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From the Desk of Editor – in - Chief

Dear Friends

Covid -19 has been one of the most dreaded experiences in the history of mankind but human beings are always optimistic. They convert such challenges on most the occasions in to opportunity for betterment of life. With Covid -19 the world has learnt new lessons on hygiene, cleanliness and work culture. Covid-19 and New Education Policy (NEP-20) together may prove to be a force multiplier for Indian higher education and may also become a game changer. On one side, Covid-19 is enforcing technology enabled online system of delivery and on the other hand, NEP-20 is ready to usher in an era of equity, inclusion, quality, skill and holistic development with lifelong learning opportunities in higher education. Despite lots of ifs and buts, most of the institutes and universities have, though reluctantly, partially or fully, shifted to online mode of education during Covid period. Even with the limitations of resources and inadequacies of hardware and software, the way most of institutions switched to online mode, through sheer innovative methods, and recorded significant success, is highly commendable. A “new normal” is emerging post Covid in higher education sector, where a good blend of traditional and virtual system, skill and choice based liberal curriculum with quality assurance will impact pedagogy and assessment system effectively. However the ride is not going to be hurdle free.

I can see four immediate challenges which need to be converted in to opportunity by institutions of higher education in order to excel. The NEP-20 calls for inclusion of co/extracurricular activities, liberal and choice based subjects and skill projects as part of curriculum across all the disciplines. Redesigning of syllabus with clear and judicious division between traditional and virtual classes, skill development and concept building, practicals and theoretical part, will be the first challenge. To keep the class load optimum and to motivate students to, use their creativity/talent, explore/interact with outside world, develop self learning initiatives and sharpen problem solving skills; assignments and projects will have to be skillfully designed by the teachers. The second challenge will be as regard to capacity building of teachers. The motivation level of teachers currently does not appear to be very high, especially in nongovernment institutions; may be due to insecurity and low remuneration. Teachers of government run institutions on the other hand enjoy over security and nonaccountability which may work as demotivators. Training of the teachers on the new pedagogy, technology and culture will therefore be a gigantic task which actually demands institutionalized training by digital pedagogy and learning science experts. Unfortunately, NEP-20 leaves this task to individual institutes/universities through routine faculty development programmes, which so far has not been proved to be very effective. The third challenge will be as regard to establishing minimum standards of resources, technology, process and infrastructure and set up bench mark and

threshold levels. This need to be done in mission mode preferably by the government. The fourth and most crucial issue will be examination and assessment in virtual mode. The current low quality of question banks and objective questions for online examination, defeat the very objectives of quality in new education policy. Present mindset of examiners is marks and memory based. Transforming its orientation to knowledge and skill based assessment is the biggest challenge which demands deep knowledge, competency, hard work and creativity on part of teachers also.

In last few months, during Covid period, lot of brain storming sessions, conferences, webinars on virtual platforms among academicians, policy makers and other stake holders of higher education have taken place, trying to spread awareness and find where the shoe is pinching. The education system is currently going through teething troubles, as happens with any new system and each university/institution will only have to find their own solution to convert all the challenges in to opportunity and encash for achievements. So, post Covid, a race for excellence will be on, among institutions of higher education and in future foreign universities may also join the competition. Obviously students will be the beneficiaries and higher education system as a whole will be the biggest gainer.

ANUSANDHAN is a vibrant platform where authors are fully alive to, and highly concerned with, burring issues in the society. Obviously this issue of **ANUSANDHAN** has many articles on Covid-19, covering entire spectrum of its impact. Occasionally we also do include articles by technology experts who are masters of their fields. There are two articles in this issue by such experts. Mr CP Deshmukh is an expert on Power Transformers and Reactors with 34 years of experience in installation, rectification and modifications of large number of such equipments. Similarly Mr. T Mulchandani is an expert on Hydro and Thermal power projects with about 35 years of experience. Articles from these two experts will provide real field aspects which may not be available in text books. I am confident that you will find all other articles also thought provoking and interesting. Electrical Energy, whether conventional or renewable, is the foundation for development of any nation. A series of articles will be published in **ANUSANDHAN** covering all types of electrical energy provide a complete insight on concept to design. The first article is appearing in this issue by Dr. SR Awasthi who has very long experience of the field. Festive season is ahead. Celebrate it with new norms of social distancing, virtual meetings and family gatherings. Our best wishes are always there with our authors and readers for a researchful season because meaningful research holds the key for New Self Reliant India i.e. Atma Nirbhar Bharat.



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Indian Higher Education at the Cross roads of Technology Enabled Education

VK Verma

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ABSTRACT

This is probably for the first time in the history of education, that all the institutions, almost all over the world, were closed down for around 6 months i.e. March to Aug 2020, due to Covid-19 pandemic. Online education was put to acid test in all higher education institutions during the locked down period. Unpreparedness and nonavailability of contingency plan in case of conventional system collapsed became biggest hurdle when switch over to online mode was done. In this crucial Covid period it was realized that there is need to do a lot, to restructure the current higher education system by introducing greater share of online education and skill development in the curriculum. It was also realized that online education is a different cup of tea and not simply converting notes in to pdf or uploading videos or making a slide show or replicating face to face format in to online system. A great deal of learning science and digital pedagogy is needed. Unfortunately, earlier, even for conventional system in initial stages no formal training of teachers was available, and it matured with time only, but now online education is coming to stay with bigger share, is a new system, so the need is stronger for formal training of faculty on online pedagogy, at national and regional level, by establishing academies/training institutes. The New Education Policy (NEP 20) has overlooked this critical need and left to normal FDP methodology which has not proved so successful in the past. The other weak areas are standardization of format, process and technology, time and resource management to overcome cost enhancement due to new norms of social distancing and expensive online systems and virtual labs. The most critical area needing attention in online system is also quality of online examination and assessment. This paper examines various aspects of higher education in pre Covid and post Covid period in India and provides an overview of what needs to be done.

(Keywords – Covid-19, Online Education System, NEP 20 Edn 3.0, Edn 4.0, Technology Enabled Education, Digital pedagogy)

I INTRODUCTION

Covid-19 pandemic has caused biggest disruption in the higher education sector. In India, 993 universities and over fifty one thousand colleges were closed down during the crucial academic months of March to September 2020. During this period 37.4 million students and 1.5 million teachers were confined to their homes. Edutech enthusiasts were advocating, for quite some time, to switch over to highly technology enabled system, in order to reap the benefits of online education, but efforts to cross over to online system in the regular education system of India have been made only in fits and starts, mainly for three reasons. One, the infrastructure and resources required for online education for such a huge area in a developing country like India, were quite inadequate. Second, bridging the digital gap between rural and urban, rich and poor, again demanded time and cost as well as many welfare measures. Third, the mindset of academicians has not been ready to accept online system as a better option for regular teaching learning. It remained obsessed with face to face conventional system of teaching.

Covid-19 pandemic came as blessing in disguise for higher education. It did not leave any option. On line education was the only way to meet the challenge of Covid 19. Brushing aside the inertia and excuses, the Indian Higher Education System accelerated efforts to overcome shortcomings of infrastructure, devices and internet accessibility, through equipping, reengineering and innovations. During the crucial months of Covid-19, most of the Indian Institutions

of higher education switched to online system of education using innovative methods to bridge the digital divide. The biggest lesson the pandemic taught was, as regard to importance of sharing and collaborating between individuals and institutes. The fact is that despite all shortcomings of infrastructure, internet access and devices, most of the higher education institutes in India were able to complete most part of syllabus and many of them conducted exams. The government and support system also came out with many new schemes, plans and systems to facilitate online system of education. Everybody in the higher education sector has fully realized that the pre Covid-19 era in higher education may not return even after Covid-19 disappears and therefore online education has come to stay. The post Covid-19 era is likely to be of combination of conventional face to face classes and virtual classes, virtual labs, online delivery and soft content. In this hybrid system of teaching -learning also, the contribution of conventional face to face may reduce to a level of around 30 to 50%. There is strong need for standardization of infrastructure, devices, platforms and processes. The whole effort of Indian higher education system has to be for design of a proper hybrid system, standardization, quality control, content development, design of an effective assessment and online exam system and training of teachers on new system of teaching learning methodology. Online exam proved to be the weakest area during the Covid period.

II ONLINES VERSUS TRADITIONAL EDUCATION

Traditional teaching, where one teacher teaches a group of students at a time, in a class room face to face, has been there since ages. As technology came in to human life it brought comfort, convenience, effectiveness and efficiency. The growth in

technology has been divided in to technology based era/generation. Table 1 shows the generation wise growth of technology from Tech 1.0 to Tech 4.0. Tech 5.0 is now knocking the door where AI and Robots work parallel to human and not as subservient. Education system also initially grew in parallel to Technology era as shown in the table 1.

Table 1
Eras/Generation of Technology and Education

Industry	Tech 1.0 (Mech)	Tech 2.0 (Eectt, Elec)	Tech 3.0 (Digital)	Tech 4.0 (Adv Dig)	Tech 5.0 (AI parallel to Human)
Education	Edn 1.0 (Dictation) (Guru – Shisya)	Edn 2.0 (Socially Constructed) Interactive	Edn 3.0 (Use of Technology in class room)	Edn 4.0 (Virtual Class Simulation gaming)	Edn 5.0 —
Interaction	Face to Face	Face to Face	Hybrid (80:20)	Hybrid (20:80)	—

With Tech 4.0, Education system also should have been upgraded to Edn 4.0 with maximum share of tech mediated system using advanced digital technology for online delivery, taking benefits of virtual system, simulation, gaming and artificial intelligence. Edn 4.0 faced many barriers and could not replace traditional face to face teaching system in right ratio. This is also a fact that there are many advantages of face to face system and it cannot be rejected all together. On line learning on other hand has many advantages eg. it permits flexibility (pace of learning, schedule of learning, balance between work and study) for both teacher and student, accessibility from home reducing travel and cost, cost effectiveness, possibility of customization as per ability of learner, use of effective power of video, virtual field trips etc. The online learning has some disadvantages like possibility of distraction for student in non class environment, current virtual

system's inability to replace totally, labs and workshops and high cost of infrastructure and devices, poor availability of internet in rural areas, missing face to face interaction and team spirit which promotes all round development. However these disadvantages and barriers will disappear gradually when all the potential of online technology is used and the current rate of high growth is indication of this. Online education market in 2016 was of 247 Million \$ which has grown to 1.9 Billion \$. Number of lease lines has grown from 1.6 million in 2016 to 9.5 million in 2020. The penetration of internet and its speed are improving at unprecedented pace. Costs of devices are coming down and infrastructure is growing. Cost of data is also reducing day by day. Problems and reasons for online education being not able to take its due share in teaching – learning pedagogy is shown in table 2.

Table 2
Online Education Problem & Reasons

Why Online	Barriers	Reasons
<ul style="list-style-type: none"> • Efficiency • Accessibility • Flexibility • Quality Edn • Overall cost low • Convenience • Wide Choice • Customization 	<ul style="list-style-type: none"> Teacher's Non Acceptability Internet Reach Distraction of Student Training of Faculty Initial Infra Cost high Discipline/Attendance Curriculum Development Time & Effort needed 	<ul style="list-style-type: none"> Mind Set of academicians Cost & Time for system Work Culture Trg Resources Reluctance of academicians Counselling in proper Redesign Required Collaboration

III PRE COVID ERA – GETTING READY FOR UNSEEN

In mid nineties computers gained a strong foot hold in the Indian higher education class rooms and since then digital journey commenced. The journey had to face many hurdles. In 2010 the internet penetration was merely 8% against neighboring China's 34%. Around 66% of student strength in India comes from rural sector, which suffers from archaic methods of teaching, shortage of teachers, poor teacher to students' ratio and out dated teaching material. It was realized at policy level that these problems could be addressed to quite some extent through online education. Technology enabled education could provide educational access to rural sector which urban sector was enjoying and that is how the playing field could be leveled. However it was easier said than done. The major challenge was non-availability/inadequacy of electricity, internet connectivity and nonavailability or unaffordability of costly devices like computers, smart phones and tablets in rural sector. It involved huge cost and infrastructure. Large numbers of initiatives were therefore initiated at the level of Government of India. Some of these initiatives/programmes which have helped in technology enabled higher education are:-

- (a) **Bharat Net-** This is world's largest rural broad band network being completed in 2 phases under **Make in India** initiative, by laying 10 million km of optical fiber cable covering 6.2 Lakh villages, 25.0 Lakh Govt Institutes and 50.0 Lakh households, designed for a minimum of 100 M bit/s broad band connectivity. Cables have been laid at a breath taking speed of 30 thousand km per month. The project is being completed by 2020 end.
- (b) **Digital India** – Launched in 2015, it is a massive programme aimed at taking digital revolution to masses from city to villages adopting, Public Private Participation mode (PPP) with initial outlay of Rs. 1 Lakh Crore. E-education, digital lockers etc were some important programmes. Two to five hot spots per village are being created in 6.25 Lakh villages. This has helped in providing 276.5 million wire line and wireless broad band connections to internet users in 2014 and by 2020 just before Covid-19 it grew to 681.1 million at annual growth rate of 14%. Internet users in India now account for about 17% of world internet users.
- (c) **Schemes, Apps, Platforms & Facilities** – Large number of schemes have been launched by the government to promote online system at very low and affordable cost. This includes free access to higher education study material, 32 channels launched by MHRD providing, digital platform at low cost for rendering academic services, SWAYAM platform making 500 courses available free of cost through Video

lectures, reading material tests and interactive session free of cost by 1000 chosen faculty, NPTEL project of 7 IITs providing free courses and effort to develop content under MOOCS India etc.

- (d) **National e-Governance Plan (NeGP)** – With 31 Mission Mode Projects in which computerization and e-service have helped Digital India in a big way and build infrastructure for on line delivery.
- (e) **Subsidies** – Government of India has highly subsidized the digital services to make services and devices available to users at affordable cost e.g. 76% subsidy to private operators for 4G broad band.
- (f) **Make in India** – Launched in 2014, under Make in India, has 25 sectors including electronics, IT and renewable energy to promote design, development and innovations by investors from abroad also there by bringing cost down and add to economy. This has helped improving reach of online system to rural area and makes it affordable.
- (g) **Swach Bharat Abhiyan-** This helped in improving environmental condition to mitigate suffering due to Covid 19

All these initiatives/programmes came handy to higher education sectors and made grounds to move towards technology enabled education. Owing to this ground work it was possible to cross over to online education system, when the Covid 19 pandemic set in, by most of the institution.

IV UNLOCKING ONLINE EDUCATION DURING LOCKDOWN

On 9th Jan 2020, the WHO announced that coronavirus SARS Cov-2 could cause Covid-19. On 11th March 2020 it declared spread of Covid-19 as pandemic. On 25th March 2020 India clamped country wide lock down. Confinement and social distancing became norms. Higher Education sector of 185 countries was adversely affected by coronavirus, where most of the institutions of higher education were closed down during crucial months of March to August 2020. A survey taken by International Association of Universities (IAU) and some other organizations like IIE of USA and EAIE in Europe revealed the pandemic has resulted in; closer of institutions during crucial academic months, 45% international admissions affected, forced move to distance learning, adverse affect on research and examination etc. Most of the institutions did not have an effective contingency plan. In India also all higher education institutions are closed down from Feb/March 2020. Most of the institutions did not have plan for such contingency in India also. It was realized at all levels that there are many difficulties and some disadvantages in switching to online system. The difficulty was in terms of inadequacy of infrastructure, many rural students not having access to internet and smart phones, teachers not having soft

content readily available with them etc. The disadvantages of online system cited by academicians were mainly related to quality of delivery, quality of audio and video in non standard format and student's distraction and being unable to adjust to new format of learning. Surprisingly all the stake holders joined to gather to reorganise and reengineer available resources with innovative approach to initiate on line teaching-learning system in a big way, when no other way was left for continuing education. It took about a month's time to stabilize and develop an effective and adequate system by exploiting available resources in most of the places. Following resources/plans came handy:-

- (a) **Government Resources-** Various initiatives taken by the Indian Government to promote Digital India in terms of providing open sources in form of e- Books, education media files and repository for higher educational institutions helped to switch to on line mode. NPTEL is the largest single repository of around 1500 technical courses using Googal's open source platform. SWAYAM launched in 2016, MOOKIT, IITBx etc provided large number of soft content free of cost. Education and Research Network (ERNET) connecting colleges and universities libraries, EDUSAT satellite for education, Consortium for Education Communication (CEC) to use power of TV for education - all these resources were exploited to initiate online system of learning.
- (b) **MOOCs-** Many institutions and universities have developed Massive Open Online Courses (MOOCs) within the resources available with them. All libraries have their own stock of e-Books, Video Lectures, e- content which were also used extensively for online delivery. Students also used MOOCs available on various platforms by various agencies like Udacity, Coursera edx and Udemy – etc to complete some of the courses within their programmes of studies.
- (c) **Online Delivery-** Teachers used various methods of conducting online classes. Teachers, who could reach their institutions, used formal infrastructure available there, including LMS platforms to conduct the online classes making them interactive. Many teachers used camera/mobile phones and normal white board to conduct the classes from their home. Due to restrictions and limitations imposed by lock down, most of the institutions gave free hand to their teachers to use synchronous and asynchronous methods for online delivery of courses as per their convenience.
- (d) **Innovative Methods-** Many students during critical Covid-19 period were locked up in areas where network was not available or speed was problem. In such cases teachers used innovative methods of asynchronous mode, social network and tools. Googal Class room whats app, webinar, skype, Ever note, Drop box were skill

fully used by both faculty and students. Flexibility was stretched to maximum limit to achieve the target of reaching maximum students.

- (e) **Student Attendance and Discipline.** The pandemic taught a good lesson on discipline and time resource management to both faculty and students. It also revealed short comings of online education and also innovative methods to deal with them. Also it revealed the importance of plans for such contingency.
- (f) **Examination and Assessment-** For most of the institutions this was the grayest area. Only some institutes had the resources in terms of question bank, hardware and software system to take exam on line. Most of the institutions, however, developed online examination system during Covid period but quality of examination and assessment was quite not up to the mark.

V THE WAY AHEAD

In all probability, pre Covid days in education sector may not return for three reasons. First, online education system has proved itself adequately during crucial pandemic period. Second, it will be very difficult to do away with the infrastructure, equipment, work culture and processes developed for online education. Thirdly, even after conquering coronavirus, fear will always loom large of similar virus attack in future. So the only option now is to restructure higher education system efficiently with major role for technology enabled education. Covid-19 pandemic has taught another crucial lesson, that no sector can progress in isolation. Each sector of national economy including education sector, will have to restructure itself for national goals for sustainable development and work in collaboration with others. The goal of 5 trillion dollar economy by 2024 and self reliant India have already been set by the Government. All the sectors will have to deduce their own goals to support the national goals. Obviously for higher education sector the agenda for sustainable development is to ensure inclusive, equitable uninterrupted quality education and promote lifelong learning opportunities to produce competent human resources. The whole economic framework of the nation can be divided broadly in three Es i.e. Economic Sector, Education Sector and Environment Sector. Economic Sector covers all sectors related to production, maintenance and services and Environment sector covers all units engaged in building and maintaining ecological and environmental support. The road ahead for higher Education Sector in post Covid-19 era need to focus on following aspects:-

- (a) **Interface with Economic and Environmental Sectors –** The New Education Policy (NEP-20) emphasizes on skill and employability oriented choice based system with multidisciplinary approach liberal education and technology enabled option for New India. For sustained

development and achieving goals set by NEP-20 following initiatives could be thought of in post Covid period:-

- (i) **Establishing a Vibrant Interface:** - A vibrant interface between Industry/Corporate/Services and Education and between Education and Environmental Sectors will need to be established across all the disciplines. The role of existing Industry Academia Cell in institution could be modified to discharge this function. This interface should be part of all BoS/Academic Council and advise them to include new topics and subjects related to Economic and Environmental sectors in syllabus across all disciplines to build awareness on all govt programs and build ground for active participation by students and faculty in nation building.
- (ii) **Skill Development and Virtual labs:** - Syllabus needs to be modified and percentage of practical and hands need to be increased Skill training need to be made compulsory across all disciplines. In light of NEP 20, curriculum development will be biggest task. NEP calls for inclusion of liberal education with science and arts subject curricular activities and cocurricular activities as part of all syllabus. To ensure that core subjects are not diluted and student is not overburdened, the curriculum has to be skillfully designed. Initiatives need to be taken to develop virtual labs. These being expensive could be established jointly by more than 2-3 institutions.
- (iii) **Research Orientation:** - Greater portion of research effort need to be devoted on existing problems of society, economy, industry, service sector and ecology with target/result orientation with online approach.
- (iv) **Multi disciplinary Projects & Internship:** - Institutes need to develop labs with advanced digital technologies and take up multidisciplinary projects with feasibility of partly work from home if need arises. Project should be related to problems of the society and support theme of vocal for local.
- (b) **Infrastructure and Equipment for Technology Enabled System:** - There are various issues as related to quality and standards of technology enabled system which need to be addressed :-
 - (i) **Online Technology** - There are two issues; the internet speed and internet penetration, especially in rural sector. India ranks 89th among 149 countries as per Akamai ranking with average internet speed of 6.5 M bit/sec against Singapore's 150 Mbps and USA's 75 Mbps. There is need to improve the speed in existing system. There has

been lot of progress made in internet accessibility in last 5 years with 718.74 million internet users now, which is 54.29% of population, still penetration in rural area needs further improvement. Govt initiatives like e-Kranti, e-learning in rural, e-Vidya lok are quite effective.

- (ii) **ICT devices-** Current cost of broad band access in India is 5% of average national income against 1% in developed countries. Programmes like Make in India, Digital India and Start up India may help reduce the cost. Very recently 22 companies have made bid to manufacture smart phones, laptop and components in India under Make in India and Atma Nirbhar Bharat initiatives.
- (iii) **Infrastructure** - Creation of soft content in audio and video needs quality equipment, devices and environment which are expensive. Covid -19 has forced new cultural and working norms, like social distancing, frequent sanitization, class rooms with online facilities and reduced seating capacity, good audio visual studios etc. All these new needs will obviously enhance cost. There will be need to reduce effective cost by better time management; innovative methods of utilization, sharing of resources and skill fully designed home assignments and projects.
- (iv) **Electric Power Adequacy:** - There is need to improve quality and duration of power supply by better grid management and reduction of losses.
- (c) **Standardization and Quality** - It took decades to develop existing system of conventional face to face system of education. In order to make technology enabled system, there is need to standardize technology, devices, infrastructure and process and also ensure minimum quality level. This will be an uphill task. **Problem will multiply with new NEP-20 which calls for inclusion of cocurricular, extracurricular activities and science/arts/liberal education subjects also in curriculum even with professional and technical programmes.**
- (d) **Training of Teachers and Supporting Staff** - A recent survey raises questions as regard to quality of online education as compared to face to face system. Online teaching is just not converting notes in to PDF nor is it library of video and audio lectures. Blind replication of conventional class room to an online affair defeats the very purpose. To bring in quality, it needs

great deal of learning science and digital pedagogy. How to keep students engaged and attentive and make session interesting and interactive is also a matter of skill and home work by teacher. Supporting staff also have a different role now. **There will be need for professional training of teachers and supporting staff at state and national level in institutionalized manner and should not be diluted like current Faculty Development Programmes.**

- (c) **Curriculum and Content Development** - This will be most crucial area. Main aspects on which, work need to be done by BoS, Academic Council and Policy makers may fall in to following seven categories. One, **deciding on each subject ratio of online to conventional delivery.** Two, **how to enhance skill and hands on part of curriculum effectively for each programme.** Three, **ratio of virtual and actual labs/projects.** Four, **system of inclusion of subject topics of ongoing government programme initiative on Economy, Environment and National Development in to syllabus/curriculum.** Five, **how to include choice based liberal and non professional subjects, extra/cocurricular in curricular without diluting core subjects and overloading students.** Six, **making participative activities, with industry/corporate/society/rural grass root mass, as a part of syllabus/curriculum.** Seven, **introducing at least one multidisciplinary project every year as part of syllabus in order to keep student in touch with ongoing development in technology/industry/society with research orientation. In addition Virtual Field Trips and Adaptive courses through web apps also need to be made part of curriculum. Gaming and simulation need to be made part of maximum syllabus.**
- (f) **Examination and Assessment** - This is the grayest area of online education system. There is a big question mark on quality of question bank. Most of the questions are objective type and test only memory and not knowledge. If online education has to achieve its objectives then most important areas in which academicians need to work on are examination and assessment system in addition to training of teachers.

VI CONCLUSION

Post Covid-19, the online education has taken center stage in higher education. The share of online delivery and conventional face to face teaching in universities and colleges is likely to be in ratio around 50: 50 to 70: 30. During the Covid period online system of education has proved its edge and value which no one can deny. At the same time in areas like, practicals, team work, interactive methodology and human touch, conventional method has its importance reminding the importance of face to face teaching. Covid period has revealed the weakness and inadequacies in many areas of technology enabled online system. Unless all the stake holders of higher education accept the fact whole heartedly that online system of education has to be adopted in colleges and universities for normal curriculum also and not only in distance education, it will be difficult to reap the benefits of technology enabled higher education. Following are the critical areas needing immediate attention:-

- (a) **Examination and Assessment** - This is the most critical area due to which in many institutes during Covid period general promotion was resorted to. Wherever online examination was taken also, the quality of questions, process and assessment were very poor.
- (b) **Training of Teachers** - This is a very weak area as currently quality and content of on line teaching is found to be poor. Mostly conventional lectures are being replicated in on line format. Formal training is a strong need not by technology expert alone but also by digital pedagogy experts and learning science experts.
- (c) **Curriculum Development** - For better resource management and for following new culture of social distancing, curriculum has to be developed for skillful division of on line and face to face sharing assignments and home work by students and teachers.
- (d) **Standardization & Quality** - Adhoc methods, system and process need to be replaced with standard ones with proper bench marks.
- (e) **Virtual Labs, Gaming & Simulation** - This area needs lot of work in terms of cost effectiveness and sharing.
- (f) **Virtual Events** - Virtual events like webinar, workshops expert lecture can be very cost effective with better reach globally. Issues as regard to technology, process security and reliability; need to be addressed. One example is Zoom app which was found to be doubtful on security aspect by the Government was mostly used and need to be replaced.

It can be easily concluded that coming era is of highly technology enabled higher education with very vital role for online systems and virtual world for regular programmes also in colleges and universities.

Fault Analysis of a Large Auto Transformer in a Power Transmission System

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ABSTRACT

The paper gives a brief overview of electric power system and role of power transformers. The faults in transformers and their protections will be briefly discussed. The damages caused by the occurrence of fault due to some abnormal conditions resulting in consequential severe damages. The root cause of the damage is normally established by conducting various tests at low voltage. A special case will be discussed when due to extensive damages to the transformer; it is not possible to conduct low voltage tests. The paper will explain as to how the cause of damage is established by very minute study of the type and extent of damages.

Keywords: Faults in power transformer, bursting of transformer, analysis of transformer failure

I INTRODUCTION

An electric power system is a network of electrical components to generate electric power in the power plants, transmit the power to the load centres using transmission lines called grid, and distribute to the consumers for domestic, irrigation, industry use etc. as shown in Fig. No. 1. Globally, the power systems have mostly adopted three-phase AC power for generation, transmission and distribution. The use of high voltage direct current (HVDC) power

transmission is preferred for long distance bulk power transmission as it is economical.

The power plant generates the power which is stepped-up through the transformer for transmission at higher voltage to minimize the transmission losses. The power is transmitted to the various substations. The voltage is stepped-down using the distribution transformer for supply to the consumers at a voltage as per their need.

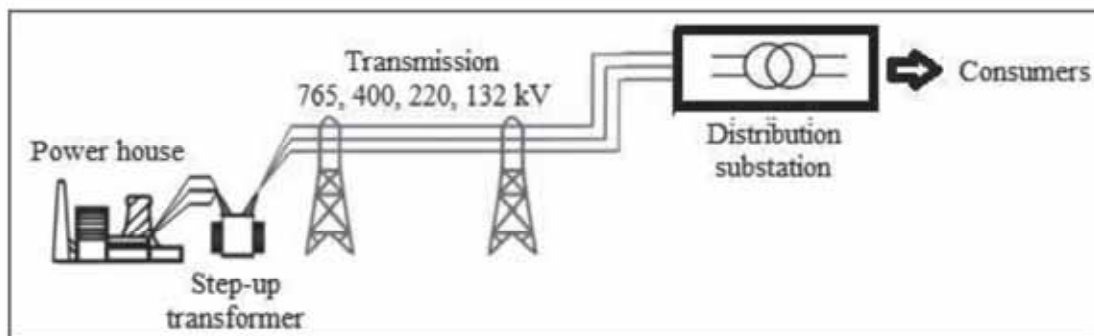


Fig. 1: Power system schematic

The generation is by the conventional sources of energy such as thermal, hydro, and nuclear. However, during last decade, renewable sources of energy are growing rapidly. The voltage at the power house is stepped-up for high voltage AC transmission to minimize the losses. The voltage is stepped-down for supplying electric power to the consumers.

Transformers are the highest voltage static electrical machine used in the power system. The maximum transmission voltage in operation in India is 765 kV. The next stage is for 1200 kV AC transmission for which the transformers of Power Grid Corporation of India Limited have been successfully tested at CPRI, Bina, Madhya Pradesh. The transformers used at

power stations are conventional type whereas auto-transformers are preferred as an economical option to supply power to the feeders.

An autotransformer has magnetic core as usual but has only one winding which is used as primary as well as secondary winding. Thus, two windings are linked magnetically and electrically. The winding is tapped at number of points along its length so that an appropriate tap is selected to apply desired voltage across load as shown in Fig. No. 3. The main advantage of autotransformer is that for the same VA rating, it is cheaper and overall dimensions and weight are also less.

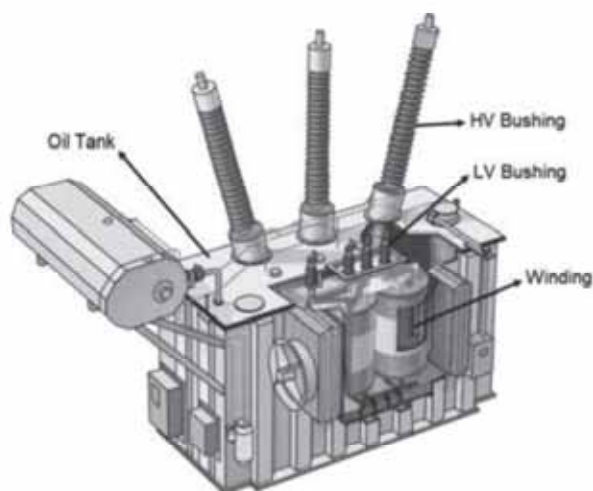


Fig. 2: Main parts of a power transformer [1]

The author discusses the power system and role of transformer along with the faults that occur along the protection. A case of 100 MVA, 400/220/33 kV, 3-phase, 50 Hz auto-transformer is presented which suffered extensive damages due to the fault resulting in the bursting of transformer tank and catching of fire. Analysis of the damages had to be carried out to establish the cause of fault as it was not possible to carry out low voltage test to determine the cause of occurrence of fault.

II FAULTS AND PROTECTION SYSTEM IN POWER TRANSFORMERS

A fault i.e. abnormal condition in a transformer cause mechanical and thermal stresses inside the transformer winding and its connecting terminals. Thermal stresses lead to overheating which ultimately affect the insulation system of transformer. Deterioration of insulation leads to winding faults.

The transformer faults are internal and external type. The internal faults are the earth faults, core faults, inter-turn faults, phase-to-phase faults, and tank faults. Similarly there are some external faults. In order to prevent the occurrence of faults and to minimize the damage in case of a fault, transformers are equipped with protective relays and monitors. The transformer must be isolated at the earliest on occurrence of fault.

(a) Internal Faults

- (i) **Earth faults:** A fault on a transformer winding results in flow of currents depending on the source, neutral grounding impedance, leakage reactance of the transformer, and the position of the fault in the windings. The winding connections also influence the magnitude of fault current.

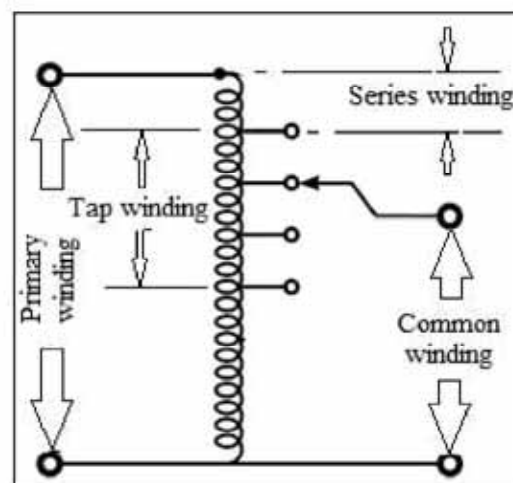


Fig. 3: Schematic of auto-transformer winding

- (ii) **Core faults:** The core faults due to insulation breakdown can permit sufficient eddy-current to flow to cause overheating, which may reach a magnitude sufficient to damage the winding.
- (iii) **Inter-turn faults:** The inter-turn faults occur due to winding flashovers caused by line surges. A short circuit of a few turns of the winding will give rise to high currents in the short-circuited loops, but the terminal currents will be low.
- (iv) **Phase-to-phase faults:** The phase-to-phase faults rarely occur but they result in substantial currents of magnitudes similar to those of earth faults.
- (v) **Tank faults:** The tank faults occur due to loss of oil which reduce winding insulation and increase the temperature abnormally.

(b) Protection against internal faults

Differential protection scheme provides the protection against the internal faults.

(c) External Faults

The abnormal conditions due to external factors result in stresses on the transformer. These conditions include overloading, system faults, over voltages, and over fluxing.

- (i) **Overloading:** It results in increase in temperature. Thermal relay protection is provided.
- (ii) **Over fluxing:** The over fluxing may result due to the operation at rated voltage and under frequency. The over fluxing may also be caused due to operation at over voltage and rated frequency. It results in increased iron loss and magnetizing current.

(d) Protection against external faults

- (i) **Buchholz protection:** The gases are released due to burning of oil and insulation and they are collected in the Buchholz relay. These gases are analyzed to get indication of the possible fault.
- (ii) **Pressure relieve valve:** When the pressure due to gases release due to burning of insulation exceeds preset limits.
- (iii) **Lightning protection:** The lightning stroke will result in sudden and excessive rise in voltage. The lightning arrester is provided for protection.

III DAMAGES TO TRANSFORMER

The 400 kV autotransformer was in operation satisfactorily for about 5 years. The fault occurred during rainy season which resulted in bursting of transformer tank resulting in huge fire and extensive damage in spite of the provision and automatic actuation of the firefighting equipment. The inspection and investigation by a transformer expert was done to establish the cause of fault.

(a) Occurrence of fault and protective system

During investigation it was observed that differential protection system operated at the occurrence of fault and differential protection relay was actuated. However, other protections such as Buchholz relay, pressure relieve valve, winding temperature relay and oil temperature relay did not operate.

(b) Damages in transformer

During inspection of damaged transformer, following major damages were observed:

(i) HV bushing

- W-phase bushing along with turret dislodged from the transformer tank and was thrown 6 to 7 m away on ground.
- V-phase bushing also got burst and current transformer (CT) installed inside the turret was damaged and flew away.
- U-phase bushing along with turret remained in intact.

The air end and oil end portions of HV bushings of V and W phase was completely shattered. Its core was found to be burnt due to fire. The bushings used were oil impregnated type and its oil was non-communicating type i.e. totally isolated from the oil filled in transformer tank.

**Fig. 4: Damaged bushings****(ii) Transformer tank & outer fittings**

Transformer tank was found in intact, however, bulging was noticed at the rim joint at the end of V-Phase.

The accessories such as marshalling box, cables, piping along with fire fighting system got distorted and damaged.

**Fig. 5: Damaged transformer**

(iii) HV bushing / LV bushing / terminal gear (internal)

- Transformer winding profile appeared intact and no distortion/ bulging were visible. However, the windings were found burnt on the outer periphery due to fire.
- Terminal gear of transformer windings found charred / burnt inside tank.
- The corona shield of HV bushing was dislodged from its position and damaged. It was found fallen in the tank.
- The Current Transformers of W & U Phases 420 kV installed in the turrets were found completely burnt and their turrets were found charred from inside.

(iv) Core & Winding

General Profile of core and winding inside the tank was found in shape but burning was noted on the surfaces of windings and associated terminals.

IV DAMAGE ANALYSIS TO ESTABLISH THE CAUSE

In normal course winding ratio, resistance, magnetizing current/magnetic balance and tan delta tests are conducted to establish the cause of fault. However, due to the extensive damages to HV leads and terminal gear due to the fire inside the tank, it was not possible to conduct low voltage tests the transformer.

The reason of failure is most likely due to the condenser failure of 2W (420 KV) bushing resulting in its bursting. Subsequent to the failure, there would have been repeated flash over between bushing corona shield and tank wall till actuation of protection.

The repeated flash over between 420 kV bushing stress shield and tank built-up very high pressure leading to the bursting of the bushing, arcing hot oil

with exposure of air combined together had resulted in huge fire inside the transformer. Thus, the transformer got totally damaged.

Initiation of failure of 2W (HV) bushing and flash over between stem shields to tank caused failure of companion bushing 2V (HV). This spread the fire extensively, mainly inside the transformer.

