured way.

3. The study suggests that even though there was an increase in digital transaction especially after demonetization, but majority of people (47%) spends less than 10% through various digital transactions from their monthly income.
4. The study also reveals that even though there are various steps taken by Government and banks to improve digital transactions, but still people are facing problems in using them which needs to be corrected so as to reach the goal of complete digitalization.
5. The remarkable point to be noted is that around 61% of the people responded are of the view that the security features currently available for online transactions are enough while some are of the view that some more improvements has to be brought in to effect such as biometrics, face recognition etc. to improve security.
6. In order to reach the goal of digital economy, the major step to be taken by the Government should be to teach the people regarding the benefits and make them aware of the process so that fear in the minds of people can be washed off and can reach success easily.

REFERENCES

1. Publications:- India's Readiness for Digital Economy: Cashless Economy by Ajit Roy
2. <http://cashlessindia.gov.in/index.html>
3. <https://www.forbes.com/sites/nusbusinessschool/2018/09/01/indias-demonetization-drive-a-necessary-jolt-towards-a-more-digital-economy/#6f91d34b3dc3>
4. <http://cashlessindia.gov.in/index.html>
5. <https://www.forbes.com/sites/wadeshepard/2016/12/14/inside-indias-cashless-revolution/#3666e0b4d124>
6. http://cashlessindia.gov.in/banking_cards.html
7. http://cashlessindia.gov.in/internet_banking.html
8. <http://cashlessindia.gov.in/usd.html>
9. <http://cashlessindia.gov.in/aeps.html>
10. <http://cashlessindia.gov.in/upi.html>
11. http://cashlessindia.gov.in/mobile_wallets.html
12. <http://cashlessindia.gov.in/pos.html>

A STUDY ON IMPACT OF CASHLESS TRANSACTION - A SOCIAL PERSPECTIVE

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ABSTRACT

Money is being a core element in every transactions, since many centuries but with the evolution of business in different forms money being considered as a more risky factor and cannot cope with emerging modes of transaction. Therefore, another mode known to be cashless transaction is taking a new shape in the modern era preventing cash centric transactions. Cashless transaction is the alarming needs of the technological era. The present study highlights the impacts of various modes of cashless transaction. From the larger purview it analyze the Positive and Negative reaction of the common population in Mumbai region, towards the digitalization of money. The paper adapts a exploratory approach wherein the conclusion will be drawn after conducting interview to population of different strata of the society. Different aspects of the cashless transaction are analyzed and deviation is highlighted. The alternatives suggested by the general population are also expressed. The study advocates the need of simplification of process of this kind of transaction and also the need of making it accessible to the layman population.

Keywords: Cashless transaction, Modes of cashless transaction and Positive and Negative Impact.

1. INTRODUCTION

Business is a part and parcel of human life right from ancient time, and exchange is considered as one of the main feature of any business transaction. Along with the evolution of human being, Exchange in transaction has also undergone much evolution, right from barter exchange to digitalization of money. Cashless transaction is not a new concept, but existed in barter system also, wherein one good was exchanged for another. But the disadvantageous of biased transaction in barter system had enabled to introduce coins and currency notes as legal tender money to transact. The growth and advancement of technology, the emergence of globalization had increased trade and commerce globally, whereas the physical limitation of legal tender money cannot cope up with the globalization. Therefore the emergence of cashless transaction had been initiated. Any kind of transaction which is not done through physical mode, but used digital mode is known as cashless transaction.

Earlier it was known that approximately only five percentage of the population in India were benefiting from the cashless transaction but after demonetization of money announced by our Honorable Prime Minister in 8th November, 2015, the people experienced a panic situation all over the nation waiting in their bank in a long queue to collect their money. This embracing condition had made people lose their confidence in legal tender money, and forced them to find another mode of transaction which would be easily accessible. Therefore the use of cashless transaction has taken new shape. Moreover India is known to be one of the youngest nations with approximately sixty percent of the population come under the age group between sixteen and sixty. This age group is regarded as the working population who are more prone to technopak, therefore they always find an alternative means for shopping and making easy payment. There are different methods of cashless transaction like Paper based method and Electronic based method. Paper based method includes Cheque and Demand Draft, whereas Electronic method includes Credit and Debit card, Prepaid card, E-cash coupon, Internet Banking Transfer, Mobile Wallet, Unified Payment Interface, NEFT, RTGS, and AEPS.

Modes of cashless transaction in India

- ❖ **Cheque:** A cheque is a negotiable instrument that orders a bank to pay a certain amount of money from the cheque issuer's account to the person in whose name the cheque has been issued. Normally cheque is divided into category depending upon the functions namely cash cheque and transfer cheque cash cheques are beneficial to withdraw cash from bank immediately, whereas in transfer cheque the amount is transferred to the payee account directly.
- ❖ **Demand Draft:** A demand draft is a negotiable instrument issued by a bank to a client, directing another bank or any of its own branches to pay a certain sum of money to the specified party mentioned as in the demand draft.
- ❖ **Debit Card:** Debit card is a plastic payment card which allows the card holder to transfer money electronically from their bank account when making a purchase.
- ❖ **Credit Card:** Credit card is a plastic card issued by a bank, building society, etc., allowing the card holder to make payment to the merchant while purchasing goods or services on credit.

- ❖ **Pre-paid Card:** A pre-paid card is a payment card with a monetary value stored on the card itself.
- ❖ **E-Wallet :** A digital wallet refers to an electronic device or online service that allows an individual to make electronic transaction.
- ❖ **Internet Banking:** it is a method of banking in which transactions are conducted electronically via the Internet.
- ❖ **NEFT:** National Electronic Funds Transfer is a nation-wide payment system facilitating one-to-one funds transfer. Under this scheme, individuals can electronically transfer funds from any bank branch to any individual having an account with any other bank branch in the country involved in the scheme.
- ❖ **RTGS :** Real Time Gross Settlement is an electronic form of funds transfer where the transmission takes place on a real time basis. In India, transfer of funds with RTGS is done for high value transactions on a real time basis.
- ❖ **AEPS :** Aadhaar Enabled Payment System is a bank led model which allows online interoperable financial transaction at PoS (Point of Sale/Micro ATM) through the Business Correspondence (BC)/Bank Mitra of any bank using the Aadhaar authentication.

The present paper brings out the impact of different modes of cash less transaction. The present research was conducted in Mumbai city among the common people, appealing to age group between 'eighteen to fifty eight'. The study complies the opinion and suggestion of the interviewee. The methodology followed in the present day was questionnaires and casual interactions. To supplement to the primary method, secondary method was also considered by referring the articles to analyze the different modes of cashless transaction. The impact of cashless transaction forms the major part of the research paper.

2. REVIEW OF LITERATURE

- Banerjee S. (2018), in their research paper "Impact Importance and Requirement of Cashless transactions in India". States that there is unprecedented transition of people to cashless transaction. She laid a positive impact of cashless transaction towards the development of an economy.
- Rajanna K.A. (2018), in their study "Perception and Awareness about Cashless Transaction". States that there is awareness among the people about cashless transactions but they hesitate to utilize the modes since they feel unsecured with emerging cyber crimes. Therefore the study concludes that government should emphasis in bringing technical literacy among people to benefit the usage of cashless transaction. This study is carried in Chikkamagaluru district of Karnataka.
- Venkateshwararao P. (2017), "Public Perception on Cashless transactions in India". The present study was conducted in Andhra Pradesh, India. the study examines the impact of transaction related with positive and negative factor. The findings revealed that even though there are many positive aspects in cashless transaction there are still some negative aspects which are holding back the people to avail the cashless transaction.

3. OBJECTIVE OF THE STUDY

The following are the objectives of the study-

1. To take an overview of cashless transaction in India.
2. To evaluate the perception of consumers towards awareness among cashless transaction in Mumbai city.

4. RESEARCH METHODOLOGY

The present study adopts primary method and secondary method. Primary data is collected through survey method. Well structured questionnaire were framed which includes ten questions. Population of the study is the common people of Mumbai city between the age group of eighteen and fifty eight which is divided into four groups. Stratified Sampling technique is used for selecting respondent for the sample. Total sample size is forty. Ten respondents from each groups. Collected data is statistically analyzed and interpreted To supplement to primary data secondary data like journals, articles and website were also utilized.

5. FINDING AND ANALYSIS

The present study attempted to find out perception of consumers towards awareness among the cash less transaction in Mumbai city. The age-wise respondents are presented in table 1.

Table-1: Age-group of respondents

Age group	Respondent
18-28	10
28-38	10
38-48	10
48-58	10
Total	40

Source: Personally data collected from commuters through questionnaire.

Table-2: Response towards awareness about cashless transaction

Particulars	Respondents as per Age-Group			
	18-28	28-38	38-48	48-58
Yes	10	10	10	08
No	-	-	-	02
Total	10	10	10	10

Source: Personally data collected from commuters through questionnaire.

The table 2 reveals that out of total sample of 40 surveyed, 38 people have positively responded towards the cashless transaction, which is around 95 percent, while only 2 respondents between the age group forty eight to fifty eight were totally negligent about cashless transaction which is around 5 percent. This table brings out the fact that majority of the people are aware of cashless transaction.

Table-3: Response towards usage of different modes of transaction

Different modes of transaction	No. of respondents	Percentage of response
Cheque	38	95
Demand Draft	20	50
Debit Card	38	95
Credit Card	20	50
E-Wallet	10	25
Internet Banking	10	25
NEFT	6	15
RTGS	6	15
AEPS	6	15

Source: Personally data collected from commuters through questionnaire.

The above table describes the fact that cheque and debit card is the most familiar mode of cashless transaction among the common people of the all the age group from eighteen to fifty eight, as 95 percent of the sample is familiar with the debit card and cheque. Credit card and Demand Draft is also familiar among the working population, which represent 50 percent of the total response. E-Wallet and Internet banking is common among a few samples, which reflects 25 percent of total response. NEFT, RTGS and AEPS is generally not common among the general people as, it reveals only 15 percent of the total response gained. The above table brings out the fact that apart from a few modes of cashless transactions like cheque and Debit card, remaining modes are still far from reach to the general people.

Table-4: Response towards the frequency of Usage of cashless transaction

Frequency of Usage	No. of Response	Percentage of Response
Daily	16	40
Weekly	12	30
Monthly	07	17.5
Rarely	03	7.5
Never	02	5
Total	40	100

Source: Personally data collected from commuters through questionnaire.

The table conveys the truth that forty percent of the samples are more frequent in using the cashless mode that is, using it daily. The other response is from very conscious users who reflect thirty percent using it on weekly basis. Seventeen point five percent of the sample use only once in a month and there are still seven point five percent respondent who rarely use cashless transaction, whereas there are only five percent of the sample size who are not aware of any such mode and never use any cashless mode of transactions. The table also describes

that majority of the respondent use it very frequently, which shows that people are eager to use an alternative for money.

Table-5 Response towards satisfaction towards cash less transaction

Particulars	Respondents as per Age-Group				Total Respondents
	18-28	28-38	38-48	48-58	
Yes	10	10	10	08	38
No	-	-	-	02	02

Source: Personally data collected from commuters through questionnaire.

The above table displays the opinion of the samples, based on whether they are satisfied are not towards the cashless transactions. The table reveals, that around ninety five percent of the samples are satisfied with the current mode of cashless transactions, while only five percent of the samples between the age group forty eight and fifty eight is not aware of the cashless transaction, therefore they didn't pass any comments on satisfaction. So hereafter only sample size of thirty eight is considered to analyze the satisfaction level of the samples.

Table-6: Response towards the satisfaction level of samples pertaining to ranking points

Age-group	Level of Satisfaction			
	Excellent	Very good	Good	Satisfied
18-28	08	01	01	Nil
28-38	03	03	04	Nil
38-48	01	02	03	04
48-58	Nil	Nil	02	06
Total	12	06	10	10

Source: Personally data collected from commuters through questionnaire.

The table displays the fact that majority of the respondents between the age group eighteen to twenty eight is more addict towards the new technology, therefore eighty percent of their response towards ranking point is Excellent and ten percent in Good and Very good rating respectively. The respondent between the age group twenty eight and thirty eight also rated their thirty percent in Excellent, thirty percent in Very good and forty percent in good. The level of Excellent is low compared to the respondent in age group between eighteen to twenty eight. The respondent age group between thirty eight to forty eight symbolized an fluctuating rating in all the level of satisfaction scale namely, forty percent in 'satisfied' thirty percent in 'good' twenty percent in 'very good' and ten percent in 'Excellent' this trend clarifies that these age group are very cautious user and still they have expectation in the growth level of classless transactions. Finally the last category of the sample size that is, age group between forty eight and fifty eight who are very keen about security, did not show a high level of efficiency in cashless transaction. Out of ten samples from this age group only eight were considered for this response, as the two out ten respondents are not aware of cashless transaction, therefore asking their satisfaction level would be meaningless to the study. The eight respondent of this age group between forty eight to fifty eight didn't rate to higher level of satisfaction like Excellent and Very Good; they had rated seventy five percent in Satisfaction and twenty five percent in Good. This shows they have high level of expectation which is not yet met by these modes of transactions.

6. CONCLUSION

The above study states that there is a gradual transition of majority of the people in Mumbai, from cash-centric to cashless transactions. People are nowadays more prone to digitalization as they believe that there is need for strong alternatives for cash transactions. But again, there is some kind hesitation which prevents them to take active part in cashless transaction. The major factor which majority of the people complains is security. People feel a sense of insecurity when they transact through online process. So, therefore it is essential for the government authorities to solve the deviations in the cashless transactions which abstains the people to enter into different modes. The major problem met by the above fifty five age groups is complicated procedures; majority of them suggested that process of cashless transaction has to be still more user friendly. Moreover positive awareness among the common people has to be inculcated to develop the digitalization in transactions in all the nooks and corners of the nations. To make our nation a Digital India free from corruption it essential that government as well as the common population has to encourage the usage of cashless transaction.

7. REFERENCES

- Ms. Sunita Banerjee (2018), "Impact Importance and Requirement of Cashless transactions in India".
- Dr.K.A. Rajanna (2018), "Perception and Awareness about Cashless Transaction".
- Dr. Venkateshwararao Podile (2017), "Public Perception on Cashless transactions in India".

A STUDY OF DIGITAL PAYMENT: AN INNOVATIVE WAY OF CASHLESS ECONOMY IN INDIA

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INTRODUCTION

Cash is a basic need of any economy. In a country like India, it is widely accepted that it is a tremendously cash intensive economy. This is attributable to several factors like it is in the form of paper money and coins, no electronic payments, universally accepted, hassle free, no internet or finger print required only one wallet transaction required. Another important component strengthening cash transaction is the habitual tendency of people towards utilizing hard cash. India comes fourth in the world among the list of cash users. Almost every country has adopted cashless economy and many countries have made significant progress. In other words, cashless economy is a world trend that India needs to adapt for its overall development.

SIGNIFICANCE OF THE STUDY

Before demonetization 86 per cent cash in India was in the form of Rs.1000 and Rs. 500 notes. It cost the central bank Rs. 3917 crore to print Rs. 500 notes and Rs. 2000 crore to print Rs. 1000 notes and apart from that to manufacturing of coins cost a lot to Government of India. The revolution of digitization in India has been rather slow until 2016. In spite of several options of payment available other than cash, such as plastic cards and mobile money. Their usage was not satisfactory for an economy on the road to development. More and more preferences were given to cash bound economy.

Hence, demonetization was a major initiative taken by Government of India to promote our country as digital India. Digital payment is one of the effective solutions for various problems curb black money, counterfeit currency, curb tax evasion in India. Therefore, the present study is very useful in changing scenario of digitalization.

OBJECTIVES OF THE STUDY

The present study deals with the concepts of digital payment and its contribution towards development of cashless economy in India. There are number of benefits of digital payment are highlighted in the present study which will be useful for every person in their day to day transactions. Keeping these things in mind the following objectives were designed for this study.

1. To study the concept of digital payment.
2. To identify the pros and cons of cash and cash less economy.
3. To understand the causes of dissatisfaction among the consumers about digital payment.
4. To suggest some remedial measures to improve digital payment system in India.

METHODOLOGY OF THE STUDY

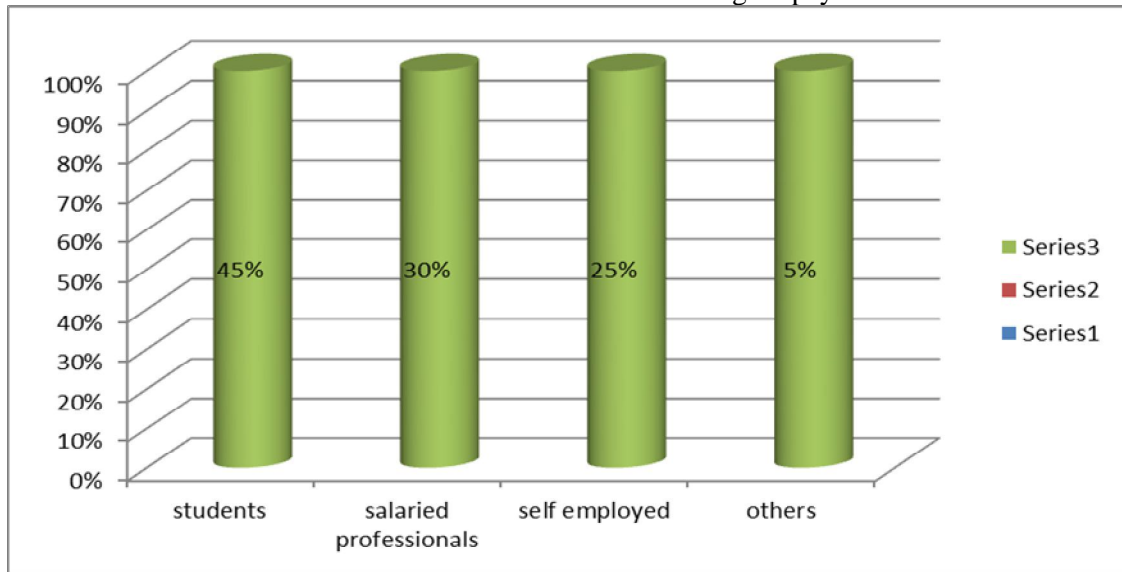
The present study "A study of Digital Payment: An Innovative way of Cashless Economy in India" is empirical in nature. It is based on both primary and secondary data. The primary data has been collected from Metropolitan city Mumbai and nearby suburbs cities in Maharashtra; where a sample size of 200 was selected at random. The method used to obtain

Data was in the form of questionnaire. The secondary data has been collected from reference books, research papers, and progress reports of Pradhan Mantri Jan Dhan Yojana, Ministry of Finance, Government of India; news papers and relevant websites. The informative material found through primary and secondary data have been studied and put in systematic form to arrive at appropriate conclusions.

DATA ANALYSIS AND INTERPRETATION

India is undergoing a digital revolution with a variety of cashless payment methods being introduced. Cashless economy boosted by Demonetization. According to survey of Indian express, in a last few months Paytm has touched a record 5 million transaction a day. Over 28,50,000 offline merchant across India accept paytm. The highest increase in usage was seen in Chennai, followed by Ahmedabad, Hyderabad, Kolkata and Bangalore. The present study is undertaken to find out the responses of consumers in terms of digital payment in Mumbai city.

Graph No. : 1
Classification of consumers in terms of digital payment

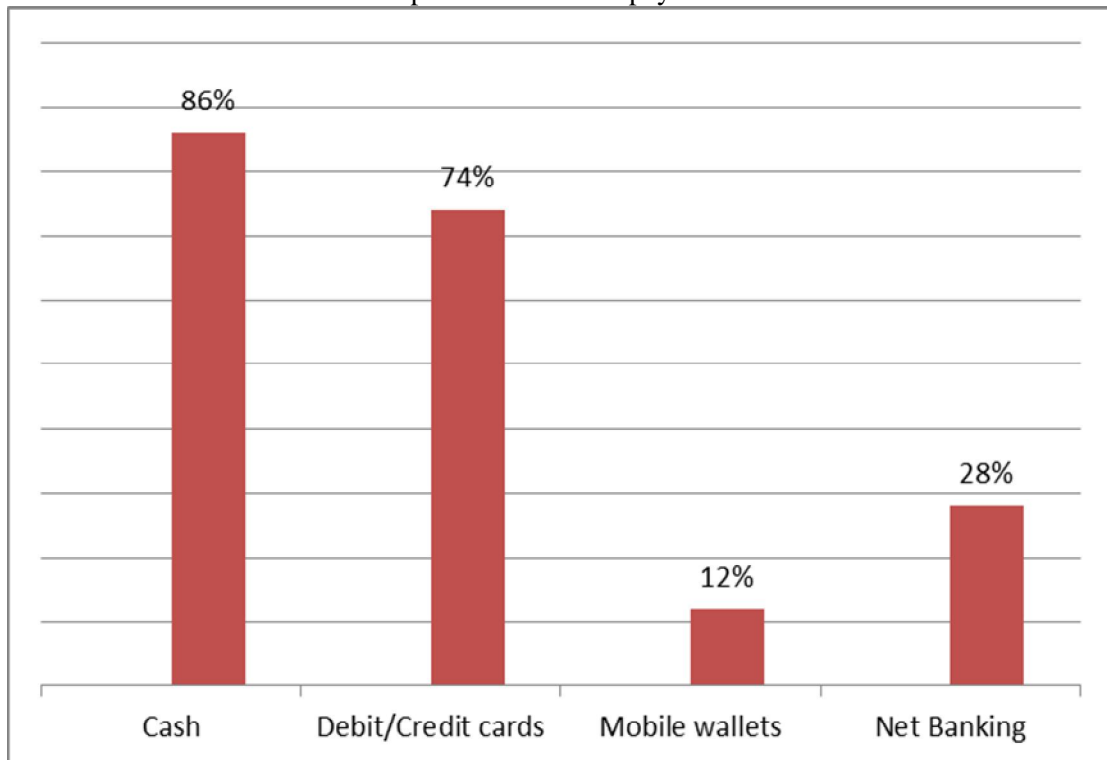


Graph No. 1 indicated that majority of responses for digital payment is from students 45 per cent and salaried professional followed next in line 30 per cent. Whereas self employed consumers shows 25 per cent response towards digital payment and others shows very less response 5 per cent for digital payment system.

The study focused on the areas where digital payments are used the most by the consumers in Mumbai city. It has been seen that for shopping purpose digital payment system used by the consumers. At the same time for mobile and DTH recharge, payment of Utility bills, payment of educational fees etc. people are used the method of digital payment.

The reasons of the choices being the convenience, hassle free nature of digital transactions. Digital payment through cards and wallets do not take a lot of time and the ease of not carrying physical cash is a driving force behind the accelerating growth of digital payment. The present study undertakes to find out the most preferred modes of payment for consumers in Mumbai city.

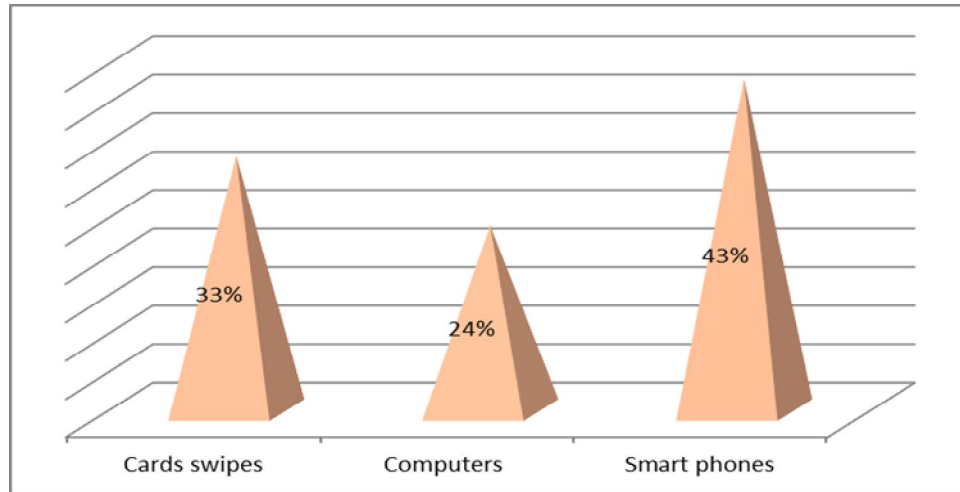
Graph No. : 2
Most preferred mode of payment



Here study shows that the most preferred mode of payment still remains cash as more than 85 per cent out of total number of respondents chose cash as the best method of payment. Bank cards ranked second with 74 per cent, for net banking only 28 per cent preferences are being given whereas, very less response 12 per cent given for mobile wallets respectively.

Smart phones have taken lead with respect to the most preferred mode of carrying out digital transactions, primarily because of their ease of access and availability. The present study finds out the most preferred payment method undertaken by consumer of Mumbai city.

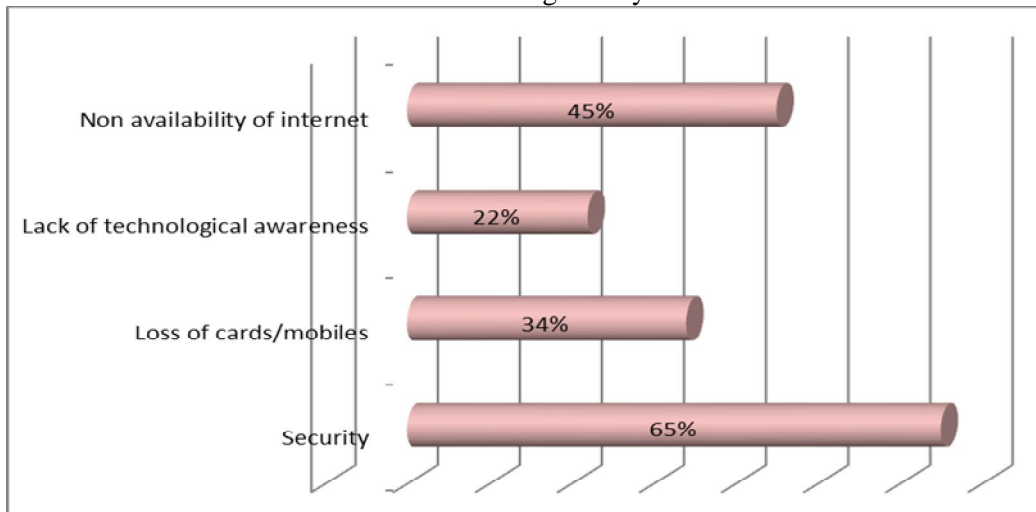
Graph No.: 3
Preferred Payment Method



The present study indicates that 33 per cent respondents are using cards swipes for their day to day transactions, 24 per cent respondents are using computer for the purpose of digital payment whereas 43 per cent respondents are using smart phones for digital payment. While mobile phones do makes it convenient for transacting or conducting business. It puts consumers to the threats like virus attacks, malware, frauds and theft of information and so on.

The benefits of digital payments are sure many and will continue being a contributing factor of digital economy in India but there are some of the factors that surface as barriers for the adoption of digital payment methods are also highlight in the present study.

Graph No. :4
Barriers to Growth of Digital Payment Method



The study shows that consumers are aware of the benefits of using minimum cash in their purchase patterns also the long term benefits like coping with terrorism, money laundering and so on. The growth prospects of digital transactions are undoubtedly strong and show signs of a steady rise. But due to lack of security, fear of loss of cards or mobiles, lack of technological knowledge and non availability of continuous internet facility creates hurdles in the growth of digital payment system.

CONCLUSIONS

There are number of benefits of cashless economy and the same can be made all the more effective by tackling the problems that obstruct its growth prospects, improving and setting up a robust cyber space to combat any attacks of fraud, quick information about theft and others is a prerequisite for a smooth conduct of digital transaction system. Digital literacy among the citizens is also a key driver of the cash less campaign. There is also a need to create more and more awareness of the various methods and modes of payments and to increased financial inclusion. The Indian economy is a long way to go in terms of achieving high rural as well as urban literacy rates and support for digital transactions. However the consumers, businesses and the Government of India need to work in consistently and progressively to achieved the cashless economy in the country.

REFERENCES

- Progress Report on Pradhan Mantri Jan Dhan Yojana, Ministry of Finance, Government of India 2017, <https://www.pmjdy.gov.in/account>
- Mathaiyan R. “Digitalization and Good Governance in India”, MJP Publication, Chennai, 2016.
- Sijariya Rajeev, :Digital India-A Socio Economic Transformation”, Bharti Publication, New Delhi, 2017.
- The Indian Journal of Commerce, Oct-Dec 2017.
- The Indian Journal of Commerce, April-June 2018.
- www.digitaleconomyinindia
- www.cashlesseconomy

A SOCIOLOGICAL STUDY ON GLOBALISATION, ICT AND YOUTH

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ABSTRACT

Globalisation along with Information and Communication Technology (ICT) have the potential to supplant or reorganise the structures of society which we clearly see in the transformation of our country in the last two decades. Youth has the power to influence the creation, demand, diffuse or the oppose these global forces. It is seen that one's social environment plays an important role in governing the use of digital technology gadgets. Social capital and economic resources in the Globalised era are underlying factors that determine the dependence on technology.

INTRODUCTION

The first few years of the new millennium saw extremely rapid increases in internet, mobile phone, and computer use in developing countries. Between 2000 and 2003, the developing world gained more than one-quarter of a billion internet users and almost half a billion mobile phones users. ICTs (Information and Communication Technologies) act as an appendage to the process of Globalisation. As India is one of the fastest growing economies in the world, it is then inevitable that more and more of its citizens will tend to be part of this global networked world. These new technologies are growing much faster than older information and communication technologies such as television, radio, mainline telephones, and newspapers. Young people are more likely to adopt these new technologies for economic, physiological, and social reasons.

Most of the studies focus on a one-dimensional effect of technology on youth mostly in terms of its negative aspects. This brings about an incomplete picture of the use of digital technology in the lives of its users. As we live in a network society, using digital technology does not remain a choice but an unavoidable reality. Factors like dual careers of parents, a demanding educational system, changing ethical perspectives, changing family outlook, rising standard of living have contributed to the dependence on technology. This proves that digital technology cannot be considered as the prime cause of change in youth behaviour but can in fact be seen as an effect of the above mentioned factors.

THEORETICAL FRAMEWORK

The empirical study is anchored in a theoretical framework of “**Networked Individualism**” which falls under the larger discourse of social construction of technology. Network Individualism helps to trace a gamut of social changes through the prism of a neo-liberal globalised system in which ICT plays a colossal role. According to Lee and Wellman's (2012) theory on ‘*Networked Individualism*’, there has been a shift in people's social lives away from closely knit family, neighbourhood and group relationships towards larger and more diverse personal networks. From a network perspective, society is not merely the sum of individuals or of two-person ties. Rather, everyone is embedded in structures of relationships that provide opportunities, constraints and coalitions. Work, community and domesticity have moved from hierarchically arranged, densely knit, bounded groups to social networks. This transformation has been brought about by the ‘*Triple Revolution*’ which constitute of *the social network revolution, the Internet revolution and the mobile revolution*.

The main objective of this research is to find out the patterns of ICT use in the everyday lives of the youth in Mumbai.

I] ICT in daily lives of the youth

- To study how and in what areas are ICT tools used by the youth.
- To explore the role of ICT on youths' Millennial lifestyle.

SAMPLING DESIGN

The universe of this study comprise of the students of Degree colleges in Mumbai. There are about 80 Degree Colleges with greater Ranking & certificate Recognition under Mumbai University (University of Mumbai 2011). It is however not possible to study students of all degree colleges of Mumbai. Hence, the universe of the study was narrowed down to 11 degree colleges in Mumbai which includes colleges under Mumbai University, an Autonomous College and a Deemed university. A sampling procedure was utilised for this research after which a questionnaire was given to about 200 respondents belonging to the selected colleges. Male students were 90 while female students were 110. The researcher channelized her main study to a homogenous group of English speaking (not necessary their first language), upper middle class youth studying professional courses

(150 respondents) and non-professional courses (50 respondents) from affluent colleges of western suburban and south Mumbai colleges.

RESULT ANALYSIS

Moore's law states that the price-to-performance ratio of computing hardware may continue to double every eighteen to twenty-four months, which creates changes so rapid that at times it becomes difficult to trace the social changes initiated by technology. Miniaturization of technology creates powerful impact on the social lives of people (Elliott and Urry 2010). It was seen that loyalties towards technological brands and gadgets are short-lived suggesting a herd-mentality of joining the bandwagon of popular devices/websites only to abandon after few years. Studies of the earlier decade focussed on access to Internet as a stand-alone activity which however, is not the case anymore. Prior to 2009-2010, youth used to allot certain hours in a day to access internet with the help of desktop which restricted mobility. The exclusive time spent on being online is nullified because people can now be always online thanks to ubiquitous internet mobiles, wi-fi connectivity, dongles (internet connectors) and portable devices. The advanced features of smartphones have brought the best of both the worlds i.e., internet and a feature phone. This latest technology coupled with the allurements of cheap internet packages have now made it possible for any college student to access internet irrespective of their social class. Smart phones have been heavily used by college students in areas of academic interests or personal communication. Hence, the compartmentalization of time into internet time and non-internet time has been effaced.

It was seen that there was an increase in ICT use in academics as educational courses are giving more emphasis to assignments than written tests. When it comes to reading habits, even with a plethora of free e-books available on internet we still observe that youth are not inclined to reading. The only time most of the students download e-books from the internet is when they are given class assignments. Thus, the percentage for reading e-books for leisure is quite negligible and so is the habit of blogging. Thus, an aversion for reading and writing in an offline world is also reflected in the online sphere. The trend that we see with reading books and writing blogs is not emulated however, in the field of music which has become an indispensable part of a youth's life. Listening to music and watching Youtube music videos on a daily basis, is the most popular activity among the youth. Chatting online while browsing on the internet is a very common form of online multitasking found among the youth. Nevertheless, the incessant use of digital tools does bear a brunt on one's health.

Technology-induced arousals do contribute to youths' delayed bedtime and reduced sleep patterns. It is seen that about two-third of the youth delayed their sleep patterns due to late night online communication. Monday morning is the worst day according to most of the college students, where attending early morning lectures in the college becomes extremely difficult.

Digital tools do not negate social processes but reconfigure them digitally. The heart of digitalization is providing convenience to its users making youth choose processes that are increasingly hassle free. Online shopping has evidently increased among Millennial generation (generation born after 1980 is called the Millennials) with about 81 per cent of the youth have bought at least one product online. Along with convenience, youth also have the heart for adventure a constant urge to do something different in life. Thanks to the mushrooming and segregation of satellite TV channels according to one's choices and languages, this desire to be different coupled with the exposure to lifestyle channels is reflected in the choices of professions. Popular career choices revolved around travelling, food and music industry and sports. There was a common aspiration to start their own enterprises and an equally common disdain for working under someone else. Major part of their pocket money is spent on eateries and watching movies or buying gadgets.

Around 87 per cent of the decisions for hang-outs are decided on Whatsapp rather than face-to-face. Due to various online videos, today's urban youth are going multi-cultural with the palettes where the choices are not just restricted to Indian or Chinese cuisines anymore. Home parties have now become very common among the youth. Right from searching for popular restaurants to booking tickets in a movie theatre, use of mobile applications have become unavoidable. Mobile applications like Book My Show not only helps to book movie tickets but also helps to pre-select the seats in the theatre even before entering the theatre physically.

Branded products are indicator of high-end lifestyles. Hence, college students are very particular about their brand of the mobile phone as it has become a marker for status in their social circles. Thus, they make sure that they buy mobile phones of popular brands like Apple. American sitcoms are preferred over Indian television shows while International football matches are were increasingly becoming more popular among the youth. Youtube channels and live streaming of programs is rapidly replacing Television.

NETWORKED RELATIONS

About 88 per cent of the youth were of the view that today's educational system is one of the prime reasons that take them away from their families as they hardly get time to spend with their families. They stated that it is Digital tools that help simplify their academic chore. Digital technology use is a time-consuming activity and thus high frequency of use might be negatively associated with family time and positively associated with family conflicts. As youth use digital tools for social and entertainment purposes, the frequency of the conflicts between youth and parents increased. Conversely, using the digital tools for educational purposes, a use that is highly valued by parents and consistent with parental expectations, decreases the frequency of the conflicts between youth and parents.

Digital technology helps to facilitate repeated interactions between participants and allows for shared experiences that lead to increased solidarity and intimacy. However, it is seen that online communication did not stimulate relationship formations with acquaintances (weak ties) which is proved by the fact that on an average, youth have 600 friends on the most popular social networking site Facebook, while only 20-30 contacts out of 600 contacts would be considered as good friends. Friendship on these sites focuses a great deal on collecting and managing the people you know and does not focus on getting to know friends much as is the motive of social networking sites. The closeness of relationships with known-others determines the intensity of online communication. Instead of online relationship turning into friendship, it is real life friendship that is turning online.

SIGNIFICANCE OF THE STUDY

According to the survey conducted by the Internet & Mobile Association of India (IMAI, 2014), Mumbai has the **highest number of Internet users in India**, their total count being estimated at 16.4 million. The overwhelming majority of the studies have focused on users in developed countries. The total number of Internet users in India has been estimated to be 243 million. When it comes to the use of smartphones, India ranks third among the top countries. Further surveys conducted by IMAI found that more than 75 per cent of internet usage is among school- and college-going students. Thus, we see that even though a significant number of children and youth use the latest digital tools, there has still been relatively little research done on sociological studies on technology in India.

Unlike many studies on the internet and mobile phones that focus exclusively on online activities, this study also tries to explore the underlying factors brought in by a neo-liberal economic structure coupled with the ubiquitous nature of technology. From the findings on inter-relation between ICT and youth, we see that how technology both is shaped and is being shaped and how it is both enabling and constraining. It also shows that the cyberspace is but a reflection of the existing world. The online world and the use of digital technologies like smartphones and mobile applications are a manifestation of the changing roles of family members, personal outlook, social and political priorities, lifestyles and ethics.

CONCLUSION

The increased availability of wireless frequencies and new genres of handheld devices are increasing the ubiquity of computing. The emergence of new devices like smartphones is introducing new interaction paradigms. Newer phones and web 3.0 services are creating a techno- social context. In learning how to make sense of this network world that is so different from those that of earlier generation, youth reveal valuable techniques for interpreting and reworking of the social life. Their experiences provide valuable insight for understanding how technology becomes part of people's everyday lives.

REFERENCES

- Elliott, A. and Urry, J. 2010. *Mobile Lives. International library of sociology*, Routledge, 188.
- Internet & Mobile Association of India (IMAI).2014. <http://www.thehindubusinessline.com> (Accessed on 12/12/2014).
- Lee, R. and Wellman, B. 2012. *Networked-The New Social Operating System*. London: The MIT Press.
- Wellman, B. and Haythornthwaite, C.2002. *The Internet in Everyday Life* .(eds) Oxford, UK: Blackwells.
- Wellman (2002) uses the term "little boxes" for bounded groups

A STUDY OF PREFERENCES TOWARDS THE MOBILE WALLETS AMONG USERS IN MUMBAI CITY

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1.1 INTRODUCTION

In today's world, smart phone has become an important part of life. Number of smart phone users has increased dramatically as it has become more affordable. According to data released by TRAI (Telecom Regulatory Authority of India), there are around 300 million users of mobile phone in India. Besides providing the basic function of communication there are plenty of services a smart phone provides. These services includes entertainment (music, movies, games etc.), socialization (social networking applications like Facebook, twitter and instant messaging services like WhatsApp, messenger), internet access services and even payment services. For using payment services on smart phones and application for the same is required to be installed in it. This application is called the digital wallet or electronic wallet or popularly mobile wallet. Its functions of keeping and paying the currency are same as of traditional leather wallet with the only difference of performing the same digitally and more number of parties directly or indirectly involved in performing the same on digital platform. For using mobile wallet service customer needs to register him with that mobile wallet and preload a certain amount of money in it, which can be used for shopping, recharge, utility bill payments etc.

There are open wallets, closed wallets and semi closed wallets in operation in India.

Open wallets- Open wallets are part of Open System Payment Instruments and can be used for purchasing goods and services including financial services and also allow customers to withdraw cash at ATMs/BCs. Such type of wallets can only be jointly launched with a bank. M-pesa by Vodafone is an example of such type of wallets.

Closed wallets- Closed wallets are the part of Closed System Payment Instruments which can be used for buying goods and services from the entity which issued that payment instrument. Example is- Amazon pay balance.

Semi Closed wallets- Such type of wallets are part of payment instruments which can be used for purchasing goods and services only from selected merchants. Cash withdrawal or redemption cannot be performed using semi closed wallets. Examples are-Paytm wallet, SBI Buddy, Citrus wallet etc.

As per the statistics of Internet and mobile Association of India by the end of June 2016 there were around 371 million mobile internet subscribers in India. Due to tariff rates of 2G and 3G coming down and 4G hitting the Indian market, ASSOCHAM expects the mobile internet users to grow at a compound annual growth rate of 67% during the period 2016-2020.

In the context of this, the researcher has framed problem statement "**A STUDY OF PREFERENCE TOWARDS THE MOBILE WALLETS AMONG CUSTOMERS IN MUMBAI CITY**"

1.2 RESEARCH OBJECTIVES

The researcher has framed the following objectives:

1. To study the mobile wallet players in India.
2. To find out the impact of various demographic variables on the opinion regarding the future of mobile wallets.
3. To examine the factors influencing adoption of mobile wallets.
4. To examine the factors refraining the usage of mobile wallets.
5. To study the various issues with use of mobile wallet.
6. To study the popularity of mobile wallet in Mumbai

1.3 RESEARCH METHODOLOGY

Sample size: Initial sample size of the study was 90 respondents using mobile wallets but 10 questionnaires were found invalid due to several reasons so the actual sample size reduced to 80.

Sampling technique: Since the sampling frame of the students using mobile wallets was not available purposive sampling was used.

Data collection tools: This research was basically based on primary data collected using a structured questionnaire administered to 90 respondents during a period of study. Small amount of secondary data collected from various sources was also used.

Data analysis tool: Collected data was analyzed using SPSS software by using statistical tools such as average method and Ranking method.

1.4 HYPOTHESES OF THE STUDY

In view of the objectives framed, the following hypotheses were framed:

1. There is no significant difference between respondents' gender and in their reasons for the use of mobile wallets.
2. Paytm is most popular mobile wallet among the wallets in operation in Mumbai.

1.5 MOBILE WALLET PLAYERS IN INDIA

The major Mobile Wallet Players in India are given below:

1. PayTM

PayTM is launched in 2010 which offers its customers a digital wallet to store money and make quick payments. It is a semi closed mobile wallet, which is used to make bill payments, transfer money, and avail services like travel, entertainment and retail industry.

2. Momoe

Momoe is a Bengaluru based mobile payments startup that can be used to store customer's credit card details and make mobile payments at various restaurants, grocery stores, apparel, salons and other retail outlets.

3. PayUMoney

PayUMoney, a Gurgaon-based company. This e-wallet by PayUMoney enables the user to store cash and pay for various services and transactions. PayUMoney provide a wide range of discounts and offers on transactions.

4. Mobikwik

MobiKwik is an independent mobile payment network. This mobile wallet allows the use of debit, credit card, net banking and even doorstep cash collection service, which can be used to recharge, pay utility bills and shop at marketplaces.

5. Citrus

Citrus Pay is a popular e-wallet app for cash storage, payments and money transfers.

6. State Bank Buddy

State Bank of India launched this mobile wallet application. This mobile wallet is used to transfer money to other users and bank accounts, pay bills, recharge, to book movie tickets, hotels, shopping as well as travel. It offers its services in 13 languages and is available for non-SBI customers as well.

7. Citi MasterPass

Citi Bank India has launched 'Citi MasterPass'. It is India's first global digital wallet for faster and secure online shopping.

It stores customer's credit, debit, prepaid, loyalty cards and shipping details in one place.

8. ICICI Pockets

This wallet is offered by ICICI digital bank for its customers. It provides the convenience of using any bank account in India to fund your mobile wallet and pay for transactions.

It can be used to transfer money, recharge, and book tickets, send gifts and split expenses with friends.

9. HDFC Chillr

Chillr app is created by HDFC to simplify money transfer and payment process for its customers.

It can be used to transfer money to anyone in his or her phone book. It is currently available only for HDFC Bank customers and can be used to send money, recharge, split bills, request funds or transfer and will soon be able to pay at online & offline stores.

10. LIME

Axis bank that offers a mobile wallet, payments, shopping and banking facilities launches 'LIME'.

This mobile wallet is available for both account & non-account holders. It can be used with his or her credit, debit and net banking details. It can be share with others and to pool funds into a share wallet.

1.6 DATA ANALYSIS AND INTERPRETATION

The analysis and interpretation of collected data from 80 respondents in Mumbai is done using percentage method and is presented below:

1.6.1

Table-1.1: Demographic profile of the students

Element	Categories	Count	Percentage
Gender	Male	40	50
	Female	40	50
Age	31-40	36	45
	41-50	26	33
	51-59	13	16
	60 & above	05	6
Occupation	Business	20	25
	Service	25	31
	Student	15	19
	Housewife	10	12.50
	Pensioners	10	12.50

The table 1.1 shows the demographic profile of the respondents.

1. Both respondents male and female were 50%.
2. 45% of the respondents are in the age group of 31-40, 33% were in the age group of 41-50, 16% were in the age group of 51-90 and 6% were 60 and above.
3. 31% respondents are servicemen, 25% are businessmen, 19% were students and 12.50 % each were housewives and students.

1.6.2:Preference regarding usage of mobile wallets

The researcher had to study the preference of the customers on usage of Mobile wallet for different purposes. The question was asked to the respondent, the result of which is presented in the table No. 1.2

Table-1.2: Preference regarding usage of mobile wallets

Goods/Services	No. of respondents	Percentage
Books and cloths	12	15
Food order	10	12.50
Movie tickets	14	17.50
Railway/Bus reservation	8	10
Recharge(Mobile/DTH)	22	27.50
Transfer money	14	17.50
Total	80	100

Source: Field Survey

Table 1.2 shows that majority 27.50 % respondents were using mobile wallet to recharge mobile/DTH. 17.50% each to book movie tickets and transfer money. 15% were using wallet to buy books and cloths. 12.50% were using it to order food and 10% for railway/Bus reservation

1.6.3:Factors influencing the use of mobile wallet

The researcher had to study the factors that influenced the customers to us E-wallet. Accordingly question was asked to the customers on, the result of which is presented in the table No. 1.3

Table-1.3: Factors Influencing the Use of Mobile Wallet

Factor	Frequency	Rank
Instant Payments	50	5
Instant Refunds	35	6
One Stop Shop	75	2
Offers and rewards	68	4
24x7	80	1
Queue avoidance	75	2
Saves Time	70	3

Source: Field Survey

The table 1.3 shows that 24x7 factor influenced more the users to use mobile wallet followed by Queue avoidance and one stop shop. Time saving, offers and rewards, Instant payments and Instant refunds factors influenced users in ascending order.

1.6.4:Concerns of the Customers on the use of E-wallet

It is observed that in today’s world customer’s prefer to use Mobile wallet to traditional mode of payment. However they have some issues in mind on uses of mobile wallet. The related question was asked to the respondent. The table No.1.4 shows various concerns customers are recorded on use of E-wallet.

Table-1.4: Concerns of the Customers on the use of E-wallet

Concerns Of Using E-Wallet	Count	Percentage
Unsafe	20	25
No Refund Payment If Cancel The Order	27	34
Complexity procedure	12	15
High cost of data access	11	14
Distrust(in merchant, telecom operator, financial intermediary)	10	12
Total	80	100

Source: Field Survey

Table 1.4 shows that the majority 34% have concern for non-refund if order is cancelled, 25% thinks it may be unsafe. 15% think about complexity of using E-wallet, 14% worried about high cost of data access and 12% think for distrust.

1.6.5:Continuity of the Usage of E-Wallets

The researcher asked the respondents that will they continue the use of mobile wallet, the result of which is shown in the table No. 1.5.

Table-1.5: Continuity of the Usage of E-Wallets

Continue Use of E-Wallet	count	Percentage
Yes	80	100
No	0	0
Total	25	100

Source: Field Survey

Table shows that 100 users said yes for continue use of mobile wallet.

1.6.6: Popularity of E-wallet

Table-1.6: Popularity of E-wallet

Mobile Wallet	count	Rank
1. PayTM	78	1
. PayUMoney	34	6
4. Mobikwik	40	5
5. Citrus	32	7
6. State Bank Buddy	45	4
7. Citi MasterPass	10	10
8.ICICI Pockets	25	8
9. HDFC Chillr	15	9
10. Google pay	56	3
11.Free Charge	60	2

Source: Field Survey

The table 1.6 shows that Paytm is highly popular among the users ranking 1 followed by Free charge, Googlepay rank 3 and State bank buddy 4th. 5th and 6th rank is secured by mobwik and payUMoney respectively. Cirus secures 7th and ICICI pockets score 8th rank. 9th rank goes to HDFC Chillr and City Master Pass secures 10th rank.

1.7 TESTING OF HYPOTHESES

There is no significant difference between respondents' gender and in their reasons for the use of mobile wallets.

Table-1.7: Gender and their reasons for the use of mobile wallets.

Gender	Instant Payments	Instant Refund	One stop Shop	Offers and Rewards	24x7 availability	Que avoidance	Saves Time
Male	40	35	35	30	40	38	30
Female	30	30	40	28	40	32	30
Total	70	65	75	58	80	70	60

The result shown in the Table 1.7 indicates that there no There is no significant difference between respondents' gender and in their opinion regarding the use of mobile wallets. Therefore, the hypothesis "There is no significant difference between respondents' gender and in their reasons for the use of mobile wallets." is accepted.

1. Paytm is most popular mobile wallet among the wallets in operation in Mumbai.

The result given in table 1.6 shows that Paytm is highly popular among the users of mobile wallet, therefore the stated hypothesis "Paytm is most popular mobile wallet among the wallets in operation in Mumbai" is accepted.

1.8 FINDINGS OF THE STUDY

- Both 50% of male and female used mobile wallet.
- Majority i.e 45% of the respondents are in the age group of 31-40.
- Majority 31% respondents are servicemen.
- Majority 27.50 % users use mobile wallet to recharge mobile or DTH.
- 24x7 service rank 1st as the factor that influence the users to use mobile wallet.
- Majority 34% users have doubt on non refund of amount if they cancel the order.
- 100% users assured continue the use of mobile wallets.
- Paytm is most popular mobile wallet among the users of mobile wallet.

1.9 CONCLUSIONS

- Male and female respondents are equal for the purpose of study.
- Young populations are more enthusiastic towards the use of mobile wallet.
- Servicemen and businessmen are frequently using mobile wallets.
- Mobile wallet is highly used to recharge mobile or DTH.
- 24x7 availability is highly influence the users to use mobile wallet.
- Users will continue the use of mobile wallet, so mobile wallets have bright future in India.

REFERENCES

- Hem Shweta Rathore, "Adoption of digital wallet by consumers" BVIMSR's journal of management research. Volume 8 issue 1, pp 69-75, 2016.
- S. Manikandan, An Empirical Study on adoption of Mobile Wallet with special reference to Chennai City, International Journal of Research Granthaliya, Vol.5 (Issue 5), May 2017.
- Shailendra Singh Rana, A Study Of Preference Towards The Mobile Wallets Among The University Students In Lucknow City Scholedge International Journal of Management & Development, Scholedge Publishing, Vol.04, Issue 06, Pg 46-57, 2017.
- <http://www.forbes.com/sites/stevenbertoni/2014/02/21/how-do-you-win-the-mobile-wallet-war-be-like-starbucks/> accessed on 28th August 2017.

BENEFITS OF DIGITIZATION ON BANKS, COMMERCE AND INDUSTRY

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ABSTRACT

The developments of computers and digitization have brought about revolution of how human beings would work and create value in a modern world. The expansion and use of digitalization in performing various tasks has been all pervasive. From banks, commerce and industry to its efficiency enhancing role in the delivery of public services has been notable. New developments and use of digital information today from comprehensive organization performance reviews, enterprise resource planning and decision making to more advanced uses such as artificial intelligence can have far reaching implications. This paper assesses the usefulness/benefits provided by digitalization and goes on to discuss some of the cutting edge technologies now being fostered to serve businesses and public interests.

The advancements made by the human ingenuity readily captured by the development of computers over past decades has helped immensely in easing the workload that consumed hours of unproductive labour in manual or paper based documentation of records of transactions in almost all spheres of life. The advancement of computer technology and the process of digitalization has ushered in a new era which is not only making work more efficient but also virtually supporting the ability for unlimited scalability of storing records and other information. Quick and selective retrieval of information and its analysis for decision making has improved productivity manifold in banks[1], industries and commerce.

In banks customer records/information can be pulled out quickly for review. For example, a loan disbursal process can be facilitated much faster as all information related to the applicant can be scanned within seconds on the managers desktop. In commerce, records of sales and volumes similarly can be reviewed by business managers and analysed for inventory management and developing distribution and marketing strategies. In industry, production run data can be stored easily and an account of materials costs and purchases can be reviewed instantly. All these information goes on to vastly help in quicker decision making and serve to scale up businesses rapidly compared to where information retrieval process are slower due to manual or paper dependent methods. Digitalization helps governments to keep records of budgetary expenses and revenues, of deficits and more importantly allow more efficient distribution of benefits to eligible people. A great example, is the AADHAAR –JAN DHAN account linkage which has allowed the Government to announce a Direct Benefit Scheme (DBT) for the common man. The digitization of records of beneficiaries under the DBT scheme allows for direct transfers to their bank accounts and eliminates leakages that occurred due to fraudulent beneficiary records made by vested interest at various levels.

Another interesting offshoot of digitalization in industry is CAD (Computer Aided Design). CAD is used throughout the value chain from product development, manufacturing, logistics and sales. Designers not only build 3D sketched for visualization of products and showrooms but also do integral products design. The Automotive industry uses detailed CAD tools to virtually validate production lines. This helps them accurately predict throughput (production/day) as well as fix issues in the design before they are built. This proactive correction results in a huge impact on the bottom line of the business by way of cost and time to market saving. CAD goes one step further with CAE (Computer Aided Engineering). Engineers can now virtually predict failure and test components ranging from mechanical stresses to electromagnetic effects. The Auto industry today is running high end solvers to predict welding stresses. These Thermo Mechanical elasto plastic solvers calculate everything from thermal flow to crystal structure changes in the welding. The industry is also using high end ergonomic solvers to predict human machine interaction thereby making the worker central to the operations. This has huge impact on the morale and thus quality and productivity of the workers.

Digitization is taking the next bold step by way of 3D printing[2]. This tool is new in the auto industry and has been heavily adopted for prototyping. One motorcycle prototype costs around 30 Lakh rupees to build. 3D printing helps save costs by building these one off parts without specialist casting, forgings, tools etc. 3D printing is an interesting field to watch for development as research is making it more cost effective. This "Additive" process will redefine how man thinks of manufacturing. These tools are used in all industries from banking to mining to automotive and defence.

The integration of a variety of digital information is called 'Digitalization' – a process which can fetch at once a variety of digitally stored information at various sources for strategic decision making. A bank can for example

fetch at once a customer's record of his relationship including his profile and activities in deposit and loan accounts simultaneously to assess his creditworthiness. A good example of digitalization in banking is the information stored in credit bureaus – which can immediately disclose the details about loans taken by a borrower from various banks in the past including her/his the history of his ability to service liabilities. Similarly the development of block-chain technology which is now evolving can enable verified and permanent completion of contracts without human assistance using digital information and inter-node communication among blocks of records. Likewise in both industry and commerce various streams of digital records can be fetched together on a single screen in required formats to review activities in various verticals. For example in a company context, the enterprise resource planning (ERP) can use a protocol of integrated applications to manage and automate office work related to technology, services and human resources all at once. An ability to do so allows a comprehensive view of the organization and supports active strategies for making forward looking decisions to support growth and profitability. This kind of facility is very useful for very large organizations that do business at massive scale and are spread out in various geographies. The UBER – the transport network company which has worldwide operations can integrate, collect and monitor digitally stored information on its business at its headquarters in the United States and analyse commuter behaviour and formulate suitable marketing strategies to expand revenues.

The availability of quick data/information for analysis and decision making in today's world separates winners from losers. The digitization of data has been a boon although it is making the world more technology dependent which appear to have hindered job creation. Needless to mention, the automation of several common functions have eliminated the need for human labour in various spheres of activities. At the same time automation based on digitalization has also improved efficiency and reduced human errors in sensitive transactions such as in capital and banking markets where even simple errors could cost millions of dollars.

A new interesting offshoot of digitization is the new field of artificial intelligence (AI) that has the ability to learn from data patterns based on algorithms and take autonomous decisions[3]. AI enabled systems can perform various tasks such as perceiving patterns in pictures and speech to enable identification or even providing answers to questions. AI is also being tested for developments of 'Humanoids' that is robots that behave like humans. So we do not know whether 'Humanoids' could one day become so powerful to rule to world.

These are perceptions in the world of imagination but seeing the progress of science in the last century, we may expect even bigger inventions to take shape. And digitization at the basic level would be the mother of all.

Let's hope for a world of efficient digitization that also preserves jobs in a country like India with huge population.

REFERENCES

1. PMJDY with respect to current situations' of financial inclusion in India; V. patil & S. mawale; Casirj.vol 5,issue 11,2014
2. Impact of 3D printing in automotive industries; V. Shreehita; International journal of mechanical and production engineering;vol-5,issue-2,feb.2017
3. Truth about Robots ;Author Kai-Fu-Lee;Pg60-61; "Time" Feb 4-11,2019

A STUDY ON PASSENGERS' SATISFACTION TOWARDS MOBILE APPS BASED CAB SERVICES IN MUMBAI CITY

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ABSTRACT

Mumbai had shown a tremendous expansion in its transport network. The local railway service, B.E.S.T. bus service and the private players like black-and-yellow taxis and auto rickshaws play a major role in daily passenger service. Due to increasing pressure of population there is the deficiency in the existing transportation system. Travelling in crowded city like Mumbai is nuisance for people. As a result the territorial expansion of Mumbai has led to the development of app based cab services in Mumbai. These cab services connect the commuters with driver through a technical platform. The cabs can be reserved through website or mobile application. The present paper is an attempt made to take an overview of Mobile Apps Based Cab Services in Mumbai City. The paper also intends to evaluate the commuter's satisfaction towards Mobile Apps Based Cab Services in Mumbai City.

Keywords: Public transport, Mobile Apps Based Cab Services-Ola, Uber, Meru, Commuters satisfaction

1. INTRODUCTION

Mumbai is one of the most thickly populated city in the world. As per the census of 2011 the total population of Mumbai was 18.41 million. With growth in population, Mumbai had shown a tremendous expansion in its transport network. From last 164 years the city is well connected with leading railway transport service which is considered as a major lifeline for this sleepless city. It consists of Central, Western, Harbour and Trans-Harbour lines and carries approximately 7.5 million passengers on daily basis. The public road transport service operated by Brihanmumbai Electric Supply and Transport (B.E.S.T.) is complimentary to Rail transport service and is available throughout the city and also connects to the suburbs of Mumbai. This service covers approximately 3.65 million passengers on daily basis. The private players like black-and-yellow taxis and auto rickshaws also play a major role in daily passenger service. Despite of this vivid mode of transportation available in the city, there are still many lacunas in the market. The deficiency in the existing transportation system, increasing pressure of population and the territorial expansion of Mumbai has led to the development of app based cab services in Mumbai. The common players in the market are Meru, Ola, Uber, Easy cab, Taxi for sure and Tab Cab. In the year October 2013, the Uber has actively entered 29 cities in India. As on 2016, Uber provided cab services in 66 countries in the world.

2. REVIEW OF LITERATURE

Khupse M., (2017), in his paper "A study of Passengers motives for using Mobile App based cabs", tried to find out the reasons why the travelers prefer app based taxi services. The paper reveals that a taxi cab conveys passengers between locations of their choice. The large benefits such as quick availability of the cabs, safety, comfortable seating arrangement, economic than traditional taxis, various cash back and discounts offers on rides etc. is making these App based taxis very popular amongst the passengers.

Hemanth Kumar V. & Sentamilselvan K. (2018), in their paper "Customer satisfaction towards call taxi services", deals with the consumer behavior and their satisfaction level towards service provided by call taxis. The paper states that in every business the service and quality should be matched with the expected and delivered. In all cities especially the metropolitan cities call taxis services are increasing. They also reveal that the comfort, ease of access, tariff system, promotion, safety and convenience are the factors that help the service provides to understand the consumer's satisfaction towards their service.

Panigrahi A. (2018), in his paper "Success story of a start-up- A case study of OLA Cabs", dealt with how the Ola cabs capture the market by providing effective services to the customers. The paper reveals that the Ola is a great technology platform for transportation and offers flexible options to customers. It further says that due to the increase in competition and public demand the transport service sector has seen tremendous growth in cabs services in the past few years. Also, different companies are operating in various models.

3. OBJECTIVES OF THE STUDY

The objectives of the present study are:

1. To take an overview of mobile apps based cab services.
2. To evaluate commuters' satisfaction towards services provided by mobile apps based cabs in Mumbai city.

4. HYPOTHESIS OF THE STUDY

H0: There is no significant difference in the commuter's satisfaction towards mobile apps based cab services across different age groups.

H1: There is significant difference in the commuter's satisfaction towards mobile apps based cab services across different age groups.

5. RESEARCH METHODOLOGY

The present study took into account secondary as well as primary data. The secondary data is collected from various sources such as Internet, books, journals, newspapers, related articles and research papers etc. The primary data is collected from 40 commuters belonging to different age groups. The respondents were the users of mobile apps based cab services in Mumbai City. The data was collected with the help of well-structured questionnaire. To facilitate interpretation statistical tools such as percentage, Mean, ANOVA is applied with the help of statistical package, SPSS. Graphs have also been used for presentation of findings.

6. FINDINGS AND DISCUSSIONS

6.1 Overview of Mobile Apps Based Cab Services

In Mumbai, mobile apps based cab services has become the primary transport medium for travelling to office, shopping, hospital, airport and all other places. The mobile apps based cabs has made the life of people easier. By installing the cab booking apps and locating destination using GPS, user can book the cab instantly from mobile phone. There are multiple apps available in android play store and apple app store for cab booking in Mumbai. The prominent amongst them are:

Ola: It is one of the top rated taxi booking apps in India which provides services in all major cities including Mumbai. It was started in 2010 by Bhavish Agarwal and Ankit Bhatia. The app helps people to book the cab by simply using their registered email-id and mobile number. After the commuter chooses the pickup and drop location, the app sends request to the nearby cabs and help to confirm the ride. The cost of ride differs based on the ride options selected from the app which includes Ola Mini, Sedan, Prime, Share and Auto. Ola Cab booking apps are available in both Android and iOS platforms. Ola app for android is currently having more than 50,000,000 installs, which is highest for Indian cab booking app. The app provides user friendly payment methods for commuters including both online and offline payment.

Uber: It is the Global leader for taxi booking app. It started its operation in 2013 in India and is running successfully at all major cities including Mumbai. The commuters can book cabs using mobile app and website. Uber apps are available in android and iOS stores for free. The taxi fare is computed on the basis of various factors such as type of vehicle choose for ride, distance, waiting charge, traffic and more. After completion of ride, user can pay the fare by multiple methods as per their convenient.

Meru: Meru Cabs is based in Mumbai. It provides taxi services in many Indian cities including Mumbai. It was founded in 2007. Initially, Meru Cabs provided taxi for its customers using call services but later due to technology development, the company launched its app in android and iOS platforms. This app provides services like easy map navigation, live route tracking, view ride history and more.

Easy Cabs: Carzonrent is a prominent taxi booking services in India operating from New Delhi. The company came into existence in the year 2000 and it provides services in all major cities including Mumbai. The cab services offer end to end long and short term transit services on rental basis. The company started its services by call and order method, later the company has launched its mobile application in android and iOS platforms. Carzonrent in collaboration with Government of India's "Indian Railway Catering and Tourism Corporation (IRCTC)" in 2015, started providing taxi services to all railway customers under the name of Easy Cabs in major cities. It was rated as best taxi booking app in India. The commuters can book Carzonrent cabs through mobile app by tapping starting and end dropping location.

Travelling in crowded city like Mumbai is nuisance for people, therefore to provide a better experience; many online cab services are offering efficient, economical and comfortable cab services. These cab services connect the commuters with driver through a technical platform. The cabs can be reserved through website or mobile application. The mobile apps invite consumers to submit a trip request and the software program automatically sends the request to the nearest driver available to the consumer. This alerts the driver to the location of the customer.

6.2 Commuters' Satisfaction

The present study attempted to find out commuters' satisfaction towards services provided by mobile apps based cabs in Mumbai city. A self developed questionnaire was used to collect information from the users of

Mobile apps based cab services. A sample size of 40 respondents was taken which was equally divided between the four age groups taken in the study. The profile of respondents is displayed in Table 1.

Table-1: Profile of Respondents

Age	Frequency	Percent
18-30	10	25
31-45	10	25
46-60	10	25
60 & Above	10	25
Total	40	100

Source: Primary data survey.

The selected age groups for the study were 18-30, 31-45, 46-60, and 61 and above. Out of total 40 respondents 10 respondents were from the age group of 18-30, 10 from 31-45 age group, 10 from 46-60 age group and 10 from 61 and above age group. As, the present study is an attempt to evaluate commuters’ satisfaction towards mobile apps based cab services, it was made sure that the respondents selected were the users of mobile apps based cab services (Table 2).

Table-2: Usage of Mobile App Based Cabs

Use	Frequency	Percent
Yes	40	100
No	0	0
Total	40	100

Source: Primary data survey.

Table 3 shows the most frequently used mobile apps based cabs in Mumbai. It was found that Uber is the most popular and frequently used cab service with 57.5 percent usage frequency followed by Ola with 37.5 percent frequency and Meru with 5 percent frequency.

Table-3: Frequently used Mobile App Based Cabs

Cab Services	Frequency	Percent
Ola	15	37.5
Uber	23	57.5
Meru	2	5
Easy Cab	0	0
Tab Cab	0	0
Others	0	0
Total	40	100

Source: Primary data survey.

Uber is therefore the most popular cab services in Mumbai. One of the important results of the present research is that the cab services are not used by commuters on a regular basis. Table 4 shows that only 2.5 percent of commuters use mobile apps based cabs twice a week. Some 15 percent of commuters use these services on weekly basis. A major 40 percent and 42.5 percent of the commuters use mobile apps based cabs monthly and occasionally respectively. The reasons for this are easy availability of variety of public transportation in Mumbai, Good connectivity, Low penetration of mobile apps based cabs, Expensive rates of mobile apps based cabs as compared to public transport etc. These services are used on contingency basis mostly.

Table-4: Frequency of Usage of Mobile Apps based Cab

Use	Frequency	Percent
Daily	0	0
Twice a Week	1	2.5
Weekly	6	15
Monthly	16	40
Occasionally	17	42.5
Total	40	100

Source: Primary data survey.

The study further enquired about satisfaction towards mobile apps based cabs. The results are summarized in Table 5. It shows that 87.5 percent of commuters’ are satisfied and 12.5 percent are dissatisfied with the mobile apps based cabs.

Table-5: Satisfaction towards Usage of Mobile Apps based Cabs

Satisfaction	Frequency	Percent
Yes	35	87.5
No	5	12.5
Total	40	100.00

Source: Primary data survey.

To understand the reasons for the same, the respondents were asked to rate the performance of mobile apps based cabs in a five point likert scale. The parameters were availability, speed, economic mode, safety and security, payment system, variety in payment options, cashless payment and promotional strategy. The results are summarized in Table 6.

Table-6: Level of commuters’ satisfaction towards Mobile Apps Based Cabs

Parameters	Highly Satisfied (%)	Satisfied (%)	Moderately Satisfied (%)	Dissatisfied (%)	Highly Dissatisfied (%)	Total (%)
Availability	22.5	75	2.5	0	0	100.00
Speed	32.5	65	2.5	0	0	100.00
Economic Mode	22.5	65	10	2.5	0	100.00
Safety and Security	20	70	10	0	0	100.00
Payment System	30	62.5	7.5	0	0	100.00
Variety	30	62.5	7.5	0	0	100.00
Cashless Payment	20	75	5	0	0	100.00
Promotional	20	75	5	0	0	100.00

Source: Calculated with the help of SPSS.

The study shows that the respondents are satisfied with all the parameters related to Mobile apps based cab services. The mobile app based cab services are very popular in Mumbai. The reason for this can be owed to their easy availability, quick services, good quality and maintenance of vehicles resulting into fast and speedy transit, economic mode of transport, safety and security due to GPS tracking, flexible payment system and lucrative promotional offers for different categories of commuters.

TESTING OF HYPOTHESIS

H0: There is no significant difference in the commuter’s satisfaction towards mobile apps based cab services across different age groups.

H1: There is significant difference in the commuter’s satisfaction towards mobile apps based cab services across different age groups.

Table-7: Results of One Way ANOVA across the age groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.569	3	3.523	1.250	.310
Within Groups	78.900	28	2.818		
Total	89.469	31			

Source: Calculated with the help of SPSS.

The result of one way ANOVA is summarized in Table 7, at 5 percent level of significance. The result shows that there were no statistically significant differences between group means as determined by one way ANOVA (F (3, 28) =1.250, p=.31). The present study, therefore, accepts the null hypothesis proposed. It can be interpreted as commuters across different age groups are equally satisfied towards different parameters of mobile apps based cab services.

7. CONCLUSION

Mobile apps based cab services are certainly filling the gaps of existing transportation system in Mumbai. The quality conscious commuters are well satisfied with the existing setups. The various features such as call service, GPS facility, advance booking and flexible payment system has appealed to the Mumbaikars. Despite of different attractive features, mobile apps based cab services has not been able to take the place of traditional

public transport system. The mobile app cab services have a huge potential for growth in Mumbai targeting middle and affluent class. The young consumer crowd is more innovative and is ready to adopt new technology. The need of the time is to come up with more user friendly features. There should be something for everyone. The cost, comfort, services and approach should be made commuter centric.