V CONCLUSION

The paper presented an overview of electrical power system and power transformers, both conventional and auto transformers. The faults in transformers and their protection system have been briefly discussed. The damages due to faults caused by abnormal conditions result in damages. The root causes of the damage are established by conducting tests at low voltage. A special case was presented in which it was not possible to conduct low voltage tests due to extensive damages in the auto-transformer of a power transmission system. In such a case a precise investigation and study of the damages by highly experienced experts were carried out to establish the cause of damage to the transformer.

The failure of transformer and consequential damages were so severe that complete transformer i.e. winding/core and tank along with fittings were totally damaged. Hence, the transformer was beyond repair and there was no other option but to scrap it.

REFERENCES

- [1] Akbaria M., Allahbakhshia M., and Mahmoodianb R. (2017) Heat analysis of the power transformer bushings in the transient and steady states considering the load variations. *Applied Thermal Engineering* (Vol. 121) PP 999-1010.

Some Common Practical issues of Operation of Power Station Units in India

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ABSTRACT

India's growth in Power generation has been spectacular over the past several years. Apart from conventional Hydro and Thermal Power, the non-conventional Solar and wind Power have greatly contributed to this upsurge. There is however some technical issues related to the practices generally being followed or otherwise, in the operation of these plants particularly for hydro which need attention. This paper attempts to bring out and discuss these issues. While doing so, concepts involved are also touched to enable the Power Station engineers to fully appreciate these issues for implementation to reap maximum benefits of the asset they have been entrusted with for operation.

Key words: Operation of power station, droop characteristics, reactive power, operation at no load, operation in manual mode

I DROOP CHARACTERISTICS OF MACHINE

Every generating set has a governor to start/stop it and to control its speed rise during load throw offs so as to bring it back to normal speed, ready for next synchronization. An additional feature of droop is also invariably provided for stabilization of speed in NO LOAD (Temporary droop) and load sharing when operating in the Grid (Permanent droop).

Permanent droop setting selectable in the range of 0 to 10% of 50 Hz, decides load change with change in frequency of the grid. For example a 5% setting

would cause 100% change in load on the machine when change in frequency by 2.5 Hz would occur, with no operator intervention. It follows that units at lower setting would pick up more load with fall in frequency, thereby contributing more for maintenance of grid frequency. Thus, it is important for operating engineers to know this setting and be able to change it as per the requirement for base load or peaking operation.

Figure No. 1 shows the variation in real time load with frequency of a 60 MW hydro set plotted while running the unit without operator's intervention.

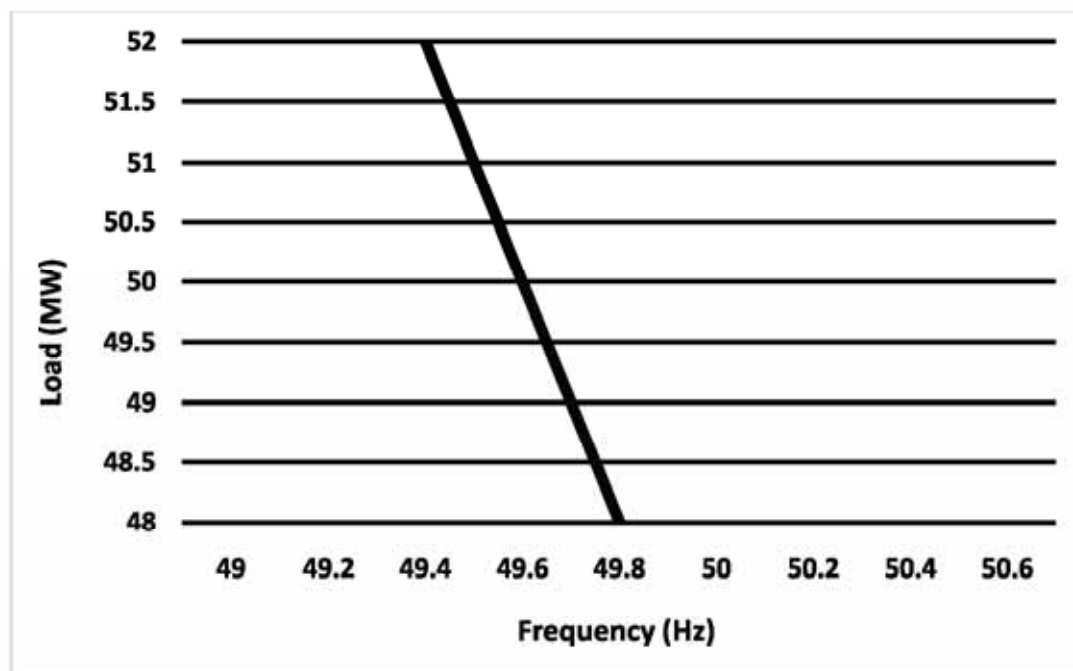


Fig. 1: Variation in real time load with frequency

The calculation of droop from the observed values gives droop of 10% which matched with actual droop setting of 10% as given in Table No. 1.

Table 1
Calculation of droop

S.No.	Machine speed (Hz)	Load on machine (MW)
1	49.0	51.7
2	49.65	48.7
3	$\nabla f = 49.65 - 49.4 = 0.25$	$\nabla P = 51.7 - 48.7 = 3$
4	Change in frequency $= (0.25/50)100 = 0.5\%$	Change in load $= (3/60)100 = 5\%$
5	For 5% load change, the change in frequency = 0.5%. Hence, for 100% load change, the change in frequency = $(0.5/5)100 = 10\%$	

Note: Synchronous generator is used in this case and in almost all large rated generating units. In a synchronous generator, the speed of revolution is

directly proportional to the frequency as can be seen from following formula of synchronous speed.

$$\text{Synchronous speed} = (120 f/P) \quad (1)$$

where, f = frequency (Hz)
 P = no. of poles in generator

II REACTIVE POWER GENERATION

All generating units are designed for producing both active (P) and reactive (Q) powers. The grid needs both these powers to sustain itself as a stable source of power to meet the requirement of inductive loads connected to it. The active power is generated by further opening of guide vanes of reaction turbine (Francis/Kaplan) and nozzles of an impulse i.e. Pelton turbine. The reactive power is generated by giving more excitation in the rotor winding, after synchronization.

The issue here is that either the reactive power is not being generated (operation at unity pf) or is not generated fully as per the capability of the machine which in fact is much more than name plate specifications if operating below rated load, subject to limit of rotor current (and –stator current/voltage). For example, a 105 MW, 11 kV, 0.9 pf generator would deliver 50.93 MVAR at 105 MW, but at 30 MW, it can give 60 MVAR at 0.26 pf, with all parameters remaining within limits. It follows that maintaining rated pf at all loads should not be the aim during operation.

III OPERATION AT NO LOAD

For any generating unit to produce power it has to pass through “No Load” run where efficiency is zero (efficiency = output / input). It is obvious that duration of this run should be kept minimum. The issue here is that power house authorities at different levels are generally found not giving due importance to it, with the result that sizable energy goes waste.

Below are given some practical tips to curtail the duration of no load run.

- Avoid unnecessary long duration of no load run for dry out/complex testing before commissioning or re-commissioning after flooding of a machine.
- Make use of a function generator for setting speed relays rather than doing it by running the machine.
- Tripping logics of machine should not unnecessarily cause stoppage of the unit on occurrence of system faults or after load throw-offs.
- After Commissioning, go for full auto start up to auto-synchronization sooner than later. In manual synchronization, the settings of the synchronizing relay should not be too tight.

IV OPERATION IN MANUAL MODE

Normally though machines are operated in Auto Mode- Governor/AVR both in auto – yet at times, due to some or other reason, manual governor or manual AVR operation becomes inevitable. The issue here is that operator must keep in mind inherent risks to the machine in manual mode and therefore remain vigilant. The risks are summarized below.

- Operation with Governor in manual mode-** Here, strong support of automatic speed control being unavailable, reliance solely on speed relays against over speeds is what we are left with. Cases are known when due to failure of DC control supply, machine broke-down due to the resulting runaway speed.
- Operation with AVR in manual mode –** Like above, automatic voltage control being unavailable, Stator overvoltage protection alone will guard against over voltage.

Other disadvantages of manual mode are that Machine gets tripped in manual governor, requiring restart involving no load run and consequential energy loss as mentioned above under Section III (Operation at no load).

V CONCLUSION

Hydropower plants play very important role in the stable operation of power system mainly due to the quick start/stop feature of hydrogenerating units and their capability to supply/absorb reactive power. It is necessary to make optimum use of our natural resource, water in this case. The water management is at top of the agenda of the Government of India in view of its challenging 'Jal Jeevan Mission' of providing tap connection to supply water to every household in the country by 2024. The hydropower projects are multipurpose and power generation may be one of the benefits which may be derived wherever feasible. There is however some technical issues related to the practices generally being followed or otherwise, in the operation of power plants which need attention. This paper has presented some operational issues of a power plant based on vast practical experience of the author for the benefit of power plant operators.

Synthesis And Antifungal Activity Of Thiazole-Triazine

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ABSTRACT

N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e) were synthesised from 4-(naphthalen-2-yl)thiazol-2-amine (1) on reaction with different hetero aryl aldehydes (2a-e). The compounds (3a-e) then react with phenyl isocyanate and formed 3-aryl-6-(naphthalen-2-yl)-2-phenyl-2H-thiazolo[3,2-a][1,3,5]triazine-4(3H)-thione (4a-e). The structures of all the synthesised compounds were characterized by elemental and spectroscopies method. All the schiff bases (3a-e) and thiazole-triazinederivatives (4a-e) examined for their antifungal activity, which show that all the compounds have good antifungal activity.

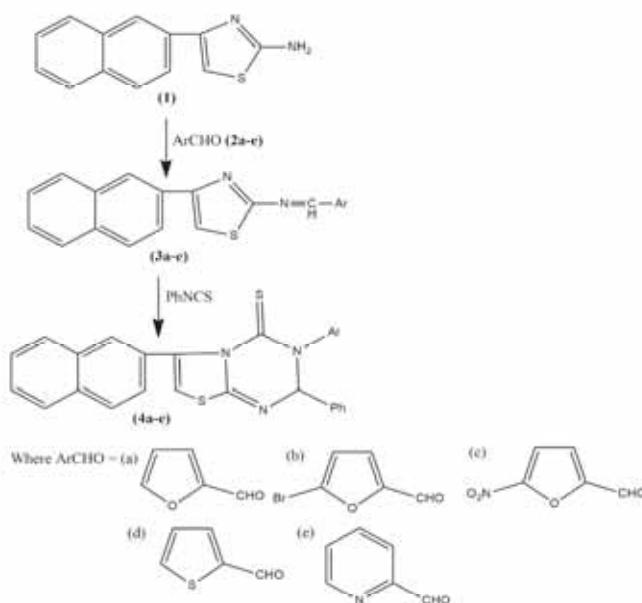
Keywords: schiff bases, thiazole-triazine, spectral studies and antifungal activity.

I INTRODUCTION

Now a days number of researchers synthesized biological active compounds. As unique heterocyclic amine, 2-amino thiazole is an initial compound for the synthesis of drugs, dyes and corrosion inhibitors. More particularly these derivatives have received more attention of bioactive compounds like antimicrobial, anesthetic, antiviral, anti T.B. etc [1-6]. Thiazole derivatives were also reported with their anticancer,

antiparasitic, antibacterial, antifungal agents and antifolate activity[7-11]

Thiazole and triazine moiety presented compounds shows excellent pharmaceutical activity[12,13]. Thus it was thought to explore this type of merge molecules. The present research article discussed the synthetic approach on thiazole-triazinederivatives shown in scheme-1.



II EXPERIMENTAL DETAILS

4-(naphthalen-2-yl)thiazol-2-amine (1) was synthesis by reported method[14]. All other reagents were used laboratory grade.

¹HNMR spectra were recorded on a Bruker (400 MHz) spectrometer. Deuterated DMSO was used as a solvent. The IR spectra of all compounds were taken in KBr pellets on a Nicolet 400D spectrometer. LC-MS of selected samples taken on LC-MSD-Trap-SL_01046. The characterization data of all these compounds are given in Table.1.

The antifungal activity of both the series of compounds (3a-e) and (4a-e) were measured at 1000ppm concentration in vitro Plant pathogen shown in Table-3 have been selected for study[15].

(a) Synthesis of N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-c)

A mixture of 4-(naphthalen-2-yl)thiazol-2-amine (1) (0.01 mol) and different hetero aryl aldehydes (2a-e) (0.01mol) in anhydrous ethyl alcohol (25mL) was refluxed on a water bath for 2 to 2.5 hrs. The solid separated was collected by filtration, dried and

recrystallized from ethyl alcohol. The analysis of these compounds are represented in Table -1.

Table-1
Analysis of the Synthesized Compounds (3a-e)

Comp.	Molecular Formula M.P.*°C	Elemental Analysis			
		C%	H%	N%	S%
		Found Calcd.	Found Calcd.	Found Calcd.	Found Calcd.
3a	C ₁₈ H ₁₂ N ₂ OS (304) 156-157	71.03 71.0	3.97 3.9	9.20 9.1	10.54 10.5
3b	C ₁₈ H ₁₁ N ₂ OSBr (383) 162-163	56.41 56.4	2.89 2.8	7.31 7.3	8.37 8.3
3c	C ₁₈ H ₁₁ N ₃ O ₃ S (349) 168-169	61.88 61.8	3.17 3.1	12.03 12.0	9.18 9.1
3d	C ₁₈ H ₁₂ N ₂ S ₂ (320) 159-160	67.47 67.4	3.77 3.7	8.74 8.7	20.01 20.0
3e	C ₁₉ H ₁₃ N ₃ S (315) 166-167	72.36 72.3	4.15 4.1	13.32 13.3	10.17 10.1

*Uncorrected LC-MS data for 3b:385, 3e: 318

(b) Synthesis of 3-aryl-6-(naphthalen-2-yl)-2-phenyl-2H-thiazolo[3,2-a][1,3,5]triazine-4(3H)-thione (4a-e)

A mixture of compound N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e) (0.01 mol), dry benzene (15 ml), and phenyl isocyanate (0.01 mol) was refluxed in 50 mL of 4N aqueous sodium hydroxide

solution for 10-11 hrs. The mixture was cooled to room temperature and then neutralized with 4N hydrochloric acid. The precipitate was filtered off and then crystallized from aqueous ethanol. The analysis of these compounds are represented in Table -2.

Table-2
Analysis of the Synthesized Compounds (4a-e)

Comp.	Molecular Formula M.P.*°C	Elemental Analysis			
		C%	H%	N%	S%
		Found Calcd.	Found Calcd.	Found Calcd.	Found Calcd.
4a	C ₂₅ H ₁₇ N ₃ OS ₂ (439) 212-213	57.92 57.9	3.11 3.1	8.10 8.0	12.37 12.3
4b	C ₂₅ H ₁₆ N ₃ OS ₂ Br (516) 227-228	56.41 56.4	2.89 2.8	7.31 7.3	8.37 8.3
4c	C ₂₅ H ₁₆ N ₄ O ₃ S ₂ (484) 220-221	61.97 61.9	3.33 3.3	11.56 11.5	13.23 13.2
4d	C ₂₅ H ₁₇ N ₃ S ₃ (455) 209-210	65.90 65.8	3.76 3.7	9.22 9.2	21.11 21.1
4e	C ₂₆ H ₁₈ N ₄ S ₂ (450) 245-246	69.31 69.3	4.03 4.0	12.43 12.4	14.23 14.2

*Uncorrected LC-MS data for 4b:518, 4e: 462

(c) Antifungal Activities

In vitro fungicidal activity of all the compounds was screened. Plant pathogenic organisms used were *Nigrospora* Sp, *Aspergillus niger*, *Botrydella thiebromine*, and *Rhizopus nigricans*, *Fusarium oxysporum*. The antifungal activity of all the

compounds (3a-e) & (4a-e) were measured on each of these plant pathogenic strains on a potato dextrose agar (PDA) medium. [15]

The fungicidal activity displayed by various compounds (3a-e) and (4a-e) is shown in Table-3.

Table-3
Antifungal Activity of Compounds (3a-e) and (4a-e)

Zone of Inhibition at 1000 ppm (%)				
Comp.	BT	NS	PE	RN
3a	45	47	46	52
3b	52	54	54	58
3c	47	50	49	54
3d	50	52	50	56
3e	48	49	47	53
4a	57	67	62	59
4b	60	70	66	69
4c	58	69	64	61
4d	66	75	70	65
4e	59	66	63	63

BT-*Botrydella thiebromine*, NS- *Nigrospora* Sp.

PE- *Penicillium expansum*, RN- *Rhizopus nigricans*

III RESULTS AND DISCUSSIONS

The 4-(naphthalen-2-yl)thiazol-2-amine (1) on reaction with different hetero aryl aldehydes (2a-e) gives N-(arylmethylene)-4-(naphthalen-2-yl)thiazol-2-amine (3a-e).

The structures of (3a-e) were confirmed by elemental analysis and IR spectra showing an absorption bands at 3030-3080 cm^{-1} (C-H of Ar), 710 cm^{-1} (C-S), 1120 cm^{-1} (C-O), 1555, 1375 ($-\text{NO}_2$), 690 cm^{-1} (C-Br) and 1620-1640 cm^{-1} (C=N). ^1H NMR (400MHz, DMSO - d_6 , δ / ppm) : 8.45-7.65(m, 8H, Ar-H), 7.54(s, 1H, CH=N), (3a): 7.78-7.00 (m, 3H, furan-H); (3b): 7.10-6.85(m, 2H, furan-H); (3c): 7.60-7.10(m, 2H, furan-H); (3d): 7.72-7.20(m, 3H, thiophen-H); (3e): 8.70-8.00(m, 4H, pyridine-H). The C, H, N analysis data of all compounds are presented in Table-1.

The 3-aryl-6-(naphthalen-2-yl)-2-phenyl-2H-thiazolo[3,2-a][1,3,5]triazine-4(3H)-thione (4a-e) synthesised from compounds (3a-e) and phenyl isocyanate. The structures of (4a-e) were confirmed by elemental analysis and IR spectra showing an absorption bands at 3030-3080 cm^{-1} (C-H of Ar), 710 cm^{-1} (C-S), 1620-1640 cm^{-1} (C=N), 1273 (C=S), 1120 cm^{-1} (C-O), 690 cm^{-1} (C-Br) and 1555, 1375 ($-\text{NO}_2$). ^1H NMR (400MHz, DMSO - d_6 , δ / ppm) : 7.10-8.70(m, 14H, Ar-H), (4a): 7.80-6.98 (m, 3H, furan-H); (4b): 7.15-6.80 (m, 2H, furan-H); (4c): 7.65-6.98(m, 2H, furan-H); (4d): 7.50-7.10(m, 3H, thiophen-H); (4e): 8.60-7.90(m, 4H, pyridine-H).

All the elemental and spectral features suggest that the data are consistent with the predicted structure shown in Scheme-1. The LC-MS of selected compounds shows the peak of M^+ ion which is consistent of their molecular

weight. All these facts confirm the structures (3a-e) and (4a-e).

The examination of antifungal activity data reveals that all compounds exhibited moderate to good antifungal activity and the compounds 4b and 4d found more active.

IV CONCLUSION

A novel thiazole-triazine containing heterocyclic compounds has been synthesised from thiazole containing schiff's base with phenyl isocyanate. The synthesised compounds structure was confirmed by elemental as well as spectral studies. All these compounds show moderate to good antifungal activity.

REFERENCES

- [1] Wang, Y., Wu, C. Zhang, Q., Shan, Y. (2019) "Design, synthesis and biological evaluation of novel β -pinene-based thiazole derivatives as potential anticancer agents via mitochondrial-mediated apoptosis pathway", *Biorg. Chem.*, 84, 468-477.
- [2] Prajapati, N. P., Patel, K. D. and Vekaria, R. H. (2019) "Thiazole fused thiosemicarbazones: Microwave-assisted synthesis, biological evaluation and molecular docking study", *J. Mol. Stru.*, 1179, 401-410.
- [3] Dawood, D. H., Abbas, E. M. H., Farghaly, T. A. (2019) "ZnO Nanoparticles Catalyst in the Synthesis of Bioactive Fused Pyrimidines as Anti-breast Cancer Agents Targeting VEGFR-2", *Med. Chem.*, 15(3), 277-286.

- [4] Shah, P. J., Patel, H. S. and Patel, B. P. (2013), "Synthesis, characterization and antimicrobial activity of novel sulphapiperazine containing arylazopyrazoles", *Journal of Saudi Chemical Society*, 17, 307-316.
- [5] Kemson, J. (2011), *Name reactions in heterocyclic chemistry II*. Jie-Jack Li editor, J. Wiley & Sons, Inc., Hoboken, New Jersey; 299-308.
- [6] Sukanta, K., Kimberly, M. (2012) "Microwave assisted Hantzsch thiazole synthesis of N-phenyl-4-(6-phenylimidazo[2,1-b]thiazol-5-yl)thiazol-2-amine from the reaction of 2-chloro-1-(6-phenylimidazo[2,1-b]thiazol-5-yl)ethanones and thioureas", *Tetrahedron Lett.*, 53(37), 4921-4924.
- [7] Koppireddi, S., Chilaka, D. R. K. (2014) "Synthesis and anticancer evaluation of 3-aryl-6-phenylimidazo[2,1-b]thiazoles.", *Bioorg. Med. Chem. Lett.*, 24(23), 5428-5431.
- [8] Swarnagowri, N., Gaonkar, S. L. (2019) "A Review on Recent Synthetic Strategies and Pharmacological Importance of 1,3-Thiazole Derivatives", *Mini reviews in Medicinal chemistry*, 19(3), 215-238.
- [9] Asif, M., Ali, A. (2017) "Microwave-assisted one pot synthesis, characterization, biological evaluation and molecular docking studies of steroidal thiazoles", *Photochem. Photobiol.*, 166, 104-115.
- [10] Samadhiya, P., Sharma, R. (2015) "Synthesis of 2-oxoazetidine derivatives of 2-Aminothiazole and their biological activity", *J. Serb. Chem. Soc.*, 77, 599-605.
- [11] Turan-Zitouni, G., Altıntop, M. D. (2016) "Synthesis and evaluation of bis-thiazole derivatives as new anticancer agents", *Eur. J. Med. Chem.*, 107, 288-294.
- [12] Ghosh, A., Rao, K., Nyalapatla, P., Bulut, H., Das, D., Weber, I. and Mitsuya, H. (2017) "Design and Development of Highly Potent HIV-1 Protease Inhibitors with a Crown-Like Oxotricyclic Core as the P2-Ligand To Combat Multidrug-Resistant HIV Variants", *J. Med. Chem.*, 60(10), 4267-4274.
- [13] Colombo, F., Tintori, C., Bosch, J. and Passarella, D. (2012) "'Click' synthesis of a triazole-based inhibitor of Met functions in cancer cells", *Bioorg. Med. Chem. Lett.*, 22(14), 4693-4698.
- [14] Patel, K. H. and Mehta, A. G. (2006) "Synthesis and Antifungal Activity of Azetidinone and Thiazolidinone Derivatives of 2-Amino-6-(2-naphthalenyl)thiazolo[3,2-d]thiadiazole", *E-Journal of Chemistry*, 3(4), 267-273.
- [15] Nweze, E. I., Mukherjee, P. K. and Ohannoum, M. A. (2019) "Agar-based disk diffusion assay for susceptibility testing of dermatophytes", *J. Clin. Microbiology*, 48(10), 3750-3752.

To Measure the Effectiveness of Web-Based E-Learning in India With Reference To Management Students of Ahmadabad

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ABSTRACT

As the world is going through covid-19 pandemic, the education industry has got shattered. To lift the economy and maintain the continuous process of education, many institutes have taken a rout of web-based learning. This new process has been carried out using multiple online sources. This paper will analyze the effect of web-based learning for management student. How effective online education is, and will be it more beneficial if online education is continued in future. The primary research is carried out through questionnaire method and the data has been collected of 100 management students. Students' satisfaction level adopting on the new way of learning has been analyzed in this paper.

Key words: online learning, management students, effectiveness

I INTRODUCTION

Web-based learning refers to the type of learning that uses the Internet as an instructional delivery tool to carry out various learning activities. It can take the form of (1) a pure online learning in which the curriculum and learning are implemented online without face-to-face meeting between the instructor and the students, or (2) a hybrid in which the instructor meets the students half of the time online and half of the time in the classroom, depending on the needs and requirement of the curriculum. Web-based learning can be integrated into a curriculum that turns into a full-blown course or as a supplement to traditional courses.

Non face to face, using web technologies, it is learning that occurs with lessons conducted via the internet.

Higher Education sector has witnessed a tremendous increase in its institutional capacity in the years since Independence. The number of Universities/University-level institutions has increased 18 times from 27 in 1950 to 504 in 2009. The sector boasts of 42 Central universities, 243 State universities, 53 State Private universities, 130 Deemed universities, 33 Institutions of National Importance (established under Acts of Parliament) and five Institutions (established under various State legislations). The number of colleges has also registered manifold increase with just 578 in 1950 growing to be more than 30,000 in 2011. Higher Education is the shared responsibility of both the Centre and the States. The coordination and determination of standards in institutions is the constitutional obligation of the Central Government.

According to the current report, the Indian e-learning market size was USD247 million, composing 1.6 million learners in 2016. It is expected to have an 8 times growth to reach USD1.96 billion and the recent user base will increase at 44 percent CAGR to 9.6 million learners by 2021.

In fact, India's e-learning market is the second largest after the US, which is predicted to grow by 15.64 percent and increased \$48 billion by 2020.

The E-learning in India is changing at a rapid pace unsettled to the following factors:

- (a) Growth in internet and smart phone.
- (b) Cost of online education
- (c) Digital friendly government policies

The online source that gives opportunity to get certified education is Udemy, coursera, edx, Upgrade, Jigsaw, etc.

During this pandemic, the group learning portal business has increased tremendously. The different portals like Zoom, google meet, Jio meet, Web ex, and now the university has started adopting this online portal for delivering education to the management student.

II LITERATURE REVIEW

- (a) **Mushtaq Hussain(2018)** - The author has examined the relationship between student engagement and the course assessment score.
- (b) **Monica Trakru(2019)** - The author highlights difficulties to preserve the standards of education because of limitations of finance, infrastructure, and other resources including skilled and experienced human power which can be addressed through Information Technology (IT), to some extent which also ensures high quality learning by providing necessary information at a convenient place and suitable time. They have observed that e-Learning emphasizes on quality and effective presentation of information.
- (c) **Partha pratim ray(2012)** - The author is underlines great diversity in India and need for uniform or standardized teaching learning resources or methods with Web Based e-Learning (WBeL).

- (d) **Gaurav Chopra (2019)** -The author finds that E-learning has become an increasingly prevalent learning approach in higher educational institutions due to the fast growth of internet technologies in India. They have found that information available on the website may not be very useful as it's a one-way mode of communication. The researcher also found that the three dimensions (system quality, service quality and information quality) of e-learning system contribute to user satisfaction and net benefits. Students are satisfied with e-learning websites and intent to continue to use it in future as well.
- (e) **Dr.S.Radha (2019)** – The author has examined the role of e-learning and digital media resources in employability of management students in Chennai city.
- (f) **Mohammad zare (2016)** – The author investigates the impact of e-learning on creativity and content knowledge of chemistry students and concluded that e-learning is effective for knowledge and creativity acquisitions among chemistry students and the greater e-learning opportunities should be provided for wider audiences.
- (g) **Shashi Kant Dhir(2017)** – The author has discussed the need and scope of e learning in medical education in India. The study shows that students and faculty are mostly in favor of adopting e-learning side-by-side with traditional learning, and the advantages far outweigh the likely discomfort associated with adoption of this new method.
- (h) **Nidhi Phutela(2020)** – The author grouped the findings under two sections referred to as “themes,” which include “drivers for e-learning adoption” and “inhibitors which restrict the adoption of e-learning.

- (i) **Nanigopal Kapasia(2020)** – The author finds that in West Bengal undergraduate and post graduate students 70% of learners have adopted e-learning. Most of these learners used android mobile for attending e-learning. Students were found to be facing various problems related to depression anxiety, poor internet connectivity, and unfavorable study environment at home.

III RESEARCH METHODOLOGY AND OBJECTIVES

(a) Objective

- (i) To understand effect of online learning on management student.
- (ii) To analyze the sustainability of e-learning in India.
- (iii) To measure the satisfaction level of online learning on management student.

(b) Scope of the study

- (i) Area: Ahmadabad, Gujarat
- (ii) Sample size: 100 management student.
- (iii) Research Design: Descriptive research
- (iv) Data collection method: Primary Data
- (v) Population: Ahmadabad (Gujarat)
- (vi) Sampling Method: Sampling frame
- (vii) 100 management student pursuing management degree from different B school of Ahmadabad.

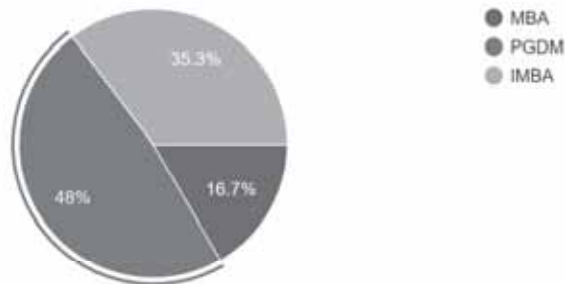
- (c) **Expected Contribution** - This study will benefit to different B school to understand the importance of online learning and its effect on student. This study will help them to analyze how much students adopting this e-learning teaching method.

- (d) **Research Model** - Dependable Variable: Students, university Independent variable: Online platform.

IV DATA ANALYSIS

What course you are studying?

102 responses

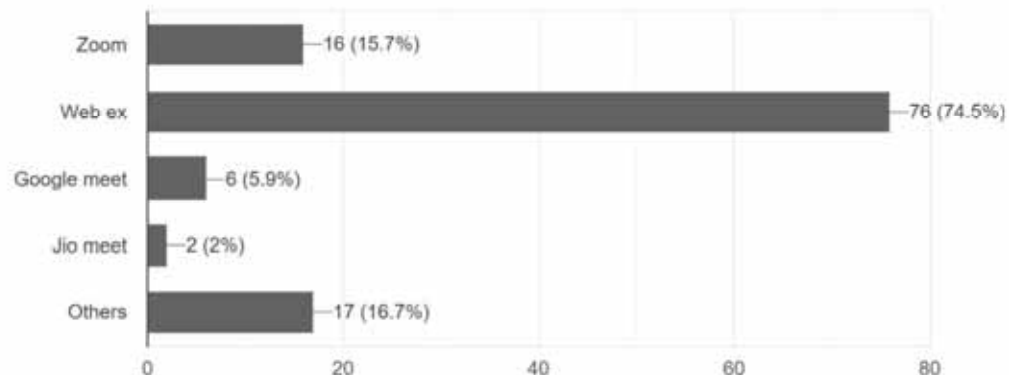


We have categorized our research in 3 courses of management which includes MBA, PGDM and IMBA in which 48% of respondents are pursuing

IMBA course. Out of which 48% of the student are doing PGDM and 35.6% students are from IMBA.

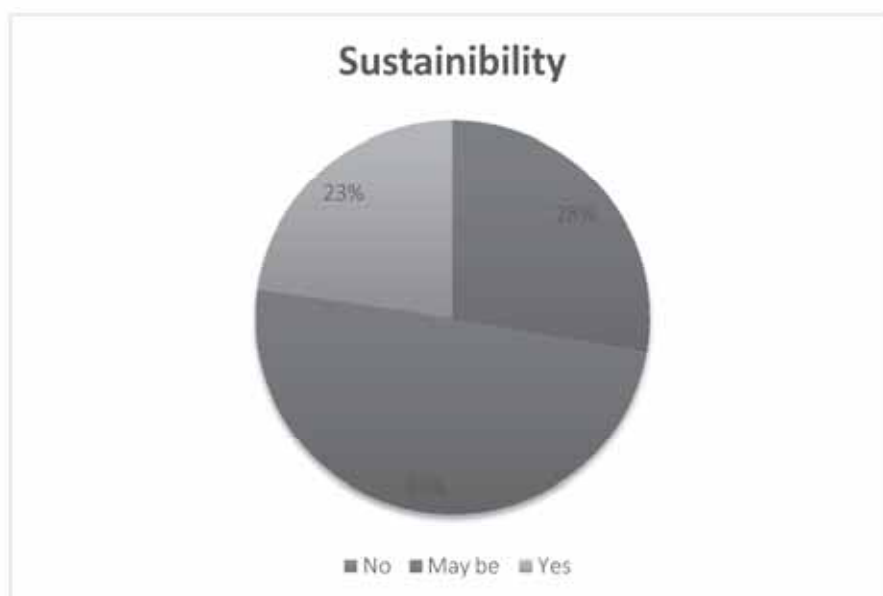
Which web based portal does your institute uses?

102 responses



By the research we came to know that most of the institute uses Web Ex for online education purpose. I.e. approx. 75% of the institute uses Web ex following to it 18% uses other application and 15%

uses Zoom. Hence from the above chart it can be estimated that web ex is most popular amongst the educational institute.

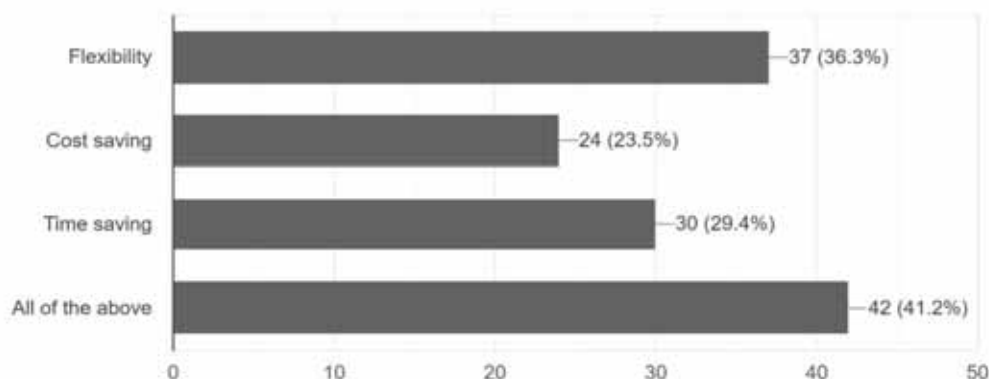


During the pandemic over 4 months students are learning on web portals but still 49% of students are not sure that is it sustainable in India or not. As well 23% students said yes and 28% students denied.

Hence from the above pie chart it can be observed that the suitability of web based learning is still difficult as student do not adopt the technology and teaching methodology easily.

What makes online education different to offline education?

102 responses

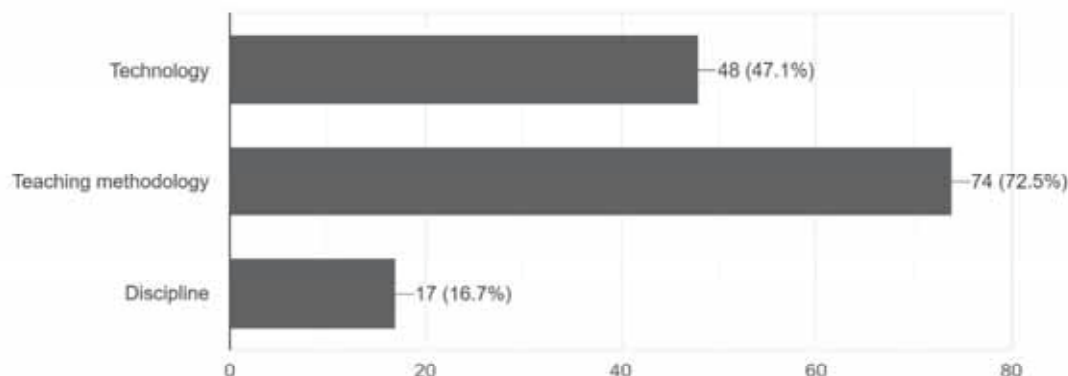


Web based educations have many perks as students can study on their own convenience so almost 37% of students thinks that this concept is flexible and 30% students found this option as a time saving. 42% of

students found that it is flexible, cost saving as well as time saving. Hence from the chart it can be analyse that online education is flexible, cost saving and time saving.

On which factor does your university should focus for web based e-learning?

102 responses



We found one drawback that most of students (72.5%) are not comfortable with the teaching methodology of the institute and 47% students are not comfortable by the technology which institute use.

Hence from the above chart it can be assume that educational institute should change their teaching methodology and should adopt easy technology for the online education.

Through which electronic gadgets do you frequently attain your lecture?

102 responses

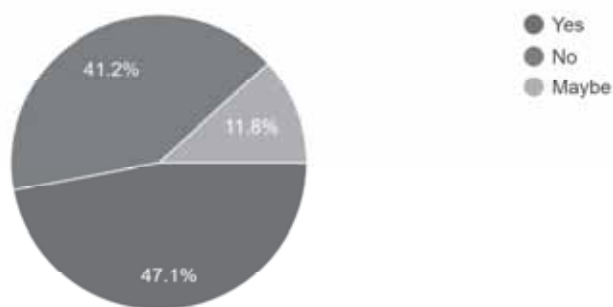


Most of the students attend online classes on the smart phone and laptops. There are 53% of the student uses mobile for their online education.