8. REFERENCES

Books

- Kothari C.R., 1990, '*Research Methodology Methods & Techniques*', New Age International(P) Ltd. Publication, New Delhi.
- Khupse Mukund (2017). '*A study of Passengers motives for using Mobile App based cabs*'. KAAV International Journal of Economics, Commerce and Business Management. ISSN: 2348-4969. PP. 474-480.
- Hemanth Kumar V. & Sentamilselvan K. (2018), '*Customer satisfaction towards call taxi services*'. International Journal of Pure and Applied Mathematics. Vol. 119 No. 12. pp. 14919 to 14928.
- Panigrahi A., Shahi Shambhavi and Rathore Amar Singh (2018). '*Success story of a start-up- A case study of OLA Cabs*'. IOSR Journal of Business and Management (IOSR-JBM), Vol-20, Issue 2. pp. 30 to 37.
- P. Kishor Kumar & N. Ramesh Kumar (2016). '*A study on factors influencing the consumers in selection of cab services*'. International Journal of Social Science and Humanities Research. Vol. 4, Issue 3, PP: 557-561.

Web sites

- www.google.com
- <http://www.olacabs.com>
- <http://www.uber.com>
- <http://rider.uber.com>

IMPACT OF TECHNOLOGY ON INCLUSIVE GROWTH

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ABSTRACT

In the 11th Five Year Plan document, the term Inclusive Growth was introduced. In Economic terms an Inclusive Growth implies that benefits of Economic Growth should be enjoyed by all irrespective of their cast, religion, gender, region etc. It is must for achieving sustainable development. Due to globalization and subsequent competition with the world economy, technological developments have become the need of our nation. Advancement in technology is a key to achieve heights in agriculture, industry, infrastructure, health and education. Our scientists, researchers, technicians, entrepreneurs and policy makers are doing very well and have set a benchmark at international level; but to achieve global excellence, technological developments are the most important. Information Technology has developed to a great extent from last decade and is acting as an instrument for inclusive growth. Our remote areas have huge potential, abundant natural and human resource and outstanding hidden talents; but there are many hurdles and hardships in implementing innovative developments in these areas. Therefore, the need of today's economy is to remove such hurdles through appropriate mechanism and system of governance. Technology can play an important role in utilizing these resources in best manner. If we neglect these regions and people belonging to these areas, we can't achieve inclusive growth. This paper explores the impact of technology on Inclusive Growth.

Keywords: Inclusive growth, technology, development, governance, economy etc.

INTRODUCTION

Inclusive growth means equality of opportunities for economic participants as we can say that equality in all aspects i.e. equality in health, education, food security, environment quality and social protection. India's current population is 1.3 billion; out of which 5% population lives in extreme poverty according to the World Poverty Clock. As per data released by UNDP 2018 India shows a remarkable progress in reducing Multidimensional Poverty despite that, 364 million Indians showed deprivations in all dimensions like health, nutrition, schooling and sanitation. Inadequate social and economic infrastructure like roads, transport, communication banking services, education and health in rural areas is the main cause of regional disparities. Over half of the Multi dimensionally poor live in four poorest states i.e. Bihar, Jharkhand, Uttar Pradesh and Madhya Pradesh. In all these states Jharkhand reduced its position in Multidimensional poverty. Our recent growth rate is impressive. India is well known for its innovative high-tech products and services but still India could not utilize its innovation potential. In-spite of having huge dynamic young population, without developing their skills and giving them higher level of education we can't achieve inclusive growth. On the one hand social development occurs if advance technologies apply for improving the social and cultural lives of the rural poor and shortage of skilled workers as well as lack of infrastructure facilities like electricity and roads are further constraints in inclusive growth. On the other hand technological advancement could help further in separating the labor market into low skilled workers and high skilled workers, leading to growing inequality and weakens inclusive growth. Achieving inclusive growth is far more challenging job than any other objectives in the path of economic growth.

OBJECTIVES OF THE STUDY

1. To study about the impact of technology on Inclusive Growth.
2. To study about the implementation of technology in rural areas.
3. To study about the challenges and measures of Inclusive Growth.

RESEARCH METHODOLOGY

The study is purely based on secondary data. The data is collected from magazines, journals, internet, reference books, newspaper etc. Collected data are compiled and analysed for the purpose of study.

TECHNOLOGY IN AGRICULTURE SECTOR

Agriculture has got a prime role in Indian Economy. Though the share of agriculture in National Income has come down but still it has a substantial share in GDP. For developing countries advances in computing power, connectivity, artificial intelligence, biotechnology, more capable technologies led to tremendous growth in agriculture. Adoption of new technologies in agriculture sector led to accelerating rural growth. Transformation

of agriculture sector to a large extent transforms individual's lives and enables developing countries to progress at the speed which is previously unthinkable. Modern farmers and agricultural operations work differently than few decades ago. Today's agriculture routinely uses sophisticated technologies such as robots, temperature and moisture sensors, and aerial images through GPS technology. These advance devices make agriculture more profitable and more environments friendly. Agricultural technology led to higher productivity. Less use of water, fertilizer, pesticides and less runoff of chemicals into river and ground water reduce negative impact on environment and ecology. Rural energy systems have gained enormously from scientific work related to biogas, biomass, solar energy, wind and other forms of renewable energy. New laboratories and research centers like Krishi Vigyan Kendra are being opened up to carry forward new farming techniques, new varieties of seeds, fertilizers and pesticides which are being used by the agro scientists and researchers. Investment on some agricultural equipments are long time investment like tractor, turbines generator, store houses, poly houses etc are the source of income generation for the farmers. Use of intensive technology in agriculture sector raises productivity resulted to creation of many other jobs in related sectors like food processing industries, jobs in the agricultural inputs producing industries. High yielding varieties of crops leads to increase in the demand for more labour due to high harvesting. Rapid technological development in agricultural sector increases productivity and make food more affordable. There are some revolutionary innovation to make farming more sustainable and more profitable for farmers in Indian Ariculture popularly known as Skymet, Ekgaon, Digital Green, Barrix Catch Fruit and Fly Lure + trap, Frontal rain technologies, Agrostar, Bio-sat, Air Blast Sprayers etc.

The ministry of agriculture promote various extension services for knowhow of small and marginal farmers especially in remote areas. To increase accessibility of modern technology to small & marginal farmers Agricultural Technology Management Agencies (ATMA), Kisan Call Centres (KCC), Kisan Vigyan Kendras of Indian Council of Agricultural Research (ICAR) has been established. Technological applications like genetically modified crops, precision farming (using sensors and GIS based soil, water & weather data to guide farm decisions), market information services etc could create additional value in the sector. Digital system and electronic payments could reduce the leakage in the public food distribution system.

TECHNOLOGY IN MSMEs AND INCLUSIVE GROWTH

MSME sector plays a very significant role in Indian economy. This sector is largest employment generator globally and in India also it employs 59.7 million persons. It is fact that SMEs in India is not able to utilizing its full potential because of obsolete technology but globalization compelled MSMEs to adopt innovative methods and equip themselves with new technology. Application of new technology improves productivity of SMEs. This sector contributes a lot in rural industrialization and employment generation for rural poor which ensure the improvement in their standard of living. Technology plays a key role in the success of SMEs. For technological upgradation of the MSMEs and make them enable to strengthen their capabilities Ministry of MSMEs has recently launched ten innovative schemes under the National Manufacturing Competitiveness Programme. This program is also for improving the process, design, technology and market access of the MSMEs. The various organizations under the Ministry of MSMEs provide opportunities to sellers to display their products in exhibitions. Further National Small Industries Corporation (NSIC) has launched B2B web portal to provide marketing facilities.

INFORMATION TECHNOLOGY AND INCLUSIVE GROWTH

Inclusive Growth is a political, social and economic necessity. Ensuring this growth would require action in which information technology would play a key role. Information technology now a day emerged as a key driver of economic growth. Digitization can help in sustainable development of rural economy in all aspects. In Northeast India which is the place of large number of tribal people establishment of web-based technology, Community Information Services (CIS) become helpful in improving the health and socioeconomic status of residents in these areas and help Indian government to narrow the digital divide between rural and urban people. ICT could do wonders in improving productivity in agriculture and the service sector, while boosting access to some basic services among the rural population. Applications of Information and communication technology, such as mobile banking, can support both growth and inclusion. ICT sector mainly provide opportunities for skilled elite but ICT has more potential for innovation that benefits middle class and lower middle class. Mobile is the best example of technology whose falling cost make it accessible for Indians of all income classes. Cheaper access devices like phones and PCs that can be shared real time would change the landscape for millions of people. Fortunately, investment in telecom infrastructure is resulting in the increase in the number of users. Joint ventures between telecommunication and banks could provide inclusive banking and supply chain benefits to millions of people on a profitable basis.

IMPACT OF TECHNOLOGY ON WOMEN

India is a male dominant society in which women held back for ages. Since last some years technology revolution especially in the form of cloud, broadband, wifi, mobile devices, social media and internet not only increased accessibility of mobile and internet by rural women but also provide them opportunity to utilize their potential. Due to this, India's rank in Global Gender Equality Report published by the World Economic Forum became 108th out of 144 nations. Google's Internet Saathi program also created women ambassadors called Saathi to provide training and educating women about the use of internet in their day to day activities. Through technology rural women get their way to enhance socioeconomic position in society which can transform their lives.

CHALLENGES IN ACHIEVING INCLUSIVE GROWTH

Apart for being a 62 year old democracy with over a billion people India is a land of vast disparities in socio-economic conditions therefore the growth is far from inclusive. Government launch various schemes for the benefits of socially unsecured population but due to corruption exist in administration proper implementation of these programmes is a big challenge. Concept of inclusive growth starts from agriculture. In reality small and marginal farmers are the least beneficiary because they are small landholders and they face difficulties in getting economies of scale, accessing credit and getting market oriented from their subsistence level. Deforestation for technological development is also a challenging issue because rural poor especially women's depends on nature for their day to day life and cutting of trees leads to low rainfall and low productivity. Most of the government policies benefiting large farmers are having large landholdings. In rural areas 25% of Indian adults cannot read or write. Geographical application of new technologies is still limited in rural areas. Due to lack of literacy, basic computer knowledge many farmers remain unaware of these advances. Benefits of technological change have been limited to a small section of the people, who are the participants in the global knowledge economy. Distances, roads, illiteracy, poverty comes as obstacles in providing financial services in rural areas at minimum cost. Many issues like lack of access to healthcare, education, banking facilities, internet and mobile connectivity also increase migration from rural to urban areas.

MEASURES

In India there is large disparity between rich and poor, rural and urban. India is investing a huge amount on digital learning. It is estimated by Technopak, a consultancy that the Indian digital learning market will almost become triple between 2016 and 2020 growing from \$2billion to \$5.7billion. There is biggest gender gap in employment, banking and access to the internet. In 2014 according to the government survey it was found that only 9% of women know about searching internet and sending email. To resolve this issue many companies like Google's parent Alphabet, Telenor ASA, Norwegian IT Company are taking initiatives for gender inclusion. Alphabet has appointed 9000 female tech trainers on bicycles in rural India to train women about smart phones, tablets and accessing internet. Government's remarkable initiative of Digital India improved the life of many rural people across the length and breadth of the country. Digital India Programme aimed at bridging the gap between haves and have nots. This program is also aimed to provide connectivity for every citizen through fixed-line broadband, mobile connectivity or Wi-Fi hotspots. The 11th e-Governance National Summit with the theme 'Inclusive Growth through Digital Empowerment' is another step in that direction. International Finance Corporation focuses in India in several significant areas to achieve inclusive growth. IFC invested in Financial Information Network & Operations Private Ltd (FINO), a startup provider of technology services will enable India's to provide banking and financial services in rural areas. It also provide India an opportunity to bridge the gap between large financial services and many underserved people. IFC and FINO play an important role in adoption of IT technologies in India's underserved markets and provide training in local dialects which definitely helps in enhancing the banking services for those people and areas which are deprived of financial services. The Common Service Centers reduce disparity between rural and urban India through proper use of technology by extending services like primary healthcare, banking and education to the rural population. Better planning and judicious use of technology will help India to achieve inclusive growth.

SUGGESTIONS

1. There is a need to increase accessibility of IT application in rural sector.
2. Technology should be developed in such a way that it can create jobs in rural areas which can improve the life of the rural people.
3. More investment in rural education is required.
4. Proper inspection of successful implementation of poverty eradication programs in rural areas is needed.
5. Make computer education more affordable for rural population.

6. To educate and convince village representative about the benefits of the technological change is needed.

7. More investment in rural infrastructure is required to achieve inclusive growth.

CONCLUSION

India's large population constitute by rural population. We can't neglect rural population to achieve the objectives of technological development. Inclusive growth is broader concept than mere economic growth. To achieve inclusive growth it is must that technological development should reach rural areas and weaker sections of the society. To strengthen the rural economy many remarkable steps were taken in agricultural sector. Ministry of MSME sector are also taking various efforts for technological upgradation which also leads to the increase in the income of the rural poor who are associated with these industries. ICT sector is also doing wonders through digitization and increase accessibility for those who were beyond the reach of the technological development. Technological development also provides lots of opportunity for women to improve their socioeconomic position. Despite various efforts taken in the direction of inclusive growth, India is far from achieving the goal of complete inclusive growth. Better planning and judicious use of technology is needed to achieve inclusive growth.

REFERENCES

1. Unleashing India's Innovation, Mark Dutz
2. <https://qrius.com/can-use-technology>
3. <https://www.weforum.org/agenda/2017>
4. Economic Times - Sept 12, 2008
5. World Economic Forum- 5 Nov,2015
6. Morgan Stanley Inclusive Growth Opportunities Index
7. <https://www.lotusarise.com/technology-missions-in-india>
8. Infrastructure Development- An imperative for Inclusive Growth, Report by CISCO.

A COMPARATIVE STUDY OF TWO MAJOR STREAMING PLATFORMS IN INDIA

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ABSTRACT

In the current age of Internet, watching videos and listening to music online is a major trend amongst youngsters in India. Streaming video is content sent in compressed form over the Internet and displayed by the viewer in real time. With the increase in the number of mobile users with smart phones, the popularity of streaming videos for entertainment is increasing by leaps and bounds. Netflix and Amazon Prime Video are the two major Streaming platforms in India. Both the companies are trying to attract and lure the customers with their marketing strategies. This research paper tries to undertake a comparative analysis between this tug of war of aggressive marketing between the major giants in this field.

Keywords: Comparative study, Netflix, Amazon prime Video

INTRODUCTION

In the early days of streaming media i.e. the mid-to-late 1990s watching videos and listening to music online was not very popular as it required "buffering" and internet connections were slow and interrupted. With the increase in the availability of high speed and the bandwidth internet facilities, watching videos and listening to music online has become a major trend amongst youngsters in India today. Streaming video is content sent in compressed form over the Internet and displayed by the viewer in real time. With streaming media, a Web user does not have to wait to download a file to play it. Instead, the media is sent in a continuous stream of data and is played as it arrives. It is a type of media streaming in which the data from a video file is continuously delivered via the Internet to a remote user. It allows the video to be viewed online without being downloaded on a computer or any other compatible device. It works on data streaming principles, where all video file data is compressed and sent to a requesting device in small parts.

MAJOR STREAMING PLATFORMS IN INDIA**Netflix**

Netflix began offering its video streaming services to Canada in September 2010 and later on expanded its services into Central and Southern America including Mexico in 2011. By 2012 it started its services in the UK and Northern Ireland, which was even more successful than their introduction into Canada. From there they slowly integrated into most of the rest of Europe over the next two years. In the early part of 2015, Netflix entered the Australia and New Zealand video streaming markets, followed by Japan and Singapore later that year. Then in the year 2016, Netflix surprised the world by switching on in almost 200 different countries around the world, including India. Currently, Netflix is available in every country around the globe except China, Crimea, North Korea and Syria, though the content libraries differ greatly.

Amazon Prime Video

In the year 2011, Amazon Prime Instant Video launched a streaming platform offering a huge range of content to the customers in the United States. However, it wasn't until December 2016 that Amazon's streaming efforts were launched in high gear and it took Prime Video global to 200 countries around the world, including India. Its content was not as extensive as Netflix during its launch but it marketed itself by saying that they had invested significantly in original series programming, which would be delivered exclusively via the Prime Video platform.

Comparison of Netflix and Amazon Prime Video

Criteria	Netflix	Amazon Prime Video
Subscription charges	First month free, after that Basic Plan Rs.500, Standard Plan Rs.650 and Premium Plan Rs.800 per month.	First month free, after that Rs.129 per month or Rs. 999 per year. It also includes free fast delivery of eligible items from its online store and also Prime music
Video quality availability	HD and Ultra HD not available for Basic Plan, Ultra HD not available for Standard Plan	SD, HD and Ultra HD available for all basic plans if supported by devices on which you watch it
Device	Netflix can be streamed from smart	Amazon Prime Video can be streamed

support	phones (iOS, Android, and even Windows phones), tablets (including Fire tablets), desktops, browsers, game consoles, connected Blu-ray players and virtually every Smart TV and streaming box (Roku, Apple TV, Fire TV) out there. Netflix content can also be from a smart phone to a Chrome cast or Airplay it to an Apple TV.	from iOS, and Android smart phone and tablet apps, streaming box apps (Roku, and Apple TV, and Fire TV, of course), connected Blu-ray players, game consoles, and various Smart TVs and also watch it's content on a web browser. It cannot do Chrome casting. Due to competitive reasons, it doesn't allow casting from its video apps to Google's streaming stick. However Airplay can be used to stream Prime videos from your smart phone to an Apple TV.
Interface/User friendly	Netflix's interface is clean, simple and easy to navigate and searching through its library is very user friendly.	It's main interface is not as clean as Netflix's. one can find it too busy and cluttered.
Content	Manages to bring a good collection of old classics, recent blockbusters and hit TV shows plus niche and original content. It offers about 100,000TV shows and movies that are over a year old (with the exception of Netflix's own productions)	It has a smaller library of , more than 40,000 available titles, but tends to offers more of the latest movies and TV shows for instant watching. It has plenty of independently produced (but not necessarily good quality) content. It also has good web shorts and off-the-wall documentaries
Original programming	Netflix is the home of original and quality content	Amazon has less original and exclusive content
Popularity	Netflix accounts for more popularity as according to a report released in June 2016, networking company, Sandvie estimated that Netflix accounts for 35.15% of prime-time Internet usage in North America	It has comparatively less popularity as according to a report released in June 2016, networking company, Sandvine estimated, Amazon Video accounts for 4.26%
Regional content	More content in Indian regional languages not available	More content in Indian regional languages available

While trying to compare two major streaming platforms in India, the researcher has conducted a primary study to analyse respondents' choice and factors affecting their choice of streaming media for entertainment.

RESEARCH METHODOLOGY

This study tries to understand the demographics of the respondents, their choice of streaming media, duration and time spent viewing this media, device on which the respondents watch it, reasons for using both Netflix and Amazon Prime Video and comparison between the two streaming media on selected parameters.

Problem Statement - "There is a need to study, analyse and compare the preference of audience among the two major streaming platforms i.e. Netflix and Amazon Prime Video currently competing aggressively in India."

OBJECTIVES OF STUDY

1. To study the usage of streaming media platforms as a means of entertainment.
2. To analyse the reasons of using Netflix and Amazon prime Streaming Video.
3. To compare the preferences of audience among the two major streaming platforms i.e. Netflix and Amazon Prime Video in India.

DATA COLLECTION: TOOLS USED FOR DATA COLLECTION

Questionnaire

The researcher has used a Structured Questionnaires to collect data through Google forms. The Questionnaire contains Close ended questions with multiple choice options to obtain data.

Sampling

For the purpose of this research Convenience or Random Sampling method is used. Data is collected from 100 respondents who watch the streaming media, through Google forms.

LIMITATIONS OF THE STUDY

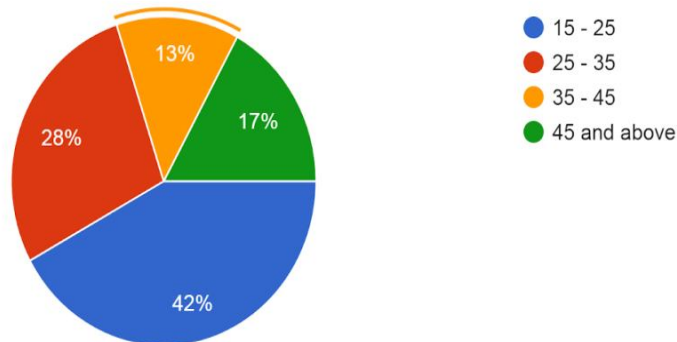
1. The sample size is small.
2. The data collected is based on the opinions and perceptions of a limited number of respondents.

ANALYSIS

The analysis and interpretation of the primary data, collected through primary questionnaire, reveals the following

1. Age

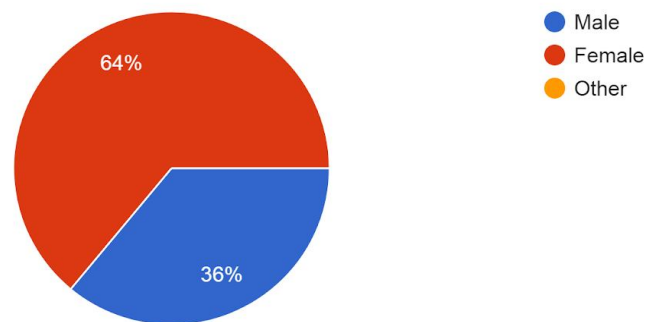
100 responses



This chart reveals that maximum of the respondents i.e. 42% watching streaming media belong to the age group of 15 to 25 years, 28% belong to the age group of 25 to 35 years, 17% to age group of 35 to 45 years and only 13% to the age group of above 45 years. Thus, Youngsters who are tech savvy and use internet very often are the target audience using this media.

2. Gender

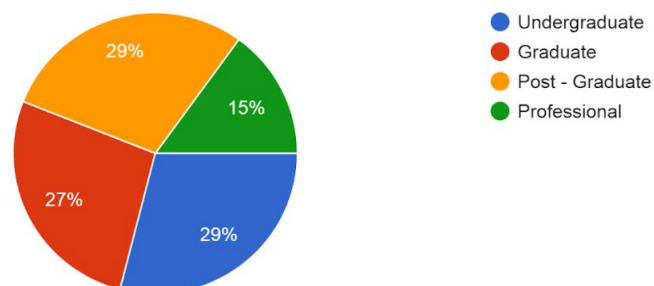
100 responses



This chart reveals that, 64% respondents are female, and 36% are male.

3. Qualification

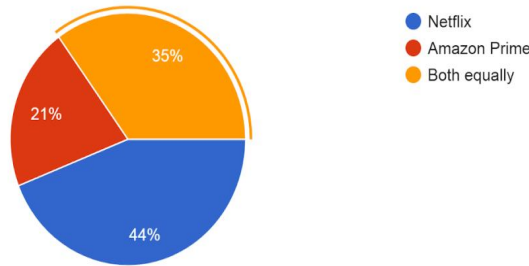
100 responses



This chart reveals that 29% of audience is post graduate and undergraduate, 27% are graduate and 15% are professionals.

4. Streaming Media platform out of the two used more often

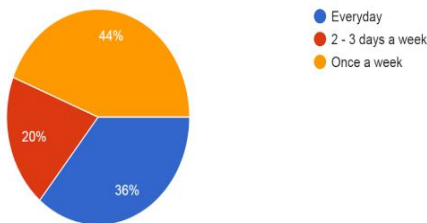
100 responses



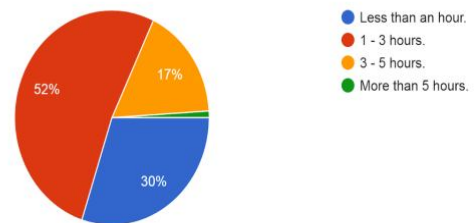
The above chart reveals that 44% of audience watch Netflix, 21% watch Amazon Prime Video and 35% watch both equally. This reveals that Netflix is more popular than Amazon Prime Video.

5. Time duration and usage of Streaming Media

100 responses



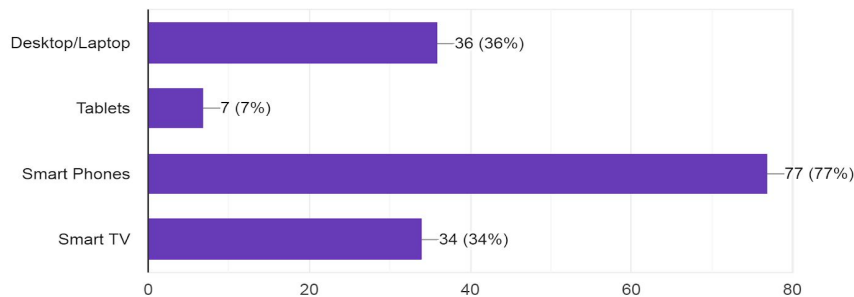
100 responses



The above two charts depict that 44% of audience watch the streaming media once in a week, 36% watch it every day and 20% watch it 2 to 3 days in a week. It also shows that 52% audience watch it for 1 to 3 hours, 30% spend less than an hour, 17% spend 3 to 5 hours and only 1% spend more than 5 hours watching it.

6. Devices on which videos are Streamed

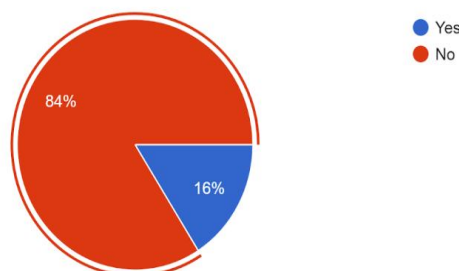
100 responses



The above table reveals that 77% of the audience streams videos on smart phones, 36% on desktop and laptops, 34% on Smart T.V and only 7% on Tablets.

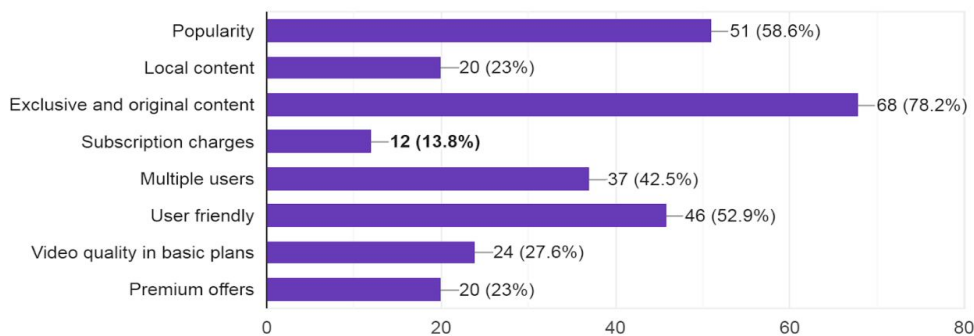
7. Influence of Telecom operator's offers to use these streaming platforms

100 responses



The above chart shows that 84% of respondents are not attracted by the offers given by telecom operators as a marketing strategy. Only 16% are using it due to attractive offers by telecom operators.

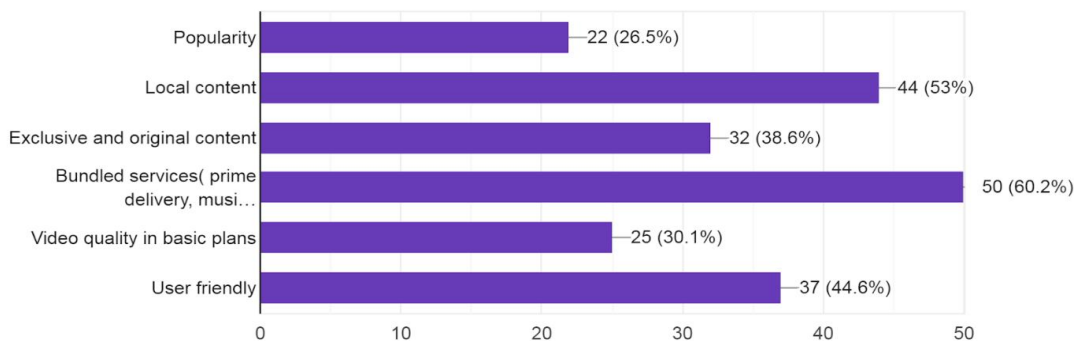
8. Reasons for using Netflix as a preferred streaming platform



When respondents were asked the reasons for preferring Netflix, 78.2 % were of opinion that it was due to exclusive and original content, 58.6% due to its popularity, 52.9% due to its user friendly characteristic, followed by other features such as multiple users, video quality, premium offers and local content. Very few were satisfied with its subscription charges.

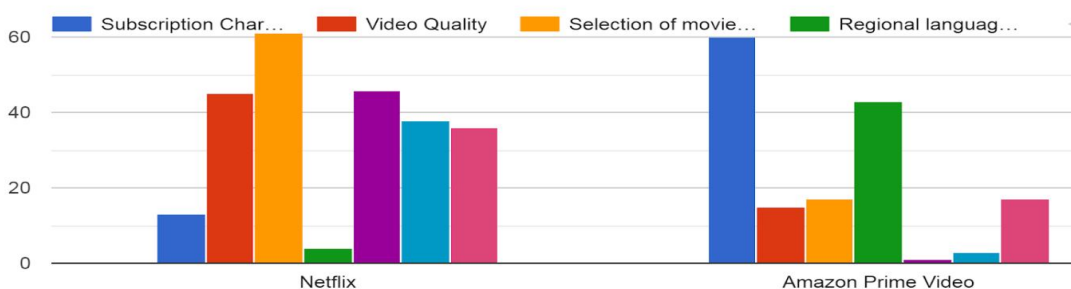
9. Reasons for using Amazon Prime Video as a preferred streaming platform

When respondents were asked the reasons for preferring Amazon Prime Video, 60.2 % were of opinion that it was due to bundled services offered by Amazon, 44% preferred due to availability of local and regional content and 37% said that it was user friendly. 32% preferred it due to its exclusive and original content, 30.1% due to video quality in basic plans and 26.5 % due to its popularity.



10. Comparison between Netflix and Amazon Prime Video on various parameters

Popularity Original Content User friendly and appealing



The above comparative charts reveal that audience prefer Netflix for its good selection of movies and TV shows available, popularity, video quality, original and exclusive and it being user friendly and appealing. Audience prefer Amazon Prime Video due to its subscription charges and regional content.

CONCLUSION

1. Maximum of the respondents i.e. 42% watching streaming media belong to the age group of 15 to 25 years. Youngsters who are tech savvy and use internet very often are the target audience using this media.
2. Out of the two major steaming media platforms, 44% watch Netflix which reveals that it is more popular.
3. Audience watch the streaming media once in a week and spend on an average spend 1 to 3 hours watching it.

4. Maximum of audience watch the streaming media on Smart phones as they are technically supported by it and is convenient. It is estimated that the country will have nearly 500 million smart phones by 2020, double from the current estimate of 200-250 million smart phones.
5. Amazon's tie with Vodafone in offering Amazon Prime Video free for its users for one year has not attracted the customers to use it.
6. Audience prefer Netflix for its exclusive and original content, popularity, user friendly characteristic and multiple users facility.
7. Audience prefer Amazon Prime Video for its bundled services offered and due to availability of local and regional content.

RECOMMENDATIONS

1. Netflix should understand the India customers who are price and value conscious, and reduce their prices. They should undertake efforts to provide more local and regional content.
2. Amazon Prime Video should undertake aggressive marketing and develop more original and exclusive content and be more user friendly in characteristic.

Both Netflix and Amazon Prime Video are looking at India as big market for streaming media which has exhibited remarkable potential in recent years.

BIBLIOGRAPHY

- <http://knowledge.wharton.upenn.edu/article/can-netflix-amazon-disrupt-indias-streaming-video-market/>
- <http://www.businessworld.in/article/Is-Netflix-Falling-Behind-Amazon-Prime-In-Indian-Market-/21-06-2017-120542/>
- <http://www.icmrindia.org/Short%20Case%20Studies/Marketing%20Management/CLMM132.htm>
- <https://bestmediainfo.com/2018/07/prime-video-and-netflix-spending-money-to-build-content-library-will-that-be-enough/>
- <https://computer.howstuffworks.com/internet/basics/streaming-video-and-audio4.htm>
- <https://gadgets.ndtv.com/tv/news/amazon-prime-video-launched-in-india-all-you-need-to-know-1637714>
- <https://inc42.com/buzz/hooq-changes-game-plan-to-challenge-netflix-amazon-prime-in-india/>
- <https://qz.com/india/1205896/how-amazon-edged-past-netflix-in-india/>
- <https://searchunifiedcommunications.techtarget.com/definition/streaming-video>
- <https://www.cnbc.com/2018/07/05/netflix-and-amazon-are-struggling-to-win-over-indian-viewers.html>
- https://www.diffen.com/difference/Amazon_Prime_Instant_Video_vs_Netflix
- <https://www.digitaltrends.com/home-theater/best-on-demand-streaming-services/>
- <https://www.exchange4media.com/digital-news/amazon-prime-video-is-growing-faster-in-india-than-any-other-countryjames-farrellamazon-prime-video-88861.html>
- <https://www.exchange4media.com/digital-news/marketing-tug-of-war-between-amazon-indianetflix-heats-up-90993.html>
- <https://www.finder.com/in/internet-tv/amazon-prime-video>
- <https://www.finder.com/in/internet-tv/netflix-india>
- <https://www.forbes.com/sites/greatspeculations/2017/03/20/heres-how-amazon-is-expanding-prime-video-in-india/#20ac20352ece>
- <https://www.hindustantimes.com/business-news/why-netflix-isn-t-keen-to-expand-to-regional-languages-in-india/story-15BIUoXJJ1hZ8pAx5E8WQJ.html>
- <https://www.indiatoday.in/technology/features/story/netflix-or-amazon-prime-netflix-is-expensive-but-here-are-5-reasons-why-it-is-worth-paying-extra-for-it-1398102-2018-11-28>

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- <https://www.komando.com/tips/443173/whats-better-amazon-prime-video-or-netflix>
 - <https://www.quora.com/What-are-the-business-strategies-of-Netflix-and-Amazon-prime-in-India>
 - <https://www.quora.com/What-is-Amazon-Prime-Video-India>
 - <https://www.techsupportalert.com/5-Best-Free-Video-Streaming-Sites.htm>
 - <https://www.techopedia.com/definition/9927/video-streaming>
 - <https://www.thenewsminute.com/article/swiggy-acqui-hires-bengaluru-based-ai-startup-kintio-96181>
 - <https://yourstory.com/2017/01/netflix-vs-amazon-prime/>

AN OVERVIEW OF EMERGING TRENDS IN ADVERTISING AND ITS FUTURE PROSPECTS

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ABSTRACT

In the last few years, the trend in worldwide business has been the adoption of new marketing strategies that utilize the ever-advancing technology applications available today. In 2019, it is estimated that there will be around 258.27 million social network users in India, up from close to 168 million in 2016. The most popular social networks in India were YouTube and Facebook, followed by social app WhatsApp. Facebook is projected to reach close to 319 million users in India by 2021 (www.statista.com). Social Network Advertising is the advertising which is done online through Social networking sites like Facebook, Google Ads, twitter etc. It is a paid form of promotion of brand or product or service and requires a properly planned communicative message and budget.

This paper will focus on the new advertising strategies emerging in global businesses and its impact on the revenue generation and purchase inspirations. It reveals the fact that Google and Facebook still hold the largest share of total US digital ad spend, with 38.6% and 19.9%, respectively. It should come as no surprise to experienced digital marketers that the majority of online advertising dollars go to Google and Facebook (PPC Advertising Statistics).

Keywords: Advertising, Social Media Advertising.

INTRODUCTION

Media propagation has changed the ways in which advertising messages are delivered and received. Due to the high costs incurred in delivering message to mass audience, advertisers are moving away from television and investing in alternate media, such as social network sites (SNSs), to reach their target customers. The term Social Network Advertising is the advertising which is done online through Social networking sites like Facebook, Friendster, twitter etc. It is a paid form of promotion of brand or product or service and require a properly planned communicative message and budget. This form of advertising is more customer centric and customers play a vital role in short or long communication because they are one who will decide the fate of the advertising communication. (P. Sri. Jothi, et.al 2011). The emergence of Social Media has helped organisations in engaging a direct, efficient, cost effective and timely end-consumer contact as compared to the traditional communication tools. Therefore Social Media Advertising is more beneficial not only to large multinational firms, but also to small and medium sized companies, and even non-profit and governmental agencies.

LITERATURE REVIEW

Elizabeth Wright et al (2010), in their paper have made an attempt to highlight the various marketing concepts till the recent holistic marketing concepts with consumer engagement. The crucial aspect of advertising with reference to targeting the right people with right message has been effectively dealt by the researchers. At the end the study concludes that the technological interventions in Advertising will continue to advance at a skyrocketing rate. Kyongseok Kim et al. (2014), the purpose of this study was to focus on the direction and progression of advertising as an academic field by updating and extending Yale and Gilly's (1988) study of advertising research trends. It is a longitudinal content analysis of advertising research articles in top advertising, marketing and communication journals published from year 1980 -2010. The authors have attempted to develop an understanding of the true nature and direction of advertising, its practical personality to support with pool of research content for future researches in the field of advertising. Kiandokht Hadadi et al(2013), this paper focuses on the impact of different media on selling ratios, with the objective of finding the most effective media and its impact on sales. A review of previous researches in media internationalisation is done in this paper. This study revealed that customers are more influenced by internet advertising followed by commercial, T V and print advertisement. Akashdeep et.al(2017), in their paper have made an attempt to analyse the pattern of social networking usage and impact in order to determine the social networking addiction, with an objective to investigate the extent of social networking impact on the Indian youth. The reason for selecting youth as the target audience is because the direction of a country and culture is decided by the direction taken by youths of that country. The Social Networking patterns shown by people in the study are largely consistent with those recorded in previous research studies with respect to impact of popular social media sites on Indian culture and the extent of the use, purposes, mode of access when using these sites. The author also reviewed benefits of the social networking sites in culture development, building self-identity,

developing relationships and acquisition of social, communication, and technical skills. Findings of this study have revealed a possibility of social networking addiction among Indian youth and the authors have devised few recommendations for tackling the issue. Prateek Maheshwari et al. (2014), authors of this paper have made an attempt to review various studies on advertisement effectiveness and identify a range of measures used in context of a specific media. The study threw a light on development of advertisement effectiveness literature from year 1964 to 2013 from traditional to modern media. The authors have identified the complexities and vagueness of the subject. Ibrahim Salim (2016), the objective of this paper was to conduct a comprehensive literature review of technological issues that are changing the advertising industry with its influence on both consumers and advertisers. The web of Science database was selected to explore articles from year 2000 to 2016. The study focused on impact of technology on Advertising business.

RATIONALE OF THE STUDY

Previous studies on the trends of advertising have focused on the review of various research works which covered the dimensions of advertising as a marketing communication over a selected time framework. Many studies have focused on the affective aspect of advertising on consumer behaviour. Studies on the perception of consumers towards advertising have revealed the fact that advertising message and the media used for delivering the message are having a large impact on consumer buying decisions. Studies have also tried to mention the significance of social media in communicating the marketing message to masses at low cost, which has led to a desire to have an overview of emerging trends in advertising ,whereby aims to study the present scenario of advertising and its future prospects with respect to social media advertising in specific.

OBJECTIVES OF THE STUDY

1. This study aims at having an overview of emerging trends in advertising and its prospects.
2. To identify the most effective form of social media used for advertising.
3. To devise the strategies for effective performance of social media advertisements.

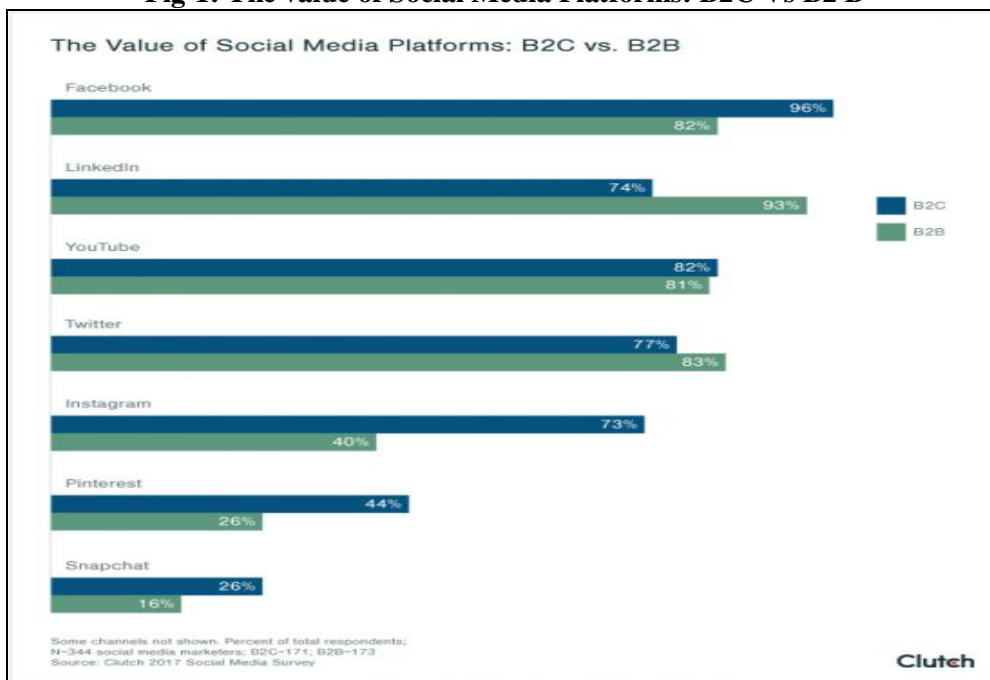
METHODOLOGY OF THE STUDY METHODOLOGY

This research paper is an attempt of exploratory research, based on the secondary data sourced from journals, magazines, research articles, published reports, seminal work in advertising research and the statistics published at official sites of various social media. Looking into requirements of the objectives of the study the research design employed for the study is of descriptive type.

B2 B and B2C in Social Media

B2C businesses prefer Facebook and You Tube, while B2B businesses see the most value in LinkedIn and twitter as shown in the fig .1 below. Snapchat and Pinterest are the lowest preferred B2B businesses as well as in B2C businesses

Fig-1: The value of Social Media Platforms: B2C Vs B2 B



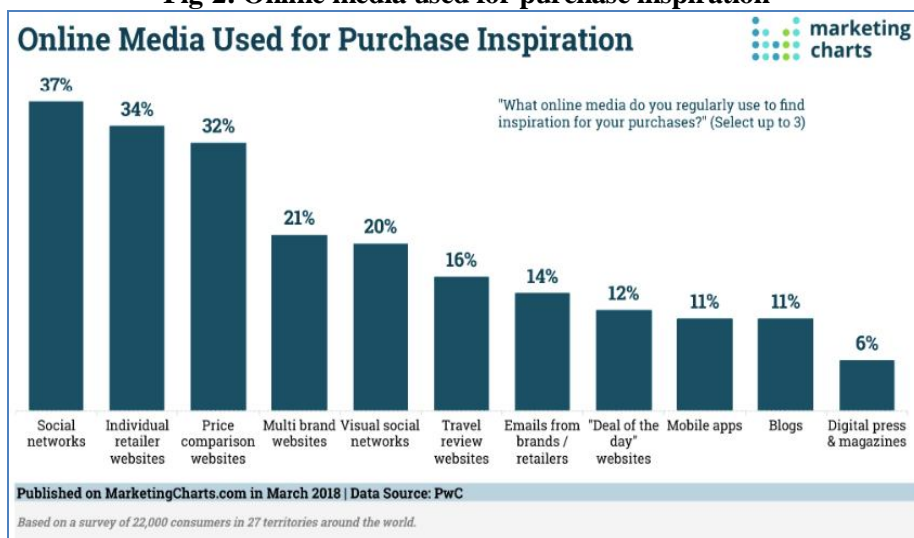
Source: Clutch 2017 Social Media Survey

ONLINE MEDIA AND PURCHASE INSPIRATION

Companies communicate with consumers through a wide range of online, word-of-mouth forums including blogs, company-sponsored discussion boards and chat rooms, consumer product or service rating websites and forums, internet discussion boards and forums, mo-blogs (sites containing digital audio, images, movies or photographs) and social networking websites to name a few. With the help of Social network sites (SNSs) consumers can actively interact with advertising like for instance SNS gives opportunity to the consumers to “like” certain ads, follow ads on twitter, share them with friends and to know which friends like the ads. Many consumers are turning away from the traditional sources of advertising like radio, television, magazines, and newspapers and are using social media more frequently to search information about products and make purchase decision. Therefore many researchers think that Social Media should be included as an integral part of the organization’s Integral Marketing Communication strategy.

The insights from Shareablee’s State of Social TV 2018 report reveals 70% of respondents between the ages of 18 and 24 watch long-form TV shows on various online platforms. Of that group, 47% would continue viewing their favourite TV shows on social media if they were available there.

Fig-2: Online media used for purchase inspiration



Source: PWC, published on marketing charts.com Marsh 2018

Although trust in the brand plays a strong role in determining where consumers shop, they rely heavily on other people’s opinions to decide what to buy. “Today’s consumer’s trust the wisdom of the crowd, what somebody in their network says about something”, as quoted by Rick Kauffeld, a PwC US principal. A consumer survey was done to enquire on which online media is regularly used to find inspiration for their purchases, wherein Social networks ranked first (37% of respondents), followed by individual retailer websites (34%) and price comparison websites (32%). Chinese respondents again stood out, as their preference for social networks soared to 52%, with retailers’ websites (20%) and emails (10%) trailing far behind. But consumers in some other countries responded that they rely even more heavily on social networks in this regard, with 70% of respondents from the Middle East selecting social networks, 58% from Indonesia and Malaysia, and 55% from Hungary. These findings reveals the fact that opinions and suggestions on social media sites—posted by friends and strangers alike—have more influence on specific purchase decisions than factors that retailers can control, such as advertising, promotions, and pricing. Recognising the importance of social media, many retailers have sought to use these sites as channels not just for getting their mass marketing messages out to consumers, but also to participate in ongoing conversations that are relevant to the brand. Consumers trust opinions on social media because they regard these as authentic and helpful.

PRESENT SCENARIO OF SOCIAL MEDIA ADVERTISING

As per the report published and updated by Liis Hainla (Feb-2019), social media delivers measurable results in sales, leads, and branding. It offers marketers great RoI, enabling them to reach a large audience at low cost. The world of social media is dynamic and constantly changing. There are 3.48 billion social media users in 2019, with the worldwide total growing by 288 .i.e. 9 percent since this time last year(Source-We are Social).Social media just keeps growing and growing.

At the end of 2018, Facebook had 2.32 billion monthly active users. And most of the other social networking platforms and apps also continued to grow past 2018 levels. Online adults aged 18-34 are most likely follow a

brand via social networking (95%) (Source: Marketing Sherpa). 63% of customers actually expect companies to offer customer service via their social media channels, and 90% of social media users have already used social media as a way to communicate with a brand or business (Source: Smart Insights). 80% of companies online are under the impression that they deliver exceptional social media customer service, while only 8% of their customers say that they agree. (Source: Smart Insights)

The active number of global mobile social media users is 3.3 billion global equalling 42% penetration (Source: Statista). Nearly 1 million people used mobile social media for the first time each day in 2018 (Source: We Are Social). Users spend on average 69% of their media time on smart phones (Source: comScore). 96% of the people that discuss brands online do not follow those brands' owned profiles. (Source: Brandwatch).

There are now more than 50 million small businesses using Facebook Pages to connect with their customers (Source: Facebook). 4 million of those businesses pay for social media advertising on Facebook. (Source: Forbes) Visual content is more than 40 times more likely to get shared on social media than other types of content. (Source: HubSpot)

Latest study by Locowise found that adding hashtags had no effect on engagement rates. In fact, tweets without hashtags outperformed tweets with hashtags. (Source: Adweek).

For Instagram Top brands are seeing a per-follower engagement rate of 4.21% which is 58 times higher than on Facebook and 120 times higher than on Twitter (Source: Hootsuite). Media brands are the most active whereas business services, financial services, and fast moving consumer goods have the lowest percentage of brands represented on Instagram. (Source: Simply Measured)

Pinterest is one of those platforms that tend to get overlooked. Marketers think of pinboards as being full of random images that don't have a lot of meaning. Pinner (those who use Pinterest) would like to see more brands content on the platform. 78% of them state that they welcome brands, and an additional 66% say that they would make purchases from those pins.

PROSPECTS OF SOCIAL MEDIA ADVERTISING

Adobe Digital Insights' 2018 State of Digital Advertising Report reveals that 50% of Gen Z (18- and 19-year-olds) and 42% of Millennials (20- to 36-year-olds) think social media is the most relevant channel for advertisements.

With better targeting than ever before, users are reporting the ads they see feel more targeted to them. Young people especially agree with this, and they're the demographic most likely to turn to social media when researching a new product or service to buy.

The relationship between businesses and customers is changing with the introduction of Social Media. Businesses are required to develop their marketing strategies in order to generate a genuine relationship with its customers.

The adoption of advanced technologies have changed the manner in which people buy a product or choose a service. Various aspects of consumer behaviour including information acquisition, awareness, attitudes, opinions, purchase behaviour and post purchase communication and evaluation are influenced by Social Media. Online consumers are unwilling to read large amounts of data. They prefer brief but complete information while seeking the key benefits of a product or service. Integrated timesaving features like pop-up descriptions, photo galleries, product comparison etc. are always valued by the online consumers.

CONCLUSION

As the usage of Face book is more and other social media are used less by the people, so we can give suggestions to other social networking sites like linked In , my space Twitter to make it more attractive as like face book and you tube to attract more people to their sites. They can improve their advertisements, visual design they can also give advertisements which are more attractive for people. Other advertisements like advertisements play before start a video should change their form of presentation they should make it like a story so that people will get engrossed in the add and they will forget that we are watching a add.

The feedback shared on the review social networking sites such as Face book, LinkedIn, Twitter, Google+, holidayiq.com & Trip Advisor is an opportunity to improve the service offering to advertisers to improve advertisements. Measuring the affects that reviews, Wall-posting, Blog, Photo Video, Pop-up, tweets and posts can directly have impact on consumer perception towards social media advertisements.

REFERENCES

- Akashdeep. Bhardwaj, Vinay Avasthi, Sam Goundar Impact of social networking on Indian Youth, I.J. of Electronics and Information Engineering, Vol.7, No.1, PP.41-51, Sept. 2017 (DOI: 10.6636/IJEIE.201709.7(1).05) .
- Amilia Haida, Hardy Loh Rahim, Social Media Advertising Value: A Study on Consumer's Perception, International Academic Research Journal of Business and Technology, ISSN: 2289-8433, 1(1) 2015, Pages: 1-8.
- Electronic copy available at: <http://ssrn.com/abstract=2194864>.
- Elizabeth Wright et al (2010), The lasting effects of social media trends on Advertising, Elizabeth Wright et al, Journal of Business & Economics-November, 2010, Volume8, Number 11.
- Ibrahim Salim (2016), Changing trends in Advertising and online strategies: A systematic Review of online advertising, International Refereed Journal of Marketing and Market Researchers, 2016, ISSN: 2148-4764, online 2148-5666.
- Kiandokht Hadadi et al (2013), The Relationship between media Advertising and Selling Ratios: A review paper. Journal of modern marketing research Vol.2 No.1, September 2013, 86-97, ISSN: 2231-9131.
- Kyongseok Kim et al. (2014), Trends in advertising: A longitudinal analysis of leading, marketing and communication journals, 1980 to 2010. Journal of Advertising 43(3): 296-316, July 2014.
- Lunardi Gunawan (2015), The Impact of Consumers' Attitude on Online Video Advertising towards Product Branding, iBuss Management Vol. 3, No. 2, (2015) 413-422.
- M. Nick Hajli, A study of the impact of social media, on consumers, International Journal of Market Research Vol: 56, Issue 3.
- Muranda Lazaro s (2009). Factors influencing the selection of advertising media- A case study of television. A Dissertation submitted in (partial) fulfilment of the requirement for the Degree of Master of Business Administration (Finance) of the open university of Tanzania.
- Prateek Maheshwari et al. (2014), Advertisement Effectiveness: A Review and Research Agenda, World Academy of Science, Engineering and Technology International Journal of Economics and Management Engineering, Vol: 8, No: 12, 2014, [waset.org/Publication/10000065](http://www.waset.org/Publication/10000065).
- Rejili Liligeto, Gurmeet Singh and Rafia Naz (2014), Factors influencing Consumer Perception (CP) towards TV and Newspaper Advertising, the Journal of Pacific Studies, Volume 34, Issue-2, 2014, pg. no 63-85.
- Sandeep Vij & Jyoti Sharma, An Empirical Study on Social Media Behaviour of Consumers and Social Media Marketing Practices of Marketers, 5th IIMA Conference on Marketing in Emerging Economies, 9-11 January 2013 .
- Report on Social Media Statistics by Liis Hainla (Feb-2019)
- Adobe Digital Insights' 2018 State of Digital Advertising Report
- The insights from Shareablee's State of Social TV 2018 report
- Clutch 2017 Social Media Survey
- www.Statista.com

SUSTAINABLE SMART CITIES: THE SMART ROUTE TOWARDS FUTURE URBANISATION

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ABSTRACT

Our planet is inhabited by our 7 billion people and is in the midst of massive transition due to climatic change, biological evolution. Climatic change brings its adverse consequences such as threat to biodiversity and risk to human health, rising sea level, increasing water stress as well as decline agricultural productivity. The government of India has undertaken concrete steps for making smart cities a reality with the recent announcement of converting 100 cities to smart cities. The government has initiated sustainability as the key component of smart cities. Due to abnormal weather conditions and natural calamities, the concept of smart cities must be integrated with sustainability for the welfare of people and planet as the whole Sustainable smart cities would be the smartest route for future urbanisation. Therefore this research paper attempt to understand smart cities mission and the need for sustainable development for future India.

Keywords: Smart cities, urbanisation, sustainable development

INTRODUCTION

India is on its development pathway toward urbanisation. According to the census 2011 about 32 percent of the country's population lives in urban areas as against 28 percent in 2001. By 2039 most estimates consider India to be 50 percent urbanised. To keep the pace with that India has to spend 1.2 trillion in its urban areas. While worldwide there is a call to battle global challenges like climate change, poverty, inequality and speedy development in development societies through transformative sustainability there is a smouldering pressure from Indian urbanities for enhanced economic growth, job creation urban renewal, and international living standards. To overcome this government of India recently announced the 100 new smart cities development. The union budget earmarked 7070 crores during the 2013-14 financial year for developing smart cities in the country. Mean while the over all allocated has been hiked to 17628 crores in 2014-15 budget. These new cities should be developed to accommodate the burgeoning number of people. A major national daily reported that the seven out of the 25 smart cities have been planned in the first phase of Delhi, Mumbai industrial corridor. There would be one in each in UP, Haryana, Maharashtra, Rajasthan, Madhya Pradesh and two in Gujarat.(Indian express 2014). But there are some unresolved issues and challenges in this upcoming venture that demand for a sustainable model for urbanisation. Sustainable smart cities would be the smartest route for future urbanisation. Therefore this research paper attempt to understand smart cities mission and the need for sustainable development for future India.

OBJECTIVES OF THE STUDY

- To overview the smart cities mission programme of government of India.
- To understand the challenges of the smart cities mission.
- To analyse the sustainable smart cities development as the road map for development.

RESEARCH METHODOLOGY

The study is based on the secondary data analysis by referring the news articles, research report , industry reports on smart cities and sustainable smart cities.

CHALLENGES IN SMART CITIES URBANISATION

India ranks 131 (out of 188 countries) on the Human Development Index and records the world's largest number of people, 642 million, living in multidimensional poverty (UNDP 2016). While the rate of urbanization is increasing, the country still has about 69 per cent of its population or over 800 million people living in rural areas. Urbanization processes,

There is neither an internationally accepted definition nor India has any policy on urbanization but there is no consensus on what are the inputs and strategies to achieve. It is also been studied that smart cities would bring multiple challenges for the India. As the Mission completes three years on 25 June 2018, Housing and Land Rights Network, India (HLRN) has published this report to assess its progress and contributions to urban development in India as well as its impacts on the most marginalized among the urban population. The study undertaken by HLRN consists of an analysis of all 99 selected Smart City Proposals as well as an extensive review of media, government, and other reports about the Mission. Only about 8 per cent of India's total

population or 22 per cent of its urban population is likely to benefit from the Smart Cities Mission. The rationale of selecting only 100 of India’s over 4,000 cities and towns and of focusing only on select areas within each city misses an opportunity to evolve an inclusionary approach to development. It could also tend to perpetuate biases and discrimination in national planning processes. Of the total proposed investment of Rs 2.04 lakh crore (2,039 billion) in ‘smart cities,’ 80 per cent will be spent on ‘Area-based Development (ABD),’ i.e. only on specific areas in each city, with only 20 per cent of funds being devoted to ‘pan-city development. Some of the challenges observed are

ENVIRONMENTAL ISSUES

Though there is a stated focus on environment sustainability within smart city proposal but this mission would result in the growing ecological footprints of smart cities. It could also pose threat of increased e-waste and loss of forest cover in the pursuit of green field development.

RISK OF DIGITALISATION

The tendency of new and emerging technologies to capture personally identifiable information and household level data about citizen, give rise to serious concern about the smart city’s Propensity to violate people’s privacy through misuse of big data. Several other rights including the right to access information and the right to security are threatened by increase surveillance and control of personal data.

FORCED LAND ACQUISITION AND EVICTION

In 2017 Housing and land right network (HLRN) documented force eviction and demolition of homes in 32 out of 99 smart cities. The goal of the several cities to be slum free could promote eviction and destruction of low income settlement under the guise of creating cities without slums. This is giving rise to fears of increased land acquisition particularly along economic and industrial corridors.

ABSENCE OF HUMAN RIGHTS-BASED STANDARDS AND MONITORING INDICATORS

The smart city project lack a clear city development blueprint and adequate standard to monitor the implementation that includes housing, water, sanitation, health and environmental sustainability, raise question about whether the mission will really be able to deliver and ensure fulfilment of rights and entitlements of all city residents. The smart mission guidelines do not include any right based indicator to monitor and to ensure that the project will also benefit the disadvantaged groups.

NEED FOR ADOPTION OF SUSTAINABLE SMART CITIES

According to the World Bank’s Sustainable cities framework, Sustainable cities can be understood as resilient cities that can more readily adapt to mitigate and promote economic, social and environmental changes. Sustainable development encompasses all aspect of a city’s health development and should be done with triple bottom line in mind addressing economic financial, social and environmental issues.

“A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects”

As per the sustainability frameworks around the world, sustainability also calls for stake holder engagement, robust corporate governance, responsibility and accountability and transparent reporting. Successfully implementation of the smart cities will require accurate benchmarks and good governance structure

Table-I: Comparison of smart Cities and sustainable smart cities

Smart cities component	Sustainable smart cities
Institutional infrastructure E-governance and citizen services	Economic progress Competitive economy Employment growth and opportunity Affordable housing Governance
Physical infrastructure Smart energy management Smart water management Smart waste management Urban mobility Smart communications Smart environment	Environmental stewardship Climate change mitigation and adaptation Water, waste and energy management Green buildings Sustainable transport Water quality and air quality Natural resource management, including

Smart spaces Smart surveillance	biodiversity and green cover
Social infrastructure Smart healthcare Smart education Recreation: arts, sports, entertainment	Social development Social inclusion, stakeholder engagement and participation Human rights Sanitation, public health and safety
Economic infrastructure Incubators, skill development centres, specialised business parks, hubs, etc.	

Source: Smart cities report 2018

Therefore the sustainable smart city will be the holistic city with multiple theme to ensure easy service delivery and quality of life for citizens. With the recent announcement of 100 smart city aspirants by the government, India has taken concrete step towards the smart city transformation. The clean and sustainable environment will be significant feature for the upcoming smart cities. Sustainable economic advancement, political participation and social emancipation are the three core foundation of sustainable smart city. A model city must have an open and responsive government that involves citizens in decision making and robust governance structure with single nodal agency. Additionally the city must have the open data that is accessible to all, a robust model, for city functioning and supportive regulatory systems that foster the culture of innovation and inclusiveness

CONCLUSION

The path towards sustainable smart cities will invariably require coordinated action by various stakeholders. The city management structure needs to work in harmony in order to deliver the city’s vision. This require integrated approach both during planning as well as at the execution level of sustainable strategies. The state must established agencies that will work together with city municipal corporation and policy-makers, in order to ensure that strategies and urban planning targets are completely aligned with the city’s overall smart and sustainable vision. Institutional factors for achieving sustainable smart cities are:

- Good Governance
- Legislation and policies
- Public and private cooperation
- Financing
- Education training and development

Thus for sustainable future development responsibility and accountability of all stakeholders would play an integral role towards the development of smart cities.

REFERENCES

- Sharma, Poonam & Rajput, Swati. (2017). Sustainable Smart Cities in India: Challenges and Future Perspectives. 10.1007/978-3-319-47145-7.
- Sethi Mahindra (2015) “smart cities in India: challenges and possibilities to attain sustainable urbanisation, Nagarlok vol. XI VII, no. 3, July-September, 2015,

REPORTS

- Chaudhry, Saxena, Kumar (2018) “India’s Smart Cities Mission: Smart for Whom? Cities for Whom?”, Housing and Land Rights Network, New Delhi.
- Neel Ratan (2015) “Making cities smart and sustainable.” PWC, Corporate communication, India

CURRENT TRENDS IN INDIAN FOOD PROCESSING INDUSTRY**Sayali Yadav**Assistant Professor, Department of Commerce, Guru Nanak Khalsa College

1. INTRODUCTION

The entire world is looking at India as one of the massive attractive investment hubs. Increasing disposable incomes, rapid industrialization and a significant shift in the demographic pattern of Indian population are the major reasons behind this advancement. Consumer-centric sectors play the vital roles in this growth story. These sectors have witnessed major transformation over the last decade. Food sector is one of these contributing sectors. The food sector in India has become more vibrant and substantial over the years. A strong growth is expected due to India's demographic dividend i.e. young population, their increasing standard of living and increased income among the middle-class people, evolving business and consumer trends and so on.

2. RATIONALE OF THE STUDY

India being an agrarian economy, food processing sector plays a major role. India has a major agribusiness sector which has achieved a remarkable success over the last few decades. The right post harvest practices such as good processing technique, proper packaging, transportation and storage can play a significant role in reducing spoilage and extending shelf life. The global processed food market is estimated at \$3.2 trillion. Indian food market is estimated at \$182 billion. Food processing industry in India is growing at 14% per annum. The total food production in India is likely to double in next ten years and there is an opportunity for huge investments in food industry. In India, only 6% of total agricultural output is currently processed as against 80% in some developed countries leaving a large potential to be tapped in this sector.

3. REVIEW OF LITERATURE

Kurulkar R. P., Mitra, A. K. and Sahoo, B. (1994)- studies the role of two agro-based industries, the sugar industry, and the cotton-based industry, in the development of rural areas of Marathwada region, Maharashtra, India, using Thompson's Model of endogenous development. The chapter discusses the nature of investment and employment in agro-based industries, the objectives of planning. It then discusses each of the agro-industries, capital requirements, and potential employment levels. The chapter concludes that agro-based industries have the potential to help rural development in almost all the backward areas of India, but require strong leadership to do so.

Diagnostic Study Sme The Food Products Cluster (1997) - The study concludes that No significant improvements in the food processing industry can come through unless we ensure that the raw material itself is of uniform good quality. For this we have to start from the farmer itself. We need to provide necessary inputs and farm management training to the farmers themselves so that the produce that they come up with is of requisite uniform quality. Only then the processing can add value to make the product of uniform good quality. This would also involve upgradation for the post harvest technology and infrastructure available. Some experts can be called from foreign countries even on free basis. Such institutions exist that provide technical expertise not only to run regular programs but also to provide institution building expertise.

H. Martin Dietz (2000) - This report highlights the potential contribution that small-scale food processing enterprises can make to the overall development of the agricultural sector and, in particular, the rural economy in Uganda and Tanzania. The major constraints hindering the development of small-scale food processing enterprises in these countries include: a lack of access to capital for investment and operation; the limited technology choice for entrepreneurs; poorly developed technical and managerial skills among entrepreneurs; and a lack of technical and market information available to entrepreneurs. The author recommends various approaches for improving the operating environment for food processors in order to increase their productivity and competitiveness. The report also notes that improving the flow of information to small-scale food processors is particularly crucial to their future success. A key recommendation on information management and skills development relates to the establishment of advisory services business support centers.

Amiya Kumar Behera (2004) - There is a need to increase food processing in India from an existing low level of 2 percent up to 10 percent by 2010. This would require an investment of Rs.14 trillion in the food processing sector. 60 This investment would generate direct employment for about 7.7 million persons and indirect employment for about 30 million. This could also reduce food wastage worth Rs.800 billion. Apart from these advantages, the value addition to the food products will go from 7 to 35 percent, which will increase contribution of this sector to the GNP. The thrust will have to attract foreign and domestic investment, and

generate internal accruals of such magnitude. Domestic investment needs to come from the private sector, NGOs and community-based organization, including farmers associations

4. RESEARCH OBJECTIVES

- To understand the current trends in food processing industries in India.
- To evaluate existing support schemes offered by Indian government in promoting food processing units.

5. RESEARCH METHODOLOGY

For the study secondary data is used. The data is collected form secondary sources such as books, research papers and government reports.

6. DISCUSSION

6.1. Food Processing

Food processing is the process of performing a series of mechanical and chemical operations on food in order to preserve it for a longer duration. It is a process that involves transformation of agricultural products into food products. It also includes transformation of one form of food into other. It involves many forms of processing food such as making raw flour from grain by grinding, from raw flour to home cooked food or by using complex industrial methods to make convenience foods. Food processing uses crops or animal products like raw food ingredients and produces the convenience products having a long shelf life. These products are highly marketable.

6.2 Indian Food Processing Industry

India has marked a significant progress in agriculture and food sectors since independence. This progress is in terms of growth in agricultural output and processing of fresh farm products. Indian agriculture has witnessed the success of various revolutions such as green revolution, white revolution, yellow revolution, blue revolution and so on. Today, over the globe, India is the ranks first in production of milk, cashew nuts, fruits, tea and coconuts. It ranks second in production of wheat, sugar, vegetables and fish. Whereas it ranks third in production of tobacco and rice. Food processing industry is indigenous to India. This is because simple traditional home-based techniques like fermentation have resulted in the creation of global acknowledgment of Indian pickles, papads, chutneys, murabbas and so on.

IBEF states that, the food processing industry is one of the biggest industries in India. It is the fifth largest industry in terms of production, consumption and export. Indian food processing industry is expected to grow even more in future.

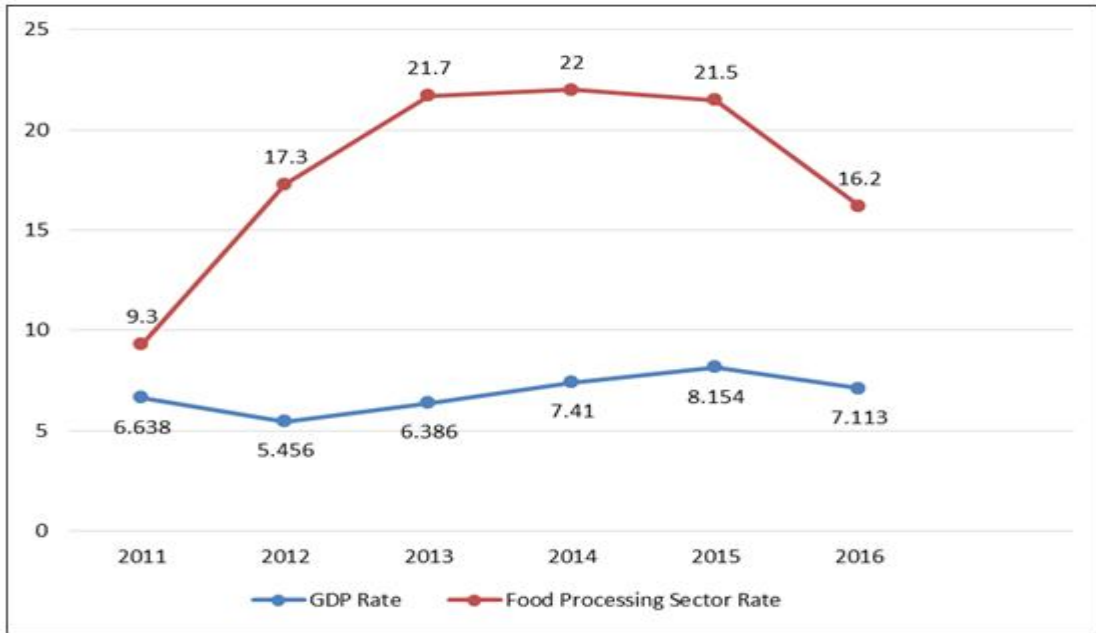
With the rapid growth of the Indian economy, a major shift is seen in the consumption pattern of the country, from cereals to more varied and nutritious diet of fruit, vegetables, milk, fish, and meat and poultry products. All these changes have resulted in the development of sunrise industry namely food processing industry.

India's food industry offers vast opportunities for investments with inspiring growth in the food retail sector. Constructive economic policies and attractive fiscal incentives boost these investments further. The Government of India through the Ministry of Food Processing Industries is also taking all the necessary steps to increase investments in the food processing industry. The government has sanctioned 42 Mega Food Parks (MFPs) to be set up in the country under the Mega Food Park Scheme. Currently, 12 Mega Food Parks have become functional.