Whereas 45% of them uses laptop. The rest of them prefer desktop for the online lectures.

Do you face any problem while having online lectures

102 responses



Students may face few problems like internet connectivity and audio or video cracking so here 47% students face problems while online lectures and 41%

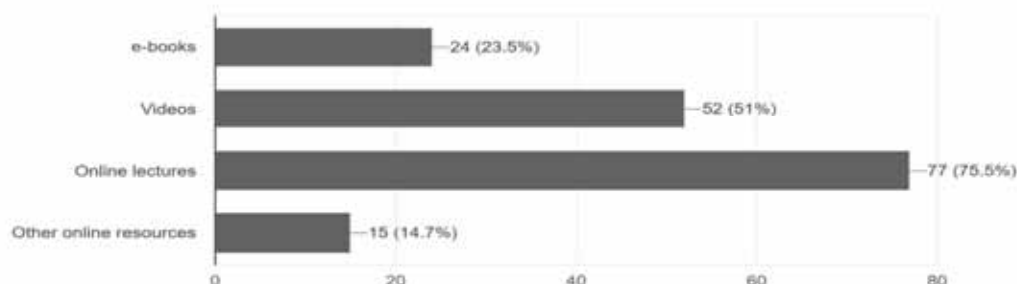
students are not facing any problem while online lectures.



From the respondents 37 respondents have moderate review and 31 students are satisfied where 6 students

are highly dissatisfied and 11 students are highly satisfied.

Which is the best resource for online learning?
102 responses



From the research we get to know that by online lectures 75% of students can connect more on same

side by learning from e-books only 23% students can connect.

Rate your satisfaction level of e-learning. * Course * What is your specialization? Cross tabulation

Count

What is your specialization?			Course			Total
			MBA	PGDM	IMBA	
Finance	Rate your satisfaction level of e-learning.	Highly Satisfied	1	0	2	3
		Satisfied	4	1	4	9
		Moderate	4	4	3	11
		Not satisfied	5	4	5	14
		Highly dissatisfied	2	0	1	3
	Total		16	9	15	40
Marketing	Rate your satisfaction level of e-learning.	Highly Satisfied	1	0	1	2
		Satisfied	5	0	0	5
		Moderate	16	0	5	21
		Not satisfied	8	3	6	17
		Highly dissatisfied	0	2	2	4
	Total		30	5	14	49
Human Resource	Rate your satisfaction level of e-learning.	Highly Satisfied	0	0	1	1
		Satisfied	0	0	2	2
		Moderate	0	1	0	1

Other	Total	Not satisfied	1	0	0	1
		Highly dissatisfied	0	0	1	1
			1	1	4	6
		Moderate	1	2	2	5
		Not satisfied	0	0	1	1
	Rate your satisfaction level of e-learning.	Highly dissatisfied	1	1	0	2
			2	3	3	8
		Highly Satisfied	2	0	4	6
		Satisfied	9	1	6	16
		Moderate	21	7	10	38
Total	Rate your satisfaction level of e-learning.	Not satisfied	14	7	12	33
		Highly dissatisfied	3	3	4	10
			49	18	36	103
		Total				

Cross tabulation is a method to quantitatively analyse the relationship between multiple variables. Here three major management courses have analysed (MBA, PGDM and IMBA). Also, with three major specialization fields we have analysed (Finance, Marketing and Human resources).

We have measured student satisfaction level according to their specialization field.

From the total 40 Finance students only 3 students are highly satisfied with the eLearning method, 11 of

them have moderate satisfaction level and 3 students are highly dissatisfied with eLearning method.

From the total 49 Marketing students only 2 students are highly satisfied with the eLearning method, 21 of them have moderate satisfaction level and 4 students are highly dissatisfied with eLearning method.

From the total 6 Finance students only 1 student is highly satisfied with the eLearning method, 1 of them has moderate satisfaction level and 1 student is highly dissatisfied with eLearning method.

Do you agree web based e-learning is better substitute of offline learning * Course Cross tabulation

Count		Course			Total
		MBA	PGDM	IMBA	
Do you agree web based e-learning is better substitute of offline learning	Strongly Disagree	2	0	6	8
	Disagree	9	2	6	17
	Neutral	24	6	11	41
	Agree	12	5	10	27
	Strongly Agree	2	5	3	10
Total		49	18	36	103

Here we have measured from the student's perspective that is web-based eLearning is better substitute of offline learning from different management courses. We get to know that 10

students are highly agreed with the eLearning method. 41 students have moderate opinion with the eLearning method, 8 students are strongly disagree with the eLearning method.

Through which electronic gadgets do you frequently attain your lecture? * Course Cross tabulation

Count		Course			Total
		MBA	PGDM	IMBA	
Through which electronic gadgets do you frequently attain your lecture?	Desktop	0	2	0	2
	Laptop	18	6	23	47
	Smart phone	31	10	13	54
Total		49	18	36	103

By the research through which electronic gadgets do you frequently attain your lecture, so here majority of students (54 students) attend from the smartphone and laptop (47 students). Hence this data shows that

smart phone is most popular among the student when it comes to online lecture. Laptop stands second which is approx. 48% student attain their lecture through laptop.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.327 ^a	6	.156
Likelihood Ratio	8.134	6	.228
Linear-by-Linear Association	.835	1	.361
N of Valid Cases	103		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is .17.

The level of statistical significance is often called p value. Depending on the statistical test we have chosen, we have calculated the probability of observed sample. The significant P value, which is 0.156, which is greater than 0.05, hence it has a

statistical relation between effectiveness and the online education. Hence this test proves that there is huge effect of online education on management student.

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Interval by Interval Pearson's R	-.090	.093	-.913	.363 ^c
Ordinal by Ordinal Spearman Correlation	-.102	.097	-1.033	.304 ^c
N of Valid Cases	103			

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

(c) Based on normal approximation.

Statistics

	Do you agree web based e-learning is better substitute of offline learning	Rate your satisfaction level of e-learning.
N Valid	103	103
Missing	0	0
Mean	3.14	3.24
Std. Deviation	1.058	1.024

Above table signifies the relationship between two variable namely students adoption towards online learning and course where they are pursuing the education and it shows negative relationship between these two and research conclude that there is negative relationship between adoption/satisfaction level and in which course they are pursuing their management education.

V CONCLUSION

From this study it can be concluded that the satisfaction level of the students is quite low in the matter of online education. Hence the sustainability of web based learning is in doubt. The technology, teaching methodologies are the two key point's university should focus on. With this study it can also be assumed that online learning has a different effect

on management students and shortcoming need to be addressed.

REFERENCES

- [1] Chopra, G. (2019). Effectiveness of e-learning portal from students' perspective: A structural equation model (SEM) approach.
- [2] Dhir, S. K. (2017). E-learning in medical education in India.
- [3] Dr.S.Radha. (2019). Role Of E-Learning And Digital Media Resources In Employability Of Management Students.

- [4] Hussain, M. (2018). Student engagement predictions in an e-Learning system and their impact on student course assesment scores. 21.
- [5] Kapasia, N. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India.
- [6] Patel, S. A. (2018). India's Emerging Economy: E-Learning: Challenges & Opportunities in Rural India.
- [7] Phutela, N. (2020). A qualitative study of students' perspective on e-learning adoption in India.
- [8] Ray, P. P. (2012). Web Based E-Learning In India: The Cumulative Views Of Different Aspects. 12.
- [9] Trakru, M. (2019). E-Learning Effectiveness in Higher Education . 6.
- [10]zare, M. (2016). The Impact of E-Learning on University Students' Academic Achievement and Creativity.

Evolution of Electrical Power System: Changing Trends in Power Generation

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ABSTRACT

The paper deals with the conventional sources of energy viz. fossil fuels, hydro and nuclear to generate electricity along with the historical development of electric power system comprising of power generation, transmission, and utilization. The growth of conventional electric power in India will be discussed. The depleting fossil fuel deposits and serious climate change concerns due to the emission of green house gases caused by the burning of fossil fuels have compelled to adopt the environment friendly renewable sources of energy. The paper gives evolution of renewable sources of energy and its present status. Finally, the futuristic renewable energy technologies have been briefly discussed.

Key words: Conventional power, renewable energy, power system

I INTRODUCTION

Energy is an essential need in our daily life and is a backbone for social and economic development. The per capita electricity consumption is considered as an

indicator of economic development of a nation. The per capita energy consumption in India was 16.3 kWh in December 1947. Table 1 gives growth in per capita electricity consumption.

Table No. 1
Growth in per capita electricity consumption in India [1]

Status as on	Per capita consumption (kWh)
31Dec 1947	16.3
2005-06	631.4
2006-07	671.9
2007-08	717.1
2008-09	733.5
2009-10	778.6
2010-11	818.8
2011-12	883.63
2012-13	914.41
2013-14	957
2014-15	1010
2015-16	1075
2016-17	1122
2017-18	1149
2018-19	1181
2019-20	1208

II GROWTH OF CONVENTIONAL POWER IN INDIA

Power Sector in India has grown significantly since independence both in the installed electricity generating capacity, transmission/distribution and utilization. The total power generating capacity in India has increased from 1362 MW in 1947 to 370,048 GW (including renewable energy) by March 2020.

- (a) **Conventional power generation** - The conventional power projects are based are fossil fuels, water or nuclear fuels. The major sources of energy for power generation and transportation have been the fossil fuels i.e. coal, oil, and natural gas. The fossil fuels are

the buried deposits of organic materials i.e. dead plants and animals for lakhs of years in the earth. These materials are plants and animals which were subjected to heat and pressure and got converted into crude oil, coal, and natural gas. The utilization of fossil fuels has enabled large-scale industrial development which largely replaced burning of wood for heating.

Hydroelectric power is a renewable source of energy and has been adopted by several countries as a part of water management system for flood control, domestic use, irrigation, industries, fishing, recreation etc. It uses potential energy of water which is converted into kinetic energy and is used to rotate turbine. The hydropower projects are environment friendly and are generally multi-purpose.

Globally, the nuclear energy is based on controlled fission process in which the heavy atoms of fissionable materials, either uranium or plutonium are split into 2 or 3 parts to release huge amount of energy. Nuclear fission is considered as clean source of energy in spite of radiation hazards, health issues

and in disposal of radioactive wastes. The stringent standards and practices evolved over the decades have minimised the risk of accidents.

The growth in installed power capacity in India is given in Table 2.

Table No. 2
Growth of installed conventional power capacity in India [2]

Status as on	Thermal (MW)				Nuclear (MW)	Hydro* (MW)	Total (MW)	Growth# (%)
	Coal	Gas	Diesel	Total				
31Dec 1947	756	-	98	854	-	508	1362	-
31Dec 1950	1004	-	149	1153	-	560	1713	25.77
31 Mar 1956	1597	-	228	1825	-	1061	2886	68.48
31 Mar 1961	2436	-	300	2736	-	1917	4653	61.23
31 Mar 1966	4417	137	352	4906	-	4124	9030	94.07
31 Mar 1974	8652	165	241	9058	640	6966	16664	84.54
31 Mar 1979	14875	168	164	15207	640	10833	26680	60.11
31 Mar 1985	26311	542	177	27030	1095	14460	42585	59.61
31 Mar 1990	41236	2343	165	43744	1565	18307	63616	49.39
31 Mar 1997	54154	6562	294	61010	2225	21658	84893	33.45
31 Mar 2002	62131	11163	1135	74429	2720	26269	103418	21.82
31 Mar 2007	71121	13692	1202	86015	3900	34654	124574	20.46
31 Mar 2012	112022	18381	1200	131603	4780	38990	175373	40.78
31 Mar 2017	192163	25329	838	218330	6780	44478	269588	53.72
31 Dec 2018	197452	24937	638	223027	6780	45399	275206	2.08
31 Mar 2019	200704	24937	638	226279	6780	45399	278458	1.82
31 Mar 2020	205345	24955	510	230810	6780	45699	283289	1.73

*Hydro power plants of above 25 MW capacities are only considered.

#Growth is calculated over the previous value of total conventional installed power capacity.

The year 2016-17 was significant as for the first time, new installed power capacity of renewable energy in India surpassed installations based on fossil fuels. This trend continues year after year since then. The Central Electricity Authority (CEA) declared on 29th March 2017 that for the first time India become net exporter of electricity. During April 2019 to January 2020, India exported 8,015 GWh energy to neighbouring countries, against an import of 6,166 GWh.

(b) Transmission - The transmission of electricity was started with DC but it was suitable for short distances. Subsequently, with the advent of transformers, DC power was universally adopted with AC. However, for very long distance transmission of electric power, high voltage direct current (HVDC) is preferred in which transmission losses are minimised.

(c) Utilization - In the beginning, the use of electricity was mainly for battery charging, lighting, heating, gramophone etc. Since, then very large number of usages of electricity have been developed in all the sectors, viz. domestic, commercial, industrial, irrigation etc.

III DEVELOPMENT OF ELECTRIC POWER SYSTEMS

The evolution of electric system is a result of dedicated efforts of the scientists and engineers. Since early civilization static electricity and magnetism were experienced but they could not be distinguish as two different entities. A Greek philosopher Thales of Miletus around 600 BC discovered the phenomena of attraction when amber was rubbed with cloth. It was due to static electricity. The gradually acquired knowledge of magnetism, electricity and the interaction between them led to revolutionary inventions.

The history of historical developments in generation and transmission technologies and their usages are given next:

- 1492 - Christopher Columbus, an Italian Navigator discovered variation in declination of compass needle around the globe.
- 1729 - Stephen Gray, a British chemist, experimentally discovered electric conduction and insulation.
- 1733 - Charles Francois, French, discovered two types of electric charges, named positive and negative. He established that similar charges repel each other and opposite charges attract.

- 1752 - Benjamin Franklin, USA proved that electric charges and lightning were the same. He invented lightning rod for protection of buildings from lightning strikes.
- 1800 - First electric battery was invented by Alessandro Volta, an Italian. The unit of electric potential is named 'Volt' in his honour.
- 1808 - Humphry Davy, a British chemist invented an 'arc lamp'. The 4-inch arc was created between carbon rods that glowed when electric power was supplied by a battery.
- 1820 - Independent experiments conducted by Hans Christian Oersted - a Danish, A.M. Ampere - a French Physicist, and a French physicist Francois Arago. It established the relationship between electricity and magnetism.
- 1820 - Ampere developed a formula, known as Ampere's law, to calculate magnetic field strength when an electric current flows through a conductor.
- 1821 - The first electric motor was invented by Michael Faraday, a British.
- 1826 - Georg Ohm, a German physicist, defined the relationship between power, voltage, current and resistance in 'Ohm's Law'. The unit of resistance is named 'Ohm' in his honour.
- 1831 - Michael Faraday, a British proved that electromotive force (EMF) is induced by changing electromagnetic field. Faraday's experiments demonstrated working of an electric generator.
- 1832 - Based on Faraday's principles, a French instrument maker Hippolyte Pixii built the first 'dynamo' capable of delivering power to industry.



Fig. 1 Michael Faraday, A great scientist [3]

- 1833 - Russian physicist Heinrich Lenz formulated Lenz's law for electromagnetism that upholds the principle of conservation of energy.
- 1835 - Joseph Henry, USA invented an electromagnetic relay.
- 1837 - Thomas Davenport, USA invented the electric motor, an invention that is used in most electrical appliances.
- 1839 - Sir William Robert Grove, a British developed the first fuel cell, a device that produces electrical energy by combining hydrogen and oxygen.
- 1841 - James Prescott Joule, a British showed that energy is conserved in current flowing electrical circuits, thermal heating, and chemical transformations. The unit of thermal energy, 'Joule', was named after him.
- 1853 - William Thomson, a British mathematically formulated R-L-C circuit.
- 1860s - James Clerk Maxwell, a Scottish published mathematical theory of electromagnetic fields. His four equations unified magnetism, electricity and light which led to the invention of electric power, radios, television, and communication.
- 1876 - Charles F. Brush, Ohio, USA invented the 'open coil' dynamo that could produce a steady electric current.
- 1878 - Joseph Swan, a British invented the first incandescent light bulb. His light bulb burned out quickly.
- 1878 - Charles Brush developed an arc lamp that could be powered by a generator.
- 1878 - Edison Electric Light Co. was founded in New York by Thomas Alva Edison.
- 1879 - Thomas Edison, USA invented an incandescent bulb and continued experiments to extend its life.

- 1879 - Electric lights (Brush arc lamps) were first used for street lighting, in Cleveland, Ohio.

- 1879 - California Electric Light Company Inc., San Francisco: the first company to sell electricity to public. The company supplied power to arc light lamps.

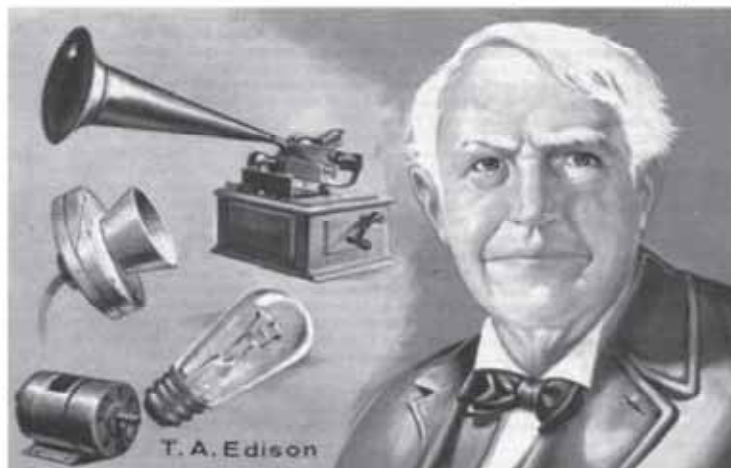


Fig. 2 Thomas Alva Edison: A great scientist [4]

- 1882 - Coal fired power plant: Pearl Street Station, Manhattan, New York built by Edison Illuminating Company was the first electric power plant of the world. The station was powered by custom-made Porter-Allen high-speed steam engines designed to provide 175 HP at 700 rpm. It was the first **cogeneration** power plant also as the steam was supplied to the local manufacturers and warming the nearby buildings in the same block. It was a direct current (DC) power system and could supply power to light about 500 customers.
- 1882 - The first hydroelectric station of the world: 1 x 12.5 kW Vulcan Street Plant on Fox River was commissioned on 30th September in Appleton, Wisconsin, USA.
- 1882 - First 2 kV, 57 km long DC transmission line between Munich-Miesbach was commissioned.
- 1883 - Nikola Tesla, a Serbian-American invented the 'Tesla coil'. It is a resonant transformer circuit which produced high-voltage, low-current, high frequency alternating-current.
- 1884 - Nikola Tesla invented an electric alternator that produced alternating current (AC).
- 1884 - Steam turbine generator for bulk power generation was invented by Sir Charles Algernon Parsons.
- 1886 - William Stanley, USA developed first practical transformer which spurred the development of AC power. He also developed an improved electric meter.
- 1888 - Nikola Tesla for the first time demonstrated complete 'poly-phase' electrical system of power generation. Westinghouse Electric Company, USA obtained the patent rights of AC system.
- 1891 - First 3-phase AC power transmission line was commissioned between Lauffen and Frankfurt, Germany.
- 1893 - The Westinghouse Electric Company used an alternating current (AC) system to light the Chicago World's Fair.
- 1893 - A 22 mile (35 km) AC power line was commissioned to transmit electric power from Folsom Powerhouse in California to Sacramento.
- 1896 - First power line, 11 kV, 3-phase, 20 mile (32 km) transmission line was commissioned between Niagara Falls to Buffalo, New York.
- 1897 - India's first hydroelectric power station: 2 x 65 kW Sidrapong Hydroelectric Power Station, Darjeeling, was commissioned.
- 1899 - India's first thermal power project: Emambagh Lane was commissioned (The Calcutta Electric Supply Corporation Limited).



Fig.3 Hydro power station at Darjeeling [5]

- 5-MW turbine for Fisk St. Station, Chicago, USA was commissioned.
- 1902 - World's longest and highest voltage transmission line: 50 kV, 136 km from Shawinigan Power Station to Montreal was commissioned.
- 1909 - First pumped storage plant was commissioned in Switzerland.
- 1912 - First 110 kV-overhead power transmission line was commissioned.
- 1921 - Lakeside Power Plant in Wisconsin became the world's first power plant to burn only pulverized coal.
- 1923 - World's first 220 kV transmission line was commissioned between hydroelectric plants in the Sierra Nevada to the San Francisco Bay Area.
- 1923 - Big Creek - Los Angeles lines were upgraded to the 220 kV.
- 1925 - Peat fired power plant: 1,500 MW Shatura, Russia, the highest capacity in the world was commissioned.
- 1936 - Highest steam temperature of 900 degrees Fahrenheit was attained in early 1920s.
- 1936 - Boulder (Hoover) Dam was completed.
- 1936 - A 287 kV, 266 miles (428 km) transmission line was laid to transmit 240 MW power from Hoover Dam to Los Angeles.
- 1938 - Nuclear fission process: discovered by Otto Hahn and Fritz Strassmann, German radio-chemists
- 1939 - First industrial gas turbine: 4 MW was commissioned at Neuchatel, Switzerland. It was manufactured by Brown Boveri.
- 1942 - World's first nuclear fission reactor with controlled chain reaction was designed and developed by Enrico Fermi in USA.
- 1953 - First 345 kV, 3-phase AC transmission line was commissioned by American Electric Power, USA.
- 1954 - World's first Obninsk nuclear 5 MWe reactor supplied power to grid in Russia on 27 June.
- 1954 - First high voltage direct current submarine cable transmission in Sweden (20 MW, 100 kV, 96 km) between Vastervik and Yagne on Gotland island.
- 1957 - Shippingport Atomic Power Station in Pennsylvania became the first nuclear power plant to provide electricity to customers in USA.
- 1967 - Highest transmission voltage: 765 kV line was commissioned in Russia, USA and Canada.
- 1973 - Oil shale fired power plant: 1,615 MW, the largest capacity in the world was commissioned in Estonia, Europe.
- 1977 - Nuclear power plant: 6384 MW, the largest in the world was commissioned at Bruce, Canada.
- 1979 - Run-of-the river power plant: 2,620 MW, the largest in the world was commissioned at Chief Joseph, USA.
- 1982 - First 1,150 kV transmission line between Elektrostal and power station at Ekibastuz, Soviet Union was commissioned.
- 1985 - Pumped Storage hydro power plant: 3,003 MW Bath County, USA, the largest in the world commissioned
- 1987 - Coal fired power plant: 4,760 MW Vindhyachal, Madhya Pradesh, the largest in India was commissioned
- 1988 - Natural gas power plant: 5,597 MW Surgut-2, Russia, the largest in the world commissioned
- 1992 - Coal fired power plant, 5,500 MW Taichung, Taiwan, the largest in the world was commissioned.
- 1999 - First 1,000 kV transmission line with double circuit between Kita and Iwaki, Japan.

- 1999 - Oil refinery: 1,97,000 m³/day, Jamnagar, India, the World's largest commissioned
- 2012 - Hydro power plant: 22,500 MW, Three Gorges, China, the largest in world commissioned
- 2013 - Concentrated solar thermal generating system: 377 MW, Carolina, South Mojave desert. Ivanpah, California, the largest in the world commissioned
- 2013 - HVDC line: 600 kV, 7.1 GW, 2385 km, Rio Madeira transmission link, Brazil, the longest in the world
- 2014 - Oil fired power plant: 5,600 MW and desalination complex at Shoaiba in Saudi Arabia, world's largest commissioned
- 2014 - Zero emission coal power plants: 229 MW GutureGen 2.0 Illinois, USA, the first in the world is under construction (retrofitting the old Meredosia Power Station).

IV OIL SHOCKS AND CLIMATE CHANGE

An oil embargo in 1973 imposed by members of the Organization of Arab Petroleum Exporting Countries (OAPEC) led to fuel shortages and sky-high prices. In the wake of oil shocks, self-sufficiency in energy

was identified as the major driver for the development and adoption of new and renewable sources of energy. It led to the formation of a Commission for Additional Sources of Energy (CASE) under the Department of Science & Technology in March 1981. A new department, named Department of Non-Conventional Energy Sources (DNES) was created in 1982. In 1992, a new ministry named, 'Ministry of Non-Conventional Energy Sources' was formed which was re-named as the Ministry of New and Renewable Energy in October 2006.

Climate change is a threat to sustainable development. Increasing temperatures, rising sea levels and frequent weather extremes have become a global and regular phenomenon. Rapidly changing climate puts many coastal areas, food security, human health and ecosystems at risk and may intensify further. To avoid such devastating consequences, the international community has committed itself to limit the mean global temperature rise to 2° C above pre-industrial levels. In agriculture sector, methane and nitrous oxide are emitted which have 25 and 298 times warming potential than carbon dioxide. Natural sources of GHG emission are forest clearing and waste decay in landfills. A relation amongst energy, land and climate is depicted in Figure 4.

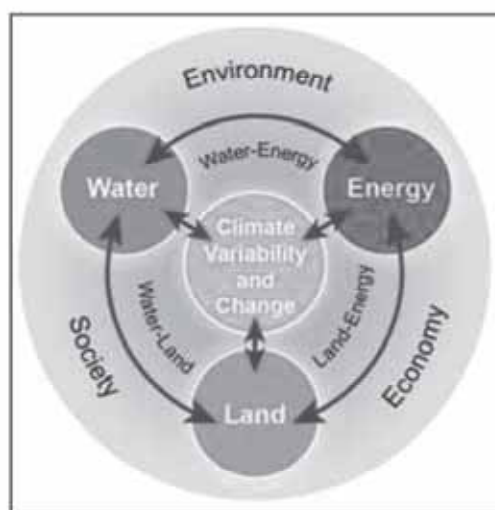


Fig.4 Energy, water, land and climate [6]

V RENEWABLE SOURCES OF ENERGY

The trends in the usage of energy sources have been changing since the beginning of the human civilization. Shift in the usage of energy sources is directly linked with the economy and technological developments. The trend has been to adopt the sources available locally with higher energy density.

The trend in the 21st century is undergoing major shifts in energy sources. The pace of fossil fuel based power generation is subsiding with a focus on efficient 'clean coal' technologies whereas the share of renewable sources of energy is picking-up rapidly.

Sun is the ultimate source of energy for earth. Sun is a star and is powered by the fusion reaction of hydrogen isotopes taking place in the sun and forming the heavier atoms. In the fusion process, hydrogen atoms combine to form helium atoms and release huge amount of energy. The fusion reaction continues till fusion material gets exhausted. After all the hydrogen atoms are used up, the fusion of helium atoms starts. The solar energy is radiated in all directions in the forms of heat, visible light and UV radiations. Even after travelling hundreds of kilometres through atmosphere, solar radiation reaches earth with adequate energy. The average solar insolation entering the atmosphere is $1,366 \text{ W/m}^2$. The major portion of the solar radiation is absorbed by earth, clouds, and atmosphere whereas remaining is reflected back. The average insolation that reaches earth's surface is 684 W/m^2 .

The renewable sources of energy are direct (solar heat and light) and indirect (wind, water, etc.) which are originated by the solar energy. The solar energy warms the earth's surface and oceans and causes weather patterns, air flow, and ocean currents. The evaporation of water caused by solar heat energy initiates the water cycle causing rainfall. The potential energy of the stored water in reservoirs is converted into electrical energy in a hydroelectric power plant.

(a) **Water power and wind power** - The watermill was invented about 2,500 years ago. Using watermills, men managed to master the water power to produce flour, oil, tanning of leather, smelting of iron, sawing the wood, and so on. Later in the first century AD, windmill was invented and was used for various applications such as milling (grinding), rolling, or hammering. These processes were used in the manufacture of paper, textiles, rolling, wire drawing, and metal products.

(b) **Biomass** - During evolution of human civilization, wild grains were collected and eaten. Agriculture was a revolutionary milestone in the history of mankind. Agriculture began in different parts of the world independently and included diverse crops. The food grains like wheat, barley, peas, vetch, lentils, chick peas, rice, and flax were cultivated initially. The cultivation of sugarcane, sorghum, bananas, cotton, and some root vegetables were developed later.

The agriculture resulted in food security and paved the way for permanent human settlements. The animals were used for agriculture also and hence, domestication of animals increased. The agricultural wastes are the main sources of biomass which are used for power generation. Similarly, animal waste is an important source of biogas for cooking and power generation.

VI EVOLUTION OF RENEWABLE ENERGY: PAST AND PRESENT

The evolution of electrical engineering and electrical power system are a result of dedicated efforts of the scientists and engineers. Since early civilization static electricity and magnetism were experience but they could not distinguish between the two. A Greek scientist around 600 BC discovered the phenomena of attraction when amber was rubbed with cloth. It was due to static electricity. The gradually acquired knowledge of magnetism, electricity and the interaction between them led to revolutionary inventions.

The landmark achievements in electric power generation from renewable sources of energy are given next:

- 1888 - The first wind turbine to generate electricity of 12 kW was developed at Cleveland, Ohio, USA to charge the batteries.
- 1904 - World's first geothermal power plant was commissioned at Larderello, Italy.
- 1921 - Geothermal power plant: 1517 MW, The Geysers, California, USA, the largest in the world was commissioned.
- 1974 - Solar Photo Voltaic cell for harnessing light energy of sun was developed by Joseph Lindmayer, USA.
- 1980 - The first wind farm of the world with 20 turbines each 30 kW was commissioned in New Hampshire, England.
- 1981 - Solar One, commissioned first large scale, 10 MW pilot solar thermal power plant in Daggett, California.
- 2001 - Biomass power station: 265 MW Alholmens, Finland, the world's largest commissioned
- 2008 - Wave power plant: 2.25 MW Agucadoura Power Plant, Portugal, the largest in the world
- 2008 - The largest onshore wind park with the capacity of 1500 MW was commissioned at Muppandal, Tamil Nadu.
- 2011 - Tidal power plant: 254 MW Sihwa Lake, South Korea, the largest in the world was commissioned
- 2011 - Solar PV Concentrated power plant: 60 MW Golmud-2, China, the largest in the world
- 2013 - Concentrated solar thermal generating system: 377 MW, Carolina, South Mojave desert. Ivanpah, California, the largest in the world commissioned
- 2014 - Offshore wind farm: 630 MW London Array, United Kingdom, the largest in the world commissioned

- 2015 - OTEC (Ocean Thermal Energy Converter) power plant: 100 kW, Hawaii,

USA, the largest in the world



Fig. 4 Largest solar power plant of the world at Bhadla, Rajasthan [7]

- 2016 - Largest unit rating wind turbine: 8 MW of MHI Vestas model V164-8.0 MW for offshore is the largest unit rating turbine in operation. It has a 164 m rotor diameter and a hub height of 138 m. Two turbines were installed in Esbjerg, Denmark.
- 2016 - Solar PV Power Plant, 1547 MW Tengger Desert Solar Park, Zhongbei, Ningxia, China commissioned, the largest in the world.
- 2017 - The largest capacity offshore floating wind farm of the world rated 30 MW was commissioned at Hywind Project, Scotland.
- 2018 - World's largest onshore wind park with present installed power capacity of 7,965 MW (to be expanded to the planned capacity of 20,000 MW) was set-up in Gansu, China
- 2018 - Walney Extension Wind farm was set up which is world's largest offshore wind farm. It comprises of 87 turbines (40×8.25MW MHIVestas+47×7MW

Siemens-Gamesa) spread over 145 km² in Irish Sea, North-West coast, England.

- 2019 - Onshore Wind Park with around 8,000 MW at Gansu, China is the largest in the world. The ultimate planned capacity is 20,000 MW.
- 2019 - World's largest MHI-Vestas make wind turbine model V164-9.5MW, 9.5 MW was commissioned in January 2020 in the 209 MW offshore wind power project at Northwester-2, Belgium.
- 2020 - Hornsea One is world's largest offshore wind farm with the capacity of 1218 MW. It comprises of 174 floating foundation turbines (each 7 MW), Siemens-Gamesa model SWT-7.0-154 spread over 407 km² Sea at 20-40 m depth. It is off the coast of Yorkshire, southern North Sea, U.K.
- 2020 - Solar PV Power Plant in the world, 2245 MW Bhadla, Jodhpur district, Rajasthan, India commissioned.

Table No. 3
Installed renewable power capacity (June 2020) [8]

GRID-INTERACTIVE POWER (MW)	
Wind power	37829.55
Solar power –ground mounted	32305.15
Solar power –roof top	2817.15
Small hydro power	4688.16
Biomass (bagasse) cogeneration	9200..50
Biomass (non-bagasse) cogeneration/captive power	679.81

Waste to power	148.84
Total	87669.16
OFF-GRID/CAPTIVE POWER (MW0)	
Waste to energy	200.5
SPV system	980.8
Total	1181.3

VII EMERGING TECHNOLOGIES

Coal fired power generation is mainly responsible for climate change but it cannot be stopped suddenly but could be gradually phased out. Clean coal technology aims to reduce GHG emissions by adopting well developed super-critical technology for generation and technology to capture the SO_x and NO_x gases.

The nuclear fusion process and technology are being developed in which lighter atoms join to form heavier atom and release huge amount of energy. The fusion is quite safe and being developed jointly by few countries including India. A 500 MW experimental fusion reactor is being developed for installation in France.

In the Indian context, fast breeder reactor is very important as its fuel, thorium is abundantly available indigenously. A 500 MW indigenously developed prototype fast breeder reactor 'Bhavini' has been installed and is under commissioning at Kalpakkam in Tamil Nadu. It will operate with uranium as a nuclear fuel and its experience will be utilised in developing thorium based fast breeder reactor.

Hydrogen has great potential as a source of energy but safety hazards in transportation and storage are the main hurdles. Once these hurdles are overcome, hydrogen will play vital role in transportation sector with the use of fuel cells instead of batteries and small power generating stations. The fuel cells overcome the drawback of batteries of low energy storage capacity.

Extraction of bio-diesel from ethanol obtained from sugarcane bagasse and biodiesel from Jatropha, Karanj, Pine etc. are likely to become an important source of green energy in transport sector.

The future trend is for hybrid wind-solar power plants with energy storage for optimum utilization of land and also to take care of the variability of solar and wind resources to enhance reliability of power supply.

In order to capture high wind at heights, flying turbines are being developed which do not need tower and yawing mechanism. However, several challenges are to be overcome.

VIII CONCLUSION

The paper discussed the conventional sources of energy viz, fossil fuels, hydro and nuclear for generation of electric power and their growth in India along with the historical development of electric power system. The paper explains as to how the depleting fossil fuel deposits and serious climate change concerns due to global warming caused by the green house gases emissions on burning of fossil fuels have forced to adopt the environment friendly renewable sources of energy. The paper summarises the evolution of renewable sources of energy. The futuristic renewable energy technologies have been briefly mentioned. Hydropower is eco-friendly and

has special significance as it is a part of water management.

REFERENCES

- [1] Central Electricity Authority (2020). Executive Summary on Power System. http://www.cea.nic.in/reports/monthly/executive-summary/2020/exe_summary-05.pdf
- [2] Central Electricity Authority (2019). Executive Summary on Power Sector. http://cea.nic.in/reports/monthly/executivesummary/2019/cxc_summary-03.pdf
- [3] Flatiron School (2016). 4 Ways Michael Faraday Revolutionized the World, <http://blog.flatironschool.com/3-ways-michael-faraday-revolutionized-the-world/>
- [4] Gajab Hindi, Interesting Facts about Thomas Alva Edison in Hindi, <http://www.gajab-hindi.com/2016/09/interesting-facts-about-thomas-alva.html>
- [5] Mahajan A. (2012). NITTTR, Chandigarh. <https://www.slideshare.net/AnkurMahajan1/power-scenario-in-india>
- [6] Shevliakova E., Averyt K., Harris R., Rose S. (2014) National Climate Assessment, Energy, Water, and Land Use. <https://nca2014.globalchange.gov/report/sectors/energy-water-and-land>
- [7] Bhadla Solar Park, Rajasthan. NS Energy. <https://www.nsenergybusiness.com/projects/bhadla-solar-park-rajasthan/>
- [8] Ministry of New and Renewable Energy (2020) Physical progress, <https://mnre.gov.in/the-ministry/physical-progress>

OTHER REFERENCES

- [1] The History of Electricity-A Timeline, A Historical Archive, <http://www.thehistoricalarchive.com/happenings/57/the-history-of-electricity-a-timeline/>
- [2] A Chronological History of Electrical Development from 600 BC https://archive.org/stream/chronologicalhis00nati-rich/chronologicalhis00nati-rich_djvu.txt

Conventional and Advanced Technologies in Coal Preparation

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ABSTRACT

Coal preparation is the removal of mineral matter from the Run-of-Mine (ROM) coal by employing separation processes which are able to differentiate between the physical and surface properties of coal and the mineral matter. Through coal preparation, a uniform product is obtained. Coal is prepared for its utilization in carbonization, combustion, gasification, liquefaction etc. plants. The selection of the logical separation process is based on laboratory studies of the run – of – mine coal known as wash ability studies viz. size distribution, yield curve, cumulative float curve, cumulative sink curve, partition tromp curve. Through coal preparation, extraneous non combustible materials are reduced besides lower emission of particulates and reduction in ash handling problems in thermal power stations. Lower in SO_x, NO_x and carbon emissions as also reduction in transportation costs per unit and improvement in heat guaranteed. Due to consistent quality of washed coal, the plant efficiency will improve. Also due to lower green house gas emission, reduction in global warming is achieved. The cost of washed coal will enhance. Coarse coal cleaning (particle size > 0.5 mm) was discussed using gravity based and surface properties based methods. Dry separation processes such as electrical and magnetic properties based processes were narrated.