- By 2020, Indian Food and retail market is projected to touch \$ 482 bn
- By 2020, the Indian Dairy industry is expected to double to \$ 140 bn
- By 2020, the Food processing industry has the potential of attracting \$ 33 bn of investment
- By 2030, Indian annual household consumption to treble, making India 5th largest consumer

At present almost one-third of the total food market in India is occupied by processed food. Indian food processing industry is valued at US\$258 billion. It is the fifth largest industry in India. It contributes to around 14 % of India's GDP and 13% of India's total food exports.

The Indian Food Processing Industry has arisen as one of the major industries which can make significant contribution to India's economic growth. While the country's GDP growth rate had increased from 6.6% in 2011 to 7.11% in 2016, the food processing industry has grown from 9.3% in 2011 to 16.2% in 2016.



Source: IBEF & The World Bank

6.3 Key drivers of growth in food processing

- **Consumer spending on food**

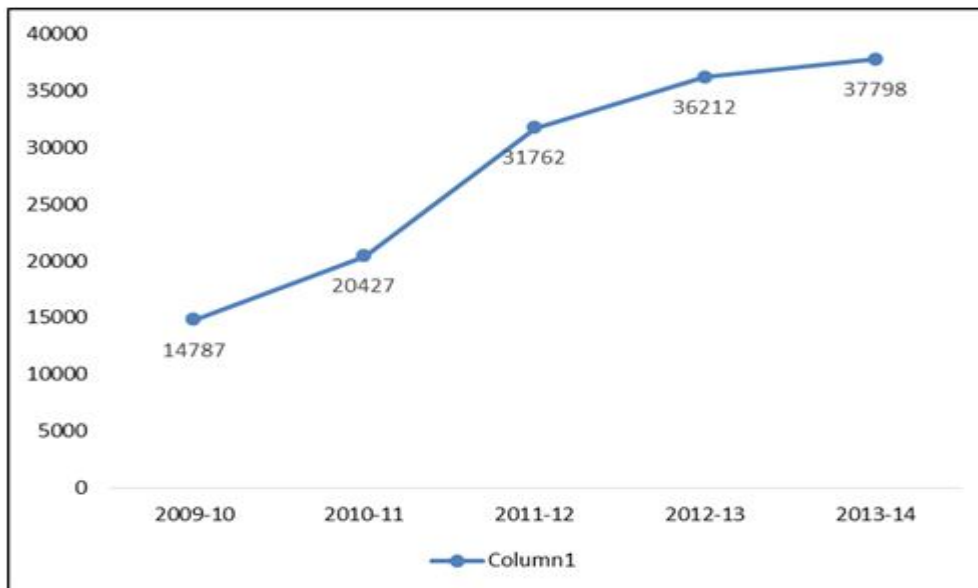
The Indian food and grocery market are the world’s sixth largest retail market which accounts to 70% of the total sales. On average, Indians spend 31% of their total earnings on food and grocery. Whereas the food expenditure by US consumers is only 9% while in Brazil and China, the expenditure on food is 17% and 25% respectively. So

- **Change in consumer taste and preference**

Across the world food consumption pattern is undergoing a steady and continuous change due to many factors such as globalisation, modern lifestyle, growing awareness, better health consciousness, need for convenience and so on. In India, this change is supported by increasing per capita income, a large young population (60 percent below 35 years of age), increase in number of working women, deeper retail penetration, and a growing number of nuclear families.

- **Growth in food exports**

Demand for Indian processed food in the international market is rising over the years. With India’s increased integration with the global economy and proximity to important foreign markets India’s food processing industry is observing better export potential. This can be observed in the following figure.



Source: DGCI&S, Kolkata

India has a distinct competitive advantage over its peers in agricultural production. India’s competitive advantage lies in its favourable climate, large agriculture sector and livestock base, long coastline and inland water resources. India also has an edge in cost of production compared to its competitors in the world. The following snapshot explains India’s global ranking in agricultural production.

Food processing can be undertaken in various areas such as agriculture, horticulture, plantation, animal husbandry and marine products. It also comprises other industries as well who manufacture edible products from the agricultural ingredients. The following segments have been specified by the Ministry of Food Processing, Government of India within the food processing industry.

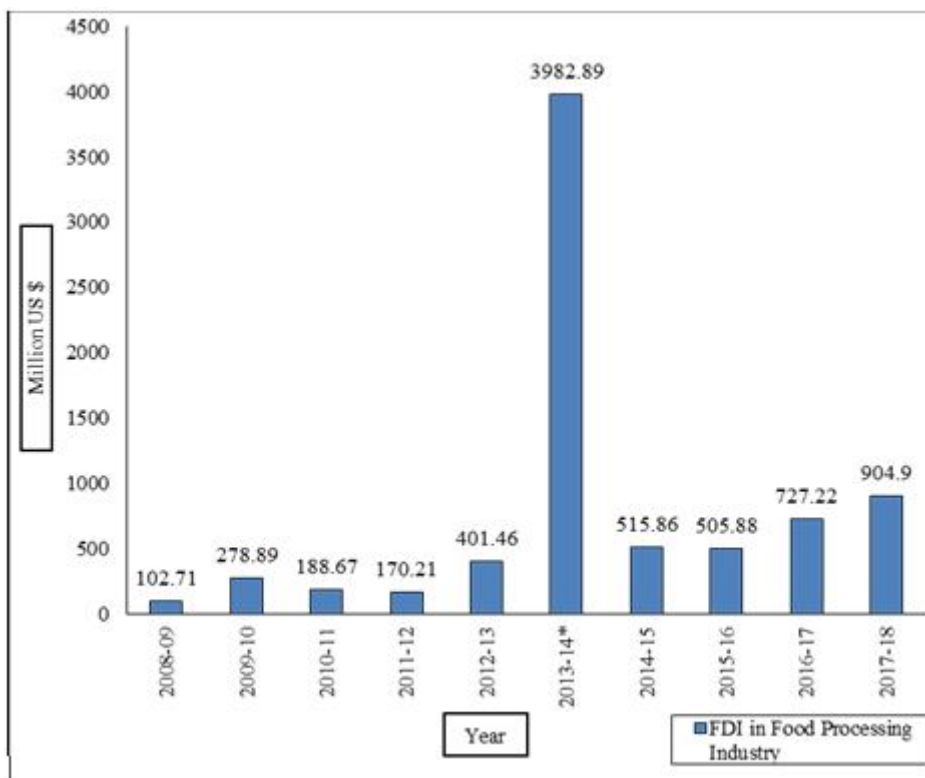
6.4 Government support for Food Processing Industry

In order to boost the food processing sector, the government has extended full support by formulating several schemes. These schemes intend to provide financial assistance for setting up new units in food processing industry. Also, the schemes are designed to provide infrastructural development, support for research and development and other promotional measures to encourage the growth of the processed food sector. Some of the major initiatives undertaken by the Government of India for the improvement in the food processing sector are as follows:

1. 100% FDI:

The Government of India has relaxed FDI norms for the food processing sector. FDI is allowed up to 100% through automatic route. Also, 100% FDI is allowed through approval route for trading of food products manufactured in India. FDI in food processing sector in India during 2008-09 till 2017-18 is shown in the following figure:

FDI in Indian Food Processing Industry



Source: Ministry of Food Processing Industries

Note: *2013-14 Highest FDI inflow – Investments by PepsiCo and Coca-Cola

Food Processing Minister Harsimrat Kaur Badal Stated that FDI in the food processing sector has already touched the USD 1-billion mark so far. This is a tip of the iceberg. India needs to go a long way. FDI in Indian food processing sector will rise further.

2. Pradhan Mantri Kisan SAMPADA Yojana

Government of India has approved a new scheme called ‘Pradhan Mantri Kisan SAMPADA Yojana’. The scheme is for processing of agro-marine products. It also aims at the development of agro-processing clusters with an allocation of ₹ 6,000 crore for the period 2016-20. It is a complete package which will result in creation

of modern infrastructure with efficient supply chain management from farm to market. It will provide a big boost to the growth of Indian food processing sector. It will also help Indian farmers by doubling their income, creating a huge employment opportunities in the rural areas, reducing wastage of agricultural produce, increasing the processing level and enhancing the export of the processed foods.

3. Mega Food Park:

The Scheme of Mega Food Park a mechanism to link agricultural production to the market. It will provide a common platform for the farmers, processors and retailers. The important objectives of the scheme are to maximize value addition, to minimize wastage, to increase farmers' income and creating employment opportunities particularly in rural sector.

So far twelve Mega Food Parks, namely, Patanjali Food and Herbal Park, Haridwar, Srinu Food Park, Chittoor, North East Mega Food Park, Nalbari, International Mega Food Park, Fazilka, Integrated Food Park, Tumkur, Jharkhand Mega Food Park, Ranchi, Indus Mega Food Park, Khargoan, Jangipur Bengal Mega Food Park, Murshidabad and MITS Mega Food Park Pvt Ltd, Rayagada, Satara Mega Food Park, Satara, Himalayan Food Park Pvt.Ltd., Udham Singh Nagar, Greentech Mega Food Park Pvt. Ltd., Ajmer are functional.

4. Creation/ Expansion of Food Processing/ Preservation Capacities (Unit Scheme):

The main objective of this scheme is to create additional processing and preservation capacities. It also aims at modernizing and expanding the existing food processing units with a view to increase the level of processing. This additional value addition will lead to reduction in wastage of farm products.

5. Cold Chain

The main objective of the Scheme is to provide integrated cold chain facility. It also aims at preservation of continuous infrastructure facilities. It covers creation of infrastructure facility along with the entire supply chain viz. pre-cooling, weighing, sorting, grading, waxing facilities at farm level. The scheme allows flexibility in project planning with special emphasis on creation of cold chain infrastructure at farm level.

6. Agro Processing Cluster

The scheme aims at development of modern infrastructure and common facilities to encourage group of entrepreneurs to set up food processing units based on cluster approach. The scheme facilitates linking of farmers groups to the processors and markets through well-equipped supply chain with modern infrastructure. Each agro processing clusters under the scheme have two basic components i.e. basic enabling infrastructure like roads, water supply, power supply, drainage, ETP etc. and Common facilities like warehouses, cold storages, IQF, tetra pack, sorting, grading etc. The scheme needs at least 5 food processing units with a minimum investment of ₹ 25 crore.

7. Scheme for Creation of Backward and Forward Linkages

The objective of the scheme is to provide effective and seamless backward and forward integration for processed food industry. It tries to plug gaps between supply chain in terms of availability of raw material and linkages with the market. Under the scheme, financial assistance is provided for setting up of primary processing centers and collection centers at farm gate and modern retail outlets at the front end along with connectivity through insulated and refrigerated transport.

8. Food Safety and Quality Assurance Infrastructure

Quality and Food Safety have become competitive edge in the global market for food products. For the overall development of Indian food processing sector, various quality assurance aspects should be functional in a horizontal fashion. Apart from this, in the interest of consumer safety and public health, there is a need to ensure that the quality food products manufactured and sold in the market meet the stringent parameters prescribed by the food safety regulator. Keeping in view the aforesaid objectives, government has been extending financial assistance under the scheme for setting up and up-gradation of Food Testing Laboratories as well as Quality Management Systems.

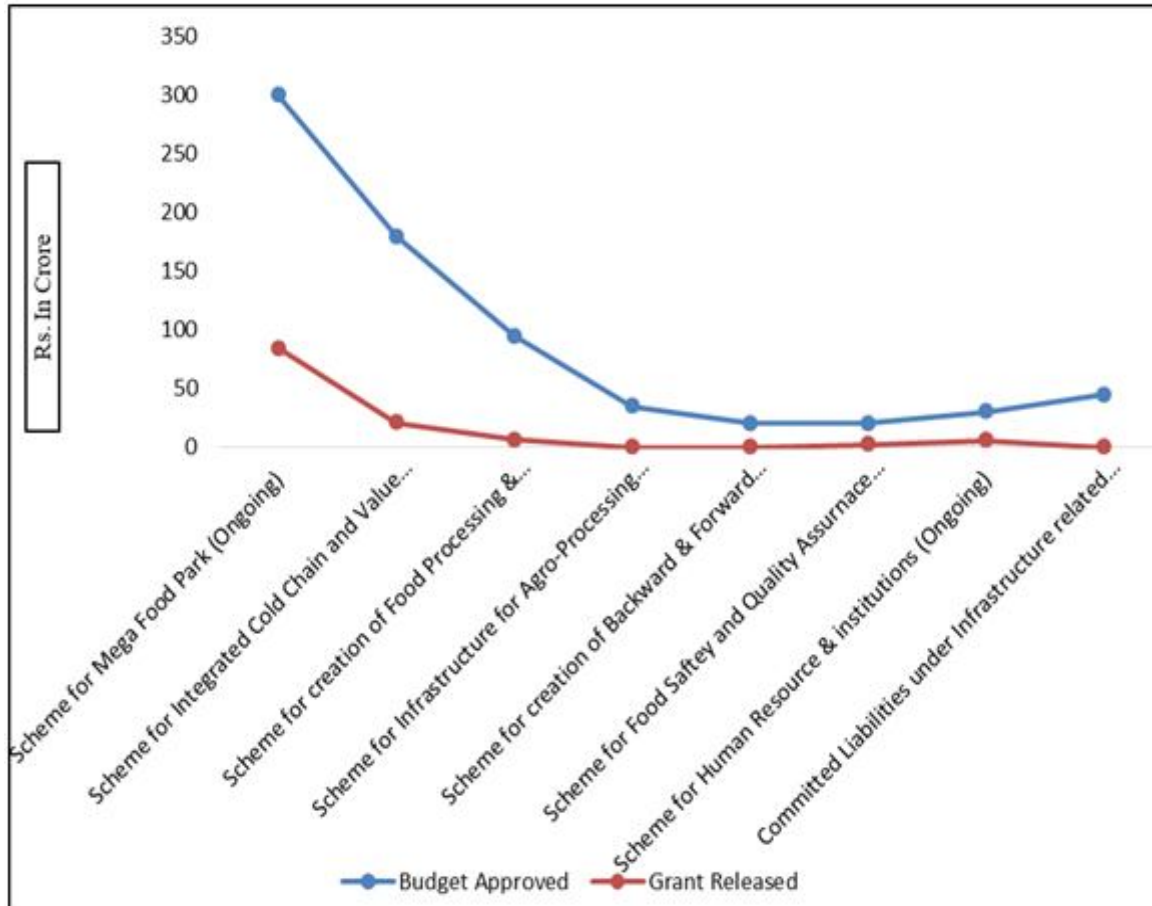
9. Skill Development Programmes

To provide sector specific skilled workforce in the various segments of food processing industries and to contribute towards achieving the projected skilled human resources requirement as envisaged by National Skill Development Corporation (NSDC) in food processing sector i.e. 17.8 million persons by the year 2022, the government undertakes various Skill Development Programmes. A number of initiatives have been taken by GOI to address the skill gap in the food processing sector. The Ministry of Food Processing Industries is working in close collaboration with other related agencies to augment skilled manpower in the food processing sector.

10. Subsidized income tax and custom duty rates

Under 'Make in India' vision, Government has reduced rates of custom duty on inputs and raw materials used for food processing. This reduces the overall cost of production of the processed food. Also, the government has offered rebate in income tax for food processing units.

Budget Approved and Funds Released for Food Processing Sector under various Schemes in India



Source: Lok Sabha Unstarred Question No. 3603, dated 08/08/2017

Note: *2013-14 Highest FDI inflow – Investments by PepsiCo and Coca-Cola

7. CONCLUSION

From the discussion above it can be concluded that Indian food processing industry is growing at a faster pace. This industry will be a sunrise industry in terms of its contribution to Indian economy. Tremendous employment opportunities are possible to tap in this sector.

BIBLIOGRAPHY

BOOKS

1. Borse, M. (n.d.). *Handbook of Research methodology*. Jaipur: Srinivas Publication.
2. Cauvery, R., Nayak, Sudha, U., Girija, M., & Meenakshi, R. (2010). *Research Methodology: For Students of Social Sciences*. New Delhi: S Chand and Company.
3. Naika, G. P. (2017). *Sevnty Years of Industrial policy and Promotion in India*. New Delhi: New Century Publications.

RESEARCH PAPERS

1. Abraham, B. (2007). Changing Trend of Household Food Consumption : A Case Study of Cochi, Kerala. *Scientific Management And Advanced Research Trust (SMART)*, 3(1), 8-12.
2. Agarwal, A. (2008). Dissecting the Food Consumption Pattern of Households in India, *Economic Research*, 23: 1-7.
3. Ahmad, N.; Sheikh, M. R. and Saeed, K. (2015). Rural Urban Food Consumption Analysis in Pakistan: Expenditure Elasticities Approach. *Pakistan Journal of Commerce and Social Sciences*, 9 (1): 159-170.

REPORTS

1. FICCI. (2010). *Bottlenecks In Indian Food Processing Industry – Survey 2010*. Retrieved July 23, 2018, from https://smallb.sidbi.in/sites/default/files/knowledge_base/reports/FICCIBottlenecksintheFoodProcessingIndustry.pdf
2. Corporate Catalyst India. (n.d.). *Indian Food Processing Industry*. Retrieved April 10, 2018, from https://smallb.sidbi.in/sites/default/files/knowledge_base/reports/AreportonIndianFoodProcessingIndustry.pdf
3. KPMG. (2009). *CONSUMER MARKETS Food processing and Agri business*. Retrieved March 05, 2018, from https://smallb.sidbi.in/sites/default/files/knowledge_base/reports/FoodProcessingandAgribusinessAssocham_opt.pdf

WEB RESOURCES

1. <http://badgerherald.com/artsetc/2008/01/30/untold-history-of-in/>
2. <http://ficci.in/spdocument/22941/Startup-Report.pdf>
3. <http://futureconsumer.in/our-business.aspx>
4. http://icpe.in/icpefoodnpackaging/pdfs/13_readytoeat.pdf
5. http://m.oecdobserver.org/news/fullstory.php/aid/3681/An_emerging_middle_class.html
6. <http://www.businessdictionary.com/definition/food.html>

REFERENCES

1. ibef. (2017 June). *Report on Food Processing*. Retrieved October 3, 2018 from ibef: <https://www.ibef.org/download/Food-Processing-June-2017.pdf>
2. IBEF. (2017, June). *Indian Food Processing*. Retrieved February 01, 2019, from IBEF: <https://www.ibef.org/industry/indian-food-industry.aspx>
3. The World Bank. (2017). *GDP Annual Growth Tate*. Retrieved February 01, 2019, from worldbank: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=IN>
4. MOFPI. (n.d.). *Statement on Financial Year Wise Fdi Equity Inflows* . Retrieved August 14, 2018, from mofpi: http://mofpi.nic.in/sites/default/files/fdi_2_0.pdf
5. IBEF. (2018, September 26). *FDI in food processing touches USD 1-bn mark this year: Badal*. Retrieved Novemebr 10, 2018, from ibef: <https://www.ibef.org/news/fdi-in-food-processing-touches-usd-1bn-mark-this-year-badal>
6. Indiastat. (2017, July 31). *Budgets Approved & Funds Released*. Retrieved on February 01, 2019, from Indiastat: Retrieved February 01, 2019, from <https://www.indiastat.com/table/industries-data/18/financial-budget-for-agro-based-food-processing-industries-1990-2018/449564/1097773/data.aspx>

CHANGING DYNAMICS OF RETAILING IN INDIA**Paulomi A. Merchant**Associate Professor, Department of Accountancy, Bhavan's Hazarimal Somani College, Chowpatty, Mumbai

1. INTRODUCTION

The retail industry always evokes a special interest because its potential market is virtually every member of the human population, be it in India or the world over. However, this also makes its task most challenging as it has to cater to the widest and most diverse spectrum of consumers from young to old, rich to poor, tech – savvy to tech-illiterate, gender – specific or unisex and overriding caste, creed or religion.

In today's extremely competitive retail market, the old adage "Necessity is the mother of invention" is being manifested at all levels in the retail chain. Not only has wooing the customer become the need of the hour, but calling him back again and again has become the toughest challenge facing the retail industry. To complicate matters even further, not only do sellers have to compete with each other, but they also have to juggle between the online & offline channels. In simple words, to make their pockets jingle, the retailers of today need to be ever so nimble!

2. OBJECTIVES OF THE STUDY

- 1 To take an overview of the Indian retail industry.
- 2 To provide an insight into current trends of retailing.

3. REVIEW OF LITERATURE

Chattopadhyay Pritam and Jain Ruchi (2017), in their research paper, "Recent stipulation of organized retailing in India: a literature review" made a comprehensive study on different literature available on organized retailing in India. The research paper provides insight on the origin of organized retailing in different context and the way it has been interpreted and pronounced by different authors in different era. The paper is classified into four parts: the first part takes care of current issues in the retail industry. The second part provides a brief idea of global retail industry. The third part deals with the difficulties faced by the retail industry and the fourth part conveys the challenges and future option for retailing in India. The paper is a good source to understand and comprehend the different work done on the subject.

Kanwaljeet (2015), in his research paper, "Organized retailing in India: Opportunities and challenges", provides detailed information about the growth of retailing industry in India. It also highlights the challenges faced by the industry in near future. The paper covers areas like different types of retail formats and FDI in retailing. The study concludes that retailing has a very promising future in India. The paper also suggests that retail if organized in rural sector also through rural retailing can provide an immense untapped market ready to be catered if approached rightly and in calculated and well planned manner.

Goyal B. B. (2009) in his research paper, "Organized retailing in India - an empirical study of appropriate formats and expected trends", scrutinizes the relative prominence of the various products purchased at organized retail outlets and the choice of format, the consumer has when purchasing a product. The paper also discusses the expected development of organized retailing in the future, focusing on aspects with potential effects on consumer purchasing behavior. The study marks that the retail markets in India offer tremendous potential and is growing fast. The retail boom in India brings tremendous opportunities for foreign as well as domestic players.

A study of various literatures available on retailing shows that much study is done on the current issues, challenges and prospects in retailing in India. There are many studies available in the area of Global retail industry also. Retailing being a sunrise industry is constantly under research and the available literature provides comprehensive information on it. However, the dynamics of retailing and its ever growing expanse demands consistent research and that too on a current note. The present paper is an attempt in the said direction.

4. RESEARCH METHODOLOGY

The study is purely based on secondary data. The data has been collected from various sources such as books, journals, newspaper and e-resources. The collected data was comprehended and then compiled to provide useful information related to the subject. The present research is a descriptive approach and hence will be able to provide narrative information to the readers.

5. FINDINGS AND DISCUSSIONS**5.1 Overview of Retail Industry in India**

What has brought about an intense need of luring the retail customer?

On the demand front, the combined influence of rising disposable incomes, a large and growing middle class, increase in urbanisation & education, increased aspirations of the new generation customers, and economic growth of the country have led to a robust growth of the retail industry.

On the supply side, ease in obtaining credit, favourable government policies including FDI in retail, rapid development and use of technology in both production and distribution, has made available a wider range of quality products at affordable prices. The purchase function for the common man has now transformed from that of a routine and ordinary one, to a pleasant shopping experience!

All this has catapulted the retail industry into a higher trajectory and an elevated status. India is already the fifth largest retail market in the world & the retail industry contributed over 10% to its GDP. Besides, it provides employment to over 8% of its workforce.

From a market size of US 600 billion in 2015, the retail industry grew to USD 950 billion in 2018 and by 2020, retail sales are expected to well cross the trillion US dollar mark. This industry has been riding on a compounded annual growth rate of nearly 8% over the last few years. Further, India today boasts of nearly 15 million outlets and has amongst the highest per capita shops in the world.

The rapid advances in the field of telecommunication in the last two decades has revolutionised the way the modern retailer functions today. The use of internet, social media and smartphones has brought about this transformation and it is now being further used to introduce innovations in the following areas to capture the untapped potential in the Indian retail market:

- (1) Food and grocery, i.e staples, constitutes almost two- third of the retail market, whereas apparel & jewellery constitute less than 10% each. This leaves huge scope for promotion of lifestyle & luxury products.
- (2) Although exponential growth has taken place in e-commerce, online sales still continue to be a small percentage of total sales. Smartphone penetration in India is still less than one-fourth, whereas it is more than 50% in China and nearly 70% in U.S. and U.K. Computer literacy and affordable smartphones are spreading far and wide into Tier II and Tier III cities, offering possibilities of greatly widening the e-commerce base.
- (3) The unorganised sector which was forming more than 90% of the retail market is gradually coming into the mainstream sector due to ease in obtaining credit, ease in doing business, affordable technology, awareness of labour rights and benefits of organised sector.

5.2 Innovations in Retail Industry

Although most of the innovations are being pioneered in the Western countries and China, but, due to globalisation, which has led to the presence of multinational companies in India and FDI in retail, the Indian consumer is now reaping the benefits of these new trends.

The following are some of the recently introduced innovations in the retail industry

1. Shopping with AR and VR

Virtual Reality (VR) is now the new buzz word in big retail brands. Through the use of this technology, customers can get to view the products in 3D mode, as in a life-like shopping experience. With Augmented Reality (AR), customers can have a simulated experience of how products would appear in different backgrounds under different parameters. For example, customers can see how the furniture would look when placed into their specific home surroundings, before making the final choice.

2. Personalisation

Retailers are now in the mode of providing customization or personalization of their products to satisfy the status-conscious customers. Both on-line and off-line stores are enabling customers to modify products to suit their needs and tastes. This makes the product exclusive in terms of colour, embroidery, name or phrase or other features embedded into the product. This satiates the customers' need of being and owning something unique and outstanding.

3. Visual Search

Artificial Intelligence (AI) allows a potential customer to click a photo of a product she wants to buy and this technology then searches for the same or similar products across multiple sites allowing the customer to then select or buy what suits her needs. This makes her work both quick and convenient.

4. Omnichannel

Although e-commerce is clocking in a galloping growth, data shows that consumers still enjoy the physical experience of shopping. The generation of today therefore uses the online modes to do its search and survey and then the purchase is culminated in the brick and mortar stores.

5. Same –Day delivery

With better logistics and high volumes lowering costs, larger retailers are offering same day delivery at no extra cost for the online shoppers who do not have time to go to the physical stores even for their immediate needs. This is proving to be a major boon to the working women of today who are struggling between spending their time on jobs and with their families.

6. Social media

The young and earning generation of today is greatly influenced by posts and ‘ likes’ on social media platforms such as Facebook and Instagram. Modern retailers are greatly leveraging this channel to lure customers using this social shopping mode.

7. Eco-friendly products

The customer of today is very much conscious of the need for environment –friendly products. They are more keen to buy such products even at a higher price. Retailers are therefore getting manufacturers to produce such products and while advertising, retailers are highlighting such eco-friendly features of the product. Even the packaging is being made recyclable and it is prominently being displayed on the product.

8. Chatbots

A Chatbot is a computer program which is designed to talk to users. By using Artificial Intelligence, these chatbots can help customers find their desired products, assist or recommend products according to the customer’s individual needs.

9. Newer Payment Methods

Digital wallets such as PayTm, BHIM App, Google Pay, Apple Pay, PayPal, etc. eliminates the inconvenience of even carrying debit or credit cards whenever consumers need to make a purchase. These new modes enable payments through electronic transactions in a safe secure way. In physical stores, these can often enable a frictionless checkout experience.

10. Artificial Intelligence and Machine Learning

Retailers are making use of the above in a very big way to study consumer behaviour patterns and can accordingly predict their requirements. Individual customers are then prompted with respective product promotional information to lure them into making a purchase.

11. Video Content

The impact of the video mode of product display cannot be over – emphasized. Brands which use video content have greater appeal value and are more effective in engaging the customers’ attention. The conversion from prospective to actual buyer is much higher in such cases as the customer can well visualise the product and the return-rates also tend to be very low.

12. Better Customer Experience

The shopping experience has never been so pleasant for the customer. Today, even the man on the street can enjoy the comfort and convenience of shopping in a mall, and that, too, at discounted rates. Besides, shops and showrooms are well laid out, well decorated and well-stocked with all sizes, grades, colours and varieties of the product to ensure that no customer walks out empty-handed. Well trained, well groomed salespersons are employed to guide the customer through her shopping needs.

6. CONCLUSION

As we see all these innovations unfold, we are experiencing that, what was regarded as science fiction not so long ago, has now become the reality of today. Amazon and Flipkart of U.S.A. and Alibaba of China have been the major international retailers who have leveraged technology to bring in most of these innovations to the door step, or rather, to the finger tips of the customers! And just as products are jostling for shelf space, the retailers are also constantly vying with each other to get even a wafer thin slice of this huge retail pie. Hence, it is inevitable for today’s retailers to keep working out innovative ways of attracting their customers and keep satisfying their rapidly changing tastes & preferences which are fuelled by the technology embracing generation of today.

7. REFERENCES

- Akhter Shahid, Equbal Iftekhhar –“Organized Retailing in India – Challenges and Opportunities”, International Journal of Multidisciplinary Research Vol.2 Issue 1, January 2012, ISSN 2231 5780.
- Chattopadhyay Pritam and Jain Ruchi, “Recent Stipulation of Organized Retailing in India: A Literature Review”, Global Journal of Marketing Management and Research, ISSN 2250-3242 Volume 7, Number 1, 2017, pp. 5-21.
- Goyal B. B., “Organized Retailing in India- An Empirical Study of Appropriate Formats and Expected Trends”, Global Journal of Business Research, Volume 3, Number 2, 2009.
- Jhamb, D. & Kiran, R., “Emerging Trends of Organized Retailing in India: A Shared Vision of Consumers and Retailers Perspective”, Middle East Journal of Scientific Research, Volume 11, No. 4, 2012, pp 481 – 490.
- Kanwaljeet, “Organised Retailing in India: Opportunities and Challenges”, IRACST – International Journal of Commerce, Business and Management (IJCBM), ISSN: 2319–2828 Vol. 4, No.2, April 2015.
- Kumar Pawan – “Organized retail sector: future, challenges and opportunities in India”, International Journal of Computing and Business Research (IJCBR) ISSN (Online): 2229□6166Volume 4 Issue 1 January 2013.
- www.google.com
- www.indianmirror.com
- www.forbes.com
- www.marketing-interactive.com
- www.cpcstrategy.com
- www.misdev.com

RAILWAY TRANSPORT SYSTEM IN MARATHWADA REGION OF MAHARASHTRA

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ABSTRACT

Transport refers to moving of people and products between or across places. Transportation system ensures, fast, speedy, safe, cost competitive, convenience, flexibility towards movement of people and products and services. Transport network plays a very important role in reducing disparities and bringing about a balanced and integrated development. A good transport network provides connectivity and accessibility to remote areas. Transport development helps to open - up remote regions and resources for production, it also helps in the better and fuller utilization of resources. Industrial development plays a very important role in the economic development of the country. Hence, an increase in the efficiency and sufficiency of transport is an essential element for industrial growth.

In this paper an attempt has been made to study the railway network in Marathwada Region and suggest measures for betterment of the system.

1. INTRODUCTION

Transportation is the means to carry people and goods from one place to another. This has become very important in each stage of human civilization. If the present means of transportation were not developed, situation of the world would be totally different. Transportation has contributed much to the development of economic, social, political and cultural fields and uplifting their condition. Speedy industrialization is impossible without development of transportation. It is unavoidably necessary to promote transport system for the proper development of agricultural sector and rural areas. Without development of transportation neither mass production nor distribution is possible.

Rail Transport play an integrating role as people move across the country for sight -seeing, business, education and pilgrimage and bring together peoples of far flung areas. Indian Railways have been a great integrating force during the last hundred years. It is bound by the economic life of the country and helped in accelerating the development of the industry and agriculture. But the developments that have taken place so far are not up to the mark. In a developing country like India, with the rapid increase in intensity of traffic and pollution growth of railway network become very necessary. Indian Railway has grown its vast network throughout the country, but for a long period of time Marathwada region in Maharashtra was not considered as either strategically or economically important. There is a huge imbalance in development of railway network in this region. The Demand for passenger transport is growing due to population and improved economy. Travel need now – a – days is equally important like food, shelter and clothing.

2. OBJECTIVES OF THE STUDY

The Objectives of the study are as follows:

1. To study the development of Railways in the Maharashtra state.
2. To examine the development of railway transport in Marathwada Region through parameters such as:
 - a. District – wise Railway Route Length
 - b. Major Railway Routes in the region.
 - c. Density of Railway kilometerage per hundred square km.

3. REVIEW OF LITERATURE

Mathur, J. S. and Agarwal, S. P. in their book 'Surface Transport in India' (1999) states that there is a direct and intimate link between the availability of transport facilities and the ability of human being to create good environment in any country. The availability of adequate transport facilities has contributed to the development of a nation in all fields. The concentration of population in urban areas and the migration of people from rural areas have created many socio - economic problems.

Raza, M. and Aggarwal, Y. states that the analysis of transport network has indicated the concentration of flows towards large metropolitan centres. Such an analysis of the Indian railway network indicates the concentration of well-connected centres in a few pockets of the Indian space economy which are usually

associated with large metropolitan and city centres in shaping the regional pattern of network efficiently also becomes apparent.

4. RESEARCH METHODOLOGY:

1. Area selected: The present study is confined to Marathwada Region of Maharashtra.
2. Study period: The study is stretched over a period of five years i. e. from 2009 -10 to 2012 – 13.
3. Data Sources: The present study is based on secondary sources. The secondary data was collected from books, journals, newspapers and annual government reports of Government of Maharashtra.
4. Analysis of Data: The collected data is compiled and analysed for the purpose of the study.

5. OVERVIEW OF ROAD TRANSPORT IN MAHARASHTRA

The first short stretch of railway line in India, Bomabay (now Mumbai) to Thane, began operation in 1853. By 1900 the route miles exceeded 23,000, which represented the world’s fourth largest railway system at the time. Today, India has the world’s largest railway system under single management. The railways have been of enormous consequence in the making of modern India. However, surprisingly, the railway routes are not spread over in equal proportion in the entire country.

The development of railway routes in Maharashtra state during last three decades i.e. from 2009 - 2010 & 2012 - 2013 is shown in Table 1.

Table-5.1: Railway Gauge and Route Length in Maharashtra State (2010 – 2013)

Sr. No.	Year	Gauge Route Length			Total Rail Route Length
		Broad Gauge	Meter Gauge	Narrow Gauge	
1.	2009 – 2010	5,229.95	105.75	596.29	5,931.99
2.	2010 - 2011	5,376.29	105.75	459.10	5,941.14
3.	2011 - 2012	5,510.22	105.75	458.81	6,074.78
4.	2012 - 2013	5,661.02	105.75	458.81	6,225.58

N.B.: All figures are in Kilometers.

Source: 1. Infrastructure Statistics of Maharashtra 2009 – 2010 & 2010 -2011, Table 1.20, pp 31.

2. Infrastructure Statistics of Maharashtra 2011 -2012 & 2012 - 13, Table 1.20, pp 39.

As shown in Table 1, there is increasing trend in railway route length in the state over a period of time. In the year 2009 - 2010, the rail route length was 5,931.99 kms. the same has increased up to 6,225.58 kms. till 2012 - 13. It shows that during this period, 293.59 kms. of new rail routes were constructed in the state. The most remarkable fact is the Table 1 also shows that there is a continuous increase in the rail routes of Broad Gauge and on the other side Meter Gauge is showing a declining trend. On the other side, Narrow Gauge railway network has shown the steady picture. It indicates that the railway authorities are now adopting modernization policy, due to which efficiency of railways will increase.

DEVELOPMENT OF RAILWAY TRANSPORT IN MARATHWADA REGION

The details of railway route length in Marathwada Region for the period of 2010 – 2013 are given in Table 2:

Table-5.2: District-wise Railway Routes in Marathwada Region 2010 to 2013

Sr. No.	District	Railway Route in kms.			
		2009 – 2010	2010 - 2011	2011 – 2012	2012 – 2013
1.	Aurangabad	107.25	107.25	107.25	107.25
2.	Jalna	88.25	88.25	88.25	88.25
3.	Parbhani	262.43	262.43	262.43	262.43
4.	Hingoli	0.00	0.00	0.00	0.00
5.	Beed	47.07	47.07	47.07	47.07
6.	Nanded	225.61	225.61	225.61	225.61
7.	Osmanabad	59.94	59.94	53.60	53.60
8.	Latur	156.64	156.64	139.30	139.30
Total		947.19	947.19	924.14	924.14

Source: 1. Infrastructure Statistics of Maharashtra 2009 – 2010 & 2010 -2011, Table 1.20, pp 31.

2. Infrastructure Statistics of Maharashtra 2011 -2012 & 2012 - 13, Table 1.20.

As shown in Table 2, the total rail route length in Marathwada region in 2009 -10 and in 2010 – 11 was 947.19 kms. Whereas, the rail route length in the years 2011 – 12 was 924.14 kms. It indicates that during this period, there is no growth in the railway route length in the region. In the region, districts like Parbhani, Nanded, Latur and Aurangabad shows a satisfactory length of railway routes. But, mere length of routes is not a single parameter on which, the efficiency of transport can be measured. These railway routes does not cover all the tehsils of respective districts. Thus, fails to provide efficient transport network to the people in these region. Moreover, districts like Jalna, Osmanabad and Beed are poorly connected with railway. Whereas, Hingoli district is not connected by railway routes.

MAJOR RAILWAY ROUTES IN THE MARATHWADA REGION

The rail routes in Marathwada Region are maintained by the Central Railway and South Central Railway. The larger area of railway routes in Marathwada region is lying under South Central Railway whereas, Central railway has limited coverage of railway route length in the region. All routes in this region are of Broad Gauge. Meter Gauge and Narrow Gauge rail routes are absent in the region.

South Central Railway operates its operations in this region through Nanded Division It covers districts of Nanded, Parbhani, Jalna, Beed and Aurangabad. This network connects Marathwada region of Maharashtra with other regions of a State, namely; North Maharashtra and Vidarbha as well as Telangana state. The railway routes maintained by South Central Railway are as follows:

- Parbhani Junction – Parli Vaijanath
- Nanded – Parbhani – Jalna - Aurangabad - Rotegaon (Towards Manmad)
- Nanded – Kinwat - Ambari (Towards Telamgana State)

The Central Railway operates in this region through Solapur Division and it covers the districts of Latur, Osmanabad and Solapur. There is only one line maintained by Central Railway in this region, which is:

- Latur – Kurduwadi

This railway route was earlier of Narrow Gauge, but in 2007, same has been converted into Meter Gauge.

Density of Railway kilometerage per hundread suare km.

Table No.3 shows the district - wise density of railway per 100 square km of geographical area.

Table-5.3: District - wise Density of Railway per 100 square km of Geographical Area for the Year 2012 – 2013 in Marathwada Region

Sr. No.	District	Railway Kilometerage per hundred sq. km. of Geographical Area
1.	Aurangabad	1.06
2.	Jalna	1.14
3.	Parbhani	4.22
4.	Hingoli	0.00
5.	Beed	0.45
6.	Nanded	2.14
7.	Osmanabad	0.71
8.	Latur	1.95
Total		1.43

Source: Infrastructre Statistics of Maharashtra 2011– 12 & 2012 – 13, Table 1.21, pp. 40.

As shown in Table 3, Parbhani district has a 4.22 kms. of railway routes for per hundred square km. of geographical area. Nanded and Latur districts have a railway network of 2.14 kms. per hundred square kms. Whereas, rest of the districts have lower density of railway network as compared to the Marathwada region. The entire Marathwada region has a railway network of 1.43 kms. for per hundred square kms of geographical area. Which is very low.

6. CONCLUSION

Railway transport is vital to the economic development and social integration of the country. Rail transport fulfils a major role in the Indian economy involving a wide range of industries and services. The vast country like India needs to be well-developed transport network not only to urban centres or big cities but it should to down to rural India for its fast development in all sphere. The present study has examined the rail transport in

Maharashtra region of Maharashtra. The analysis of the rail transport sector explains that the rail transport facilities in Marathwada region leave much to be desired. Railway transport has an important role in the economy, as it provides access to local resources, facilitates trade, encourages inter-regional contracts and migration. This region in the State needs attention on a priority basis for laying new railway lines. Inadequate attention to this region will no longer be beneficial for the State.

REFERENCES

1. Mathur, J. S. & Agarwal, S. P., (1999) *Surface Transport in India*, Printwell Publication, Delhi.
2. Raza, M. and Aggarwal, Y. (1986). *Transport Geography of India: Commodity Flows and the Regional Structure of the Indian Economy*, Concept Publishing Company, Delhi.
3. Vaidya, B. C. (2009). *Geography of Transport Development in India*. Concept Publishing Company, New Delhi.
4. Misra, R. N. (2008). *Surface Transport for Rural Development*. Discovery Publishing House, Delhi.

PROBLEMS AND PROSPECTS OF BLOCKCHAIN TECHNOLOGY: A GAME CHANGER INNOVATION**CMA Rashmi Agnihotri**Head of the Department of Commerce, V. P. M's Joshi Bedekar College, Thane

ABSTRACT

Blockchain technology has offered open source based opportunities for developing new type of digital platform and services. For last few years it has been able to provide digital platform for multiple burst of creativity and innovation not seen since the advent of the Internet. With digitisation and decentralisation, it has the capacity to disrupt almost all sectors of the economy, but greatest impact is expected to be on financial sector. While initially popularized by Bitcoin, Blockchain is much more than a foundation for crypto currency. It offers a secure way to exchange any kind of good, service, or transaction, but increasing regulation, cybercrime and fraud are inhibiting its expansion. Although, research on this topic is still emerging, it is predominantly on technical and legal issues. Therefore, this research paper tries to understand the upcoming issues, challenges and future prospects of implementing blockchain technology as it is essential to address the need and risks of this technology to understand its full potential.

Keywords: blockchain, digitisation, decentralisation, disruption

INTRODUCTION

Technology often creates disruptions. One of such technological innovation is in the form of blockchain technology. Originally devised for the digital currency, blockchain is now useful for various other purposes. It allows individuals and communities to redesign their interactions in business, politics and society at large with disintermediation on large scale based on automated and trust less transactions. This process will bring about a drastic change in present methods of transactions and governance. With this in mind it is interesting to know about blockchain technology's brief background and aspirations.

BACKGROUND AND ASPIRATIONS

Ideation and the first use of this technology can be traced back during global financial crisis of 2008. In his article Bernard Marr wrote that when "When Satoshi Nakamoto, whose true identity is still unknown, released the whitepaper Bitcoin: A Peer to Peer Electronic Cash System in 2008 that described a "purely peer-to-peer version of electronic cash" known as Bitcoin, blockchain technology made its public debut. Blockchain, the technology that runs Bitcoin, has developed over the last decade into one of today's biggest ground-breaking technologies with potential to impact every industry from financial to manufacturing to educational institutions." Thus, it is characterised by distributed ledger technology where distributed transaction databases are secured by cryptography on one side and are governed by a consensus mechanism on the other. In blockchain technology the record of digital events are kept. However, it is not "just a record," since it also consists of so called smart contracts, which are programmed stored on blockchain. (Buterin 2014). Nowadays, blockchain is commonly considered for cryptocurrencies such as Bitcoin, but it will most likely become an even more valuable enabler of economic and social transactions, such as for the purpose of keeping digital records of asset ownership (Lindman et al. 2017). For most optimistic people, the blockchain can act as a more efficient, decentralized and consensus-driven public repository, which can have a number of applications in order to make citizens less dependent on governments. They are generally inclined to consider the government as an illegitimate and unnecessary depository of power. Thus, blockchain technology has enormous scope and huge potential to develop, however, for the purpose of this study following objectives have been considered.

OBJECTIVES OF THE STUDY

1. To understand the basics of blockchain technology
2. To study the major problems of implementing blockchain technology

RESEARCH METHODOLOGY

The study is based on secondary data analysis. In detail research has been carried out from available literature on this technology. Intension is to analyse various issues related to it. Research articles, papers and news available on the topic has been referred and analysed for the purpose of this study.

MEANING

A blockchain is a kind of distributed databases where data is recorded and stored in blocks. Here, data is stored in various participating nodes. Blockchain is enumerated list of records containing information. The individual

enumerated records are called blocks and are chained together using a cryptographic hash that is linked to previous block. All these blocks together are called distributed ledger. Data stored here is immutable which means it cannot be altered without affecting other blocks. Since it is distributed ledger, it does not involve third party to complete the transaction. It facilitates peer – to – peer transactions. The distributed ledger can contain financial or non-financial data which can be replicated across network using cryptography. There are a lot of confusion arising over bitcoin and blockchain. Bitcoin is a type unregulated digital currency called as cryptocurrency whereas, blockchain is a distributed ledger technology that enables and maintained bitcoin transactions over peer – to- peer network without central authority. Thus, a distributed ledger is a database of assets or transactions that can be shared across various nodes in network. Each transaction is recorded as block. Each block has a ‘header’ which contains technical information, reference to previous block, a digital fingerprint (hash) of the data contained in the block and the information of the transaction. Every time a participant of the network adds a transaction a new block is created. Each new block has encrypted copy of the previous blocks included within. Blocks are linked using cryptographic signatures to create a ‘chain’ of transactions which are time- stamped, distributed and temper-proof. Every participant of the network owns the same copy of the ledger which gets updated whenever transaction is added. It uses cryptography and digital signature (time stamped) to prove identity, authenticity enforcing access rights. Thus, it creates an incorruptible ledger of information. To simplify, it can be explained with the help of following chart:

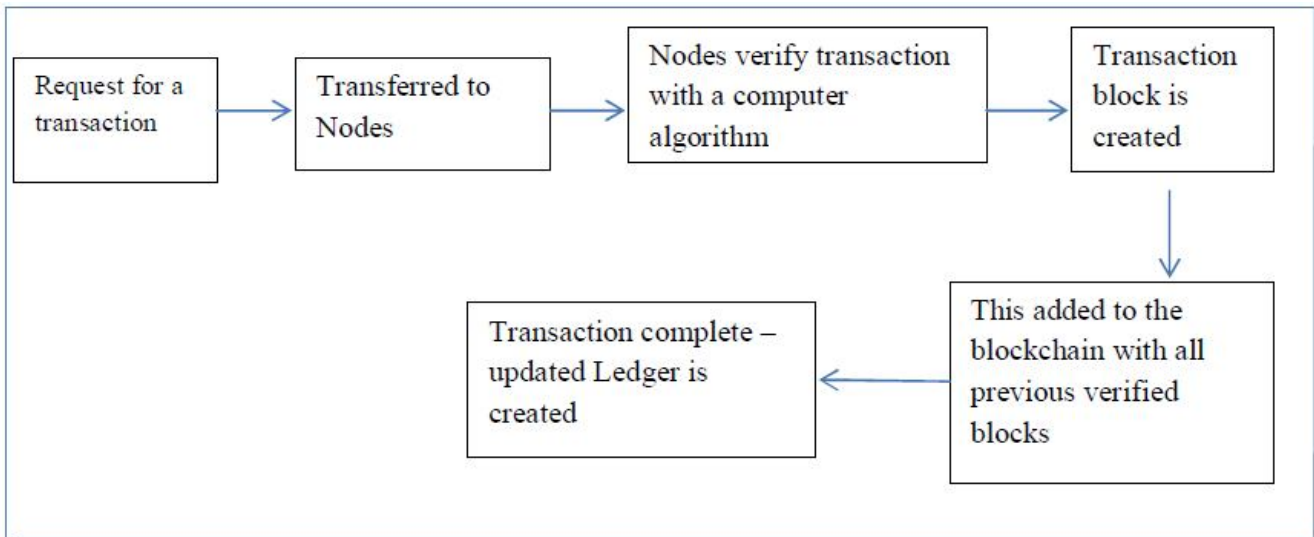


Figure-1: Chart explaining the process of basic blockchain transaction

Thus, as compared to our standard conventional method where centralised system of ledger is practiced, blockchain uses decentralised form. It can be conveniently explained with the help of following chart:

Standard	MODEL	Blockchain
Trusted third-party / central coordinator	Paradigm	Trustless system / pseudonymous participants
Centralized server / many clients	Architecture	Peer-to-peer network
Single copy	Database	Multiple copies
Controlled access / firewalls	Security	Cryptography
Intermediation	Price / Cost	Consensus / proof-of-work
PRIVATE		PUBLIC

Figure-2: Comparison of standard and distributed ledger

PROBLEMS OF BLOCKCHAIN TECHNOLOGY

In practical world, blockchain technology suffers from lots of issues and challenges. Blockchain is mostly considered as a innovative technology which has the capacity to change the world. However, it isn't necessarily the cure-all panacea for the world's problems that many evangelists would have you believe." Some of the important problems cited by experts in this field are:

1. Blockchain has environment implication and high energy cost

As these transactions are carried out using encryption to provide its security as well as establish consensus over a distributed network, it requires large amount of computing power. In order to "prove" that a user has permission to write to the chain, complex algorithms must be run, which in turn require huge computing power. For example – Bitcoin – which requires sophisticated and computationally intense security, last year it was claimed that the in order to keep its networking operational, it has used energy level of as much as energy required for 159 countries. Therefore, from environment point of view, it is essential to consider its negative impact. At the same time higher cost of operations due to higher consumption of energy cannot be underestimated.

2. Absence of regulatory framework

This is largely a problem with value-based blockchain networks. It has a very volatile environment. Due to the lack of regulatory oversight, scams and market manipulation are very common. Among the high profile cases is Onecoin– recently revealed as a Ponzi scheme which is believed to have robbed millions from investors who believed they were getting in early on what would become the "next Bitcoin". It is basically due to the fact that in recent years, legislators have largely failed to keep pace with innovators (or scammers), leading to rich pickings for those seeking to exploit the "fear of missing out" (FOMO). There is always a fear that online wallets can be hacked or government may take some actions against it and close it. This is the result of robust regulatory systems and procedures.

3. Difficulty in appreciating its benefits

Blockchain complexity is working against its benefits. Layman finds it difficult to understand its operations and use it for their benefits. Its benefits of distributed ledgers, principles of encryption, clearing payment, safe peer to peer transactions, prevention of third party intermediation etc. are difficult for common man accept in current well established eco system.

4. Slow and cumbersome process

Block chain transactions are quite time consuming as the processing takes a lot of time. The complexities of the transactions and related encryptions are few of the main causes of it. This challenge has been considered and efforts are on to overcome this problem in near future. However, now it is a big hurdle in making the blockchian popular among investing public.

5. Not in the interest of present financial system

Banks make huge amounts of profit from playing the middle-man role, and because the cost is distributed among their millions of customers, end users usually pay very little individually. They also carry huge lobbying power with governments and legislators. Therefore it's understood that they will decide it in their interests and dramatically reduce blockchain's usefulness and restrict its availability.

6. Unavoidable security flaw

There is one important security problem in many blockchain technologies. That is getting carried away with majority. This is called a '51% attack' and was highlighted by Satoshi Nakamoto when he launched bitcoin. For this reason, bitcoin mining pools are monitored closely by the community, ensuring no one unknowingly gains such network influence. A '51 percent attack' occurs when a hacker (or group of hackers) produces more than 50 percent of a blockchain's computing power. Here, they gain the network majority take control of the entire blockchain operations. The risk level increases for smaller blockchain operators who have fewer mines.

7. Blockchain Privacy issues

Public blockchain transactions face this issue. However, no one identifies the individuals but important and critical information on such a domain can create problems for financial, legal, healthcare sectors which require robust privacy norms.

8. Blockchain legal issues

In a decentralized environment where nodes exist around the planet, it is difficult to establish the correct set of rules and laws. Various countries follow different laws and approaches to various legal aspects such as titles of property, ownership, contracts laws, and arising liabilities. Therefore, it is very difficult to enforce same laws in all countries where blockchain technology is used.

9. Ethical issues

Blockchain technology raises some ethical issues due to criminal activities behind the screen. Using dark web websites, cybercriminals could sell drugs, weapons, and other banned items safely and anonymously with Bitcoin and other blockchain technology, are great challenges for the world economies. Anonymity can really be one of the factors responsible for such transactions.

CONCLUSION

Although these issues could pose significant hurdles for blockchain technology, it will evolve over the coming years. All the above issues don't have straight forward solutions but, after all, technological advancement, much like nature, has a way of finding its way around barriers. If the blockchain lives up to its promised potential, it will deliver to the digital world a new level of objectivity and trust that even known reputable trustees will not be able to match. In other words, with the evolution of new eco system, it could provide a decentralized global information infrastructure in which no one is in full control, no one has absolute power, and no one can distort or lie about past or current events.

REFERENCES

1. Collomb, A., & Sok, K. (2016). Blockchain/Distributed Ledger Technology (DLT): What Impact on the Financial Sector?. *DigiWorld Economic Journal*, (103).
2. Steve Huckle, Rituparna Bhattacharya, Martin White, Natalia Beloff Internet of Things, Blockchain and Shared Economy Applications *Procedia Computer Science*, Volume 98, 2016, pp. 461-466
3. Lindman, J., Tuunainen, V. K., & Rossi, M. (2017). Opportunities and risks of Blockchain Technologies—a research agenda.
4. Guo, Y., & Liang, C. (2016). Blockchain application and outlook in the banking industry. *Financial Innovation*, 2(1), 24.
5. Chung, M., & Kim, J. (2016). The Internet Information and Technology Research Directions based on the Fourth Industrial Revolution. *KSII Transactions on Internet & Information Systems*, 10(3).
6. Atzori, M. (2015). Blockchain technology and decentralized governance: Is the state still necessary?. Available at SSRN 2709713.
7. Beck, R., Avital, M., Rossi, M., & Thatcher, J. B. (2017). Blockchain technology in business and information systems research.
8. Ahram, T., Sargolzaei, A., Sargolzaei, S., Daniels, J., & Amaba, B. (2017, June). Blockchain technology innovations. In *2017 IEEE Technology & Engineering Management Conference (TEMSCON)* (pp. 137-141). IEEE.
9. <https://www.forbes.com/sites/bernardmarr/2018/02/16/a-very-brief-history-of-blockchain-technology-everyone-should-read/#1331a3347bc4>
10. <https://www.forbes.com/sites/bernardmarr/2018/02/19/the-5-big-problems-with-blockchain-everyone-should-be-aware-of/#144707c71670>
11. <https://www.coindesk.com/information/blockchains-issues-limitations>
12. <https://www.cnbc.com/2018/10/01/five-crucial-challenges-for-blockchain-to-overcome-deloitte.html>
13. <https://blocksdecoded.com/blockchain-issues-security-privacy-legal-regulatory-ethical/>
14. <https://techcrunch.com/2018/11/08/three-challenges-facing-blockchain-technology/>

ENDNOTES

- i. <https://www.forbes.com/sites/bernardmarr/2018/02/16/a-very-brief-history-of-blockchain-technology-everyone-should-read/#1331a3347bc4>
- ii. <https://www.forbes.com/sites/bernardmarr/2018/02/16/a-very-brief-history-of-blockchain-technology-everyone-should-read/#1331a3347bc4>
- iii. Beck, R., Avital, M., Rossi, M., & Thatcher, J. B. (2017). Blockchain technology in business and information systems research.
- iv. <https://www.forbes.com/sites/bernardmarr/2018/02/16/a-very-brief-history-of-blockchain-technology-everyone-should-read/#1331a3347bc4>

-
-
- v. Collomb, A., &Sok, K. (2016). Blockchain/Distributed Ledger Technology (DLT): What Impact on the Financial Sector?.DigiWorld Economic Journal, (103).
 - vi. <https://www.forbes.com/sites/bernardmarr/2018/02/19/the-5-big-problems-with-blockchain-everyone-should-be-aware-of/#144707c71670>
 - vii. <https://www.coindesk.com/information/blockchains-issues-limitations>
 - viii. <https://www.coindesk.com/information/blockchains-issues-limitations>
 - ix. <https://blocksdecoded.com/blockchain-issues-security-privacy-legal-regulatory-ethical/>
 - x. <https://blocksdecoded.com/blockchain-issues-security-privacy-legal-regulatory-ethical/>
 - xi. <https://blocksdecoded.com/blockchain-issues-security-privacy-legal-regulatory-ethical/>

PERCEPTION OF INTERNATIONAL TOURISTS ON INDIA AS A TOURIST DESTINATION

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ABSTRACT

The adjudge the perception of foreign tourist about India as a tourist destination is the purpose of the study. Many studies show that India is ranked highly for its rich art forms and culture heritage. Tourism industry is one of those industries which are tremendously growing larger and faster day by day. Its contribution is remarkable to increase the global GDP and employment. The performance and progress of Indian tourism industry has a very influencing impact among the service sector of India. Tourism in India contributes to various sectors like to generate an employment, creates a noteworthy source of foreign exchange for the country and it also helps to improve economic activity which has direct positive impact on the life of local and host communities. Rise in income level of citizens and their changing lifestyles, development in multiple tourism offerings, administrative support by the government are performing a significant role in mounding the tourism sector in India. The Indian tourism consists of many different tourism such as rural tourism, eco-tourism, adventure tourism, cultural tourism, agro tourism, religious tourism, medical tourism and cruise tourism, etc. However, the sector is facing many difficulties such as inadequacy of good quality tourism infrastructure, global concerns regarding health and safety of tourists, and shortfall of trained and skilled manpower. For the sustainable development and maintenance of the tourism sector of India, government, private sectors and the community are taking great efforts collectively.

Keywords: GDP, companions, tourist destination, eco-tourism, sustainable development.

1. INTRODUCTION

Travel and tourism is reflector to each other in our developing world. Tourism sector is spirited and motivating in the economic, social and environmental shifts of the times. There is reliable growth in the arrivals of international tourists. In 1950 the numbers of international tourist were 25 million which has responsibly grown up to 1.1 billion in 2014. According to the report of the WTTC Travel & Tourism Economic Impact 2015, 1 in every 11 people worldwide is employed by the tourism sector, with the industry generating US\$ 7.6 trillion or 10% of the global GDP in 2014. Now a days the middle class of large emerging economies are rapidly attracting towards the international tours and vacations, its becoming a way of life. At a global scale, the sturdy economic growth has given rise to millions of new tourist which are looking for great travel experience, it may be business or leisure, domestically, nationally, regionally or internationally and this trend is expected to continue with the sustained momentum, outpacing global economic growth. Over the past two decades the large urban middle class has become the main stay of India's tourism sector because of transformation of India economically demographic and psycho graphically.

The planning commission of India stated in its 12th Five Year Plan that "the tourism sector has played a major role to promote a faster, sustainable and more inclusive economic growth; it has better prospects for promoting pro poor growth that many other sectors."

Climate change is an occurrence that affects the tourism sector and certain destination, in particular mountain ranges and coastal destinations which is not a remote event for the tourism sector. Climate is a crucial factor that affects tourism especially for the beach nature and winter sport tourist segment. Change in climate and weather patterns affects direct negatively on tourist comforts and their travel decisions. There is now urgent need for the tourism industry and national governments and international organizations to find the different advance techniques which will help to face the climatic difficulties and take strong and powerful actions to prevent them from future effects and mitigate the environmental impacts of tourism contribution to climatic change.

2. OBJECTIVES OF THE STUDY

1. The study the impact of tourist perceptions, destination image.
2. To analysis the attributes of the tourist perception and destination image.
3. To examine the attributes of tourist satisfaction
4. To highlights the government plans and policies for the development of tourism in India.

3. HYPOTHESES OF THE STUDY

The following are the hypotheses of the study:

H₀– India is not ranked highly for its rich art forms and culture heritage.

H₁- India is ranked highly for its rich art forms and culture heritage.

H₀– Travel and tourism is not a reflector to each other in our developing world.

H₁- Travel and tourism is reflector to each other in our developing world.

4. RESEARCH METHODOLOGY

The study was based on extensive literature survey consists of secondary sources of information. It included the books, research papers, working notes, related web sites and articles published in the leading newspaper and information covered through various journals.

5. STRENGTH OF INDIA FOR TOURISM

- Country of rich heritage and traditions having a vast and varied history.
- Places of ancient civilization and settlements dating back to several centuries present in India.
- Unity in Diversity i.e. multicultural people staying together in the same country.
- One of the fastest growing economies of the world.
- India has been maintaining good and cordial relationship with different countries which helps the people of those countries to get the visas easily to visit India.

5.1 INITIATIVES TAKEN BY GOVERNMENT TO PROMOTE TOURISM INDUSTRY

In the year 2002, the Government of India announced a New Tourism Policy. The policy is built around the 7-S Mantra of –

- SWAAGAT (WELCOME)
- SOOCHANAA (INFORMATION)
- SUVIDHAA (FACILITATION)
- SURAKSHAA (SECURITY)
- SAHYOG (COOPERATION)
- SANRACHNAA (INFRASTRUCTURE)
- SAFAAI (CLEANLINESS).

5.2 TOURIST ATTRACTION

India is one of the greatest civilizations in the world, and is home to four great religions. It is a rich tapestry of varied product and experience offerings across the nation's innate strengths of culture, heritage, nature, beaches, mountains, wild life, wellness, cuisine and other unique assets spread across different landscapes, communities and climatic zones.

The important tourist attractions are discussed below

- **Heritage and Culture:** India is blessed with a rich history and a vibrant heritage and culture. India has an array of 32 cultural and natural sites inscribed on the World Heritage list of UNESCO. There are Museums which are rich repositories of the country's culture with explicit examples as proof of the development of the country's culture and heritage over a period of time. Tourism is one of the most effective instruments to give a new lease of life to such priceless heirlooms inherited and celebrated by us.
- **Spirituality:** India has from time immemorial been a destination that has drawn and welcomed seekers from afar in search of enlightenment. Tourism in India has traditionally thrived upon Travellers visiting places of spiritual interest. As the birthplace of four great religions, Hinduism, Buddhism, Jainism and Sikhism, India can attract significant number of visitors.
- **Yoga:** As a science that seeks to keep the body, mind and soul in concert, Yoga is India's gift to the world which holds the promise of self-realization. Yoga has drawn followers from all over the world over the years. Properly marketed, Yoga has the potential to draw in significant number of long stay Travellers. India has the potential to establish itself as the land of Yoga, leveraging this growing global interest.

- **Ayurveda / Holistic Health Systems / Wellness:** The ancient science of Ayurveda seeks to maintain a balance amongst the different elements in the body to maintain good health. Entirely holistic in its approach, it has emerged as the answer to lifestyle issues that ail modern living through its detoxification and maintenance regimens. With increasing consumer demand for wellness services and products, the global wellness market is now worth US\$3.4 trillion (Source: The 2014 Global Spa & Wellness Economy Monitor).
- **Medical Tourism:** India has a large medical tourism sector which is expected to grow at an estimated rate of 30% annually, to become a US\$ 2 billion industry in 2015. India is placed among the top three medical tourism destinations in Asia (with Thailand and Singapore), mainly due to the low cost of treatment, quality healthcare infrastructure and availability of highly skilled doctors (Source: FICCI-KPMG Report on Medical Value Travel in India).
- **Cruises:** The Cruise sector is a fast growing component of the leisure industry, worldwide. Experience in the Caribbean, Latin American and South-East Asian countries indicate that a huge amount of foreign exchange can be earned and sizeable direct & indirect employment can be generated onshore by providing the right policy environment and infrastructure for the growth of cruise shipping.
- **Adventure:** With its diverse geographical zones India has immense potential for adventure activities throughout the year. 73% of the Himalayas are situated in India and along with the other mountain ranges can host a variety of activities like skiing, trekking, rock climbing, Para-gliding etc. Caravan parks and caravan tourism can add yet another facet to the tourism product.
- **Wild Life/ Eco Tourism:** India has ecological hotspots, which are rich in flora and fauna. While uncontrolled tourism can harm these areas, a calibrated and meaningful approach can help in preserving these areas with the visitors acting as a check against illegal activities.
- **Cuisine:** Getting a taste of local cuisine has become an essential part of the travelling experience, and as such gastronomy presents a vital opportunity to enrich the tourism offer and stimulate economic development. India's strongest calling card to the world is its cuisine. Indian restaurants are now running in many parts of the world to great popularity.
- **Destination Weddings:** India is known for its vibrant and colorful weddings and its spectacular palaces and rituals can form an attractive proposition for destination weddings. The opportunity exists to elevate this niche, linking together various locations and experience creators (i.e. wedding planners, tour operators, and hoteliers etc.) to create attractive offerings, expanding our ability to tap into this unique, lucrative market.

5.3 RECOGNIZABILITY

Trust is the cornerstone on which all businesses are built. Buyers need to be reassured that what they buy is what they get. All stakeholders within the tourism industry, whether product or service providers, need to view themselves as part of India's delivery of:

- The Incredible India Brand promise
- Exceptional traveller experience.

6. PROPAGANDA OF TOURISM INDUSTRY

The Incredible India campaign is one of the most successful projects that placed India on the world tourism map. It is imperative that we build on its strength by keeping it fresh to productively engage with the audience. This is also an excellent vehicle to project our soft power and create a positive perception about India.

There is a strong case for achieving coordination with the States while planning our publicity campaign to achieve synergy and greater efficiencies. A consultation and co-ordination mechanism is envisaged. Our campaigns address two kinds of audience, the international and the domestic. It is important to focus on key markets to engage with established markets along with a few key identified emerging markets that can push our growth and insulate us from market risks.

7. CONCLUSION

At the global scale the tourism industry has emerged as one of the largest and fastest growing economic sectors globally. It has contributed to the GDP and employment generation remarkably. The tourism industry has influenced the other sectors significantly. It also helped to create employment. However, the sector is facing challenges such as lack of good quality tourism infrastructure, global concerns regarding health and safety of

tourists, disparate passenger/road tax structures across various states and shortfall of adequately trained and skilled manpower.

There are many initiatives taken by the government to promote the tourism industry like swagat, soochanaa, etc. There are many things which attracts the tourist are heritage and culture, spirituality, yoga, Ayurveda, medical tourism, cruises etc. With increasing tourist inflows over the past few years, it is a significant contributor to Indian economy as well.

Concerted efforts by all stakeholders such as the central and state governments, private sector and the community at large are pertinent for sustainable development and maintenance of the travel and tourism sector in the country.

REFERENCES

- Dr. T. Subash, 2015. Tourism in India: Potentials, Challenges and Opportunities, ISSN 2348 –1269.
- R. Rajesh, 2013. Impact of Tourist Perceptions, Destination Image and Tourist Satisfaction on Destination Loyalty: A Conceptual Model.
- M. Chaudhary, 2000, India's image as a tourist destination - a perspective of foreign tourists.
- Dr. R. R Chavarrand Dr. S SBhola, 2014, Indian tourism: a conceptual review, ISSN: 2319-9032.

CASHLESS ECONOMY AND DEMONETIZATION

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ABSTRACT

The paper aims at analysing the cashless system of payments which is very prominent in today's era. The volume of cashless transactions is increasing drastically after the two major steps taken by the Government of India. One is Digital India Movement and another is the Demonetization. Hence the paper tries to examine various pros and cons of cashless economy. It also emphasises on impact of demonetization on cashless transactions.

INTRODUCTION

A cashless society refers to an economic state whereby financial transactions are not conducted with money in the form of physical banknotes or coins, but rather through the transfer of digital information (usually an electronic representation of money) between the parties under transaction. Cashless societies were present in ancient India in form of barter economy. And now those are present in terms of artificial digital currencies such as bitcoin.

Digital India is one of the important programme of the Government of India. It was launched on 1st July 2015 by Prime Minister Narendra Modi, with a vision to transform India into a digitally empowered society and knowledge economy. "Faceless, Paperless, Cashless" is one of the professed roles of Digital India.

The commencement of this programme was followed by the demonetization of the Indian economy which has boosted the movement.

DEMONETIZATION

'Demonetization refers to the act of pulling a currency unit out of its status of a legal tender. In this process, the current form of the currency is replaced by a new one. Before India, the economies such as U.S.A., European Union and Zimbabwe have gone through this reform.

In Indian case, the demonetization of ₹500 and ₹1000 currency notes accounted for 86% of the country's circulating cash. These notes were to be replaced by new notes of ₹2000 and ₹500 with the restrictions on withdrawals from banks and ATMs.

The announcement of Demonetization of ₹500 and ₹1000 banknotes by the Government of India was a milestone in the bureaucracy. The Government made this major announcement on 8 November 2016. The decision was preceded by a number of measures taken by the Government in its tenure. The main objectives behind the decision were elimination of black, parallel economy, corruption, flow of funds to terrorism, removal of fake currency and so on. It also aimed at enhancing the use of paperless transactions, plastic currency and digitalisation of the entire financial system.

IMPACT OF DEMONETIZATION ON CASHLESS ECONOMY

India has been a highly cash-centric economy since decades. However after the implementation of demonetization, the circulation of physical currency has been reduced drastically. It has also curbed the black money to a large extent and also the real estate prices.

There are different methods of cashless payments such as interbank electronic funds transfer, UPI, card payments and mobile banking. Following are the trends in transaction size through these modes.

Volume of Transactions (In Millions)

	Cheque Transactions	IMPS	Credit Cards	Debit Cards	Mobile Banking
Oct-16	82.04	42.09	89.49	942.45	78.08
Nov-16	87.08	36.17	98.31	808.78	85.45
Dec-16	130.01	52.78	116.46	1,045.93	110.64
Jan-17	118.45	62.42	113.24	1040.97	106.12
Feb-17	100.44	59.75	95.08	944.32	95.41
Mar-17	119.21	67.41	108.10	981.28	113.65
Apr-17	95.26	65.08	107.06	928.32	106.18
May-17	97.08	66.72	115.88	922.99	114.1
Jun-17	91.85	65.84	110.03	922.47	115.73
Jul-17	92.20	69.07	111.38	958.85	102.4
Aug-17	92.05	75.66	115.99	981.81	99.64

Source- Economic Times

The table shows the following trends

- There is a sharp increase in all the modes of digital transactions in December 2016.
- It started falling by small portion in January 2017 and again started rising till March 2017.
- Again there was a fall till July 2017.
- In August 2017, all the transactions have shown the upward trends except cheques.
- The most effective mode of payment has been the debit cards.

Benefits of Cashless Economy

- It reduces the cost of printing notes.
- It reduces the black money which in turn has positive impact on reduction on black marketing and terrorist activities.
- It reduces the number of fake notes in the market.
- The number of 'official' transactions is more.