Key words – RoM, Coal Preparation, Gravity based cleaning, surface property based cleaning

I INTRODUCTION

In India millions of tonnes of coal and lignite are produced. Daily output of coal production has already reached 3 million tonnes in March 2020 which is enough to run a 660 MW power plant for a year as the state run miners focuses on expansion of projects and increasing production. Now the Coal India Limited (CIL) has focussed on remaining top soil to expose coal, which will rapidly raise output of coal. The CIL has also received environment clearances for a handful of large expansion projects. CIL is currently operating in 15 public sector coal washeries with a total capacity of 36.8 million tonnes per year. Of these 11 are coking coal washeries, while the rest are non coking coal washeries with a capacity of 20.58 million tonnes and 16.22 million tonnes per year respectively, out of 25 coal washeries installed and commissioned in India. But only 19, out of these, are in operation at present with a total washing capacity of 33.17 million tonnes per year. We are getting high to very high mineral matter contents in coal (caking, non coking and coking varieties) on production specially from open cast mines. When this coal is transported from the pit head to any other place in India, either by truck or rail (both using diesel to run their engines), the transportation cost per unit heat becomes more because it is carrying both combustible and non combustible materials. Combustible matter gives heat on burning it in air while non combustible mineral matter takes away part of that heat to raise its own temperature which is a loss. It is therefore imperative to clean the coal to the desired level, as per their utilization needs such as for steel industry or for electricity / power generation in thermal power plants or in any other industry where coal is used as a source of heat.

II DISCUSSION ON VARIOUS METHODS OF COAL PREPARATION

- (a) **Coal Cleaning** - Coal cleaning is a process by which impurities such as mineral matter, sulphur and rocks are removed from coal to upgrade its value. Coal cleaning processes are categorised as physical cleaning, microbial cleaning or chemical cleaning. For the first time in the world, the research work carried out on disposition pattern of sulphur in coal structure by Srivastava revealed that the sulphur present in coal is present in different forms such as pyritic sulphur, sulphate sulphur, thioether sulphur, thiophenic sulphur, aromatic sulphidic and disulphidic sulphur, thioketonic sulphur. This was done using temperature programmed reduction method. A lot of work on chemical desulphurization of coal was done but the total sulphur in coal could not be quantitatively reduced. The reason is one reagent is not effective in reducing all forms of organic sulphur. The reagent effective in removal of pyritic and sulphate sulphur will not at all be effective in reduction of organic sulphur. The iron sulphate may be removed by simple washing the coal with water. Thus the chemical desulphurization process is economically not viable hence no commercial plant came up. Treatment with ferric sulphate could reduce more than 90% of pyritic sulphur. Lot of work on Microbial desulphurization of coal was done resulting in removal of more than 90% pyritic sulphur (using *Thio-bacillus Ferro-oxidans* as microbe), this is very slow process. Using other different microbes a maximum of about 19% organic sulphur was removed which is uneconomical and hence once again no successful commercial plant came up.

Physical coal cleaning processes includes mechanical separation of coal from its contaminants using differences in their density, magnetic properties etc., are by far the major processes in use today. As already stated chemical coal cleaning processes are currently being developed but their performance and cost are undetermined as on today. Typically density separation is used to clean coarse coal while surface property based methods are preferred for fine coal cleaning. In the density based processes, coal particles are added to a liquid medium and then subjected to gravity or centrifugal forces to separate the organic rich (float) phase from the mineral rich (sink) phase. Gravity based separation is the most common coal cleaning method and is commercially accomplished by the use of jigs, mineral spirals, concentrating tables, hydro cyclones and heavy media separators. The performance of density based cleaning circuits is estimated by using laboratory float and sink (F & S) tests. Organic liquids of varying density as well as inorganic solutions were used as a media for separation of coal from the mineral.

In the surface property based processes, ground coal is mixed with water and a small amount of collector reagent is added to increase the hydrophobicity of coal surfaces. Subsequently, air bubbles are introduced in the presence of a frother to carry the coal particles to the top of the slurry, separating them from the hydrophilic mineral particles. Commercial surface property based cleaning is accomplished through froth or column flotation. To estimate the performance of flotation devices, a laboratory test called release analysis is used.

Theoretically the efficiency of physical cleaning should increase as particle size decreases because of the improved liberation of the mineral matter from the coal matrix. Therefore, recent research on advanced coal cleaning has focussed on improving fine coal cleaning. Column flotation devices developed since 1980's can remove most of the impurities from finely ground coal. Likewise advanced gravity separators, developed mainly for metal mining industries, were shown in recent years to have a good potential for improving the cleaning of finely ground coal. Other physical cleaning methods are selective agglomeration, heavy media cyclonning and dry separation with electrical and magnetic methods. Selective agglomeration and advanced cyclonning have the high probability of commercialization particularly for reducing sulphur content of coal. In selective agglomeration the coal is mixed with oil. The oil wets the surface of the coal particles and thus causes them to stick together to form agglomerates. The agglomerated coal particles are then separated from the mineral particles that stay in suspension because they do not attract oil to their surfaces. A version of selected agglomeration, called the Otisca T process, was reported to reduce the ash content of some coals, ground to about 200 μ m, below 1% with a high recovery of the heat content.

Conventional cyclonning has been used for many years for cleaning relatively coarse coal and considered for fine coal cleaning only in recent years. Coal and heavy media enters the conical shaped cyclone tangentially near the top. As the cyclone spins around its axis, impurities move downwards along the walls and exit through the bottom opening while coal particles move upward near the centre and exit from the top.

Dry methods take advantage of the differences between electrical and magnetic properties of minerals and the coal particles and have not been developed enough for its commercialization. The estimated cost of advanced fine coal cleaning is uneconomical. However, some expenses of advanced coal cleaning can be offset by reduction in transportation cost, elimination of milling cost at power plants, and reduced maintenance cost of power plants. Widespread commercialization of advanced coal cleaning technologies depends upon further improvements in technology, supply and demand for different fuels and future environmental regulations coming up.

(b) Dewatering - Now coming to dewatering of coal fines – water present in clean coal is a contaminant and reduces heat content of the coal. It is estimated that every 1% moisture in clean coal is equivalent to 4% ash. Moisture adds to the transportation of coal as well as handling problems. In case of refuse slurry, a significant amount of land and water gets tied up with the slurry disposal and also a significant amount of water is lost due to seepage and evaporation. Breakage of the slurry dams creates a substantial loss of property and sometimes human lives.

Dewatering of fine clean coal and refuse slurry is one of the most important aspects of coal cleaning scenario. It also adds significant cost to the price of the clean coal. For particles larger than 0.5 mm size no particular dewatering problem is encountered, however, particles finer than 0.5 mm are the most difficult to dewater. A typical coal preparation plant produce about 20% of the mined coal as 0.5 mm. Generally, this fine fraction is discarded due to its high cost of processing. However, with the development of advanced coal cleaning technology, such as column flotation, cleaning of fine size coal to low ash and low pyritic sulphur is feasible at high recovery. One of the biggest hurdles in utilization of fine coal cleaning technology by the coal industry is the economic dewatering of fine clean coal product. Until an economical and practical solution to dewatering of fine clean coal is achieved, the efforts devoted to developing fine clean coal technology will be wasted. The hyperbaric filter (HBF), being an expensive technique and refuse being waste material, the coal companies do not want to invested money in dewatering refuse. Deep cone thickener (DPT) was evaluated for dewatering of fine coal refuse. The study showed that using a proper addition of anionic

and cationic flocculants to the slurry before it is fed to the deep cone thickener produced a dewatered paste product containing about 50% solids. The process captured more clean water for recycling and produced a material that could be stacked on a slightly slanted surface. The paste eliminates the danger of slurry spillage which had been a serious problem. A couple of coal preparation plants in USA have installed commercial scale deep cone thickeners.

The utilization of super absorbent polymer (SAP) in the nappy application is well known. The concept of utilizing these polymers was investigated for the purpose of dewatering coal and other fines generated by preparation processes such as flotation. SAP's are granular, highly cross linked synthetic polymers with excellent water absorbing properties. The dewatering process is characterized by three main stages (a) contact of SAP with high moisture fine coal, (b) separation of dewatered fine coal from SAP, and (c) regeneration of used SAP, by exploiting its response to changes in conditions such as pH or temperature. Preliminary tests showed the separation step to be very difficult. The novel idea of encasing a given amount of polymer in a water permeable cloth solved this problem of separating the swollen polymer from the dewatered coal. Preliminary tests investigating the effectiveness of the sachets of polymer showed a drastic decrease in the moisture contents of slurries.

Furthermore, it was shown that it was possible to regenerate the polymer (still within the sachets) through thermal drying. A full scale experimental program was then followed to accurately determine the feasibility of using the sachets of SAP. The experimental variables were initial slurry moisture content and polymer dose. It was observed that the sachets seemed to work fastest and most effectively at high moisture and also at high doses of SAP. Regeneration of polymer was also investigated using two methods (a) thermal regeneration, and (b) pH induced regeneration. The experimental variables for investigating the regeneration processes were - method of regeneration and grade of water used. Thermal regeneration at 70 C seemed to work successfully. Although the cost of using thermal energy is still a problem, the safety aspect (fine hazards) has been addressed since the polymer does not ignite when heated, unlike fine coal particles that may do so. The alternative method of regeneration, which exploits the pH sensitivity of the polymer, was less successful. The laboratory experiments conducted over a period of 76 hours on slurry

mixtures, with phases of mixing showed that it is possible to decrease moisture content by 70% (on an average) using SAP's. A final moisture content of 13% (on an average) was obtained. It was observed that the sachets seemed to work fastest and most effectively at high moisture contents and also at 2% dosage of SAP. The fact that higher polymer dosage is more effective has financial implications in terms of the amount of SAP needed to dewater a given amount of coal as well as time constraints. However, more vigorous experimentation could prove the dewatering of fine coal by SAP to be economically feasible. It is important to mention here that Virginia Tech developed new chemicals which were added to the fine coal slurry that increased the efficiency of mechanical dewatering of coal fine using Vacuum filtration, and centrifugation.

III CONCLUSION

Coal preparation is the removal of mineral matter from the Run-of-Mine (ROM) coal through separation processes which differentiate between the physical and surface properties of the coal and the mineral matter. Through coal preparation, a uniform product is obtained. Coal is prepared for its utilization in carbonization, combustion, gasification, liquefaction etc. plants. The selection of the logical separation process is based on laboratory studies of the run - of - mine coal known as wash ability studies viz. size distribution, yield curve, cumulative float curve, cumulative sink curve, partition tromp curve. Through coal preparation methods, extraneous mineral matter was reduced resulting in lower emission of particulates and reduction in ash handling problems in thermal power stations. Coarse coal cleaning (particle size > 0.5 mm) was discussed using gravity based and surface properties based methods. Dry separation processes such as electrical and magnetic properties based processes were narrated.

Lowering in SO_x, NO_x and carbon emissions, as also, reduction in transportation costs per unit heat can be easily achieved. Due to consistent quality of washed coal, the plant efficiency will improve. Also due to lower green house gas emission, reduction in global warming is achieved. The cost of washed coal will enhance. Dewatering of washed fine coal and that of slurry refuse were discussed using SAP. Processes for regeneration of SAP have also been discussed.

Covid -19 Pandemic and Online Education: an Empirical Study with Reference to Students and Employees"

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ABSTRACT

Electronic learning offers many methods which decreases the limitations of traditional education. E-learning appeals to organizations that a strong need or desire to deliver consistent training across multiple locations. Today's new economy is characterized by industrial change, globalization, knowledge sharing and information technology revolution thus, traditional classrooms do not satisfy the needs of new world of lifelong learning. This paper aims to provide a discussion about the satisfaction level of students among E-learning and employees among work from home by online mechanism. This study examines the evidence of the effectiveness of online learning by organizing and summarizing the findings and challenges of online learning into positive, negative, mixed and null findings. The research was Descriptive in nature and both primary and secondary data has been collected for this purpose. Taken as a whole, there is robust evidence to suggest online learning is generally at least as effective as the traditional format.

Keywords: - E-learning, online learning, web-enhanced, blended learning, hybrid learning, significant learning, technology-mediated instruction.

I INTRODUCTION

Technology, communication & ICT applications have presented our generation with numerous opportunities. Technology has touched each and every field in some or the other way. Education through e-learning applications have opened up horizons of e-learning from distance, efficient method of learning and added quality to knowledge sharing activities & some technology experts had developed application for e-meeting for working people too. There has been a significant amount of research by scholars, academicians & technology experts with technology at its prime focus but the effectiveness of e-learning and e-meeting in extensively shaping the future of students and employees & adding quality to their thinking & values has not been discussed much. This study therefore reviews the literature that is available on online & offline sources in the form of books, scholarly articles and research writings from peer reviewed journals. The aim of the literature review is to understand the scholarly works on the topic of e-learning and e-meeting both from the technological point of view and for its effect on the students as well as on employees during covid-19 pandemic. This research will help us to know the effect of e-learning as well as e-meeting on students and working people as to know how they cope up with the continuity of knowledge during corona virus pandemic.

II LITERATURE REVIEW

This research includes a review of literature relating to e-learning as against traditional forms of classroom teaching attitudes and perception of faculty and students towards e-learning. The following is a brief description on the literature review that has been undertaken.

Jakobsone & Cakula (2015) aimed to go a new perspective on knowledge sharing process & better understand the future of automated learnings support system involving the use of new technological opportunities. The major study

question was how the automated learning support system could develop the efficiency & quality of further knowledge flow & other sustainable cooperation between educational institutions & entrepreneurs. The researchers found that the analysis of the information system as an online learning, support platform, improved quality of knowledge flow & recommendations for advancing work-based learning besides the encouragement of efficient management technologies.

E-learning can deliver the following substantial positive effects.(1) Students are more engaged & able to develop 21st century skills. (2) Teachers have a positive attitude towards their work & are able to provide more personalized learning. (3) Family interaction and parental involvement may increase. (4) Economic progress can result from direct job creation in the technology industry as well as from developing a better educated workforce. (The Positive Impact of E-learning-2012 UPDATE, White Paper on Education Transformation).

Sangeeta Kakoty,et.al. (2011) analyses the current e-learning procedure and showed the new dimension of research work on the area that follows the importance e-education system and recent market of e-learning procedure. This study showed that globalization of education, cross-culture aspects and culturally complex student support system in distance as well as e-learning environment is a prospective research area.

Internet education is soon to be the dominant form of education in the world. It emphasized that a lot of efforts is being dominated into furthering the work methods and communication among students & professors aimed at bettering the quality of this kind of studying.(Mirjana Radovic-Markovi,2010).

E-learning has been extensively not just for academic purposes for students but also for business and corporate employees training on various upcoming industrial revisions (Judith B. Strother, 2002).

This literature review suggested that despite the enormous growth of e-learning in the education & its perceived benefits, the efficiency of such tools will not be fully utilized if the users inclined to not accept and use the system. Therefore, the successful implementation of e-learning tools depends on whether or not the people are willing to adopt & accept the technology.

III OBJECTIVES AND METHODOLOGY

(a) **Objectives** -The following were the objectives for conducting the study;

- (i) To measure the level of satisfaction among students on online learning mechanism during covid-19 pandemic
- (ii) To measure the key challenges faced by learning in an e-learning program via meeting apps during covid-19 pandemic.
- (iii) To measure the level of satisfaction on work from home employees via meeting apps during covid-19 pandemic.

(b) **Hypothesis** - The research is based on the situation that over a period during COVID 19 which in turn have helped them to get the online education. For the purpose of testing the hypothesis, has developed null hypothesis as;

- (i) H_0 = There is no significant difference in the satisfaction level towards online learning on the basis of age.
- (ii) H_1 = There is a significant difference in the satisfaction level towards online learning on the basis of age.

(c) **Methodology** - The research methodology was then formulated considering the area of research. The criteria used for selecting studies reviewed were; both primary and secondary focus on e-learning and issues faced by students and employees during covid-19 pandemic. This research was supplemented by a questionnaire survey of learners & employers to ensure the data identified from the literature were grounded in reality. The research was descriptive in nature and the sample size taken was of 200 respondents. The type of sampling used in this paper was convenience sampling. The paper draws on in-depth qualitative comments from students and employees evaluation of e-learning module during covid-19 pandemic situation, to develop a picture of their perspective on the experience. Questionnaire that yields some basic qualitative data were administered. General questions on satisfaction and dissatisfaction identified the criteria that students used in evaluation, while specific questions of aspects of module generated some insights into the students learning process during covid-19 pandemic.

(d) **Interpretations** - Data has been interpreted by using statistical tools like, percentage and ANOVA test.

(e) **Limitations of the study**

- (i) The study is restricted to the selected sample of Madhya Pradesh. Therefore the results of the study cannot be generalized.
- (ii) The statistical tools used to analyze the data have their own limitations.
- (iii) All the limitations are applicable in primary data to this study.

III DATA ANALYSIS & INTERPRETATIONS

Question- Wise Analysis Mentioned Here:-

(a) Q.1 What Is Your Profession?

Table 1

Choices	Percentage	Count
Student	81.67%	149
Teacher	3.85%	7
Employee	14.29%	26

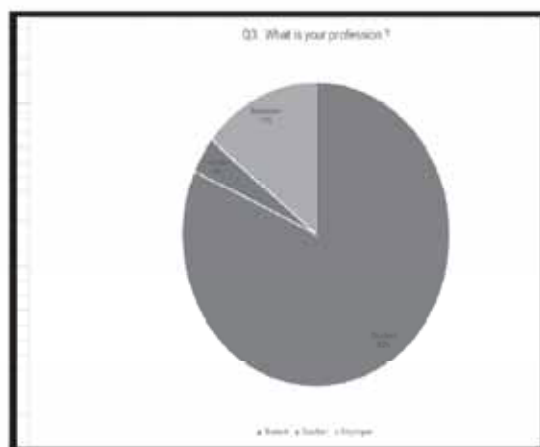
**Fig.1**

Fig.1 illustrates that out of our total sample size i.e 184 respondents collected from the survey ,majority are the students i.e (81.87%) followed by employees i.e (14.29%) & (3.85%) are teachers who are using online learning mechanism.

As we belongs to the students fraternity, so there is a wide majority of students out of 184 respondents other than employees and teachers in our survey who use online learning mechanism during covid-19 pandemic.

(b) Q.2 Which Application Are You Using For Online Education/Online Meeting?

Table 2

7. Which application are you using for Online Education/Online Meeting		
RESULTS		
Choices	%	Count
Zoom Ap.	79.88	131
Google Hangouts Meet	15.05	26
Cisco Webex Meetings	4.27	7

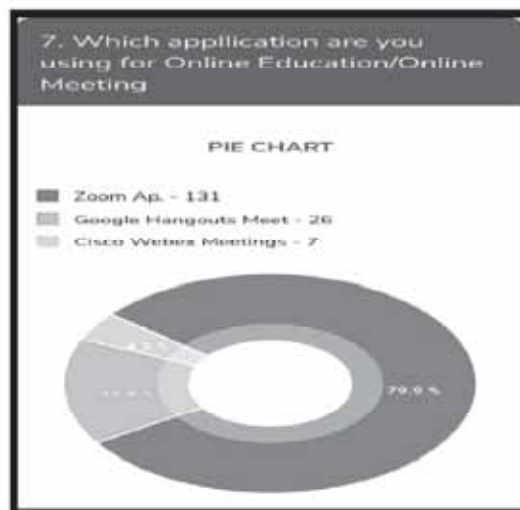
**Fig.2**

Fig.2 illustrates that (79.88%) respondents are using Zoom App, (15.85%) are using Google Hangouts & (4.27%) are using Cisco Webex Meeting App.

Majority of people are using Zoom App because it is easy and free and have much higher quality than

Hangouts, it has better call quality, ability to record meetings and allows multiple people within meetings to share their screens at once.

(c) Q.3 What Is Your Level Of Satisfaction In Online Mode?

Table 3

8. What is your level of Satisfaction in Online Mode		
RESULTS		
Choices	%	Count
Highly Satisfied	11.89	22
Satisfied	71.89	133
Dissatisfied	12.43	23
Strongly Dissatisfied	3.78	7



Fig.3

Fig.3 illustrates that (71.89%) respondents are satisfied with online mechanism & (12.43%) respondents are dissatisfied but (11.89%) respondents are highly satisfied & rest (3.78%) respondents are those who are strongly dissatisfied with the online learning mechanism.

According to the survey, majority of respondents are satisfied with online learning mechanism because it is easily available, saves money, saves time, flexible time schedule and environment.

(d) Q.4 Is Work From Home/Classes In Home Easy?

Table 4

9. Is work from home/ Classes in home easy ?		
RESULTS		
Choices	%	Count
Yes	62.98	114
No	37.02	67

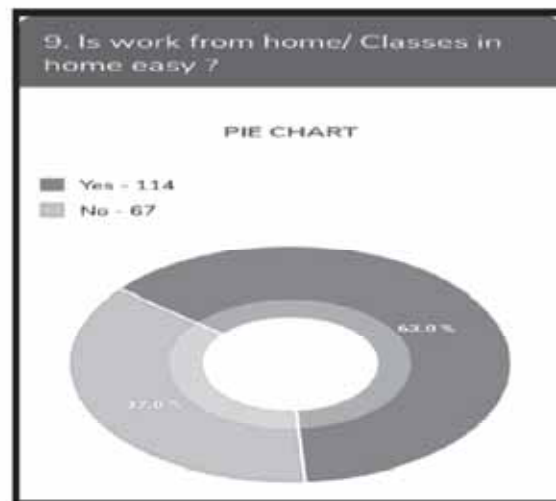
**Fig.4**

Fig.4 illustrates that out of 184 respondents (62.98%) employees/students said that work from home/ classes from home are easy & (37.02%) students/employees said that it is not easy to work from home/classes from home.

Because of its flexible time schedule and comfortable working environment, majority of respondents found it easy to do classes / work from home.

(e) Q.5 Do You Have Any Benefit From Online Mode, Please Suggest-

Table 5

Benfits	Count	Percentage
Saves time	121	29%
Saves money	80	19%
Easy	94	22%
Flexible schedule and environment	75	18%
Instructor availability	53	12%

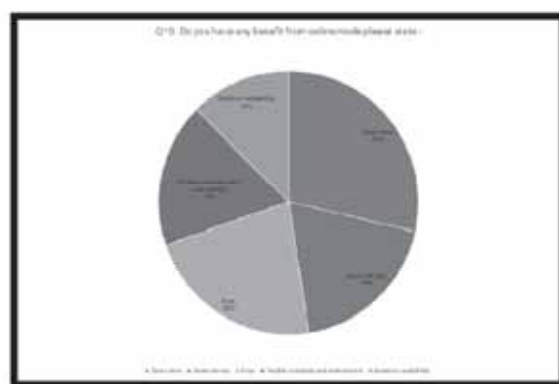


Fig.5

Fig.5 illustrates that out of 184 respondents (29%) respondents said that the benefit of online mode is it saves times, (19%) said it saves money, (22%) found it easy, (18%) said that it has flexible time schedule and environment and rest (12%) said that it has good availability of instructors.

According to the survey, there are some benefits of online learning mode that it saves time, saves money, it has flexible time schedule and environment and it is easy to access. Instructor's availability is also good.

(f) Q.6 Can You Share Notes/Files By The Means Of Application?

Table 6

11. Can you share notes/ files by the means of application ?		
RESULTS		
Choices	%	Count
Yes	65.93	120
No	34.07	62

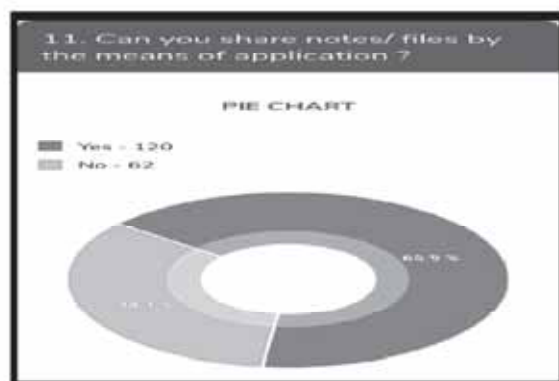


Fig.6

Fig.6 showed that (65.93%) students and employees shares notes/ files by means of application during online learning mechanism & (34.07%) said that they does not share any file/notes via application.

Majority of repondants said that they shares files/notes via screen sharing and recording by means of application.

(g) Q.7 Is There Any Negative Point Of This Mode?

Table 7

12. Is there any negative point of this mode		
RESULTS		
Choices	%	Count
Not having proper connecti...	55.61	109
Device getting hot, because of ...	24.49	48
Any other device problem	19.90	39

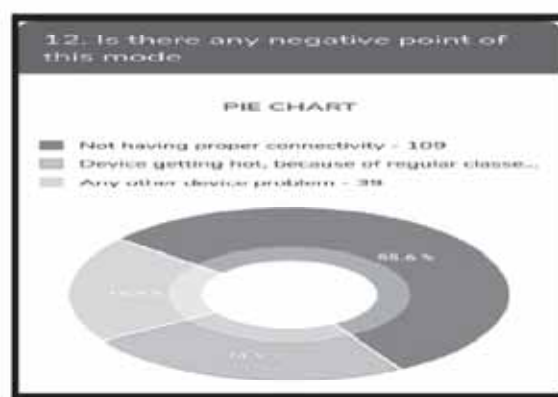
**Fig.7**

Fig.7 illustrates that (55.61%) students/employees said that out of 184 respondents, majority of respondents found that it not having proper connectivity is the most significant negative point of online mode, (24.49%) students/employees said that device heating up of device is also an issue because it makes battery low faster which is the negative point Rest (19.9%) said that other than these, any other device problem is also the negative point of this mechanism.

(h) Q.8 Do You Want Online Mode Should Be Used After Lockdown Also?

Table 8

13. Do you want Online mode should be used after Lockdown also..?		
RESULTS		
Choices	%	Count
Yes	55.43	97
No	44.57	78

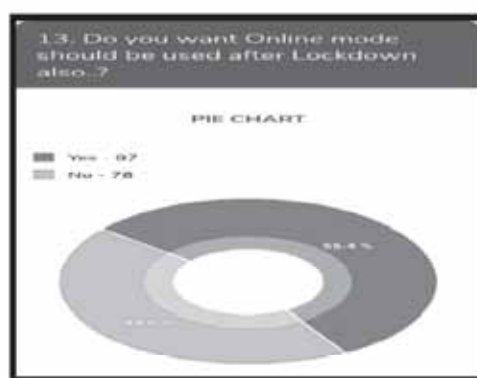


Fig.8

Fig.8 illustrates that (55.4%) respondents said that online mode should be used after the lockdown also and (44.57%) respondents said that it should not be continue after lockdown also.

According to the survey, out of 184 respondents, majority of respondents want this online learning mechanism to be continued after lockdown also due to its comfortable working environment, money saving and flexible time schedule. Minority of the respondents founds that it doesnot provides the taste of traditional form of learning,

also due to the missing effect of face to face interaction which provides huge motivation.

IV ANOVA TEST

Further to test the hypothesis, one-way anova test have been applied, assuming that data is normally distributed and the F value comes to be 2.031 and P value is 0.005 which is less than 0.05 indicates that there is a significance difference in the satisfaction level towards online learning mechanism on the basis of age.

ANOVA

VAR00002

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.590	24	0.733	2.031	0.005
Within Groups	57.011	158	0.361		
Total	74.601	182			

V CONCLUSION AND SUGGESTING SCOPE

- (a) **Conclusion** - Online education is here and is likely to stay and grow. The review of its history clearly showed online education has developed rapidly and fueled by Internet connectivity, advanced technologies and a massive market.

Throughout this study, the primary focus was to measure the level of satisfaction among students and employees during online learning mechanism/ during work from home. Also to find out the key challenges they are facing during covid-19 pandemic. It started with a basic overview of online education as studied and perceived by Mirjana radovic markovic, (2010), which served as the theoretical framework for this study. We then examined how presented theories have applied to various aspects of effectiveness of online learning mechanism and development. We first examined the profession of employees and online environment over time, its evolvement and the technological impacts on online learning mechanism also their preferences of online

focused our attention on the key challenges like poor internet connectivity, heating of device and other problem faced by the students and employees during online learning mechanism to determine the best and most desirable practices and strategies for online learning. Within the realm of online learning, we directed our attention onto the flexibility and instructor's availability and other benefits of online learning mechanism promoting social presence, interactions and collaborations among students, employees and instructors.

(b) **Suggestions**

- Online learning is a very efficient and latest process of learning but it requires proper connectivity. If internet connectivity will be good, then only E Learning will be favourable.
- There can be a little doubt that online education is destined to continue to grow, possibly at ever fast speed. That being the likely case, more research should be conducted to investigate the effectiveness, efficiency and improvement of online teaching and learning.

- (c) **Future scope for research** -This research was conducted considering the whole Madhya Pradesh as a sample. Similar researches could be conducted to focus on every state of the country and streamline the most preferred applications. The research findings could be compared with other states and countries to determine the effectiveness of e-Learning and the growing economy. This would help in obtaining the emphasis on various factors such as technology, study materials and availabilities, etc.

REFERENCES

- [1] **Dongsong Zhang. (2003)** Powering e-learning in the New Millennium: An Overview of e-learning and Enabling Technology.
- [2] **Garrison, D.R., Anderson, T. & Archer, W. (2000).** Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3),87-105.
- [3] **Garrison, D.R., Anderson, T. & Archer, W. (2009).** Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, 15,(1), 7-23.
- [4] **Intel. (2012),**The Positive Impact of e-learning-2012UPDATE. USA: Intel.
- [5] **Jakobone, A., and Cakula, S. (2015).** Automated Learning Support System to provide Sustainable Cooperation between Adult Educational Institutions and Enterprises. *Procedia Computer Science*, 43, 127-133.
- [6] **Markovic, M.R.(2010).** Advantages and disadvantages of e-learning in comparison to traditional forms of learning. *Annals of the university of Petrosani, Economics*, 10(2), 2010, 289-298.
- [7] **Sangeeta Kakoty, M.L. (2011).** e-learning as a Research Area: Analytical Approach, *International Journal of Advanced Computer Science & Applications*.

Emerging trend in Horizontal Axis Wind Turbines to Exploit Low Wind Resource

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ABSTRACT

Renewable energy is finding increasing adoption in generation of electrical energy. One of the most widely used forms of renewable energy is wind; but utility scale WECS need a minimum average wind speed which is not available in most of the areas in India. Hence, traditional WECS is unlikely to be economically viable due to inadequate power generation. Avante Garde has developed a small efficient horizontal wind turbine system with very low cut-in speed of 1.9 m/s and made it commercially available at a reasonable price. This paper discusses the horizontal axis WECS with permanent magnet synchronous generator and electronic convertor system for extracting the maximum power at a constant voltage and constant frequency. The WECS is simulated for a standalone application and its performance evaluated for Bhilai, Chhattisgarh.

Keywords: Low Wind Speed WECS, TSR based Duty ratio Control, TSR MPPT, HAWT based WECS

I INTRODUCTION

Avante Garde has developed an efficient small wind turbine "AVATAR" suitable for low wind speed horizontal axis wind turbine with a start-up wind speed of 1.4 m/s and cut-in wind speed of 1.9 m/s. AVATAR is available for the price of a smart phone which can power homes, farms and offices. In 2015 the first prototype of "AVATAR" was chosen as one of the top 20 cleantech innovations in India. The new "AVATAR" small wind turbine was showcased by UN as one of the top 20 innovations at the UN Innovation Summit held in September 2019 in India. It has paved the way for exploration of vast low speed wind resource in India (Fig No. 1) with the well established technology of horizontal axis wind turbines (HAWT).

Electrical Energy is one of the most utilized forms of energy worldwide. It is widely preferred as it can be easily converted to other forms like light, heat, motion etc. Electrical energy is mostly generated using coal based thermal power plants, nuclear power plants, hydel power plants and renewable energy sources. India has a total installed power capacity of 3,71,054 MW comprising of fossil fuel based 2,30,906 MW, nuclear based 6,780 MW,

Hydro based 45,699 MW and renewable energy based capacity of 87,669 MW as of June 2020 [1]. The share of fossil fuel based capacity is 62.29% which contributes largely to the green house gases emissions leading to global warming. In order to counter this, a rapid shift towards renewable energy has become inevitable. Wind Energy plays an important role in the mission to minimise dependence on renewable energy by any nation and helps in the sustainable development. Wind is the movement of air caused by temperature differences, pressure difference or altitude difference. Wind energy can be simply stated as the conversion of energy in the motion of air (kinetic energy) to electrical energy. Wind is one of the oldest power sources to be utilised by humanity to grind grains, as sail in boat, draw water etc.

Standalone WECS (Wind Energy Conversion Systems) used for power generation will have a turbine, power electronic converter, generator and a controller. The interest in small HAWT WECS system will increase rapidly with the development of innovative cost effective and efficient wind turbines for low wind speeds. It would pave the way for utilization of huge low wind speed resource of India which is not viable with the conventional WECS [2].



Fig.1: Wind Speed Map of India at 20m agl

When talking about Low Wind Speed WECS it has the potential to enhance the wind energy production [6] and penetration in India. Some factors to be considered in the selection of site and wind turbine are given below:

- (a) Increasing the number of blades in case of VAWT increases power output, but in case of HAWT using 2 or 3 blades give the maximum power output [4]. Further, HAWT proves to be more advantageous than VAWT based on power output [5][7][8][13] while in terms of portability[7], VAWT is better in handling the turbulence [9].
- (b) The surroundings to be free from obstacles for laminar wind flow [16].
- (c) The provision of MPPT techniques to optimize the usage of wind resource to enhance power generation [3][14]. The MPPT can be achieved by:
 - (i) Pitch control of blades to maximize output up to rated wind speed [17].
 - (ii) PWM control for power electronic switches helps in achieving constant voltage and constant frequency above the rated wind speed [17].
- (d) Power Electronics life also plays a role in reducing the maintenance and improving performance of a WECS. The life of power electronics was found to be more for HAWT [10].
- (e) PMSG is preferred for low speed wind power generation system [15] starting time can be reduced by reducing the resistive torque of generators [12] which will result in small decline in power output.

The Utilisation Factor for a low speed wind turbine lies between 19% and 21% of rated capacity for a three bladed HAWT. The efficiency decreases above rated wind speeds [11]. The provision of a tail fin offers alternative to pitch control in small HAWT [16]. The use of VAWT or HAWT depends on the wind speed, place where it is to be installed and its application [13].

Based on the literature review it was noted that WECS generally uses Horizontal Axis Wind Turbine (HAWT) in conjunction with a Permanent Magnet Synchronous Generator (PMSG). It consists of a tip speed ratio based Maximum Power Point Tracking (MPPT) coupled to a Proportional Integral (PI) Controller and a Power Electronic circuitry consisting of a Rectifier-DC link-inverter set-up. The duty ratio of switches can be controlled as per the MPPT algorithm.

In this paper, the methodology adopted is described in Section II whereas section III deals with the application of the developed methodology. The results and discussion are provided in Section IV. Finally, the conclusion drawn from the work is given.

II METHODOLOGY

The objective of this work is to assess the performance of a WECS for Bhilai. The paper showcases a MATLAB/Simulink based performance assessment for a WECS which can operate in lower average annual wind speed.

The steps involved in the process of simulating a WECS which can work in lower wind speeds:

- (a) Selection of wind speed range for which WECS is to be used.
- (b) Selection of a Wind Turbine Generator based on the wind speed and performance desired
- (c) Selection of Converters to transfer power from the machine to the load (Uncontrolled Rectifier – Boost Chopper – Three Phase Inverter, so that a constant voltage, constant frequency AC supply can be fed to the load)
- (d) Selection of a power extraction scheme (Tip Speed Ratio based MPPT which is used for duty ratio control of the converter)

- (e) Selection of Load (As a standalone system is considered AC Load is used here)

For simulating the Wind Energy Conversion system for performance assessment MATLAB/Simulink may be used. Simulink is one of the many tools provided by MATLAB. Simulink is a graphical environment which can be used for modelling, analyzing and simulating a system. Simulink helps make simulations easier to achieve using blocks available in the Library Browser. This helps to produce results which may be used for

further analysis. Using Simulink, the system may be studied economically.

III APPLICATION OF THE DEVELOPED METHODOLOGY

The developed methodology is applicable for Bhilai, Chhattisgarh which has an annual average wind speed of 3.61m/s. Block diagram shown in Fig. No.2 is prepared to visualise the ideas of the proposed Low Wind Speed WECS and components.

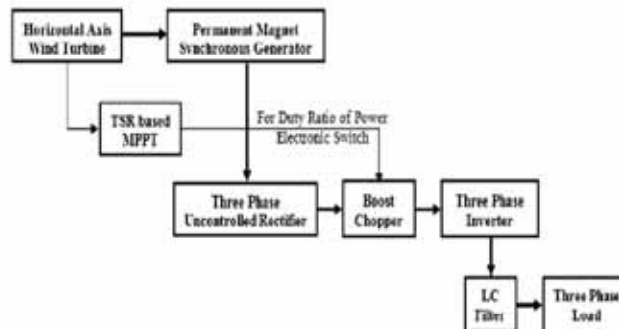


Fig. 2 Block Diagram for Proposed Low Wind WECS

The components to be used are selected based on the literature review and their availability in the market.