Challenges for cashless Economy

- It increases the dependency on cards which may be problematic during emergencies.
- There may be the chances of frauds related to cards.
- There may be cut down in number of jobs because of the online transactions.
- It may be difficult for the financially illiterate population specially in rural areas.

CONCLUSION

The 'cashless' movement has been wisely encouraged by the Government of India and it is showing the upward trends. It is essential to overcome certain flaws the system is facing to make it more effective and hence to make India a developed country.

REFERENCES

- The Economic Survey 2017, 2018
- www.rbi.org
- Work by ms R. Rupa in the article 'Demonetization: A Way TO Cashless Economy' published in 2017 in an international journal of Finance Research Review ISSN:2321-0354 - Online ISSN:2347-1654 - PRINT - Impact Factor:4.236 Volume 5, Issue 7, July 2017 - UGC Approved Journal - S.No:48817
- Economic Times dated Nov.07,2017
- www.globallogic.com

COMPARATIVE STUDY OF GENDER DEVELOPMENT INDEX OF INDIA IN THE CONTEXT OF GDP

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ABSTRACT

The GDI concept is widely used to depict the gender gap between men and women by United Nation and its member countries all over the world. To calculate the GDI index United Nation measure three main parameters that are Health, Education and Per capita income of Female and male. The paper represents that how these all measures are strongly correlate with GDP and also how it affects the GDP of nation. By analysing the most recent data (1995-2017) the paper also represent comparison between neighbouring countries on account of same measures. It also point out what measures to be taken to pull off better GDI that convert better HDI and automatically better GDP.

Keywords: GDI, Inequality, Women empowerment, HDI, GDP

INTRODUCTION

Gross domestic Product (GDP) is the final value of the goods and services produced within the geographic boundaries of the countries during a specified period of a time, normally a year. GDP is an important dimension to count the economic growth of the economy. Human Development Index (HDI) is widely used concept to measure the development of humans in terms of Health, Knowledge, and Standard of living but it is a cumulative measure. It does not represent a real picture of a society. Even some countries having high HDI, their found a greater extend of disparity especially in gender. This gender gap is calculated by using Gender development Index (GDI). This index measures the gap between men and women by considering three dimensions i.e. Health, Knowledge and Standard of living. The growth of nation (GDP) could not be complete without the real development of women. GDP is a one dimension to calculate the growth of nation. Without major contribution of women, growth of better GDP is also not possible. When the situation seen in India, It is observed that India is lag behind in terms of mortality rate (Health), mean year of Schooling (Education), Female per capita income (Standard of living) and also in Female Labour force participation as compare to other neighbouring countries such as Bangladesh and Sri Lanka. This affect the GDP of nation negatively. We have to take more efforts to improve the female labour force participation, mortality rate, mean year of schooling as well as per capita income of female. In India the women shares in parliament is 11.06% (2017 data) as compare to world (20.00%) is near about half. Now government has taken initiatives to promote the women by implementing various women welfare schemes that will help to participate in various activities and it will help to reduce the gender gap. These all positive efforts will increase the growth of GDP.

OBJECTIVES OF THE STUDY

1. Comparing India GDP in terms of Female labour force participation, mean year of schooling female, per capita income female
2. To know the relationship between GDI and its major determinants.
3. To suggest the measures to improve women contribution in GDP.

THE CONCEPT OF GROSS DOMESTIC PRODUCT(GDP)

Definition: Gross domestic Product (GDP) is the final value of the goods and services produced within the geographic boundaries of the countries during a specified period of a time, normally a year. GDP is an important dimension to count the economic growth of the economy.

It can be measured by three methods, namely,

1. Output Method: This method counts the market value of all goods and services produced within country.

As per output method

$GDP = \text{Real GDP (GDP at constant prices)} - \text{Taxes} + \text{Subsidies.}$

2. Expenditure Method: This method counts the incurred by all entities on goods and services within domestic boundaries of a country. As per Expenditure method

$GDP = C + I + G + (X-IM)$

Where,

C= Consumption expenditure,

I= Investment expenditure,

G= Government spending and

(X-IM)= Exports minus imports, that is, net exports.

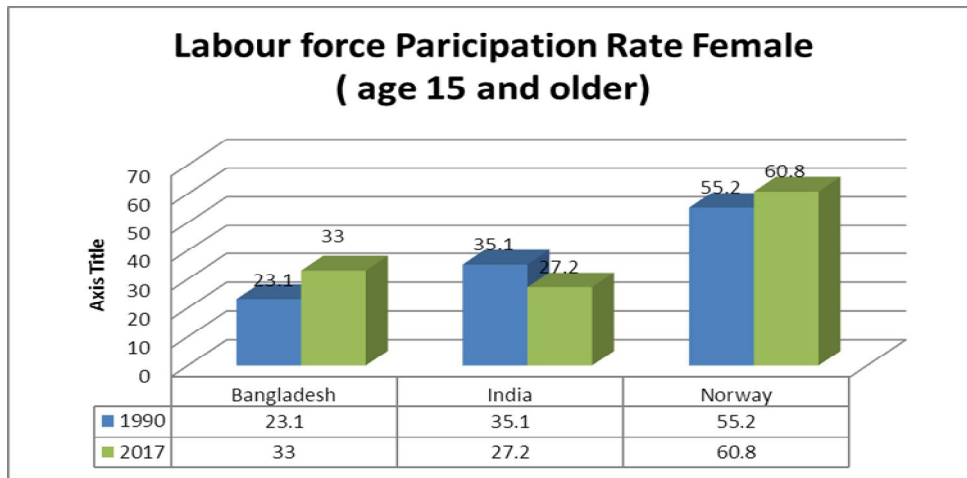
3. *Income Method*: It counts the total income earned by the factors of production, that is, labour and capital within the domestic boundaries of a country. As per Income method

GDP = GDP at factor cost + Taxes – Subsidies.

In India, contributions to GDP are mainly divided into 3 broad sectors – agriculture and allied services, industry and service sector. In India, GDP is measured as market prices and the base year for computation is 2011-12. GDP at market prices = GDP at factor cost + Indirect Taxes – Subsidies.

➤ **COMPARING INDIA IN TERMS OF FEMALE LABOUR FORCE PARTICIPATION**

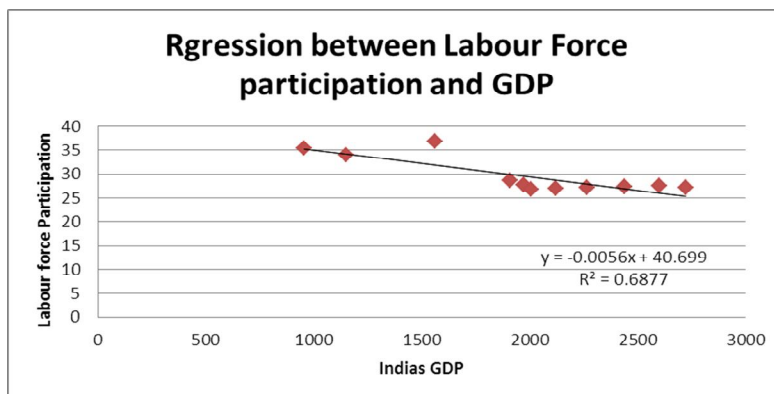
❖ Labour Force Participation Rate of female(age 15 and Above)



Labour Force Participation Rate of female (age 15 and above) of India is showing declined whereas Bangladesh which is our neighbouring country and Norway which has Highest GDI showing inclined. Study says that the nation who have more female participation in labour have positive economy growth. It not only increases the Economy but also improve the health of society. Here we have to take initiative step to increase the participation of female towards Labour that will yield overall Economy Growth of nation.

● **Regression coefficient between Labour force participation of Female and GDP of INDIA**

Labour Force Participation											
Years	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017
India's GDP	956	1152	1563	1909	1973	2007	2121	2266	2437	2599	2722
Labour force Participation	35.4	34	36.8	28.6	27.7	26.8	27	27.1	27.3	27.5	27.2

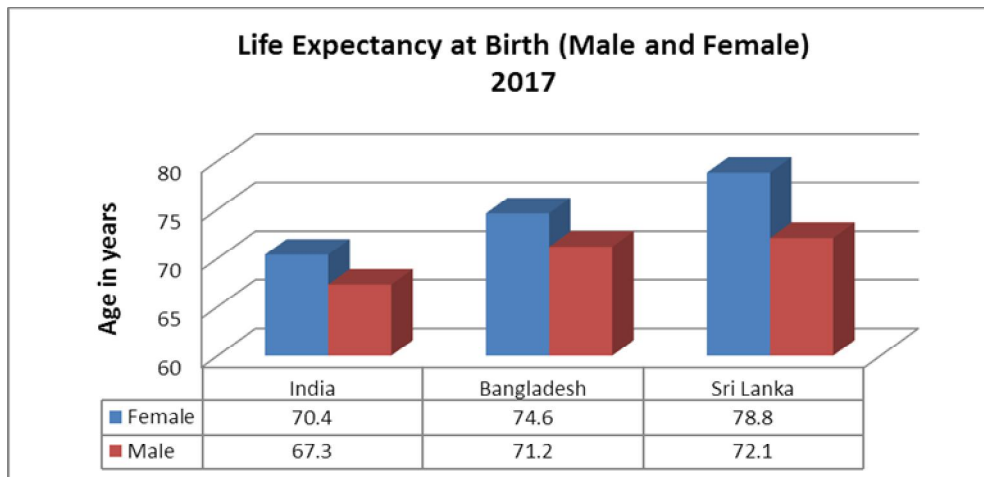


The scatter chart represents the regression between Labour force participation of female and GDP of India. The value of R is Positive. In a chart dependant variable(Y) is GDP and Independent variable(X) is Labour Force participation female. $R^2 = 0.6877$ and $R = 0.8292$ (nearest to 1) means GDP is strongly correlate with Labour force Participation of Female.

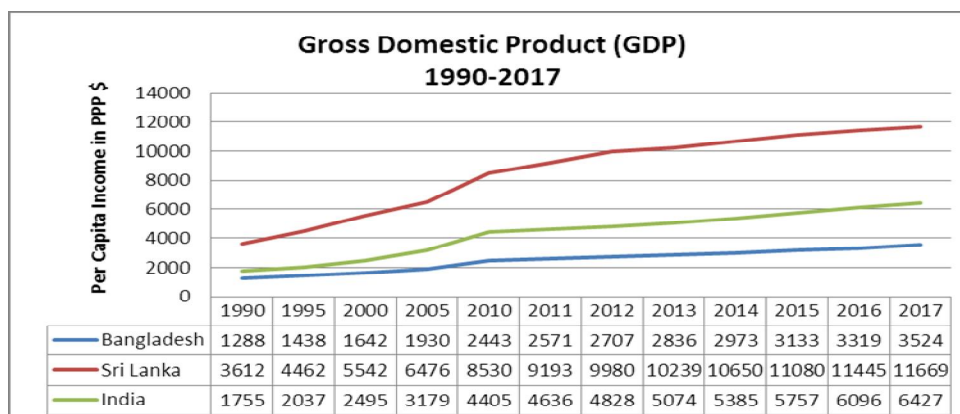
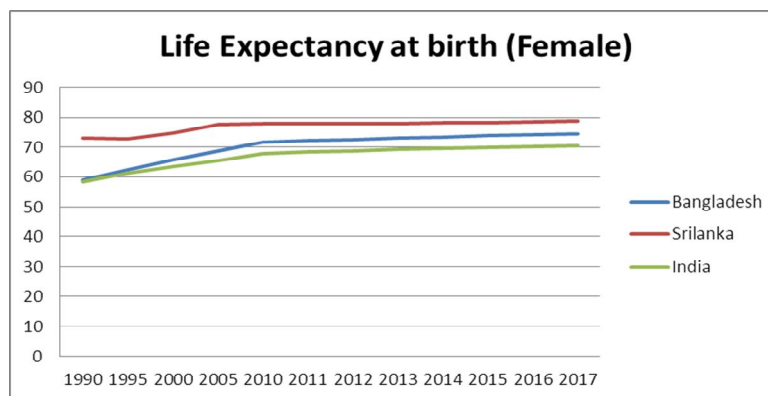
➤ Evaluation of GDI factors between India and Other neighbouring countries.

❖ Life Expectancy at Birth female

Country	Life Expectancy at Birth(2017)	
	Female	Male
India	70.4	67.3
Bangladesh	74.6	71.2
Sri Lanka	78.8	72.1



Life Expectancy at birth (Female)												
Country	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017
Bangladesh	58.8	62.2	65.7	68.7	71.5	72.1	72.6	73.1	73.5	73.9	74.3	74.6
Srilanka	73.2	72.9	74.9	77.7	77.9	77.9	78	78.1	78.3	78.4	78.6	78.8
India	58.3	61.1	63.4	65.4	67.8	68.3	68.8	69.2	69.6	69.9	70.2	70.4

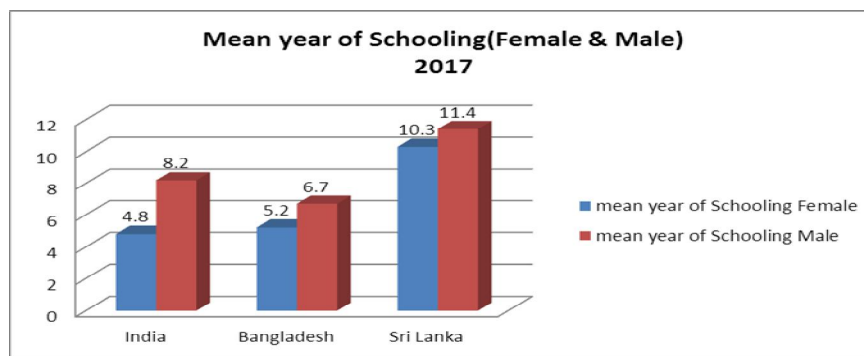


Above line chart demonstrate the real picture of Indian Female on the basis of Life Expectancy at Birth and GDP of Nation.

In Life Expectancy at Birth (Female) Chart, India has 70.4 years as compare to Bangladesh (74.6) and Sri Lanka (78.8). As per the 2015 data our health expenditure is 3.89 % of GDP, whereas Bangladesh (2.64 %) and Sri Lanka (2.97%) has lesser than India. Both the life expectancy and GDP of India is found to be higher than Bangladesh and Sri Lanka.

❖ Mean year of schooling female

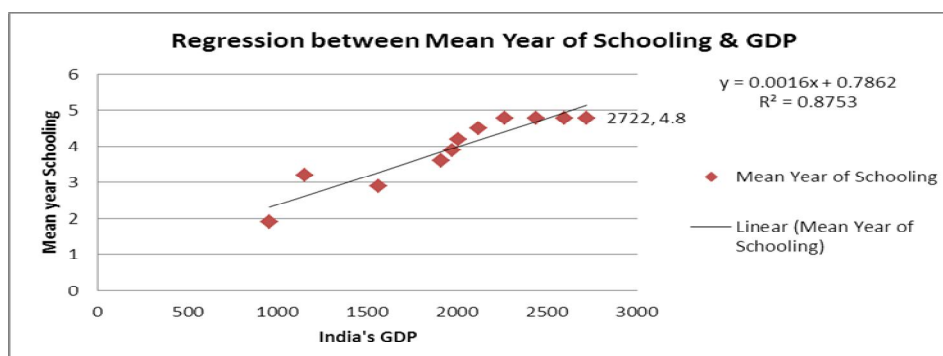
Country	mean year of Schooling(2107 data)	
	Female	Male
India	4.8	8.2
Bangladesh	5.2	6.7
Sri Lanka	10.3	11.4



Above Bar chart shows the comparison between three countries mean year schooling of female and male. For India it has 4.8 years for women and 8.2 years for men. The difference is near about double. In a graph the difference between women and men mean year schooling of India is higher than other countries. Means India has higher inequality in mean year of schooling than Bangladesh and Sri Lanka. Education is a important factor for social and economic progress of society. The study (Doller and Gatti 1990) prove that there is a positive relationship between education of women and economic growth. And also the education of mothers compares to that of fathers has a higher effect on the investment on education for their children. The study also proved that as more educated household(male and female both) are likely to have more productivity than more children. It also shows that the household are less fertility rates where female is educated than uneducated. Education is important for reducing poverty.

There are more chances to get equal rights and decision making power when a woman is equally educated in a household. Study (Morrison, Raju, & Sinha 2007) proved that the impact of women’s rights and decision-making power in families helped reduce poverty and improve productivity at per person and family levels. In addition, they showed the relationship between gender equality and poverty reduction and economic growth at the macro level.

Mean year of schooling (Female)											
Country	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017
India’s GDP	956	1152	1563	1909	1973	2007	2121	2266	2437	2599	2722
Mean Year of Schooling	1.9	3.2	2.9	3.6	3.9	4.2	4.5	4.8	4.8	4.8	4.8

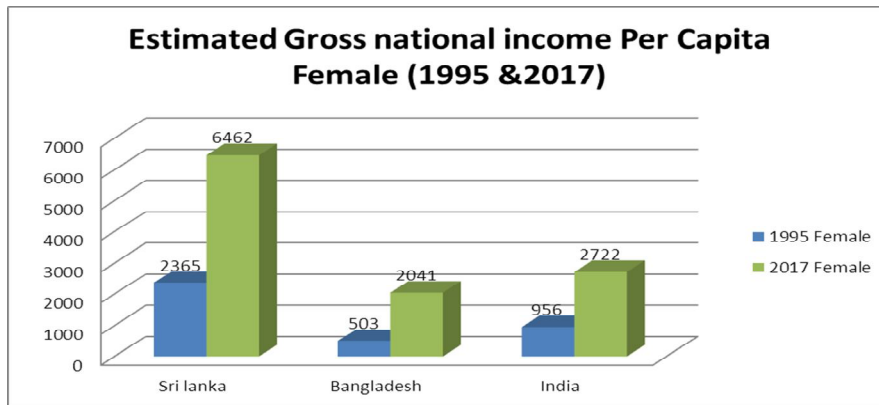


The scatter chart represent the regression between Mean year Schooling of female and GDP of India. The value of R is Positive. In a chart dependant variable(Y) is GDP and Independent variable(X) is Mean year Schooling female . $R^2=0.8753$ and $R=0.9355$ (nearest to 1) means GDP is strongly correlate with Mean year of Schooling of Female.

❖ **Per capita income female**

Estimated gross national income per capita

	1995		2017	
	Female	Male	Female	Male
	2365	6431	6462	16581
Bangladesh	503	2427	2041	5285
India	956	3002		9729
			Country	
			Sri lanka	

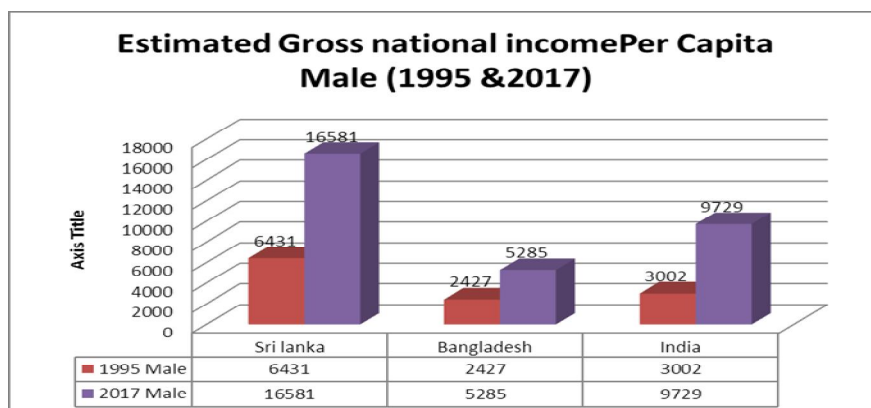


As the above chart compares the overall Gross National Income per capita of female from 1995 to 2017 among the three Asian countries.

Graph indicates that in 1995 the neighbourhood country of India i.e. Sri Lanka had a per capita income of female Rs. 2365 and now (in 2017) it is Rs. 6462, whereas India’s Female capita income for 2017 is 2722 Rs which is near about same of Sri Lanka’s 1995 female Capita Income. The overall growth of capita income of female of Sri Lanka is increase by 273.23% ,whereas India’s female Capita income is increased by 284.72%, Which is not that much better to achieve good GDI index.

In the same period i.e. from 1995 to 2017 Bangladesh Female Capita income is increased by 405.76% i.e. almost more than FOUR times.

County	1995	2017
Sri Lanka	6431	16581
Bangladesh	2427	5285
India	3002	9729



As the above chart compares the overall Gross National Income per capita of Male from 1995 to 2017 among the three Asian countries.

During the period of 1995 to 2017 India’s Male Capita income is increased by 324.08 % whereas Female Capita Income is increased by 284.72%. Means Females Capita is lag behind by almost 40% in India.

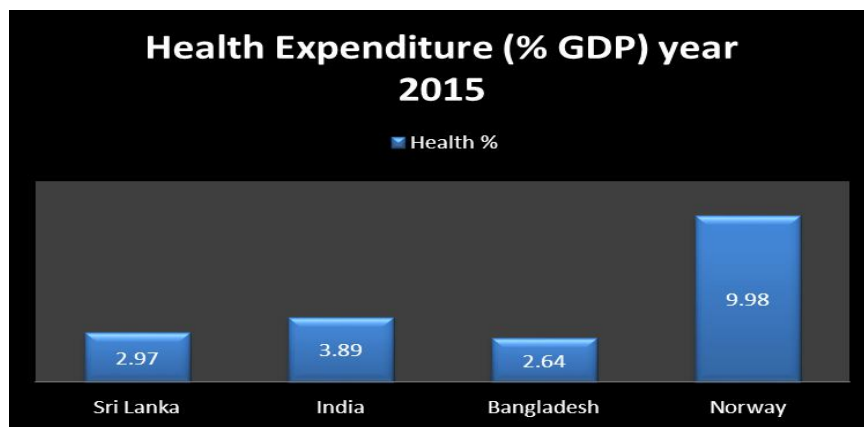
But if we look at Neighbouring Countries their Female Capita Income is increased as compare to their male capita income.

For Sri Lanka it is (Female Capita 273.23%, Male Capita 257.82) increased by 15.41%.

And for Bangladesh it is (Female Capita 405.76 %, Male Capita 217.75) increased by 188.01%.

❖ **Health expenditure of India(2015)**

Country	Current Health Expenditure (% GDP) 2015
	Health %
Sri Lanka	2.97
India	3.89
Bangladesh	2.64
Norway	9.98



➤ **CONCLUSION**

We have examined the contribution of female in GDP of nation. That will automatically yield the economic growth and as well as Human development index of the nation. The study is done mainly between India and two neighbouring countries i.e. Bangladesh and Sri Lanka because all are same geographic condition. Even if our nation spend more on health on account of GDP, we are lag behind in Life expectancy at Birth of Female. In Mean year schooling of female also we are lag behind. It means that we have to take measure steps to implement the proper schemes for welfare of female in terms of health and education. Once we get positive result, labour force participation will increase that yields to increase per capita income of Female. Paper mainly compare Labour force participation of female, Life expectancy at Birth of Female, Mean year of Schooling of Female and also shares in parliament in % with GDP of nation with neighbouring nation. We taken a GDP of nation as a dependant variable and Labour force participation(female), mean year of schooling, Life expectancy at birth(female),and shares of female in Parliament (in %) as a independent variables. Based on some theoretical study and also from graphical representation bar charts we get important results that are labour force participation (female) rate are highly impact able factor on nation GDP per capita. As the female get more education it increases labour force participation rates. Once the women get well education she will secure better job, better job will benefit to family specially for children and also to for growth of nation. It also changes the traditional approach towards women in society.

REFERENCES

- <http://hdr.undp.org/en/data>
- Doller and Gatti (1990) , Gender Inequality, Income, and Growth: Are Good Times Good for Women, The World Bank Development Research Group/ Poverty Reduction and Economic Management Network, May 1999
- Morrison, Raju,& Sinha (2007), Gender Equality, Poverty and Economic Growth, Policy Research working paper no. WPS 4349. Washington, DC: World Bank. World Bank’s Global Monitoring Report

GENDERED OCCUPATIONS: A SOCIOLOGICAL STUDY OF WOMEN TAXI DRIVERS IN MUMBAI**Manjusha Patwardhan**

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ABSTRACT

Patriarchal tradition has been the hallmark of India. In keeping with this, gender socialization has been prominently followed by the society. As a result, there has been a clear cut distinction between behavior patterns, attitudes and activities prescribed for females and males. This differentiation is also visible in the employment choices that are available to women.

The paper highlights the occupations women are engaging in recent times, which were earlier dominated by men. It tries to understand the changing behavioural patterns, attitudes and activities performed by, especially, women as members of the modern metropolis. Amongst the complexities involved in modern metropolitan cities like Mumbai, employment is generally an area of concern and especially the issue of women's employment is of major concern due to the patriarchal background of Indian society.

The paper deals with the issue of women employment in the occupation of Taxi driving. The paper is based on the primary data collected through interview schedules. The data collected for the purpose is restricted to the city of Mumbai and analysed in keeping with sociological canons of research.

The paper tries to conclude that the earlier trend of patriarchal society's attempt to restrict women from participating in certain occupations is changing with the changing times and it is likely to continue in the era of globalization.

Keywords: Patriarchy, Gender Socialisation, Women Employment, Gendered Occupations

The developmental processes of Urbanisation¹, Industrialisation², Modernisation³ and Globalisation⁴ brought drastic changes in the Indian society. These processes have opened vast opportunities of employment for women in different sectors of the economy. In modern times, women employment has necessitated women's presence in the public space. The emerging structure has given rise to new opportunities where there are unconventional, multiple and even conflicting roles. This applies more to women who have moved into a ruthless, competitive, male-dominated job market. This has put greater pressure on women who are seeking equality and excellence.

Globalisation, liberalization and new market democratization promise new employment opportunities, equal status, more freedom and choice to women. Many women today are making an attempt to tread the unbeaten path. They are entering newer and newer occupations which they could not even dream of being in earlier. The stereotyping of occupations has been challenged and threatened.

¹ Urbanisation is undoubtedly a key force of development. The great transition from farm to city is filled with economic and socio-cultural change. The concentration of people in cities can offer both, economic opportunities and the chance for social change toward a more open, innovative, inclusive and democratic society. Cities are the driving force of economic growth. Cities have better education and training systems that feed the talent pool and attract students from elsewhere, many of whom continue to stay in cities. In large cities, businesses can access more customers and employers and benefit from a broader supplier and service base. With a large number of customers at their doorsteps, cities are instant markets for many kinds of businesses- professional and personal services and shops, restaurants and entertainment venues.

² Due to the processes of Industrialisation, two significant changes took place in society: Firstly, the nature of work itself changed and secondly, there was a geographical separation of work and family.

³ Modernisation is a historical inescapable process of social change. Industrialisation had increased the size of economic surpluses and fundamentally altered the nature of labour forces and economies of industrial societies. Similarly, nearly all large nations shifted from Monarchies governed by hereditary kings and emperors to democratic nation states. Modernisation is a type of social change which is both transformational in its impact and progressive in its effects. It is also as extensive in its scope. As a multifaceted process, therefore, it touched virtually every institution of society.

⁴ Globalisation deals with the processes that not only cross national boundaries or link states, but which rely on worldwide flows of capital, communication and manufactured goods from region to region. This global structural transformation that was initiated by the developed countries is posing new social, political, economic and environmental challenges for the developing and underdeveloped countries of the world. Most of the developing and underdeveloped economies are in the process of restructuring in the direction of liberalization and free market economy. This economic restructuring and the increasing reliance on market mechanisms have social consequences which demand specific policy responses.

Under these circumstances, it would be interesting to know, how some occupations which hitherto denied entry to women, now have been approving women working in those occupations. Hence, the paper is primarily focused on the newer avenue of employment where women get trained to have compatible performance on par with male members. The paper is an attempt to understand the issues and problems, if any, of the women under study due to the demand of their occupation to be in public spaces.

RELEVANT CONCEPTS

(1) Patriarchy

Patriarchy is seen as a universal “mode of power relationships” and domination. Patriarchy is a social system of gender relations in which there is gender inequality. Gender relations are the social relations between men and women. The effects of patriarchy are to be found in many things around us. The division of labour based on sex promotes the dominance of men over women.

(2) Gender Socialisation

It is the society or the culture which turns females and males into feminine and masculine beings respectively. It happens through a continuous on-going process of socialization or gendering within families and society. The specific process of socialisation which teaches the children gender roles is also called gendering or gender-indoctrination. The process of ‘Gender Socialization’¹ plays a crucial role in socially constructing behaviour patterns in society among females and males. Gender-role can be defined as an expectation regarding behavior patterns, attitudes and activities of females and males.

(3) Gendered Occupations

‘Gendered Occupations’ refer to gender-based division of functions is visible even in the world of work. Job markets have been segregated on the basis of sex and women have been found suitable for the occupations which match the roles they perform at home. High professional aspirations are not seen as promoting family welfare. This factor may be responsible for deterring women from entering male dominated occupations which typically require ‘masculine’ characteristics. ‘Gender-typing’² of jobs/ occupations/ professions is, therefore, commonly found in Indian society. ‘Gender Roles’ are created which are societal expectations about appropriate qualities and behaviour on the basis of socially identified gender.

Statement of the problem

By gaining access to the conventionally male dominated employments, women have, in a way, challenged the patriarchal system of society in India. The belief that women can have equal competence in public space to dwell upon the resultant consequences of this break-through (going beyond the earlier accepted notion of social hierarchy in gainful activity) on the present society and future generations; has been the core of investigation in this study.

Aims and Objectives

In keeping with the statement of the problem, the study proposes to have the following objectives:

1. To identify the compelling factors for women under study to opt for these employment avenues.
2. To locate special capabilities to handle the modern job responsibilities of women under study.
3. To find out, how women in this newer employment avenue balance their work and family life.
4. To highlight the problems, issues and challenges faced by these women in their jobs.

Research approach

This study has been primarily an empirical research carried out through field work. In pursuing the objectives of the research, the secondary sources of data have been consulted in order to understand the nature of newer

¹ Boys are socialized to develop ‘masculine’ characteristics and girls are socialized to develop ‘feminine’ characteristics. During the process of socialization, individuals thus internalize the qualities and characteristics considered appropriate for their sex. As the individual grows up, he/she is expected to engage in those tasks which are considered to be ‘suitable’ for his/her sex and gender.

² A gender-typed occupation is one that is seen as requiring distinctly masculine or feminine characteristics. For example, nursing which requires nurturance and caring is considered appropriate for females as these characteristics are assumed to be feminine and typical of women. Similarly in the occupation of pre-primary and primary school teachers, one is required to possess feminine qualities such as being gentle, loving and caring, patient, soft-spoken, understanding etc. It implies that women are better suited than men for this occupation. On the other hand, some occupations presumed to require masculine characteristics of aggression and competitiveness such as prosecutors and managers, are considered as more appropriate for men.

employment opportunities for women in the city of Mumbai. The primary data for the study has been collected through the technique of personal interviews of women in the select occupations, participant observation techniques, and case study method employed to arrive at sociologically relevant and theoretically pertinent analysis in keeping with the objectives of the study.

RESEARCH SAMPLE

Due to constraints of time, energy and cost it was practically not possible to study the entire population. Therefore, the researcher has selected a small portion of the population under study as a sample. The sample selected for this research is a representative sample from the population and it is selected through non-probability procedure. A sample of 35 women Taxi Drivers in the city and suburbs of Mumbai was selected for the study.

DATA COLLECTION

The study, analyses both the primary sources (Personal interview, Survey techniques) and secondary sources (Sociological and Anthropological literature, Books and journals and News papers) of data on Women employment in Mumbai, in order to arrive at academically relevant conclusion.

ANALYSIS OF DATA

After the data collection, the data was arranged for processing. Then the data was analysed in order to draw conclusions. The purpose of data analysis is to summarize the gathered data in such a way that it aids in procuring answers to research questions. Through the interview schedules, both quantitative and qualitative data was gathered.

The Quantitative data has been collected under the category of Personal profile of the respondents, which is presented under the following heads:

1) Age group

Sr. No.	Age Group	Number	Percentage
1	20-30	09	26
2	30-40	19	54
3	40-50	06	17
4	50 and above	01	03
	Total	35	100

2) Education level

Sr. No.	Educational Level	Number	Percentage
1	Below S.S.C.	13	37
2	S.S.C.	18	52
3	H.S.C.	04	11
4	Graduation	--	--
5	Post-Graduation	--	--
	Total	35	100

3) Income of respondent

Sr. No.	Income in Rs. (Monthly)	Number	Percentage
1	10,000-20,000	18	51
2	20,001-30,000	12	35
3	30,001-40,000	05	14
4	40,001-50,000	00	00
	Total	35	100

4) Marital status

Sr. No.	Marital Status	Number	Percentage
1	Unmarried	10	28
2	Married	16	46
3	Separated/ Divorced	06	18
4	Widowed	03	08
	Total	35	100

5) Type of family

Sr. No.	Type of Family	Number	Percentage
1	Nuclear	13	37
2	Joint	06	17
3	Extended Joint	07	20
4	Single -parent	09	26
	Total	35	100

6) Religion

Sr. No.	Religion	Number	Percentage
1	Hinduism	16	46
2	Islam	13	37
3	Christianity	01	03
4	Sikhism	01	03
5	Buddhism	04	11
	Total	35	100

Qualitative data has been collected for the following categories: Employment profile, Social profile and Issues of concern.

ISSUES

Many of the respondents felt that the issue of safety of women in public space was the main issue of concern. With increased incidents of violence against women in public space, at times these women as well as their family members do feel anxious. But they also look at it in a positive manner. With recent instances of auto-rickshaw drivers' misbehavior towards female passengers, more and more women passengers will prefer travelling with female drivers, which might increase their demand. Therefore, more women may take up driving as an occupation.

Another major issue of concern is the absence of public toilet facilities for women in the city. What is more surprising is the fact that Mumbai is considered as one of the prime cities of India. Working women who are away from their homes almost for 10 to 12 hours (out of which at least 1 to 2 hours are spent in the to and fro journey to their place of work) are not even given the basic convenience facility like a well maintained public toilet. The lack of or the inadequacy of public toilets is not only a mere inconvenience for women but it is a denial of their public policy rights. In most cases there is an absence of the kinds of spaces and locales that would help to make women psychologically comfortable. Various women's organizations and feminist activists have taken up this issue. What is required urgently is the state's initiative to resolve the issue by provision of this facility in city like Mumbai.

FINDINGS

The researcher has tried to make an attempt to draw certain conclusions and present the findings of the research. It is found from the data analysis that the processes of urbanization, industrialization, modernisation and globalization have brought significant changes in Indian society. Especially the process of globalization has resulted in widening the opportunities of employment for women. These processes have compelled women to enter employments that were earlier dominated by men. More and more women are engaging in such employments and are successfully handling them as a challenge.

It was observed that working in this newer type of employment has certainly increased the confidence of these women. They portray a very bold and confident behavior while dealing with people. These women have proved that they are equally capable, as their male counterparts in these jobs. Presence of women in these occupations stresses upon the fact that women have equal right to enjoy the benefits of liberty and freedom like men, in the city of Mumbai, in the era of globalization.

CONCLUSION

Work, whether waged or not, is central to women's and men's lives and in the social construction of masculine and feminine identities. Women who have entered occupations traditionally performed by men have to face lot more challenges and difficulties than women who are in traditional occupations considered 'fit' for women. Presence of women in such occupations which were previously dominated by men is a positive change. Though the number of women in such occupations is still small, these women have made a new beginning and taken a step closer to the goal of women empowerment. These women have redefined the notions of role of

womanhood changing the concept of womanhood in modern times. Though there are certain issues and concerns, these women are here to stay and it is a step toward the dream of women empowerment.

BIBLIOGRAPHY

- 1) **Arora, Poonam B.** 2003, *Professional women: Dual Role & Conflicts*, New Delhi: Manak Publications.
- 2) **Bhasin, Kamala.** 2000, *Understanding Gender*, New Delhi: Kali for Women.
- 3) **Butler, Judith.** 2004, *Undoing Gender*, New York: Routledge.
- 4) **Evans, Mary.** 2011, (ed), *Gender: Making Gender* Vol. II, London: Routledge.
- 5) **Evans, Mary.** 2011, (ed), *Gender: Living Gender* Vol. III, London: Routledge.
- 6) **Geetha, V.** 2007, *Patriarchy: Theorising Feminism Series*, Kolkata: Stree Publications.
- 7) **Ghadially, Rehana.** 2007, (ed), *Urban women in contemporary India: a reader*, New Delhi: Sage Publications.
- 8) **Rege, S. and Chanana, K.** 2008, *Sociology of Gender: The Challenge of Feminist Sociological Knowledge*, (Themes in Indian Sociology Series), New Delhi: Sage Publications.
- 9) **Simone de Beauvoir.** 1949, *Extracts from the Second Sex*, (Translated by Constance Borde and Sheila Malovany-Chevallier), London: Vintage Books.

MAKE IN INDIA**Archana Vishnu Pawar**Sonopant Dandekar Arts, V. S. Apte Commerce and M. H. Mehta Science College, Palghar

ABSTRACT

Make in India is biggest project taken by Indian government to initiate industrial development and investments inside and outside India. Make in India is a 'Swadeshi Movement' covering 25 sectors of the economy. India steps towards increase in investment with Make in India project. It was launched by Government of India on 25th September 2014 to encourage companies to manufacture their products in India. India jumped to 77th place out of 190 countries in the world Banks' 2018 Ease of Doing Business Index. India jumped to 100th place out of 190 countries in the World Bank's 2017 Ease of Doing Business Index, from 130th in 2016. The campaign was designed by Wieden+Kennedy, with the launch of a web portal and release of brochures on the 25 sectors, after foreign equity caps, norms and procedures in various sectors were relaxed, including application of manufacturing application made available online and the validity of licenses was increased to three years. "Zero Defect Zero Effect" slogan was coined by Prime Minister of India, Narendra Modi, to emphasize on the production mechanism that produces products with no defects with no adverse environmental and ecological effects. Sectors covered in Make in India are Automobiles, Automobiles components, Aviation, Bio-Technology, Construction, Defence Manufacturing, Defense exports, Electronic systems, Electronic machinery, Food processing etc.

Keywords: Ease of Doing, Swadeshi Movement, Web portal, Ecological Effects, Campaign

INTRODUCTION

Make in India, a type of Swadeshi movement covering 25 sectors of the economy, was launched by the Government of India on 25 September 2014 to encourage companies to manufacture their products in India and also increase their investment. As per the current policy, 100% Foreign Direct Investment (FDI) is permitted in all 25 sectors, except for Space industry (74%), defence industry (49%) and Media of India (26%). Japan and India had also announced a US\$12 billion "Japan-India Make-in-India Special Finance Facility" fund to push investment. After the launch, India received investment commitments worth ₹ 16.40 lakh crore (US\$230 billion) and investment inquiries worth ₹ 1.5 lakh crore (US\$21 billion) between September 2014 to February 2016. As a result, India emerged as the top destination globally in 2015 for foreign direct investment (FDI), surpassing the USA and China, with US\$60.1 billion FDI. Several states launched their own Make in India initiatives, such as "Make in Odisha", Vibrant Gujarat, "Happening Haryana" and "Magnetic Maharashtra". India received US \$60 billion FDI in FY 2016-17. Combined with other initiatives by the end of 2017, India rose 42 places on Ease of doing business index, 32 places World Economic Forum's Global Competitiveness Index, and 19 notches in the Logistics Performance Index. This initiative converges, synergises and enables other important Government of India schemes, such as Bharatmala, Sagarmala, Dedicated Freight Corridors, Industrial corridors, UDAN-RCS, Bharat Broadband Network, Digital India. The main objective of study is Make in India's effects on India. Currently how India is working towards development through this program. Through Make in India how intellectual property rights are protected. Effect of Make in India on development on economy.

METHODOLOGY

Research Methodology Data for the purpose of research has been collected from secondary sources. Resources are used Government publications, Government data, Government websites. The study is exploratory and quantitative in nature.

PROGRAM

The Make in India initiative was launched by Prime Minister in September 2014 as part of a wider set of nation-building initiatives. Devised to transform India into a global design and manufacturing hub, Make in India was a timely response to a critical situation: by 2013, the much-hyped emerging markets bubble had burst, and India's growth rate had fallen to its lowest level in a decade. The promise of the BRICS Nations (Brazil, Russia, India, China and South Africa) had faded, and India was tagged as one of the so-called 'Fragile Five'. Global investors debated whether the world's largest democracy was a risk or an opportunity. India's 1.2 billion citizens questioned whether India was too big to succeed or too big to fail. India was on the brink of severe economic failure.

PROCESS

Make in India was launched by Prime Minister against the backdrop of this crisis, and quickly became a rallying cry for India's innumerable stakeholders and partners. It was a powerful, galvanising call to action to India's citizens and business leaders, and an invitation to potential partners and investors around the world. But, Make in India is much more than an inspiring slogan. It represents a comprehensive and unprecedented overhaul of out-dated processes and policies. Most importantly, it represents a complete change of the Government's mindset – a shift from issuing authority to business partner, in keeping with Prime Minister's tenet of 'Minimum Government, Maximum Governance'.

PLAN

To start a movement, you need a strategy that inspires, empowers and enables in equal measure. Make in India needed a different kind of campaign: instead of the typical statistics-laden newspaper advertisements, this exercise required messaging that was informative, well-packaged and most importantly, credible. It had to (a) inspire confidence in India's capabilities amongst potential partners abroad, the Indian business community and citizens at large; (b) provide a framework for a vast amount of technical information on 25 industry sectors; and (c) reach out to a vast local and global audience via social media and constantly keep them updated about opportunities, reforms, etc.

The Department of Industrial Policy & Promotion (DIPP) worked with a group of highly specialised agencies to build brand new infrastructure, including a dedicated help desk and a mobile-first website that packed a wide array of information into a simple, sleek menu. Designed primarily for mobile screens, the site's architecture ensured that exhaustive levels of detail are neatly tucked away so as not to overwhelm the user. 25 sector brochures were also developed: Contents included key facts and figures, policies and initiatives and sector-specific contact details, all of which was made available in print and on site.

PARTNERSHIPS

The Make in India initiative has been built on layers of collaborative effort. DIPP initiated this process by inviting participation from Union Ministers, Secretaries to the Government of India, state governments, industry leaders, and various knowledge partners. Next, a National Workshop on sector specific industries in December 2014 brought Secretaries to the Government of India and industry leaders together to debate and formulate an action plan for the next three years, aimed at raising the contribution of the manufacturing sector to 25% of the GDP by 2020. This plan was presented to the Prime Minister, Union Ministers, industry associations and industry leaders by the Secretaries to the Union Government and the Chief Secretary, Maharashtra on behalf of state governments.

These exercises resulted in a road map for the single largest manufacturing initiative undertaken by a nation in recent history. They also demonstrated the transformational power of public-private partnership, and have become a hallmark of the Make in India initiative. This collaborative model has also been successfully extended to include India's global partners, as evidenced by the recent in-depth interactions between India and the United States of America.

PROGRESS

In a short space of time, the obsolete and obstructive frameworks of the past have been dismantled and replaced with a transparent and user-friendly system that is helping drive investment, foster innovation, develop skills, protect Intellectual Property (IP) and build best-in-class manufacturing infrastructure. The most striking indicator of progress is the unprecedented opening up of key sectors – including Railways, Defence, Insurance and Medical Devices – to dramatically higher levels of Foreign Direct Investment.

A workshop titled "Make in India – Sectorial perspective & initiatives" was conducted on 29th December, 2014 under which an action plan for 1 year and 3 years has been prepared to boost investments in 25 sectors.

The ministry has engaged with the World Bank group to identify areas of improvement in line with World Bank's 'doing business' methodology. A 2 day workshop and several follow up meetings were held to formulate framework which could boost India's ranking which is currently 130 in terms of Ease of doing business.

An Investor Facilitation Cell (IFC) dedicated for the Make in India campaign was formed in September 2014 with an objective to assist investors in seeking regulatory approvals, hand-holding services through the pre-investment phase, execution and after-care support.

The Indian embassies and consulates have also been communicated to disseminate information on the potential for investment in the identified sectors. DIPP has set up a special management team to facilitate and fast track

investment proposals from Japan, the team known as 'Japan Plus' has been operationalized w.e.f October 2014. Similarly 'Korea Plus', launched in June 2016, facilitates fast track investment proposals from South Korea and offers holistic support to Korean companies wishing to enter the Indian market.

Various sectors have been opened up for investments like Defence, Railways, Space, etc. Also, the regulatory policies have been relaxed to facilitate investments and ease of doing business.

Six industrial corridors are being developed across various regions of the country. Industrial Cities will also come up along these corridors.

Today, India's credibility is stronger than ever. There is visible momentum, energy and optimism. Make in India is opening investment doors. Multiple enterprises are adopting its mantra. The world's largest democracy is well on its way to becoming the world's most powerful economy.

Progress under 'Make In India' scheme

Significant achievements have been made under the Make in India initiative since its launch on 25th September, 2014.

'Make in India' initiative was launched on September 25, 2014 with the objective of facilitating investment, fostering innovation, building best in class manufacturing infrastructure, making it easy to do business and enhancing skill development. Action Plans for 21 key sectors were identified for specific actions under (i) Policy Initiatives (ii) Fiscal incentives (iii) Infrastructure Creation (iv) Ease of Doing Business (v) Innovation and R&D (vi) Skill Development areas.

Details of achievements under the 'Make in India' initiatives in the focus sectors are as follows:

1. Foreign Direct Investment

The total Foreign Direct Investment (FDI) inflow was USD 160.79 billion between April 2014 and March 2017 – representing 33% of the cumulative FDI in India since April 2000. In 2015-16, FDI inflow crossed the USD 50 billion mark in one fiscal year, for the first time ever. In 2016-17, FDI inflow stood at a record of USD 60 billion, highest ever recorded for a fiscal year ever. According to IMF World Economic Outlook (April 2017) and UN World Economic Situation Prospects 2017, India is the fastest growing major economy in the world, and is projected to remain so in 2017 and 2018. FDI policy and procedure have been simplified and liberalized progressively. Key sectors that have been opened up for FDI include Defence Manufacturing, Food Processing, Telecommunications, Agriculture, Pharmaceuticals, Civil Aviation, Space, Private Security Agencies, Railways, Insurance and Pensions and Medical Devices.

2. Ease of Doing Business

Steps taken to improve ease of doing business include simplification and rationalisation of existing rules. As a result of the measures taken to improve the country's investment climate, India jumped a massive 30 places to 100th in World Bank's ease of doing business rankings as per World Bank Group's 'Doing Business 2018: Reforming to Create Jobs' report. This is driven by reforms in the areas of Starting a Business, Construction Permits, Getting Credit, Protecting Minority Investors, Paying Taxes, Trading across Borders, Enforcing Contracts, and Resolving Insolvency.

3. Sector specific achievements

During Make in India's three-year journey, significant achievements have been witnessed across different domains. Some of key achievements across focus sectors under Make in India are as below:

(i) Aerospace & Defence

- **Indigenous defence products unveiled** - Akash Surface to Air Missile System, Dhanush Artillery Gun system and Light Combat Aircraft
- **Exports increased** to INR 2059.18 crore (2015-16) from INR 1153.35 crore (2013-14)
- **The Defence Procurement Procedure (DPP) - 2013 amended** to introduce Buy Indian-IDDM (Indigenously Designed, Developed and Manufactured)
- Defence offset policy streamlined:
 - **100% Offset claims filed** during 2014-16 against 64% during 2008-2013

Industrial licensing streamlined

- **119 licenses issued** during 2014-16 against 217 during 2001-14

(ii) Aviation

- **FDI grew 6 times** - from \$93 million (2011-14) to \$519 million (2014-17)
- **Passengers carried by domestic airlines increased by 29%**
 - 148 Million (2012-14) to 191 Million (2014-16).
- **National Civil Aviation Policy (NCAP)** to boost **regional air connectivity**, establish an integrated ecosystem to promote tourism and generate employment
- **160 airports** being revived & operationalized
- **6 greenfield airports approved**
- **16 Common User Domestic Cargo Terminals (CUDCT) operationalized**
- The GPS-Aided Geo Augmented Navigation system (**GAGAN**) **launched**

(iii) Basic Metals and Cement

FDI grew 5.9 times in Mining sector- from \$213 million (2011-14) to \$1261 million (2014-17)

- India's **largest blast furnace, Kalyani commissioned** at SAIL, Burnpur
- **First project to generate power through green technology commissioned** at Rashtriya Ispat Nigam Limited (RINL)
- **Expansion of RINL capacity enhancement** from 3 MTPA to 6.3 MTPA
- **Modernisation of IISCO Steel Plant (ISP), Burnpur** : threefold increase in the hot metal production capacity
- **Modernisation of Rourkela steel plant:** capacity enhancement from 2 MTPA to 4.5 MTPA.

(iv) Biotechnology

- **First indigenously developed and manufactured Rotavirus vaccine, 'Rotavac', launched**
- **Current Good Manufacturing Practices (CGMP) Plant inaugurated** at CSIR-IIIM, Jammu for the manufacture of phyto-pharmaceuticals.
- **India's first cellulosic ethanol technology, demonstration, plant developed** through indigenous technology
- **30 bioincubators and Biotech Parks supported**
- **A virtual centre launched across five Indian Institutes of Technology** to develop advance technologies in the area of biofuels.
- **Asia's largest MedTech Zone (AMTZ) being set up** in Andhra Pradesh to host around **200 independent manufacturing units.**

(v) Capital Goods & Automotive

FDI grew 1.7 times in Automobile and Auto Components - from \$3.98 billion (2011-14) to \$6.86 billion (2014-17)

- **15% growth in turnover** of Auto components sector during 2014-16
- **22% growth in exports** of Auto components during 2014-16
- **16% growth in exports** of passenger vehicles in 2016-17
- **Major Investments by Global Players-** ISUZU Motors, FORD Motor, Mercedes-Benz, Suzuki Motor, Magneti Marelli
- **2.9 lakh people trained** by Automotive Skill Council during 2014-16

CONCLUSION

Overall Make in India changed industrial sector of India. It gave boost to Indian industry even to the local area industrialist, investors and even to economy also. Currently GDP of India increased from 7.2 to 8.2. MAKE IN INDIA program I a very good initiative by our honorable prime minister. I think this program helps to become India a manufacturing hub and through this MAKE IN INDIA program the foreign investor will come in India and the forest reserve of our country will grow.

REFERENCES

- <http://pib.nic.in/newsite/PrintRelease.aspx?relid=174892>
- <http://www.makeinindia.com/about>
- <http://www.makeinindia.com/home>
- https://en.wikipedia.org/wiki/Make_in_India
- <https://www.ndtv.com/india-news/make-in-indias-symbol-is-a-lion-made-of-cogs-670827>
- http://www.pmindia.gov.in/en/major_initiatives/make-in-india/
- Ishwar .c.Dhingra.(2016).Make In India.

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ABSTRACT

The objective of paper is to focus on dimensions and challenges of make in India program. The Make in India program includes major new initiatives designed to facilitate investment, foster innovation, protect intellectual property. Make in India program is on cutting down in delays in manufacturing projects clearing, develop adequate infrastructure and make it easier for companies to do business in India. Four major challenges on path of Make in India and growth dreams are energy requirement, hunger, urbanization and climate change.

Keywords: Challenge, energy, Make in India, Poverty, Urbanization, Human Resource Management, Skill Development, Employability, skill education, barriers and challenges.

INTRODUCTION

Modiji our P.M. said – “The World is looking at Asia. I do not have to waste time to invite people. I need to give them the address.”

Make in India is the campaign intended to boost the domestic management industry and attract foreign investors to invest into the Indian economy with an intention reviving manufacturing business and highlight key sectors in India.

Make in India vision manufacturing currently contributes just over 15% to the nation GDP. The aim of this campaign is to grow this to a 25% contribution as seen with other developing nations of Asia. In the process, the government expects to generate job, attract much foreign direct investment and transform India into a manufacturing hub performed around the globe.

The Make in India program includes major new initiatives designed to facilitate investment, foster innovation, protect intellectual property, and build best – in – class manufacturing infrastructure.

FDI role in Make in India -

A foreign direct investment (FDI) is an investment made by a company or entity based in one country, into a company or entity base in another country. In simple terms it is the direct investment by a corporation in a commercial venture in another country. The effectiveness and efficiency depends upon the visitor's perception. If investment with a purpose of long-term then it contributes positively towards economy. On the other hand if it is for short-term for the purpose of making profit then it may be less significant depending upon the industry sector and type of business a Foreign Direct Investment maybe an attractive and viable option. Both countries are directly invested inviting FDI, because they benefit a lot from such type of investment.

OBJECTIVE OF FDI

- A. Development of basic economic infrastructure- It has been observed that the domestic capital of the under developed countries is often too inadequate to build up economic infrastructure of its own.
- B. Improvement in balance of payments position – The under developed countries need much larger import (in the machinery, capital goods, industrial raw materials,) then they can possibly export. As a result the balance of payments generally turns adverse.
- C. Sustaining a high level of investment – Because of general poverty of masses, the saving are often very low. Hence emerges a resource gap between investment and savings. This gap has to be filled through foreign capital.
- D. Technological- The under developed countries have very low level of technology as compared to advanced countries.
- E. Exploitation of natural resources- A number of under developed countries possess huge mineral resources which await exploitation. As a consequence, they have to depend upon foreign capital to undertake the exploitation of their mineral wealth.

MSMES (micro, small, medium, enterprises) :-

MSMES, as a major contributor towards growth of domestic economy and employment generation should get adequate in terms of policy frame work, incentives, and other relevant aids “Make in India” concept, there is a

need to identify existing loop holes in MSME sector. With respect to financial, technical, skill set, at each stage of manufacturing lifecycle and providing requisite solution the same time.

Although, Indian MSMES are finding it difficult to sell their products in the domestic and international markets increasing competition. To make their products globally competitive, Indian MSMES need to up-grade their technology and put more emphasizes on innovation. It will also help them to actively participate in “Make in India” initiative and make it successful.

Although, estimated statistical data issued by Central Statistics Office (CSO) indicated India’s overall GDP growth during the period 2013-14 to be around 4.7%, rise of 0.4 basis points from previous period i.e. 2012-13, but at the same time growth rate of manufacturing sector remained negative. Manufacturing output declined from 1.02% in FY13 to FY14 .i.e.

SR. NO.	SECTOR WISE	PERIOD (2012-13)	PERIOD (2013-14)
1.	Agricultural Forestry And Fishing	1.93%	4.76
2	Manufacturing	2.06	-0.68
3	Services	7.13	6.79

SIGNIFICANCE

There is no denying that India urgently needed to welcome global investors and ease their operations here. The following numbers capture the sorry state of India’s industrial competitiveness, and why Make In India was needed.

- Low Growth of 15%:** that is the current share of manufacturing sector in India’s GDP. It compare poorly to other Asian countries.
- 100 million jobs:** The number of manufacturing jobs the Indian government aims to create by 2022. China will reduce 85 million manufacturing jobs in the next few years because of fast rising wages. India can attract some of these jobs.
- Strong Demand:** Global companies want to come to Asia but they don’t know where to look in Asia. Democracy, the demographic dividend and strong demand are important factors, and India has all three.
- Young Population:** 65% of India’s 1.2 billion population under the age of 35. The average of Indian in 2020 will be 29, compared with 37 in China and the United States.
- Jobless growth:** In the last five to six years we have job less growth and consumption. That is unsustainable.

OBJECTIVES OF STUDY

My object of study the concept of Make in India is that Make in India focuses on different sectors of the economy for job creation as well as skill enhancement. It focuses on attracting capital and technological investment in India and in turn a high quality standard of living. In the process of Make in India Skill education has a critical role to play. This paper focuses on various barriers and challenges in the development of skills sector as India gets ready for the implementation of the concept of Make in India.

REVIEW OF LITERATURE

Having connectivity, new youth focused programs and institution and dedicated to developing specialized skills.

- Focus on developing industrial Corridors of Smart Cities.
- A new ‘National Industrial Corridors Development Authority’ is being created to co-ordinate, monitor and supervise development of all Industrial Corridors.

FINDINGS AND DISSCUSION

Following are the major findings of the study

- Make In India initiatives have a lot of positive impacts but it is not out of criticism. The government of India started single window service for foreign investors but how far this will cope with the serious reform has been undertaken in different areas needed for ‘Make In India’ like land acquisition, labour laws is a big question mark.
- The development of small and medium enterprises (SMEs) is the back bone of our industry and they need support and encouragement. The focus of ‘Make in India’ campaign is more on foreign investment and big corporations and ignores the SMEs which would create problems of more unemployment and literally no development of local products and skills.

-
- Ignoring SMEs next to impossible to shine India's industry. But it is not clear what 'Make in India' is doing for small business.

Manufacturing sector in India is expected to pick up pace and will provide a lot of opportunities to domestic and international investors to come and make in India in the coming times. In India there are lack of basic amenities, proper transportation facility and connectivity for success of Make in India.

CONCLUSION

The success of the "Make in India" campaign will take place by the success of Indian manufacturing in the coming years. It is the right time of great expectation for India, and it is the only time in recent past where our growth in manufacturing are very high. To set a momentum to the Make in India campaign, the skill education policy frame work has to encourage the establishment of more institutions for skill based training and exclusive universities for skill training.

REFERENCES

Newspapers, internet, book 'Make in India and Its Impact on Indian Economy' by Suresh Kumar Sahoo and Suman Kalyan Chaudhary. 'Economy Empower of Women in Rural and Urban Areas' by Wajeeda Banu, Mohammed – qasim. 'Self – help Group and women empowerment' by Dr. Arjun Yallappa Pangannavar.

STUDY OF FINITE DIFFERENCE METHODS FOR NUMERICAL SOLUTION OF DIFFUSION EQUATION

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ABSTRACT

The aim of this paper is to study finite difference methods to obtain the numerical solution of Diffusion equation. We study Explicit method, Implicit method and Crank-Nicolson finite difference methods to obtain approximate solution of partial differential equation. We study the most celebrated Diffusion equation and its solution is simulated using mathematical software Mathematica.

Keywords: Crank-Nicolson method, Diffusion equation, Explicit method, Implicit method, Mathematica.

1. INTRODUCTION

Study of differential equations and its numerical solution is one of the most active topic of research during these days. Researchers are developing new improved techniques to obtain numerical solutions to differential equations. Amongst these methods, the finite difference methods are used for approximating the solutions to differential equations using finite difference equations to approximate derivatives involved in differential equation. In this method approximate solutions to difference equations is obtained. The method involves finding a function (or some discrete approximation to this functions) which satisfies a given relationship between several of its derivatives on some given region of space or time, along with some given initial and boundary conditions, along the edges of this domain. A finite difference method proceeds by replacing the derivatives in the differential equation by the finite difference approximations. This gives a large algebraic system of equations to be solved in place of the differential equation, something that is easily solved on a computer. Many mathematical software's like Mathematica, Matlab are used to simulate the solution for the better analysis of the problem [1, 3, 4].

In this paper we study different finite difference methods to study well known diffusion equation. Many researchers have been working in this field and developing more improved methods to solve the IBVP for diffusion equation. In the year 2006, A. N. Richmond develop the analytical solution to IBVP by choice of parameters, can be reduced to Sturm-Liouville problem [2, 4, 5].

Section 2, present a short discussion on Diffusion equation as IBVP. We describe explicit, implicit and Crank-Nicolson finite difference methods for diffusion equation in section 3. In section 4, we study local truncation error and stability analysis for explicit finite method. In section 5, we study the solution of diffusion equation by Mathematica software. Finally the conclusions of the paper are given in the last section.

2. ONE DIMENSIONAL DIFFUSION EQUATION

In this section we study one dimensional diffusion equation.

We would like to discuss the diffusion equation $u(x, t)$, with space variable x and time variable t , as initial and homogeneous boundary value problem.

It is described as follows:

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}, \quad t_0 \leq t \leq T, \quad a \leq x \leq b \quad (1)$$

Initial condition $u(x, 0) = u_0$, and

Boundary conditions $u(0, t) = g_a(t)$, $u(L, t) = g_b(t)$

3. NUMERICAL METHODS FOR DIFFUSION EQUATION

Obtaining analytical solution of a partial differential equation is not easy every time. To have the proper analysis of partial differential equation various numerical methods like finite difference method, finite element methods etc. are developed which gives approximation solution to differential equation. In this section we study some of the finite difference methods

3.1 Explicit finite difference method

3.2 Implicit finite difference method

3.3 Crank – Nicolson finite difference method.

Finite difference methods are treated upon the partial derivatives involved in the equation.

The first order and second order partial derivatives are treated as follows:

$u_x := \frac{\partial u}{\partial x}$ and $u_{xx} := \frac{\partial^2 u}{\partial x^2}$ are always approximated by central difference quotients,

$u_x \approx \frac{u_{j+1}^n - u_{j-1}^n}{2\Delta x}$ and $u_{xx} \approx \frac{u_{j+1}^n - 2u_j^n + u_{j-1}^n}{(\Delta x)^2}$ at a grid point (j, n) .

Here $u_j^n = u(x_j, t_n)$.

Depending on how u_x is approximated, we have three basic schemes: explicit, implicit, and Crank-Nicolson finite difference method.

3.1 Explicit Finite Difference Method

If u_t is approximated by a forward difference quotient

$u_t \approx \frac{u_j^{n+1} - u_j^n}{\Delta t}$ at (j, n) , then the corresponding difference equation to (1) at grid point (j, n) is given by

$$w_i^{n+1} = \lambda w_{i-1}^n + (1 - 2\lambda)w_i^n + \lambda C_{j-1}^n \tag{2}$$

Where $\lambda = c^2 \frac{\Delta t}{(\Delta x)^2}$

The initial condition is $w_j^0 = u_0(x_j), j = 0, \dots, N$, and

the boundary conditions are

$$w_0^n = g_a(t_n) \text{ and } w_N^n = g_b(t_n), n = 0, 1, \dots$$

The difference equations (2), $j = 1, \dots, N - 1$, can be solved explicitly.

3.2 Implicit Finite Difference Method

If u_t is approximated by a backward difference quotient

$u_t \approx \frac{u_j^{n+1} - u_j^n}{\Delta t}$ at $(j, n + 1)$, then the corresponding difference equation to (1) at grid point $(j, n + 1)$ is

$$-\lambda w_{j+1}^{n+1} + (1 + 2\lambda)w_j^{n+1} - \lambda w_{j-1}^{n+1} = w_j^n \tag{3}$$

The difference equations (3), $j = 1, \dots, N - 1$, together with the initial and boundary conditions as before, can be solved using Crout algorithm or the SOR algorithm.

3.3 Crank – Nicolson Finite Difference Method

The Crank Nicolson scheme is the average of the explicit scheme at (j, n) and the implicit scheme at

$(j, n + 1)$.

The resulting difference equation is

$$-\frac{\lambda}{2}w_{j-1}^{n+1} + (1 + \lambda)w_j^{n+1} - \frac{\lambda}{2}w_{j+1}^{n+1} = \frac{\lambda}{2}w_{j-1}^n + (1 - \lambda)w_j^n + \frac{\lambda}{2}w_{j+1}^n \tag{4}$$

The difference equations (4), $j = 1, \dots, N - 1$, together with the initial and boundary conditions as before, can be solved using Crout algorithm or SOR algorithm.

4. EXPLICIT FINITE DIFFERENCE METHOD

In this section we study the discretization of diffusion IBVP by using explicit method.

In order to develop the scheme, we discretize the $x - t$ plane by choosing a mesh width

$h = \Delta x$ space and a time step $k = \Delta t$. Using Finite difference methods, we produce approximations $c_i^n \in R^n$ to the solution $c(x_i, t_n)$ at the discrete point by

$$x_i = ih, i = 0, 1, 2, 3 \dots N + 1$$

$$t_n = nk, n = 0, 1, 2, 3 \dots$$

Let the solution $u(x_i, t_n)$ be denoted by U_i^n and its approximate value by u_i^n .

Simple approximations to the first derivative in the time direction by forward difference can be obtained from

$$\frac{\partial u}{\partial t} \approx \frac{U_i^{n+1} - U_i^n}{\Delta t} + o(\Delta t)$$

Discretization of $\frac{\partial^2 u}{\partial x^2}$ obtain from second order central difference in space.

$$\frac{\partial^2 u}{\partial x^2} \approx \frac{U_{i-1}^n - 2U_i^n + U_{i+1}^n}{\Delta x^2} + o(\Delta x^2)$$

Substituting it in diffusion equation (1), we obtain

$$\frac{U_i^{n+1} - U_i^n}{\Delta t} = c^2 \frac{U_{i-1}^n - 2U_i^n + U_{i+1}^n}{\Delta x^2} + o(\Delta t + \Delta x^2)$$

The term $o(\Delta t + \Delta x^2)$ denotes the order of the method. Neglecting the error terms and simplifying, we obtain the difference methods:

$$U_i^{n+1} = \frac{c^2 \Delta t}{\Delta x^2} U_{i-1}^n + \left(1 - 2 \frac{c^2 \Delta t}{\Delta x^2}\right) U_i^n + \frac{\Delta c^2 t}{\Delta x^2} U_{i+1}^n$$

This is the required Explicit centred difference scheme (FTCS) for the IBVP for the diffusion equation

$$U_i^{n+1} = \lambda U_{i-1}^n + (1 - 2\lambda) U_i^n + \lambda U_{i+1}^n$$

This scheme uses a second order central difference in space and the first order forward scheme in time, where
 $\lambda = c^2 \frac{\Delta t}{\Delta x^2}$.

4.1 LOCAL TRUNCATION ERROR

These are measures of the error by which the exact solution of a differential equation does not satisfy the difference equation at the grid points and are obtained by substituting the exact solution of the continuous problem into the numerical scheme.

A necessary condition for the convergence of the numerical solutions to the continuous solution is that the local truncation error tends to zero as the step size goes to zero. In this case the method is said to be consistent.

For the explicit scheme we get for the LTE at (j, n)

$$E_j^n = \frac{u(x_j, t_{n+1}) - u(x_j, t_n)}{\Delta t} - c^2 \frac{u(x_{j-1}, t_n) - 2u(x_j, t_n) + u(x_{j+1}, t_n)}{(\Delta x)^2}$$

With the help of a Taylor expansion at (x_j, t_n) we find that

$$\frac{u(x_j, t_{n+1}) - u(x_j, t_n)}{\Delta t} = u_t(x_j, t_n) + O(\Delta t),$$

$$\frac{u(x_{j-1}, t_n) - 2u(x_j, t_n) + u(x_{j+1}, t_n)}{(\Delta x)^2} = u_{xx}(x_j, t_n) + O((\Delta x)^2)$$

Hence

$$E_j^n = u_t(x_j, t_n) - c^2 u_{xx}(x_j, t_n) + O(\Delta t) + O((\Delta x)^2)$$

As $(\Delta x, \Delta t)$ tends to zero, $u_t(x_j, t_n) - c^2 u_{xx}(x_j, t_n)$ tends to zero.

Thus, the explicit method has LTE $O((\Delta t), (\Delta x)^2)$

4.2 STABILITY ANALYSIS

Theorem 4.2 Stability of the explicit finite difference method is given by $0 < \lambda \leq \frac{1}{2}$.

Where $\lambda = c^2 \frac{\Delta t}{\Delta x^2}$

Proof:

The Fourier method can be used to check if a scheme is stable.

Assume that a numerical scheme admits a solution of the form

$$v_j^n = a^{(n)}(\omega) e^{ijw\Delta x} \tag{5}$$

where ω is the wave number and $i = \sqrt{-1}$

Define

$$G(\omega) = \frac{a^{(n+1)}(\omega)}{a^n(\omega)}$$

where $G(\omega)$ is an amplification factor, which governs the growth of the Fourier component $a(\omega)$.

The Von Neumann stability condition is given by

$$|G(\omega)| \leq 1$$

For $0 \leq \omega\Delta x \leq \pi$

For the explicit scheme we get on substituting (5) into (2) that

$$\begin{aligned} a^{(n+1)}(\omega) e^{ijw\Delta x} &= \lambda a^{(n)}(\omega) e^{i(j+1)w\Delta x} + (1 - 2\lambda) a^{(n)}(\omega) e^{ijw\Delta x} + \lambda a^{(n)}(\omega) e^{i(j-1)w\Delta x} \\ \Rightarrow G(\omega) &= \frac{a^{(n+1)}(\omega)}{a^{(n)}(\omega)} = \lambda e^{iw\Delta x} + (1 - 2\lambda) + \lambda e^{-iw\Delta x} \end{aligned}$$

The Von Neumann stability condition then is

$$\begin{aligned} |G(\omega)| \leq 1 &\Leftrightarrow |\lambda e^{iw\Delta x} + (1 - 2\lambda) + \lambda e^{-iw\Delta x}| \leq 1 \\ &\Leftrightarrow |(1 - 2\lambda) + 2\lambda \cos(w\Delta x)| \leq 1 \\ &\Leftrightarrow \left| 1 - 4\lambda \sin^2\left(\frac{w\Delta x}{2}\right) \right| \leq 1 \quad [\cos 2\alpha = 1 - 2 \sin^2 \alpha] \\ &\Leftrightarrow 0 \leq 4\lambda \sin^2\left(\frac{w\Delta x}{2}\right) \leq 2 \\ &\Leftrightarrow 0 \leq \lambda \leq \frac{1}{2 \sin^2\left(\frac{w\Delta x}{2}\right)} \end{aligned}$$

Since $0 \leq w\Delta x \leq \pi$.

This is equivalent to $0 \leq \lambda \leq \frac{1}{2}$

Thus, explicit finite difference method is conditionally stable if $0 \leq \lambda \leq \frac{1}{2}$, where

$$\lambda = c^2 \frac{\Delta t}{\Delta x^2}$$

4. MATHEMATICA SOFTWARE

Test Problem 1:

Consider the differential equation

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2} \text{ with } c^2 = 1, u(x,0) = x^{10}, u(0,t) = 0, u(1,t) = 1, \Delta t = 0.25 \text{ and } N=1$$

Using mathematical software Mathematica, the solution is simulated as

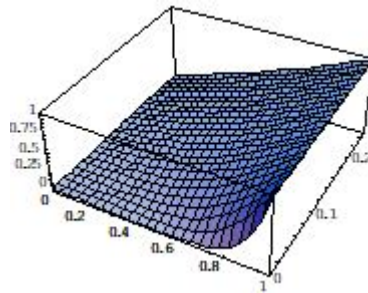


Figure 4.1

Test Problem 2

Consider the differential equation

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2} \text{ with } c^2 = 1, u(x,0) = 2x^2, u(0,t) = 0, u(1,t) = 1, \Delta t = 0.50 \text{ and } N=1$$

Using mathematical software Mathematica, the solution is simulated as

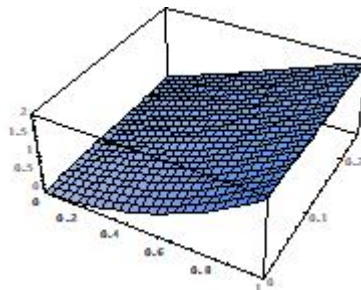


Figure 4.2

5. CONCLUSIONS

1. We study finite difference methods, explicit, implicit and Crank-Nicolson methods.
2. Explicit finite difference method is used to discretize the diffusion IBVP.
3. We study stability and local truncation error analysis of this method. Explicit scheme is conditionally stable.
4. Solution of diffusion equation is graphically simulated by using Mathematica software.

6. REFERENCES

- [1] Ames, W.F. (1977), "Numerical Methods for Partial Differential Equations", Academic Press, New York
- [2] John A. Trangestein (2000), "Numerical Solution of Partial Differential Equation", Durham.
- [3] Randall J. Leveque (1992), "Numerical methods for conservation laws", second edition, Springer.
- [4] S. S. Sastry (2007), "Introductory Methods of Numerical Analysis", Fourth edition, Prentice - Hall of India Ltd.
- [5] W.A.Strauss (2008), "Partial Differential Equations: An Introduction", Second edition, Willey.

THE EIGENVALUES OF GRAPH K_4 AND ITS PROPERTIES USING LINEAR ALGEBRA

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ABSTRACT

Some of the mathematical modelling problems require more than one technique for their solutions. Graph theory is branch of Mathematics . The combinatorial nature of Graph Theory have lead to great many rediscoveries. It has also helped researchers to do some creative thinking of their own. Many graphs are represented in form of adjacency matrix. To study the structure and enumeration of graphs , the techniques in Matrix theory and linear algebra becomes a tool. In this paper , to find eigenvalues of a graph, the adjacency matrix of the given graph K_4 is considered, which is symmetric matrix . The characteristic polynomial of the adjacency matrix of the graph are interpreted in terms of subgraphs , then it is related to eigenvalues of other graph parameters and this helps to characterize the sets of eigenvalues for respective graph.

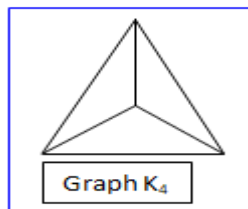
Keywords: Graph Theory, Matrix Theory, Adjacency matrix, Eigenvalues, characteristic polynomial, Symmetric matrix, Regular graph K_4 .

1. INTRODUCTION

Graph theory is a branch of Mathematics. Graphs are structured and enumerated using various techniques and tools of pure Mathematics. Matrix theory and linear algebra are the tools to explore properties of graphs. Researchers are studying many graphs like cycle graph, path graphs and complete graphs. The study of properties of graph with the help of characteristic polynomial, eigenvalues and eigenvectors of matrices associated with the graph is done under the branch of Mathematics named Spectral Graph Theory.

2. The graph K_4

K_4 is complete and regular graph. Each vertex of K_4 is incident to remaining three vertices of the graph. Degree of each vertex of K_4 is three. There are four vertices and six edges in the graph K_4 . [1]



3. Notations and terminologies

Most of the notations and terminologies of Graph theory are taken from [1] while that of matrix theory and linear algebra are taken from [2].

3.1. Definition: The **eigenvalues** of a matrix A are the numbers λ such that $Ax = \lambda x$, has a non-zero solution vector. Each such solution is an **eigen vector** associated with λ .

3.2. Remark: 1. The **eigenvalues** of a graph are **eigenvalues** of its adjacency matrix A .

2. The eigenvalues are roots $\lambda_1, \lambda_2, \lambda_3, \dots, \lambda_n$ of characteristic polynomial

$$\phi(G; \lambda) = \det (A - \lambda I) = \prod_{i=1}^n (\lambda - \lambda_i).$$

3.3. Definition: The list of eigenvalues $\lambda_1, \lambda_2, \lambda_3, \dots, \lambda_n$ of graph G along with their multiplicities $m_1, m_2, m_3, \dots, m_t$ is represented in matrix form and this is called **Spectrum** of graph G . It is denoted as $\text{Spec}(G)$.

$$\text{Spec}(G) = \begin{bmatrix} \lambda_1 & \dots & \lambda_n \\ m_1 & \dots & m_t \end{bmatrix}.$$

4. Properties of K_4

The study of properties of K_4 is obtained using its adjacency matrix.

4.1. Eigenvalues and Spectrum of K_4

The vertices of K_4 are a, b, c, d. If the line joins two vertices then the entry in adjacency matrix is taken as 1 otherwise it is zero.

a b c d

The adjacency matrix of K_4 is $A = \begin{matrix} a & \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} \\ b \\ c \\ d \end{matrix}$

Characteristic polynomial of matrix A is $\det(A - \lambda I) = 0$

$$\Rightarrow \begin{vmatrix} -\lambda & 1 & 1 & 1 \\ 1 & -\lambda & 1 & 1 \\ 1 & 1 & -\lambda & 1 \\ 1 & 1 & 1 & -\lambda \end{vmatrix} = 0 \Rightarrow \lambda^4 - 6\lambda^2 - 8\lambda - 3 = 0 \Rightarrow (\lambda+1)^3 (\lambda - 3) = 0$$

\Rightarrow Eigenvalues of A are $\lambda = -1, -1, -1, 3$

\Rightarrow Multiplicity of eigenvalue $\lambda = -1$ is three while that of $\lambda = 3$ is one.

Thus, **Eigenvalues of graph K_4 are $\lambda = -1, -1, -1, 3$ and**

Spectrum of K_4 denoted as $\text{Spec}(K_4) = \begin{bmatrix} -1 & 3 \\ 3 & 1 \end{bmatrix}$

4.2. Eigen vectors corresponding to eigenvalues

We have to find eigen vectors corresponding to eigenvalues $\lambda = 3$ and $\lambda = -1$.

This way we can obtain basis for eigen space.

The eigen vectors $\{v_1, v_2, \dots, v_n\}$ are said to be **linearly independent** vectors if for

$a_1, a_2, \dots, a_n \in \mathbb{R}$ and $a_1v_1 + a_2v_2 + \dots + a_nv_n = 0$ then $a_1 = a_2 = \dots = a_n = 0$

4.2.1. For $\lambda = 3$, characteristic equation $(A - \lambda I) X = 0 \Rightarrow \begin{bmatrix} -3 & 1 & 1 & 1 \\ 1 & -3 & 1 & 1 \\ 1 & 1 & -3 & 1 \\ 1 & 1 & 1 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

Using Gauss elimination method and row transformations

$$\begin{aligned} & \begin{bmatrix} -3 & 1 & 1 & 1 \\ 1 & -3 & 1 & 1 \\ 1 & 1 & -3 & 1 \\ 1 & 1 & 1 & -3 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \xrightarrow{-(1/3)R_1} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 1 & -3 & 1 & 1 \\ 1 & 1 & -3 & 1 \\ 1 & 1 & 1 & -3 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \xrightarrow{R_2 - R_1} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 0 & -8/3 & 4/3 & 4/3 \\ 0 & 4/3 & -8/3 & 4/3 \\ 0 & 4/3 & 4/3 & -8/3 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \\ & \xrightarrow{R_3 - R_1, R_4 - R_1} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 0 & -8/3 & 4/3 & 4/3 \\ 0 & 4/3 & -8/3 & 4/3 \\ 0 & 4/3 & 4/3 & -8/3 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \xrightarrow{R_2 / (-8/3)} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 0 & 1 & -1/2 & -1/2 \\ 0 & 4/3 & -8/3 & 4/3 \\ 0 & 4/3 & 4/3 & -8/3 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \\ & \xrightarrow{R_3 - (4/3)R_2, R_4 - (4/3)R_2} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 0 & 1 & -1/2 & -1/2 \\ 0 & 0 & -2 & 2 \\ 0 & 0 & 2 & -2 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \xrightarrow{(-1/2)R_3} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 0 & 1 & -1/2 & -1/2 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 2 & -2 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \\ & \xrightarrow{R_4 - 2R_3} \begin{bmatrix} 1 & -1/3 & -1/3 & -1/3 \\ 0 & 1 & -1/2 & -1/2 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \xrightarrow{R_2 - (-1/2)R_3, R_1 - (-1/3)R_3} \begin{bmatrix} 1 & -1/3 & 0 & -2/3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \begin{matrix} | \\ 0 \\ 0 \\ 0 \end{matrix} \end{aligned}$$

$$\underline{R_1 - (-1/3)R_2} \begin{bmatrix} 1 & 0 & 0 & -1 & | & 0 \\ 0 & 1 & 0 & -1 & | & 0 \\ 0 & 0 & 1 & -1 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \end{bmatrix}$$

$\Rightarrow x_1 - x_4 = 0; x_2 - x_4 = 0; x_3 - x_4 = 0 \Rightarrow x_1 = x_4; x_2 = x_4; x_3 = x_4$

General solution $X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} x_4 \\ x_4 \\ x_4 \\ x_4 \end{bmatrix} = x_4 \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

The eigen vectors corresponding to eigenvalue $\lambda = 3$ is $v_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

$\{v_1\}$ is the basis for the eigen space E_λ where $\lambda = 3$.

4.2.2. For $\lambda = -1$, characteristic equation $(A - \lambda I) X = 0 \Rightarrow \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

Using Gauss elimination method and row transformations

$$\begin{bmatrix} 1 & 1 & 1 & 1 & | & 0 \\ 1 & 1 & 1 & 1 & | & 0 \\ 1 & 1 & 1 & 1 & | & 0 \\ 1 & 1 & 1 & 1 & | & 0 \end{bmatrix} \xrightarrow{R_2 - R_1} \begin{bmatrix} 1 & 1 & 1 & 1 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \\ 1 & 1 & 1 & 1 & | & 0 \\ 1 & 1 & 1 & 1 & | & 0 \end{bmatrix} \xrightarrow{R_3 - R_1} \begin{bmatrix} 1 & 1 & 1 & 1 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \\ 1 & 1 & 1 & 1 & | & 0 \end{bmatrix}$$

$$\xrightarrow{R_4 - R_1} \begin{bmatrix} 1 & 1 & 1 & 1 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \end{bmatrix}$$

$\Rightarrow x_1 + x_2 + x_3 + x_4 = 0 \Rightarrow x_1 = -x_2 - x_3 - x_4$

General solution $X = \begin{bmatrix} -x_2 - x_3 - x_4 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = x_2 \begin{bmatrix} -1 \\ 1 \\ 0 \\ 0 \end{bmatrix} + x_3 \begin{bmatrix} -1 \\ 0 \\ 1 \\ 0 \end{bmatrix} + x_4 \begin{bmatrix} -1 \\ 0 \\ 0 \\ 1 \end{bmatrix}$

The eigen vectors corresponding to eigenvalue $\lambda = -1$ are $v_2 = \begin{bmatrix} -1 \\ 1 \\ 0 \\ 0 \end{bmatrix}, v_3 = \begin{bmatrix} -1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, v_4 = \begin{bmatrix} -1 \\ 0 \\ 0 \\ 1 \end{bmatrix}$.

$\{v_2, v_3, v_4\}$ is the basis for the eigen space E_λ where $\lambda = -1$.

These eigenvectors v_1, v_2, v_3 and v_4 are linearly independent.

4.2.3. Cayley –Hamilton theorem

Cayley –Hamilton theorem states that every square matrix satisfies its characteristic polynomial(characteristic equation).[2]

Here, A satisfies its characteristic polynomial.

Consider characteristic equation of A : $\lambda^4 - 6\lambda^2 - 8\lambda - 3 = 0$

To verify that $A^4 - 6A^2 - 8A - 3I = 0$

Consider $A^4 - 6A^2 - 8A - 3I$

$$\begin{aligned}
 &= \begin{bmatrix} 21 & 20 & 20 & 20 \\ 20 & 21 & 20 & 20 \\ 20 & 20 & 21 & 20 \\ 20 & 20 & 20 & 21 \end{bmatrix} - 6 \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 3 & 2 & 2 \\ 2 & 2 & 3 & 2 \\ 2 & 2 & 2 & 3 \end{bmatrix} - 8 \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} - 3 \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \\
 &= \begin{bmatrix} 21 & 20 & 20 & 20 \\ 20 & 21 & 20 & 20 \\ 20 & 20 & 21 & 20 \\ 20 & 20 & 20 & 21 \end{bmatrix} - \begin{bmatrix} 18 & 12 & 12 & 12 \\ 12 & 18 & 12 & 12 \\ 12 & 12 & 18 & 12 \\ 12 & 12 & 12 & 18 \end{bmatrix} - \begin{bmatrix} 0 & 8 & 8 & 8 \\ 8 & 0 & 8 & 8 \\ 8 & 8 & 0 & 8 \\ 8 & 8 & 8 & 0 \end{bmatrix} - \begin{bmatrix} 3 & 0 & 0 & 0 \\ 0 & 3 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 3 \end{bmatrix} \\
 &= \begin{bmatrix} 21-18-0-3 & 20-12-8-0 & 20-12-8-0 & 20-12-8-0 \\ 20-12-8-0 & 21-18-0-3 & 20-12-8-0 & 20-12-8-0 \\ 20-12-8-0 & 20-12-8-0 & 21-18-0-3 & 20-12-8-0 \\ 20-12-8-0 & 20-12-8-0 & 20-12-8-0 & 21-18-0-3 \end{bmatrix} \\
 &= \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = 0
 \end{aligned}$$

Cayley-Hamilton theorem is verified.

Matrix of K_4 satisfies Cayley-Hamilton theorem.

4.2.4. Minimal polynomial of K_4

The minimal polynomial of $n \times n$ matrix A over a field F is monic polynomial P over F of least degree such that $P(A) = 0$. [2]

Characteristic polynomial of matrix A is $P_A(\lambda) = \lambda^4 - 6\lambda^2 - 8\lambda - 3$.

Characteristic equation of matrix A is $\lambda^4 - 6\lambda^2 - 8\lambda - 3 = 0 \Rightarrow (\lambda+1)^3(\lambda-3) = 0$.

To find a polynomial of least degree that is satisfied by A .

The divisors of $P_A(\lambda)$ are $1, (\lambda+1), (\lambda-3), (\lambda+1)(\lambda-3), (\lambda+1)^2(\lambda-3)$ and $(\lambda+1)^3(\lambda-3)$.

The constant polynomial $f(\lambda)=1$, is not satisfied by A as $1 \times I \neq 0$.

To check if $f(\lambda)=\lambda+1$ is satisfied by A .

$$\text{Consider } A + I = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix} \neq 0$$

A does not satisfy the polynomial $f(\lambda)=\lambda+1$.

To check if $f(\lambda)=\lambda-3$ is satisfied by A .

$$\text{Consider } A - 3I = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} - \begin{bmatrix} 3 & 0 & 0 & 0 \\ 0 & 3 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 3 \end{bmatrix} = \begin{bmatrix} -3 & 1 & 1 & 1 \\ 1 & -3 & 1 & 1 \\ 1 & 1 & -3 & 1 \\ 1 & 1 & 1 & -3 \end{bmatrix} \neq 0$$

A does not satisfy the polynomial $f(\lambda)=\lambda-3$.

To check if $f(\lambda)=(\lambda+1)(\lambda-3)$ is satisfied by A .

$$\text{Consider } (A + I)(A - 3I) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} -3 & 1 & 1 & 1 \\ 1 & -3 & 1 & 1 \\ 1 & 1 & -3 & 1 \\ 1 & 1 & 1 & -3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = 0$$

A is satisfied by the polynomial $f(\lambda)=(\lambda+1)(\lambda-3)$.

Hence, minimal polynomial of A is $f(\lambda)=(\lambda+1)(\lambda-3)$.

Thus, Minimal polynomial of K_4 is $f(\lambda) = (\lambda+1)(\lambda - 3)$.

4.2.5. Orthogonal and orthonormal vectors of K_4

The vectors u and v are said to be **orthogonal** if $\langle u,v \rangle = u.v = 0$ (is dot product).

The **projection of vector u on v** is denoted as $\text{proj}_v(u)$ defined as $\frac{v.u}{u.u} u$.

Norm of a vector u denoted as $\|u\|$ is defined as $\sqrt{u.u}$.

Consider the eigen vectors of A . $v_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$, $v_2 = \begin{bmatrix} -1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$, $v_3 = \begin{bmatrix} -1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$, $v_4 = \begin{bmatrix} -1 \\ 0 \\ 0 \\ 1 \end{bmatrix}$.

To find the orthogonal and orthonormal vectors, using Gram Schmidt orthogonalization process.

Take $u_1 = v_1 = (1,1,1,1)$; $v_2 = (-1,1,0,0)$; $v_3 = (-1,0,1,0)$; $v_4 = (-1,0,0,1)$.

$$u_2 = v_2 - \text{proj of } v_2 \text{ on } u_1 = v_2 - \frac{v_2.u_1}{u_1.u_1} u_1 = (-1,1,0,0) - \frac{(-1,1,0,0).(1,1,1,1)}{(1,1,1,1).(1,1,1,1)} (1,1,1,1) = (-1,1,0,0)$$

$$\text{Then } u_3 = v_3 - \text{proj of } v_3 \text{ on } u_1 - \text{proj of } v_3 \text{ on } u_2 = v_3 - \frac{v_3.u_1}{u_1.u_1} u_1 - \frac{v_3.u_2}{u_2.u_2} u_2$$

$$= (-1,0,1,0) - \frac{(-1,0,1,0).(1,1,1,1)}{(1,1,1,1).(1,1,1,1)} (1,1,1,1) - \frac{(-1,0,1,0).(-1,1,0,0)}{(-1,1,0,0).(-1,1,0,0)} (-1,1,0,0)$$

$$= (-1,0,1,0) - 0 - \frac{1}{2} (-1,1,0,0) = (-1,0,1,0) - (\frac{-1}{2}, \frac{1}{2}, 0, 0) = (\frac{-1}{2}, \frac{-1}{2}, 1, 0)$$

Then $u_4 = v_4 - \text{proj of } v_4 \text{ on } u_1 - \text{proj of } v_4 \text{ on } u_2 - \text{proj of } v_4 \text{ on } u_3$

$$= v_4 - \frac{v_4.u_1}{u_1.u_1} u_1 - \frac{v_4.u_2}{u_2.u_2} u_2 - \frac{v_4.u_3}{u_3.u_3} u_3$$

$$= (-1,0,0,1) - \frac{(-1,0,0,1).(1,1,1,1)}{(1,1,1,1).(1,1,1,1)} (1,1,1,1) - \frac{(-1,0,0,1).(-1,1,0,0)}{(-1,1,0,0).(-1,1,0,0)} (-1,1,0,0)$$

$$- \frac{(-1,0,0,1).(\frac{-1}{2}, \frac{-1}{2}, 1, 0)}{(\frac{-1}{2}, \frac{-1}{2}, 1, 0).(\frac{-1}{2}, \frac{-1}{2}, 1, 0)} (\frac{-1}{2}, \frac{-1}{2}, 1, 0) = (-1,0,0,1) - 0 - \frac{1}{2} (-1,1,0,0) - \frac{1}{3} (\frac{-1}{2}, \frac{-1}{2}, 1, 0)$$

$$\underline{= (-1 + \frac{1}{2} + \frac{1}{6}, 0 + \frac{-1}{2} + \frac{1}{6}, 0 + 0 + \frac{-1}{3}, 1 + 0 + 0) = (\frac{-1}{3}, \frac{-1}{3}, \frac{-1}{3}, 1)}$$

The orthogonal vectors of A are $u_1=(1,1,1,1); u_2=(-1,1,0,0); u_3=(\frac{-1}{2}, \frac{-1}{2}, 1, 0); u_4=(\frac{-1}{3}, \frac{-1}{3}, \frac{-1}{3}, 1)$.

The orthonormal vectors of A are $w_1 = \frac{u_1}{\|u_1\|} = (\frac{1}{\sqrt{4}}, \frac{1}{\sqrt{4}}, \frac{1}{\sqrt{4}}, \frac{1}{\sqrt{4}})$; $w_2 = \frac{u_2}{\|u_2\|} = (\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0, 0)$;

$$w_3 = \frac{u_3}{\|u_3\|} = (\frac{-1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}, \frac{\sqrt{2}}{\sqrt{3}}, 0)$$
; $w_4 = \frac{u_4}{\|u_4\|} = (\frac{-1}{2\sqrt{3}}, \frac{-1}{2\sqrt{3}}, \frac{-1}{2\sqrt{3}}, \frac{\sqrt{3}}{2})$

Thus, the orthogonal vectors of K_4 are $u_1=(1,1,1,1); u_2=(-1,1,0,0); u_3=(\frac{-1}{2}, \frac{-1}{2}, 1, 0); u_4=(\frac{-1}{3}, \frac{-1}{3}, \frac{-1}{3}, 1)$.

The orthonormal vectors of K_4 are $w_1 = \frac{u_1}{\|u_1\|} = (\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2})$; $w_2 = \frac{u_2}{\|u_2\|} = (\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0, 0)$;

$$w_3 = \frac{u_3}{\|u_3\|} = (\frac{-1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}, \frac{\sqrt{2}}{\sqrt{3}}, 0)$$
; $w_4 = \frac{u_4}{\|u_4\|} = (\frac{-1}{2\sqrt{3}}, \frac{-1}{2\sqrt{3}}, \frac{-1}{2\sqrt{3}}, \frac{\sqrt{3}}{2})$

4.2.6. Orthogonal Diagonalisation of K_4

A $n \times n$ real symmetric matrix is said to be Diagonalisable if there exists nonsingular matrix P such that $P^{-1}AP$ is diagonal matrix.

The eigen vectors are taken as column vectors to form the matrix $P = \begin{bmatrix} -1 & -1 & -1 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$ which is nonsingular.

$$P^{-1} = \text{inverse of matrix } P = \begin{bmatrix} \frac{-1}{4} & \frac{3}{4} & \frac{-1}{4} & \frac{-1}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{3}{4} & \frac{-1}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} & \frac{3}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} \end{bmatrix}$$

$$\text{Consider } P^{-1}AP = \begin{bmatrix} \frac{-1}{4} & \frac{3}{4} & \frac{-1}{4} & \frac{-1}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{3}{4} & \frac{-1}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} & \frac{3}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} \end{bmatrix} \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} -1 & -1 & -1 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{-1}{4} & \frac{3}{4} & \frac{-1}{4} & \frac{-1}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{3}{4} & \frac{-1}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} & \frac{3}{4} \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} & \frac{-1}{4} \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 & 3 \\ -1 & 0 & 0 & 3 \\ 0 & -1 & 0 & 3 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 3 \end{bmatrix} = D \text{ (Diagonal matrix with eigen values as diagonal elements)}$$

Matrix A is diagonalizable.

Thus, K_4 is diagonalizable.

A $n \times n$ real symmetric matrix is said to be **Orthogonally Diagonalisable** if there exists orthogonal matrix S such that S^TAS is a diagonal matrix, where S^T denotes transpose of S.

$$S \text{ is orthogonal matrix } \Rightarrow S^T S = S S^T = I \Rightarrow S^T = S^{-1}$$

Matrix A is Orthogonally Diagonalisable if $S^{-1}AS = D$

$$\text{Matrix } S = [w_1 \ w_2 \ w_3 \ w_4] = \begin{bmatrix} \frac{1}{2} & \frac{-1}{\sqrt{2}} & \frac{-1}{\sqrt{6}} & \frac{-1}{2\sqrt{3}} \\ \frac{1}{2} & \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{6}} & \frac{-1}{2\sqrt{3}} \\ \frac{1}{2} & 0 & \frac{\sqrt{2}}{\sqrt{3}} & \frac{-1}{2\sqrt{3}} \\ \frac{1}{2} & 0 & 0 & \frac{\sqrt{3}}{2} \end{bmatrix} \text{ is matrix of orthogonal vectors.}$$

Matrix A is orthogonally diagonalizable.

Thus, K_4 is orthogonally diagonalizable

5. CONCLUSION

K_4 is complete regular graph. The matrix of K_4 is real symmetric matrix of order four. The properties a real symmetric matrix satisfies are associated to graph K_4 . It is shown that K_4 has eigen values 3 and -1 with multiplicity 1 and 3 respectively. There are four eigen vectors which are linearly independent. There are four

orthogonal and corresponding four orthonormal vectors for K_4 . Cayley Hamilton theorem is satisfied. Minimal polynomial of K_4 is obtained. K_4 is also orthogonally diagonalizable. Many more linear algebraic properties of this graph can be explored. K_4 can be generalized to K_n and further the properties of K_n can be studied.

6. REFERENCES

1. Gary Chartrand and Ping Zhang, *A first course in Graph Theory*, Dover publication, Boston(2012)
2. Serge Lang, *Introduction to Linear Algebra*, Verlag, New York Inc.(2009) Allyn and Bacon Inc. Boston(1971).
3. Bondy.J.A.and Murty.U.S.R., *GraphTheory*, Springer(1976)
4. Shyi- Long Lee, Yeong-Nan Yeh; *On eigenvalues and eigenvectors of graphs*, Journal of Mathematical Chemistry 12(1993),121-135
5. Bapat. R. B., *Graphs and matrices*, Springer,Hindustan Book Agency, New Delhi(2010)
6. Vasudev C., *graph theory with applications* , New Age International (P) Ltd(2011)
7. www.wikipedia.org
8. mathworld.wolfram.com › Algebra › Linear Algebra › General Linear Algebra

THE CORRESPONDENCE BETWEEN GRAPHS AND THEIR AUTOMORPHISM GROUPS

Ujjwala Kurkute¹ and Veena Shinde-Deore²¹Mithibai College, Vile-Parle (W), Mumbai²Bhavan's Hazarimal Somani College, Chowpatty, Mumbai**ABSTRACT**

Graph theory and Group Theory are the branches of Mathematics. The researchers have experimented and used their imagination to explore these two branches of Mathematics. It has also helped researchers to do some creative thinking of their own. Graphs can be used to model situation that occur within certain kinds of problems. Using Automorphism, a link is established between graph theory and group theory. In this paper, Automorphism group of a graph is defined. Bipartite graph $K_{1,3}$ and Diamond graph are considered and it is shown that Automorphism group for these graphs is subgroup of the symmetric group S_n and Klein's 4-group V_4 respectively.

Keywords: Graph Theory, Group Theory, Automorphism, Bipartite graph $K_{m,n}$, Symmetric group S_n , Klein's 4-group V_4 .

1. INTRODUCTION

This paper is an exploration of the relationship between graphs and the groups. The concept of automorphism group of a graph is the main, peripheral to present this paper[6]. The binary operation that is composition on permutation group to aid in computing automorphism groups of graphs.

Let $G(V,E)$ be a graph where V is the set of all vertices and E is the set of all edges. Define identity map $f:G(V,E) \rightarrow G(V,E)$ as $f(v) = v$ for $v \in V$. The function $\alpha:V(G) \rightarrow V(G)$ is called automorphism if α maps a vertex of same degree to a vertex of same degree[1].

Arthur Cayley states that every group is isomorphic to a group of permutation[1]. The automorphism group of a graph is a group of permutations. The group of all permutations on a set of cardinality n is called the symmetric group S_n and its order is $n!$. The automorphism group of a graph G of order n is a subgroup of S_n [1]. The content of this paper is broad discussion about graphs $K_{1,3}$, the Diamond graph whose Automorphism group is subgroup of S_n and Klein 4-group V_4 respectively[1].

2. BASIC NOTATIONS AND TERMINOLOGY OF GRAPH THEORY

Some of the basic graph theory notations and terminologies for example, a Graph $G(V,E)$, Automorphism group of a graph $\text{Aut}(G)$, Degree of a vertex, Orbit of a graph are taken from the book [1,6].

Some of the basic group theory notations and terminologies for example, identity map, permutation, composition of permutations, isomorphism, automorphism, automorphism group of G , inverse of element, Group table, Klein 4-group V_4 , order of Group, symmetric group S_n of order n are taken from the book.[4,5]

2.1. Types of Graphs

There are many types of graphs like paths, cycle, complete graph, regular graph wheel etc. the graphs which are presented in the paper are bipartite and diamond graph.

2.1.1. Bipartite graph G

A graph G is said to be bipartite, if vertex set $V(G)$ can be partitioned into two non- empty subsets U and W so that every edge of G has one vertex in U and other in W . [6]

$K_{1,3}$ is a Bipartite graph (star graph), as every edge of $K_{1,3}$ joins a vertex of $U = \{x\}$ and a vertex of $W = \{u,v,w\}$.

2.1.2. Diamond graph

Diamond graph is a planar undirected graph with 4-vertices and 5-edges. It consist of a complete graph minus one edge.[7]

Orbit of a graph: For a vertex v of a graph G , the set of all vertices into which v can be mapped by some automorphism of G is called an orbit of G [1].

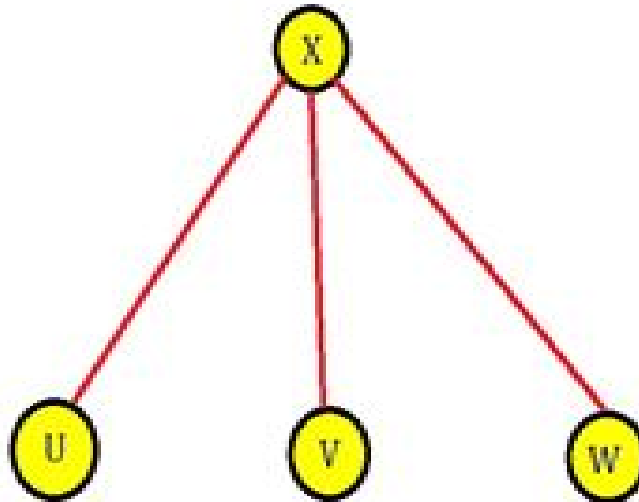
Automorphism group of a graph G: An automorphism of a graph G is an isomorphism of G with itself. The set of all automorphisms of G forms a permutation group, $\text{Aut}(G)$, acting on the vertex set $V(G)$. This $\text{Aut}(G)$ is called the automorphism group of G .

automorphism group of G

3. Bipartite graph $K_{1,3}$:

Consider the graph $H= K_{1,3}$. The vertices of H are labelled as shown below.

H : labelled diagram of $K_{1,3}$



Consider automorphisms $\alpha_i: V(G) \rightarrow V(G)$, $1 \leq i \leq 6$ by

$$\alpha_1 = (x)(u)(v)(w) = e \text{ identity, } \alpha_2 = (u,v,w), \alpha_3 = (u,w,v), \alpha_4 = (v,w), \alpha_5 = (u,w),$$

$\alpha_6 = (u,v)$, where every automorphism of a graph is a permutation on $V(G)$, automorphism can be expressed more simply , in terms of permutations cycles.

\circ	α_1	α_2	α_3	α_4	α_5	α_6
α_1	α_1	α_2	α_3	α_4	α_5	α_6
α_2	α_2	α_3	α_1	α_6	α_4	α_5
α_3	α_3	α_1	α_2	α_5	α_6	α_4
α_4	α_4	α_5	α_6	α_1	α_2	α_3
α_5	α_5	α_6	α_4	α_3	α_1	α_2
α_6	α_6	α_4	α_5	α_2	α_3	α_1

Table-1: Automorphism of $K_{1,3}$

From Table1,

$$\alpha_1 \circ \alpha_1 = \alpha_1, \alpha_1 \circ \alpha_2 = \alpha_2, \alpha_1 \circ \alpha_3 = \alpha_3, \alpha_1 \circ \alpha_4 = \alpha_4, \alpha_1 \circ \alpha_5 = \alpha_5, \alpha_1 \circ \alpha_6 = \alpha_6$$

implies α_1 is identity element of $\text{Aut}(H)$.

$$\alpha_2 \circ \alpha_3 = \alpha_1 = \alpha_3 \circ \alpha_2 \text{ implies } \alpha_2 \text{ is a inverse of } \alpha_3 \text{ and conversely.}$$

$\alpha_4 \circ \alpha_4 = \alpha_1, \alpha_5 \circ \alpha_5 = \alpha_1, \alpha_6 \circ \alpha_6 = \alpha_1$ implies $\alpha_4, \alpha_5, \alpha_6$ are their own inverse. Multiplication of any two elements of $\text{Aut}(H)$ is again a element of $\text{Aut}(H)$.

Therefore, $\text{Aut}(H)$ is closed under multiplication (composition)

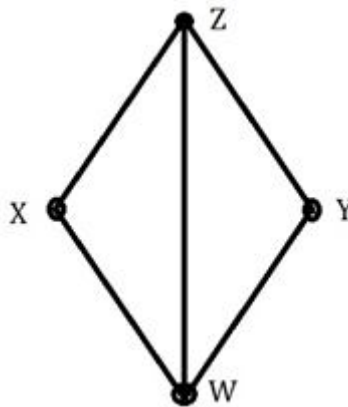
Set of these permutations form a non-abelian group under composition called automorphism group of H denoted by $\text{Aut}(H)$.

$$\text{Aut}(H) = \{ \alpha_1 = e(\text{identity}), \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6 \}$$

such that $\alpha_2 \alpha_3 = e, \alpha_6^2 = \alpha_4^2 = \alpha_5^2 = e$ is group of order 6 isomorphic to S_3 .

Orbits of graph H are $\{x\}, \{u,v,w\}$.

4. Diamond graph



Consider the diamond graph F as follows:

Consider Automorphisms $\beta_i: V(F) \rightarrow V(F)$, $1 \leq i \leq 4$ by

$$\beta_1(v) = v, \forall \text{ vertices } v \text{ of } F, \beta_2(v) = \begin{cases} x \text{ if } v = y \\ y \text{ if } v = x \end{cases}$$

$$\beta_3(v) = \begin{cases} w \text{ if } v = z \\ z \text{ if } v = w \end{cases}, \beta_4(v) = \begin{cases} y \text{ if } v = x \\ x \text{ if } v = y \\ w \text{ if } v = z \\ z \text{ if } v = w \end{cases}$$

$\beta_1 = \text{identity} = e$, $\beta_2 = (x, y)$, $\beta_3 = (z, w)$, $\beta_4 = (x, y)(z, w)$, where every automorphism of a graph is a permutation on $V(G)$, automorphism can be expressed more simply, in terms of permutations cycles. The group table for $\text{Aut}(F)$

e	β_1	β_2	β_3	β_4
β_1	β_1	β_2	β_3	β_4
β_2	β_2	β_1	β_4	β_3
β_3	β_3	β_4	β_1	β_2
β_4	β_4	β_3	β_2	β_1

Table-2: Automorphisms of Diamond graph

From Table 2,

$$\beta_1 \circ \beta_1 = \beta_1, \beta_1 \circ \beta_2 = \beta_2, \beta_1 \circ \beta_3 = \beta_3, \beta_1 \circ \beta_4 = \beta_4, \beta_2 \circ \beta_2 = \beta_1, \beta_3 \circ \beta_3 = \beta_1, \beta_4 \circ \beta_4 = \beta_1$$

implies β_1 is identity element of $\text{Aut}(F)$.

$\beta_2 \circ \beta_2 = \beta_1$, $\beta_3 \circ \beta_3 = \beta_1$, $\beta_4 \circ \beta_4 = \beta_1$ i.e $\beta_2, \beta_3, \beta_4$ are their own inverse. Multiplication of any two elements of $\text{Aut}(F)$ is again a element of $\text{Aut}(F)$. Therefore $\text{Aut}(F)$ is closed under multiplication (composition)

Set of these permutations form a group under composition called automorphism group of F denoted by $\text{Aut}(F)$.

$\text{Aut}(F) = \{\beta_1 = e(\text{identity}), \beta_2, \beta_3, \beta_4\}$ such that $\beta_2^2 = \beta_3^2 = \beta_4^2 = e$ is abelian group of order 4 isomorphic to Klein 4-group V_4 .

Orbits of graph F are $\{x, y\}, \{z, w\}$.

5. CONCLUSION

Graphs are interesting tool for the study of groups. A group is associated with each graph, known as the Automorphism group of a graph. Different groups can be associated with automorphisms of a graph and vice-versa. The orbits are the equivalence classes of the equivalence relation induced on vertex set $V(G)$ of graph G. This relation is automorphism of graphs.

6. REFERENCES

1. Gary Chartrand and Ping Zhang, *Introduction to Graph Theory*, Tata Mcgraw-Hill(2006) ,Chapter3,pp.66-75.
2. Mehdi Behzad and Gary Chartrand, *Introduction to the Theory of Graphs*, Allyn and Bacon Inc. Boston(1971),chapter 13,pp.166-180.
3. Bondy.J.A.andMurty.U.S.R., *GraphTheory*, Springer(1976),chapter1,pp.1-36.
4. Michael Artin, *Algebra*, Prentice-Hall of India, New Delhi(1994),chapter1, pp.24-27,chapter2,pp.38-50.
5. Joseph A.Gallian, *Contemporary Abstract Algebra*, Narosa Publishing House(1998),chapter1,pp.29-32,chapter 5,pp.90-106,chapter 2, pp.40-48, chapter 6,pp.121-125.
6. Arthur T. WHITE, *Graphs ,Groups and surfaces* ,Elsevier science Publishers B.V.(1984), chapter 3,pp.15-21.
7. www.wikipedia.org

PROJECTIONS IN *-RING

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ABSTRACT

A ring A with an involution is known as $*$ -ring. An element $e \in A$ is called projection if it is self-adjoint and idempotent i.e. $e^* = e$ and $e^2 = e$. There is no systematic procedure to find projections in $*$ -rings. The problem become more complicated in matrix rings i.e. $M_n(\mathbb{Z}_m)$. In this research paper I tried to identify projections for the case $n=2$ i.e. $M_2(\mathbb{Z}_m)$. Apart from this I derived the condition under which \hat{A} , the set of projections in A become lattice. This discussion will be helpful for enumeration of projections in $M_n(\mathbb{Z}_m)$ for $n \geq 3$

Keywords: Involution, projection, lattice, transpose

INTRODUCTION

If A is a ring then the mapping $x \rightarrow x^*$ satisfying $(x^*)^* = x$, $(x+y)^* = x^*+y^*$, $(xy)^* = y^*x^*$ is called an involution on A . A ring with involution is called $*$ -ring. An element $e \in A$ is called a projection if $e^* = e$ and $e^2 = e$. The set of all projections in A is denoted by \hat{A} . Further for any subset S of A we write $\hat{S} = S \cap \hat{A}$. One can prove that if e and f are projections then ef is projection iff e & f commute. We define order relation in \hat{A} as $e \leq f$ in case $e = ef$ & hence $e = fe$. Thus \hat{A} becomes a poset with this relation.

Two projections e and f are said to be orthogonal if $ef = 0$.

Proposition 1: In a $*$ -ring A

- i) If e, f are orthogonal projections then $e + f$ is projection.
- ii) If e, f are projections with $e \leq f$ then $f-e$ is projection orthogonal to e and $e \leq f$

Proof: see the proof in [1]

In general \hat{A} is not a lattice. A drastic condition that work is commutativity given in the following result

Proposition 2: If $e, f \in \hat{A}$ commute then $e \wedge f$ and $e \vee f$ exist and given by $e \wedge f = ef$, $e \vee f = e + f - ef$

Proof: see the proof in [1]

We are going to identify projections in $M_n(\mathbb{Z}_m)$ with $*$ -transpose as involution. In this direction let us prove the following

Corollary: If $A \in M_n(\mathbb{Z}_m)$ is projection then $I-A$ is also projection

Proof: As A is a projection

$$\text{Therefore } A^2 = A \text{ and } A = A^t$$

$$\text{We have } (I-A)^t = I^t - A^t = I - A$$

$$\text{Moreover } (I-A)^2 = (I-A)(I-A)$$

$$= I - A - A + A^2$$

Hence $I-A$ is a projection

Identification of projections in $M_2(\mathbb{Z}_m)$.

Let A be a projection in $M_2(\mathbb{Z}_m)$ with $*$ -transpose as involution

$$\text{Hence } A = A^t \text{ and } A^2 = A$$

$$\text{Write } A = \begin{bmatrix} x & y \\ y & z \end{bmatrix}$$

$$\text{Therefore } A^2 = \begin{bmatrix} x^2 + y^2 & xy + yz \\ xy + yz & y^2 + z^2 \end{bmatrix}$$

$$\text{Thus } A^2 = A \text{ gives } x^2 + y^2 = x, xy + yz = y, y^2 + z^2 = z$$

One should note that the only involution on \mathbb{Z}_m is identity

Thus when $y^2=0$ we get $x^2=x, z^2=z$ i.e. $x, z \in \check{Z}_m$

But $y^2 \neq 0$ in this case x and z can be determined from above equations

Illustration: Find all projections in $M_2(\mathbb{Z}_3)$

Suppose $A = \begin{bmatrix} x & y \\ y & z \end{bmatrix}$ is projection in $M_2(\mathbb{Z}_3)$

Now $y^2=0$ gives $y=0$

As explained above x & z are such that $x^2=x, z^2=z$

Thus x and z can be 0 or 1

Hence projections are $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Take $y^2 \neq 0$ then y is either 1 or 2

For $y=1$, x & z are given by $x^2+1=x, x+z=1, 1+z^2=z$

Clearly x & z cannot be 0 & 1

Therefore $x=2$ gives $z = 1 - x = 2$ in \mathbb{Z}_3

Thus the projection is $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

Similarly for $y = 2$ projection is $\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$

So all projections in $M_2(\mathbb{Z}_3)$ are

$\{ \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}, \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix} \}$

Note : Refer corollary proved before

Write $0 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $e = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ $f = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$

The set of projections can be written as $\hat{A} = \{ 0, I, e, f, I-e, I-f \}$

In respect of Prop. 2 we are going to find the condition so that projections in $M_n(\mathbb{Z}_m)$ is lattice

For convenience take $n=2$ i.e. $A = M_2(\mathbb{Z}_m)$ with $*$ -transpose as involution.

Take $e, f \in \hat{A}$ write $e = \begin{bmatrix} x & y \\ y & z \end{bmatrix}$ and $f = \begin{bmatrix} u & v \\ v & w \end{bmatrix}$

Thus $ef = \begin{bmatrix} xu + yv & xv + yw \\ yu + zv & yv + zw \end{bmatrix}$ and $fe = \begin{bmatrix} xu + yv & yu + zv \\ xv + yw & yv + zw \end{bmatrix}$

Hence $ef = fe \iff xv + yw = yu + zv$

$\iff y(u-w) = v(x-z)$ ----- (1)

Observe that for $y = v = 0$ we get $ef = fe$

Thus we have to check condition (1) only for non-diagonal matrices.

CONCLUSION

In general \hat{A} is not necessarily lattice. But for $M_2(\mathbb{Z}_m)$ we could derive condition so that \hat{A} is lattice. One can derive superior & sophisticated result in this direction.

REFERENCES

- 1) S.K. Berberian, Baer $*$ -rings, Springer-Verlag, Berlin [1972]
- 2) I.N. Herstein, Rings with involution, Chicago Uni. Press, London [1976]
- 3) Gopalkrishnan N.S , University Algebra, Wiley Eastern, Publi. [1998]
- 4) Jacobson N. Basic Algebra Vol-I Hindustan Publi. Company [1980].

THE IMPACT OF PLASTIC BAGS ON THE ENVIRONMENT: A FIELD SURVEY OF THE THANE

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ABSTRACT

“Don't be drastic, Say ' No' to plastic.” It is easy to listen and read but difficult to implement. Since plastic bags are provided free of charge, people have a tendency to use these bags excessively. The effects of plastic bags on the environment are really quite harmful. Hence, the current study undertaken to understand the current usage plastic and its impact on the environment. With the sample of 100, the study covered the respondents like student, teachers and passerby.

The study reflected that even though State Government Ban on plastic use, nearly, approx 83% of people are still using it. Even their well known the harmful effects of plastic bags on the human lives, marine life and animals, they are still using plastic bags. Though they are ready to use biodegradable plastic bags, but due to lack of some awareness and facilities provided by the government, the implementation of a plastic bag ban is lacking somewhere. Because, now-a-day our life fully depends on plastic bags.

If the plastic bag ban is implemented properly, it will help's in environment, social and economic sustainability. Sustainability focuses on equal economic growth that generated health and wealth.

INTRODUCTION

The scenario of global environment is changing day by day and it's very difficult to survive or challenging to live life without any harm. Every nation is trying to develop their countries without taking into consideration of the environment impact of degradation and pollution of agricultural land.

The government alone cannot find ways to eradicate the problem of environmental hazard. However, it is the responsibility of both the business sector and the individual consumers in reducing the environment and agriculture pollution.

When it comes to problems related to the environment, and then every individual needs to be a part and parcel to think of way out. Being an education institution, it becomes a moral duty to sensitize the generation next regarding the grave issue so that these future policy makers, managers, implementers and consumers ultimately can work hand in hand to bring a positive change.

STATEMENT OF PROBLEM:

Plastics and their products are littering our, cities, oceans and water ways and contributing to health problems in humans, animals and marine lives. Plastic bag problems loom larger every day. Plastic bags tend to disrupt the environment in serious way. They get into soil and lowly release the toxic chemical, burning of plastic in the open air, leads to the environmental pollution due to the release of poisonous chemicals.

The polluted air, when inhaled by humans and animals affects their health and cause respiratory problems. The life under water, 100 million marine animals killed every year, due to the plastic debris in the ocean as they often mistake plastic bag for food such as a jellyfish and as plastic cannot be digested. Plastics are made by the use of petroleum and natural gas which are non-renewable resources and contribute to the climate change.

As Maharashtra contains of many developed cities, many peoples are migrating towards it. Due to this Maharashtra has become India's biggest generator of plastic waste which produces more than 4.6 lakhs tonnes of waste per year. Which lead into the blockage in sewage system and results in floods.

OBJECTIVES:

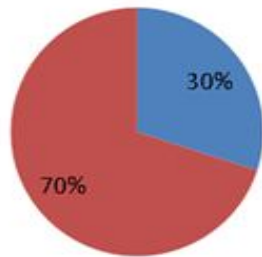
- To study the profile of respondents.
- To study the effects of plastic bags on the environment.
- To find out the reaction of respondents on plastic ban.
- To determine the usage of plastic bags
- To justify the plastic ban is solution for environmental sustainability.

FINDINGS:

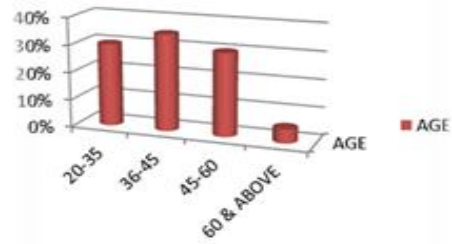
Under the study we have taken the sample of 100 people in which there are 70 females and 30 males under which there are 35% of people are students, 10% are teachers, and 55% are passersby.

GENDER

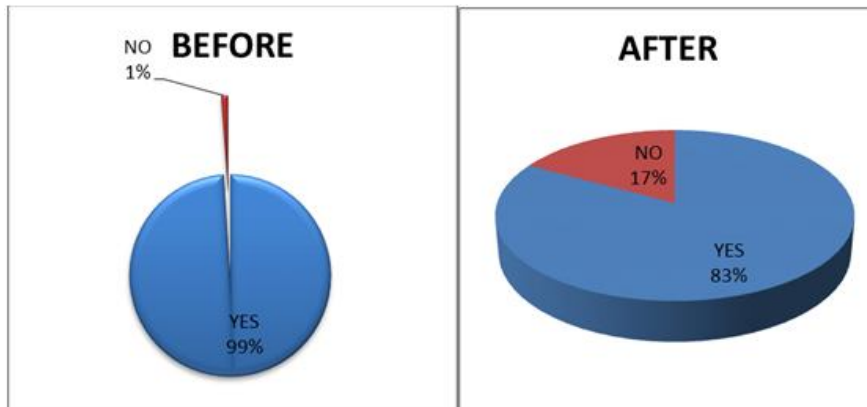
■ MALE ■ FEMALE



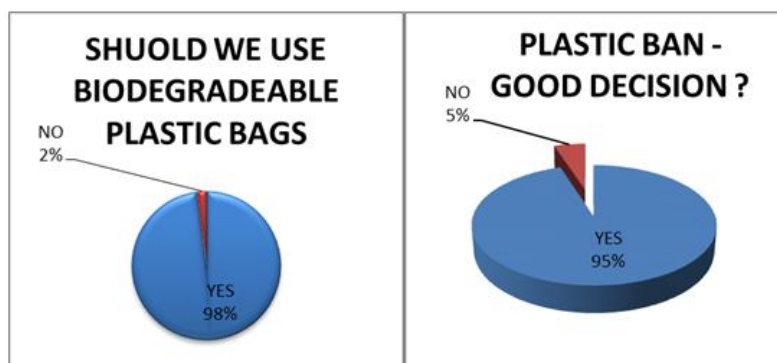
AGE



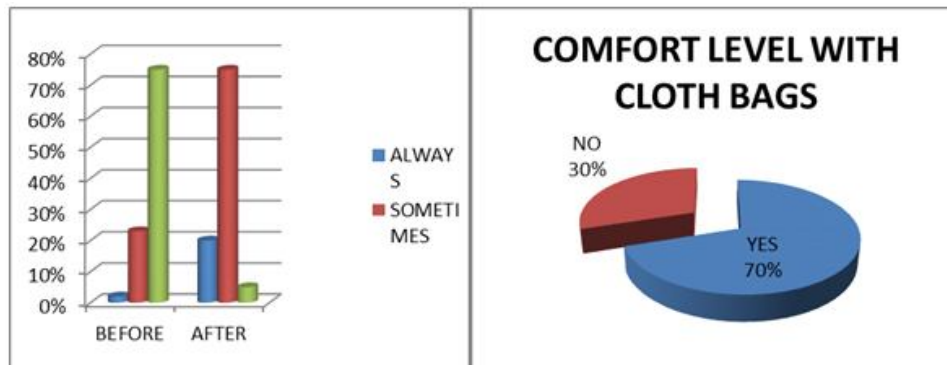
We came to know that before the ban there are 99% of people are using it and only 1% of them are not using. And after the ban 83% of people are still using the plastic bags and 17% of them are not using of plastic. They are using plastic bags of various purposes such as 35% are using for dust bin, 10% are using for shopping bags, 15% using for storing and carrying things and 40% of them throw away.



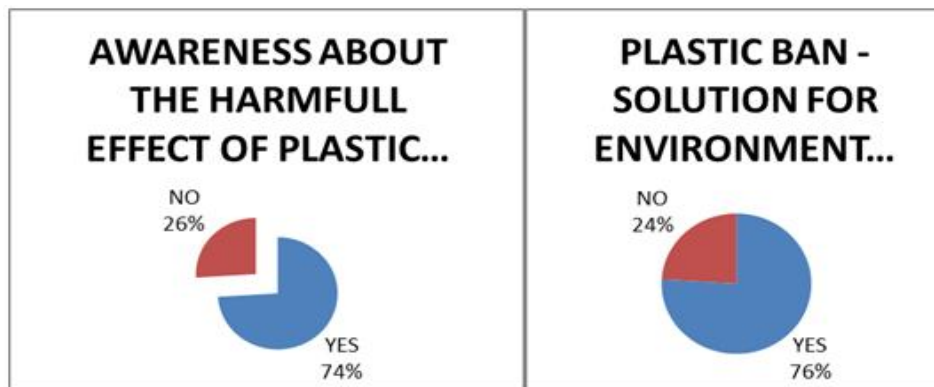
On further studies, there are 98% of public are agreed on, that they should use the biodegradable plastic bags and 2% are not. 95% of them thinks that the ban on plastic is the good decision from the govt. and 5% of them thinks that it is a retrograded step.



On asking that do they bring their own bags for shopping the scenario before the ban 2% carries always, 23% carries sometimes, and 75% never. But after the ban 20% bring always, 75% brings sometimes and 5% brings never. On asking that if they are comfort by using cloths bags, instead of plastic bags, 70% of them answered yes and 30% are not.



On the further study we came to know 74% of people are well aware of the negative impact of plastic bags on our environment, human life, marine life and wild life. And 26% of people are not.



After the whole study of research we came to know that only 76% of public beliefs that YES plastic ban is the solution for environment sustainability, and 24% of public says NO on this.

LITERATURE REVIEW

- 1) Nitin Joseph, Aswin Kumar - The aim of study was to find out the status of awareness of the health hazards associated with the usage of plastic bags among people and their perceptive towards the legislations prohibiting the usage of plastic bags. Interview methodology used for the present study. Data was collected interviewing any adult members. The sample size was 250. Data was entered and analyzed using version 16.0 of the statistical package for social science software package. It is found that most of the participants in the settings had the awareness of hazards of plastic bag usage.
- 2) Bella Jaisinghani (2018) - With the enforcement of the state wide plastic ban, commercial establishment and citizen alike have started to shun single use plastic items. The article given the analysis of plastic bag seized and how much amount collected in terms of fine by Municipal Corporation. The article also revealed the negative opinion of merchants on plastic ban. Merchant demands that the administration should give them time to implement their norms. The article also emphasized that how the merchant shopkeepers were cheated through fine by officers of the Municipal Corporation.

RESEARCH METHODOLOGY

- a) **Primary Data:** A structured questionnaire used to collect primary data from the respondents. The sample size was 100. The chi square test used to analyse and the interpretation of data.
- b) **Secondary Data:** The research articles published in journals, Published article in Newspaper referred for the study.

Hypothesis testing

H₀ - Plastic Bag Ban effects does not effects more females than males

H₁ - Plastic Bag Ban effects more females than males

	USer	Non user	Total
Male	18	12	30
Female	40	30	71
Total	58	42	100

O _i	E _i	(O _i -E _i) ² /E ²
18	17.4	0.02
12	12.6	0.02
40	40.6	0.00
30	29.4	0.01
Critical value 0.05		

Degree of Significance -(R-1) (C-1)= 2-1*2-1

1*1 =1

$$\chi^2_c = \sum \frac{(O_i - E_i)^2}{E_i}$$

Interpretation: Looking up the value 2.0 in the χ^2 table for 1 degree of freedom, the probability of this result is 3.811. Hence, H₀ is rejected, i.e. plastic bag ban does not effects more females than males. (The chi square value is more than critical value).

SIGNIFICANCE OF THE STUDY

This study helps to environmental conservation. It promote majors of sustainable development alternative degradable resources.

LIMITATIONS AND SCOPE OF THE STUDY

A very limited sample size selected for the study and foused on only one city i.e. Thane. The study can extend in the future by focusing on the number of cities and also sample size can be increased to drawn the conclusion.

RECOMMENDATION & SUGGESTIONS

- Spread awareness as negative effects on environment.
- Replace plastic bag with paper and cloth bags
- The price of cloth bags should be reducing.
- A toll free number should be provided to the public, so that if they saw anyone using plastic bags, they can complain. And imidiata can take action against the offender.
- Alternative solution should b provides, specially in Rainey season.
- As total plastic ban is not possible, but recycled plastic bags is one option that should be considered.
- The educational institutions should conduct seminars/ workshop on Plastic ban. Under entrepreneurship student having knowledge like stich cloth bags and distribute the Society to create awareness.
- Society chairman should take initiative, under the plastic bags gathered it should be keep together and then call to BMC to collect it.

CONCLUSION

Through field survey of plastic bags, which done in thane city and found that the city containing a very large amount of plastic bags where there are on the streets, roads, the trees, vegetables and so on which leads to contamination and distortion environment and reduces the aesthetic view of the thane city which refers to the environmental disaster in the city. It is found that plastic bags waste material cause serious environment problems, so it is essential that the waste materials must remove by using the microorganism which associated with plastic bags.

The government cannot do alone there is required hand to hand support of each individuals of the society. The NGO's should take initiatives to create awareness among the society. The education institution can also contribute in creating awareness with the support of students who are the future nation builders. The vendors of

vegetables should also restrict to giving vegetables in plastic bags. Each of us should take oath not use of plastic bag and protect the environment.

REFERENCE

- <https://www.ncbi.nlm.nih.gov>
- Bella Jaisinghani ‘ On day 2, banned plastics found in only 9% of shops’ published article in Times of India, Monday, June 25, 2018.

STUDY OF TOLERANCE INDEX OF COMMELINA BENGHALENSIS L. AND ALTERNANTHERA SESSILIS L. TO DIFFERENT HEAVY METALS

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The present research were undertaken to study the tolerance index of two weed species *Commelina benghalensis* L. and *Alternanthera sessilis* L. to different heavy metals such as Zn, Cu, Cr, Cd, Pb and Hg. The standard stock solution of all these heavy metals was prepared from which dilute solutions were used every time before experimentation. The plant material of the both the species were collected from the non polluted area around Kalyan city, Thane District. The rooting experiment was conducted to study the tolerance index of these plants to the given heavy metals. Result shows that the indices tolerance of *Alternanthera sessilis* and *Commelina benghalensis* differs characteristically in the presence of different metals. Both these plants show tolerance to all the studied heavy metals up to 4 ppm and decreases as the concentration of heavy metals increases. Both these plants show highest tolerance to Zn whereas lowest to Hg. Both these species can be used to remediate the disturb habitat contaminated by heavy metal pollution.

Keywords: *Alternanthera sessilis* L., *Commelina benghalensis* L. Tolerance Index, Heavy Metals

INTRODUCTION

Heavy metals have a molecular mass $>5.0 \text{ g cm}^{-3}$ which is distinctly higher than the average particle density of soils (2.65 g cm^{-3}). Several heavy metals such as iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), cobalt (Co), or molybdenum (Mo) are essential for the growth of organisms. The remainder of the heavy metals is always toxic to organisms: cadmium (Cd), lead (Pb), uranium (U), thallium (Tl), chromium (Cr), silver (Ag), and mercury (Hg). Arsenic (As) and selenium (Se) are non-heavy metals. However, since they partly share toxicity features with heavy metals, they are often referred to as metalloids (Bothe H., 2011).

The toxicity of metals and their compounds largely depends on their bioavailability in the soil (Beyersmann and Hartwig, 2008). Plants specifically adapted to life on heavy metal-rich soils and term as metallophytes. Discovery of lead-tolerant races of the grasses *Agrostis tenuis* (Bradshaw, 1952) and *festuca ovina* (Wilkins, 1957) leads to the opening metal tolerance plant species field. Different plants show different mechanism of tolerance to these heavy metals. Earlier work has showed presence of *Chloris harbata*, *Cynodon dactylon* (H.) Pers. and a sedge *Cyperus rotundus* L., at highly contaminated with mercury dump site of a chloralkali plant (Lenka, Panda & Panda, 1992). This work showed these plant species are highly tolerate to the mercury.

Current research paper reports the test of tolerance to Zn, Cu, Cr, Cd, Pb and Hg by two weed species *Commelina benghalensis* L. and *Alternanthera sessilis* L. *Commelina benghalensis* belonging to the family Commelinaceae is the weedy herb growing on sandy soils. It invades areas with moist soil including roadsides, grasslands and other disturbed areas. The plant is seasonal grow during July to October. It is associated with disturbed soils such as yards, lawns and cultivated areas. *Alternanthera sessilis* belonging to the family Amarantheceae is branched prostrate herb. It is one of the most successful perennial weed found near roadsides, railway track and wasteland in and around the Thane District. As the pollution of heavy metals is common in water and soil, it is necessary to screen the plant species which can tolerate the high concentration of heavy metals. Therefore the present study were undertaken.

MATERIALS AND METHODS

The standard solutions of heavy metals were prepared by using their respective salts and suitable acid were added to make the solution acidic. The final volume was made to 1000ml from which dilute solutions were prepared a fresh every time before the experimentation.

Determination of the range of metal concentration to which the plants were to be exposed

Plant materials for the present work were collected from the non-polluted land of Thane District. The plant materials were collected in polythene bags and brought to laboratory for further study. The plants were washed with tap water and then distilled water. Cuttings (tillers) from these plants were used for the experiment. Cutting of both the plants were rooted in distilled water in polythene containers for 3 days. The length of longest root was measured on first day. The rooted cuttings were then transferred to heavy metal solution of Zn, Cu, Cr, Cd, Pb and Hg at concentration of 0.1, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0 and 10.0 ppm. A control sample was maintained in distilled water. Rooting media were renewed every second day. Likewise, every set was

experimented in triplicates whereas entire sets were repeated for each season (i.e August- Monsoon, October-post Monsoon and December winter). On 9th day, lengths of longest roots were measured and results were reported.

The tolerance indices towards Zn, Cu, Cr, Cd, Pb and Hg were estimated by using the formula given by Wilkins (1957) based on rooting of plant cuttings in metal solution. Tolerance Index can be calculated by using following formula:

$$\text{Tolerance Index} = \frac{\text{Length of the longest root in toxic solution}}{\text{Length of the longest root in nontoxic solution}} \times 100$$

RESULTS AND DISCUSSION

The various degree of tolerance of *Alternanthera sessilis* L. of different concentration of heavy metals is given in tables 1 and figure 1 while that for *Commelina benghalensis* L. is given in table 2 and figure 2 respectively. At the lowest concentration tested i.e. 0.1 ppm, *Alternanthera sessilis* L. fared very well with tolerance index ranging from 94.54 % to 56.36%. At 1 ppm tolerance index ranging from 61.81 % for Zn to 28.84% for Hg and it appeared to be most toxic followed by Cu, Cd, Pb, Cr and Zn. At 2 ppm, tolerance index is ranging from 45.46 % for Zn to 3.84% for Hg. In this case again Hg is showing more toxic followed by Cu, Pb, Cr, Cd and Zn. At 3 ppm tolerance index is ranging from 25.58 % for Cr to 2.94% for Pb. Cr found to be more toxic followed by Zn, Cd, Cu, Pb and Hg. At 4 ppm, tolerance index is ranging from 16.04 % for Cd to 3.84% for Hg. Highest tolerance index is found to be for Cd followed by Zn, Cr, Cu, Pb and Hg. At 5 ppm the plant shows high tolerance 9.90% for Zn followed by Cd, Cu and Cr. The plants do not show tolerance to Hg, Pb and Cu. For 6 ppm, roots of plants grow only in Zn and Cr solution. Zinc has more tolerance index i.e., 5.45 % than Cr which is 4.65 %. At 7 ppm, only Zn shows tolerance index 1.82 % whereas other heavy metals are toxic and there is no growth after this concentration. The sequence of tolerance of *Alternanthera sessilis* is Zn > Cu > Cr > Cd > Pb > Hg.

At the lowest concentration tested i.e. 0.1 ppm, *Commelina benghalensis* fared very well with tolerance index ranging from 93.15 % for Zn to 68.75% for Hg and it is most toxic followed by Cr, Cd, Cu, Pb and Zn. At 1 ppm, tolerance index ranging from 89.04 % for Zn to 57.81 % for Hg and it appeared to be most toxic followed by Cr, Pb, Cu, Cd and Zn. At 2 ppm, tolerance index ranging from 60.27 % for Zn to 47.05% for Cr again it is showing more toxicity followed by Pb, Cu, Cd, Hg and Zn. At 3 ppm, tolerance index is ranging from 46.57 % for Zn to 23.94% for Cu. Hg with tolerance index of 0 % is most toxic followed by Cu, Cr, Pb, Cu, Cd and Zn. At 4 ppm the plant shows highest tolerance index for Pb with 23.72 % followed by Cd, Zn, Cr, Cu and Hg. At 5 ppm the plant shows high tolerance to Zn i.e. 10.95 % followed by Pb and Cr. The plant do not show tolerance to Cu and Hg. For 6 ppm, roots of plants grow only in Zn and Cr solution. Zinc has tolerance index i.e., 2.73% while in other metals the value is zero. In the concentration of heavy metal above 6 ppm, no rootings were observed. The sequence of tolerance of *Commelina benghalensis* is Zn > Pb > Cu > Cd > Cr > Hg.

The indices tolerance of *Alternanthera sessilis* and *Commelina benghalensis* differs characteristically in the presence of different metals. Both these plants do not show tolerance to all the studied heavy metals after 7 ppm. Both these plants show highest tolerance to Zn whereas lowest to Hg. Similar results reported by Patra et.al. (2004) in the grass *Chloris barbata* Sw. for Zn with tolerance index at 1-40 ppm. Zn tolerance is due to its requirement for large numbers of enzyme and in DNA transcription. The results show high toxicity of mercury and Cadmium. This result is due to the inhibitory effect of these two metals and no known role in physiology. Hg at low concentration, however, has been reported to stimulate root growth in *Allium cepa* and frond growth in *Lemna minor* (Subhadra et.al. 1994). Although Copper is trace essential nutrient to all higher plants, it becomes toxic at moderate to high concentration (Baker and Waker, 1990). Chromium is a toxic, non-essential element to plants; hence, they do not possess specific mechanisms for its uptake. Lead is non-essential element in metabolic process and may become toxic or lethal to many organisms. The result shown in table for both these plants gives same trend.

CONCLUSION

The tolerance indices of *Commelina benghalensis* are lower than *Alternanthera sessilis* probably due to its periodic occurrence and low adaptability and sustainability. As far as *Alternanthera sessilis* is far aggressive weed compared to *Commelina benghalensis* occurring throughout the year and greatly tolerance to different metallic toxicity fluctuation. It is observed that both these plants *Alternanthera sessilis* and *Commelina benghalensis* can be used for restoration of disturbed habitat contaminated with considerable levels of toxic metals.