A 1 kW wind turbine model e300i of E-Hands Energy Pvt. Ltd. [18] with directly coupled PMSG has been selected for simulation on MATLAB 2016a. It avoids

the need of a gearbox which reduces complexity, losses/problems in gearbox and cost. Fig No.3 shows the simulation of these connections in MATLAB/Simulink,

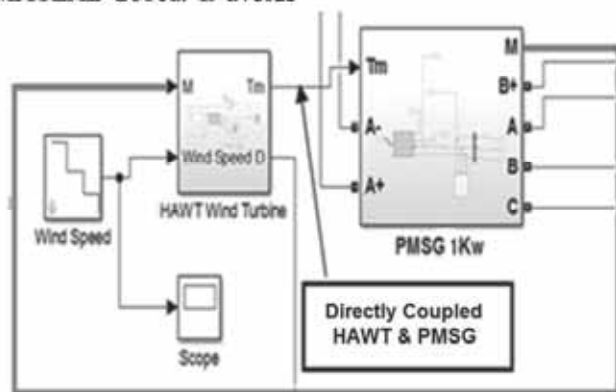


Fig. 3 Simulation Diagram of Directly Coupled HAWT

The broad specifications of wind turbine generator are given in Table No. 1.

Table 1
Specifications of Wind Turbine Generator[18]

Parameter	Value
Type	HAWT
No. of Blades	3 (Fibre Glass)
Rotor Diameter	3.0 m
Cut in Wind Speed	2.5 m/s
Rated Wind Speed	10.5 m/s
Type	Off Grid
Capacity	1000 Watts
Generator Type	PMSG (Axial Flux)
Rated Voltage	415VAC, 3-phase

MPPT normally either changes the pitch angle or controls the duty ratio. Implementing pitch control again means increasing the complexity and cost as wind measurement devices and pitch control motors are also to be provided. Here duty ratio is changed for the power electronic switches.

Wind turbines must be designed with optimal Tip Speed Ratio (TSR) to extract the maximum power from wind. Here a TSR based MPPT is considered to regulate the

output of generator in order to maintain an optimum value at which power is extracted. A PI Controller is used which controls the actual rotor speed to the desired value by varying the duty ratio using PWM scheme. The scheme of tip speed ratio MPPT is shown in Fig No.4. The TSR based MPPT is used for manipulating the switching of power electronic switches using a PI Controller.

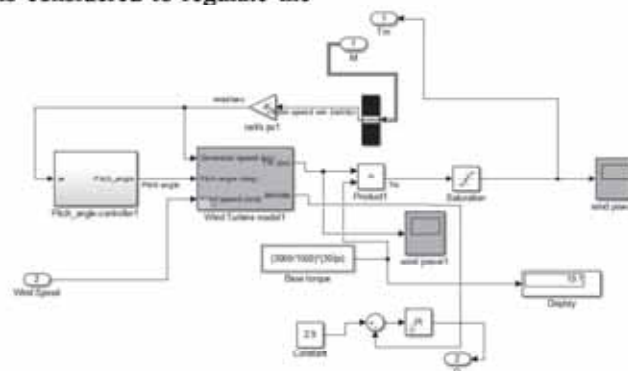


Fig.4 Simulation Diagram of MPPT

The Uncontrolled Rectifier gets input from PMSG which converts AC output to DC. The boost chopper increases the level of DC from the rectifier to desired level boosted DC output and the switching scheme used here is pulse width modulation (PWM). The duty ratio of switch is controlled based on signals from PI Controller which is controlled by TSR based MPPT. The Inverter uses space vector pulse width modulation

(SVPWM) technique and converts the boosted DC output to a suitable AC output, at constant voltage and constant frequency. This output is given to the load so that there are no power quality issues at the load side due to variation in the output due to fluctuating wind, the implementation of power electronic converter is illustrated in Fig No.5.

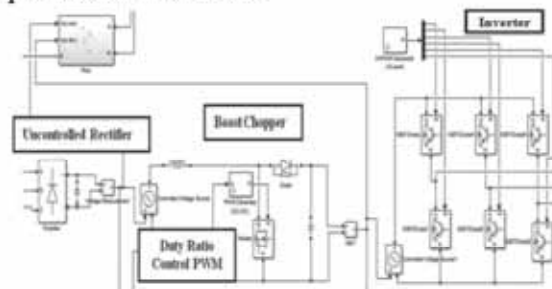


Fig.5: Simulation Diagram of Power Electronic Converter (Uncontrolled Rectifier-Boost Chopper-Three Phase Inverter)

The output from the Power Electronic Converter is fed to a LC filter to smoothen out any ripples and then it can be connected to load directly as a standalone system is

simulated. The connection of load to the output is shown in Fig No.6.

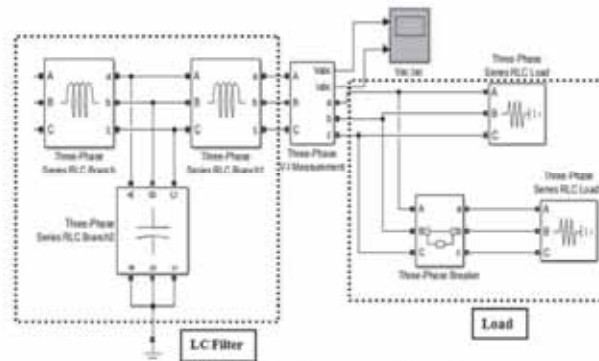


Fig. 6: LC Filter and Load

IV RESULTS AND DISCUSSION

MATLAB 2016a has been used for running the simulation. The input wind speed data is fed to the

HAWT and based on these values the system operates. The input wind speeds used in the simulation of the WECS are shown in Fig. No.7.

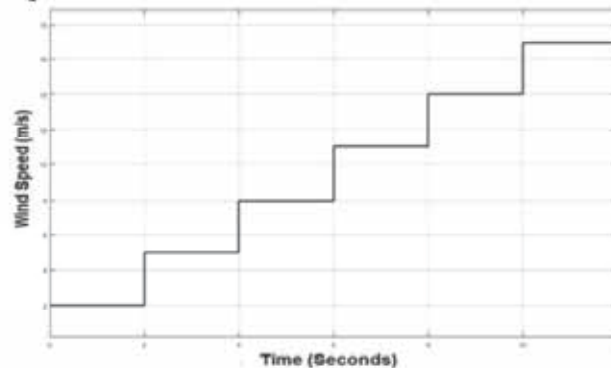


Fig.7: Wind Speed vs. Time

The PMSG starts producing power after 3m/s and reaches rated power at wind speeds near 10.5 m/s. During the simulation 1004 Watt was power output at a wind speed of 10.5 m/s.

The output voltage and current generated by the PMSG generator are shown in Fig No.8 and generated power is shown in Fig No.9.

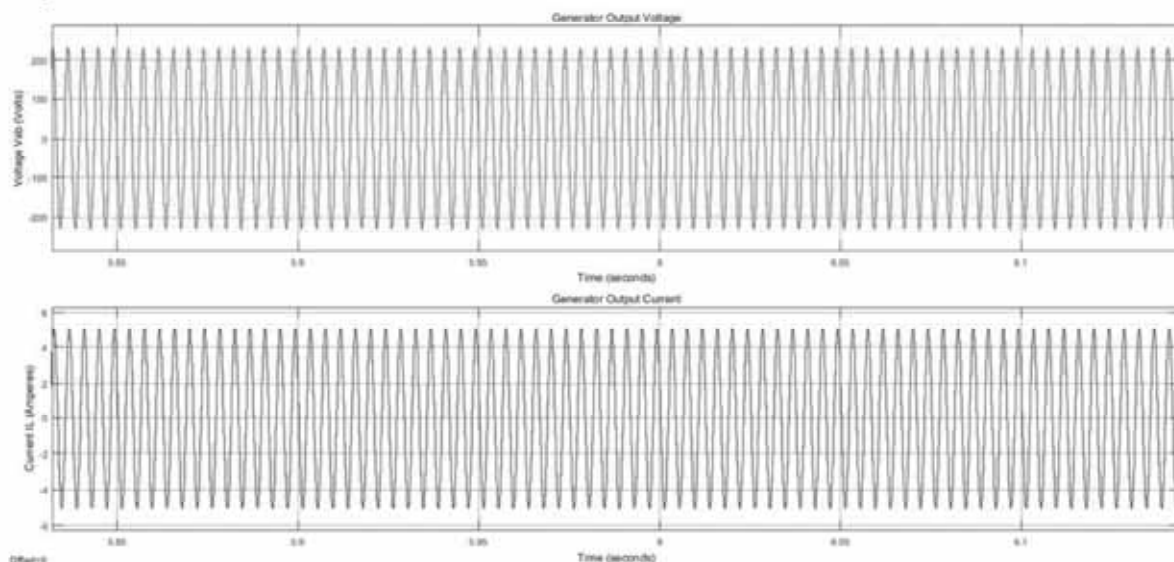


Fig.8: Voltage and Current Waveforms of PMSG

It can be seen from the Fig No.9, that the power output of PMSG used in WECS takes some time to reach the peak power production, but once it reaches the peak the

MPPT kicks in and helps in maintaining the power delivered to the load even when input wind speeds drop slightly.

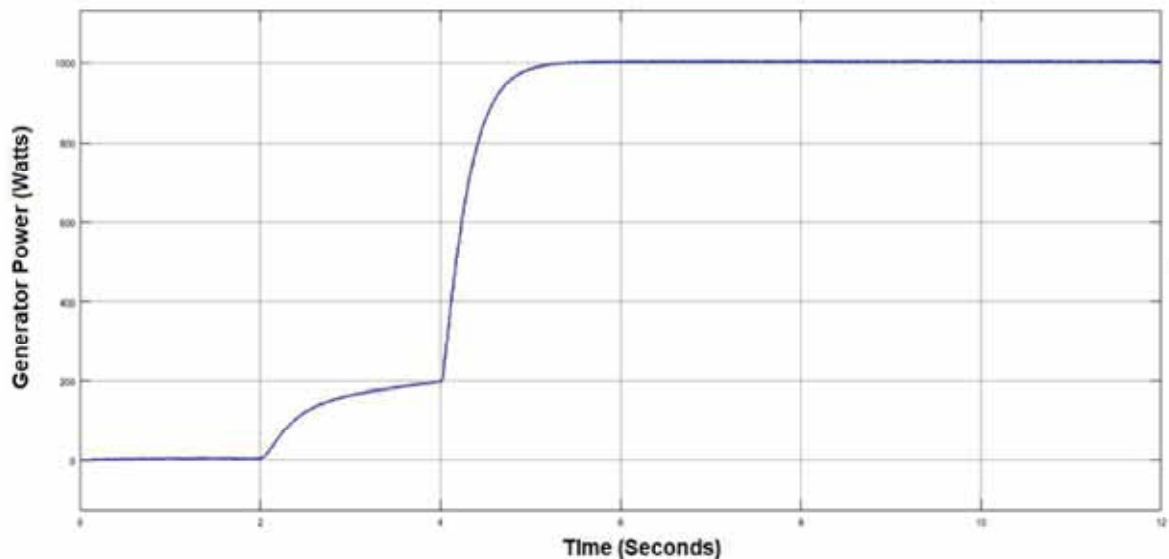


Fig.9: Power Output of PMSG

The system simulation has shown that it can operate in lower wind speed regions. Table No.2 gives the maximum values and time of their occurrence after

running the simulation of WECS. These values were found using the peak finder function in the graph window.

Table 2
PMSG Output Parameters

Stages of WECS	Maximum Value
Generator Phase Voltage (V_a)	230.3 V @ 10.18 s
Generator Phase Current (I_a)	5.032 A @ 10.74 s
Generator Power	1004 W @ 9.8 s

V CONCLUSION

HAWT based WECS simulated operates well in low wind speed range of 3 m/s to 17 m/s. The WECS generated a peak power of 1004 Watt at a wind speed of 10.5 m/s. The TSR MPPT and electronic converters proved to be helpful in extracting maximum power at constant voltage and frequency for the low wind speed range and enhancing performance of the WECS. A series of wind turbines developed by Avante Garde Innovations under trade name, 'AVATAR' rated 1, 3 and 5 kW are commercially available. With the further research and policy support, such wind turbines have potential to emerge as a viable option to venture in large low wind regions spread over India.

REFERENCES

- [1] Executive summary on power sector for May 2020, Central Electricity Authority, http://www.cea.nic.in/reports/monthly/executivesummary/2020/exe_summary-05.pdf
- [2] Wind Speed Map by Envitrans Pvt. Ltd., <https://www.envitrans.com/windrosc.php>
- [3] Xiaolian Zhang, Yangfei Zhang, Sipeng Hao, Lei Wu and Wei Wei, (2019), An improved maximum power point tracking method based on decreasing torque gain for large scale wind turbines at low wind sites, *Electric Power Systems Research* 176 (Elsevier), Pg. No.1-10
- [4] Langlang Gumilar, Muhammad Afnan Habibi, Dwi Prihanto, Hendro Wicaksono, Achmad Gunaman and Jade Rosida Larasati, (2019), Maximum Power of Horizontal and Vertical Wind Turbine to Changes on Wind Speed and Number of Blade, *International Conference on Electrical, Electronics and Information Engineering (IEEE)*, Pg. No. 27-31
- [5] Anjana Jain, Shankar S. and Vanitha V., (2018), Power Generation Using Permanent Magnet Synchronous Generator (PMSG) Based Variable Speed Wind Energy Conversion System (WECS): An Overview, (Vol.-7, Issue-4) *Journal of Green Engineering*, Pg. No. 477-504

- [6] Anil Patel, Albert John Varghese and Soma Rajwade, (2017), Evaluate Yearly based Forecasting Model of Wind Energy Production Capacities in India using NARX Neural Network, (Vol-5, Issue-1) *International Journal of Recent Trends in Electrical & Electronics Engineering*, Pg.No.1-12
- [7] Apurb Das, Chimonyo K.B., Rohith Kumar, Gourishankar T. and Rani C, (2017), Vertical Axis and Horizontal Axis Wind Turbine- A Comprehensive Review, *International Conference on Energy, Communication, Data Analytics and Soft Computing (IEEE)* , Pg.No.2660-2669
- [8] Jazuli Fadil, Soedibyo and Mochamad Ashari (2017), Performance Comparison of Vertical Axis and Horizontal Axis Wind Turbines to Get Optimum Power Output, *International Conference on Quality in Research (IEEE)*, Pg.No.429-433
- [9] Winslow Andrew R., (2017), Urban Wind Generation: Comparing Horizontal and Vertical Axis Wind Turbines at Clark University in Worcester, Massachusetts, *International Development, Community and Environment (IDCE)*,127(Master's Papers)
- [10] Max Alexander Parker, Conaill Soraghan and Alex Giles, (2016), Comparison of power electronics lifetime between vertical- and horizontal-axis wind turbines, (Vol.-10, Issue-5), *IET Renewable Power Generation*, Pg. No.- 679-686
- [11] Ravi Anant Kishore, Anthony Marin, and Shashank Priya, (2014), Efficient Direct-Drive Small-Scale Low-Speed Wind Turbine, *Energy Harvesting and Systems*, Pg. No. 27-43
- [12] Abolfazl Pourrajabian, Reza Ebrahimi and Masoud Mirzaei, (2014), Applying micro scales of horizontal axis wind turbines for operation in low wind speed regions, *Energy Conversion and Management(Elsevier)*, Pg. No. 119-127
- [13] Magedi Moh, Saad M. and Norzelawati Asmuin, (2014), Comparison of Horizontal Axis Wind Turbines and Vertical Axis Wind Turbines, (Vol.-04, Issue-08) *IOSR Journal of Engineering*, Pg. No. 27-30
- [14] Yun Yang, Kwan-Tat Mok, Siew-Chong Tan and S. Y. R. Hui, (2013), Nonlinear Dynamic Power Tracking of Low-Power Wind Energy Conversion System, *IEEE Transactions on Power Electronics*
- [15] Zhuoran Zhang, Yangguang Yan, and Yangyang Tao, (2012), A New Topology of Low Speed Doubly Salient Brushless DC Generator for Wind Power Generation, (VOL.-48, NO.-3) *IEEE Transactions on Magnetics*, Pg. No. 1227-1233
- [16] David Wood, (2011), Small Wind Turbines, *Advances in Wind Energy Conversion Technology, Environmental Science and Engineering*, Pg. No. 195-211
- [17] Wang Fengxiang, Hou Qingming, Bo Jianlong and Pan Jian, (2005), Study on Control System of Low Speed PM Generator Direct Driven by Wind Turbine, *International Conference on Electrical Machines and Systems*, Pg. No. 1009-1012
- [18] Small Wind Energy, Directory Indian Wind Power-2019, Pg. No.10-12. Consolidated Energy Consultants Limited, Bhopal.

Achieving 'Knowledge Based Society' In Kandi Zones of Punjab through Skill Development Education

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ABSTRACT

This study is focusing Hoshiarpur in Punjab. Hoshiarpur is sub hilly and this region is generally called Kandi territory or semi-sloping region. This study is directed to discover the adequacy of advertising systems for expertise training in sub-mountain zones of Punjab. Improved advertising systems can cop up with the difficulties. Customary Marketing, print ads, for example, bulletins, boards, flyers and paper print advertisements and advanced marketing techniques can help in advancement of the significance of ability improvement training in rustic zones.

I INTRODUCTION

Skill development education is the leading necessity of modern society. It can change human beings to human resources, so we need to frame marketing strategies for the promotion of the same. Along with higher education, Skill Development Education (SDE) is equally important for the future generation. Most of the Skill Development training organizations in rural areas need quality.

Kandi region is full of seasonal streams. It falls into two equivalent segments of hills and plain nation. For Development of Kandi Zones, Skill Development Education (SDE) can be a crucial input. Sub-Mountain (Kandi), zones of Punjab have been trying particularly hard to achieve its Skill Development and educational objectives to attain the growth and overall development. While developing marketing strategies, it would be found that youth of Kandi regions must be considered for SDE. Skill Development Institutions essentially center on the youth can go for native advertising medium, video/visuals advertisements, social media, email and marketing automations; so that individuals and society can get the advantage.

II OBJECTIVES OF THE STUDY

Through this study an attempt is made to highlight the status of skill development in semi uneven sub-mountain areas as well as what challenges have been faced by the skill developmental institutions in Kandi areas. The objective youth are in the age gathering of 18 to 25 years and have a place with Agriculture families having a landholding of 3 to 5 section of land. Larger part of the guardians are uneducated however optimistic for their child training. They are

prepared to put resources into instruction for their youngsters; however they have no essential comprehension of the courses being offered by the Institutes. The study is conducted to the following objectives:

- (a) To determine the status of SDE in Kandi.
- (b) To know the problems of SDE in Kandi.
- (c) To find out best possible remedies to cope out those problems through marketing.

III METHODOLOGY ADOPTED

This research is based on survey that gathers data from members of the selected population with the aid of open and close ended questionnaire containing statements and interview from more than 300 respondents. The data has been gathered using both by primary data collection methods as well as secondary sources. The data generated using the questionnaire is analyzed and inference made out of the data could be used by the decision makers.

IV RESULT ANALYSIS

The fresh data collected through questionnaire is classified & tabulated into useful information by organizing and compiling the bits of data contained in each questionnaire i.e., responses from respondents and the observations are converted into easily understandable and orderly statistics, which are then used to organize and analyze the data. Basic analysis of the data involves testing of hypothesis. Further chi-square test is used as inferential statistics. The observation and responses are converted in to understandable and orderly statistics and further used to organize and analyze the data.

Chi – Square Test

Profile	Variable	Observed Values	Expected Value	Chi-Square	χ^2 Sum	Degree of Freedom (df)	Level of Significance (α)	Table Value	$\chi^2 >$ Table value	Hypothesis
Age	< 35	6	25	14.44	44.24	3	0.05	7.815	44.24 > 7.815	H1 : Satisfied
	35 - 45	43	25	12.96						
	45 - 55	40	25	9.00						
	> 55	11	25	7.84						
Teaching Staff and Facilities in Institute	Very Good	55	25	36.00	67.76	3	0.05	7.815	67.76 > 7.815	H1 : Satisfied
	Sufficient	33	25	2.56						
	Not Sufficient	8	25	11.56						
	Very Poor	4	25	17.64						
Motivation of Parent's through Marketing	Highly Agree	47	20	36.45	63.50	4	0.05	9.488	63.5 > 9.488	H1 : Satisfied
	Agree	28	20	3.20						
	Neutral	15	20	1.25						
	Highly Disagree	6	20	9.80						
	Disagree	4	20	12.80						
Promotional Strategies	Social Media	42	25	11.56	35.76	3	0.05	7.815	35.76 > 7.815	H1 : Satisfied
	Newspaper Advt.	37	25	5.76						
	Hoardings	15	25	4.00						
	Pamphlets	6	25	14.44						

V RECOMMENDATIONS

To create a new generation of professionals; Urgent action is needed to upgrade local regional Universities, fund educational institutes, start research centers, and design affordable skill programs in skill development institutes providing excellence in teaching for youth. Effective marketing is essential to increase parents' knowledge and awareness about the significance of SDE & future opportunities. Advertisements of Skill Development training institutes motivate parents to send youngsters for training. Recommendations to overcome existing problems in SDE in Kandi and rural areas of Punjab are:

- The defective curriculum, in our higher education system does not provide practical knowledge.
- For technical courses, distance education should be avoided.
- Colleges and Universities in rural areas of Punjab don't have adequate ICT facilities. It is the duty of NSDC to provide value education.
- Private institutions are mostly commercial and are profit oriented. So the government institutions need to be opened.
- The best marketing strategies can show signs of improvements.
- Conducive research environment should be created.
- Employability has to be ensured.
- Highly qualified faculty and improved technology for delivery of education should be ensured.
- International equivalency of certification should be ensured.
- NSDC, PMKVY & PSDM may shoulder greater responsibilities to ensure quality education.
- Political interference should be aborted.
- Scholarship schemes for economically poor students of any category should be introduced.

VI CONCLUSION

For improvement of Kandi Zone of Punjab, SDE can play a crucial importance in relation to the development. Most of youth is educated but lack of skills and technical knowledge is found. Youth of Kandi zone is facing serious unemployment problem. This can be overcome by making perfect marketing strategies regarding quality SDE for the youth of these deprived areas. There has been growth in the number of educational institutes, but the gap in rural-urban disparities, regional disparities, inadequate

infrastructure etc. seem to be widening. Thus a number of problems are inflicting our system of education in this area. Resolving these issues is a Herculean but not an impossible task.

Even a large portion of youth are being instructed, yet it is investigated that absence of natural ability to do something and specialized information in the present situation is missing. This can be overcome by:

- (a) Providing quality Skill Development training to the young people of these denied zones by creating establishments and these organizations ought to have good promotional schemes.
- (b) National Skill Development Corporation (NSDC) needs to take more effective activities in semi-sloping territories of Punjab.
- (c) Marketing techniques increase proficiency rate. The advertising for instruction can show signs of improvement. Decadal changes have been found in proficiency rate because of showcasing stunts. Presently we have increasingly computerized advertising approach to evacuate absence of education.
- (d) On the planet, India has one of the most youthful populace profiles with more than three-fourth of its populace underneath the age of 35 years. It is an expect to prepare individuals living in sub-mountain territories of Punjab, various aptitudes by 2022 in India and is likewise ready to make new chances, space and extent of the abilities of Indian Youth for self improvement.

An Overview of Covid-19 and Its Impact on It Industry

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I INTRODUCTION

Coronavirus or COVID-19 is a family of viruses that causes a range of illnesses in human including the common cough, cold and more severe forms like SARS and MERS which are life threatening. With the increase of COVID-19 cases and death rate worldwide, the WHO declared the virus outbreak a pandemic in the second week of March 2020. The Coronavirus outbreak and the subsequent country wide lockdown deeply impacted the Indian Economy. Majority of the companies are expecting a significant loss of revenue and jobs. The most severely impacted sectors are aviation, automotive and sea food etc. At the same time, many pharma companies are benefited due to huge demand for paracetamol and alike medicine. These companies gained priority due to the pandemic. This pandemic has made the people realize the importance of life and medical insurance. A lot of apps have been built in the past few months to help the people.

II IMPACT ON IT INDUSTRY

IT Industry is facing the significant slow down due to the fall in economy [2]. Most of the companies have asked their employees to work from home (remotely) on account of the health concerns. Many companies are facing massive loss. For example due to the lack of market availability of iPhones, Apple Inc.'s share has faced 10% fall in its face value. The parts of the iPhones are imported from China. A lot of conferences which are planned to organize to build a partnership among the top companies are cancelled due to the spread of deadly virus. Few of them were arranged teleconferences but those meetings don't get the same reach. COVID-19 is impacting almost all industries & sectors worldwide. Most impacted sectors are manufacturing and travel & transportation. Both sectors are set to be severely impacted by corona virus pandemic. During these crises, people came to realize the importance of the internet and technology and its major role in communication between the doctors and the public.

Sumeet Doshi, Sr. Director and Country Manager, Kronos India says "Work from home solutions have been a client demand for a long time. But now they have become top priority. And for many of those businesses for whom WFH is not an option such as hospitality and retail, bringing in 10-30% employees and starting work in a staggered manner will have to be flawless. Social distancing norms, team functionality and operational requirements – everything will have to be catered to" [4].

III POST-COVID-19 – THE WORLD WILL CHANGE

The cost of full damage due to COVID-19, both economic and non-economic, may not be predicted. It is only possible to identify the important lessons learnt from COVID-19 [3]. They are

- (a) Public health security will be given more importance like national security in the post-corona virus world. The Govt has already come out with a national digital health mission.
- (b) The economic impact of COVID-19 is expected to be big and ruinous. A social safety net like right to food, to shelter, to education can also be considered necessary for the poor.
- (c) Our Country India has taken a quick decision to help the countries US, Brazil, Europe and Israel. The sound remembers the mantra 'The whole world is one family'.
- (d) India fulfils the role of "net public health security provider" for the world by producing the 70% of production of global vaccines and the drugs like pharmaceutical ingredients and HCQ.
- (e) Sustainable Development Goals (SDG) may have to be re-standardized. One of the goal is "ensuring healthy lives and promote well-being for all at all ages". The impact of COVID-19 cannot be assumed. So it is very tough to predict the steps to be taken to fulfill the goal. Other SDG goals are "No Poverty" and "Zero Hunger".

IV THREATS AND BLOOMING OPPORTUNITIES IN IT INDUSTRY

On the other side of the corontine, a lot of opportunities are opened in IT industry. 5th generation (5G) Technology is the best example for that. This will help to increase the remote interaction and also it leads to the further development of e-commerce. Consumers directly buy goods or services from the distributors with the help of internet via shopping search engine. Some of the developing online industries are Electronic Business, Digital distribution, online action business model, Online shopping malls, online pharmacy, Retail therapy, Tourist trop and Virtual Shopping malls.

V TEN BOOMING INDUSTRIES DUE TO COVID 19

This will give new perspectives and insights how people need to modify business models and how to start a business once COVID 19 is over or during the crisis.

- (a) **E-Learning** - New skills, new knowledge have to be upgraded in order to find a job due to mass lay-offs. CEO's and business owners are thinking of new insights and ideas for learning opportunities from home.
- (b) **Medical Product** - This refers anything related to curing or preventing corona virus. Eg. Hand sanitizers, Masks. Even though these are in huge demand and shortage in the world.
- (c) **Delivery Services** - People are ordering delivery. They buy more things on-line and the delivery services are huge. Companies related to this sector will be booming as well.
- (d) **In-Home Entertainment Industry** - Some are Netflix, YouTube, Amazon Prime. Due to this, lot of content creator's revenue is down as advertisers using this platform which brings the industry a profitable business.
- (e) **Online gaming industry** - People wants some kind of entertainment to escape from reality. Online casino's and multiplayer gamines are getting bigger and bigger user base.
- (f) **Online dating industry** - People are really lonely and isolated than ever before. They carve for human connection. Not even the dating websites but particularly that serves the dating websites industry will be booming as well.
- (g) **Software industry** - Especially the software helps people to connect and work comfortably like skypee and zoom. That helps people to connect and communicate better. Some software helps people to start online business. That will be booming as well.
- (h) **Supplement industry** - People are getting more health conscious and more fearful. They want

strong immune system. They want to take care of the body with more vitamin and supplement. People are not buying supplement for themselves but also for their family members too.

- (i) **Super market** - Many people are stocking and over buying food and groceries. The super markets are getting more sales and running out of stock. They're buying more than what they require out of fear. **52% of** consumers that won't go back to grocery shopping in store. Since March, online shopping for groceries has grown by 400%. In the coming months, **58% of** online shoppers are expected to order more online. People are also turned to continue online shopping to reduce their exposure to others amid the outbreak.
- (j) **Cleaning industry** - In Offices, hospitals and homes, the people want to have a cleaner and sanitize the places. They always hire a high quality group of professionals to clean their places.

VI WORLD HEALTH ORGANIZATION (WHO) – STATISTICAL REPORT

(a) Global Report

This report gives a small flavor of current COVID-19 epidemiological situation, present official case and death counts at World Wide.

Globally, as of 10:30am CEST, 28 June 2020, there have been 9,825,539 confirmed cases of COVID-19, including 495,388 deaths, reported to WHO [1].

WHO Coronavirus Disease (COVID-19) Dashboard
Data last updated: 2020/06/28, 11:30am CEST

Situation by WHO Region

Americas	4,933,972 confirmed
Europe	2,638,903 confirmed
Eastern Mediterranean	1,024,222 confirmed
South-East Asia	735,854 confirmed
Africa	278,815 confirmed
Western Pacific	213,032 confirmed

Source: World Health Organization
Data may be incomplete for the current day or week.

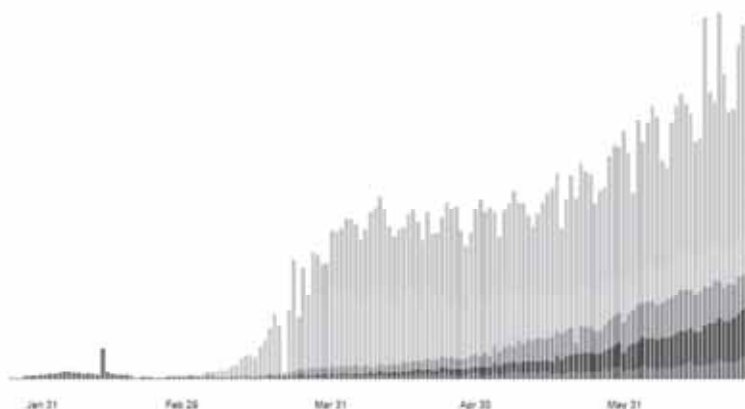


Fig.1 Graphical Representation of Global Statistical Report

(b) National(INDIA) Statistical Report

As of 10:30am CEST, 28 June 2020, confirmed statistics of COVID-19 in INDIA, reported by WHO. Month wise consolidated report is generated from the WHO surveillance data collection.

Month_reported	March'20	April'20	May '20	June '20
New_cases	1161	31799	149093	346716
Cumulative_cases	8440	413862	2939503	9443216
New_deaths	31	1042	4090	10931
Cumulative_deaths	181	13061	89793	286322

Table 1
National(INDIA) Statistical Report

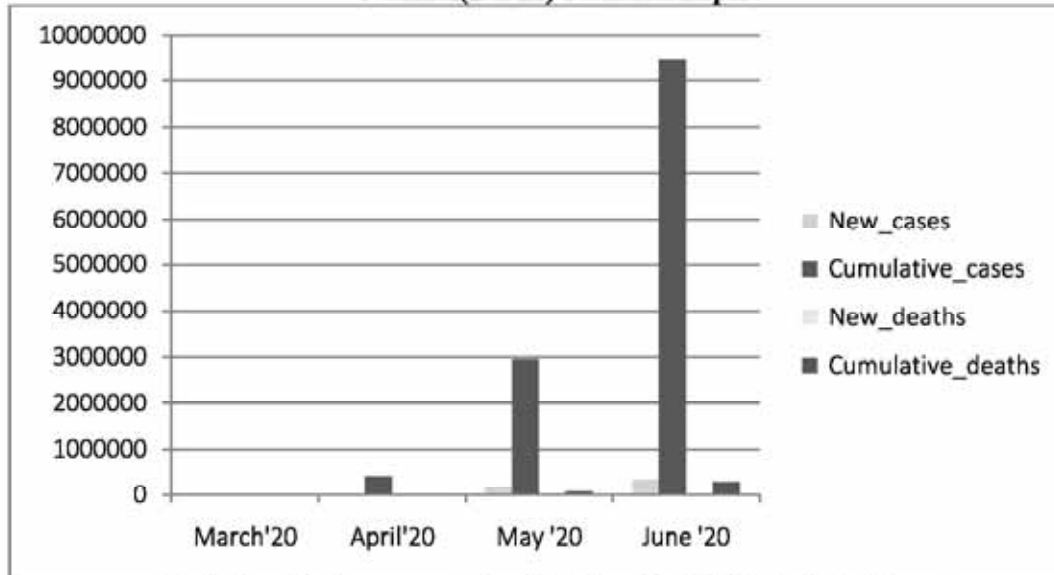


Fig.1 Graphical representation of National (INDIA) Statistical Report

VII CONCLUSION

The spread of novel coronavirus has changed the rhythm of the globe. People are intensely concerned about the denouncement of the World Health Organization (WHO). Everyone wants to turn the page on COVID-19 as soon as possible. But the chapter of COVID-19 is unpredictable. We the people start with the indivisibility of all aspects of security and we should stand ready to help the governments, whatever their policies may be. COVID-19 affects the collective economic architecture. Stagnation in business activity and distraction in universal production chains have had an enormous impact on the world economy. To

overcome the consequences caused by COVID-19, countries need to stay more united than ever and to gather all strengths and resources.

REFERENCES

- [1] <https://www.who.int>
- [2] www.marketforecast.com
- [3] www.hindustantimes.com
- [4] www.economictimes.indiatimes.com

ANN Optimization for Short Term Forecasting of Solar PV Power

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ABSTRACT

One of the renewable energy resources used worldwide is solar energy. Its availability varies from day to day and even within a day itself depending on season. Due to this variability, forecasting of solar PV power becomes necessary but also challenging. The reasonably accurate forecast is an important input to the state load dispatch centres for scheduling power generation by various sources of energy. Artificial Neural Network (ANN) is widely used for such forecasting which involves training of the ANN using Bayesian Regularization and Levenberg-Marquardt algorithms. The forecasting approaches endeavour to minimize the error. In this paper, ANN based short term PV power forecasting algorithm is used to forecast solar PV power 6 hour ahead using trial and error approach and to compare different training approaches to reach at an optimized ANN solution.

Keywords: Solar PV forecasting, Artificial Neural Network, Bayesian Regularization, Levenberg-Marquardt algorithm

I INTRODUCTION

A renewable energy source for power generation helps to reduce greenhouse gases and protects environment [1]. Globally the installed power capacity of renewable energy based sources is rapidly increasing [2]. With the use of solar and wind energy, India is steadily moving towards renewable power target of 175 GW by 2022. National Institute of Wind energy (NIWE) is an Autonomous Research & Development Institution under the Ministry of New and Renewable Energy (MNRE), Government of India that provides high quality various services including forecasting of wind and solar resources [3]. MNRE launched a Solar Radiation resource assessment (SRRA) project in the year 2011 in India aiming for large scale utilization of solar energy [4].

Sun is a clean and renewable energy source available in plenty in the form of light and heat. The DC voltage obtained from the solar PV system can be enhanced using boost converter [5]. The forecasting of wind and solar energy for power generation is very difficult due to their variable nature unlike coal, nuclear or hydropower plants [6]. Forecasting of solar PV power facilitates the state load dispatch centre to schedule the generation of various power plants. A converter based photovoltaic (PV) module is simulated using mathematical modelling. Data of solar power is collected for the purpose of forecasting [7].

Forecasting methods utilize solar resource data from satellite and weather station, output from numerical weather prediction (NWP) model besides solar PV system data. Forecasting of solar energy is generally based on physical and statistical approaches. Physical approach utilizes PV modules to forecast solar power. With the help of available software tools, necessary forecast results can be obtained by simulation in statistical approach [8].

Requirement of forecasting energy depends on different time horizon. On the basis of various time horizons, solar forecasting can be classified into very short term or now-casting (2 to 3 hours ahead), short term (for next

few days) and long term (monthly to yearly basis) [9][10].

The rapid change in solar irradiance on the day of forecasting leads to wide variation in power generation and results in higher forecasting error. Higher accuracy in forecasting helps in proper generation scheduling and thus in making optimum utilization natural resource. Forecasting accuracy helps to ease price risks associated with the power exchange and thereby evading economic penalties on the balancing market [11]. Power can be planned to consumers only when their demand pattern is known. Hourly load data of consumers were used in neural network model to forecast future values of load data trained by LM algorithm [12].

A forecasting model for a solar power plant was developed using LM optimization approach. For multi-layered feed forward network architecture, LM approach helped to choose the best training rate through back propagation method [13][14][15]. To achieve better accuracy in forecasting, optimization of LM algorithm along with a recurrent neural network (RNN) model helps to forecast solar power generation in very short intervals [16].

In this paper Section II deals with various steps in methodology for forecasting are elaborated. Section III deals with the application of ANN to forecast solar PV power 6 hour ahead for Bhilai, C.G. (India). The results and discussion are provided in Section IV. Finally, the conclusions drawn from the work is discussed.

II METHODOLOGY

The purpose of this work is to simulate a Short Term PV Power Forecasting with the help of Artificial Neural Networks which can forecast solar PV power 6 hour ahead. A Multi Layered Back Propagation Neural Network is used for achieving this. Trial and error approach was utilized to obtain the optimized network for the application.

The steps for designing the neural networks for solar power forecasting are given below:

- Data collection: (Data can be collected from Photovoltaic Geographical Information System (PVGIS), NASA, local meteorological station etc.)
- Creating the Neural Network: (The input values to be assigned to the network are fixed).
- Configuration of the Network: (The data to be used for Training, Validation and Testing and the number of hidden neurons are to be fixed)
- Initializing the weights and biases for the network: (This is done automatically by the Neural Network using software program)
- Training the Network: (An appropriate method to train the Neural Network has to be selected. The available optimization methods are Levenberg-Marquardt, Bayesian Regularization, Scaled Conjugate Gradient etc.)
- Validating the results: (Analysing the values of errors, regression plots and comparing forecasted and actual values)
- Using the network for an application: (The developed neural network can be used for the application for which it was created)

Coding for forecasting can be done in R, Scilab, Python, MATLAB etc.

III APPLICATION OF DEVELOPED METHODOLOGY

The Neural Network based PV forecasting method is applied on Bhilai, Chattisgarh, India (Latitude - 21.220 N, Longitude- 81.380 E). The Input Data were collected online from Photovoltaic Geographical Information System (PVGIS), an official website of European Union that provides free and open access to full time series of hourly data solar radiation data. For obtaining the Short Term PV Power Forecasting, MATLAB 2016a is used which provides a multi paradigm numerical computing environment and a proprietary programming language developed by Math Works. Coding is done using Command Window and Script Editor. Neural Network toolbox available in MATLAB is used to simulate the required network.

Two inputs i.e. temperature and irradiance are given to the neural network. Output of the neural network is PV power. There are 256 hidden layers in the network. The optimum value 256 for hidden layers was reached by trial and error. Any deviation from the value 256 increases the error. The forecasted results are monitored looking at the values of error and regression plots. The Neural Networks structure is shown in Fig No.1.



Fig.1: Neural Network structure for Short Term PV Power Forecasting

The training of neural network was first done using Levenberg-Marquardt algorithm. While training the error values using Levenberg-Marquardt optimization were very large and the forecasted value had large error and was not accurate. Hence, Bayesian Regularization

was used which minimised the error and improved the forecast accuracy. But time required for training was more. The Fig No.2 shows the Neural Network Training status.

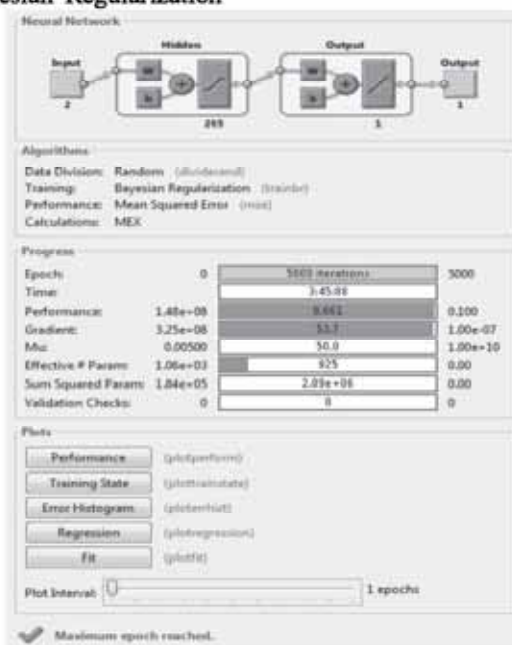


Fig.2: Neural Network Training Status

Data Division is done using "divider and" to separate the data into three sets of values, viz. training, validation

and testing. By default 70% of values are allocated for training and 15% each for validation and testing.

Training is done using the functions “trainlm” and “trainbr”. Here, “trainlm” is a network training function in which the weights and bias are updated using Levenberg-Marquardt optimization. This is normally the first choice and the fastest back propagation algorithm. The network training function for Bayesian Regularization is “trainbr” that updates weights and bias using Levenberg-Marquardt optimization. But here it minimizes a combination of weights and squared errors and determines the combination to produce a well generalized network.

Error is checked using “mse” function. It is a network performance function which measures the error of a neural network based on the mean of squared errors.

The Neural Network stops the training when any of following conditions is met:

- Maximum number of iterations as defined is reached.
- Maximum execution time is reached.
- Error is minimized within specified limit.
- Minimum error gradient value is reached ($1e-7$ in case of Bayesian Regularization and Levenberg-Marquardt optimization).
- Maximum value for “mu” function to control weight of neuron updation process during training

is reached ($1e10$ in case of Bayesian Regularization, and Levenberg-Marquardt optimization)

This Condition given below holds true only for Levenberg-Marquardt optimization:

- The validation has deteriorated even after 6 times validation failures (system built in)

IV RESULTS AND DISCUSSION

The Neural Network was simulated and run successfully for Short Term PV Power Forecasting using Back propagation ANN trained with Bayesian Regularization & Levenberg-Marquardt algorithm.

Here 8762 data (i.e., hourly data of a year) were used for training the neural network. The graph of Actual PV Power vs. Forecasted PV Power obtained from Levenberg-Marquardt optimization is shown in Fig No.3. A small portion of graph in Fig No.3 has been zoomed and shown in Fig No. 4 to have a clear view of the superimposition of actual PV power plot on the forecasted PV plot. It can be seen that the forecasted values have low accuracy as the training could not be fully completed.

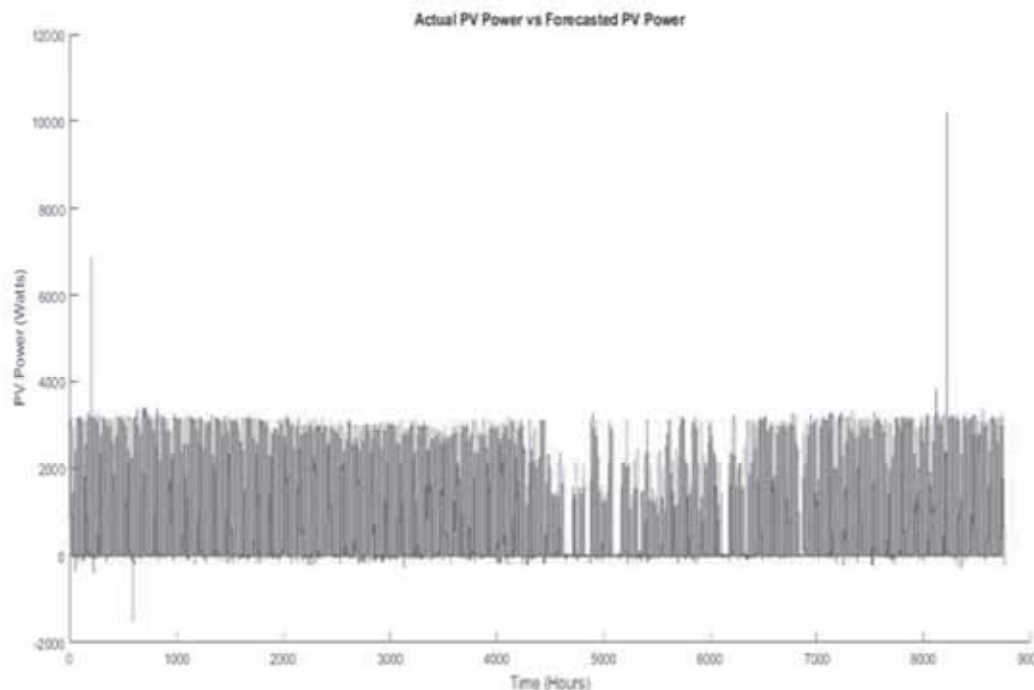


Fig.3: Actual PV power vs. Forecasted PV Power produced using Levenberg-Marquardt optimization

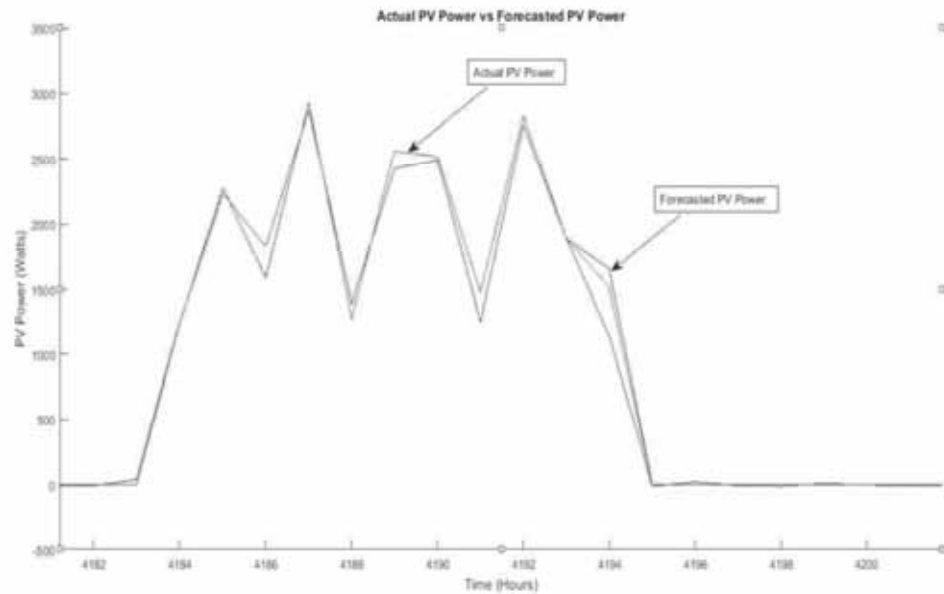


Fig. 4: Actual PV power vs. Forecasted PV Power produced using Levenberg-Marquardt optimization

The graph of Actual PV Power vs. Forecasted PV Power produced using Bayesian Regularization is shown in Fig No. 5. A small portion of graph in Fig

No.5 has been zoomed and shown in Fig No. 6 for clarity. The forecasted results were found have an average accuracy of 99.3%.

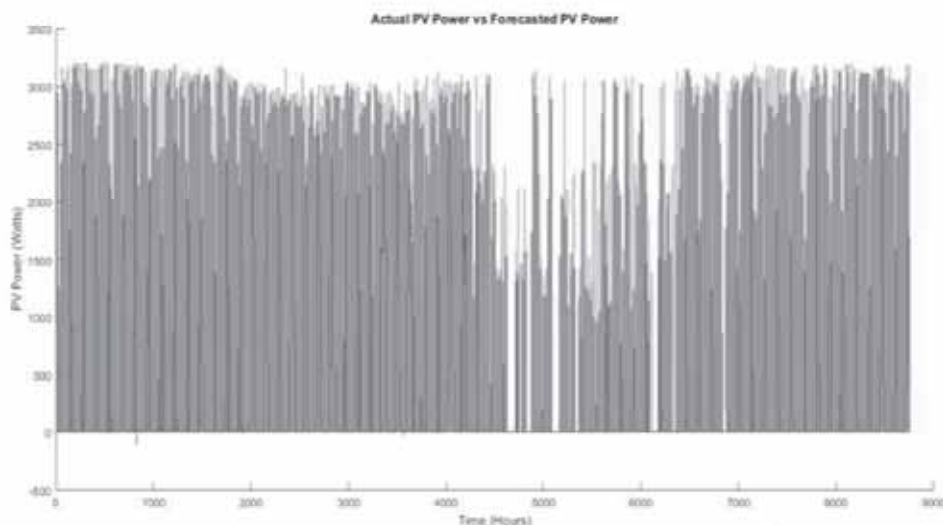


Fig. 5: Actual PV power vs. Forecasted PV Power produced using Bayesian Regularization

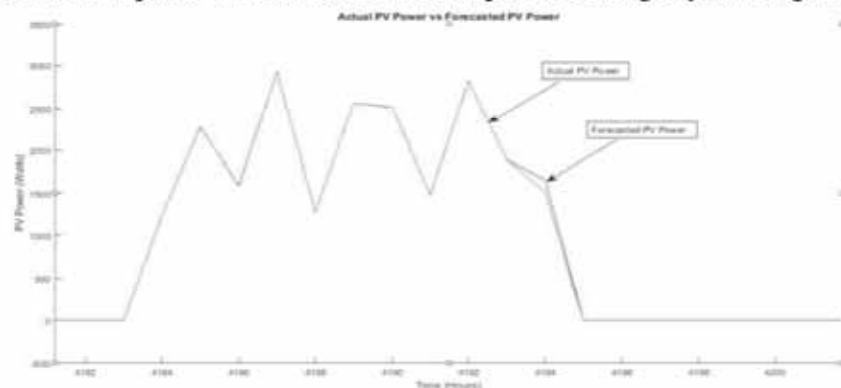


Fig. 6: Actual PV power vs. Forecasted PV Power produced using Bayesian Regularization

The Regression plots for the Neural Network using both the training methods are shown in Fig No. 7a and Fig No. 7b. The regression plot displays the output of the network with respect to the data for training, validation,

and test sets. For a perfect fit, the data should fall along a 45 degree line, where the network outputs match with the targets.

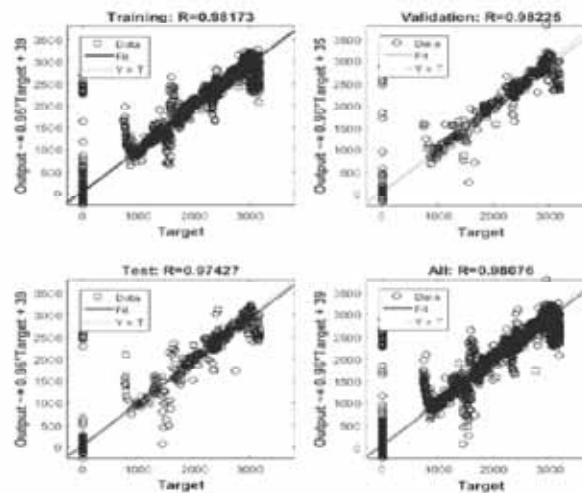


Fig. 7a: Regression Plot for Levenberg-Marquardt optimization

It is seen from Fig. 7a that there is large deviation from the target whereas in Fig. No. 7b a good matching well within a narrow band resulting in high accuracy in forecasting.

V CONCLUSION

The simulation for ANN based optimized short term PV power to forecast 6 hour ahead was simulated successfully for Bhilai, Chhattisgarh. Here both Levenberg-Marquardt optimization and Bayesian

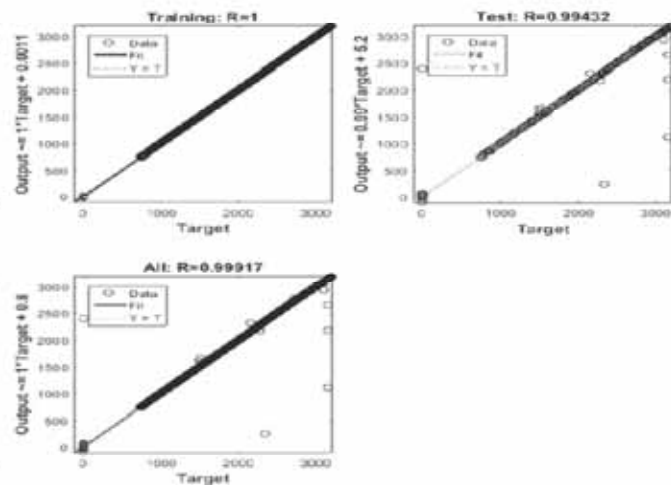


Fig.7b: Regression Plot for Bayesian Regularization

Regularization training methods were used. It was observed that Levenberg-Marquardt optimization takes less time (36 iterations) to train neural network but it results in very high error ($MSE=3.7443e+04$) i.e. poor accuracy which makes it unsuitable for very large number of inputs. By Bayesian Regularization, the error was $MSE=0.6610$ i.e. high accuracy of 99.3% (after 5000 iterations) was obtained but it took more time to train the neural network. Thus, ANN trained by Bayesian Regularization performs better for the short term PV power forecasting.

REFERENCE

- [1] Reju Roy and N. Vinodhini, (2018), Comparative Analysis between Wind and Solar Forecasting Methods Using Artificial Neural Networks and Fuzzy Logic, *Journal on Science Engineering and Technology* (Volume 5, Issue No. 02)
- [2] Michael Dale, (2013), A Comparative Analysis of Energy Costs of Photovoltaic, Solar Thermal, and Wind Electricity Generation Technologies, *Applied Sciences* (ISSN 2076-3417)
- [3] Gomathinayagam S., (2019), Trails of Technologies in Wind Energy Development in India and Future Trends, *A Newsletter from Indian Wind Power, Chennai* (ISSUE – 6)
- [4] Kumar A., Gomathinayagam S., Giridhar G., Ramdhan V., Meyer R, Mitra I, Schwandt M. and Chhatbar K., (2012), Solar Resource Assessment and Mapping of India, *SolarPACES, Marrakech, Morocco*
- [5] Anil Patel, Albert John Varghese, Soma Rajwade, (2017), Comparison of electrical output quantity of photovoltaic module through boost converter in MATLAB - simulink environment, *Research Journal of Engineering Sciences*, (Vol. 6, ISSN 2278 – 9472)
- [6] Kristian Holm, (2019), Renewable Energy - It is all a Balancing Act", *A Newsletter from Indian Wind Power, Chennai* (ISSUE – 6)
- [7] Anil Patel, Albert John Varghese, (2017), Simulation of Converter based Solar PV Module, for Prediction of Output Solar Power Generation using NARX Neural Network, *International Journal for Scientific Research & Development* (Vol. 5, Issue 04, ISSN: 2321-0613)

- [8] Sophie Pelland, Jan Remund, Jan Kleissl, Takashi Oozeki, Karel De Brabandere, (2013), Photovoltaic and Solar Forecasting: State of the Art, *International Energy Agency Photovoltaic Power Systems Programme* (ISBN: 978-3-906042-13-8)
- [9] Bella Espinar, Jose Luis Aznarte, Robin Girard, Alfred Mbairadjim Moussa, Georges Kariniotakis, (2010) Photovoltaic Forecasting: A state of the art, 5th European PV-Hybrid and Mini-Grid Conference (ISBN: 978-3-941785-15-1)
- [10] Utpal Kumar Das, Kok Soon Tey, Mehdi Seyedmahmoudian, Saad Mekhilef, Moh Yamani Idna Idris, Willem Van Deventer, Bend Horan, Alex Stojcevski, (2018), Forecasting of photovoltaic power generation and model optimization: A review, *Renewable and Sustainable Energy Reviews* (Volume 81, Part 1)
- [11] Davide Caputo, Francesco Grimaccia, Marco Mussetta, Riccardo E. Zich, Member, (2010), Photovoltaic Plants Predictive Model by means of ANN trained by a Hybrid Evolutionary Algorithm, *World Congress on Computational Intelligence*, IEEE (ISBN:978-1-4244-8126-2)
- [12] Anil Patel, Albert John Varghese, (2017), Evaluate Hourly based Load Forecasting using NARX Neural Network in MATLAB Environment, *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*, (Vol. 6, Issue 3, ISSN: 2278 – 8875)
- [13] Garima Sharma, Alok Pandey and Pravesh Chaudhary, (2016), Prediction of Output Solar Power Generation Using Neural Network Time Series Method, 3rd International Conference on Electrical, Electronics, Engineering Trends, Communication, Optimization and Sciences (EEECOS)
- [14] Watetakarn S. and Premrudeepreechacharn S., (2015), Forecasting of Solar Irradiance for Solar Power Plants by Artificial Neural Network, *Innovative Smart Grid Technologies - Asia (ISGT ASIA)*, IEEE
- [15] Ghanbarzadeh A., Noghrehabadi A.R., Assareh E., Behrang M.A., (2009), Solar radiation forecasting based on meteorological data using artificial neural networks, *International Conference on Industrial Informatics IEEE* (ISBN: 978-1-4244-3760-3/09)
- [16] Shahid M. Awan, Zubair A. Khan, Muhammad Aslam, (2018), Solar Generation Forecasting by Recurrent Neural Networks optimized by Levenberg-Marquardt Algorithm, *44th Annual Conference of the IEEE Industrial Electronics Society*, IEEE (ISBN:978-1-5090-6684-1/18)

Developments in Matrix Converter - A Review

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ABSTRACT

A matrix converter is a converter with a single stage conversion comprising a group of nine switches connecting the three phase source to the load. Matrix Converter can transform inputs with constant amplitude, frequency, variable amplitude and variable frequency into three-phase outputs because it can generate any output frequency because of multiple inputs. The Matrix Converter has four intrinsic features, a powerful input power factor, no intermediate DC link for energy storage, high regenerative capacity, and improved power density, lightweight and robust features. It is a result of several innovations over the decades due to which has made matrix converter very versatile. This paper presents developments that have taken place in nine way matrix converter topologies and modulation, protection and diversified applications.

Keywords: Development of Matrix Converter, Electrical Drives, protection of matrix converter

I INTRODUCTION

In the academic community, for over three decades, the research on matrix converter and its extended topologies has been performed. Large numbers of research papers have been published on Matrix a converter which has made it a 'Power Electronics Evergreen'. The researchers continue to develop various AC-AC/AC-DC-AC converter topologies.

The author [1] presented the effective voltage aspect of AC-AC pulsed direct converters. There was an implicit threshold irrespective of control strategy. An innovative converter control algorithm was presented for maximum output with some interesting features. The prospect of enhancing the matrix conversion control technique using feedback approaches and the converter's feedback-based modulation approach was discussed.

The authors [2-3], discussed development and growth with comprehensive history of matrix converter. Thus far, the best mechanism developed for modulation has been the control techniques. New approaches are developed and used to solve the current switching problem that includes nine switch arrays in one module in both the directions. The author finally addressed the issues related to high-voltage safety, filter use and fault driving power of the MC. Author presented a well-known, intermediate DC-converter system for use in AC-AC converters.

Eventually the vector modulation governs direct matrix converter. The proposed converter clearly demonstrates the power converter information, resulting in versatility of PWM control technology. A new topology [6]-[7] was developed in which the converter transforms input AC to output power by direct transfer, avoiding the use of input filters or intermediate DC connector condensers with the exception of certain minor Snubber parts. On the converter's proposed topology input line, the current waveform is similar to the diode corrector, with an intermediate DC inducer. Induction motors are normally operated using PWM-based source voltage inverters. The matrix converter is the best option among various switching combinations [9-10]. The advantage of such converters is that they operate in both directions and deliver sinusoidal output. The main drawback was the unreliable bidirectional transition [11]. By connecting two switches to diodes, two-way load switches can be used.

In this paper, the key features of matrix converter are mentioned in section II whereas section III presents a brief account of the developments taken place in matrix converters. Section IV describes the protection and operational safety aspects. Section V presents the applications of matrix converters.

A 3-phase to 3-phase converter topology is shown in Fig No. 1.

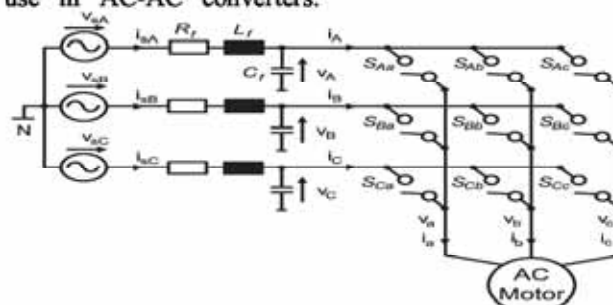


Fig.1 A 3-phase to 3-phase Matrix Converter Topology [3]

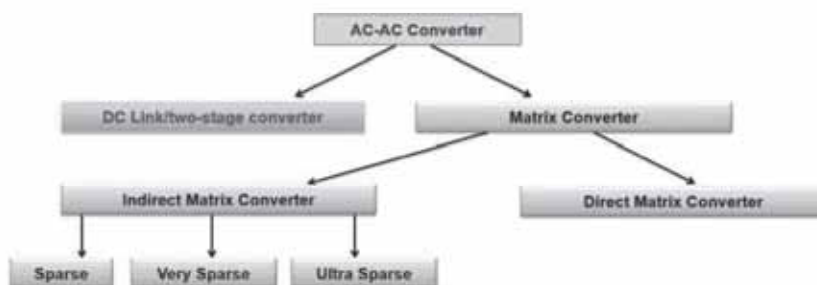


Fig. 2 Classification of AC-AC converters used in electrical drives [6]

II KEY FEATURES OF MATRIX CONVERTER

- (a) AC/AC direct electrical power conversion.
- (b) There are 2^9 (512) possible combinations.
- (c) Each output phase can be connected to any input phase.
- (d) Compact
- (e) Safer (being used in hostile environments, aircraft, submarine.)
- (f) Bidirectional power flow, 4 quadrant converter.

- (g) No restriction on input and output frequency within limits imposed by switching frequency.
- (h) Sinusoidal input and output current /voltage waveforms.
- (i) 9 bidirectional switches. (18 IGBT + 18 diodes).
- (j) The matrix converter topology provides universal power conversion options such as AC-DC, DC-AC, DC-DC or AC-AC besides 1-3 phase conversions and vice versa. .
- (k) Matrix converter can convert three phase to single phase or single phase to three phase power at desired frequency.

III DEVELOPMENTS IN MATRIX CONVERTER

The Hazeltine Research Cooperation in 1923 filed a patent for a matrix like electric power converter based on electromechanical smirches.

In 1959 a patent from Specialties Development Corporation was filed for half bridge matrix converter (HBSC) topology using BJTs.

In 1960, Westinghouse Electric Corporation filed a patent for forced commutated current converter (FCCC) for aircraft generator systems.

In 1967, Westinghouse filed another patent for controlling the variable frequency converting switching units of FCCC's in order to control the output voltage.

In 1976, Jones and Bose were first to publish experimental results of three phases to single phase FCCC's using BJTs.

In 1980, the power circuit of the conventional matrix converter as a matrix of bidirectional switches and introduced the "matrix converter"

The use of space vectors and control of MCs was proposed by Braun and Hasse in 1983.

In 1985 number of research projects has been conducted for the application of MC, starting with the investigation of AC motor drives.

In 1988 it was experimentally confirmed that a MC with nine four-quadrant switches can be effectively used for vector control of an induction machine.

In 1989, Holtz and Bocklens, published the research article on indirect matrix converter (IMC) topology.

In 2001 first experimental results of IMCs were published.

A novel topology of IMC for isolated direct AC-AC power conversion for a variable frequency input and a constant frequency output. was proposed in 2003 by Cha and Enjeti.

A modified version of IMC for UPS applications was investigated in 2005.

In 2006, Mohapatra and Mohan suggested full bridge IMC topology for supplying an open winding AC machine with a limited common mode voltage.

In 2009, Yamamoto described another means of extending the output voltage range by a modular interconnection of multiple identical MCs by a common multi-pulse transformer.

In 2011, Ge and Peng proposed the most recent topologies, Z-source MCs (ZSMCs).

In 2012, Sergio Sausa and Sonio Pinto, proposed a control system for an IMC with a Z-source while at same time guaranteeing unity power factor.

In 2015, V.V. Subramayana and Martin Jara, proposed a new ZCS single phase matrix converter for the traction applications. This soft switching MC is enhanced with auxiliary resonant circuit in order to achieve a zero current switching for main bidirectional switches of the matrix converter.

In 2018, Boran Fan and Kui Wang, proposed modular multilevel matrix converter for high voltage high power applications. This research offers its significant advantage in adjustable motor speed drives.

In 2020, Yuzhou Li and Yun Wei Li proposed a general synthesizing approach of multilevel MC (MLMC)

topologies and analyzed with the considerations of the voltage source, current source and matrix type MLMC.

IV PROTECTION AND OPERATIONAL SAFETY

The absence of DC-link affects the safety and failures of the matrix converter e.g. over-voltage. In 1997 protection circuit was introduced which consisted of six additional diodes. In 1998 a new protection circuit was invented by Schuster, without reactive clamp elements using varistors only. Barun, in 2000 proposed a new protection circuit based on varistors and suppressor diodes. This circuit replaced the standard diode clamp circuit. Schonberger in 2007 proposed an active clamp circuit for PMSM drive. The latest technology for protection of matrix converter is Field programmable gate arrays (FPGA) circuits. FPGA are semiconductor devices that are on a matrix of configurable logic blocks connected by programmable interconnect.

V APPLICATION OF MATRIX CONVERTERS

The matrix converter is considered for bidirectional variable frequency AC drives for low and medium voltage applications. Application areas are as follows:

- (a) Field control.
- (b) SCIG conversion of wind energy,
- (c) Dual generators.
- (d) Deep sea robots.
- (e) Contact less energy transmission
- (f) AC utility power units.

In 2005, Yaskawa, the Japanese drive manufacture, presented the world's first commercial MC. Table No. 2 gives an overview of the research on matrix converters reported by various industries.

Table 1
An overview of reported research on MC in industries [23]

Company	MC topology	Year
Westinghouse	CMC	1988
Mitsubishi Electric	I-IMC	1990
ABB & Daimler	CMC	1997
ABB	CMC	2002
Alstom	CMC	2003
Bosch	S-A-X	2004
Fuji Electric	I-IMC	2005
Hitachi Electric	CMC	2006
Meidensha	CMC	2007
Yaskawa	ARCP MC	2009
Schneider-Toshiba	CMC-IMC	2010
Hyundai heavy industry	CMC	2011
Siemens Electric	Multilevel MC	2013
Samsung	Z-source MC	2014
Arvi system and Control	IMC	2016
Emerson Network Power	CMC	2017
Toyo Electric	CMC-IMC	2019
Reillo PCI	I-IMC	2020

VI CONCLUSION

A review of developments in matrix converters has been presented. The paper concludes that topology, modulation methods, protection circuit algorithms have been extensively developed which has made provided it versatility in any combination of AC/DC and 1/3 phase conversions at required voltages and frequencies. It has widened the applications of matrix converters in industries, power sector, transportation section etc. The innovations in matrix converters continue.

REFERENCES

- [1] Roy K.C., (2014) Investigations on Matrix Converter for Induction Motor Drive during Abnormal Conditions, *IEEE Trans. Power Electronics*, vol.28 pp. 1-4.
- [2] Quiraishi K. and Dubey S.P, (2014) Comparative Analysis on Matrix Converter Fed Induction Motor With No Load and Load Condition, *IET Power Electron* vol. 2, no. 4, pp. 331-334,

- [3] Karlovský P. and Lettl J., (2017) Application of MRAS Algorithm to Replace the Speed Sensor in Induction Motor Drive System", *Procedia Eng.*, vol. 192, pp. 421-426, .
- [4] Bhavssar A. and Khampariya P., (2017) ,Induction Motor Fed by Matrix Converter Modeling Simulation and Implementation, *IEEE Trans. Power Electron.*, no. 4, pp. 1079-1083,
- [5] Sri Vidhya D. and Venkatesan T., (2018) ,Quasi-Z-Source Indirect Matrix Converter Fed Induction Motor Drive for Flow Control of Dye in Paper Mill, *IEEE Trans. Power Electron.*, vol. 33, no. 2, pp. 1476-1486.
- [6] Mohamed E.E.M. and Sayed M.A., (2016) , Matrix converters and three-phase inverters fed linear induction motor drives-Performance compare, *Ain Shams Eng. J.*,
- [7] Bhavithra S. K. and Balasubramonian M.,(2016), Matrix Converter Fed Induction Motor Drive, *Turkish J. Electr. Eng Comput. Sci.*, vol. 24, no. 3, pp. 776-781,
- [8] NNADI D. and OMEJE C.,(2016), Steady state analysis of a three phase indirect matrix converter fed 10 HP 220 V 50 Hz induction machine for efficient energy generation, *Turkish J. Electr. Eng. Comput. Sci.*, vol. 24, pp. 3877-3897.
- [9] Shi T., Zhang X., S. An, Yan Y. and Xia C., (2016) Harmonic suppression modulation strategy for ultra-sparse matrix converter, *IET Power Electron.*, vol. 9, no. 3, pp. 589-599.
- [10] Li, X . Sun Y., Zhang,J. Su M. and Huang S., (2017) Modulation Methods for Indirect Matrix Converter Extending the Input Reactive Power Range, *IEEE Trans. Power Electron.*, vol. 32, no. 6, pp. 4852-4863,
- [11] Sun Y., Xiong,W. Su M., Li,X. Dan H. and Yang J., (2016), Carrier-based modulation strategies for multi-modular matrix converter, *IEEE Trans. Ind. Electron.*, vol. 63, no. 3, pp. 1350-1360, Mar.
- [12] Lei J., Zhou B., Bian J., Qin X. and Wei J., (2016) ,A simple method for sinusoidal input currents of matrix converter under unbalanced input voltages, *IEEE Trans. Power Electron.*, vol. 31, no. 1, pp. 21-25,
- [13] Sun Y., Xiong W., Su M., Dan H., Li X. and Yang J.,(2016),Modulation strategies based on mathematical construction method for multi-modular matrix converter, *IEEE Trans. Power Electron.*, vol. 31, no. 8, pp. 5423-5434,
- [14] Hamouda M., Blanchette H. F. and Al-Haddad K., (2016),Unity power factor operation of indirect matrix converter tied to unbalanced grid, *IEEE Trans. Power Electron.*, vol. 31, no. 2, pp. 1095-1107,
- [15] Pinto S. Alcaria P., Monteiro J. and Silva J.F., (2016),Matrix converter based active distribution transformer, *IEEE Trans. Power Del.*, vol. 31, no. 4, pp. 1493-1501,
- [16] Wang H., Su M. Sun,Y. Yang J., Zhang G., Gui, W. et al.,(2016),Two-stage matrix converter based on third-harmonic injection technique, *IEEE Trans. Power Electron*, vol. 31, no. 1, pp. 533-547.
- [17] Sun Y., Xiong W., M. Su, X. Li, Dan H. and Yang J.,(2016),Carrier-based modulation strategies for multi-modular matrix converter, *IEEE Trans. Ind. Electron.*, vol. 63, no. 3, pp. 1350-1360,
- [18] Lei J., Zhou B., Bian J., Qin X. and Wei J., (2016) A simple method for sinusoidal input currents of matrix converter under unbalanced input voltages, *IEEE Trans. Power Electron.*, vol. 31, no. 1, pp. 21-25,
- [19] Sun Y, Xiong W., M. Su, Dan H., X. Li and Yang J.,(2016),Modulation strategies based on mathematical construction method for multi-modular matrix converter, *IEEE Trans. Power Electron.*, vol. 31, no. 8, pp. 5423-5434,
- [20] Hamouda M., Blanchette H. F. and Al-Haddad K., (2016).Unity power factor operation of indirect matrix converter tied to unbalanced grid", *IEEE Trans. Power Electron.*, vol. 31, no. 2, pp. 1095-1107,,
- [21] Ibaceta Efrain, Diaz Matias, Duran Alberto, Rojas, Felix ,Espinoza Mauricio, Mora Andres, (2019) Vector Control of a Modular Multilevel Matrix Converter for Variable-Speed Drive Applications, *CHILECON Valpara'iso, Chile*, 978-1-7281-3185-6.
- [22] Verdia Monica, Johari Shivani, L.Gidwani Vinod , (2020). A Technological Review on Multilevel Matrix Converter for Wind Power Generation System, *International Conference on Computer Communication and Informatics Coimbatore*, INDIA.
- [23] Moghaddami, Masood , Sarwat Arif, (2018). A Three-Phase AC-AC Matrix Converter with Simplified Bidirectional Power Control for Inductive Power Transfer Systems, *IEEE Transportation Electrification Conference and Expo (ITEC)*,

- [24] Kandavel B., Uvaraj G., Manikandan.M., R.Gobi, (2018). Comparative Study of Total Harmonic Distortion in VSI and Matrix Converter based WECS, 4th International Conference on *Advances in Electrical, Electronics, Information, Communication and Bio-Informatics* (AEEICB-18),
- [25] Zhao Xun, Wang Hui, Dan Hanbing ; Zhengzhang Di .Yao Sun, Mei Su, Rivera Marco, wheeler Patrick, (2020). A Cascade PI-SMC Method for Brushless Doubly-Fed Induction Machine with Matrix Converter, *IEEE Applied Power Electronics Conference and Exposition* (APEC).
- [26] Zarchi Linn; Shigeuchi Koji ; Sato Yukihiro, (2018) Performance Analysis of High Frequency Isolated AC/DC Converter Based on Matrix Converter, 15th *International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology*.

Role of Green Marketing in India

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ABSTRACT

In the present business situation environmental issues and problems have become primary concern for the business. Having an environmentally balanced and supportive business has become a compulsion for every organization. Green marketing is one such policy that supports environment friendly business. Green marketing can effectively facilitate sustainable improvement globally. There has been an inclination in consumer mind for green life fashion. In the current study I have discussed significance and impact of green advertising. This paper describes the current scenario of Indian green advertising and its evolution.

Key words: Green Marketing, Environment, Organization, Sustainable.