Table-1: Tolerance Indices (TI) of *Alternanthera sessilis* L. exposed to different concentration of heavy metals in ppm

Conc. of H.M.	Zn TI	Cu TI	Pb TI	Cd TI	Cr TI	Hg TI
0.1	94.54	94.18	60.29	75.30	72.09	56.36
1.0	61.81	41.81	47.05	45.67	55.81	28.84
2.0	45.46	7.27	19.11	43.20	41.86	3.84
3.0	25.26	5.45	2.94	20.98	25.58	0
4.0	14.54	1.81	0	16.04	11.62	0
5.0	9.09	0	0	8.61	6.97	0
6.0	5.45	0	0	0	4.65	0
7.0	1.82	0	0	0	0	0
8.0	0	0	0	0	0	0
9.0	0	0	0	0	0	0
10.0	0	0	0	0	0	0

Table-2: Tolerance Indices (TI) of *Commelina benghalensis* L. exposed to different concentration of heavy metals in ppm

Conc. of H.M.	Zn TI	Cu TI	Pb TI	Cd TI	Cr TI	Hg TI
0.1	93.15	77.46	79.66	74.19	72.54	68.75
1.0	89.04	64.78	61.01	70.96	60.78	57.81
2.0	60.27	47.88	47.45	50.00	47.05	56.25
3.0	46.57	23.94	33.89	38.70	25.49	0
4.0	21.91	7.04	23.72	22.58	9.08	0
5.0	10.95	0	8.47	3.22	3.92	0
6.0	2.73	0	0	0	0	0
7.0	0	0	0	0	0	0
8.0	0	0	0	0	0	0
9.0	0	0	0	0	0	0
10.0	0	0	0	0	0	0

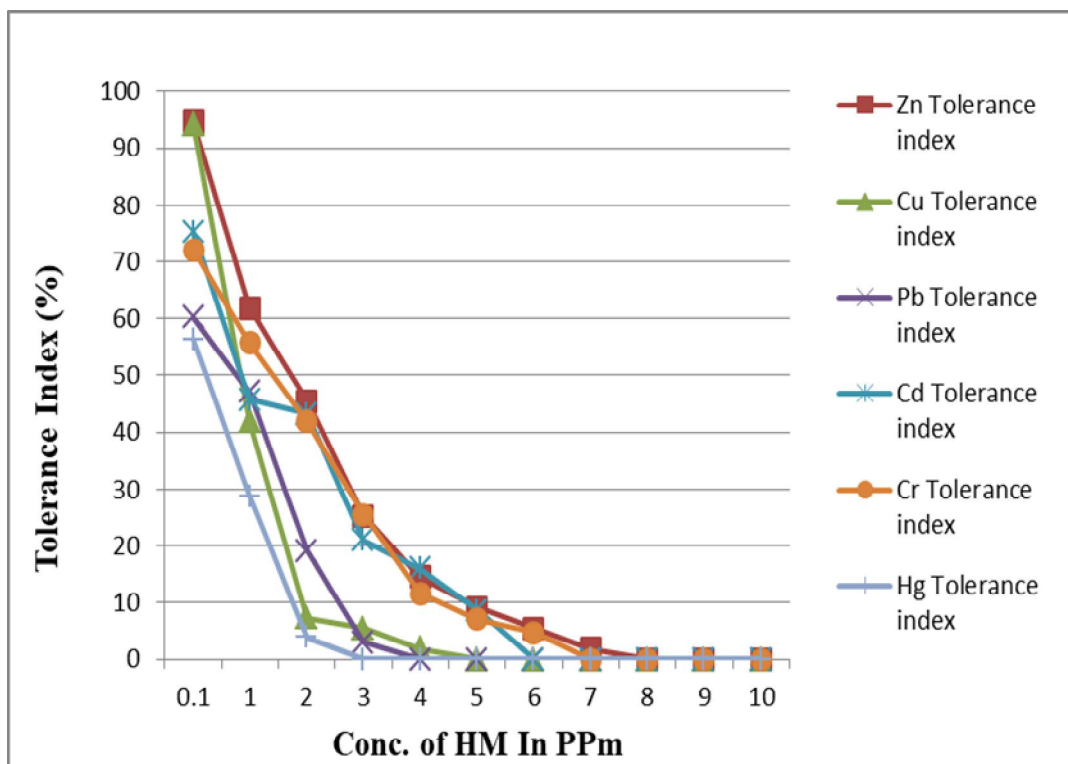


Figure-1: Comparative Tolerance Index of *Alternanthera sessilis* L. in different concentration of Heavy Metals

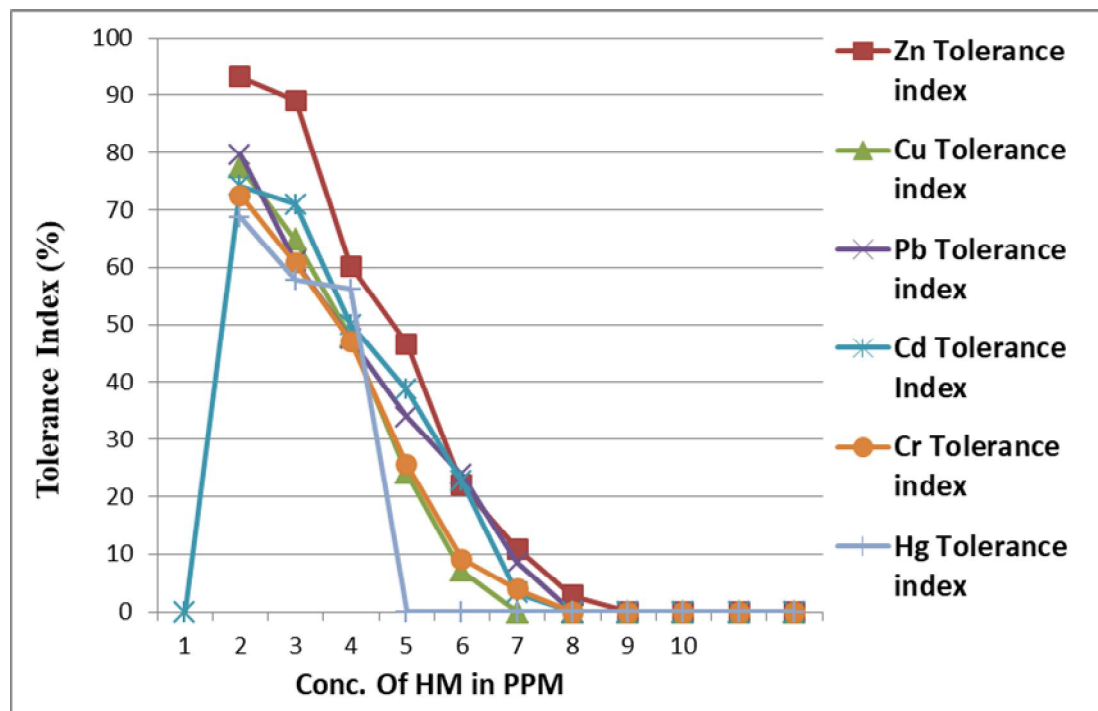


Figure-2: Comparative Tolerance Index of *Commelina benghalensis* L. in different concentration of Heavy Metals

REFERENCES

1. Baker, A.J.M., Walker, P.L.(1990). Ecophysiology of metal uptake by tolerant plants. In: Shaw, A.J. (Ed.), Heavy Metal Tolerance in Plants, Evolutionary Aspects. CRC Press Inc, Boca Raton, Florida, pp. 155–178.
2. Beyersmann D. and Hartwig A.(2008) “Carcinogenic metal compounds: recent insight into molecular and cellular mechanisms,” Archives of Toxicology, vol. 82, no. 8, pp. 493–512.
3. Bothe H., (2011) Plants in Heavy Metal Soils, Springer 35-57
4. Bradshaw AD (1952) Populations of *Agrostis tenuis* resistant to lead and zinc poisoning. Nature 169:1098
5. Lenka M, Panda KK, Panda BB. 1992. Monitoring and assessment of mercury pollution in the vicinity of a cholaralkali plant, IV, Bioconcentration of mercury in situ aquatic and terrestrial plants at Ganjam, India, Archives of Environmental (Contamination and Toxicology 22: 195-202
6. Patra M., Bhowmik N., Bandopadhyay B. and A. Sharma(2004) “Comparison of mercury, lead and arsenic with respect to genotoxic effects on plant systems and the development of genetic tolerance,” Environmental and Experimental Botany, vol. 52, no. 3, pp. 199–223.
7. Subhadra, A. V., Nanda, A.K. Behra, P.K., Panda, B.B.(1991). Acceleration of catalase and peroxidase activities in *Lemna Minor* L. and *Allium cepa* L. in response to low level of aquatic mercury. Env. Pollution, 69: 169-179.
8. Wilkins, D.A. (1957). A technique for the measurement of lead tolerance in plants. Nature, 180: 37-38

MUMBAI RAILWAY TRACKS (DISTURBED HABITATS): RICH SOURCES OF ARBUSCULAR MYCORRHIZA

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ABSTRACT

Mumbai - Economical capital of India, the city which never sleeps. Heart-line of this city is Local Railway which covers approximately 200 km area and help in connecting main city with many suburbs. Huge numbers of people are commuter and us this service of Government of India daily. The railway tracks for Mumbai local railway harbours various plants mainly in the form of herbaceous weeds. Many of the times these weeds grow very massively especially in rainy season.

Arbuscular mycorrhiza is a symbiotic association of fungi with roots of higher plants. According to Gerdemann (1968) mycorrhizal associations are so prevalent that the non-mycorrhizal plant is more of an exception than the rule. According to many research articles, mycorrhiza is more predominant in disturbed habitats. Railway tracks are one of the most ideal examples of such disturbed habitats.

In present investigation, weeds were collected from railway tracks such as Charni road, Dadar, Andheri and Borivali. Collected weeds were screened for arbuscular mycorrhizal root colonization. Along with weeds, rhizosphere soil samples were also collected and analysed for arbuscular mycorrhizal spores.

It has been observed in present investigation that the weeds collected from tracks of Mumbai local railway show presence of mycorrhiza in enormous amount. Per cent root colonization in weeds observed to be very high as compared to weeds growing in other habitats. Spore density of chlamydospores in rhizosphere soil sample was very high. This might be because of disturbance in the rhizosphere. The most prominent genus of arbuscular mycorrhiza recorded as Glomus.

Further investigation need to be carried out for chances of discovering new species. Ample number of chlamydospores in rhizosphere soil can be used for making pure culture of local strains of arbuscular mycorrhizal fungi.

Keywords: Arbuscular mycorrhizal fungi, railway tracks, percent root colonization, rhizosphere soil, Glomus

INTRODUCTION

Mumbai - Economical capital of India, the city which never sleeps. Heart-line of this city is Local Railway which covers approximately 200 km area and help in connecting main city with many suburbs. Huge numbers of people are commuter and us this service of Government of India daily. The railway tracks for Mumbai local railway harbours various plants mainly in the form of herbaceous weeds. Many of the times these weeds grow very massively especially in rainy season.

Arbuscular mycorrhiza is a symbiotic association of fungi with roots of higher plants. According to Gerdemann (1968) mycorrhizal associations are so prevalent that the non-mycorrhizal plant is more of an exception than the rule. According to many research articles, mycorrhiza is more predominant in disturbed habitats. Railway tracks are one of the most ideal examples of such disturbed habitats.

MATERIAL AND METHODS**Present study was carried out in following steps**

1. Collection of wild plants (common weeds) from different railway stations (railway tracks) from in and around Mumbai (its suburbs) from following collection spots for the presence of arbuscular mycorrhizal root colonization. - The plants were uprooted carefully taking care of minimum damage to the root system along with rhizosphere soil in clean, unused plastic bags. Plastic bags were tagged with the information like spot of collection and name of the plant etc.

Collection spots (stations and railway tracks)

1. Charni road
2. Dadar
3. Andheri
4. Borivali

2. Screening of roots of collected from collection spots for the presence of arbuscular mycorrhizal colonization by method described by Grace and Stribley (1991). The per cent root colonization was calculated by Nicolson's formula (1955).

$$\text{Per cent root colonization} = \frac{\text{No. of root pieces showing colonization}}{\text{Total no. of root pieces observed}} \times 100$$

3. Rhizosphere soil analysis of plants collected – Collected rhizosphere soil was screened for presence or absence of chlamydospores of arbuscular mycorrhizal fungi. Isolation and quantification of AMF spores was carried out by wet sieving and decanting method (Gerdeman and Nicolson, 1963). Different spores were examined for their taxonomic status by using standard key (Schenk and Perez, 1990).



Plate-1: Plate showing the spot of *Cleome viscosa* L. from railway tract

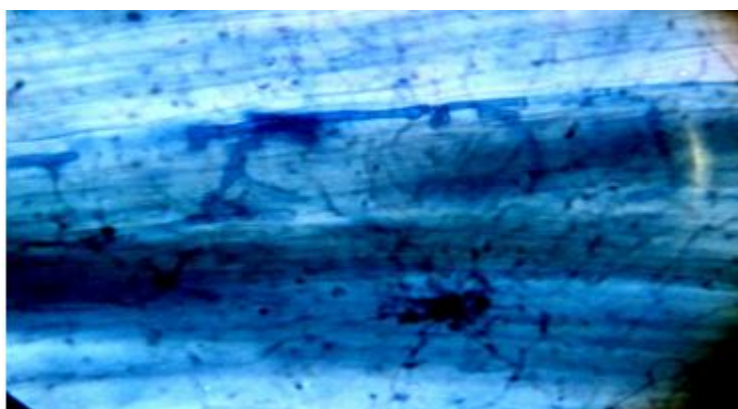


Plate-2: Portion of root showing AM fungal mycelium with vesicles (450 x)

OBSERVATIONS AND RESULTS

During present investigation 29 plants belonging to 28 genera and 29 species were collected, identified and screened for presence or absence of arbuscular mycorrhizal root colonization. Out of 29 plants, 27 belong to angiospermic group and 2 represents fern flora. Same time rhizosphere soil samples of said plants were screened for determining spore density. The results are shown in table 1. All these results are the average of triplicates.

Euphorbia hirta L. was observed from all the four spots. Maximum per cent root colonization was observed in roots of weed *Euphorbia hirta* L. at Dadar sample i.e. 92%. Minimum root colonization was shown by roots of *Portulaca oleracea* L. at Dadar i.e. 18%. No root colonization observed in *Cleome burmanni* Wight and Arn, *C. Viscosa* L. and *Heliotropium indicum* L. in spite showing presence of spores of AMF in rhizosphere soil. Maximum spore density was observed in rhizosphere soil samples of *Euphorbia hirta* L. in Andheri spot. ***Glomus mosseae* (Nicol. and Gerd.) Gerd. and Trappe and *Glomus deserticola* Trappe et al showing 567 chlamydospores / 25 g of oven dried soil sample. Minimum was observed at Borivali in rhizosphere soil of *Cleome burmanni* Wight and Arn as 111 chlamydospores / 25 g of oven dried soil sample. Most frequently occurring AM fungus was *Glomus mosseae* (Nicol. and Gerd.) Gerd. and Trappe. Least frequent was *Gigaspora margarita* W.N. Becker and I.R. Hall (Figure 1)**

Table-1: Compilation of weeds from collection spots with their arbuscular mycorrhizal status

Sr No.	Scientific Name of host	Charni road			Dadar			Andheri			Borivali		
		% RC	SD	AMF	% RC	SD	AMF	% RC	SD	AMF	% RC	SD	AMF
1	<i>Achyranthus aspera</i> L.										78	1 2 9	G f
2	<i>Alternanthera philoxeroides</i> Griseb				67	2 8 9	Gi m	52	2 1 2	G f	59	1 7 8	G ag
3	<i>Amaranthus spinosus</i> L.	26	2 2 6	G m							34	2 2 3	G f
4	<i>Boerhavia diffusa</i> L.	28	1 3 4	G f	32	2 7 6	G mu	34	3 4 5	G m			
5	<i>Bonnaya oppositifolia</i> Spreng. Syst. Reg	67	2 3 4	A l							39	1 2 0	G d
6	<i>Calotropis gigantea</i> (L.) R. Br. Ex Schult				56	3 2 3	G m						
7	<i>Cassia tora</i> L.				69	3 6 7	A l						
8	<i>Cleome burmanni</i> Wight and Arn				---	1 2 4	G m				---	1 1 1	G m
9	<i>Cleome viscosa</i> L.	---	1 1 4	G d							---	1 1 3	Gm
10	<i>Cynadon dactylon</i> (L) Pers				81	3 6 7	G f				76	2 4 3	A l
11	<i>Cyperus rotundus</i> L.							54	2 3 4	A l	52	1 8 9	G m
12	<i>Eclipta alba</i> Hassk.	76	3 4 8	G f							48	2 6 7	G mu
13	<i>Euphorbia hirta</i> L.	88	5 3 4	G m	92	3 7 8	G d	81	5 6 7	Gm + Gd	90	4 8 9	G F
14	<i>Heliotropium indicum</i> L.	---	1 2 4	A l	---	1 4 9	G m						
15	<i>Malachra capitata</i> (L) L.	23	2 6 8	G ag				22	2 3 4	G f			
16	<i>Opurculina turpethum</i> (L.) Silva Manso										48	2 7 7	A l
17	<i>Oxalis minima</i>				22	2	G						

	Steud.				4 6	ag			
18	<i>Phoenix sylvestris</i> (L.) Roxb.							34	3 3 3
19	<i>Phyllanthus niruri</i> L.	51	3 1 4	G m					
20	<i>Physalis minima</i> L.				76	3 4 7	G mu		
21	<i>Portulaca oleracea</i> L.				18	3 8 2	A l		
22	<i>Sida acutifolia</i> Steud.							36	2 7 8
23	<i>Sorghum vulgare</i> Pers.							88	2 5 9
24	<i>Tridax procumbens</i> L.							67	3 4 2
25	<i>Urena lobata</i> L.				22	2 7 6	G m		
26	<i>Vernonia corymbosa</i> (L. f.) Less							45	2 2 3
27	<i>Wedalia chinensis</i> (Osbeck) Merrill				36	3 4 5	G ag		
28	<i>Nephrolepis exaltata</i> (L.) Schott.	27	1 2 6	G m					
29	<i>Pteris vittata</i> L.	41	2 8 4	G ag				48	3 4 5

Table-2: List of abbreviations

Sr. No.	Abbreviation	
1	%RC	Per cent root colonizatio
2	SD	Spore density
3	AMF	Arbuscular mycorrhizal Fungus
4	Al	<i>Acaulospora laevis</i> Gerd. and Trappe
5	Gim	<i>Gigaspora margarita</i> W.N. Becker and I.R. Hall
6	Gag	<i>Glomus aggregatum</i> Tul. and C.Tul.
7	Gd	<i>Glomus deserticola</i> Trappe et al.
8	Gf	<i>Glomus fasciculatum</i> (Thaxt.) Gerd. and Trappe
9	Gm	<i>Glomus mosseae</i> (Nicol. and Gerd.) Gerd. and Trappe
10	Gmu	<i>Glomus multicaule</i> Gerd. and B.K. Bakshi
11	---	No root colonization
12		Plant (weed) not found in that location

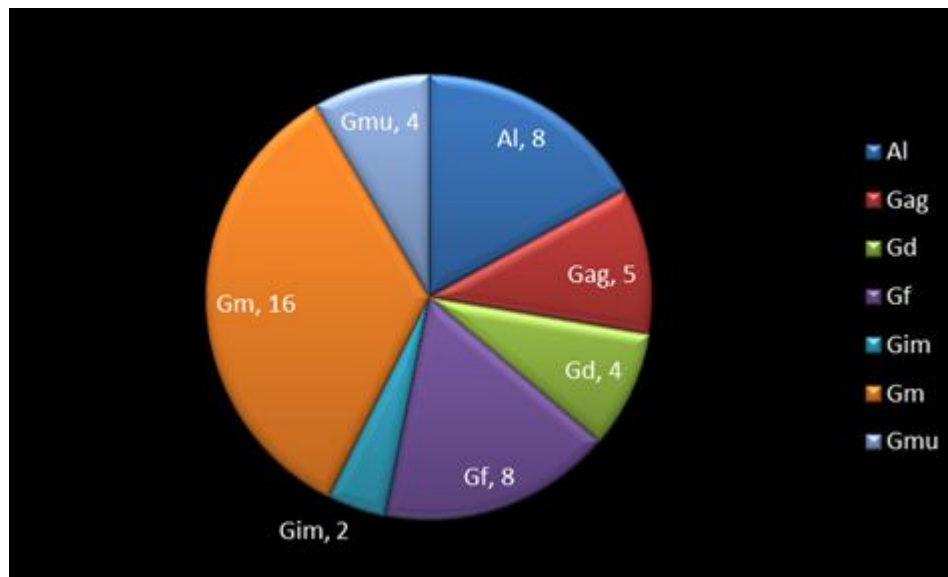


Figure-1: Distribution of various species of arbuscular mycorrhizal fungi in present study

DISCUSSION

No substantial research has been carried out on weeds for mycorrhization in ecologically disturbed habitats like railway tracks. Railway tracks for Mumbai suburban locals (central and western railway) are critical examples of such ecologically disturbed habitats. Ecological disturbance are in the form of water lodging during rainy seasons, excessive amount of non biodegradable waste deposition, very poor quality of soil etc. That is why in present investigations weeds from railway tracts were screened for mycorrhizal fungi.

Roots of weeds from non cultivated, disturbed and non fertile land of Bettiahraj, Bihar were screened for AM colonization by Prasad (2005). According to this report, per cent root infection (colonization) ranges from 0 to 40 %. Kelkar *et al* (2013) reported % root colonization in *Euphorbia hirta* L. as 94.3% in late summer from Nahur railway tracts. Gupta and Routaray (2004) studied weeds from flower beds of marigold, chrysanthemum, and rose; from the botanical gardens of the Regional Plant Resource Centre, Bhubaneswar in plantations of mango and jamun; in the nursery of ornamental plants; and in a natural stand of forest for AM colonization. They reported 0 to 90 % of root colonization in various weeds. In present study, per cent root colonization was observed to be quite high as compared to the report of Prasad (2005), Gupta and Routaray (2004). Manoharachari *et al* (1987) reported the colonization in *Heliotropium indicum* L. where as in present study, it was found to be no colonization. Similar way Gupta and Routaray (2004) reported 30% root colonization in *Cleome viscosa* L. but in present study, it was no colonization found. Ecological disturbance and sustainability instinct of weeds might be the most probable reason of getting very high per cent of root colonization and spore density.

Further investigation need to be carried out for chances of discovering new species. Ample number of chlamydospores in rhizosphere soil can be used for making pure culture of local strains of arbuscular mycorrhizal fungi.

REFERENCES

1. Gerdemann J. W. (1968) Vesicular-arbuscular mycorrhiza and plant growth Annual Review of Phytopathology 6: 397-418
2. Gerdemann J. W. and Nicolson T. H. (1963) Spores of mycorrhizal Endogone extracted from soil by wet sieving and decanting. Transitional British Mycology Society 46: 235-244
3. Gupta N. and S. Routary (2004) Arbuscular mycorrhizal association of weeds found with different plantation crops and nursery plants. Mycorrhiza News 16(3): 14 – 20
4. Grace Carol and David P. Stribley (1991) A safer procedure for routine staining of VAM fungi Mycological Research 95 (10): 1160-1162
5. Kelkar Tushar, Ajit S. Katdare and S. A. Bhalerao (2013) Seasonal Occurrence of Arbuscular Mycorrhizal (AM) Fungi Colonization in *Euphorbia hirta* from Nahur (Mumbai) Station and Adjoining Area published in the proceeding of National seminar on Fungi and Human Welfare. Organized by Department of Botany, R. Ruia College, Matunga Mumbai during 8th and 9th February 2013:24 – 30

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6. Manoharachary C., P. Ramarao and T. Sulochana (1987) Preliminary survey of VA mycorrhizal fungi in some weeds Mycorrhiza Round Table Proc. of a national workshop held at JNU, Delhi, March 13 -15: 288 - 293
 7. Nicolson (1955) Nicolson's formula Mycorrhiza News 12(2): 15 – 18
 8. Prasad Kamal (2005) Arbuscular mycorrhizal fungal occurrence in non-cultivated, disturbed and non fertile land of Bettiahraj, Bettiah, Bihar Mycorrhiza News Vol. 16 (4): 12 – 14
 9. Schenck N. C and Perez Y. (1990) Manual for the Identification of VA Mycorrhizal Fungi. (3 rd edn). Gainesville, Florida, Synergistic Publications

EFFECT OF CADMIUM²⁺ ON VIGNA MUNGO L. SEED GERMINATION AND SEEDLING GROWTH**Vinodkumar S. Didwana and Satish A. Bhalerao**

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ABSTRACT

Heavy metals are the compound which are naturally occurring elements that have a high atomic weight and density. Cadmium is a carcinogenic element. The main sources of cadmium getting to environment includes burning of diesel and heating oil, agricultural practices like use of phosphate fertilizers, sewage sludge, car tyres, street dust, smelting industries thereby entering to agricultural soils and water bodies by its sources. The present study deals with observing parameters like Percent germination, % phytotoxicity of root, % phytotoxicity of shoot, Seedling vigour, Tolerance indices, seedling weight, fresh biomass and dry biomass on growth of *Vigna mungo L.* by subjecting the seeds to different concentration of Cd²⁺ ranging from 1 ppm to 10 ppm. The result showed that there was no negative effect on seedling growth with lower concentration but at higher concentration the seedlings were not tolerant and the vigour index also showed the same pattern.

Keywords: Cd²⁺, seed germination, seedling growth, phyto-toxic, *Vigna mungo L.*

INTRODUCTION

Heavy metals are natural components of earth crust and they cannot be destroyed or degraded as they are persistent environmental contaminants. Heavy metal contamination affects the biosphere in many places worldwide (Cunningham et. al, 1997; Raskin & Ensely, 2000; Meagher, 2000). These metals enter a water supply by industrial and consumer waste, or even from acidic rain breaking down soils and releasing heavy metals into streams, lakes, rivers, and groundwater. Evaluated heavy metals contaminated soils are widely spread and concerns have been raised over the potential risks to humans, animals and agriculture crops (Aliraza and Farhang, 2011).

Cadmium

Cadmium (Cd) belongs to IIB group of the periodic table with atomic weight 112.41 and atomic number 48. It is commonly exhibited by +2 oxidation state in nature. It is not an essential element but considered as an environmental contaminant because of its toxic effects on both plant and animal. Cadmium derives its toxicological properties from its chemical similarity to zinc an essential micronutrient for plants, animals and humans. Cadmium is biopersistent and, once absorbed by an organism, remains resident for many years although it is eventually excreted. Cadmium (Cd) is a highly toxic trace element and has been ranked No. 7 among the top 20 toxins (Yang et al., 2004).

Cadmium is a carcinogenic element when compared to other heavy metals is the reason of concern to humans. It can cause anemia, damage to kidney etc. Respiratory disorders, hypertension, kidney and liver damage etc are to name some symptoms of cadmium toxicity. Cadmium inhibition of mitochondrial electron transport and respiration and enzyme activities are reported respectively by Miller et al., (1973); Lee et al., (1976); and Weigel and Jager (1980).

Vigna mungo (L.)

Classification (O.P. Sharma (2006))

Division	:	Spermatophyta
Sub division	:	Angiospermae
Class	:	Dicotyledonae
Sub class	:	Polypetalae
Series	:	Calyciflorae
Order	:	Rosales
Family	:	Leguminosae
Sub family	:	Papilionaceae
Genus	:	<i>Vigna</i>
Species	:	<i>mungo</i>

Vigna mungo (L.) is also known as Black gram, uradbean, black maple, mash, etc. an important short-duration pulse crop. Its seeds are highly nutritious with protein (25-26%), carbohydrates (60%), fat (1.5%), minerals, amino acids and vitamins. It is one of the most important and highly prized pulses in India.

MATERIALS AND METHODS

Certified seeds of Vigna mungo L. (UDID T.A.U. – 1) were procured from seed dealer, Jalna (MS). Stock solution of 1000ppm cadmium was prepared with Millipore water and concentration ranging of 1ppm to 10ppm was prepared. This solution was used to study the effect of heavy metal on the seedlings and its growth. The seeds were allowed to grow for 8 days and seed germination was recorded with interval of 24 hrs. The experiment was conducted in triplicates.

The parameters observed were percentage germination of seeds, root length, shoot length, seedling weight, fresh and dry biomass. Phytotoxicity of shoot and root, tolerance indices, Seedling Vigour Index was calculated by the shoot length, root length, seedling length and seedling weight using the following formulae.

The length of shoot and root was recorded by using a centimeter scale, % Phytotoxicity for shoot and root of seedlings were calculated by the following formula given by Chou and Lin (1976).

$$\% \text{ Phytotoxicity of Shoot} = \frac{\text{Shoot length of control} - \text{Shoot length of treatment}}{\text{Shoot length of control}} \times 100$$

Shoot length of control

$$\% \text{ Phytotoxicity of Root} = \frac{\text{Root length of control} - \text{Root length of treatment}}{\text{Root length of control}} \times 100$$

Root length of control

Tolerance Index and Vigor Indices was determined by the following formula given by Iqbal and Rahmati (1992).

$$T.I. = \left(\frac{\text{Mean root length in metal solution}}{\text{Mean root length in distilled water}} \right) \times 100$$

The Vigor Index (VI) or Seedling Vigor Index (SVI) was calculated using the formula,

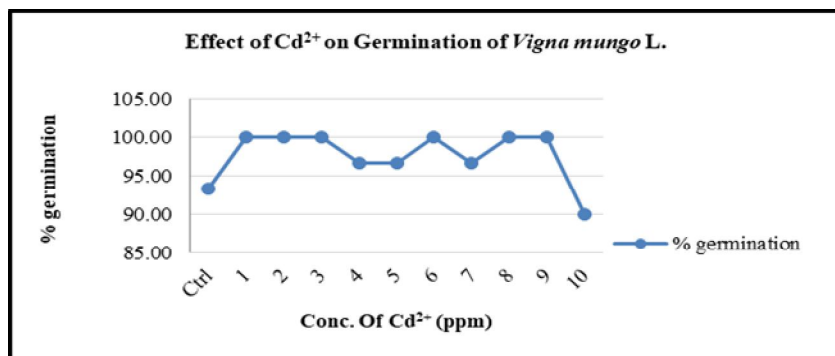
$$VI = (\text{mean root length} + \text{mean hypocotyls/shoot length}) \times \% \text{ germination.}$$

Observations:

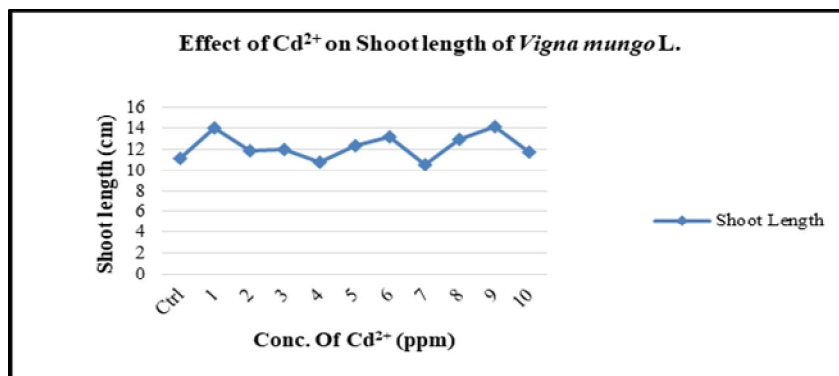
(± : Standard Deviation)

ppm	Germination (%)	Shoot length (cm)	% Phytotoxicity of Shoot	Root length (cm)	% phytotoxicity of Root	Tolerance Index	Seedling weight	Seedling Vigour Index	Fresh biomass	Dry biomass
Ctrl	93.33 ±0.5773	11.20 ±2.1290	0.00	5.11 ±0.9838	0.00	100.00	0.3705 ±0.0651	1522.80	3.2510 ±0.4505	0.2007 ±0.0050
1	100.00 ±0.0000	14.00 ±2.2946	-24.94	7.75 ±0.6336	-51.63	151.63	0.1517 ±0.0370	2175.03	3.2433 ±0.3120	0.1997 ±0.0115
2	100.00 ±0.0000	11.82 ±0.8535	-5.48	8.60 ±0.9964	-68.12	168.12	0.4000 ±0.0282	2041.33	3.6533 ±0.7953	0.2593 ±0.0068
3	100.00 ±0.0000	11.95 ±0.7197	-6.70	7.99 ±0.3593	-56.26	156.26	0.3590 ±0.0188	1994.33	3.4000 ±0.4200	0.2240 ±0.0420
4	96.67 ±0.5774	10.85 ±1.4042	3.12	5.37 ±0.9243	-4.96	104.96	0.3190 ±0.0546	1567.93	2.8067 ±0.0862	0.1813 ±0.0225
5	96.67 ±0.5774	12.38 ±1.4453	-10.48	6.44 ±0.5101	-26.01	126.01	0.3707 ±0.0412	1819.27	3.8033 ±0.7550	0.2143 ±0.0422
6	100.00 ±0.0000	13.18 ±0.3007	-17.62	4.48 ±0.2296	12.45	87.55	0.3033 ±0.0557	1765.33	3.4500 ±0.2476	0.2010 ±0.0036
7	96.67 ±0.5774	10.57 ±0.7960	5.68	4.54 ±0.2071	11.21	88.79	0.2683 ±0.0174	1460.31	2.7333 ±0.3320	0.1823 ±0.0475
8	100.00 ±0.0000	12.89 ±0.6971	-15.06	3.57 ±0.9473	30.12	69.88	0.2970 ±0.0325	1646.33	2.8767 ±0.3885	0.1677 ±0.0345
9	100.00 ±0.0000	14.07 ±0.2933	-25.62	5.59 ±0.7027	-9.39	109.39	0.3390 ±0.0187	1966.67	2.7967 ±0.3308	0.1900 ±0.0494
10	90.00 ±1.7321	11.74 ±2.9090	-4.76	2.89 ±0.5452	43.55	56.45	0.2727 ±0.0499	1316.10	2.5067 ±0.4365	0.1590 ±0.0466

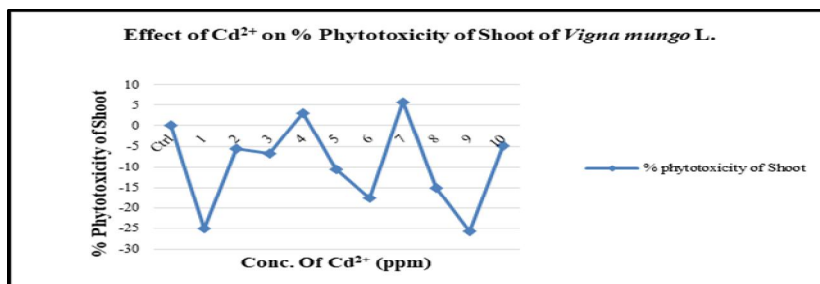
Table-1: Effect of Cd²⁺ on seeds of Vigna mungo L.



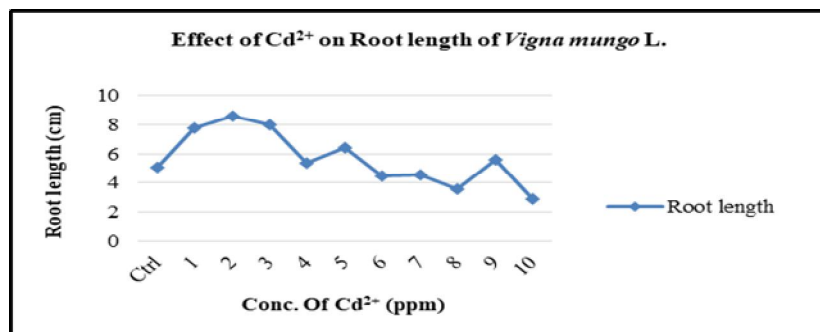
Graph-1: Effect of Cd²⁺ on *Vigna mungo* L. seedlings



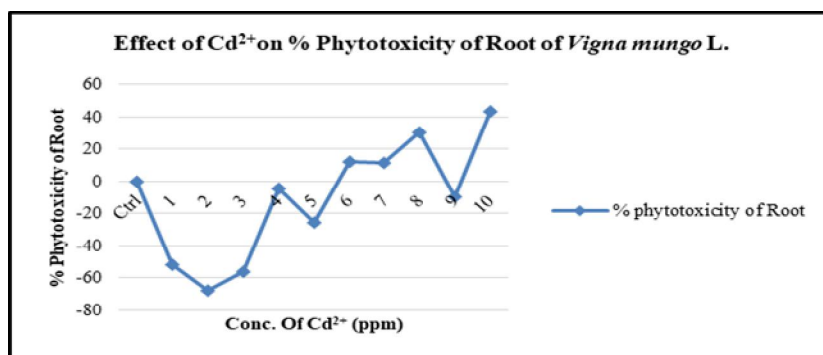
Graph-2: Effect of Cd²⁺ on Shoot length of *Vigna mungo* L.



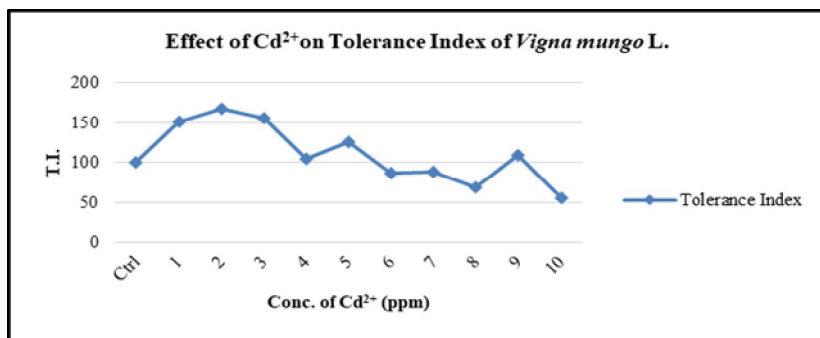
Graph-3: Effect of Cd²⁺ on % Phytotoxicity of Shoot of *Vigna mungo* L.



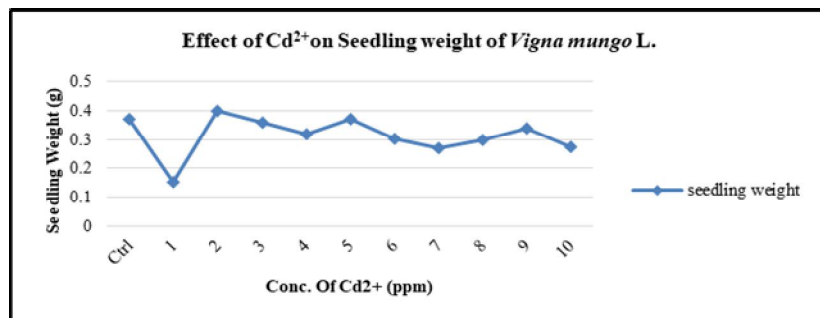
Graph-4: Effect of Cd²⁺ on Root length of *Vigna mungo* L.



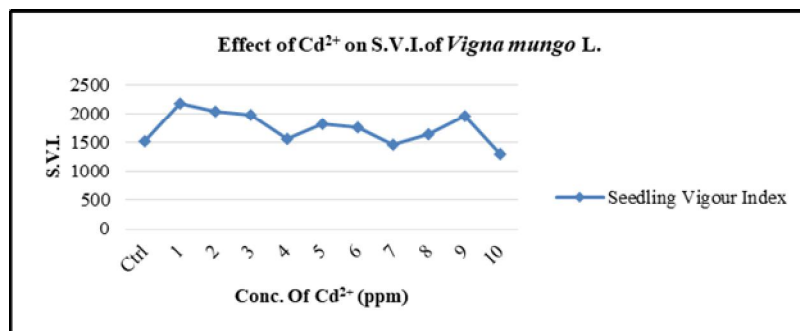
Graph-5: Effect of Cd²⁺ on % Phytotoxicity of Root of *Vigna mungo* L.



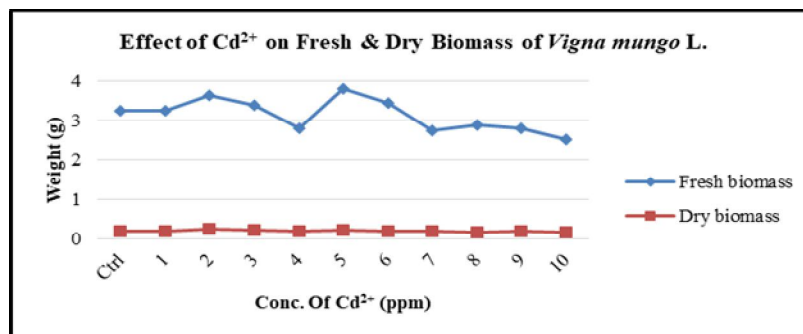
Graph-6: Effect of Cd²⁺ on Tolerance Index of *Vigna mungo*



Graph-7: Effect of Cd²⁺ on Seedling Weight of *Vigna mungo* L.



Graph 8: Effect of Cd²⁺ on S.V.I. of *Vigna mungo* L.



Graph 9: Effect of Cd²⁺ on Fresh and Dry biomass of *Vigna mungo* L.

Graphs showing effect of Cd²⁺ on *Vigna mungo* L. seedlings

Statistical Analysis

The readings were subjected to Pearson Correlation coefficient to check the effect of increasing Cd²⁺ concentration on studied growth parameters. It showed that there was a negative effect on root as the concentration of cadmium increases, thus affecting on percent phytotoxicity of root.

Sr. No.	Particulars	R value
1.	% Germination	-0.1791
2.	Shoot Length	0.1463
3.	% phytotoxicity of Shoot	-0.1459
4.	Root length	-0.6956
5.	% phytotoxicity of Root	0.6957

6.	Tolerance Index	-0.6957
7.	Seedling weight	-0.1081
8.	Seedling Vigour Index	-0.4334
9.	Fresh biomass	-0.6138
10.	Dry biomass	-0.6346

Table-2: Pearson Correlation Coefficient for effect of Cd²⁺ on *Vigna mungo* L.

DISCUSSIONS

V. mungo seeds were treated with Cd²⁺, the germination and shoot length does not affected by the heavy metal. Root length at lower concentration increase with the metal concentration but at higher concentration shows the drop in root length. % phytotoxicity of shoot shows that seedlings does not possess any phototoxicity effect on shoot whereas % phototoxicity of root was seen at higher concentration indicating the roots were affected by the higher concentration of metal. Tolerance index showed that seedlings are tolerant towards low concentration of cadmium but not tolerant higher concentration. SVI decreses with increase concentration of cadmium. Seedling weight, slightly decreases with increase in cadmium concentration, where there was no significant effect on fresh and dry biomass with respect to metal concentration.

This shows that at cadmium is not toxic at lower concentration but at higher concentration it is detrimental to the seedling growth. As the cadmium is taken up by the plant with Zinc; Zinc is utilized by the plant and cadmium accumaltes in the plant tissue and thus can cause further harm to the plant and the individual consuming it.

REFERENCES

- Cunningham S D, J R Shann, D E Crowley and Anderson T A, (1997). Phytoremediation of contaminated water and soil. Phytoremediation of soil and water contaminants, **American Chemical Society**, Washington, DC., pp. 2-17.
- Raskin I. and B. D. Ensley (Ed.) (2000). Phytoremediation of toxic metals: using plants to cleanup the environment. **John Wiley and Sons**, N. York
- Meagher R B (2000). Phytoremediation of toxic elemental and organic pollutants. **Curr. Opin. Plant Biol.**, 3: 153-162
- Aliraza Houshmandfar and Farhang Moraghebi, (2011) **American journal of Agriculture Research** vol. 6(6), pp, 1182 - 1187.
- Yang X, Long X, Ye H, He Z, Calvert D, Stoffella P, *Plant Soil*, **2004**, 259: 181–189.
- Miller. R. J., Bittell, J. E. and Koeppe, D.E. (1973). The effect of Cadmium on electron and energy transfer reactions in corn mitochondria. **Physiol. Plant.** 28. pp 166-171.
- Lee K.C., Cunningham B.A., Paulsen G.M., Liang G.H. and Moore R.B. (1976). Effects of cadmium on respiration rate and activities of several enzymes in soybean seedlings. **Physiol Plant.** 36. pp 4-6.
- Weigel H.J. and Jager H.J. (1980). Different effects of Cd invitro and invivo on enzyme activities in bean plants *Phaseoulus vulgaris* L. cv Sankt Andreas). **Z Pflanzphysiol.** 97 pp. 103-113.
- O. P. Sharma (2006). Plant Taxonomy, **Tata McGraw – Hill Publishing Company Ltd.**, New Delhi. pp 262-264,275.
- Chou C.H. and Lin H.J., (1976) Autointoxication mechanism of *Oriza sativa* L Phytotoxic effects of decomposing rice residues in soil, **J. Chem. Ecol.**, 2, 353-367
- Iqbal M.Z. and Rahmati K., (1992) Tolerance of *Albizia lebbeck* to Cu and Fe application, **Ekologia (CSFR)**, **11**: 427-430.

ALANINE AND ALLIIN CONTENT IN TWO VARIETIES OF GARLIC (*ALLIUM SATIVUM* LINN.)

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ABSTRACT

The presence of biologically active compound in the plant species is a gift of nature to the human society. Garlic (*Allium sativum* Linn.) is an essential component mainly in India dietary system and it is well known for its medicinal value, the present work has been under taken to estimate the active compounds in two varieties of garlic plant, *Allium sativum*. Both the varieties showed the existence of common compounds by HPTLC, The prominent appearance of bands for Alanine and Alliin (corresponding with the standard compounds) in the both the varieties indicates the abundance of the compounds, however, the result indicated that the Alanine and Alliin content is surprisingly more in garlic variety with big cloves (Chinese variety) and comparatively less in normal variety (Desi Lasoon). It appears that in addition to Alanine and Alliin, there may be the role of other compounds, the quality and quantity of which synergistically contribute for improved taste and aroma of garlic.

Keywords: *Allium sativum*, HPTLC, Alanine and Alliin.

INTRODUCTION

The presence of biologically active compound in the plant species is a gift of nature to the human society. Many plant species contains medicinally important metabolites like alkaloids, Saponin, Morphine, Steroids, and Glycosides etc. This plant has important components like Allicin, Allin, and Allanine etc. It is a good source of sulphur containing compounds. The types of garlic bulbs are available in the local market. One variety has small cloves and it is strong and more aromatic. Other variety has bigger cloves comparatively large size of cloves. It is less aromatic and tasty. The present work has been undertaken to estimate the active compounds in two varieties of Garlic plant, *Allium sativum*.

Garlic has long been cultivated in India as an important spice or condiment crop. The plant *Allium sativum*, belongs to the family Liliaceae (Alliaceae) The plant bears flat leaves, small white flowers and bulbils. The bulb consists of 12-16 cloves and is surrounded by a thin white or pinkish sheath (Trimen, 1962)

The part used in herbal medicine is the bulb, the parts of the plant like bulbs (cloves) and leaves. Grunewald (2004) has reported the pharmacological importance of garlic oil in base and is referred in the Ayurvedic medicinal texts of ancient India garlic is also recommended against leprosy.

ALLIIN AND ALLICIN

Alliin and its enzyme, allinase, are present in highest concentrations in fresh Garlic. As soon as the garlic is crushed, the alliin is converted to allicin. Refrigeration or placing the minced or crushed Garlic in water extends the life of the allicin for a few days. Once formed, alliin begins reacting with oxygen resulting in more stable organosulfur compounds. Cooking (including microwaving) destroys allinase. Significant amounts of alliin and allinase can be retained in dried Garlic supplements. However, freeze-dried supplements retain higher levels of these photochemical. Even if the supplements contain plenty of alliin and active allinase, they must be enteric-coated if they are to deliver significant amounts of allicin to the body, because allinase is inactive by the low pH of stomach acid. The allinase in the tablet must survive until it reaches the high-pH environment of the small intestine, where it can act on the alliin and convert it to allicin. Garlic also contains certain alliin-derived compounds, known as sulfides. Alliin and allicin in garlic has antioxidant properties.

MEDICINAL USE OF GARLIC

Preparation of garlic is given in pulmonary phthisis, bronchiectasis, and gangrene of the lung and whooping cough Laryngeal tuberculosis. The bulbs, on distillation, yield 0.06-0.1% of an essential oil (d/14.5⁰, 1.0525) contain allylpropyl disulphide, C₆H₁₂S₂ (6%), diallyldisulphide C₆H₁₀S₂ (6%), and two more sulphur containing compounds.

Cold: Consuming garlic helps to build immunity against common cold. This is attributed to its allicin content, which is released when cloves of garlic are chopped, crushed or chews. Pour half a cup honey on them; add a pinch of grated ginger, let the concoction sit for at least an hour. It is then taken as one or two teaspoons.

Cancer: It works as an anti-carcinogen in both, prevention and treatment. Garlic as a "Cure" sounds rather farfetched, but studies suggest that it reduces the susceptibility to breast, prostate, laryngeal, colon and stomach cancers. Scientists have correlated garlic intake with reduced nitrite levels in people and fewer deaths from stomach cancer. A blend of raw broccoli, garlic juice, onions and ginger is a potent anti-cancer decoction.

Immunity: A research team that studied blood samples from individuals who included garlic in their diet for three months, said that the participants' immune cells had a greater capacity to engulf E. coli bacteria. Substances in garlic were also found to kill H. pylori, a stomach bacterium linked to ulcers and stomach cancer.

Cholesterol: Garlic has been shown to lower cholesterol in the liver by as much as 30% maintaining a healthy ratio between the good (HDL) and bad cholesterol (which dissolve part of the plaque insides arteries.)

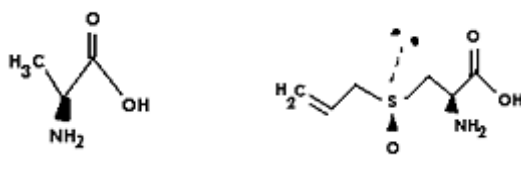
High BP: A study conducted by England's University of Exeter says regular dietary intake of garlic can help a case of mild hypertension. "A traditional folk remedy has established its usefulness," says Dr Ernest Resch. (Internet access) But medical practitioners maintain that garlic is not a substitute for prescription medicine.

Diabetes: Garlic, as well as onion, are long been known to lower elevated blood sugar levels and increasing liver glycogen levels. It helps in controlling blood sugar in case of (diabetes); this is possible because of its ability to reduce the body's requirement for insulin. It is most effective in mild cases, but should not be relied on to replace insulin in diabetics.

CHEMICAL CONSTITUENTS OF GARLIC

Garlic is much used in India cookery as a condiment or spice. It contains: moisture 62.8; protein, 6.3; fat 0.1 carbohydrates 29.0; Ca. 0.03; P.0.31; Fe.1.3mg; vitamin C. 13mg./100g. It is also reported to contain copper. The major constituents are allyl alcohol, sulphur compounds such as allicin (diallylthiosulphinates) 1-4, alliin (S-allyl sulphoxide), alanine, L-alanine diallyl sulphide, diallyldisulphide and allylpropyl sulphide and essential oil [0.45-0.80% (V/W) of the bulb] and secondary metabolites like S-methyl cysteine sulphoxide (MCSO), S-allyl cysteine sulphoxide (ACSO) and S-Trans-Prop-1-enyl cysteine sulphoxide. Secondary metabolites may also have flavour contribution including bitterness e.g. related to sesquiterpene. Garlic is reported to have vitamins like nicotinic acid, ascorbic acid, vitamin A, thiamine, riboflavin, niacin, biotin and flavanoid etc. (Martha et al. 1983).

The test of any plant product depends upon its chemical constituents, their quantity and nature of the compound. The objective of the present work is to quantify the active sulphur compounds Alanine and Alliin in normal and variety possessing small size cloves and one, which bear bigger bulb and large cloves. Alanine is an important amino acid and Alliin contributes in the formation of allicin. The content of these important constituents contribute to the quality and commercial value of the garlic plant.



Alanine

(Zeigler, 1989)

Alliin

(Martha, 1983)

MATERIAL AND METHODS

The cloves of the Garlic were used as an experimental material. The bulbs of *Allium sativum* (normal) plant and its *Allium sativum* (Big cloves) were collected from the local market.

ALANINE

Preparation of Extraction: -The cloves covers were removed and allowed to dry for seven days in the oven at 50 °C temperatures overnight. 10gm of dried garlic cloves of normal and Chinese varieties were crushed separately to make powder. The fine powder was prepared and was measured to be 1 gm and dissolved in 80% methanol to prepare Garlic extract was prepared. This extract was used for the TLC to identify the aniline following the method as suggested in by Daniel, (1999).

IDENTIFICATION AND QUANTIFICATION OF ALANINE:

THIN LAYER CHROMATOGRAPHY (TLC) FOR ALANINE:

The quantification of Alanine was done by HPTLC (High Performance Thin Layer Chromatography). The material was processed for HPTLC as follows.

- 20µl of Garlic extract was spotted (thickness, 0.2mm) on TLC plate (size, 10x10 cm).
- The plate was allowed to run in solvent system [n-propanol: acetone: water: ammonium in the proportion of 5:5:1.4:1.2 for 45 min.

- After developing the plate, light pink bands were observed in UV light at 290 nm.
- Slight dark pink spots were seen after spraying with 0.3% ninhydrin reagent for derivatisation.(Gupta et.al.2005) .
- The quantification of Alanine was done through the area under retention as appeared in HPTLC graph by using the following formula

ALLIIN

Preparation of Extraction: - 20 gm of Garlic was crushed in 50 ml of 70% methanol and stored at room temperature for 30 min. with occasional shaking. This methanolic extract was concentrated. The 5 ml of 2N HCL was added in the concentrated methanolic extract and heated in water bath to dryness. This dry residue was extracted with solvent ether and concentrated. This concentrated extract was used for TLC and HPTLC.

IDENTIFICATION AND QUANTIFICATION OF ALLIIN

The quantification of Alliin was done by HPTLC (High Performance Thin Layer Chromatography). 0.8 μ l of Garlic extract was spotted (with uniform thickness of 0.2mm) on TLC plate (size, 10x10cm). The plate was allowed to run in solvent system, n-propanol: water: glacial acetic acid: ethyl formate in the proportion of 6:2:2:2 for 45 min. After developing the plate, light brown bands were observed in UV light. Slight dark Yellowish brown bands were observed after spraying with anisaldehydesulphuric acid reagent for derivatisation. (Daniel, 1999).

RESULT AND DISCUSSION

Garlic is probably one of the earliest known medicinal plants, which has a long history of its usefulness and referred in many cultures, including the ancient Romans and Greeks. It is thought to be native to southwest Siberia and in time spread to the Mediterranean countries of south Europe.

Garlic is rich in sulphur containing amino acids like cysteine, methionine beside selenium, germanium, essentials oil, ajoene, gucokinins, B group vitamins, and flavonoids. Garlic is an effective antibiotic, an anti-viral and anti-fungal agent and an immune system enhancer.

The present piece of work deals with estimation part of important compounds Alanine and Alliin from Crude extract of two variety of Garlic i.e. *Allium sativum* (normal clove) and *Allium sativum* (big clove). The quantification of Alanine and Alliin was done by comparing the area value under retention on HPTLC chart. The results obtained on TLC and HPTLC analysis for Alanine and Alliin are discussed below.

Alanine appeared as pink spot on TLC Plate. The identification of this color spot for Alanine has been correlated with the findings of Keusgen ,(1997) and Gupta, (2005) HPTLC Plate reveals the bands with Rf-value 0.20 for standard Alanine which was corresponding with the bands with Rf-value 0.19 for *Allium sativum*, Normal and band with Rf-value 0.20 for *Allium sativum*, Big cloves.

The quantitative analysis indicates 5.2mg of Alanine content per gm of Garlic powder for *Allium sativum*, normal variety where as the *Allium sativum* (Big cloves) indicates higher content of Alanine i.e. 13.89mg per gm (Table-1, Fig.-1) The quantity of the sulfur containing amino acid is observed to be interestingly more in *Allium sativum* Big cloves variety although, this variety tests less pungently compared to normal variety.

The TLC Plate indicates the appearance of yellowish brown spot, which is identified as sulphur containing compound Alliin. (Daniel, 1999). The crude extract of Garlic of both the varieties has been analyzed on HPTLC unit. . Total of six bands were observed with the Rf-value ranging from 0.07 to 0.82 for normal and 0.02 to 0.80 for *Allium sativum*, big cloves variety. The standard Alliin was identified with the Rf-value 0.30. Each variety indicates the presence of the compound with corresponding Rf-value i.e.0.30, which corresponds with Rf-value of standard Alliin. (Table-2 and Fig.-2). It indicates the presence of Alliin in both the varieties. The other bands appeared were of unknown compounds. The band appeared on third position in both the samples on HPTLC Plate found to be matched with the band of standard Alliin compound (Photo Plate).

The Alliin content in normal *Allium sativum* variety was estimated as 387 mg /gm whereas, it is 670 mg/gm for *Allium sativum*, big cloves variety. The results obtained indicate high content of Alliin in *Allium sativum* (Big cloves). Alliin content in Indian *Allium* species also has been studied by Atal and Sethi (1963).

As per the published reports, from FAO (2005), Some varieties of Garlic like Chinese purple has high potential to produce allicin and good medicinal as well as insecticide properties. It has a sharp taste but delightfully mild and flavored. It is also used as an effective anti-bacterial sprays. The garlic varieties like Chinese Purple and *Allium sativum* are reported to contain high quantity of Alliin. The observation obtained reveals that the

studied big cloves variety of *Allium sativum* may have its origin in Chinese varieties of garlic. The big cloves garlic variety, in fact locally referred by the name of Chinese variety only. The studies of Brodnitz,et .al(1971) have established the importance of diallylsulphide , diallyltrisulphide , allyl S-cysteine Sulphoxide i.e. Alliin and an enzyme, allinase in *Allium sativum* for it flavour and aroma.

The photochemical extraction of herbs plants is a significantly important in the Industries, which are involved in the extraction of a particular metabolite sample from the plants. Sulphur Metabolites are the major flavors precursors in the genus *Allium*. Alanine and Alliin are the members of Alkyl Cysteine Sulphoxide group (CSOs), which has an important medicinal properties (Martha et.al.,1983). Alliin is classified as cysteine and most abundant sulphur compounds in whole unbruished garlic. When the cells are broken or the cloves are crushed, alliin from the Garlic cells interacts with allinase enzyme and oxidized to form new compounds, called as Allicine. Allicine is highly important sulfur compound and it is responsible for the aroma of fresh garlic and hence, these compounds are refereed as quality determining compounds in Garlic. Ajoene is a most active secondary degradation product of alliin and it is responsible for the antithrombotic activity of garlic.

Table - 1: Alanine content

Sr. No.	Garlic varieties	Alanine /gm
1.	<i>Allium sativum</i> (Normal)	5.25mg
2.	<i>Allium sativum</i> (Big cloves)	13.89mg

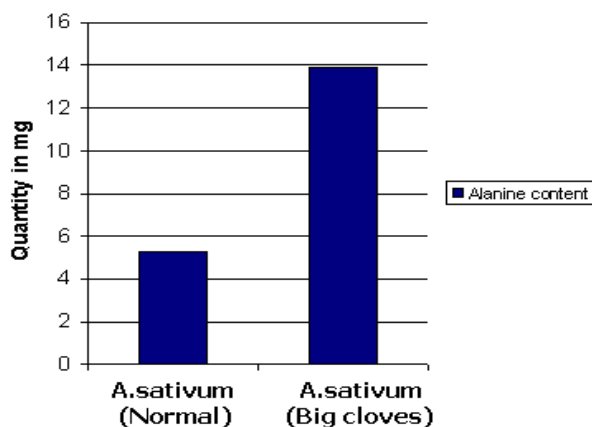


Fig.-1: Alanine content

Table-2: Alliin content

Sr. No.	Garlic varieties	Area under retention	Alliin/ 0.8µg of extract	Alliin/gm ofgarlic
1	<i>Allium sativum</i> (Normal)	2670.6	39.85%	387 mg
2	<i>Allium sativum</i> (Big cloves)	5644.2	84.23%	670 mg

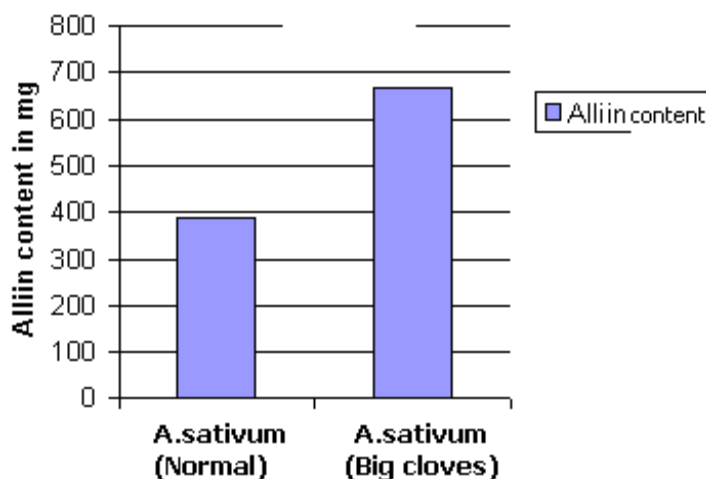
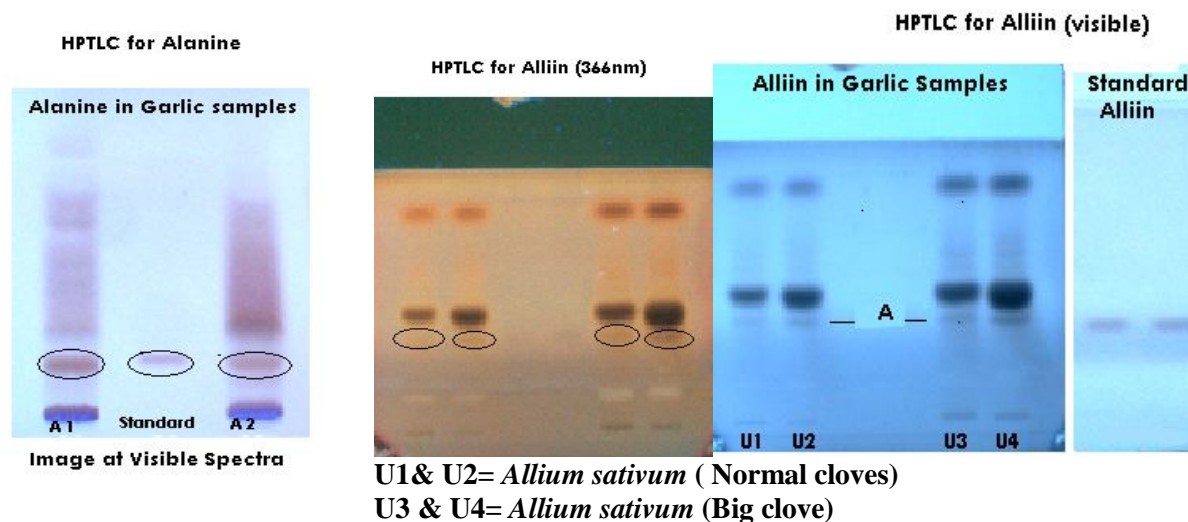


Fig.-2: Alliin content



PHOTOPLATE

CONCLUSION

The present work was carried out with the objective of estimating an important sulfur containing compound in the Garlic. *Allium sativum*, normal variety which has small size clove and the Garlic variety that has large bulbs and bigger cloves, were under taken as an experimental material in the present study. These metabolic products have a lot medicinal importance and they are important factors that determine the characteristics aroma as well as flavor of Garlic. Hence, it is considered that, these components contribute in quality determination and commercial exploitation of the Garlic variety.

The large bulb Garlic variety is locally referred as Chinese variety. The big size clove is large but it does not possess very strong aroma. The raw clove can be easily chewed. At this point it must be mentioned that both the varieties are sold in the market with more or same rate. At some places, the bulbs of bigger cloves are sold with high rate. The normal variety (Desi Lasoon) is comparatively strange in taste and concentrated. It is difficult to chew a small clove. Strong aroma and odor waters the eyes on consumption of raw clove. It is more pungent. Hence, it was expected that the quantity of studied compounds might be more in normal variety. Both the variety showed the existence of common compounds. The prominent appearance of the bands for Alanine and Alliin (corresponding with the standard compounds used) in both the varieties indicates the abundance of these compounds in studied varieties. However, the result indicated that, the Alanine and Alline content is surprisingly more in garlic variety with big cloves (Chinese variety) and comparatively less in normal variety (Desi Lasoon). It appears that in addition to Alanine and Allin, there may be the role of other compounds, the quality and quantity of which synergistically contributes for improved taste and aroma of Garlic.

REFERENCES

- Atal C K and Sethi J K (1961). Occurrence of amino acid and alliin in the Indian Alliums. Current science. 338-340.
- Brodniz, MH, Pascale, J.V. and Derslice L.V. (1971). Flavour components of Garlic extract. J. Agr. Food Chem., Vol. 19, No.2.
- Daniel, M (1999). Method in plant chemistry and Economic Botany Kalyani publisher, New Delhi. 59-60
- Gupta, A.K, Tandon. W, Sharma M – (2005) Quality Standard of Indian Medicinal Plant Vol-3.
- Keusgen M.. (1997) TLC Analysis of *Allium sativum* constituents. Planta Medica. 63: 93-94
- Martha W, Budavari, S, Blumethi, R, Otterbein. E. (1983). The Merck Index. (12th Edition)
- Trimien B (1962), Wealth of India: Published by Council of Scientist and Industrial Research, India. P. 58-59.
- Zeigler S S. (1989). HPLC of S-alk(en)yl-L-Cysteine derivative including quantitative determination of (+)-S-allyl-L-Cysteine Sulphoxide Garlic (Alliin). J., Planta Medica. 55, :372-378 .

SURFICIAL EMERGENCE OF *BOLEOPHTHALMUS DUSSUMIERI* (VAL., 1837) SYNCHRONIZED WITH TIDAL OSCILLATION ON THE SILTED INTERTIDAL MUDFLATS OF ULHAS RIVER ESTUARY

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ABSTRACT

Boleophthalmus dussumieri (Val., 1837) is a mudskipper species inhabiting, in abundance on the intertidal mudflats occurred on either banks of Ulhas River estuary. The present study scan and focal sampling method implied to record the lagged immergence of *B. dussumieri* on the surface during ebb-tide. The study revealed direct correlation with the declining water level and rate of exposure of the mudflat during the ebb-tide occurred at Kolshet creek along the west bank of the Ulhas River estuary. PCO obtained with Euclidean distance matrix represented 100% ordination of the samples depicting that the level of water defined the rate of surficial emergence of individuals.

Keywords: *Boleophthalmus dussumieri*, mudskipper, burrow, territoriality, Principal coordination analysis, PCO, tidal oscillation, Ulhas river estuary, surficial emergence, mudflats.

INTRODUCTION

Mudskippers are well-known for their amphibious and benthic-fossorial habit often found for courtship and feeding vigorously on the exposed mud flats of coastal waters (Clayton, 1993). They are studied variedly as important bio-indicators of the pollution status of their habitats (Ansari *et al.*, 2014). Their burrows are often open with slight elevation, sort of chimney and are located in the tiny pit-pools constructed of earth to retain water during low tide. They keep their tail immersed in this water for moistening their body surface so as to expedite the respiration through skin when they are exposed to air (Mutsaddi and Bal, 1973; Clayton, 1993; Yee, 1996). Ishimatsu and Graham (2011) recorded that mudskippers burrows are highly variable in structures even within a species.

Ulhas River estuary (URE) is located in the vicinity of Thane City near Mumbai, Maharashtra State, India. URE is well known for its rich and diverse fisheries from decades supporting a considerable fishermen population of the area. *Boleophthalmus dussumieri* is abundant species of mudskipper inhabiting on the intertidal mudflats of Ulhas River estuary (URE). *B. dussumieri* contribute to one of the important and highly priced fishery species along URE. Nevertheless *B. dussumieri* is highly threatened due to certain anthropogenic activities causing pollution in the URE since 2002 (Rathod, 2005). According to earlier study *B. dussumieri* have been observed to be highly sensitive to the environmental changes and responded accordingly in the polluted conditions of Ulhas River estuary and Thane creek through 2004 to 2006 (Rathod, 2016). However, there is no further confirmation on the changes in the behaviour of these mudskippers due to polluting conditions prevalent in the URE.

1. MATERIALS AND METHOD

Study envisages the bimonthly observations of various behavioral patterns of *B. dussumieri*, on the mudflats near 'Kolshet creek station' situated in the upper stretch of the Ulhas river estuary, lying between latitude 19°14'49"N and longitude 72°59'50" E from the months of July 2015 through June 2016 (Fig. 1).

A. SAMPLING AND ANALYSIS OF SURFICIAL EMERGENCE OF INDIVIDUALS

The behavioral observation of the *B. dussumieri* was accomplished using *scan and focal sampling* method (Altmann 1974; Bowden *et al.* 2008 and Gilby *et al.* 2010) during the ebbing and flooding phases of the tide at the foresaid study station for a period of four months. Minute behavioral patterns were recorded with help of 'Sony' Handy-cam (a movie-cum-photography camera) model: HDR-CX130E, to produce appropriate images and videos. The videos were used to support and revise the observations recorded on field. The ambient specimens were observed at the study site to record for their emergence from the burrow during the ebb tides. The number of individuals emerged (RIE) on the surface with the decline in water level (WLD), vertically, and rate of exposure of the mudflat (REM), horizontally, were recorded at an interval of 30 minutes each for an entire cycle of ebb tide (6 hrs.) on a mudflat of approx. 100 sq. m (10 m x10 m) area during period of the present study. The statistical analysis was carried by using Primer v6 software. Euclidean Distance resemblance was obtained after normalizing the data and was run for the hierarchical cluster analysis at group average mode. PCO (Principal Coordinates) ordination was obtained and the dendrogram was overlaid to show the relationship of water level decline with the number of individuals emerging on the mudflat surface (Fig. 4). Due to the

monsoon and the seasonality of *B. dussumieri* the observation was restricted from November 2015 to April 2016 only (Before and after these months the species was mostly lacking in the area).

B. ANALYSIS OF SOIL TEXTURE

Soil texture (clay, silt and sand) was analyzed using Buchanan’s pipette method (1984). Soil samples on monthly basis were collected from three stations from mudflats along (1) head of the estuary near Kharegaon; (2) at study area at Kolshet creek and (3) from downstream of the estuary nearly 13.6 km away from study area at Ghodbunder sand landing centre (Fig. 1). Silt (%) was taken into consideration for the present study.

Fig.1: Satellite images of the Ulhas River estuary and Sampling Station



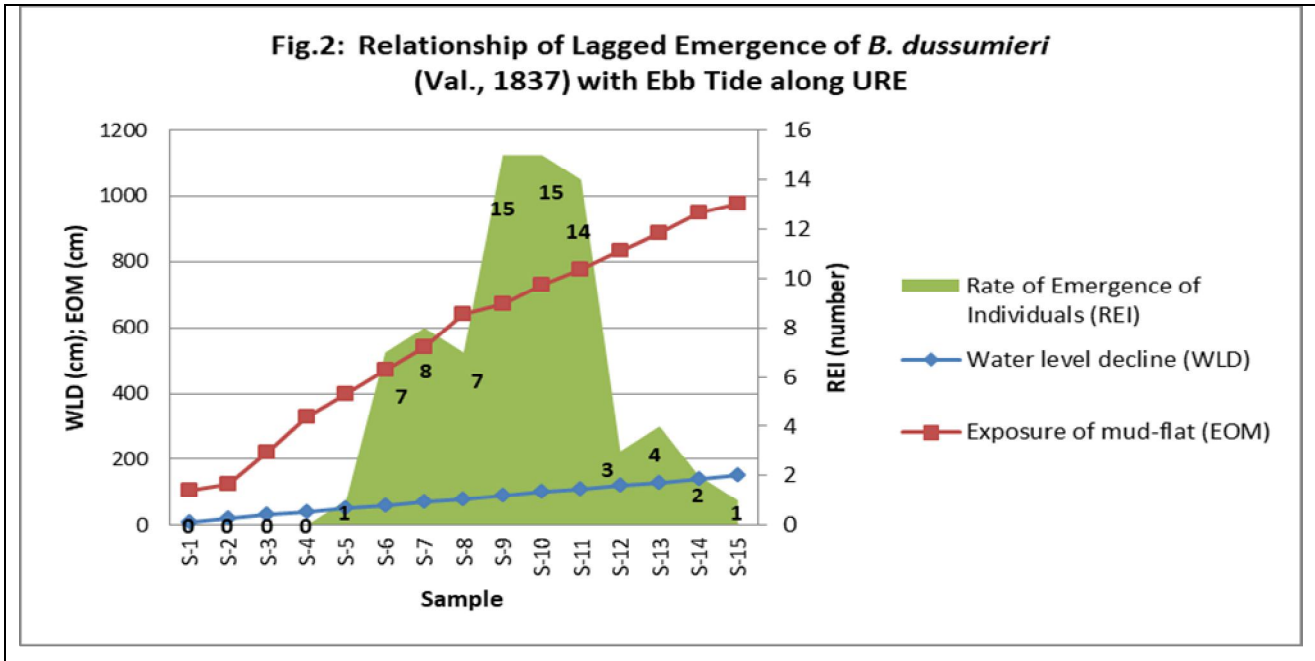
a. Ulhas River Estuary showing locations of two soil sampling stations-1, 2 & 3 at upper, middle and lower reaches respectively.