I INTRODUCTION

- (a) **Inception** - Green advertising includes various aspects to improvement, pricing, advertising and distribution of items without causing any sort of damage to the environment. Environmentalists examine products to decide their effect on surroundings and marketer's commitment to the environment. Environmentally secured merchandise is accredited and businesses receiving the inexperienced signal can use it in marketing and on packaging. Consistent with the American Marketing Association, green marketing is the promotion of products which are presumed to be environmentally secure. As a consequence, inexperienced advertising and marketing contains an extensive range of activities, together with product amendment, modifications to the manufacturing procedure, change in packaging, in addition to modifying advertising.
- (b) **Importance of Green Marketing** - Green marketing has become in evidently crucial due to the following reasons:
 - (i) **Future Scope:** Green advertising and marketing may help to acquire targets. As an example, Maruti Suzuki has introduced a peppy ok collection engine for its new car.
 - (ii) **Social Conscience:** Many firms are starting to comprehend that as participants of the broader network they ought to behave in an environmentally responsible fashion.
 - (iii) **Government Interferences:** Government regulations are seeking to protect clients and the society from negative effect of commercial enterprise activities on the environment.
 - (iv) **Competitive Edge:** Companies advertising and marketing surroundings friendly products and services could have an aggressive gain over firms marketing non-surroundings friendly products and services. For example, P&G makes use of the fundamental chlorine-unfastened pulp for agency's all paper merchandise and packaging.

- (v) **Cost Component:** Companies who reduce dangerous wastes can gain big price financial savings.
- (c) **Characteristics of Green Products**
 - (i) Grown without the use of toxic chemicals and within hygienic conditions.
 - (ii) Can be recycled.
 - (iii) Reused and is biodegradable in nature.
 - (iv) Use less packaging and Comes with eco-friendly packing.
 - (v) Products with natural ingredients.
 - (vi) Items that do not contain ingredients causing any sort of harm to the environment.
 - (vii) Items the tests of which won't be performed on the animals.
- (d) **Instances of Green Products in India**
 - (i) Power generated through renewable sources like wind and solar energy
 - (ii) Solar energy-based water heater
 - (iii) Vehicles running on gas
 - (iv) Energy saving lights and bulbs
 - (v) Green data centers
 - (vi) Vehicles running on electricity
 - (vii) Electric kitchen appliances
 - (viii) Apple green technologies
 - (ix) ITC Paper Kraft Premium Business Paper
 - (x) Suzlon Energy manufactures and markets wind turbines, which provide an alternative source of energy based on wind power.
- (e) **Golden Rules of Green Marketing**
 - (i) Understand your clients.
 - (ii) Guiding the customers in the right direction.
 - (iii) Delivering authenticity and clarity in operations.
 - (iv) Comfort the customer by solving their doubts and queries.
 - (v) Contemplate the pricing allocated.

II OBJECTIVES AND METHODOLOGY

- (a) **Objectives of the Study**
 - (i) To know the concept of green marketing.
 - (ii) To identify the importance and impact of green marketing.
 - (iii) To study the prospects of green marketing.

- (b) **Research Methodology:** The current research that is taken up is more analytical in nature that gives ample direction for further empirical research about the concept. To address the stated issue secondary data has been gathered. The secondary data had been gathered through print media such as newspapers, magazines, books, journals, conference proceedings, government reports and websites.

III IMPACT OF GREEN MARKETING

Green marketing bothers the life as well as the environmental balance in a positive manner. Public is more informed about pure items as well as purified techniques of generating, utilizing and disposing of the item in an eco-friendly manner. One important aspect of green marketing has been creating an ecofriendly way of creating and disposing off the item from the environment as well. Following instances are the resultants of green marketing

- (a) Now, people are insisting more on natural merchandise – fit for human consumption objects, fruits, and greens based on natural farming. The range of people looking for vegetarian food is on upward push.
- (b) Limiting the usage of plastics and plastic-based products.
- (c) Multiplied consumption of herbal merchandise in place of processed products.
- (d) Recommending use of leaves in preference to plastic portions; jute and fabric luggage as opposed to plastic wearing luggage.
- (e) Increasing use of bio-fertilizers (manufactured from agro-wastes and wormy-composed) as opposed to chemical fertilizers (i.e. Organic farming), and minimum use of pesticides.
- (f) International efforts to recycle wastes of consumer and commercial merchandise.
- (g) Enhanced use of herbal medicines, natural therapy, and Yoga.
- (h) Strict provisions to guard forests, vegetation and fauna, protection of the rivers, lakes and seas from pollutions.
- (i) International regulations on production and use of risky guns, atomic tests, and many others. Various companies of several international locations have formulated provisions for shielding ecological balance.
- (j) Greater emphasis on social and environmental duty of producers.
- (k) Inflict severe norms for pollution control.
- (l) Declaration of 5th June to be World Environment Day.
- (m) Strict legal norms for limiting duplication.
- (n) Setting up numerous national and global groups to monitor efforts and activities of business companies in relation pollutants manipulate and production of eco-friendly merchandise.

IV HURDEES & SOLUTIONS

- (a) **Obstacles Encountered by Green Marketing:** Green marketing is a new advent in the line of marketing. And any new concept or notion has its own inbuilt provocations and challenges in its way of implementation. It becomes inevitable for the marketer to address all the issues for a successful implementation and assured results thereafter:
 - (i) **Demands heavy capital outlay:** Green marketing being a new advent demands heavy initial investment in terms of R&D, product development and inculcation of new techniques and technology.
 - (ii) **Price sensitive consumers:** Consumers in India are more bothered of prices they are not ready to afford heavy prices for the green products that also process a biggest problem to the survival of green marketing in the country.
 - (iii) **Limited knowledge among consumers:** the level of understanding among the consumers with regard to the concept of green marketing has been relatively limited and less as it has been a new concept to be acknowledged in India.
 - (iv) **Inception stage:** One of the major hurdles is that the concept of green marketing is still in the inception phase and there is a need for a lot of development to take place to grab benefits of the process.
 - (v) **Promotion tools:** Being a new and fresh concept green marketing demands more and efficient promotional tools for its effective implementation as well as publicity in order to make the public aware of the green products around us. A combination of several techniques like social media, personal selling and advertisements through various mediums is inevitable to make it more popular and acceptable.
 - (vi) **Availability of duplicate products in the market:** one of the major problems confronting green marketing has been that many marketers cheat the consumers by misleading the consumers stating that the particular product is a green product and thereby charge a higher price from the consumer for a non-green product as well.
 - (vii) **Issue of evenness:** In India the major hurdle has been the non-availability of a standard benchmark for the qualifying the products quality. This problem also made the consumers loose trust in the products and the marketers as well.
 - (viii) **Substandard marketing plans and execution:** less effective or no effective marketing plans and their inefficient execution has always stranded as a major cause of failure for green marketing products and policies in the nation.

(b) Keys to Successful Green Marketing

- (i) Brand with Green Logos or Insignias
- (ii) Save water by efficient and proper usage of water without wasting even a drop.
- (iii) Shift to energy saving bulbs and lights.
- (iv) Opt for items with less packaging requirement.
- (v) Vocal for local is the new mantra; encourage buying more of local organic products.
- (vi) Choose to operate on the fuel-efficient vehicles.
- (vii) Sort for low energy-based solutions.
- (viii) Give preference to print on the recycled paper.
- (ix) Convert to green power resources, non-conventional renewable energy resources like solar power.
- (x) Increase awareness on importance of staying green.

V CONCLUSION

Green advertising and marketing have proved to be a good technique for securing and safeguarding the environment for future generation. It is not a simple undertaking. The company has to plan and then perform research to find ways and means to achieve. Green advertising and marketing should have the economic component of advertising and marketing too. Marketers want to apprehend the implications of inexperienced advertising. This is the most proper time to choose advertising globally. All the countries need to make strict regulations to save from pollutants. From the enterprise point of view, a smart marketer is person who not only convinces the client, but additionally involves the client in advertising and marketing his product without damaging the environment.

Indian market customers too are to pay premium price for green merchandise. Therefore, there is a need for green advertising and a need for a shift within the patron's conduct and mind-set towards more surroundings pleasant existence patterns. In the long run green advertising should motivate consumers for a cleaner environment make them are willing to pay higher price for it, even through governmental intervention if required.

REFERENCE

- [1] Nadaf YBR, Nadaf SM. Green Marketing: Challenges and Strategies for Indian Companies in 21st Century. International Journal of Research in Business Management. 2014; 2(5):91-94. ISSN-2347-4572.
- [2] A Muthukumar an. (2015). Emerging Strategies of Green Marketing in India. An international journal of applied research, 553-556.
- [3] Babita Saini. (2017). Green Marketing in India: Emerging Opportunities and Challenges IOSR Journal of Business and Management (IOSR-JBM), 67-73.
- [4] Consumer Awareness towards Green Marketing <http://www.scribd.com/doc/50457938/5/Importance-of-Green-Marketing>
- [5] <http://www.businessworld.in>
- [6] <http://www.outlookindia.com>
- [7] <http://en.wikipedia.org>
- [8] <http://www.business-standard.com>
- [9] <http://www.encyclopedia.com>

Phytoremediation Technology, Mechanisms of Heavy Metal Remediation and Role of Hyperaccumulator's

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ABSTRACT

Phytoremediation is a technology of the use of plants for remediation of contaminants from soil, water, air etc. It consists of the types and mechanisms like Phytoextraction, Phytostabilization, Phytovolatilization Phytodegradation, Rhizofiltration, Phytodesalination etc. Plants take heavy metals from soil solution into their roots, after entry into the roots the heavy metal ions can either be stored in roots or translocated to aerial parts through xylem vessel's where they are mostly deposited in vacuoles and sequestered. Hyper accumulators are plants having a tendency and capacity to tolerate a wide range of contamination, heavy metals, sewage, radionuclides etc. Hyperaccumulators tolerate a wide range of heavy metals and concentrate them to aerial parts of plants. They are helpful in cleaning the environment, soil, water, air etc. They can tolerate heavy metal concentration Their role is to remediate contaminants present in soil and water by Phytoremediation technology and it's mechanisms eg of Hyperaccumulator's *Brassica juncea* (Mustard), *Solanum Lycopersicon* or *Lycopersicon esculentum* (Tomato), *Helianthus annuus* (Sunflower), *Eichhornia crassipes* etc. High concentration of Heavy metal decrease in root length, shoot and aerial parts of plant suggests metal transferred from soil to aerial parts of plant with eradication of heavy metals shows high potential of Phytoremediation.

Keywords-Phytoremediation, Heavy metals, Hyperaccumulator's, Rhizofiltration, Mechanisms.

I INTRODUCTION

Phytoremediation is a green technology of active current research. It is use of plants and associated soil microbes to reduce concentration of contaminants in the environment. It is a group of technologies that use plants to reduce, degrade or immobilized environmental toxins. Phyto Greek word means plant and remedium means recovery, restoring balance or eradication. It is a cost effective technology, environmentally and ecologically friendly (1-7) Hyperaccumulator's plants-*Brassica juncea*, *Solanum Lycopersicon* or *Lycopersicon esculentum*, *Helianthus annuus* (Sunflower), *Eichhornia crassipes* (Water Hyacinth). Heavy metals Pb, cadmium, Chromium are harmful to plants and living beings.

(a) Mechanisms and Different techniques of Phytoremediation-

- (i) **Phytoextraction**- Phytoextraction also known as Phytoaccumulation, Phytosorption and Phytosequestration (Ahmed Ibrahim Galadima 2018). Accumulation of pollutants in harvestable biomass ie shoots.
- (ii) **Phytofiltration**-Sequestration of pollutants from contaminated water by plants.
- (iii) **Phytostabilization**-Limiting the mobility and bioavailability of pollutants in soil by plants roots.
- (iv) **Phytovolatilization**-Conversion of pollutants to volatile form and their subsequent release to the atmosphere eg by transpiration.

(b) Rhizodegradation- Degradation of organic compounds in the rhizosphere by rhizosphere microorganisms.(1-7).

Heavy metals refers to metallic chemical element that has relatively high density and is toxic or poisonous at low concentration eg cadmium (Cd),

chromium (Cr), lead (Pb). Plants take heavy metals from soil solution into their roots, after entry into the roots the heavy metal ions can either be stored in roots or translocated to aerial parts through xylem vessel's where they are mostly deposited in vacuoles. Vacuoles are the cellular organelles with low metabolic activities. Heavy metal sequestration in the vacuole is one of the ways to remove excess metal ions from the cytosol and may reduce their interaction with cellular metabolic processes. Compartmentalization of complexed metals in vacuoles is a part of tolerance mechanisms in metal Hyperaccumulator's.

- (i) Role of Hyperaccumulator's- Hyperaccumulator's checks soil erosion.
- (ii) High concentration of Heavy metal decrease in root length, shoot and aerial parts of plant suggests metal transferred from soil to aerial parts of plant with eradication of heavy metals shows high potential of Phytoremediation.
- (iii) Phytoremediation capability- Hyperaccumulator plants at low concentration of heavy metal shows slight growth but at high concentration shows decrease in length of aerial parts showing Phytoremediation potential.
- (iv) Aquatic Hyperaccumulator's are used for ground water remediation.
- (v) High shoot biomass shows the metal transferred to shoot and eradication of heavy metals by High shoot biomass shows the metal transferred to shoot and eradication of heavy metals by Phytoremediator plants.
- (vi) Hyperaccumulator's clean soil, water, air and environment.

- (vii) When there are more contaminants, these plants show better results and their translocation factor is more than one mostly.

II OBJECTIVES AND METHODOLOGY

- (a) **Objectives**-To study Phytoremediation technology, Mechanisms and role of Hyperaccumulator's in remediation of heavy metals.
- (b) **Methodology**-Hyperaccumulator plants are grown in pots and treated with heavy metals (Pb, Chromium, Cadmium) and observed the plants for few days.
- (c) **Application**-Helpful in cleaning soil, water, air, land and also remediation of heavy metals and other contaminants.

III RESULTS AND DISCUSSION

Decrease in root shoot length and increase in dry weight suggests that heavy metal remediation by transfer from soil to aerial parts of plant by different mechanisms of remediation.

IV CONCLUSION

Phytoremediation is a green, cost effective, environmentally, eco-friendly and heavy metal remediation technique. Heavy metal after entering from soil solution transferred to roots and aerial parts of plants with eradication of heavy metals by either reducing mobility or precipitate formation near roots, transporters play an important role in heavy metal remediation. Hyperaccumulators tolerate a wide range of heavy metals and concentrate them to aerial parts of plants. Decrease in growth of roots and aerial parts at high concentration of heavy metals suggest metal is transferred and remediation is taking place.

Table 1
Tomato plant affected by higher concentration of lead

Lycopersicon esculentum (Tomato plant) 150mg lead	Control	Treated
Root length	14.3	10.3
Shoot length	30.7	20.7
Fresh weight	3.4	1.9

Table 2
Brassica juncea root, shoot length at higher concentration of cadmium.

Brassica juncea 150mg cadmium	Control (cm)	Treated (cm)
Root length	13	9
Shoot length	40	29

Table 3
Helianthus annuus root dry weight

Helianthus Annus 10mg/ kg of lead	Control (g/plant)	Treated (g/plant)
Root dry weight	2.4	2.5

Table 4
Eichhornea crassipes root length at higher concentration of lead

Eichhornea crassipes 100mg/l lead	Control (cm)	Treated(cm)
Root length	22.3	20.4

REFERENCES

- [1] Ashraf S et al E toxicol environ Saf 2019, Phytoremediation of environmental sustainable way for reclamation of heavy metal polluted soils 2019.
- [2] Arish Khanam A Rev. On Phytoremediation: A green Bioengineering Technology for Cleanup the environmental contaminants, Vol 7 Issue 4 pp 9925-9928, April 2016.
- [3] Rohman Razzaq R, 2017: Rev. On Phytoremediation: Env: friendly tech.
- [4] Sadique Abdurrahman: Rev. on Heavy Metal Contamination in Water, Soil, effects, sources and Phytoremediation Techniques.
- [5] 27, aug 2013 Rev. on EDTA Enhanced Phytoremediation of Heavy Metals, 27 aug. 2013.

[6] N Sarwar;2017:Rev.Phytoremediation strategies for soils contaminated with heavy metals.

[7] Hazrat Ali, Ezzat Khan et al :Rev. On Phytoremediation of heavy metals concepts and applications.

Management of Covid-19 in India

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ABSTRACT

Information regarding COVID 19, its transmission, recovery time, treatment, its severity, types of food to be taken, weather condition's effect, its nomenclature, temperature screening, its protection, deaths, dealing with dead bodies etc. were collected and compiled at one place for the benefit of the reader in a simple way. Maintaining mental health of the corona patients is extremely important. No complexity has been discussed. The various happenings from 22.03.2020 till 03.06.2020 were critically examined by subjecting them to SWOT analysis. The results show that the management of COVID 19 in India was very good. It was concluded that prevention is better than cure and for that immunity has to be boosted by each individual. For boosting the immunity, ways and means have been suggested. We all have to live and survive in presence of corona hence we all have to enhance our immunity, use masks, keep social distancing, wash hand with soap frequently, use sanitizer for hand rubs, drink golden milk, Karha, hot water drink, eat chyavanprash, moong-chana, honey, take sunbath, Vitamin C, pranayaam etc.

I INTRODUCTION

Covid-19 is an infectious disease caused by a newly discovered coronavirus. It is interesting to note that in class XI/XII, there is a mention of corona in biology book. However with Covid-19 it is found that it may be symptomatic or non symptomatic and all victims may not have same symptoms viz. high fever, cough and cold, breathing difficulty. There are cases which caused deaths when the condition of the patient became worst i.e. the virus attack was severe. It was also observed that some of the corona patients suffer from mental tension and some of them enter in to depression. It is also observed that coronavirus is more dangerous for people who are suffering with other diseases or who are aged. It is a surprise fall out of the pandemic that Indian traditional and Ayurvedic medicines are findings effective to combat this pandemic.

II DETAILS OF STUDY, ANALYSIS AND DISCUSSION

The virus that causes Covid-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. These droplets are too heavy to hang in the air, and quickly fall on floors or surfaces. Anyone can be infected by breathing in the virus if he or she is in close proximity of someone who has Covid-19, or by touching a contaminated surface followed by touching eyes, nose or mouth. Viruses are named based on their genetic structure to facilitate the development of diagnostic tests, vaccines and medicines, Virologists and the wide scientific community do this work so viruses are named by the international committee on Taxonomy of viruses. (ICTV). It was also observed that some of the corona patients suffer from mental tension and some of them enter in to depression. Thus maintaining mental health of the corona patients is extremely important.

Regarding recovery time for the corona virus diseases, it was found that for people with mild corona virus attack, recovery time is about two weeks, while people with severe or critical attack recover within three to six weeks. Regarding Covid-19 spreading through food, current evidence on other corona virus strains shows that while corona virus appear to be stable at low and freezing temperatures for a certain period, food hygiene and good food safety practices can prevent their transmission through food. The main sources of disease spreading are through respiratory droplets expelled by someone who is coughing. The risk of catching Covid-19 from someone with no symptoms at all is very low. However many people with Covid-19 experience only mild symptoms. This is particularly true at the early stages of the disease. It is therefore possible to catch Covid-19 from someone who has, as for example, just a mild cough and does not feel ill. The virus can cause a range of symptoms ranging from mild illness to pneumonia symptoms of the disease are fever, cough, sore throat and headaches. In severe cases difficulty in breathing and even death can occur. Antibiotics do not work against viruses. Most of the people who catch Covid-19 can recover and eliminate the virus from their bodies.

People of all ages can be infected by the new Covid-19. Older people and people with pre-existing medical conditions (such as obesity, asthma, diabetes, heart disease) appear to be more vulnerable in becoming severely ill with the virus. WHO advises people of all ages to take steps to protect themselves from the virus, e.g., by following good hand hygiene and good respiratory hygiene.

The 2019-20 corona viruses pandemic is an ongoing pandemic of coronavirus disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-Cov-2). Covid-19 causes more severe disease than seasonal influenza, while many people globally have built up immunity to seasonal flu strains. Covid-19 is a new virus to which no one has immunity. That means more people are susceptible to infections, and some of them will suffer from severe disease.

Globally above 3.4% of reported Covid-19 cases have died. By comparison seasonal flu kills less than 1% of those infected. Heat at 56 °C kills the SARS – Cov-2 at around 10,000 units per 15 min (Quick reduction).

At times of Anxiety, practice breathing slowly for a few minutes. Try and distance the thoughts that is causing anxious. This time, thinking of something calm, and severing and slowing down the mind from anxiety will be better. When feeling angry and irritated, calming the mind, counting back from 10 to 1 and distracting helps. Cold weather and Snow cannot kill the new Covid-19. The normal human body temperature remains around 37 °C.

Both the EMT and driver of ambulance have to wear PPE while handling, managing and transporting the Covid identified suspect patients. Similar use of PPE is to be ensured by the health personnel at receiving health facility, patient and attendant also. They should also be provided with triple layer mask and gloves. People who have died from covid-19 can be buried or cremated. Confirmed National or Local requirements may dictate the handling and disposition of the remains. There is some evidence that Covid-19 infection may lead to intestinal infection and be present in feces. However, to date only one study has cultured the Covid -19 virus from a single stool specimen. There have been no reports of faecal-oral transmission of the covid-19 virus to date. No vaccines against pneumonia such as pneumococcal vaccine and Haemophilus influenza type B (Hib) vaccine do not provide protection against the new Covid. The virus is so new and different that it needs its own vaccine. Researchers are trying to develop a vaccine against 209-n- COV and WHO is supporting their efforts. Although these vaccines are not effective against 2019-n-COV, vaccination against respiratory illness is highly recommended to protect health.

About 80% of confirmed cases recover from the disease without any serious complication. However one out of every six people who gets covid-19 can become seriously ill and develop difficulty in breathing. In more severe cases infection can cause severe pneumonia and other complications which can be treated only at higher level facilities. When someone coughs sneezes or speaks, they spray small liquid droplets from their nose or mouth which may contains virus. If someone is too close, can breathe in the droplets including the Covid-19 virus if the person has the disease.

One should eat a variety of fresh and unprocessed foods every day to get the vitamins, minerals, dietary fiber, protein and antioxidants which our body needs. Drink enough water, Eat fruits, Vegetables, Legumes (e.g., lentils, beans) , nuts and whole grains (e.g., unprocessed maize , millet, oats, wheat, brown rice or starching tubers or roots such as potato, yam, taro and cassava) and food from animal sources (e.g., meat, fish, eggs and milk). For snacks, cheese, raw

vegetables and fresh fruits rather than foods that are high in sugar, fat or salt.

Temperature screening alone, at exit or entry, is not an effective way to stop international spread, since infected individuals may be in incubation period, may not express apparent symptoms early on in the course of the disease, or may dissimulate fever through the use of antipyretics, in addition such measures require substantial investments for what may bear little benefits. It is more effective to provide prevention recommendation messages to travelers and to collect health declaration at arrival with travelers contact details, to allow for a proper risk assessment and a possible contact travelling of incoming travelers.

Regarding special protocol recommendation for the funeral of the people that died of the Covid-19 disease, if the family wishes only to view the body and not to touch it, they may do so, using standard precautions at all times including hand hygiene given the clear instruction to the family not to touch or kiss. Embalming is not recommended to avoid excessive manipulation of the body. Adults >60 years and immune suppressed persons should not directly interact with the body. Human contra viruses can remain infectious on surface for up to 72 hours in experimental conditions. Therefore, cleaning the environment is paramount. The mortuary must be kept clean and properly ventilated at all times.

The symptoms of a Covid-19 disease in a dialysis patient are fever, sore throat, cough, recent shortness of breathing, dyspnea, without major inter dialytic weight gain, rhinorrhea, myalgia/ bodyacche, fatigue and diarrhea. Covid-19, may be present with mild, moderate, or severe illness, the latter includes severe pneumonia, ARDS, Sepsis illness and septic shock. By using appropriate protective clothing it is possible to create a barrier to eliminate or reduce contact and droplet exposure, both known to transmit Covid-19, thus protecting health care workers working in close proximity (within one meter) of suspect / confirmed Covid 19 cases or their secretors. Six species of human coronaviruses are known with one species subdivided into two different strains making seven strains of human coronaviruses all together, As on today (4th June 2020), there are 2,16,919 confirmed cases, 1,06,737 active cases , 1,04,107 recovered cases and 6025 deaths.

If we compare the % death cases in India with those of America, Brazil, Italy, France, Germany, Iran, etc. We find that the deaths in India are minimum. This is because India took care right from the beginning and most importantly the people of India have more immunity (including vitamin D through sun bath) than those from other Europeans and American countries. No doubt anti social elements also contributed by creating chaos, spreading rumors to laborers', provoking Jamaty's, dirty politics of political parties for vote bank and others. Otherwise, these figures could have been much low.

As such there is no medicine available worldwide for treatment of Covid-19. Not only medicine but till date there is no vaccine developed by any country to control the situation. Hydroxychloroquine is the medicine that helps a while with respect to protect from spreading the virus. So to summarize we can say that prevention is better than cure. I wish to share my experiences with you all. I am of the firm opinion that prevention is better than cure. If the human body has strong immunity then not only corona but lots of other diseases can not attack and succeed in making you sick. This is true in >90% cases. What I do, instead of tea, Karha (Black pepper, Dalchini, Tulsi, Ginger) twice daily (one in the morning and second one in the evening). one spoon full of Chyavanprash daily, one cup golden milk (milk boiled in presence of turmeric) daily, hot water drinking, Sunbath (Vitamin D), lemon juice (vitamin C) added to Chana Sattu – salt- water solution, water soaked moong-chana with garlic and green chilli daily. Honey every day, sunbath, are taken to boost my immunity. Everyday Pranayam in the morning is a must besides above. I had suggested above to many of my friends, relatives and acquainted persons. They are benefitted by this. Besides above, one has to strictly follow social distancing, wearing mask and washing our hands frequently with soaps, alcohol based sanitizer hand rubs. In our office, before entering, we take shower of sanitizer through machine and before sitting in the chair, sanitizing chair, table computer etc.

During the period the covid period the following facts shows strength of Indian system of government, disaster management and capability of Indian mass in crises:-

- (a) On 22.3.2020, Janata curfew was religiously followed by practically all the countrymen on the invitation of our Prime Minister unitedly. This curfew brought awareness among all which became weapon to fight coronavirus.
- (b) Various gestures like clapping together on a specific day to cheer up corona fighters or lighting candles for 9 minutes at 9 pm by practically all the countrymen showed the will of the nation to fight a pandemic.
- (c) All the addresses to the nation by our Prime Minister to fight against corona were carefully heard by every Indian citizen and followed in letter and spirit.
- (d) Various guide lines issued by government of India in connection with fight against corona virus was followed by one and all. Solidarity became the strength, barring few antisocial elements.
- (e) Economy has been adversely affected and private educational institutes suffered most. Still education sector came up with alternate plans.
- (f) Working online by a huge number of employees from their home, taking up to double work load, online teaching in colleges, schools, universities, conducting webinars, virtual rallies, holding meetings through videoconferencing nationally and internationally, etc. proved innovative strength of India.
- (g) Motivation level of doctors, nurses, ward boy's, policemen, sanitary workers, military personnel, social workers, snack and meal providers, transport providers to laborers rail, road, air, various facility providers was very high and surprised the world.
- (h) Worldwide praise and recognition of the Indian Prime Minister in handling fight against corona virus improved the image of the nation.
- (i) The pandemic proved innovative strength Indians in conjecturing challenge in to opportunity. During the crisis period, India started making ventilators, masks, testing kits, PPE, started research in making vaccine for corona virus and Enhanced production of hydroxychloroquine.
- (j) It was a great challenge for higher education sector to start online teaching through online teaching courses were completed and even online exam conducted in many institutions. Similarly webinars, national and international meetings using videoconferencing became a regular affair.
- (k) Robots were used skillfully in hotels, restaurants, bars, news reading. Research on Artificial intelligence, artificial neural network has recently gained lots of importance to solve our needs.
- (l) Projects were initiative to substitute import materials by making it in India. Sugar factory making sanitizers is one such example.
- (m) Govt launched a big plan of making war/military equipments under Make in India and Make for World initiative.
- (n) The importance of boosting immunity by Indian ayurvedic medicine to fight corona gave opportunity to popularize Indian alternative therapy system in the world.
- (o) Bad weather causing reduction in production of crop yields large number of natural calamities during Covid period tested strength of disaster management capability of India in which India proved its metel.

III CONCLUSION

Covid period in India is the most trying period for everyone. All the economic and service sectors were adversely affected. However entire India rose to the occasion and successfully converted challenge in to opportunity. The result surprised the entire world. Lockdown in a developing country of 137 crore population appeared very difficult but exemplary discipline was shown by citizens, dedication of corona warriors and effective governance became the golden chapter of the Covid period. Innovation used by education sector to go online despite limitations of resources made them torch bearer to introduce era of technology enabled services. Scientist came up with indigenous products ranging from mask and PPE kits

to ventilators. The biggest achievement of the Covid period was development of vaccine for coronavirus by three pharmaceutical sectors under final phases of

trials as announced by the Prime Minister on 15 Aug 2020.

Lean Implementation in Manufacturing Industries – A Review

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ABSTRACT

With time manufacturing industries are shifting to the places where labor charges are less but once the industry is set up the manufacturing cost starts increasing as with time there will be hike in charges of labors, raw material, transport, power, fuel, maintenance etc. these all will contribute in higher manufacturing cost. Manufacturing cost per unit will see continuous uptrend and that to sustain in this competitive market manufacturer cannot increase the selling cost, this results in reduction of the profit margin (percentage). Profit can be increased by two ways either by increasing selling price or by reducing manufacturing cost. The first option is not feasible therefore; to sustain in the competitive market the only option remain to work on manufacturing cost reduction. The big question arises how one can reduce manufacturing cost? The answer is by implementing lean manufacturing. Lean manufacturing and their tools is a perfect way to reduce wastages. Lean manufacturing works on elimination of non-value activities. Once non-value added activities get reduce automatically there will be increase in value added activities. Customer pays only for value added activities so keeping in this mind implementing lean manufacturing may become need for manufacturing industries. This paper includes information about lean manufacturing and lean tools, benefits of implementing lean manufacturing and steps involved in implementation

Keywords: Lean manufacturing, tools, 7 types of wastages, benefits of lean implementation.

I INTRODUCTION

Toyota manufacturing started Lean implementation long back. Also Henry Ford is the person who had been using parts of Lean as early as the 1920's he believed and proved that Shortening of the production cycle time reduces manufacturing cost and longer the process of manufacturing leads to high manufacturing cost. The dictionary meaning of word lean means "Thin" in English. National Institute of Standards and Technology Manufacturing Extension Partnership's Lean Network: defined lean as "A systematic approach to identifying and eliminating waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection."

Most organization decides selling price of product as follow

Selling price = Manufacturing costs + Profit

In this competitive world one cannot increase-selling price, instead of this organization should work on the following formula

Profit = Selling price – Manufacturing Costs

Lean works to reduce manufacturing costs. Companies that implement Lean typically make significant cost savings so there is direct improvement in profitability.

To become best manufacturing organizations or Lean Enterprises the first step in achieving that goal is to identify and try to eliminate the all type's wastes. As Toyota and other excellent organizations have come to realize that customers are only pays for value added work, but never for waste

In simple words Lean manufacturing works on 3 'M' which is related to waste reduction.

- (a) Muda:- Systematic approach for waste elimination
- (b) Mura:- Waste generated by uneven work load.
- (c) Muri:- Waste created by overburden.

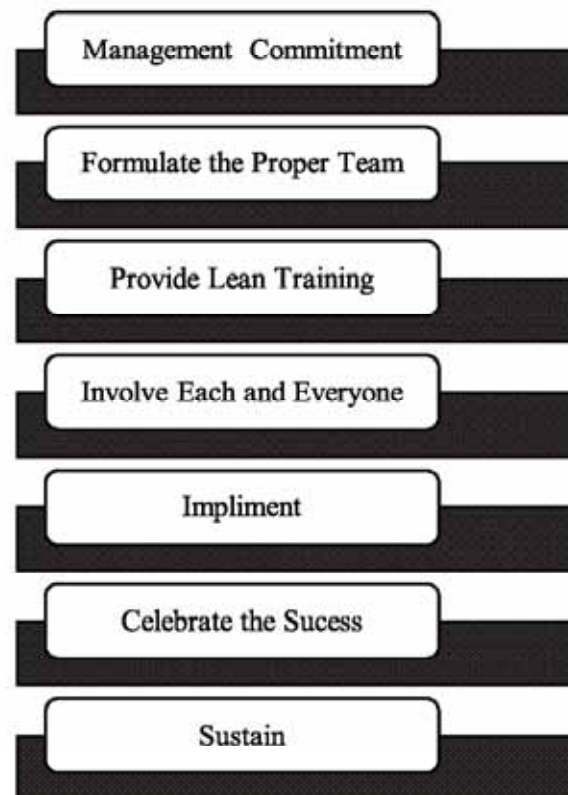
Lean manufacturing is also about conversion of push system to pull system.

II THE SEVEN WASTES

- (a) **Transporting** – Transportation does not add any value to the product also it increases material movement and handling which cause damage deteriorates quality of the product. Transportation waste is very difficult to reduce due to the costs of moving equipment and processes closer together also it is difficult to determine which processes should be next to each other. Material handling equipment and Mapping product flows can make this easier to visualize.
- (b) **Unnecessary Inventory** - This waste is result of other wastage like over-production and waiting. Work in progress (WIP) should be an optimum inventory to work continuously but if it is more than requirement then it is an excess inventory. Identification of problems gets delay this is the biggest problem with the excess inventory. This causes more rework, less productivity, increase in lead-time. In addition, Inventory blocks cash flow for organization.
- (c) **Unnecessary / Excess Motion** - Motion doesn't add any value to the product or service. "To move and add value is called work. To move and not add value is called motion. Motion means moving without working, moving and adding cost". This waste is related to ergonomics in terms of walking, bending, lifting, stretching and reaching. Also repetitive motion causes health and safety issues, which in today's society are becoming more of a problem for organizations. An analysis should be done to the Jobs with excessive motion and it should be re-designed for betterment.

- (d) **Waiting** - Traditional batch-and-queue manufacturing contains maximum waiting time. Poor material flow, too long production run and improper work balancing between two operations these are the major reasons that cause waiting type of waste. Waiting for man, material and Machine leads to lesser productivity. Waiting time is directly proportional to the lead-time. Linking processes together and balancing proper work content in two sub-sequent reduces waiting.
- (e) **Overproduction** - Overproduction is about manufacturing too much or too early. Even some companies makes more production in some excess percentage so that if any problem comes in the process they can utilize that excess production but Overproduction is highly costly to a manufacturing plant because it actually degrades quality and productivity. Just in time (JIT) is the system implemented by Toyota manufacturing to reduce this waste. In JIT product is made just as it is needed. In addition, Overproduction leads to, excessive lead-time, high storage cost and it makes process difficult to identify defects.
- (f) **Over Processing** - The waste over processing is the cause of extra operation, inappropriate techniques, handling, oversize equipment, storage, working on tolerances that are very tight also adding extra processes, which are not required by the customer and so forth. These all adds cost, time and money. Low cost automation and doing right for first time is the solution for this waste.
- (g) **Defects** - Defects are products or services that do not confirm to the specification or Customer's expectation and which causing Customer dissatisfaction. Defects in a process causes rework or scrap which increases cost to organizations. Through employee, involvement and Continuous Process Improvement both can contribute to reduce defects at many facilities. There are two more types of additional wastages are :
- Energy wastage.
 - Less utilization of talent.

III STEPS FOR LEAN IMPLEMENTATION



IV LEAN TRAINING

To get the best result, involvement of everyone is important. This involvement can be achieved with proper training. Top down approach can be followed for training. Top down means starting from the top management it goes bottom to operator level so that everyone is on the same page. Everyone should

understand what lean manufacturing is and what benefits industry will get with lean implementation.

V LEAN TOOLS

5 'S' and Kaizen are the best lean tools to start for any organization. 5 S means - Sort, Set in order, shine, Standardize and sustain while Kaizen means change for better. Both tools are actually Japanese business

philosophy of continuous improvement of working practices, personal efficiency, etc. Few experts say only proper 5's and kaizen implementation is enough to

improve organization. The list of other tools and their short meaning is given below.

Lean Tool	Meaning
5 S	Sort, Set in Order, Shine, Standardize, Sustain. In short 5'S' works to have "place for everything and everything on its place".
KAIZEN	Kaizen is an approach to create continuous improvement in industry based on the idea generated by anyone from the industry.
SMED	SMED (Single-Minute Exchange of Dies) is a system to reducing the change over time drastically.
ANDON	Andon means Light. It is used to generate an alarm to workers. This alarm can be used to highlight the problems within the production process.
KANBAN	Kanban means a signboard, it helps to visualize your work, maximize efficiency and become agile.
ROOT-CAUSE ANALYSIS	It is a popular and widely technique that helps people to get the answer of why the problem occurred in the first place.
POKA-YOKE	Poka-yoke means "mistake-proofing". In process, by mistake also mistake should not happen.
OEE	OEE (Overall Equipment Effectiveness) is an measures to show percentage of planned production time that is truly productive.
PDCA	PDCA (plan-do-check-act) is four step management method used in industry to improve processes and products.
JUST IN TIME	JIT is a management tool to control inventory that calls for the production of what, when, how much and where customer wants.
VALUE STREAM MAPPING	VSM is defined as a lean tool that employs a flowchart documenting every step in the process.
GEMBA	The Gemba Walk means walk the floor of their actual workplace to identify wasteful activities.
CONTINUOUS FLOW	Continuous flow work on work-in-process to have smooth flows through production with minimal buffers between processes.
TPM	Total Productive Maintenance creates a shared responsibility for equipment that encourages greater involvement by operators
BOTTLENECK ANALYSIS	It identifies which part of the manufacturing process limits the overall throughput and improves the performance of the process.