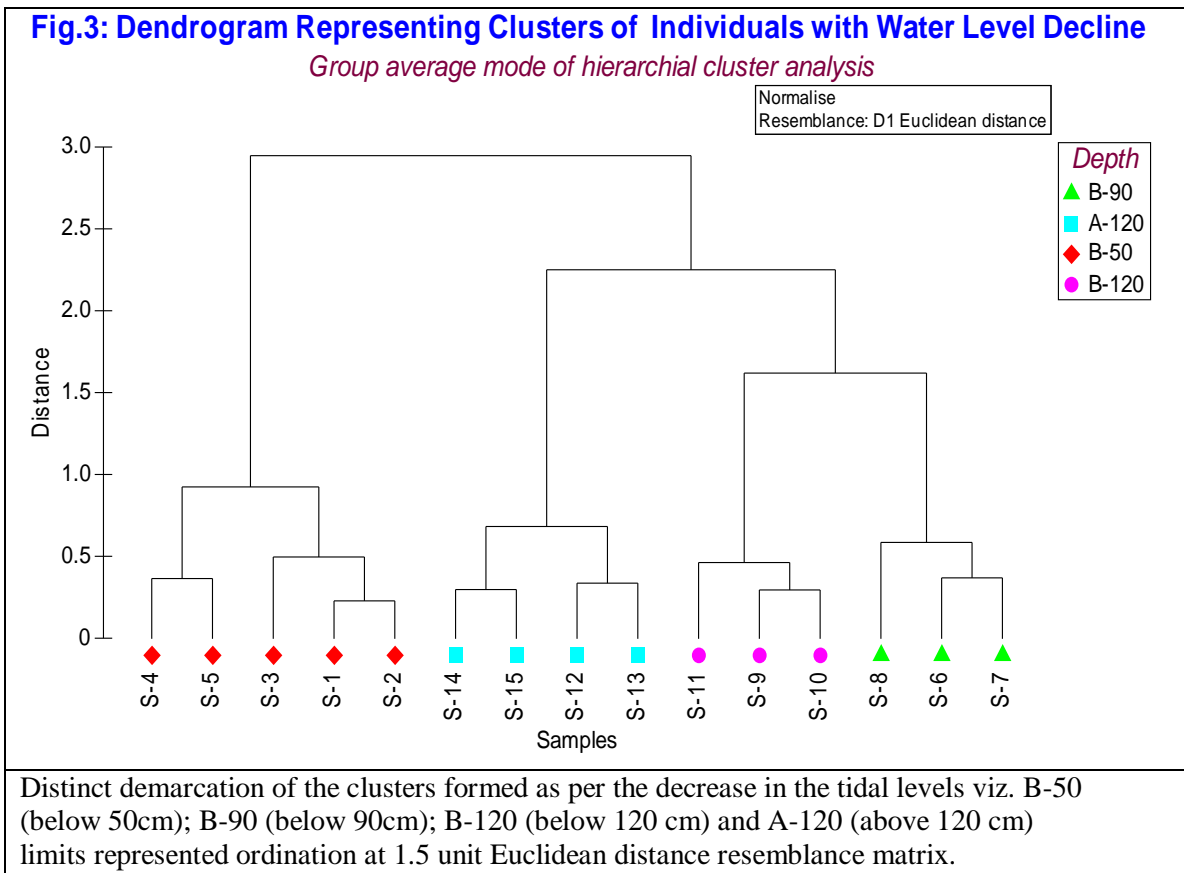
b. Kolshet Creek located near Thane City of Maharashtra State in India, between Latitude 19.228794N and Longitude 72.982963E on the world map showing the study station where *B. dussumieri* on the mudflats are of common site.

2. RESULT AND DISCUSSION

The behaviour of the *B. dussumieri* on the selected mudflat during the present study viz. observat4ion of emergence pattern of the *B. dussumieri* on the study mudflat with the tidal movement was related to depth of water receded during low tide. The rate of exposure of the mudflat (EOM) was steady and was concomitant to the decline in water level (WLD). This might be due to the evenness in the slope of the ambient mudflat at sampling station. However, the rate of emergence of individuals (REI) was varied with the WLD (Fig.2). The emergence of *B. dussumieri* on the surface of mudflat did not occur immediately after a considerable time of the onset of low tide until the level dropped to below 50cm. Further, the rate of emergence of individuals (REI) i.e. number of individuals emerged out with time, increased with the declining level of water (Fig. 3). About 89% of the individuals appeared on the mudflat surfaces when the water-level declined from 90 cm to 120 cm during low tide depicting the highest rate of surficial emergence of individuals. With the further decline in water level, rate of emergence was lower (Fig. 2).



It is evident from this observation that the individuals did not appear on the surface, until the available water in their burrows supported their respiration. As the water receded, they were forced to rush out of their burrows to breathe fresh air. It is important to mention that younger individuals appear first on the surface. It was however, observed in earlier study that smaller individuals have greater dependence on cutaneous rather than branchial respiration in *Periophthalmus chrysospilos* (Low *et al.*, 1990). This lagged emergence of *B. dussumieri* on the surface depicted that their burrows, existing on present study station, were ranged from 90 to 120 cm in depth, approximately (Fig. 4).



After emergence from the burrows individuals remained entirely engaged in feeding, courtship and protection of their territories during which they remained highly alert and vigilant in such exposed condition. The burrows were actively protected by the owners from their neighbors. Pit-pools were found refuge and source of water for various needs during exposed condition.

Fig. 4: Emergence of Number of Individuals in Relation to the Decline in Water Level

The rate of number emergence of individuals (REI) was greater between 90 cm to 120 cm of water decline level

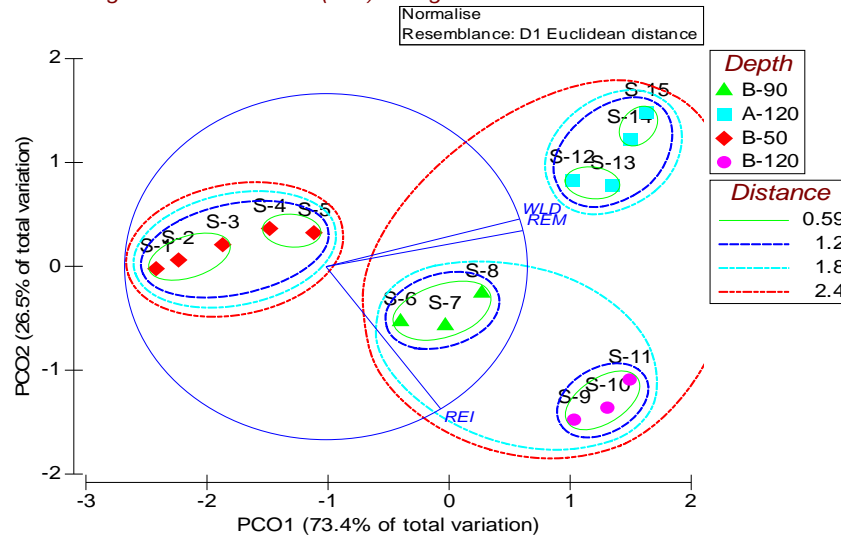


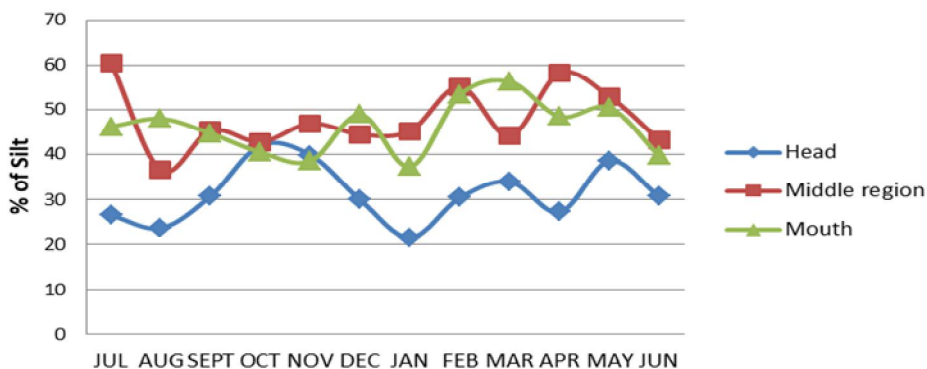
Fig. 4: Rate of emergence of individuals (*B. dussumieri*) increased with the receding water level. The number of mudskippers increased until water declined to 120 cm (B-120) below the high-tide level but suddenly decreased above 120 cm (A-120) level of depth. The ordination of samples between below 90cm (B-90) and below 120 cm (B-120) comprised about 89.7% of the individuals standing in a single cluster at 1.8 Euclidean distance level.

(Labels:- Instantaneous water level decline is depicted as B-50 = below 50 cm; B-90 = below 90 cm; B-120 = below 120 cm and A-120 = above 120 cm. RIE = rate of number of individuals appearing on the surface with water level decline; REM = rate of exposure of mudflat and WLD = water level declined).

I. SILTATION AND ITS IMPACT ON THE BURROWING BEHAVIOUR

Siltation was profound in URE towards mouth and middle region during present study. However, the siltation was near 31.26 % at head of the estuary which exceeded on an average 47.92% and 45.99% in the middle and lower regions of the URE respectively. This is probably was pertaining to the higher sand-dredging activities in the particularly from the month of January to May in middle and lower regions during the study period (Rathod, 2016). It has been observed that the present siltation hindered the construction of burrows. Consequently, the mature individuals in the study area were found to confine their burrows to upper intertidal limits (above the line of daily tidal levels which occasionally covered during spring tide only) during the study period. This might be for securing the burrow from getting demolished by tidal current.

Fig. 5: Monthly Silt Regime Towards Head, Study area (middle) and Mouth of the URE



CONCLUSION

Delayed appearance of the individuals was probably related to the water levels in their burrows. It seems that they remained in the burrow until the water was available to support their respiration. As soon as the water receded to about one meter below high tide level (90 to 120cm), the mature individuals were forced to emerge on the mudflat. This indicated that the burrows of *B. dussumieri* are nearly one meter in depth. Thus it is evident

from the present study that lagged emergence of the individuals on the surface during low tide was respiration related. Young ones appeared first after water receding below 50 cm. The early emergence of the young ones indicated their burrows were shallower or they were unable to construct burrows due to siltation in URE.

REFERENCES

1. Al-Behbehani, B. E. and H. M. A. Ebrahim (2010). Environmental Studies on the Mudskippers in the Intertidal Zone of Kuwait Bay. *Nature and Science*, 8(5): 79-89. <http://Www.Sciencepub.Net/Nature>
2. Altman, J., (1974). Observational study of behavior: sampling methods. *Behaviour*, 49(3/4): 227-267. Available at: <http://www.jstor.org/stable/4533591>
3. Ansari, A. A., S. Trivedi, S. Saggi, H. Rehman (2014). Mudskipper: A Biological Indicator for Environmental Monitoring and Assessment of Coastal Waters. *Journal of Entomology and Zoology Studies*, 2 (6): 22-33.
4. Bowden, Josh M.; Karriker, Locke A.; Stalder, Kenneth J.; and Johnson, Anna K. (2008) "Scan Sampling Techniques for Behavioral Validation in Nursery Pigs," *Animal Industry Report*: AS 654, ASL R2342. Available at: http://lib.dr.iastate.edu/ans_air/vol654/iss1/91
5. Buchanan J. B., 1984. *Methods of Study of Marine Benthos*. Edited by N. A. Holmes & A. D. McIntyre (Blackwell Scientific Publication)
6. Clayton. D. A. (1993) "Mudskippers", in *Oceanography and Mar. Biol. Annu. Rev.*, 31, 515-518.
7. Gilby, Ian C., Amy A. Pokempner, and Richard W. Wrangham (2010). A direct comparison of scan and focal sampling methods for measuring wild chimpanzee feeding behaviour. *Folia Primatologica*, 81(5): 254-264.
8. Ikebe Y., And T. Oishi (1996). Correlation between Environmental Parameters and Behaviour during High Tides in *Periophthalmus modestus*. *Journal of Fish Biology*, 49: 139-147. DOI: 10.1111/j.1095-8649.1996.tb00010.x
9. Ishimatsu, A. and Jeffrey B. Graham (2011). Roles of Environmental Cues for Embryonic Incubation and Hatching in Mudskippers. *Integrative and Comparative Biology*, 51(1): 38-48. doi:10.1093/icb/icr018; <https://www.researchgate.net/publication/51250389>
10. Mutsaddi K. B. and D. V. Bal (1969a). Food and feeding of *Boleophthalmus dussumieri* (Cuv. And Val.). *J. Univ. of Bombay*, 38: 42-55.
11. Mutsaddi K. B. and D. V. Bal (1969b). Some observations on habits and habitats of *Boleophthalmus dussumieri* (Cuv. & Val.). *J. of University of Bombay*, 39: 33-41.
12. Mutsaddi, K. B. and D. V. Bal (1970). Maturation and spawning of *Boleophthalmus dussumieri* (Cuv. & Val.). *J. of University of Bombay*, 39: 58-76.
13. Mutsaddi, K. B. and D. V. Bal (1973). Gobies from the intertidal region of Bombay. *Indian J. of Fisheries*, 20: 476-486.
14. Rathod, Sudesh D. (2005). 'Effect of pollution on mudskipper fishery of Ulhas River Estuary with a special reference to the biology of *Boleophthalmus dussumieri* (Cuv. & Val.)', Minor research project, University of Mumbai.
15. Rathod, Sudesh D. and N. N. Patil (2009). Feeding Habits of *Boleophthalmus Dussumieri* (Cuv. & Val.) from Ulhas River Estuary near Thane City, Maharashtra State. *J. Aqua. Biol.*, 24 (2): 153 - 159.
16. Rathod, Sudesh D. (2016). 'Studies on Pollution Status, Fish Faunal Diversity and Biology of Some Important Fishery Species viz. *Mystus gulio* (Ham.), *Boleophthalmus dussumieri* (Cuv. & Val.), *Scylla serrata* (Forsskal) And *Cardium asiaticum* (Brug.) from Ulhas River Estuary and Thane Creek'. Ph. D. Thesis, University of Mumbai.
17. Verney R., J. C. Brun-Cottan, R. Lafite, J. Deloffre and J.A. Taylor (2006). Tidally-induced Shear Stress Variability above Intertidal Mudflats. Case of the Macrotidal Seine Estuary. *Estuaries and Coasts*, 29(4): 653-664. <http://www.ifremer.fr/docelec/>

ADVANCED OXIDATION- THE STATE OF ART OF TRANSFORMING TOXICITY INTO PRODUCTS

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ABSTRACT

Advanced oxidation is a broad spectrum technique as it is non selective towards organic pollutants. Hydroxyl radicals with high oxidation potential (2.7eV) are produced in situ. The reduced pollutants can be measured in terms of COD, BOD, TOC or spectrometric analysis. Treatment conditions are dependent on the type of pollutants or in turn on the nature of effluents. The active •OH radicals can be combined with ligands or Fe ions as Fentons reagent or with photoactive catalyst to increase its efficiency which will be helpful in reducing the treatment cost. This paper presents the review of all such technologies used in past along with the thirist area and the e merging technology in the field of water treatment.

Keywords: Advanced oxidation, Fentons reagent, photoactive catalyst

INTRODUCTION

In the past 20 years there has been a rapid entry of new technologies that continue to be developed, tested, demonstrated, and introduced into the municipal water treatment market. Some of these technologies are membrane filtration, UV irradiation, advanced oxidation, ion exchange, and biological filtration. Rapid gravity sand filters are the most common type of filter in water treatment technologies, although pressure filters are also used. Membrane water treatment technologies separate certain molecules or ions from the feed water by the use of membranes. Clarification is usually done in combination with flocculants and coagulants to help improve the setline of these solids. Ion exchange water treatment techniques are used for water softening for domestic water use. Activated carbon contains a maze of small pores with sizes ranging from 500-1000 nm and a surface area of about one thousand square meters per gram. Electrodeionization (EDI) is a water treatment technology that uses electricity, ion exchange and resin to remove ionized species from water. Reverse osmosis (RO) is a process in which water under pressure is pass in cross-flow fashion through a membrane. Ultraviolet (UV) irradiation technology is primarily employed in the water and wastewater treatment industry as a disinfection process that capitalizes on the germicidal effect of UV light in the wavelength vary from 250 to 270 nm (EPA, 1996). The term "**advanced oxidation processes**" (AOPs) was first used by Glaze et al.¹ (1987) and Aieta et al. (1988) to explain a method that produces hydroxyl radicals (•OH) for the oxidation of organic and inorganic water impurities. AOPs include a number of processes.

In 1987 as processes that "involve the generation of hydroxyl radicals in sufficient quantity to affect water purification". In this context, advanced oxidation processes generally mean the application of either oxidation technologies using UV/O₃, O₃/H₂O₂, UV/ H₂O₂ or the photo Fenton reaction (UV/ H₂O₂/ Fe⁺⁺ or Fe⁺⁺⁺)^{2,2a}, Peyton³ gave a detailed overview and description of AOPs in 1990.

MATERIALS AND METHODS

All advanced oxidation processes (AOP) are defined by a typical chemical feature: the potential of exploiting the high reactivity of •OH radicals in driving oxidation processes which are appropriate for achieving the whole abatement and through mineralization of even less reactive pollutants. •OH radicals are extraordinarily reactive species, they attack the most part of organic molecules with rate constants⁴⁻⁵ usually in the order of 10⁶-10⁹ M⁻¹ s⁻¹. Processes like chlorination, ozonation, UV irradiation, electrochemical treatments involved •OH radical attack .Which have been investigated for more effective effectiveness to eliminate these toxic soluble substances.

However, three main AOPs are mentioned herein: ozone, ozone with hydrogen peroxide addition, and UV irradiation with hydrogen peroxide addition.

Ozonation for Organic Compound Oxidation: The ozone-H₂O₂ process is used for the destruction of taste-and-odor-causing compounds, color removal, and destruction of micropollutants, such as volatile organic compounds (Karimi et al., 1997), pesticides, and herbicides.

Application of UV/ozone for Organic Compound Oxidation: The reaction between Ultra Violet and hydrogen peroxide to form hydroxyl radicals is substantially slower than that between ozone and hydrogen peroxide. In

the presence of UV light, hydrogen peroxide decomposes to form hydroxyl radicals. Addition of hydrogen peroxide to the influent of a UV irradiation process is currently being used for the destruction of micropollutants from groundwater, but it can also be used for the same purposes as other AOPs, which include the destruction of taste-and-odor-causing compounds and the removal of color. The reaction between UV and hydrogen peroxide to form hydroxyl radicals is substantially slower than that between ozone and hydrogen peroxide.

During UV/ozone processes, ozone adsorbs UV light (wavelength shorter than 310 nm) and photolyzed to produce hydrogen peroxide and hydroxyl radicals ⁶, which able to oxidize organic compounds ⁷⁻⁹ for efficient ozone photolysis, UV light must have a wavelength at/or shorter than 254 nm. Fenton chemistry dates back to 1894 when the activation of H₂O₂ by ferrous salts was reported for oxidizing tartaric acid by Henry J. Fenton ¹⁰. In 1934 it was proposed by Haber and Weiss ¹¹ that there is a formation of ·OH due to the Fenton reaction. This ·OH has an oxidation potential of 2.73V.

Almost all contaminant can be removed from water. The question becomes that of cost. As alternative water resources availability is less, the need for innovative and cost-effective treatment technologies will rise steadily. Major mechanisms for organics removal throughout wastewater treatment by different AOPs are summarised in table 1.

Table :- 1 Major mechanisms for organics removal during wastewater treatment by different AOPs

AOP types	Oxidant for advanced oxidation	Other occurring mechanisms
O ₃	·OH	Direct O ₃ oxidation
O ₃ /H ₂ O ₂	·OH	Direct O ₃ oxidation, H ₂ O ₂ oxidation
O ₃ /UV	·OH	UV photolysis
UV/TiO ₂	·OH	UV photolysis
UV/ H ₂ O ₂	·OH	UV photolysis, H ₂ O ₂ oxidation
Fenton reaction	·OH	Iron coagulation, Iron sludge-induced adsorption
Photo-Fenton reaction	·OH	Iron coagulation, Iron sludge-induced adsorption, UV photolysis
Ultrasonic irradiation	·OH	Acoustic cavitation generates transient high temperatures (≥5000 K) and pressures (≥1000 atm), and produce H· and HO ₂ ·, besides OH·
Heat/persulfate	SO ₄ ^{·-}	Persulfate oxidation
UV/persulfate	SO ₄ ^{·-}	Persulfate oxidation UV photolysis
Fe(II)/persulfate	SO ₄ ^{·-}	Persulfate oxidation, Iron coagulation, Iron sludge-induced adsorption
OH ⁻ /persulfate	SO ₄ ^{·-} / ·OH	Persulfate oxidation

RESULTS AND DISCUSSION

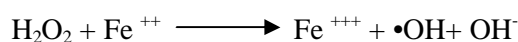
This review focuses on totally different Oxidation technologies which might be used for destruction of organic pollutants. Advanced chemical oxidation technology applications help in the elimination of environmentally hazardous waste. Another aspect concerning the opportunity of AOP application is that referring to the polluting load of wastes normally expressed as COD. A suitable application of AOP to waste water treatments must consider that they make use of expensive reactants as H₂O₂, and/or O₃ and therefore it is obvious that their application must not replace, whenever possible, the more economic treatments as the biological degradation.

The Fenton is one among the distinguished AOP and therefore the chemistry of reactions associated with this

includes reactions of peroxides (H_2O_2) with Fe^{2+} to produce reactive oxygen species that may degrade the organic as well as inorganic matter in aqueous phase. Hence it is one of the most active and powerful oxidants, which can be used in the degradation of most organic compounds including emerging. ¹²

Heterogeneous photocatalysis is quite different compared to other treatment methods involving oxidation and reduction simultaneously, with the use of light irradiation and a light absorbing photocatalyst. Various compounds will utilize light irradiation to catalytically endure photolysis to generate redox reactions. These compounds sometimes have a band structure with empty conduction and a filled valence band.

Fenton's reagent is a mixture of H_2O_2 and ferrous iron, which generates hydroxyl radicals according to the reaction. ¹³⁻¹⁵



Waste waters was treated with Fenton's reagent destroy toxic compounds such as phenols and herbicides. Production of $\bullet\text{OH}$ radicals by Fenton reagent¹⁶ occurs by means of addition of H_2O_2 to Fe_2C salts. This is a simple way of producing $\bullet\text{OH}$ radicals neither special reactants nor special apparatus being required. The advanced oxidation processes (Fenton's reagent) used successfully in the removal of organic pollutants from its aqueous solution which is helpful to determine the optimum conditions for their removal organic pollutants from industrial wastewater with efficiency.

CONCLUSION

The review explicitly discussed on the robustness of various AOPs that has been extensively used for water management. Here we clearly reviewed that treatment efficiency depended on various process parameters. However, limitations such as high energy consumption, high operational costs and lower generation of the reactive species initiated the need for process intensifications. The strength of the intensified system justified their role on treating various pollutants. Though various AOPs for water treatment are discussed, the advanced chemical oxidation processes (Fenton's reagent/Photo Fenton's reagent) is most widely preferred over the rest of the processes for real-time applications. Over all the review presented the clear scenario of the AOPs for water and wastewater treatment with a benefit to the community.

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REFERENCES

1. Atchley, A.A., Crum, L.A., Ultrasound, its chemical physical and biological effects, K. S. Suslick, Ed., Chapter one, VCH New York, 1998.
2. Jian Chen et al., Ph.D. Thesis, Advanced Oxidation Technologies: Photocatalytic treatment of wastewater; Universitair docent bij het subdepartement milieutechnologie, Holland, 1997.
3. Peyton, G.R., significance and treatment of volatile organic compounds in water supplies, (Eds.) N, M. Ram, R. F. Chrisman, K. P. Cantor, 1990, Lewis publishers. Chapter 14, oxidative treatment methods for removal of organic compounds from drinking water supplies, pp. 313-362, as cited in reference (1).
4. Farhataziz, A.B Ross, Selective specific rates of reactions of transients in water and aqueous solutions. Part III. Hydroxyl radical and perhydroxyl radical and their radical ions, Natl. Stand. Ref. Data Ser., (USA Natl. Bur. Stand.), 1977, 59.
5. J. Hoigné, H. Bader, Rate constants of reaction of ozone with organic and inorganic compounds in water. Part II. Dissociating organic compounds, Water Res. 17 (1983) 185.
6. Glaze, W.H., Kang, J.W. and Chapin, D.H., The Chemistry Of Water Treatment Processes Involving Ozone, Hydrogen Peroxide and Ultraviolet Radiation, Ozone Sci. Eng., Vol. 9, pp. 335-352, 1987.
7. Peyton, G.R. and Glaze, W.H., Mechanism of photocatalytic ozonation, in photochemistry of environmental aquatic systems, R. G. Zika and W. J. Cooper, Eds., ACS Symposium series, No. 327, Washington D. C., American Chemical Society, 76-88, 1987.
8. Peyton, G.R., Huang, F.Y., Burleson, J.L. and Glaze, W.H., Destruction of pollutants in water with ozone in combination with ultraviolet radiation. 1. General principles and oxidation of tetrachloroethylene, Environ. Sci. Technol., Vol. 16, pp. 448-453, 1982.
9. Glaze, W.H., Peyton, G.R., Sohm, B. and Muldrum, D.A., Pilot-scale evaluation of photocataytic

-
- ozonation for trihalomethane precursors removal, Final report to USEPA, EPA-600/S2-84-136, 1984.
10. Fenton, H. J. H. Oxidation of tartaric acid in presence of iron. *Journal of the Chemical Society, Transactions*, 65: 899-910 (1894)
 11. Haber, F., & Weiss, J. The catalytic decomposition of hydrogen peroxide by iron salts. *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 147(861): 332-351 (1934)
 12. Munter, R. Advanced oxidation processes—current status and prospects. *Estonian Acad. Sci. Chem*, 50(2): 59-80 (2001)
 13. Kitis, M., Adams, C.D. and Daicger, G.T., The effect of fenton's reagent pretreatment on the biodegradability of non ionic surfactants, *Wat. Res. Vol. 33, No. 11*, pp. 2561-2568, 1999.
 14. Roppert C. and Bauer R., Mineralization of cyclic organic water contaminants by the photo—Fenton reaction: influence of structure and substituents, *Chemosphere*, Vol. 27, pp. 1339—1347, 1993.
 15. Venkatadri R. and Peters R. W., Chemical oxidation technologies: ultraviolet light/hydrogen peroxide, fentons reagent and titanium dioxide-assisted photoca-talysis. *Haz. Waste Haz. Mater. Vol 10*, pp. 107—149, 1993.
 16. F. Haber, J. Weiss, The catalytic decomposition of hydrogen peroxide by iron salts, *Proc. R. Soc. Series A* 147 (1934) 332.
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STUDY OF ANIONIC DYE ADSORPTION USING BIO-WASTES

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ABSTRACT

Direct release of textile/paper dyes in the river without any pre-treatment is posing serious health challenges to aquatic life and human kinds. Adsorption being one of the simple and economical phenomenon is used to lower the concentration of water effluent polluted by anionic dyes. Effective removal of M-Navy Blue dye which is an anionic dye was studied for its elimination from water effluent with the help of non-agricultural product Tamarind Pod Shells (*Tamarindus Indica*). Studies involved the batch adsorption method for its properties like pH effect, adsorption dosage, desorption, kinetics and isothermal behaviour. High adsorption was found at low pH values and was competitive for both Freundlich and pseudo first order kinetics.

Keywords: M-Navy Blue, Anionic dye, Water effluent, Tamarind Pod Shell, Batch adsorption, Desorption.

INTRODUCTION

M-Navy blue dye is extensively used in dyeing cottons, viscose, and their blends, because of their consistency and dependability. Hence these dyes are on large amount released directly in rivers from textile industries. Dyes impose serious threats to the aquatic life as well as human being who use the river water for their domestic applications. These pollutants can be treated by several methods or phenomenon like chemical coagulation/flocculation, ozonation, oxidation processes, chemical precipitation, ion exchange, reverse osmosis and ultra-filtration etc. reported in the literature but these water treatment methods carry serious restrictions such as not cost effective, high need of energy^{1,2}. Adsorption process provides wider platform in regards purification and removal of pollutants from the industrial waste water for its simplicity in applications^{3,4}. Activated carbon is classical choice for most of the researchers in old times, but expensiveness⁵ of the activated carbon moved the research community to the other low-cost adsorbents such as Pistachio hull waste, Pillared clays, sugarcane bagasse lignin, Coffee husk based activated carbon, Rice husk, animal bone meal, orange peel, wood, papaya leaf, eggshell etc.⁵⁻¹⁹. *Tamarindus indica* seed as bio-adsorbent is also used to treat water pollution due to dye and metal.²⁰⁻²⁶ Utility of *Tamarindus Indica* pod shell involves in purification of contaminated water due to both acidic and basic dyes.²⁷ The other side of using *Tamarindus Indica* Podshells is its cost effective, easy availability, simple handling and shelf life. Consequently we tried to use the plant based adsorbent i.e. *Tamarindus Indica* Podshell to purify the water polluted with M-Navy blue dye by exercising the economically and ecofriendly adsorption process in laboratory. The present work will be an addition to mitigate pollutants from water.

MATERIALS AND METHODS

All the chemicals and reagents used in the study were of analytical grades.

ADSORBENT PREPARATION

Locally obtained tamarind pod shells were cleaned under distilled water to remove any fine dust particles and were allowed to remove the moisture in sunlight for four to five days. Powdered dried shells were sieved and fix amount of it were used in further studies. FTIR studies revealed multifunctional nature of the Tamarind Podshells.²⁷

PREPARATION OF ADSORBATE

A stock solution of 1000 mg/L was prepared by dissolving 1 g of M-Navy Blue F 2GB dye in a 1 L of distilled water. All working solutions used in tests were prepared by diluting the stock solution with distilled water to get the appropriate concentration. The dye concentration was determined using UV/visible spectrometer at a λ_{\max} value of 405 nm.

Structure of adsorbate: M-Navy Blue F 2GB

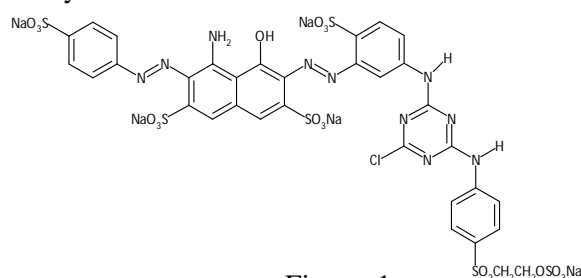


Figure: 1

Adsorption Experiments: For routine analysis batch adsorption method was adopted and performed at room temperature.

Effect of Contact time: Uptake of dye on adsorbent was studied as a function of time needed to ensure minimum time for stirring the mixture to reach equilibrium. Experiments were carried out mixing 1g of adsorbent with dye (100 ppm) at 180 rpm for natural pH of dye.

Effect of adsorbent dose: Determination of adsorbent dosage is important as it decides the concentration required to suppress the opposing forces for mass transfer of dye from its aqueous solution surface of solid adsorbent. Effective adsorbent dose was determined by stirring 50 ml of aqueous solution of M-Navy Blue (100 ppm) with varying doses of adsorbent i.e. 0.5-4.0 (g/L) at its normal pH and predetermined 180 rpm above time needed for equilibrium between dye and carbon.

Effect of pH: Accumulation of dye on the interface of adsorbent is greatly affected by pH of the reaction conditions. pH of the solution affects the electrostatic forces of attraction at the interface. pH is maintained by with 0.1 M HCl and 0.1 M NaOH respectively between 2 to 12.

Desorption Study: Regeneration of surface of adsorbent after uploading of the dye was seen by desorption study which ensures the reusability of the adsorbent. 75 mg of adsorbent loaded with M-Navy Blue dye was stirred with 50 ml of aqueous solution for greater than uptake equilibrium time at 180 rpm at different levels of pH.

RESULTS AND DISCUSSION

Effect of contact time: Time needed to establish equilibrium was found to be between 80-90 minutes and maximum removal of dye was seen around 95%. It is assumed that after 90 minutes all active sites of adsorbent are filled with dye hence no further removal of dye was observed.

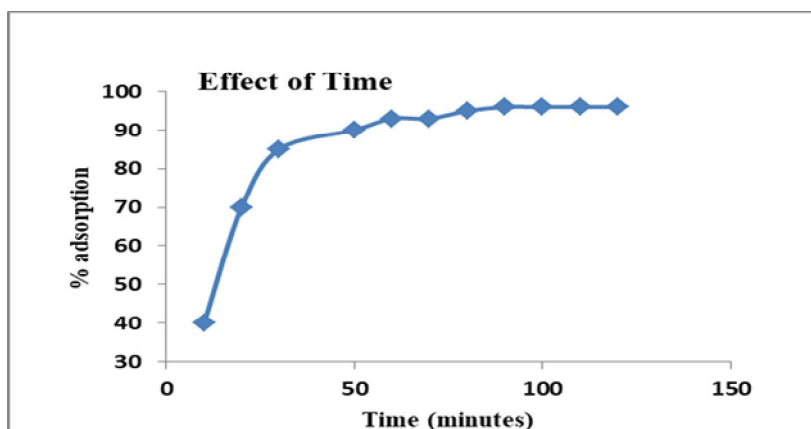


Figure: 2

Effect of initial pH of the solution: Maximum uptake of dye elimination was at pH range 2 - 4. It is postulated that in highly acidic medium surface of dye becomes positively charged hence anionic dye has strong pull towards the surface and showing maximum removal. High pH values made surface of the adsorbent negatively charged establishing the electrostatic repulsion for the dye.

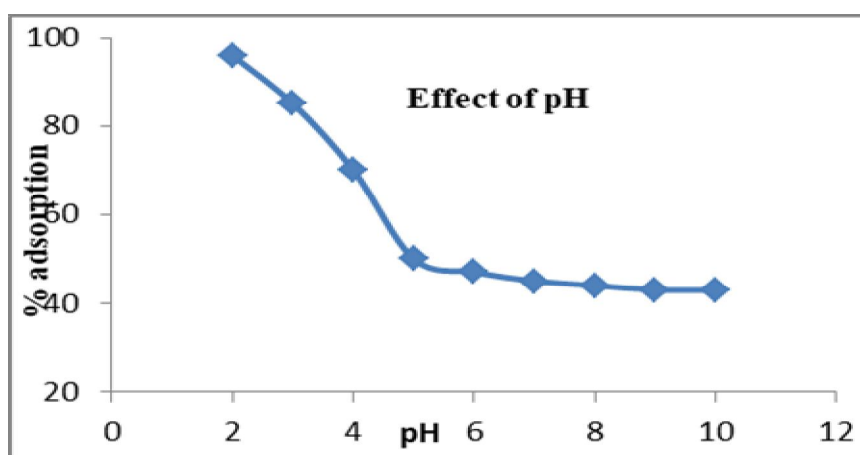


Figure: 3

EFFECT OF ADSORBENT DOSAGE

Extent of adsorption increases with amount of adsorbent as concentration increases the active site also increases. However, maximum uptake of dye was seen with dose of 2.50 (g/L) of adsorbent before reaching the flat portion of the graph with the aqueous solution of dye.

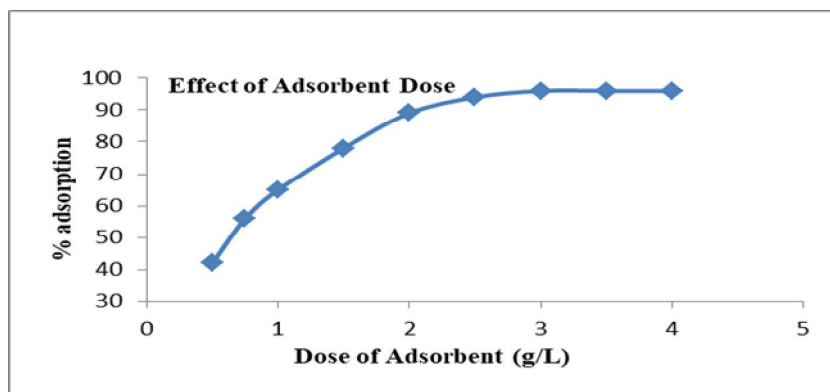


Figure 4

DESORPTION STUDY

Recyclability of the adsorbent was performed at various pH levels. As expected, desorption of dye loaded adsorbent increased with increasing pH. In basic medium i.e.pH 8, only 50 percent of desorption could be achieved before attaining the equilibrium. This can be inferred as there is possibly chemical adsorption for the dye at surface.

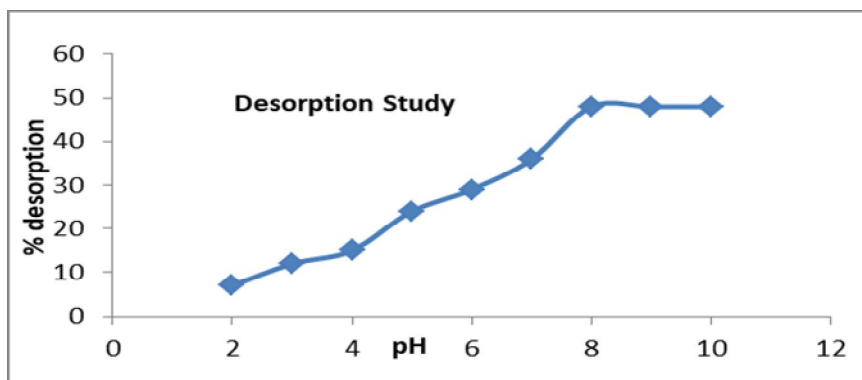
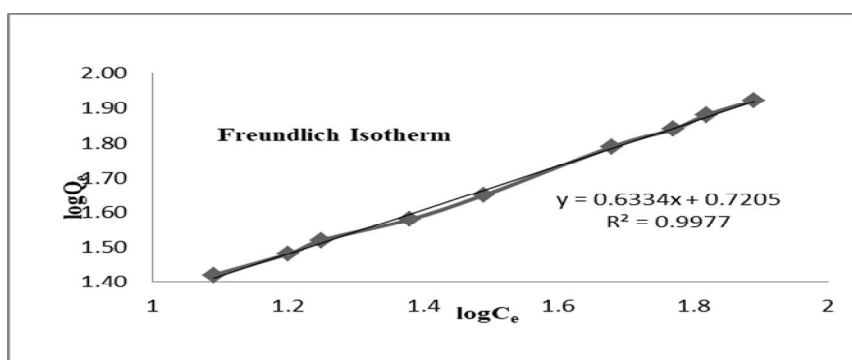


Figure: 5

ADSORPTION ISOTHERMS

Adsorption studies were examined and linear form of Freundlich isotherm model²⁸ was most appropriate model to describe the adsorption between M-Navy Blue dye and Tamarind Podshell. Freundlich isotherm model can be represented as $\log Q_e = \log K_f + \frac{1}{n} \log C_e$ where Q_e is amount of dye absorbed (mg/g), C_e is the equilibrium concentration of dye (mg/l), K_f and n are coefficients of adsorption capacity and intensity respectively. K is a function of energy of adsorption and temperature and is a measure of adsorptive capacity, and $1/n$ determines intensity of adsorption.^{29, 30} From the Freundlich isotherm figure 6, values of K_f and n which were found to be 5.248 and 1.508 respectively explained the equilibrium for dye loaded Tamarind Podshell. However, adsorption in multilayer form cannot be ruled out on the active sites of tamarind pod shell to some extent.



Figur-6 Freundlich Adsorption Isotherm

KINETICS

Kinetic models explain the adsorption rate and retention time for the dye at interface.

The Langergen's equation was used to study pseudo first-order model to the kinetics of the adsorption.³¹

$\log(Q_e - Q_t) = \log Q_e - \frac{K_{ad}}{2.303} t$ where Q_t is the amount of dye adsorbed (mg/g) at time t , Q_e is the amount of dye adsorbed at equilibrium, and K_{ad} is the rate constant of first-order sorption (min^{-1}). High correlation coefficient for pseudo first-order equation indicated that the pseudo first-order model could successfully describe the kinetic of M-Navy Blue dye adsorption on Tamarind Pod Shell.

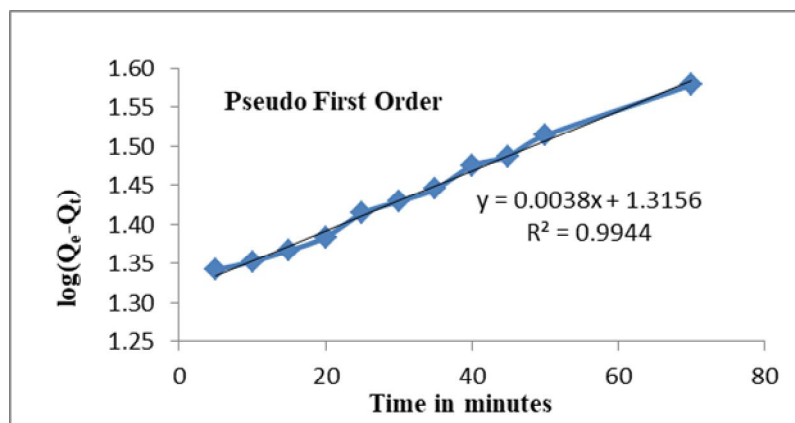


Figure: 7

CONCLUSION

Powdered *Tamrindus Indica Podshell* can be as option for the lowering of concentration dye from affected water with given given adsorbent dose and pH between 2 – 4 i. e. maximum up to 95%. Podshells can be used for both types of anionic or cationic dyes. M-Navy blue F2GB dye a category of reactive and anionic dye showed adsorption following Freundlich isotherm model. Kinetics showed that adsorption was suitable for pseudo- first order model. Adsorption can be both physisorption and chemisorption in nature. Contaminated water contains many pollutants and Powdered *Tamrindus Indica Podshell* can perhaps adsorb other materials also along with M-Navy blue F2GB dye due to multifunctional nature of the surface of adsorbent. Hence, comprehensive study is required to optimize the adsorption process by studying the remaining adsorption parameters. Since studies were done on laboratory level, actual application of *Tamarind Pod Shells* may compete with some other pollutants at the surface present in the polluted water. Hence further studies may involve the selectivity and specificity of adsorbent for M-Navy Blue F2GB dye in presence of numerous contaminants.

REFERENCES

1. K. S. Bharathi, S. T. Ramesh ; *Appl Water Sci* 3:773–790; 2013.
2. Banat, I.M., Nigam, P., Singh, D., Marchant, R.; *Bioresource Technology*, vol. 58, p. 217 – 227,1996.
3. Amit Bhatnagar, Vitor J.P. Vilar, Cidália M.S. Botelho, Rui A.R. Boaventura; *Environmental Technology*, 32(3), 231–249, (2011).
4. Ahmed Fate Ali, Abdulsalami Sanni Kovo, Sunday Adesola Adetunj; *Journal of Encapsulation and Adsorption Sciences*, 7, 95-107, 2017.
5. Malik, P.K., *Dyes and Pigments*, vol. 56,, p. 239 – 249. 200.
6. Da Silva, L.G., Ruggiero, R., Gontijo, P.M., Pinto, R.B., Royer, B., Lima, E.C., Fernandes, T.H.M., Calvete, T.,*Chemical Engineering Journal*, vol. 168, p. 620 – 628,2011.
7. Moussavi, G., Khosravi, R., *Chemical Engineering Research and Design*, vol. 89, p. 2182 – 2189, 2011.
8. Ahmad, M.A., Rahman, N.K., *Chemical Engineering Journal*, vol. 170, p. 154 – 161,2011.
9. Mahmoodi, N.M., Hayati, B., Arami, M., Lan, C., *Desalination*, vol. 268, p. 117 – 125, 2011.
10. Safa, Y., Bhatti, H.N., *Desalination*, vol. 272, p. 313 – 322, 2011.
11. El Boujaady, H., El Rhilassi, A., Ziatni, M.B., El Hamri, R., Taitai, A., Lacout, J.L., *Desalination*, vol. 275, p. 10 – 16, 2011.

12. Errais, E., Duplay, J., Darragi, F., M'Rabet, I., Aubert, A., Huber, F., Morvan, G., *Desalination*, vol. 275, p. 74 – 81, 2011.
13. Gil, A., Assis, F.C.C., Albeniz, S., Korili, S.A., *Chemical Engineering Journal*, vol. 168, , p. 1032 – 1040, 2011.
14. Li, Z., Change, P.H., Jiang, W.T., Jean, J.S., Hong, H., *Chemical Engineering Journal*, vol. 168,, p. 1193 – 1200, 2011.
15. El Hadad Mohammadine, Slimani Rachid, Manmouni Rachid, Saffaj Nabil, Ridaoui Mohammad, Lazar Said; *Journal of Engineering Studies and Research – Volume 18 No. 3, 43-52, 2012.*
16. Benaïssa, *Ninth International Water Technology Conference, IWTC9, Sharm El-Sheikh, Egypt 1175, 2005*
17. Arunachalam Agalya, Nachimuthu Palanisamy and Ponnusamy Sivakumar; *Advances in Applied Science Research*, 3 (3):1220-1230, 2012.
18. M.Z.B. Mukhlis,M.M.R. Khan, A.R. Islamand A.N.M.S. Akanda; *Journal of Mechanical Engineering and Sciences (JMES) Volume 10, Issue 1, pp. 1884-1894, 2016.*
19. Mardawani Mohamad, Tan Chia Wei, Rosmawani Mohammad1 and Lim Jun Wei; *ARPJ Journal of Engineering and Applied Sciences*, vol. 12, (11), 3621-3633,2017.
20. Edwin Vasu A., *Oriental Journal of Chemistry*, 24(3), 917-926, 2008.
21. Suneel Kumar, Kaustubha Mohanty, Meikap B C. *Journal Of Environmental Protection Science*, 4,p 1 – 7, 2010.
22. Rajeshkannan R., Rajasimman M., Rajamohan N., *Chemical Industry & Chemical Engineering Quarterly*, 17 (1), 67–79, 2011.
23. Shanthi S., Mahalakshmi T., *International Journal Of Research In Pharmacy And Chemistry*, 2(2), 289-298, 2012.
24. Jagruti S. Vaza, Satish A. Bhalerao., *International Journal of Scientific Development and Research (IJS DR)*. Volume 3, Issue 11, 244-256, 2018.
25. P. Bangaraiah and B. Sarath Babu, P. Bangaraiah, *International Journal of Civil Engineering and Technology (IJCIET)*. Volume 8, Issue 6, , pp. 708–715, 2017.
26. S. L. Pandharipande, Rohit P. Kalnake, *International Journal of Engineering Sciences & Emerging Technologies*, Volume 4, Issue 2, p: 83-89, 2013.
27. N Ahalya, MN Chandraprabha, RD Kanamadi, TV Ramachandra; *J Biochem Tech*) 3(5): S189-S192, 2012.
28. El-Sikaily, A., Khaled, A., El Nemr, A., Abdelwahab, O., *Chem. Ecol.*22 149–157, 2006.
29. Uddin, M.T., M.S. Islam and M.Z. Abedin, *ARPJ J of Engineering and Applied sciences*, 2(2): 121-128, 2007.
30. Khan, A.R., H. Tahir, F. Uddin and H. Uzma, *J.of Applied Science and environmental Management*, 9(2): 29-35, 2005.
31. Akkaya, G., Oze, A.,*Process Biochem.* 40(11) 3559–3568, 2005.

ADSORPTIVE REMOVAL OF CATIONIC DYE, METHYLENE BLUE FROM AQUEOUS SOLUTION USING RIND OF ORANGE (*CITRUS SINENSIS*) (L.) OSBECK**Sandip D. Maind, Shweta Dandekar, Onkar A. Lotlikar and Shrimant V. Rathod**

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ABSTRACT

Adsorptive removal of cationic dye, methylene blue from aqueous solution using rind of orange (Citrus sinensis) (L.) Osbeck was investigated. The adsorbent was characterized by FTIR and SEM. The point of zero charge (pH_{pzc}) of adsorbent, which determine the pH at which the adsorbent surface has net electrical neutrality was experimentally found to be 5.90. The batch experiments were performed in order to optimize the various parameters such as solution pH, adsorbent dose, initial dye concentration, contact time and temperature. Equilibrium data were well described by typical Langmuir, Freundlich, Dubinin-Kaganer-Redushkevich (DKR) and Temkin adsorption isotherm models. Langmuir adsorption isotherm model provided a better fit with the experimental data. The maximum adsorption capacity of dye, methylene blue which was determined from Langmuir adsorption isotherm model was found to be 35.971 mg per g of adsorbent. Furthermore, a detailed analysis has been conducted by testing simple chemical reaction kinetic models such as pseudo-first-order, pseudo-second-order, Elovich and Weber & Morris intra-particle diffusion. A prediction based on the so-called pseudo-second-order kinetic model was found in satisfactory accordance with experimental data which suggests that adsorption is chemical sorption controlled. Thermodynamic study revealed that the adsorption process was spontaneous, endothermic and increasing randomness of the solid solution interfaces. The rind of orange (Citrus sinensis) (L.) was found to remove dye, methylene blue very effectively from aqueous solutions and can be recommended for removal of dye from coloured effluents.

Keywords: Adsorption, Methylene blue, rind of orange (Citrus sinensis) (L.) Osbeck, FTIR, SEM, Adsorption isotherms, Adsorption kinetics, Thermodynamic study.

INTRODUCTION

The discharge of pollutants such as heavy metals, toxic dyes from various industrial sources, into aquatic ecosystems has of great concern throughout the world. Dyes are widely used in many industries such as textile, fiber, cosmetic, pharmaceutical, leather, paper, plastic, printing food to color. About 10000 different dyes are annually used in various industrial processes¹. A large amount of dyes are discharged to the wastewater effluent annually which severely pollute the water body and damage the aquatic life by increasing the COD, BOD and suspended solid of the water body. Color interferences with penetration of sun light into water, retards photosynthesis, inhibits the growth of aquatic biota and interferences with the gas solubility of water bodies². Extensive use of dyes in various industries and increase in environmental pollution due to discharge of industrial effluents containing toxic organic pollutants like dyes into the open landscapes and water bodies is one of the most serious issues of the country. The presence of dyes in industrial effluents is extremely undesirable as they are toxic, mutagenic and carcinogenic characteristics to both lower and higher concentrations and hence creates health hazard to human being & and damage the aquatic life³⁻⁵. Even a trace amount of dye present in the aquatic system may cause several health problems to mankind as well as to animals. Under certain environmental conditions dyes may accumulate to toxic levels and cause ecological damage. In the past few decades concentrations of dyes increased in environment i.e. water and at many places it reached upto toxic levels. When the concentrations of dyes are high in the environment, it is evident that inhabitant of that environment also accumulates dyes and it is well known that dyes have deteriorious effect. Some dyes at higher doses they may cause metabolic disorders and growth inhibition for most of the plant species and also creates health problems.

Continuous monitoring & controlling of pollution, identification of pollutants, development & utility of novel methods for removal of organic pollutants such as dyes is highly necessary. Strict environmental protection legislation and public environmental concerns lead the search for novel techniques for removal remove of toxic dyes from industrial waste water.

The pollutant of concern includes cationic dye affect the biosphere in many places worldwide. The cationic dye, methylene blue (Fig. 1) which has applications in a large number of industries to colour cottons, wools, sink, leather, paper etc. and which is toxic with many after effects on human beings. An exposure to methylene blue can cause breathing problem and produces a burning sensation during ingestion and many cause nausea, sweating, cyanosis, jaundice, shock and methemoglobinemia⁶. Studies also confirm that the products formed

after the degradation are also not safe and have carcinogenic potential. Dyes are resilient to fading on exposure to light and water and it therefore difficult to be removed from waste water. Thus it becomes necessary to remove such a toxic dyes from waste water before it is released into aquatic environment.

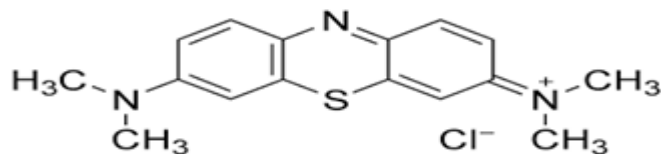


Fig-1 : Chemical structure of the cationic dye, methylene blue

Over the last few decades, several physical and chemical methods like flocculation, electro-floatation, precipitation, coagulation, ion exchange, membrane filtration, electrochemical destruction, irradiation, ozonation, katox treatment method etc. have been devised for treatment and removal of dyes from waste water⁷⁻⁸. These processes are expensive & ineffective, especially when large quantity of dyes present in water. Each of it has certain merits as well as demerits. Research is therefore important to fully understand systems and technologies for dye removal. The present study was to focus to develop cost effective, environmental friendly, effective methods as an alternate for the contemporary expensive methods for removal of dyes from aqueous solution. Further the study is helpful to find out suitable effective adsorbents for commercial exploitation for removal of dyes from industrial effluents. Due to the various disadvantages of the above methods, development of cost effective, environmental friendly methods are highly necessary.

Adsorption is most suitable method for solving this type of problems has been used for the adsorption of dyes. Recently several authors reviewed the work on adsorption of dyes. To date, plant waste material like saw dust, activated saw dust, Jhangola husk, activated Jhangola husk, Kodo husk, banana pith, hardwood, chitin and chitosan, neem leaf, fly ash & red mud, oil palm empty fruit bunch, lignite, coir pith, bagasse pith, neem leaf, orange pith, barley husk, cassava peels, rice husk etc. have been used for the removal of various dyes. Removal of methylene blue using plant waste materials is also reported.

Rind of orange (*Citrus sinensis*) (L.) Osbeck is an agricultural /fruit juice industries waste material which is relatively common, cheap and abundantly available in nature. Such materials could be a very effective and potential adsorbent for removal of dyes from industrial effluents.

The present study aims to study adsorption of cationic dye, methylene blue using cost effective adsorbent. The work was planned to explore the feasibility of rind of orange (*Citrus sinensis*) (L.) Osbeck to remove toxic dye, methylene blue from aqueous solution in a batch system. The objective of this study was to characterize adsorbent using FTIR and SEM. The study was extended with the objective for estimation and calculation of various parameters affecting the adsorption of dyes: such as solution pH, adsorbent dose, initial dye concentration, contact time and temperature. Application of mathematical modeling which are widely accepted and linearized equilibrium adsorption isotherm models (Langmuir, Freundlich, Dubinin-Kaganer- Redushkevich (DKR) and Temkin) for a single solute system was studied to understand the effect of uptake of dyes by adsorbent. Kinetic models (pseudo-first-order, pseudo-second-order, Elovich and Weber & Morris intra-particle diffusion) was employed to understand the probable adsorption mechanism. Thermodynamic study was also carried out to estimate the standard Gibbs free energy change (ΔG^0), standard enthalpy change (ΔH^0) and standard entropy change (ΔS^0).

MATERIALS AND METHODS

Chemicals and reagents: All the chemicals and reagents used were of analytical reagent (AR) grade.

Preparation of methylene blue solution: The stock solution of 1000 ppm of methylene blue was prepared by dissolving 0.5 g dye in 500 cm³ of double distilled water. Further desired test solutions of dye were prepared using appropriate subsequent dilutions of the stock solution.

Preparation of adsorbent: The rind of orange (*Citrus sinensis*) (L.) Osbeck was washed with several times with distilled water to remove the surface adhered particles, dirt, other unwanted materials, water soluble impurities and water was squeezed out. Adsorbent was then dried at 50°C overnight and crushed. It was sieved to select particles 100 µm in size was used in all the experiments. For further use, the dried adsorbent was stored in air tight plastic bottle to protect it from moisture.

Characterization of adsorbent by Fourier Transform Infrared (FTIR) spectroscopy: The adsorbent was examined using FTIR spectrometer (model:FT/IR-4100typeA) within range of 400-4000 cm⁻¹. Analysis was performed using KBr as back ground material.

Characterization of adsorbent by Scanning Electron Microscope (SEM): The adsorbent was covered with a thin layer of gold and an electron acceleration voltage of 10 KV was applied and then Scanning Electron Micrograph was recorded.

Experimental procedure: The static (batch) method was employed at temperature (30⁰C) to examine the adsorption of dye, methylene blue by adsorbent. The following equation was used to compute the percent removal (% Removal) of dye by the adsorbent,

$$\% \text{ Removal} = \frac{(C_i - C_e)}{C_i} \times 100 \quad (1)$$

where C_i and C_e are the initial concentrations and equilibrium concentrations of the dye in mg/L.

The equilibrium dye adsorptive quantity (q_e) was determined by the following equation,

$$q_e = \frac{(C_i - C_e)}{w} \times V \quad (2)$$

where q_e (mg metal per g dry adsorbent) is the amount of dye adsorbed, V (in liter) is the solution volume and w (in gram) is the amount of dry adsorbent used.

RESULTS AND DISCUSSION

Characterization of adsorbent by Fourier Transform Infrared (FTIR) spectroscopy: The spectrum clearly showed the broad peak at 3421 cm^{-1} is the indicator of -OH and -NH groups. The stretching of the -OH groups bound to methyl groups presented in the signal at 2924 cm^{-1} . The peaks at 2361 cm^{-1} and 2343 cm^{-1} are stretching peaks. The peaks located at 1733 cm^{-1} and 1636 cm^{-1} are characteristics of carbonyl group. The presence of -OH group along with carbonyl group confirms the presence of carboxyl acid groups in the biomass. The peak at 1508 cm^{-1} is associated with the stretching in aromatic rings. The peaks observed at 1074 cm^{-1} are due to C-H and C-O bonds. The -OH, NH, carbonyl and carboxyl groups are important sorption sites. As compared to simple adsorbent, adsorbent loaded with dye, the broadening of -OH peak at 3421 cm^{-1} and carbonyl group peak at 1636 cm^{-1} was observed. This indicates the involvement of hydroxyl and carbonyl groups in the adsorption of dye.

Characterization of biosorbent by Scanning Electron Microscope (SEM): The micrograph represents a porous structure with large surface area and there is more uniformity. It was evident that the adsorbent presents an unequal structure before dye adsorbed. The number of canals in the adsorbent was higher in the initial case. The dye adsorbed on the cell wall matrix and created stronger cross linking and uniformity on the surface of adsorbent.

EFFECT OF PH

The optimization of pH was done by varying the pH in the range of 2 to 10. It was found that percentage removal of dye has increased by increasing pH value, which could be due to the surface charge of the adsorbent and at pH 7 the adsorption was maximum with 53.00 %. A further increase in $\text{pH} > 7$ caused no significant improvement of dye adsorption, but percentage removal was slightly decreases. Therefore the pH 7 was chosen for the following experiments.

EFFECT OF ADSORBENT DOSE CONCENTRATION

The adsorption capacity of dye, methylene blue onto the adsorbent was studied by varying adsorbent dose from 1.0 g/L to 17.50 g/L. Percentage removal of dye, methylene blue increased with increase adsorbent dose from 1.0 g/L to 5 g/L. The point of saturation for the adsorbent was found at 5 g/L of adsorbent dose concentration with maximum removal efficiency 59.80 %. The adsorbent dose 5 g/L was chosen for all further studies.

Effect of initial dye concentration: In order to study the effect of initial dye concentration for adsorption of dye onto adsorbent, experiment was conducted with fixed amount of adsorbent and varying amount of dye from 25 mg/L to 350 mg/L. which shows that percentage removal of dye by adsorbent decreases as the initial dye concentration increased. For constant dose of adsorbent, at high initial dye concentration, the available adsorbent sites become fewer and hence the removal of dye depends upon initial dye concentration.

EFFECT OF CONTACT TIME

The effect of contact time on adsorption of dye onto adsorbent studied varying contact time between 5 minute to 120 minute and showed that as we increase the contact time, the percentage removal of dye also increases. It was found that maximum dye removal, 50.00 % achieved within 75 minute and above this no more adsorption takes place. So for further studies 75 minute was taken as equilibrium time.

ADSORPTION ISOTHERMS

The analysis of equilibrium data to construct adsorption isotherm is significant for designing the adsorption system. Adsorption isotherms express the mathematical relationship between the quantity of adsorbate and equilibrium concentration of adsorbate remaining in the solution at a constant temperature. Equilibrium modeling for the process of removal of dye methylene blue by adsorption on adsorbent was carried out by two-parameter adsorption isotherm models¹⁰: Langmuir, Freundlich, Dubinin-Kaganer-Redushkevich (DKR) and Temkin.

LANGMUIR ADSORPTION ISOTHERM

The Langmuir adsorption isotherm equation, which is valid for monolayer sorption onto a surface of finite number of identical sites, is given by,

$$q_e = \frac{q_m b C_e}{1 + b C_e} \quad (3)$$

where q_m is the maximum adsorption capacity of adsorbent (mg g^{-1}). b is the Langmuir adsorption constant (L mg^{-1}) related to the affinity between the adsorbent and adsorbate.

Linearized Langmuir adsorption isotherm equation allows the calculation of adsorption capacities and Langmuir constants and is represented as,

$$\frac{1}{q_e} = \frac{1}{q_m b C_e} + \frac{1}{q_m} \quad (4)$$

FREUNDLICH ADSORPTION ISOTHERM

The Freundlich adsorption isotherm equation which is used for the heterogeneous surfaces which have different adsorption energies, is represented by,

$$q = K C_e^{1/n} \quad (5)$$

where K and n are empirical constants incorporating all parameters affecting the adsorption process such as, adsorption capacity and adsorption intensity respectively.

Linearized Freundlich adsorption isotherm equation was used to evaluate the adsorption data and is represented as,

$$\log q_e = \log K + \frac{1}{n} \log C_e \quad (6)$$

DUBININ-KAGANER-RADUSHKEVICH (DKR) ADSORPTION ISOTHERM

Linearized Dubinin-Kaganer-Radushkevich (DKR) adsorption isotherm equation is represented as,

$$\ln q_e = \ln q_m - \beta \varepsilon^2 \quad (7)$$

where q_m is the maximum adsorption capacity, β is the activity coefficient related to mean adsorption energy and ε is the polanyi potential, which is calculated from the following relation,

$$\varepsilon = RT \ln \left(1 + \frac{1}{C_e} \right) \quad (8)$$

TEMKIN ADSORPTION ISOTHERM

The Temkin adsorption isotherm equation is given by,

$$q_e = \frac{RT}{b_T} \ln(A_T C_e) \quad (9)$$

where b_T is the Temkin constant related to heat of adsorption (J/mol) and A_T is the Temkin isotherm constant (L/g).

Linearized Temkin adsorption isotherm equation is given by,

$$q_e = \frac{RT}{b_T} \ln A_T + \frac{RT}{b_T} \ln C_e \quad (10)$$

Adsorption isotherm constants obtained for adsorption of dye, methylene blue using rind of orange (*Citrus sinensis*) (L.) Osbeck is shown in Table 1.

By comparing regression coefficient (R^2) values of adsorption isotherm models, it can be observed that Langmuir adsorption isotherm ($R^2 = 0.9911$) was better fit than Freundlich adsorption isotherm ($R^2 = 0.9866$), DKR adsorption isotherm ($R^2 = 0.6399$) and Temkin adsorption isotherm ($R^2 = 0.8373$).

Table-1: Adsorption isotherm constants for adsorption of dye, methylene blue using rind of orange (*Citrus sinensis*) (L.) Osbeck

Langmuir constants			Freundlich constants			DKR constants				Temkin constants		
q_m	b	R^2	K	$1/n$	R^2	q_m	β	E	R^2	A_T	b_T	R^2
35.9710	0.0090	0.9911	0.5388	0.7545	0.9866	-3E-5	16.075	0.0129	0.6399	0.6671	282.46	0.8373

Adsorption kinetics: As aforementioned, a lumped analysis of adsorption rate is sufficient to practical operation from a system design point of view. The commonly employed lumped adsorption kinetic equations¹¹, namely, pseudo-first-order, pseudo-second-order, Elovich and Weber & Morris intra-particle diffusion are presented below,

$$\ln(q_e - q_t) = \ln q_e - k_1 t \tag{11}$$

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \tag{12}$$

$$q_t = \frac{1}{\beta} \ln(\alpha\beta) + \frac{1}{\beta} \ln t \tag{13}$$

$$q_t = k_i t^{0.5} + c \tag{14}$$

where q_e (mg g^{-1}) is the solid phase concentration at equilibrium, q_t (mg g^{-1}) is the average solid phase concentration at time t (min), k_1 (min^{-1}) and k_2 ($\text{g mg}^{-1} \text{min}^{-1}$) are the pseudo-first-order and pseudo-second-order rate constants, respectively. The symbols of α ($\text{mg g}^{-1} \text{min}^{-1}$) and β (g mg^{-1}) are Elovich coefficients representing initial adsorption rate and desorption constants, respectively. k_i ($\text{mg g}^{-1} \text{min}^{-1/2}$) is the intra-particle diffusion rate constant, c is intercept. Adsorption kinetic data obtained for adsorption of dye methylene blue using rind of orange (*Citrus sinensis*) (L.) Osbeck is shown in Table 2.

By comparing regression coefficient (R^2) values of adsorption kinetics models, it can be observed that pseudo-second-order model ($R^2 = 0.9989$) was better fit than pseudo-first-order model ($R^2 = 0.9343$), Elovich model ($R^2 = 0.9612$) and Weber & Morris intra-particle diffusion model ($R^2 = 0.8979$).

Table-2: Adsorption kinetic data for adsorption of dye methylene blue using rind of orange (*Citrus sinensis*) (L.) Osbeck

pseudo-first-order model			pseudo-second-order model			Elovich model			Weber & Morris intra-particle diffusion model		
q_e	k_1	R^2	q_e	k_2	R^2	A	β	R^2	Ki	C	R^2
3.001	0.0391	0.9343	9.7656	0.0101	0.9989	1.4227	1.1375	0.9612	0.3001	2.949	0.8979

Thermodynamic study: The effect of temperature on removal of dye, methylene blue from aqueous solution on to adsorbent was studied at different temperatures from 20^oC-50^oC. Adsorption increases from 20^oC-30^oC and slightly decreases from 30^oC-50^oC. The equilibrium constant at various temperatures and thermodynamic parameters of adsorption can be evaluated from the following equations,

$$K_c = \frac{C_{Ae}}{C_e} \tag{15}$$

$$\Delta G^0 = -RT \ln K_c \tag{16}$$

$$\Delta G^0 = \Delta H^0 - T \Delta S^0 \tag{17}$$

$$\ln K_c = \frac{\Delta S^0}{R} - \frac{\Delta H^0}{RT} \tag{18}$$

The values of standard Gibbs free energy change (ΔG^0), standard enthalpy change (ΔH^0) and the standard entropy change (ΔS^0) calculated in this work were presented in Table 3.

Table-3: Thermodynamic parameters for adsorption of dye, methylene blue using rind of orange (*Citrus sinensis*) (L.) Osbeck

$-\Delta G^0$ (kJ/mol)			ΔH^0 (KJ/mol)	ΔS^0 (J/mol K)
293 (Kelvin)	298 (Kelvin)	303 (Kelvin)		
0.1948	0.7799	1.0000	26.355	90.481

CONCLUSIONS

In the present study, it has been demonstrated that adsorption process is a suitable technique for the removal of dye, methylene blue from aqueous solution. Fruit waste product as rind of orange (*Citrus sinensis*) (L.) Osbeck, is an efficient, cost effective and easily available adsorbent have successfully employed. As rind of orange (*Citrus sinensis*) (L.) Osbeck, is readily available in great abundance in India, it can be considered as an attractive alternative to the more expensive technologies used in waste-water treatment containing dyes.

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REFERENCES

- Nethaji S., Sivasamy A., Thennarasu, G. and Saravanan S., Adsorption of Malachite Green dye onto activated carbon derived from *Borassus aethiopicum* flower biomass, *J. Hazard. Mater.*, **181** (1-3), 271-280, (2010).
- Shahryari Z., Goharrizi A.S. and Azadi M., Experimental study of methylene blue adsorption from aqueous solutions onto carbon nano tubes, *Int. J. water Res. and Environ. Eng.*, **2** (2), 16-28, (2010).
- Preethi S. Sivasamy A. Sivanesan S. Ramamurthi V. and Swaminathan G., Removal of safranin basic dye from aqueous solutions by adsorption onto corncob activated carbon, *Ind. Eng. Chem. Res.*, **45**, 7627-7632, (2006).
- Mittal A., Krishnan L. and Gupta V.K., Removal and recovery of malachite green from wastewater using an agricultural waste material, de-oiled soya, *Sep. Purf. Technol.*, **43** (2), 125-133, (2005).
- Mittal A., Adsorption kinetics of removal of a toxic dye, Malachite Green, from wastewater by using hen feathers, *J. Hazard. Mater.*, **133** (1), 196-202, (2006).
- Tan I. A. W., Ahmad A.L. and Hameed B.H., Adsorption of basic dye on high-surface-area activated carbon prepared from coconut husk: Equilibrium, kinetic and thermodynamic studies, *J. Hazard. Mater.*, **154** (1), 337-346, (2008).
- Bulut E., Ozacar M. and Sengil I.A., Adsorption of malachite green onto bentonite: equilibrium and kinetic studies and process design, *Microporous Mesoporous Mater.* **115**(3), 234-246, (2008).
- Benat I.M., Nigam P. Singh D. and Merchant R., Microbial decolorization of textile dye containing effluents: a review, *Biores. Technol.*, **58**, 217-227, (1996).
- Volesky B., Sorption and biosorption. Montreal-St. Lambert, *Quebec, Canada, BV Sorbex Inc.*, 316, (2003).
- Rathod S.V., Pansare H., Bhalerao S. A. and Maind S.D., Adsorption and desorption studies of cadmium (II) ions from aqueous solutions onto Tur pod (*Cajanus cajan*), *Int. J. Adv. Chem. Res.*, **4**(5), 30-38, (2015).
- Maind S.D., Sharma A.S., Poojari A.C., Jadhav, J.N. and Bhalerao S.A., Utility of plant based waste materials as potential biosorbent for sequestering chromium (VI) from aqueous solutions, *Int. J. Ext. Res.*, **9**, 12-25, (2015).

A COMPARATIVE EVALUATION OF ADSORPTION STUDIES OF CATIONIC DYE, METHYLENE BLUE ONTO PEANUT HULLS (*ARACHIS HYPOGAEA* LINN.) AND RIND OF ORANGE (*CITRUS SINENSIS*) (L.) OSBECK

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ABSTRACT

A comparative evaluation of utility of agriculture/fruit waste materials as potential absorbent for removal of cationic dye, methylene blue from aqueous solution was studied in batch system. The agriculture/fruit waste materials used were peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck. The adsorbents were characterized by FTIR and SEM. The point of zero charge (pH_{zpc}) of adsorbents was found to be 7.3 and 5.9 for peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck respectively. The experiments were performed in order to optimize the various parameters such as solution pH, adsorbent dose, initial dye concentration, contact time and temperature. Equilibrium data were well described by typical Langmuir, Freundlich, Dubinin-Kaganer-Redushkevich (DKR) and Temkin adsorption isotherm models. Langmuir adsorption isotherm model provided a better fit with the experimental data for peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck. The maximum adsorption capacity of dye, methylene blue which was determined from Langmuir isotherm followed the sequence peanut hulls (*Arachis hypogaea* Linn.) (256.41 mg per g of adsorbent) > rind of orange (*Citrus sinensis*) (L.) Osbeck (35.971 mg per g of adsorbent). Furthermore, to determine the adsorption mechanism, a detailed analysis has been conducted by testing simple chemical reaction kinetic models such as pseudo-first-order, pseudo-second-order, Elovich and Weber & Morris intra-particle diffusion. Kinetic results clearly indicated that the pseudo-first-order kinetic model was found to be correlating the experimental data strongest than other kinetic models for peanut hulls (*Arachis hypogaea* Linn.). Also, kinetic results clearly indicated that the pseudo-second-order kinetic model was found to be correlating the experimental data strongest than other kinetic models for rind of orange (*Citrus sinensis*) (L.) Osbeck. The thermodynamic study confirmed that reaction of adsorption of dye, methylene blue onto the adsorbent peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck is spontaneous, endothermic and increasing randomness of the solid solution interfaces. The adsorbents were very effective for removal of dye, methylene blue from aqueous solution and can be recommended for removal of dye from coloured effluents. As peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck are readily available in great abundance in India, it can be considered as an attractive alternative to the more expensive technologies used in waste-water treatment containing dyes.

Keywords: Adsorption, Methylene blue, peanut hulls (*Arachis hypogaea* Linn.), rind of orange (*Citrus sinensis*) (L.) Osbeck, FTIR, SEM, Adsorption isotherms, Adsorption kinetics, Thermodynamic study.

INTRODUCTION

The organic pollutants from industries like textile, fiber, cosmetic, pharmaceutical, leather, paper, plastic, printing food to color is a dramatic source of pollution, eutrophication and perturbations in aquatic life. Fifteen percent of the total world production of dyes is lost during the dying process and released in textile effluents. A large amount of dyes are discharged to the wastewater effluent annually which severely pollute the water body and damage the aquatic life by increasing the COD, BOD and suspended solid of the water body. Color interferences with penetration of sun light into water, retards photosynthesis, inhibits the growth of aquatic biota and interferences with the gas solubility of water bodies (Shahryari et al. 2010; Namaivayam et al. 1998; Sharma and Kaur 2011). The small amount of dye present in effluent is highly visible and undesirable. Because of the distinct nature, colour of water can be recognized at minute level of 1.0 mg L^{-1} . Dyes are also reported to possess a tendency to chelate metal ions resulting in micro-toxicity to aquatic fauna and flora. The presence of dyes in industrial effluents is extremely undesirable as they are toxic, mutagenic and carcinogenic characteristics to both lower and higher concentrations and hence creates health hazard to human being and damage the aquatic life (Preethi et al. 2006; Mittal et al. 2007; Mittal 2006). Even a trace amount of dye present in the aquatic system may cause several health problems to mankind as well as to animals. Under certain environmental conditions dyes may accumulate to toxic levels and cause ecological damage. In the past few decades concentrations of dyes increased in environment i.e. water and at many places it reached upto toxic levels. When the concentrations of dyes are high in the environment, it is evident that inhabitant of that environment also accumulates dyes and it is well known that dyes have deteriorious effect. Some dyes at higher

doses they may cause metabolic disorders and growth inhibition for most of the plant species and also creates health problems.

Continuous monitoring & controlling of pollution, identification of pollutants, development & utility of novel methods for removal of organic pollutants such as dyes is highly necessary. Strict environmental protection legislation and public environmental concerns lead the search for novel techniques to remove of toxic dyes from industrial waste water.

The pollutant of concern includes cationic dye affect the biosphere in many places worldwide. Methylene Blue (MB) (Fig. 1.) is cationic dye which has applications in a large number of industries to colour cottons, wools, silk, leather, paper etc. and which is toxic with many after effects on human beings. An exposure to methylene blue (MB) can cause breathing problem and produces a burning sensation during ingestion and many cause nausea, sweating, cyanosis, jaundice, shock and methemoglobinemia (Tan and Hameed 2008). Studies also confirm that the products formed after the degradation are also not safe and have carcinogenic potential. Dyes are resilient to fading on exposure to light and water and it therefore difficult to be removed from waste water. Thus it becomes necessary to remove such a toxic dyes from waste water before it is released into aquatic environment.

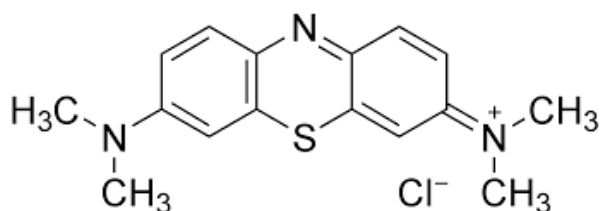


Fig-1: Chemical structure of Methylene Blue (MB)

Over the last few decades, several physical and chemical methods like flocculation, electro-floatation, precipitation, coagulation, ion exchange, membrane filtration, electrochemical destruction, irradiation, ozonation, katox treatment method etc. have been devised for treatment and removal of dyes from waste water (Bulut and Ozacar 2003; Benat et al. 1996). These processes expensive & ineffective, especially when large quantity of dyes present in water. Due to the various disadvantages of the above methods, development of cost effective, environmental friendly methods are highly necessary. Adsorption is most suitable method for solving this type of problems has been used for the adsorption of dyes. Recently several authors used plant waste materials for removals dyes from aqueous solution.

The peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck is an agricultural and fruit juice industries waste materials which is relatively common, cheap and abundantly available in nature. Such materials could be a very effective and potential adsorbent for removal of dyes from industrial effluents.

In the present paper, our aim is to compare the effectiveness of the peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck for adsorption of cationic dye, methylene blue (MB) with respect to adsorption isotherm, kinetics and thermodynamic studies.

MATERIALS AND METHODS

Chemicals and reagents: All the chemicals and reagents used were of analytical reagent (AR) grade.

Preparation of adsorbents: The peanut hulls (*Arachis hypogaea* Linn.) and the rind of orange (*Citrus sinensis*) (L.) Osbeck were washed with several times with distilled water to remove the surface adhered particles, dirt, other unwanted materials, water soluble impurities and water was squeezed out. Adsorbent was then dried at 50°C overnight and crushed. It was sieved to select particles 100 µm in size was used in all the experiments. For further use, the dried adsorbent was stored in air tight plastic bottle to protect it from moisture.

Characterization of adsorbents by Fourier Transform Infrared (FTIR) spectroscopy: The adsorbents were examined using FTIR spectrometer (model:FT/IR-4100typeA) within range of 400-4000 cm⁻¹. Analysis was performed using KBr as back ground material. In order to form pellets, 0.02 g of adsorbents was mixed with 0.3 g KBr and pressed by applying pressure.

Characterization of adsorbents by Scanning Electron Microscope (SEM): The Scanning Electron Microscope (SEM) was used to see the porosity of the adsorbents. The adsorbents were covered with a thin layer of gold and an electron acceleration voltage of 10 KV was applied and then Scanning Electron Micrograph was recorded.

Experimental procedure: The static (batch) method was employed at temperature (30⁰C) to examine the adsorption of dye, methylene blue by adsorbents. The following equation was used to compute the percentage removal (% Removal) of dye by the adsorbents,

$$\% \text{ Removal} = \frac{(C_i - C_e)}{C_i} \times 100 \quad (1)$$

where C_i and C_e are the initial concentrations and equilibrium concentrations of the dye in mg/L.

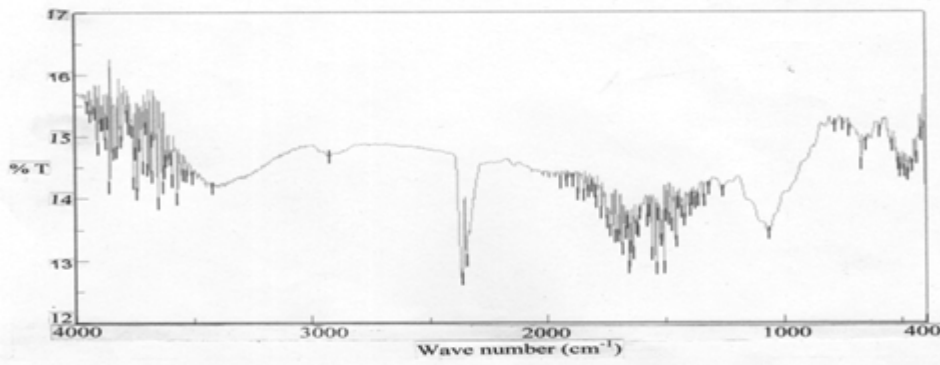
The equilibrium dye adsorptive quantity (q_e) was determined by the following equation,

$$q_e = \frac{(C_i - C_e)}{w} \times V \quad (2)$$

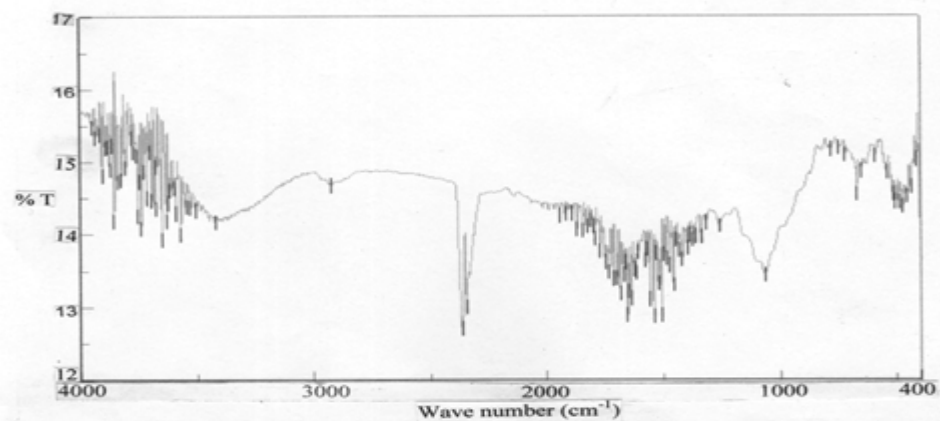
where q_e (mg metal per g dry adsorbent) is the amount of dye adsorbed, V (in liter) is the solution volume and w (in gram) is the amount of dry adsorbents used.

RESULTS AND DISCUSSION

Characterization of adsorbent by Fourier Transform Infrared (FTIR) spectroscopy: To investigate the functional groups of adsorbent, a FTIR analysis was carried out and the spectrums are shown in Fig. 2 (a) & (b). As seen in the figure adsorbent displays a number of absorption peaks, reflecting the complex nature of adsorbent. The spectrums clearly showed the broad peak between 3421 cm⁻¹ and 3422 cm⁻¹ is the indicator of -OH and -NH groups. The stretching of the -OH groups bound to methyl groups presented in the signal at 2924 cm⁻¹. The peaks between 2345 cm⁻¹ & 2366 cm⁻¹ and between 2343 cm⁻¹ & 2361 cm⁻¹ are stretching peaks. The peaks located between 1733 cm⁻¹ & 1735 cm⁻¹ and 1636 cm⁻¹ & 1637 cm⁻¹ are characteristics of carbonyl group. The presence of -OH group along with carbonyl group confirms the presence of carboxyl acid groups in the biomass. The peak at 1508 cm⁻¹ is associated with the stretching in aromatic rings. The peaks observed between 1066 cm⁻¹ and 1074 cm⁻¹ are due to C-H and C-O bonds. The -OH, NH, carbonyl and carboxyl groups are important sorption sites (Volesky 2003). As compared to simple adsorbent, adsorbent loaded with dye, the broadening of -OH peaks between 3421 cm⁻¹ & 3422 cm⁻¹ and carbonyl group peaks between 1636 cm⁻¹ & 1637 cm⁻¹ was observed. This indicates the involvement of hydroxyl and carbonyl groups in the adsorption of dye.



(a)



(b)

Fig. 2 . FTIR spectra adsorbents, peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck

Characterization of biosorbent by Scanning Electron Microscope (SEM): The surface characteristics, structure and particle size distribution of adsorbent was examined using Scanning Electron Microscope (SEM). The SEM micrographs are shown in Fig. 3(a) & (b). The micrographs represent a porous structure with large surface area and there is more uniformity. It was evident that the adsorbent presents an unequal structure before dye adsorbed. The number of canals in the adsorbent was higher in the initial case. The dye adsorbed on the cell wall matrix and created stronger cross linking and uniformity on the surface of adsorbent.

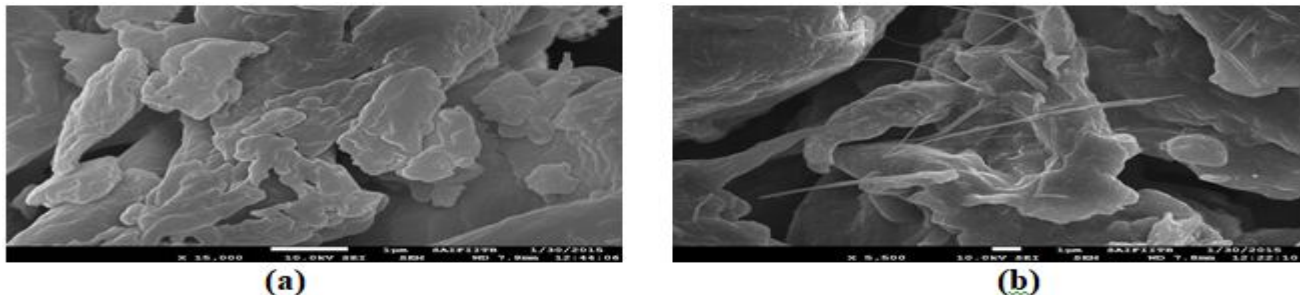


Fig. 3. Scanning Electron Microscope (SEM) images of adsorbents, peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis* (L.) Osbeck)

DETERMINATION OF POINT OF ZERO CHARGE (pH_{pzc}) OF ADSORBENTS

The point of zero charge (pH_{pzc}) of an adsorbent determination is very important characteristics that determine the pH at which the adsorbent surface has net electrical neutrality. To find out point of zero charge (pH_{pzc}) the experiments were conducted at different pH ranging from 2-10, by adding 0.5 g of adsorbents to 100 cm³ of 0.1 M solution KNO₃ and shake it for 2h in a orbital shaker. pH was measured after 2h shaking. It is observed that the point of zero charge (pH_{pzc}) of adsorbents was 7.30 and 5.90 respectively for peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis* (L.) Osbeck). At solution when pH > pH_{pzc} the adsorbent surface negatively charged and favours uptake of cationic dye due to increase electrostatic force of attraction. At pH < pH_{pzc} the surface becomes positively charged, concentration of H⁺ were high and they compete with positively charged cationic dye. Thus dye adsorption onto adsorbent is favored at pH higher than pH_{pzc} . It was predicted that percentage removal of dye was less at low pH and high at high pH.

OPTIMIZATION OF PHYSICAL PARAMETERS

Effect of pH: The optimization of pH was done by varying the pH in the range of 2 to 10. At pH 7, maximum adsorption takes place by peanut hulls (*Arachis hypogaea* Linn.) (77 %) and rind of orange (*Citrus sinensis* (L.) Osbeck (53 %).

Effect of adsorbent dose concentration: The optimization of adsorbent dose concentration was done by varying the dose concentration in the range of 1.0 g/L to 17.50 g/L. At dose concentration 5 g/L, maximum adsorption takes place by peanut hulls (*Arachis hypogaea* Linn.) (76 %) and rind of orange (*Citrus sinensis* (L.) Osbeck (59 %).

Effect of initial concentration of dye: The optimization of initial concentration of dye was done by varying the dye concentration in the range of 25 mg/L to 350 mg/L. The percentage removal of dye by adsorbents decreases first and then increases as the initial dye concentration increases and at higher concentration of dye percentage adsorption decreases slightly.

Effect of Time: The effect of contact time on adsorption of dye, methylene blue onto adsorbent studied varying contact time between 5 minute to 120 minute. We found that maximum dye removal, 76.20 % achieved within 60 minute for peanut hulls (*Arachis hypogaea* Linn.) and 50 % achieved within 75 minute for rind of orange (*Citrus sinensis* (L.) Osbeck.

Adsorption isotherms:

The analysis of the adsorption isotherms data by fitting them into different isotherm models is an important step to find the suitable model that can be used for design process. The experimental data was applied to the two-parameter isotherm models: Langmuir, Freundlich, Dubinin-Kaganer-Redushkevich (DKR) and Temkin and their equations shown below,

$$\frac{1}{q_e} = \frac{1}{q_m b C_e} + \frac{1}{q_m} \quad (3)$$

$$\log q_e = \log K + \frac{1}{n} \log C_e \quad (4)$$

$$\ln q_e = \ln q_m - \beta \varepsilon^2 \tag{5}$$

$$q_e = \frac{RT}{b_T} \ln A_T + \frac{RT}{b_T} \ln C_e \tag{6}$$

The adsorption isotherms parameters calculated are shown in Table 1.

Table-1: Adsorption isotherm constants for adsorption of dye, methylene blue using peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck.

Materials	Langmuir constants			Freundlich constants		
	q_m	b	R^2	K	$1/n$	R^2
peanut hulls (<i>Arachis hypogaea</i> Linn.)	256.41	0.0036	0.9711	1.0318	0.9707	0.9339
rind of orange (<i>Citrus sinensis</i>) (L.) Osbeck.	35.971	0.0090	0.9911	0.5388	0.7545	0.9866

Materials	DKR constants				Temkin constants		
	q_m	B	E	R^2	A_T	b_T	R^2
peanut hulls (<i>Arachis hypogaea</i> Linn.)	28.23	-7E-6	0.3779	0.6017	0.5605	129.65	0.8589
rind of orange (<i>Citrus sinensis</i>) (L.) Osbeck.	16.075	-3E-5	0.0129	0.6399	0.6671	282.46	0.8373

Adsorption kinetics: As aforementioned, a lumped analysis of adsorption rate is sufficient to practical operation from a system design point of view. The commonly employed lumped adsorption kinetic equations, namely (a) pseudo-first-order (Lagergren, 1898) (b) pseudo-second-order (McKay et al., 1999) (c) Elovich (Chien and Clayton, 1980) (d) Weber & Morris intra-particle diffusion (Weber and Morris, 1963) are presented below,

$$\ln(q_e - q_t) = \ln q_e - k_1 t \tag{7}$$

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \tag{8}$$

$$q_t = \frac{1}{\beta} \ln(\alpha\beta) + \frac{1}{\beta} \ln t \tag{9}$$

$$q_t = k_i t^{0.5} + c \tag{10}$$

The kinetics parameters calculated are shown in Table 2.

Table-2: Adsorption kinetic data for adsorption of dye methylene blue using peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck.

Materials	pseudo-first-order model			pseudo-second-order model		
	q_e	k_1	R^2	q_e	k_2	R^2
peanut hulls (<i>Arachis hypogaea</i> Linn.)	7.8209	0.0449	0.9996	9.4607	0.0046	0.9881
rind of orange (<i>Citrus sinensis</i>) (L.) Osbeck.	3.001	0.0391	0.9343	9.7656	0.0101	0.9989

Materials	Elovich model			Weber & Morris intra-particle diffusion model		
	A	B	R^2	K_i	c	R^2
peanut hulls (<i>Arachis hypogaea</i> Linn.)	0.7363	0.4642	0.9642	0.7277	0.8044	0.8823
rind of orange (<i>Citrus sinensis</i>) (L.) Osbeck.	1.4227	1.1375	0.9612	0.3001	2.949	0.8979

Thermodynamic study: The effect of temperature on removal of dye, methylene blue from aqueous solution on to adsorbent was studied at different temperatures from 20^oC-50^oC. The equilibrium constant at various temperatures and thermodynamic parameters of adsorption can be evaluated from the following equations,

$$K_c = \frac{C_{Ae}}{C_e} \quad (11)$$

$$\Delta G^0 = -RT \ln K_c \quad (12)$$

$$\Delta G^0 = \Delta H^0 - T\Delta S^0 \quad (13)$$

$$\ln K_c = \frac{\Delta S^0}{R} - \frac{\Delta H^0}{RT} \quad (14)$$

The values of standard Gibbs free energy change (ΔG^0), standard enthalpy change (ΔH^0) and the standard entropy change (ΔS^0) calculated in this work were presented in Table 3.

Table-3: Thermodynamic parameters for adsorption of dye, methylene blue using peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck

Materials	- ΔG^0 (kJ/mol)			ΔH^0 (KJ/mol)	ΔS^0 (J/mol K)
	293 (Kelvin)	298 (Kelvin)	303 (Kelvin)		
peanut hulls (<i>Arachis hypogaea</i> Linn.)	0.577	1.108	2.8876	75.216	257.03
rind of orange (<i>Citrus sinensis</i>) (L.) Osbeck.	0.1948	0.7799	1.0000	26.355	90.481

CONCLUSIONS

In the present study, it has been demonstrated that peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck. are low cost adsorbent and easily available, can be successfully employed for the removal of dye, methylene blue from aqueous solution. The FTIR analysis of adsorbent confirmed that hydroxyl, carbonyl and carboxyl group, so that the cell wall surface of the adsorbent that may interact with the dye. The SEM represents a porous structure with large surface area. The point of zero charge (pH_{zpc}) of adsorbent was found to be 7.3 and 5.9 for peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck respectively. The optimal parameters such as solution pH, adsorbent dose concentration, initial dye concentration, contact time and temperature determined in the experiment were effective in determining the efficiency of dye, methylene blue onto the adsorbent peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck. Langmuir adsorption isotherm model provided a better fit with the experimental data than other adsorption isotherm models. Kinetic results clearly indicated that the pseudo-first-order kinetic model was found to be correlating the experimental data strongest than other kinetic models with respect to peanut hulls (*Arachis hypogaea* Linn.) Kinetic results clearly indicated that the pseudo-second-order kinetic model was found to be correlating the experimental data strongest than other kinetic models with respect to rind of orange (*Citrus sinensis*) (L.) Osbeck. The thermodynamic study confirmed that reaction of adsorption of dye, methylene blue onto the adsorbents is spontaneous, endothermic and increasing randomness of the solid solution interfaces. As peanut hulls (*Arachis hypogaea* Linn.) and rind of orange (*Citrus sinensis*) (L.) Osbeck. are readily available in great abundance in India, it can be considered as an attractive alternative to the more expensive technologies used in waste-water treatment containing dyes.

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REFERENCES

1. Benat I.M., Nigam P. Singh D. and Merchant R. (1996): Microbial decolorization of textile dye containing effluents: a review, *Biores. Technol.*, 58, 217-227.
2. Bulut E., Ozacar M. and Sengil I.A. (2008): Adsorption of malachite green onto bentonite: equilibrium and kinetic studies and process design, *Microporous Mesoporous Mater.* 115(3), 234-246.
3. Mittal A., Krishnan L. and Gupta V.K. (2005): Removal and recovery of malachite green from wastewater using an agricultural waste material, de-oiled soya, *Sep. Purif. Technol.*, 43 (2), 125-133.
4. Mittal A. (2006): Adsorption kinetics of removal of a toxic dye, Malachite Green, from wastewater by using hen feathers, *J. Hazrd. Mater.*, 133 (1), 196-202.
5. Namasivayam C., Prabha D. and Kumutha M., (1998): Removal of direct Red and acid brilliant blue by adsorption onto banana pith, *Biores. Technol.*, (64) 77-79.

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6. Preethi S. Sivasamy A. Sivanesan S. Ramamurthi V. and Swaminathan G. (2006): Removal of safranin basic dye from aqueous solutions by adsorption onto corncob activated carbon. *Ind. Eng. Chem. Res.*, 45, 7627-7632.
 7. Shahryari Z., Goharrizi A.S. and Azadi M. (2010): Experimental study of methylene blue adsorption from aqueous solutions onto carbon nano tubes, *Int. J. water Res. and Environ. Eng.*, 2 (2), 16-28.
 8. Sharma P and Kaur H. (2011): Sugarcane bagasse for the removal of erythrosine B and methylene blue from aqueous waste, *Appl Water Sci.* 1, 135-145.
 9. Volesky B. , Sorption and biosorption. Montreal-St. Lambert, *Quebec, Canada, BV Sorbex Inc.*, 2003, 316.

MICROWAVE-ASSISTED SYNTHESIS OF 2-AMINO-4-H CHROMENES AND ITS ANTI-LUNG CANCER ACTIVITY

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ABSTRACT

To develop a method of synthesis of the potentially physiologically active compounds, 2-amino-4-H chromenes, we studied the three-component condensation of substituted benzaldehydes, malononitrile and 3-Amino phenol. Microwave-assisted organic synthesis has rapidly gained popularity since it accelerates a variety of synthetic transformations and has prominent advantages of short reaction time and high yield. Chromene (Benzopyran) is one of the privileged medicinal pharmacophore which appears as an important structural component in natural compounds and generated great attention because of their interesting biological activity. It is a heterocyclic ring system consisting of a benzene ring fused to a pyran ring. During the last decade, such compounds have shown interesting pharmacological properties including, anticoagulant, antiviral, anti-HIV, antitubercular, anti-inflammatory, analgesic, anticonvulsant, antimicrobial, mutagenicity, antiproliferative, antitumour, anti-cancer and central nervous system activities. 2-Aminochromenes were also used as biodegradable agrochemicals and components of many natural products. Some of 2-amino-4H-chromenes, were efficiently synthesized via one-pot, three-component reactions of benzaldehydes, malononitrile and 3-Amino phenol in the presence of catalytic amount of morpholine under microwave irradiation. Under these conditions, the reaction sufficiently rapidly and smoothly affords target structurally diverse 2-amino-4H-chromenes in high yields. All the synthesized compounds were characterized by IR and NMR techniques and also evaluated for their anti-lung cancer activity.

Keywords: 2-amino-4-H chromenes, microwave, anti-cancer.

INTRODUCTION

Cancer is a life-threatening disease that shows abnormal cell growth with the possibility of invading other tissues. Currently, there are several approaches for cancer treatment including chemotherapy, hormonal therapy, immunotherapy, surgery and radiation. However, chemotherapy remains one of the most prevailing options used for treating cancer. Accordingly, there is an urgent need to develop more potential anticancer agents. Cancer is the second leading cause of death. Discovery and development of anticancer agents are the key focus of several pharmaceutical companies as well as nonprofit government and non-government organizations, like the National Cancer Institute (NCI) in the United States, the European Organization for Research and Treatment of Cancer (EORTC), and the British Cancer Research Campaign (CRC).

Multi component reactions (MCRs) have more importance, great interest because they are one-pot processes bringing together three or more components and show high atom economy and high selectivity. These reactions are effective in construction highly functionalized small organic molecules from readily available starting materials in a single step with natural flexibility for creating molecular complexity.

Chromene (Benzopyran) is one of the privileged medicinal pharmacophore which appears as an important structural component in natural compounds and generated great attention because of their biological activity. It is a heterocyclic system consisting of a benzene ring fused to a pyran ring. Chromenes have currently attracted a great attention due to their existence as a main skeleton in variety of biologically active natural as well as synthetic compounds in addition to their interesting conformational features. Indeed, these molecules have become an elegant target for medicinal chemists to develop a large number of derivatives and evaluate their pharmacological potentials with emphasis on their medicinal applications. Among this class of compounds, 2-amino-4H-chromenes is a well-recognized privileged structure that has been commonly found in a plenty of chemical compounds with diverse biological activities⁶. These compounds exhibit significant biological activities, such as anticoagulant, antiviral, anti-HIV, antitubercular, anti-inflammatory, analgesic, anticonvulsant, antimicrobial, mutagenicity, antiproliferative, antitumour³, anti-cancer^{1, 5} and central nervous system activities. As part of our ongoing research work to develop anticancer agents, we describe herein the design and synthesis of some new chemical entities based on a 2-amino-4H-chromenes framework. The evaluation of their anticancer activity against a panel of cancer cell lines could serve as promising leads for developing potent and safer anticancer agents.

EXPERIMENTAL**1. MATERIALS AND METHODS**

Solvents used were of analytical grade. Thin-layer chromatography (TLC, on aluminium plates precoated with silica gel, 0.25mm thickness) was used for monitoring the progress of all reactions, purity and homogeneity of the synthesized compounds; eluent-chloroform:pet ether 9.8:0.2. UV radiation and/or iodine were used as visualizing agents. IR spectra were recorded on a Perkin-Elmer, Frontier equipment with a diamond tip and only characteristic peaks were reported in cm^{-1} . $^1\text{H-NMR}$ spectra were recorded in DMSO-d_6 as a solvent on a Bruker Avance (300MHz) Spectrometer and tetramethylsilane was used as internal standard. Chemical shifts were reported in ppm.

2. GENERAL PROCEDURE FOR THE SYNTHESIS OF 2-AMINO-4H-CHROMENES DERIVATIVES

A mixture of benzaldehyde (1 mmol) (1a & 1b), 3-Amino phenol (1mmol) and malononitrile (1mmol) and catalytic amount of morpholine in EtOH (5 mL) was thoroughly mixed and irradiated at 300 W MW for 5–6 min (the reactions were monitored by TLC). After completion, the reaction mixture was cooled to room temperature, and the solid formed was collected by filtration and crystallized from ethanol. Physical, analytical and spectroscopic characterization data of the synthesized compound 4a and 4b is given below:

a) 2,7-diamino-4-phenyl-4H-chromene-3-carbonitrile (4a)

IR ($\nu_{\text{max}}/\text{cm}^{-1}$): 3327 (NH_2), 3234 (NH_2), 2188 (CN), 1607 ($\text{C}=\text{C}$).

$^1\text{H NMR}$ (300 MHz, DMSO): δ 7.25-7.18 (dd, 5H, Ar-H), 6.78 (s, 2H, NH_2), 6.66 (d, 1H, Ar-H), 6.24 (d, 1H, Ar-H), 6.19 (s, 1H, Ar-H), 5.20 (s, 2H, NH_2), 4.61 (s, 1H).

b) 2,7-diamino-4-(4-chlorophenyl)-4H-chromene-3-carbonitrile (4b)

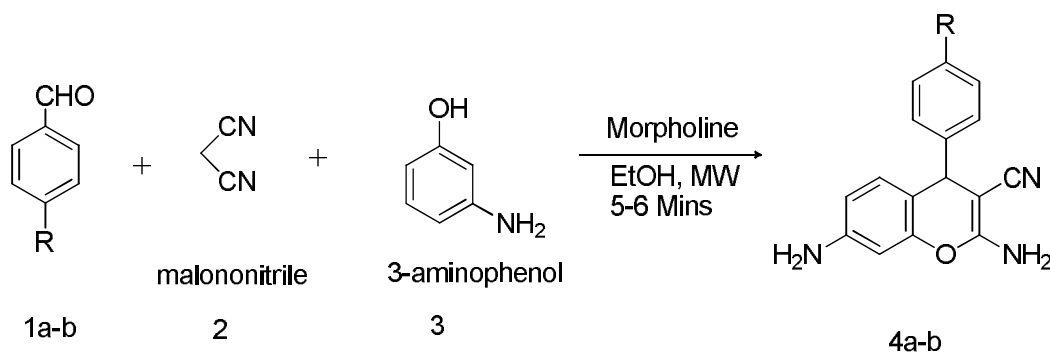
IR ($\nu_{\text{max}}/\text{cm}^{-1}$): 3377 (NH_2), 3272 (NH_2), 2186 (CN), 1601 ($\text{C}=\text{C}$).

$^1\text{H NMR}$ (300 MHz, DMSO): δ 7.36-7.15 (dd, 4H, Ar-H), 6.84 (s, 2H, NH_2), 6.61 (d, 1H, Ar-H), 6.28 (d, 1H, Ar-H), 6.21 (s, 1H, Ar-H), 5.27 (s, 2H, NH_2), 4.56 (s, 1H).

RESULTS AND DISCUSSIONS

Synthesis of the target compounds is shown in scheme 1. The one-pot three-component condensation reaction of benzaldehyde (1a & 1b), 3-Amino phenol and malononitrile proceeded smoothly in ethanol under MW irradiation in the presence of morpholine as a catalyst to give the corresponding 2-amino-4H-chromene (4a & 4b) derivatives in good yields^{2,4}.

Scheme 1:

**ANTI- LUNG CANCER ACTIVITY**

The compounds were tested for anti-lung cancer activity at A-549 cell line and their results are tabulated below.

Sr. No.	Compound	R	Yield	GI50	Reference (adrenaline)
1.	4a	-H	89%	0.0115	3E-8
2.	4b	-Cl	91%	0.326	3E-8

CONCLUSION

In summary, we have successfully combined the advantages of microwave technology with multicomponent reactions to facilitate a competitive synthesis of 2-amino-4H-chromenes in ethanol. Particularly, valuable

features of this method included the good yields and operational simplicity as well as increased safety for small-scale high-speed synthesis. This synthetic strategy allows the construction of relatively complicated nitrogen and oxygen containing fused heterocyclic system as well as introduction of various (hetero) aromatic substitutions into 4-position of chromene system. The compounds showed some anti-lung cancer activity. Further optimization and development is needed in designing more potent anticancer agents for the therapeutic use.

ACKNOWLEDGEMENTS

We express our sincere thanks towards Dr. M.M.V. Ramana, HOD of chemistry department of university of Mumbai for providing spectral facilities.

REFERENCES

1. Skommer J., Wlodkowic D., Matto M., Eray M. and Pelkonen J., 2006, *Leukemia Res.*, 30, 322.
2. Pawar R. A. and Patil A. A., 1994, *Indian J. Chem.*, 33B, 156.
3. Anderson D. R., Hegde S., Reinhard E., Gomez L., Vernier W. F., Lee L, Liu S., Sambandam A., Sinder P. A. and Masih L., 2005, *Bioorg. Med. Chem. Lett.*, 15, 1587.
4. Shah N. K., Shah N. M., Patel M. P. and Patel R. G., 2013, *J. Chem. Sci.*, 125(3), 525–530.
5. Patil, S. A., Patil, R., Pfeffer L. M., & Miller, 2013, *Future Medicinal Chemistry*, 5(14), 1647–1660.
6. Thomas N. and Zacharia S., *Asian J Pharm Clin Res*, 2013, 6(2), 11-15.

SYNTHESIS, STRUCTURAL AND MAGNETIC PROPERTIES OF BARIUM AND LITHIUM BASED HEXAFERRITES

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ABSTRACT

AR grade powders of Fe_2O_3 , $BaCO_3$, Li_2CO_3 and TiO_2 were used to prepare samples of $Ba_{1.477}Ti_{2.744}Fe_{6.963}Li_{1.477}O_{19}$ and $Ba_{1.055}Ti_{3.166}Fe_{7.385}Li_{1.055}O_{19}$ by classical ceramic route. For comparison a pure sample of $BaFe_{12}O_{19}$ was also prepared. The structural properties have been studied in detail in comparison with a pure barium hexaferrite sample prepared under similar conditions. These samples of hexaferrites exhibit hexagonal magnetoplumbic structure.

INTRODUCTION

Barium ferrite has the chemical formula $BaFe_{12}O_{19}$. Barium ferrite, a metal oxide, is highly magnetic material with a very high packing density. It is a well known permanent magnet with great technical importance. This and its related ferrite materials are predominantly used as components in speakers, magnetic card strips and magnetic tape [1]. Lithium ferrites have attractive electric and magnetic properties for microwave and memory core applications due to stability and high Curie temperature. [2]

Ba-Fe-Ti oxide system reveals existence of many compounds having wide variety of electronic applications. Significant variations in the magnetic properties is reported in doped $BaFe_{12}O_{19}$. [1]. Several preparation methods and different sintering conditions have been used to control the structure and chemical composition of doped barium hexaferrite. The basic method of preparation is conventional mixing of corresponding oxides followed by calcinations and final sintering. This has prompted us to study the influence of titanium and lithium substitution on the properties of barium hexaferrite.

EXPERIMENTAL techniques

$BaFe_{12}O_{19}$ (BFO) and its titanium and lithium substituted varieties namely, $Ba_{1.477}Ti_{2.744}Fe_{6.963}Li_{1.477}O_{19}$ (BTFLO1) and $Ba_{1.055}Ti_{3.166}Fe_{7.385}Li_{1.055}O_{19}$ (BTFLO2) were synthesized by maintaining the charge neutrality. The starting materials Fe_2O_3 , $BaCO_3$, Li_2CO_3 and TiO_2 (all 99.99% purity- AR grade) were dried in muffle furnace and mixed in stoichiometric proportion and then grounded and calcined in steps of $800^\circ C$ and $900^\circ C$ for 9 hours each for homogeneity. These mixtures were pressed into pellets and were finally sintered at $1150^\circ C$ for 12 hours to ensure a complete reaction. The crystallographic structure was determined at room temperature using the X-ray diffraction pattern of powders using a highly sophisticated microprocessor based JEOL-JDX8030 diffractometer using a Cu target. The IR spectra of the compounds are recorded on the "Nicolet Instrument Corporation, USA" MAGNA 550 spectro Photometer at room temperature in the range from 50 cm^{-1} to 4000 cm^{-1} . The magnetic properties are obtained using hysteresis loop tracer and susceptibility apparatus.

RESULTS AND DISCUSSION

X-ray powder diffraction technique was used to confirm the structure and determine the lattice parameters of the prepared samples. FIGURE 1 shows the typical XRD pattern of BTFLO1 sample. All the xray pattern indicate a single phased hexagonal magnetoplumbitic structure as per the JCPDS data. The space group is presumed to be $P6_3/mmc$. [3] the physical properties of all the samples are shown in TABLE 1.

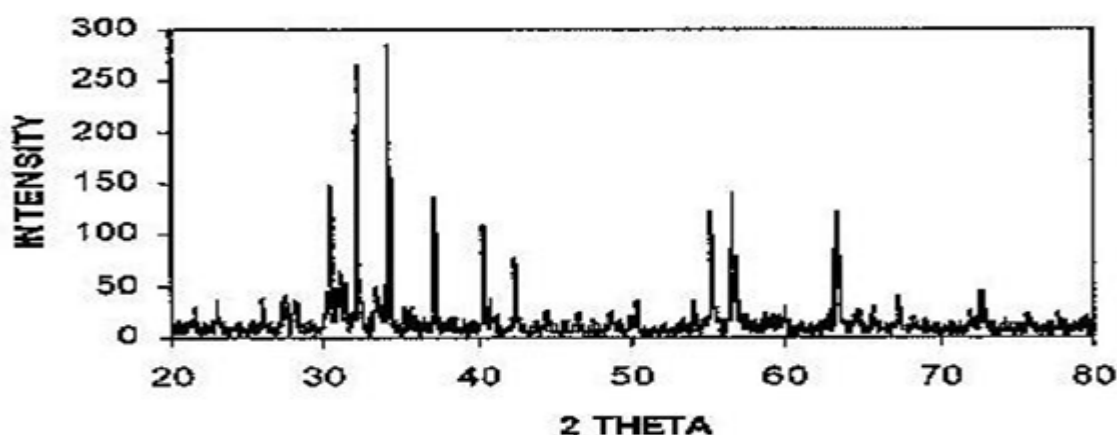


Figure-1. XRD of $Ba_{1.477}Ti_{2.744}Fe_{6.963}Li_{1.477}O_{19}$

Table-1: Structural properties of all the samples

Sample	BFO	BTFLO1	BTFLO2
Lat. Const. a=b A.U.	5.890	5.882	5.898
Lat. Const. c A.U.	23.186	23.238	23.254
c/a	3.937	3.953	3.943
Avg. part. Size A.U.	248	296	284
Avg. grain size μm	0.395	0.72	0.930
Vol. $\times 10^{-24} \text{ cm}^3$	805	804	809
Density XRD g/cc	5.22	4.82	4.65
Density exp. g/cc	4.19	3.64	3.76

The 'a' and 'c' values calculated for all the samples are pertaining to the $P6_3/mmc$ hexagonal unit cell structure. The c/a ratio is minimum for BFO. The average particle size and the average grain size is more for the substituted samples. The SEMs are dense and homogeneous. Substitution results in an increase in grain size.

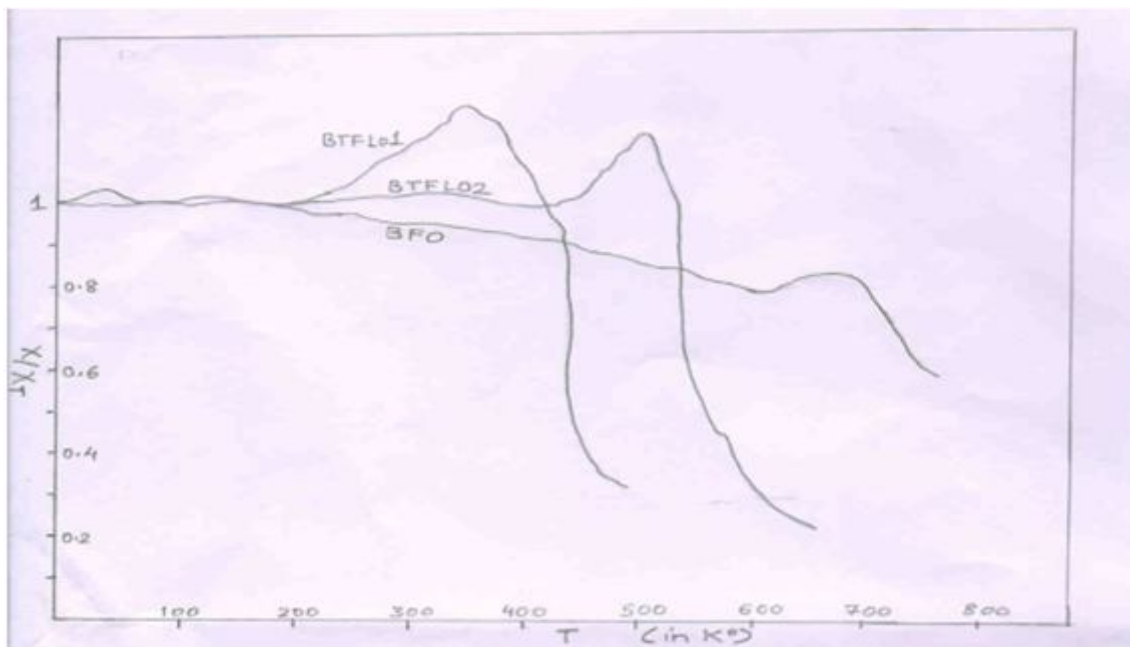


Figure-2: Variation of normalized susceptibility $\frac{\chi}{\chi T}$ with absolute temperature

There is a noticeable drop in Curie temperature of both the doped samples as depicted in the Figure 2. Sample BTFLO1 has a lower Curie at 350°C as compared to a sample 2 BTFLO2 at temperature 510°C . Sharp Curie temperature is not observed in sample 3 BFO.

CONCLUSION

Pure and lithium titanium doped samples of barium hexaferrite show the single phase hexagonal magnetoplumbic structure with space group $P6_3/mmc$. The decrease in values of M_R , M_R/M_S and T_C can be interpreted by assuming that the Li^{1+} ions replace Fe^{3+} ions of the octahedral 12k sites and hexahedral 2b sites, while Ti^{4+} ions replace the spin up Fe^{3+} ions of the octahedral 4fv1 and 2a sites. Interesting variations in magnetic properties are observed in the substituted samples.

REFERENCES

1. Puler, C. Robert, *Progress in Mater. Sci* 57(7) 1191-1334, (2012)
2. S.K. Kulshreshtha and G. Ritter, *J. Mater. Sci.* **20** 3926 (1985).
3. Z. Somogyi et al, *J. Magn. Magn. Mater.* **302(2)** e775(2006)
4. J. Huang, H. Zhang, W. Li, *Mater. Res. Bull.* **38(1)** 149(2003)

PROBING THE MAGNETIC BEHAVIOR OF MAGNETITE AND TITANOMAGNETITE SERIES IN THE BULK AND NANO SIZED FORMULATION

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ABSTRACT

Ilmenite-titanomagnetite variety of Titanomagnetite ores are found in abundance and have importance in geological studies. Lots of data about these studies is available for iron and titanium containing oxides including meteors and moon rocks. Samples with different stoichiometric ratios at various annealing temperatures of Fe-Ti solid solutions were synthesized in the laboratory. The XRD of the various samples at different steps of annealing were studied to analyze the growth of the sample.

INTRODUCTION

Minerals in the solid solution series between magnetite (Fe_3O_4) and ulvöspinel (Fe_2TiO_4) are found naturally in igneous and metamorphic rocks in micrometric as well as nanometric proportions. Studying magnetic properties of these oxides efforts are made to increase the knowledge on the history of Earth. Study of Titanomagnetites being the primary carriers of rock magnetism is subject of many numerous experimental and theoretical investigations. Pathogenesis and thermal history of the these materials play important role in the their composition, degree of oxidation and intracrystalline cation distribution. The study of synthetic Fe-Ti-O system provides an excellent platform for studying the magnetic and structural properties of titanomagnetite.

Ilmenite-titanomagnetite variety of Titanomagnetite ores is an important source of titanium. The study of phases in titanomagnetite is of much importance in geological studies. *Son & Koeberl* [1] did Chemical and petrographic study of 67 samples found at Lonar. They found magnetite, titanomagnetite, and few ilmenite grains (sizes a few to about 150 μm) as the most prominent opaque inclusions in impactites and impact glasses in both the dense/ compact and vesicular sample types. Mossbauer spectroscopy has been employed in the field of geology for identifying the composition of iron-containing specimens including meteors and moon rocks.

Basalts rock with low temperature oxidized phase are found to have extremely low magnetic susceptibility. The rearrangement of magnetic moments in initial Ti-rich titanomaghemite takes place due to the low-temperature oxidation of Fe^{2+} to Fe^{3+} ion and the formation of vacancies in creating titanomaghemite,[2].

We have tried to synthesize different Fe-Ti solid solutions. Samples of different compositions and their XRD patterns with different thermal histories were studied.

SAMPLE PREPARATION

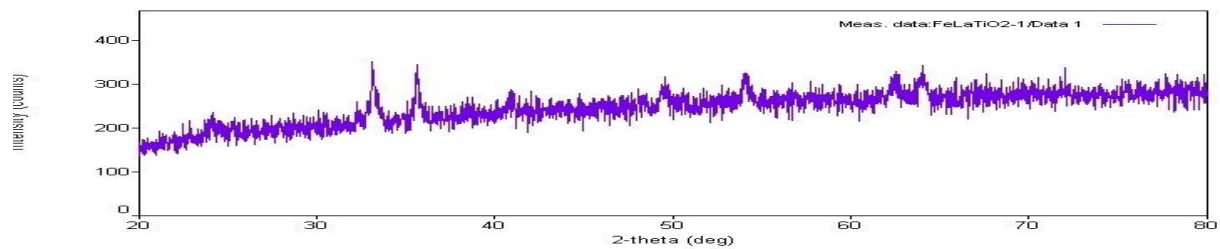
XRD patterns of some of the samples without any filtering are shown below.

Table 1 $\text{Fe}_{3-x}\text{Ti}_x$

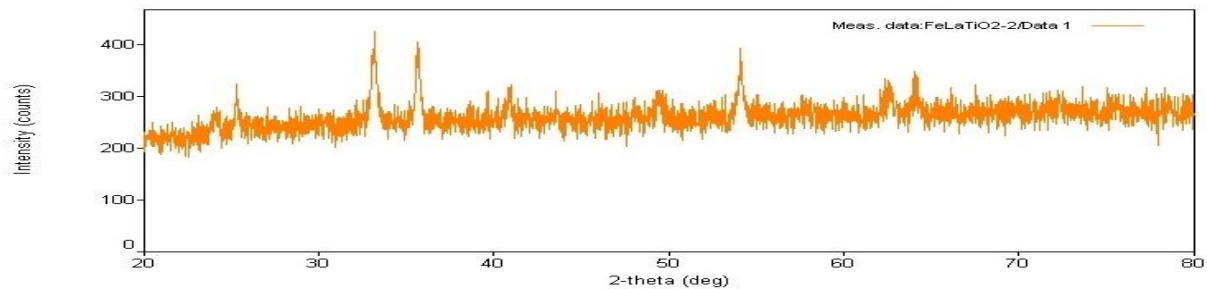
Sample	Proportion by formula			Proportion by wt in 10 g sample		
	Fe F	Ti x	La y	TiO_2 M_x	Fe_2O_3 M_f	Total
FTO1	2.8	0.2	0.0	0.716	9.284	10.000
FTO2	2.6	0.4	0.0	1.425	8.575	10.000
FTO3	2.4	0.6	0.0	2.126	7.874	10.000
FTO4	2.2	0.8	0.0	2.819	7.181	10.000
FTO5	2.0	1.0	0.0	3.499	6.501	10.000

The compounds were prepared by usual high-temperature solid-state technique. For this purpose, the fine powders of Fe_2O_3 , TiO_2 and La_2O_3 of AR grade quality were used. All the powders were first dried for 30 minutes at 200^oC to remove moisture, if any. These powders were then weighed according to stoichiometry to the nearest milligram. Samples-FT01 to FT05 were made with Fe_2O_3 and TiO_2 . Their proportions are shown in table 1. Further Samples-FT06 to FT10 were made with Fe_2O_3 , TiO_2 and La_2O_3 . Their proportions are shown in table 2. These powders were mixed thoroughly for two hours using magnetic stirrer in acetone. They were further mixed in agate mortar for 6 hours. Using Muffle Furnace of Fourtech Make the mixtures were then calcined in steps for 6 hours each at 400^oC, 600^oC and 800^oC with 2 hours mixing at every level.

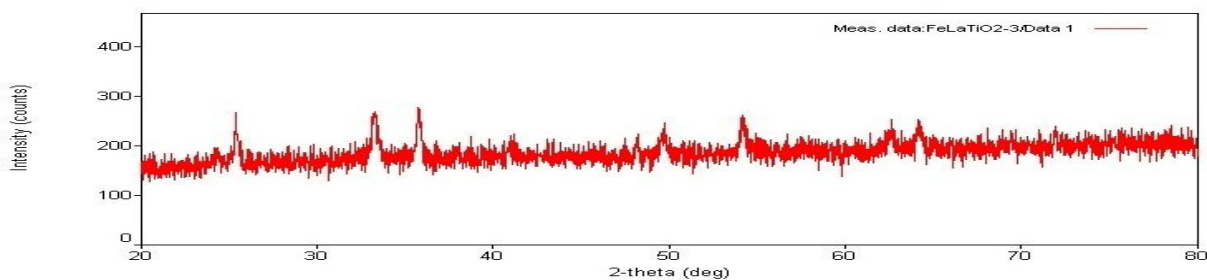
The XRD patterns for all these samples were obtained x-ray diffractometer using K_{α} emission lines of copper.



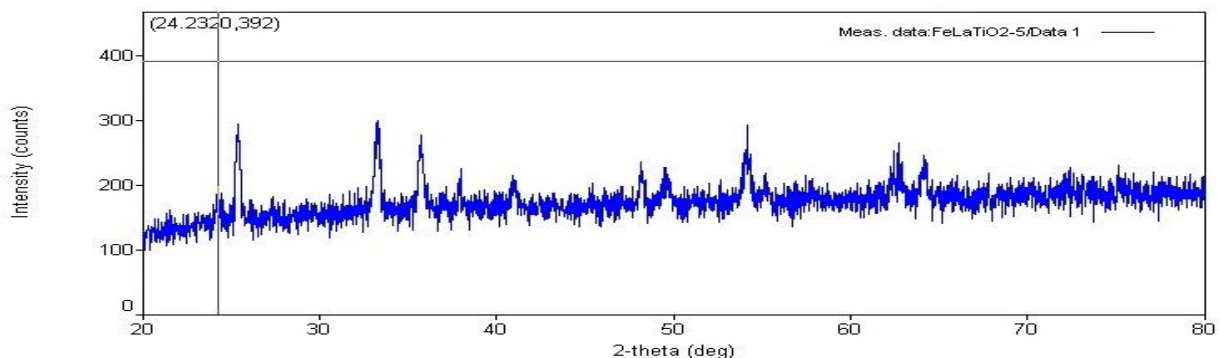
(a)



(b)



(c)



(d)

Fig. 1 (a), (b), (c) and (d) XRD patterns of the samples heated to 400°C

All the samples have trigonal cell parameters with $\text{Fe}_{1.696}\text{Ti}_{0.228}\text{O}_3$ as the predominant phase FT01 FT02, FT03 shows a single phase. However FTO2 AND FTO3 are highly amorphous. Sample FT05 shows as mixed phase.

All the above Samples were further heated to 600°C and 800°C to see the variation due to extra heating. The XRD analysis of these samples is under progress.

REFERENCES

1. Son & Koeberl: G F F volume 129 (2007), pp. 161–176.
2. Oto ORLICK Y; Contributions to Geophysics and Geodesy Vol. 40/1, 2010 (65–86)

NANOTECHNOLOGY: THE FUTURE ENGINEERING**Archana Singh¹, Smita Dubey² and Harish K. Dubey¹**¹NTRC, B K Birla College, Kalyan²Swayam Siddhi Mitra Sangh's Degree College, Bhiwandi

ABSTRACT

Nanotechnology is upcoming branch of Science and Engineering conducted at the nanoscale i.e. in the range of 1 to 100 nanometers. It is the science of manipulating atoms and molecules in the nano scale. The use of nanotechnology has stretched across various streams of basic Sciences like Physics, Chemistry, Biology, Material Science to almost all branches of Engineering starting from Mechanical, Electrical, Chemical, and Electronics to IT, Medicine and Robotics. Nanotechnology has transformed science and engineering over the past two decades. The ability to see nano sized material has opened up a world of possibilities in a verity of industries and scientific endeavors. It has explored a wide range of applications in the field of energy, data storage, medicine, food, agriculture and cosmetic industries. The future engineering is expected to be based on nanotechnology. Researchers have revealed that it has potential applications in energy harvesting, energy production, temperature control, sensors and transducers with high conversion efficiency etc. The business forecast says is has a lots of scope in future business too. Although, the products manufactured on the technology of nano scale are little costly but due to their better efficiency and reduced physical dimension it is well accepted in the market. The paper speaks about various Nanotechnology based applicative research carried out by our group.

Keywords: Nanotechnology, nanoscale, data storage, Engineering etc.

INTRODUCTION

Man's fascination and interest in smaller things and vision that smaller things have greater potential prompted him to miniaturize things which resulted in creation of laptops, palmtops in place of desktop computers and microchips which can control such machines. Now the world is demanding still smaller things which will be more efficient than today's things. So the Scientists came up with a technology that is Nanotechnology. This technology is future of technology and deals with nano size structures and its manipulation in atomic or molecular level. Nano means a scale of 10^{-9} i. e. 0.0000000001 or one billionth of a meter. This technology is based on the manipulation of Individual atoms and molecules to build Nano Size structures having complex, atomic specifications. The term 'Nanotechnology' was coined in 1976 by Norio Taniguchi and was made popular by K. Eric Drexler in Engines of Creations (1986).

Nanotechnology can be used to fabricate smaller, faster computer chips for more efficient computers, mobile phones or navigation systems. It leads to new lasers like the quantum dot laser which enable faster communication and new powerful data storage systems. Nanotechnology does not only bring improvements in the area of semiconductor technology and microelectronics but the mastery of the materials and systems on the nanometer scale can also revolutionize traditional areas. Nano structured metallic and ceramic materials are more buoyant, stronger and more rugged.

OBJECTIVES

The objective of the study is to study the Nanotechnology: its concept, its origin, its applications and prove how it is upcoming technology which can lead the future engineering.

RESEARCH METHODOLOGY

The study is explanatory in nature and sources of the data is secondary, books, Magazines, website and the papers published by our research group in the recent years.

HISTORY OF NANOTECHNOLOGY

Although Nanotechnology appears to be the modern technology; but its existence was found to be evident right from ancient times. One of the most fascinating one is the piece of Roman glass work , the Lycurgus cup in the fifth century. This magnificent cup depicts king Lycurgus dragged into the underworld by Amborsia. The stained glass windows during the medieval time and visible in numerous churches are made of a composite of glass of nano-sized metal particles. Chinese art is also filled with nanotechnology. For instance the Chinese porcelain known as families rose contains gold nano particles of 20-60 nm in size. *Bhasmas*, a ayurvedic medicines are popular in Indian subcontinent since 7th century A.D . They were widely recommended for the treatment of many disease conditions. These *Bhasmas* are claimed to be biologically produced nano-particles,

which are prescribed with several other medicines of Ayurveda. Therefore, we can say that Nanotechnology was existing from ancient time. But it was not known as Nanotechnology.

The concept of nanotechnology was discussed for the first time in 1959 by renowned physicist Richard Feynman in his popular talk "There's Plenty of Room at the Bottom". In his speech he described the possibility of synthesis via direct manipulation of atoms but the term

term was introduced in 1974 by Norio Taniguchi of Tokyo Science University while describing semiconductor processes such as thin-film deposition that deals with control on the order of size of particles in nanometers. His words to define nanotechnology was- "*Nano-technology mainly consists of the processing of separation, consolidation, and deformation of materials by one atom or one molecule.*"

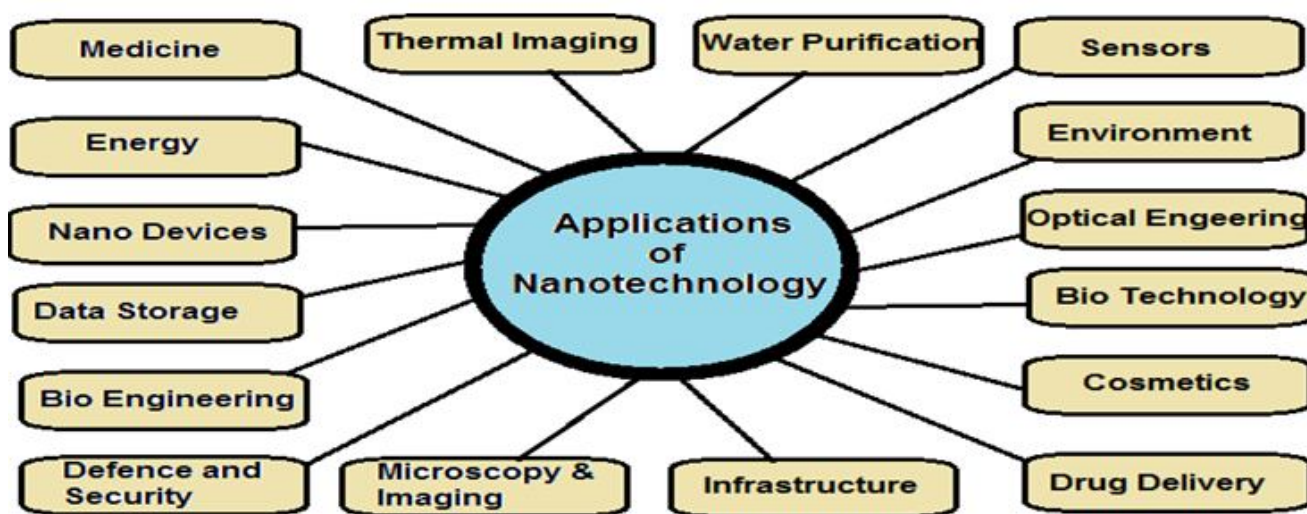
APPLICATIONS OF NANOTECHNOLOGY

As we know that nanotechnology is a technology dealing with the materials or particles of nano size. These nano-particles through technology has explored a wide range of applications in the field of energy, data storage, medicine and drugs, food, agriculture, defense and security, bio engineering, fabrics and cosmetic industries. Following are some of the predominant applications of nanotechnology/nano materials.

1. Nanotechnology has enhanced data storage capacity of memory devices like hard discs, memory chips due to use of magneto resistance heads by adopting science of magneto resistance. Metallic silver particles are used to coat the surfaces for optical storage applications too.
2. There are lots of biomedical applications of Nanomaterials. The technology helps in the fabrication of Stronger, lighter, biocompatible, multifunctional devices. In addition to this, nano particles are electrically so active that they inhibit the growth of harmful bacteria and fungus.
3. Nontechnology has developed Varsity of products such as the nanosilver seal refrigerator and washing machines that use nano-coating to create germ-free environment. Nanomaterials have also been incorporated in clothing world with wrinkle free and stain repellent threads and fabrics that can repel water too. These cloths can remain cool in summer and hot in winter. This is by attaching molecular structures to cotton fibers to prevent absorption.
4. Nano materials are helpful in produratcccng protective coatings , antireflection, scratch resistant, glare reducing and fog-resistant coating for eyeglasses, windshields and sunglasses.
5. Silver nano particles are used in deodorizer unit and water dispenser to sterilize air and water.
6. Nano-composite materials are useful in sports applications also. Many sports products such as high power tennis rackets, yachts and golf clubs.
7. Nanomaterials are useful in the field of infrastructure development too. Nano-cement composite are found to be much stronger than the conventional cement.
8. Some of the nano-composites when added to alloy increase it strength therefore such materials are useful in various defense applications.
9. Titanium nano powders are useful in solar cell applications. They have self cleaning ability too. Certain selenide nano compounds have applications in Photovoltaic. Diamond nano-coatings find applications in thermal management and water resistance. Ceramic nanoparticles show property of super elasticity.
10. Nanotechnology has applications as thermal barrier and wear resistant coatings, high strength high-weight composites for increasing fuel efficiency, high temperature sensors, improved displays, battery technology and wear resistant tyres.
11. Nanomaterials have been used for drug delivery. Nanostructured coatings are deposited on human body implants like screws, plates, rods etc allowing devices to last longer without corrosion.
12. Nanotechnology has wide application in the field of Cosmetics too. Many cosmetic materials contain nanoparticles which activate ingredients to go deep into skin layers. Now a days sun screen lotions are made up of nano dispersed Zinc Oxdies which provides broad spectral absorption range including ultraviolet.
13. The contribution of Nanotechnology in the field of surface Science is noteworthy. With the nano probes, the surfaces and interfaces can be probed at an atomic level, thus playing an important role in surface Physics and material Science. Nanotechnology provides a tool to serve as powerful platform for scientific research and manufacturing technology. Many high resolution microscopes have been designed using nano

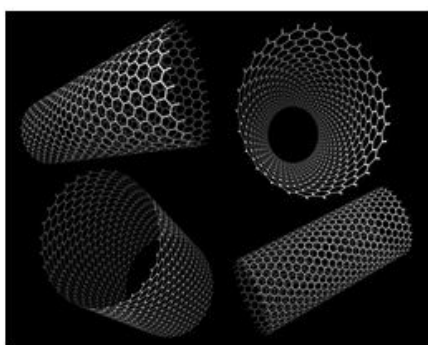
probes. Atomic Force Microscope (AFM) , Scanning electron Microscope (SEM) and Tunneling Electron Microscope (TEM) are result of Nanotechnology.

14. Nanotechnology plays an important role in the Energy production and Environment too. Energy production needs clean, less expensive sources. It can be brought about by novel Nanomaterials with high efficiency. Solid state lighting is beneficial in the sense that it reduces total electricity consumption and helps sustain the green environment. Light Emitting diodes are examples of such low power consumption and environment friendly source of light energy. One of the other example is that of Solar Cells which can be integrated from nanoscale crystals of semiconductors coated with light absorbing, dye-emitting electrons. Nanostructure diamond solar thermal cells are also an nanotechnology based source that capture slight and heat from the lattice, thereby emitting electrons. Nanotechnology has wide application in the field of Cosmetics too. Many cosmetic materials contain nanoparticles which activate ingredients to go deep into skin layers. Now a days sun screen lotions are made up of nano dispersed Zinc Oxides which provides broad spectral absorption range including ultraviolet. The Figure below indicates a broad picture of applications of Nanotechnology in various fields.

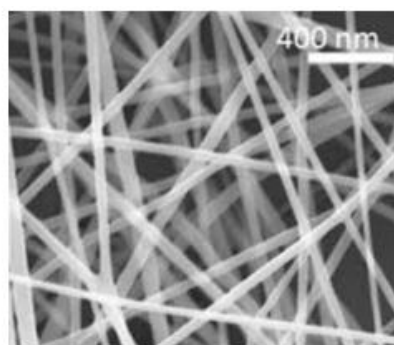


CARBON NANOTECHNOLOGY

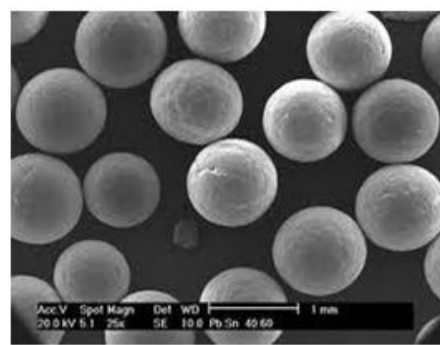
An extraordinary and versatile ability of carbon as opened a new field in nanotechnology popularly known as carbon nanotechnology. Various forms of carbon in nano forms are Carbon Nano Tubes (CNTs), Carbon Nano Fibers (CNFs), Carbon quantum Dots etc. All these forms of carbon have different applications in Nanotechnology. The most common crystalline forms of carbon, Cubic diamond and hexagonal graphite are classical examples of allotropy. Both diamond and graphite exist in two minor crystallographic forms: hexagonal diamond and rhombohedral graphite. Later fullerene, CNTs and grapheme were added to the list of crystalline allotropes of carbon, Thus, carbon became the unique element in the periodic table that has an allotrope in all the dimensions.



Carbon Nano Tubes



Carbon Nano Fibers



Carbon Nano beads

Sharon et al have reported various applications of carbon Nano materials like Solar Cell, Hydrogen Storage, Fuel Cell, Super Capacitor, Microwave absorption. It is interesting to know that all the carbon nano materials synthesized by this group were developed using natural precursors. Dubey et al from the same group have reported an interesting application of Carbon material derived from waste coconut shell as filament of bulb analogous to Tungsten.

FUTURE APPLICATIONS OF NANOTECHNOLOGY

From the above discussed applications it is evident that Nanotechnology is an emerging technology expected to have rapid and strong future developments. It is also predicted that this technology can contribute significantly to economic growth and job creation in the coming decades. According to scientists, nanotechnology is likely to have four distinct generations of advancement. We are currently experiencing the first, or maybe second generation of Nanomaterials. The first generation of materials has properties that are achieved by the incorporating "passive nanostructures". This can be in the form of coatings and/or the use of carbon nanotubes /fibers to have utility in various fields. The second generation makes use of active nanostructures, for example, by being bioactive to provide a drug at a specific target cell or organ. This could be done by coating the nano particle with specific proteins. This generation has exhibited various applications as discussed above. The complexity advances further in the third and fourth generations. Starting with an advance nano system like nano-robotics which is future engineering and moving on to a molecular nano system to control growth of artificial organs and genes in the fourth generation of nano materials.

CONCLUSION

It is very much evident from the literature that the Science has progressed in last 3-4 decades very rapidly. The advancement in the different branches of Science has resulted into development of different technologies. With the growing technology and constraints in the land and infrastructure, it has become dire need of the society to have smaller size of all kinds of goods. And that is the reason the technology has also shifted from Semi to Mili to Micro to Nano. Days are not far that Pico technology is come into market after the saturation of Nano Technology too. But it will not happen suddenly. With the existing nanotechnology it is expected that almost all branches of engineering right from Electronics, Medicine to Robotics will be nanotechnology based because of its efficiency, durability, reliability and reproducibility. Therefore we can conclude with this paper that Nanotechnology is the future engineering.

REFERENCES

1. M. S. Ramachandra Rao and Shubra Singh, Nanoscience and Nanotechnology: Fundamentals to Frontiers, Wiley, First Edition, 2013.
2. Madhuri Sharon and Maheshwar Sharon, Carbon Nano Forms and Applications”, McGraw-hill publications (USA), First Edition, 2011 (ISBN No. 007-1639608).
3. **Harish K. Dubey** et. al., “A new carbon material synthesized from coconut shell”, Advanced Science, Engineering and Medicine, 3 (2011):1-4.
4. D. E. Kshirsagar et al., “Intrinsic Ferromagnetic Behaviour of Glossy Carbon Films Obtained from Karanja Seeds Oil”, Advanced Science, Engineering and Medicine, 7 (2015):1-3. doi:10.1166/ase.m.2015.1706.
5. Manoj Mahajan, M M Khandpekar, Applied Physics for Science and Engineering Undergraduates, Evincepub Publishing, First Edittion, 2018, ISBN. 978-93-87905-07-8.
6. <https://www.slideshare.net/kirtisingh2011/nanotechnology-ppt>
7. <http://www.trynano.org/about/history-nanotechnology>
8. <https://en.wikipedia.org/wiki/Nanotechnology>

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