Other lean tools are Jidoka, Hoshin Kanri, Heijunka, Key Performance Indicators, Six Big Losses, SMART Goals, Standardized Work, Takt Time and many more are there. Organization can implement any lean tool as per the requirement.

VI ADVANTAGES OF LEAN IMPLEMENTATION

- Increase in value added activities
- Reduction in wastages
- Higher Profits.

- (d) Better Quality
- (e) Reduction in Over Time
- (f) Greater Customer Satisfaction.
- (g) Reduction in Machine Breakdowns.
- (h) Reduction in Inventory.
- (i) Improvement in cashflow
- (j) Reduced Lead Time
- (k) Betterment in Space Utilization
- (l) Higher efficiency
- (m) More output per person-hour.
- (n) Improved Visual Management
- (o) Helps to reduce Manpower
- (p) Improved Visibility to Stakeholders
- (q) Improved on time delivery percentage
- (r) Improved employee morale and involvement.
- (s) Safer Work Environment

VII DISADVANTAGES OF LEAN IMPLIMENTATION

- (a) Low inventory.
- (b) Difficult to change over
- (c) Little margin for error
- (d) Lack of Acceptance by Employees

VIII CONCLUSION

Visionary management can think of Lean implementation in their business to sustain in competitive world and to improve profit. Lean is fully focusing on elimination of non-value added activities and it add value to the product. Lean is applicable to any business but Lean implementation is becoming a need for a manufacturing organization. Being lean gives lot of advantages to organizations. Organization become

more productive and responsive to market than other organization in all aspects.

REFERENCES

- [1] R.Sundar, A.N.Balaji, R.M.SatheeshKumar, A Review on Lean Manufacturing Implementation Techniques 12th Global Congress on Manufacturing and Management, Gcmm (2014)
- [2] David Losonci, Krisztina, Demeter,Istvan Jenei, Factors influencing employee perceptions in lean transformations, Int. J. Production Economics (2011)
- [3] Wilson, L. How To Implemen Lean Manufacturing. New York: McGraw-Hill (2010).
- [4] Womak, J.P. & Jones, D.T. Lean Thinking: Banish waste and create wealth in your co/poration. New York: Simon and Schuster (1996).
- [5] Shamim, Benefits of Lean Manufacturing | Why Implement Lean? <http://leanmanufacturingtools.org/63/benefits-of-lean-manufacturing/> accessed on:8th July 2019.
- [6] George, M.L. Lean Six Sigma: Combining six sigma quality with lean speed. New York: McGraw-Hill ISBN- 9780071501903 (2002).
- [7] Seven Types of Deadly Waste http://www.leaninnovations.ca/seven_types.html#:~:text=Motion accessed on:8th July 2019

Impact of Remodeling Stress on Employee Efficiency

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ABSTRACT

In this time of economic recession, most managers or entrepreneurs have to confront many new job challenges which can easily turn into stressors. Job related stress is of rising concern because it badly affects the organization economically. Avoiding stress is not possible in today's uncertain world but handling it in the proper manner that helps in producing positive returns rather than negative can certainly be learned. Stress has always been seen as a negative force causing pain, pressure and psychological threats to people. However, many studies highlighted that positive stress which is known as eustress leads to improved performance at work place and promotes professional development. Eustress produces positive feelings of enthusiasm, accomplishment, satisfaction, and well-being. It is said to be good because it makes one feel confident and energized by the challenges one experience from the pressures. Eustress is all about properly challenging oneself without consuming all the resources. This type of stress empowers one to succeed. This research paper shall throw light on how remodeling stress to eustress or encouraging positive stress at workplace can help employees stay motivated and productive. It will also suggest measures to handle stress effectively.

Keywords: Organisational stress, stressors, eustress, distress, stress management, employee performance

I INTRODUCTION

Stress is inevitable at workplace. It is something that all employees go through at different phases of their work life. Stress is believed to affect people in different ways. It can make or break people in the business environment. Stress is a mental and physical condition that results when the resources of the person are not enough to handle the demands and pressures of the present condition. Stress was generally seen from a negative sense which usually was considered to be harmful and its positive effects were not given much emphasis. This paper shall throw light on the positive effects of stress and how it can be used to build morale and enhance performance of employees. Stress is of two types: Eustress and Distress. Eustress is the good stress as it stimulates one to continue working and acts as an incentive to get the work done. Everyone needs some amount of stress in their lives to remove the monotony and be energized, motivated and more productive by the challenges. It is when this stress goes beyond the bearing capacity of individual that distress comes in. Bad stress which is known as distress, is when the good stress becomes too much to bear. Anxiety and worry builds in and there is no more any joy in the challenges. This is where the problem begins and stress starts injuring the person. His productivity and decision making power decreases. Physiological signs of distress include increase in blood pressure, rapid breathing and restlessness. Behavioural signs include overeating, loss of appetite, getting indulged in wrong habits like drinking and using negative coping measures.

II RESEARCH METHODOLOGY

(a) Objectives of Research Study

- (i) To understand the concept of organizational stress.
- (ii) To study the difference between eustress and distress.
- (iii) To analyze how the concept of eustress can be used to enhance productivity and handle stress effectively.

- (b) **Methodology** - The research that has been taken up is exploratory in nature i.e. secondary source is used for doing the research work. Wide use of Research papers, Journals, Newspaper Articles, Magazine Articles are done so as to have a deep understanding of the topic and analyze the problems pertaining the same.

III LITERATURE REVIEW

Rawal Abhijeet and Mhatre Sneha (2018) concluded that most of teachers in self-financing institute encounter work related stress. Some because of work overload and some because of family related issues. Employees feel that the strategies Institute/ College used to lower stress are effective and so despite lot of stress they are able to balance with their work and life.

Nangia Neha and Chaturvedi Vijit (2015) said that by providing the foundation for employees to grow while also allowing employees to take responsibility for their stress related symptoms, organizations will see drastic increase in productivity and an improved workplace dynamic.

DattPunam and Washington Anthea (2015) concluded that high eustress factors should be provided for the employees in order to be highly motivated. Eustress is essential to everyone who believes in having a meaningful work life and a rising career. It should be kept in mind that in order to handle stress effectively both employee and employers need to work hand in hand.

Zafar Qadoos, Ali Ayesha, Hameed Tayyab, IlyasToqeer, Younas Hafiz Imran (2015) said that if stress is not handled properly it would badly affect the employees productivity and thereby the organization. Therefore stress management strategies should be adopted to resolve issues.

AwadhIbtisamMbarak, Gichinga Lucy and Ahmed Anwar Hood (2015) said that time pressure is one of the main factors that hinder performance as employees reach a burnout level and they are no more able to perform effectively. Furthermore they lack work life balance which ultimately affect their performance.

Ratnawat R.G. and Jha P.C. (2014) suggested that the factors likely to be affected by stress range from productivity to competencies to inter personal behavior. Employee performance is said to be combination of many factors or dimensions of job.

Venkatesh Bharti, Ram Nidhi (2015) stated that Eustress helps employees to change and energizes them to work in a better way. It is considered to be good, productive and effective. Managers should be fair in their introduction of stress into their workplace, even when the stress is of a challenging nature.

IV THEORETICAL BACKGROUND

(a) Organisational Stress - For most adults in developed countries, employment is not just about earning an income but is said to be a matter of their self-esteem and self-worth in the society. However, when the employees' calibers are utilized to the fullest and job environment becomes unfavorable, the job ultimately turns out as a source of dissatisfaction, burden and isolation for the individual. As a result, the health and performance of the employees starts deteriorating. According to the report of National Institute for Occupational Safety and Health, some of the major job-related diseases include lung diseases, musculoskeletal injuries, cardiovascular diseases, and mental disturbances. The impact of a stressful situation on a person depends on one's reaction to it or how he perceives a situation.

Occupational stress is defined as a reaction to prolonged workplace related stress and is usually shown by signs like physical and emotional exhaustion and subsequent health disorders. Work overload, role ambiguity, no autonomy, prolonged

hours of work, no proper rewards and job insecurity are said to adversely affect health conditions.

(b) Stress Factors at Work place: Stress can be of two types:

(i) Constructive Stress: It is also called Eustress as it has a positive impact on the person and the organization. Eustress signifies a situation where the stress is in the bearing capacity of an individual. Studies say that low to moderate stress motivates and energizes a person to perform with more diligence and creativity. It creates in him stress that makes him work harder with enthusiasm. Factors such as challenging responsibilities and tasks, recognition to employees for their efforts, rewards and promotions, involving one in multiple projects, accomplishing KPIs, opportunities for growth and advancement. Such opportunities create positive stress in employees which act as a driving force motivating them to achieve the goals with a competitive mind. They start finding joy in those positive stressors which makes them work to their full capacity and thus delivering higher performance.

(ii) Destructive Stress: Distress as it is commonly known is not considered healthy for both the individual and the organization. It is that situation where the stress level goes beyond the bearing capacity of an individual. High amount of stress may damage the person's physical and mental state and ultimately his performance in the form of accidents, errors, absenteeism, turnover and job dissatisfaction. Distress factors are connected to the environment in which an individual works. Factors such as work overload, strict supervision, multitasking, work deadlines, peer pressures, too much of administration work, workplace diversity in which employees have difficulty to cope may cause distress. These factors if present in excessive amount may lead to negative stress. Health issues, emotional disturbance, depression, tiredness, pressure and frustration occur in employees leading to low morale and thus decreased efficiency at work. Studies suggest that distress factors are essential at work to a balanced extent in order to make an employee perform. However, their presence alone will not lead to employees' performance. Absence of Distress factors will cause decreased job satisfaction and performance.

(c) Eustress boosters

- (i) Stress is also influenced by hereditary predispositions and expectations of people around.
- (ii) If some person enjoys new challenges and beliefs that he is of value to the world, such a person is more likely to experience eustress.
- (iii) People having high level of self-control and a nature of never giving up have more chances of experiencing eustress as they believe that they have all calibers to develop new skills to match with the challenges.
- (iv) Those who actively procrastinate the work experience eustress as by delaying the work they increase the challenge and once the challenge matches the person's high skill level, he experiences eustress. Those who do not procrastinate do not have the same experience.
- (v) Optimist people or ones with positive mindset contribute to eustress experience as they have positive response to stressors.
- (vi) Eustress can also be promoted through various HRD programmes and practices like wellness programmes, mental health benefits, flexitiming, coaching and counseling.

(d) Stress Management Techniques

- (i) Undertake a stress audit- Organization should check the mental cum physical health status of its employees from time to time. Questionnaires and interviews can be used for gathering data on various stressors, coping techniques and outcomes.
- (ii) Use scientific inputs- Organisation should share information and awareness about dealing with stress effectively both inside and outside the organization.
- (iii) Check with the company doctor- conducting stress management programmes through medical doctors.
- (iv) Spread the message- The importance and benefits of regular exercise, diet, practicing personal relaxation should be emphasized.

V FINDINGS

- (a) Occupational stress is the reaction to prolonged workplace related stress which is shown by signs like physical and emotional exhaustion and subsequent health disorders. Work overload, role ambiguity, no autonomy, prolonged hours of work, no proper rewards, lack of job security are major causes of occupational stress.
- (b) Studies suggest that low to moderate stress motivates and energizes a person to perform with more diligence and creativity. It creates in him stress that makes him work harder with enthusiasm.

- (c) It was found through the research that when stress level goes beyond the bearing capacity of an individual, it affects both his health as well as performance at work place.
- (d) Organisations should adopt those HRD practices and policies that promote eustress. But it should be noted that eustress is not always good. Too much of something is always harmful even if it is positive stress as it can result in negative outcomes.
- (e) Practices that companies can adopt to promote eustress are: wellness programs, mental health benefits, flexi timing, financial assistance like flexible spending accounts, child care subsidies, employee assistance program, community-based programs like on-site child care, elder care resources, coaching and counseling etc.

VI SUGGESTIONS

- (a) Organizations can help Employees experience state of eustress when they are recognized and rewarded for their efforts and shown the path of career success.
- (b) Healthy relationship between workers and superiors can help in reducing job pressures.
- (c) To keep the employees motivated, organizations can take steps to increase perks and facilities.
- (d) Training programmes can be provided to enhance employee's skills.
- (e) By providing clear job description, management can avoid role ambiguity and create awareness among employees about their role in the organization.
- (f) Get together and meetings once in a month can help refresh employees of their mental agony.
- (g) Positive outlook towards work/ responsibilities can help promote eustress.

VII CONCLUSION

Through the research it can be concluded that work place stress in today's fast paced uncertain world is difficult to avoid. But strategies to handle stress effectively in order to keep the employees motivated and productive can certainly be learned. This paper was an effort to help organizations remodel their employees' stress to eustress in order to maintain their efficiency. Workplace stress places serious physical, mental and financial cost to both employees as well as organization. Negative stress which is also called distress or when stress goes beyond the bearing capacity of an individual, he loses all his motivation to perform which affects not just his personal growth but also the organization. By promoting various HRD practices and programmes that enhance eustress or positive stress, organizations can keep their employees energized and motivated to face challenges with enthusiasm and joy. But it should also be remembered that managers should be fair enough in introducing eustress or challenge

stressors into the organization. Managers need to recognize that using challenge stressors is not a license to overburden their employees as it will lead to burnout. It should be used judiciously. By providing ample opportunities for employees to prosper while also allowing them to take responsibility for their stress related symptoms, organizations will find drastic rise in productivity and improved workplace dynamics.

REFERENCE

- [1] Venkatesh Bharti, Ram Nidhi (2015) Eustress: A Unique Dimension to Stress Management, *Voice of Research*, ISSN No. 2277-7733, Volume 4 (2).
- [2] Elsis Farah W., (2016) Effects of work-related positive affect on Stress Appraisals and Cardiovascular Stress response.
- [3] Nangia Neha, Chaturvedi Vijit (2015) Understanding the Role of Positive Stress as a Mediating Tool for Employee Performance: A Conceptual Insinuation
- [4] Pavithra A.C., Sivakumar V.J. (2019) The Study of the Eustress as a Mediator for Enhancing the Job Satisfaction of Employees in the Banking Sector, *International Journal on Emerging Technologies*, ISSN No. (Online): 2249-3255, Vol 10(4).
- [5] Rawal Abhijeet, Mhatre Sneha (2018) A Study on Work Stress And Its Impacts on Employee's Productivity With Respect To Teacher's (Self Financing), *IOSR Journal of Business and Management*, e-ISSN: 2278-487X, PP 15-23.
- [6] Datt Punam and Washington Anthea (2015) Impact of Stress on Work Performance and Career Development - Application of Herzberg's Theory for handling Stress Effectively, *International Journal of Education and Research*, ISSN: 2411-568, Vol. 3(6).
- [7] Zafar Qadoos, Ali Ayesha, Hameed Tayyab, Ilyas Toqeer, Younas Hafiz Imran (2015) The Influence of Job Stress on Employees Performance in Pakistan, *American Journal of Social Science Research*, Vol. 1 (4), pp. 221-225.
- [8] Awadh Ibtisam Mbarak, Gichinga Lucy and Ahmed Anwar Hood (2015) Effects of Workplace Stress on Employee Performance in the County Governments in Kenya: A Case Study of Kilifi County Government, *International Journal of Scientific and Research Publications*, ISSN 2250-3153, Volume 5 (10).
- [9] Badar-ul-islam Rana Kashif Munir (2011) Impact of stressors on the performance of employees, Munich Personal RePEc Archive.
- [10] Mirela Bucurean, Adriana Costin Mădălina (2011) Organizational Stress and its Impact on Work Performance.
- [11] Ratnawat R.G. and Jha P.C. (2014) Impact of Job Related Stress on Employee Performance: A Review and Research Agenda, *IOSR Journal of Business and Management*, e-ISSN: 2278-487X, Volume 16 (11), PP 01-06
- [12] Botwe Priscilla Bempah, Kenneth Amoah-Binfoh, Masih Enid (2017) Workplace Stress and its Effect on Performance; Special Reference to Educational Sector, *Saudi Journal of Humanities and Social Sciences*, ISSN 2415-6248, Vol-2 (9).
- [13] Shani N., Divyapriya P. (2011) A study on Influence of Eustress towards Talent Management among employees in Automobile Industry, *International Journal of Human Resources Management and Research*, Vol 1(1), 14-25.

WEBSITES

- [1] www.healthline.com
- [2] www.positivepsychology.com

SMARTx: The Next Generation Learning Management System

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ABSTRACT

With the present pandemic situation, to continue the teaching-learning process, remote education and eLearning is essential. Content creation, content delivery, assessment and feedback are the four pillars of the remote teaching-learning process. Learning management system (LMS) is an engine which powers the remote teaching-learning process by automating content delivery, assessment and feedback stages. Although LMS offers a set of advantages, there are some demerits of the same. After a detailed analysis of eLearning and keeping demerits of present LMS, SMARTx learning platform is developed by Mr. Ashish Hulle. It offers a lot of advantages over present LMS and hardly has any demerit. Detailed discussion on different LMS available, merits and demerits of available LMS software, SMARTx platforms and features of SMARTx platform has been carried out in this paper.

Keywords: LMS, Online Learning, Pedagogy, SMARTx, etc.

I INTRODUCTION

Presently the entire world is fighting against COVID-19. One cannot predict when this COVID-19 pandemic situation will come to end. Keeping this in mind, there is a need to shift all teaching, learning and training practices online oblige for the security of students, teachers, and workers or employees. To shift the teaching-learning process online one has to take the help of a learning management system (LMS). Learning management system is a software system that can be used for educational content delivery, assessment, administration, documentation, tracking, reporting, automation of the same. LMS concept has emerged from e-Learning [1][2]. Most of the learning management systems are focused on online learning delivery with a different set of features in asynchronous and synchronous modes. In asynchronous mode, the teacher or instructor can upload the course content and learners can watch or use the content at any time. In asynchronous mode, both instructor and learners are online and knowledge transfer occurs. Both asynchronous and synchronous modes have their own advantages and disadvantages. Even though LMS offers great advantages, there are a lot of loopholes and disadvantages of the same. Keeping all things in mind authors designed one of the unique LMS called SMARTx. In this manuscript, the detailed discussion has been carried out on different LMS, their advantages, disadvantages and SMARTx learning platform.

II LIST OF TOP LEARNING MANAGEMENT SYSTEMS

Based on user satisfaction (reviews & ratings), social media buzz, online presence, and other relevant information following learning management systems are ranked.

- (a) Paradiso Solutions
- (b) iSpring Learn
- (c) Easy LMS
- (d) Talent LMS
- (e) Litmos LMS
- (f) Moodle

- (g) CANVAS LMS
- (h) Lessonly
- (i) Teachable
- (j) LearningStone
- (k) NEO LMS
- (l) Tovuti LMS
- (m) eLucid
- (n) Innform
- (o) MagicBox
- (p) JollyDeck
- (q) EduBrite
- (r) Trainual
- (s) WizIQ
- (t) Skillo
- (u) Kiwi LMS [3]

III THE IMPORTANT BENEFITS OF LMS

There are six major advantages of LMS: interoperability, accessibility, reusability, durability, maintenance ability and adaptability, which in themselves constitute the concept of LMS [4]. LMS makes the learning super-easy for learners as it helps in organizing eLearning content in one location. Use of multimedia eLearning material content like video, images, audio and text etc. serve as great tools in learning new skills or information which makes learning fun, engaging and exciting. One can deliver the eLearning content in a systematic way. LMS provides unlimited access to eLearning materials. Once the instructor uploads learning material on LMS, the learner has unlimited access to the content at any time. This enables the inclusion of worldwide learners to learn at their own pace at the desired time. Instructors or teacher need not deliver the same lecture or information again and again LMS does it for him/her. Hence instructor/teacher can get more time to create new content. Also, they can experiment by applying completely different learning techniques like blended learning, social learning, storytelling etc. Teachers/instructors can modify the eLearning material, and learners can see the updated material. LMS enables communication and facilitated the collaboration between people, as student and teacher/instructor can

Key features of SMARTx include hybrid learning (self-paced courses and live class), interactive videos, interactive whiteboard for a live class, online meeting/web conference system, content seeding, automatic course tracking, a robust online examination system, online assignment submission, automatic plagiarism check for assignments, chat for real-time discussion, discussion forum, uses achievement badges, e-certificate, course feedback, grade book, real-time student activity reports, etc. The detailed discussion has been carried out on these key features in the following points.

One-way content delivery may be boring for the learners. Depending on how it's set up, LMS can diminish the motivation of learners. Learners may not sit for a long time in front of the screen. Learners need to have a basic knowledge of technology to take lessons and complete assignments online. There is a lack of communicational skill in students as they are not interacting with peer learners and teachers as in the regular physical classroom. Prevention of cheating during online assessments is complicated. It is difficult for the instructor to monitor every learner to avoid malpractice by learners during an online assessment. Also, learners may copy content from other resources to complete their assignment. This leads to plagiarism. Some student may simply skip watching the online video or may not watch it regularly or there is a chance that they may finish everything in one day itself. With such kind of malpractice, the learning objective is not fulfilled. With LMS education theoretical knowledge is imparted to students largely, rather than practical skills. One has to have good internet connectivity and suitable gadget (smartphone/tablet/laptop/desktop) to access the content. Low-quality affirmation and an absence of authentic learning material keep on debilitating the authenticity of online learning[7][8].

SMARTx is an online learning platform founded by Mr. Ashish Hulle, where one can learn many skills as per the requirement of an individual at their own pace. SMARTx is inspired by the increase in the demand by the people to learn online. SMARTx platform is an attempt made to transform traditional education to modern education with the novel learning pedagogy and features like learning by doing, peer learning, assignments, quizzes, live lectures, web conferencing and online internship. The learner can enroll in any interesting course and can get a verified certificate after completion of the course. The mission of SMARTx is to make learner smart and skilled so that learns can excel in their respective field. SMARTx platform can be accessed by visiting <https://smartxlearning.in>.



The home page of the SMARTx can be accessed by the user from the browser by putting SMARTx URL: <https://smartxlearning.in>. Usually includes information about the courses and internships offered by SMARTx along with login box. How students enroll in different courses and internships can be decided by the course administrator. Available options are self-enrollment by

students, manual enrolment by a teacher or automatic enrolment by SMARTx admin. Each user has their own customizable Dashboard. What a user sees on SMARTx dashboard depends on their role and rights granted to them by the administrator. However, Courses which are organized into different course categories can be seen by every user. Learners can select enrolled courses and start can start their learning immediately.



Fig. 2 SMARTx After Login Screen



Fig. 3 Course Content View

VII SMARTx FEATURES

SMARTx platform has been developed and evolved by keeping the disadvantages of current learning management systems. It combines all the advantages of top learning management systems and has no demerit. Unique course presentation style and high versatility are the USPs of this platform. SMARTx can meet all the needs of student, teacher or course/training manage. SMARTx is extremely customizable and has many standard features. In the following points, the features of this platform are described.

- **Personalized Learning Experience:** SMARTx platform can be used to give customized learning experiences for the learners. Teachers can customize the learning path for the students. One can understand how

personalized learning can be facilitated using SMARTx following example is cited. Consider learner wants to attempt a quiz directly, without reading a particular course material or lesson, SMARTx course can be set up to notify/alert the student instructing to read the same before taking the quiz. In the same manner, if a student attempts a quiz and obtains marks less than 60%, SMARTx can be set up to redirect that student to remedial content automatically. On the other hand, if a student performs well in quiz, i.e. if he/she scores more than 90%, he/she will be redirected to next lessor/learning material. Ofcourse, a lot of flexibility is given to the teacher. SMARTx puts no limitations on customizing learning paths. Teachers can configure the platform for the particular course according to their own way.

- **User Interface:** SMARTx has a modern and responsive user interface. SMARTx interface is easy to navigate on a smartphone, tablet as well as on desktops. On user dashboard information pertaining to current, past and future courses, along with tasks due is displayed by default. Also, they can personalize their dashboard.
- **Accessibility Control:** SMARTx is the only platform with accessibility controls. One can change the site color as well as font size as per the convenience.



Fig. 4 Accessibility Settings

- **Course Activities:** SMARTx has an array of different tools that includes Quizzes, Assignments, Chat, Forum, Survey, Feedback, Workshop, Glossary, Wiki, Book, etc. All these tools can be used by respective teachers in a particular course for taking exams, for giving assignments, course content, extra information and to enable collaborative and peer learning experience for students.
- **SMARTx Calendar:** To keep track of academic activities, deadlines, and other personal events, users can take the help of automated SMARTx's calendar tool. All the course-related activities, due dates etc. are automatically added to the SMARTx calendar.



Fig. 5 SMARTx Calendar

- **File Management:** Students can manage their personal files and notes with simple drag and drop feature. Also, they can import files from different cloud storage services like OneDrive, Google Drive, Dropbox etc.
- **Word Editor:** SMARTx has an intuitive and simple word editor. Users can do text formatting easily and can conveniently add all type of media files with an editor into a course or in assignments.
- **Forum and Messaging:** Educators and learners can send private messages to one another using messaging feature and can discuss on the common topic using SMARTx forum.



Fig. 6 SMARTx Forum Posts

- **Notifications:** SMARTx is enabled with automated notification and alert system. Learners get alerts on new forum posts, deadlines and new assignments.
- **Automated Course Tracking:** SMARTx can track course completion and course progress as well as different course activities. SMARTx automatically tracks grades, activity completion, course completion, etc. This information is useful for educators and learners in different ways.

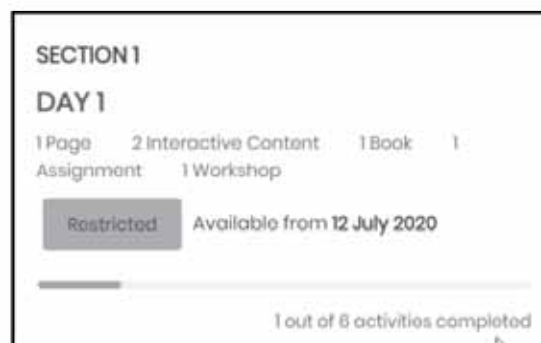


Fig. 7 SMARTx Course Section with Activity List and Completion Tracking

- **Authentication and Enrolment:** SMARTx has over 45 authentication and enrolment options for user enrollments to courses and internships.
- **Multilingual Capability:** SMARTx has Multilingual capability. One can view course content and learn in the preferred choice of language.
- **Gradebook & Rubrics:** SMARTx has advance gradebook and enabled with the criteria-based assessment.
- **Course Backup and Restore:** For the safety reasons one can take course backup and can restore at any time. So that there is no chance of data loss and rework.
- **User Role Management:** SMARTx is having user role management facility. Admins can define roles to specify and manage user access.
- **SCROM Support:** On SMARTx platform one can import and export IMS-LTI, SCORM courses.
- **Security:** Connection to SMARTx is encrypted and has secure access to the site. SMARTx is regularly updated with the latest security patches.
- **SMARTx Web Conferencing System:** To facilitate synchronous learning i.e. live online classes, SMARTx has its own webconferencing system. With this teachers can share their screen, audio, video, slides with students. One can record online lectures as well. Built-in polling system makes the class engaging. It also has a whiteboard tool which can be used to explain concepts, real-time annotations are also possible.



Fig. 8 SMARTx Web Conferencing System

- **Safe Exam Browser:** SMARTx exams/quizzes can be conducted using a safe exam browser. Common browser features like search, back/forward navigation, refresh, the addition of new tab, closing exam tab, switching applications, all shortcut keys, print screen, clipboard, browser menu, etc. are disabled. The browser cannot be closed until the test is submitted. This adds an extra layer of security during assessments.
- **Course Development/Management:** Instructors/teachers can easily design any kind of course/classes like instructor-led, self-paced, blended or entirely online. Hence a single SMARTx platform can fulfil the requirements of all types of courses.
- **Collaborative Learning:** SMARTx has multiple collaborative publishing features that can foster student engagement and content-driven collaboration. It can be further strengthened by grouping the learners for sharing courses and distinguish activities which lead to teamwork.
- **Peer learning and self-assessment:** SMARTx workshops and surveys are the two tools which facilitate the peer learning and encourage students to view, grade and assess the work submitted by co-learners or their own. In this students has to submit his work according to guidelines given by the teacher. Upon submission, the student gets the submission from other co-learners which they suppose to assess according to teachers guidelines. This enables indirect learning from peers.



Fig. 9 SMARTx Peer Evaluation

- **Badges:** To reward the learner participation and their achievements in grades or activities automated customized Badges can be given to them. This motivates students and keeps them engaging.
- **Verified Certificate:** Every learner who completes the course or internship on SMARTx gets verifiable e-certificate. One QR code is placed on the certificate that can be scanned by anyone to check the authenticity of the certificate.



Fig. 10 Example of Verifiable Certificate

- **SMARTx User Profile:** Every SMARTx user has his own profile tab along with some right to customize SMARTx platform for their own suitability. The user profile has multiple fields wherein people can add a profile picture, bio, etc. All their forum posts, individual blogs, overall activity reports, activity statistics, courses enrolled, certificates earned, course progress, etc. is shown at one place.



Fig. 11 SMARTx User Profile Section



Fig. 12 Course Completion Status in Profile

- **Reporting and Analytics:** Detailed reporting and logs of different activities can be viewed and generated at any time. Instructors/Teachers can get the activity reports of every student enrolled for the course. These reports incorporate insights and graphs regarding every

module and every activity of student like last access, a number of times read. Thus, for instance, the educator will see the detailed activities of every learner in the online course. Which pages every learner has seen and how frequently, and what undertakings have been finished. This is exceptionally useful in giving help to learners who are encountering issues.



Fig. 13 User Activity Logs

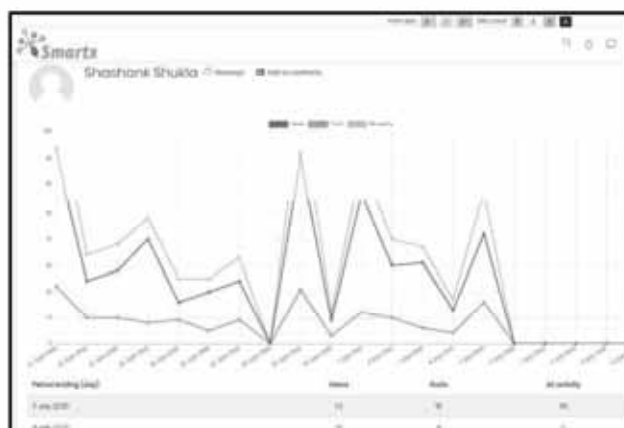


Fig. 14 User Statistics

- **AI and Analytics:** SMARTx platform is integrated with artificial intelligence. Descriptive, predictive, diagnostic and prescriptive analytics report is generated on SMARTx automatically.



Fig. 15 User Outline Report

VIII CONCLUSION

SMARTx platform fulfils all the gaps in digital learning and has overcome the demerits of most of the learning management systems. In this uncertain pandemic situation, learning management systems like SMARTx are really helpful for academia to continue the real lifelike teaching-learning process for all academic levels.

REFERENCES

- [1] R. K. Ellis, Field Guide to Learning Management. ASTD Learning Circuits, 2009.
- [2] Wikipedia, "Learning management system," 2020. [Online]. Available: https://en.wikipedia.org/wiki/Learning_management_system. [Accessed: 01-Jun-2020].
- [3] "Best LMS Software in 2020 | Learning Management System Software." [Online]. Available: <https://www.softwareworld.co/top-learning-management-system-software/>. [Accessed: 09-Jul-2020].
- [4] A. Distefano, K. Rudestam, R. Silverman, and P. D. Long, "Learning Management Systems (LMS)," in Encyclopedia of Distributed Learning, SAGE Publications, Inc., 2012.
- [5] "5 Pros and Cons of a Learning Management System – OmkarSoft Blog." [Online]. Available: <https://www.omkarsoft.com/blog/5-pros-cons-learning-management-system/>. [Accessed: 09-Jul-2020].
- [6] "9 Advantages of Learning Platforms or LMS." [Online]. Available: <https://www.cae.net/lms-learning-platforms-advantages/>. [Accessed: 09-Jul-2020].

Is Social Media Reshaping Today's Talent Acquisition Process- A Review

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ABSTRACT

Gone are those days, when face to face interview was the principal opportunity one would get to establish a decent connect and deliver their best foot forward so as to ensure that the recruiter hires him/her. Or the time when, personalities were absolutely characterized by qualities seen on paper and, during interviews. Nowadays, when recruiter says, "Educate me about yourself", the former is most likely to know you in and out through socially updated information. The particular study is an attempt to comprehend the role of social media platform in reshaping the recent talent acquisition process.

Keywords – Social Media Recruitment, HR, Conventional Methods.

I INTRODUCTION

Advent of social media driven communication channels has led to the establishment of new conditional framework in the HR department, specifically in the process of recruitment. For instance, social media platform has opened up doors for better approaches, to spread data to the general public and to explicit prospective candidates, concerning the organization.

Unlike earlier times, when social media usage was confined within the boundaries of "showcasing products" and enrollment had been tied in with evaluating candidates' capabilities, today's social media era, proposes better approaches for finding, pulling in and choosing future employees.

We cannot deny the fact that the way social media has involved & made space in our lives, almost everything sounds very easy and as fast as a click away. Even for very basic stuffs like the way connect people or plan our day. Though each and every coin has its pros and cons, but over here in this paper, we are not going to focus on the way social media has impacted and impacting our lives. Instead, this paper particularly try to concentrate on the different ways the HR recruitment framework works on online platform. The study intends to discover what impacts social media platform extends in reshaping today's recruitment process.

II CONVENTIONAL RECRUITMENT VERSUS RECRUITMENT THROUGH SOCIAL MEDIA PLATFORM

- (a) **Cons of Conventional Recruiting Methods** - In pre present time, in order to reach to a maximum pool of applicants, organizations used to select through customary recruitment and branding techniques, which can be remembered as running ads for magazines, bulletins and TV. Furthermore, they even took interest in work fairs and ran paper commercials, which used to turn out to be pretty expensive for the organizations. Thus, the above stated cons led companies to instill a shift from conventional recruitment methods to the next generation-digitally tech savvy talent acquisition.
- (b) **Social Media Impact on Recruitment** - Networking and social media have become the new spot where the greater part of the present recruitment happens. Today, organizations are exploiting social media, for example, LinkedIn, Twitter and Facebook to run recruitment promotions. LinkedIn has developed from 78 million to more than 400 million individuals in the previous 5 years and urges experts to interface, share business news and data. It has now become a piece of social move, by being one of the most prevailing aspects, for new openings. Unlike conventional recruitment days, CV's alone, at this point of time, are not thought enough to qualify as a resourceful applicant.
- (c) **Advantages of Using Social Media platform as a Recruitment Channel**



(i) From Organizations Perspective

- Extended Reach towards the prospective employees –According to a white paper in iCIMS, putting up a job vacancy on social media can step up the prospective applicants, from 30% to 50%. In addition to it, a study by Development Dimensions International (2016) discovered that the managers who want to fill the vacant positions had a notably more skilled pool of job aspirants and had an expansion in deals, who used social media to promote company's culture and brand mindfulness. This is because, the greater part of the workforce currently are recent college grads. At the point when they discover an organization whose online nearness and culture is appealing, they are bound to react to openings inside those associations. In this way, organizations are speaking to the most inspired and most youthful gathering in the workforce.
- Better Insight into the behavior of the candidate - Today numerous associations look at a candidate's online networking profiles before they even expand the main meeting offer. Twitter, Instagram, or Facebook channel gives the HR division knowledge into the conduct of the potential employee to check whether they're a decent beginning fit or not.
- Shortens hiring Time - Thanks to the social media direct messaging facility, it is now very easy and feasible to communicate immediately with the prospective candidates. It save the time of sourcing candidates from large and unsuitable talent pools.

(ii) From Candidate's Perspective

Better visibility and accessibility to the company's credentials & culture – Social media benefits the candidates in light of the fact that the individuals who are attempting to approach an organization have an access to the company's management. An applicant can easily, with the

help of websites like Glassdoor.com, or company's own social media pages, validate the organization and its way of life with the help of an core glance at the company's culture, standards and benefits from the people who have worked there or are currently appointed there. Thereby, enabling candidates to identify in the first round itself that whether the particular organization is a proper fit or not.

III LITERATURE REVIEW

Avinash S. Kapse, Vishal S. Patil, Nikhil V. Patil (2012) Studied about e-recruitment and its development process is given in this article. A discussion is also be conducted on the various advantages and drawbacks of e-recruitment practices taken broadly from different literatures.

This article concludes that old practices or conventional methods should not be replaced by the online recruitment rather it should be treated as companion. The Disadvantages of online recruitment can be shield by the old and conventional practices and recruitment process will be efficient and worldwide due to E- recruitment.

Tripathi, Roma (2016) conducted this research to assess the possible area of improvement that will make recruitment and selection practices more efficient for the next generation.

Based on research, inferences depict that many universities are still adopting conventional recruitment methods which have lost popularity these days. Local media such as print media, like, newspaper advertisement are still very common practice to connect & attract public in the smaller cities.

An organization should identify its social recruitment ability. Advertising & promoting job opportunities on social media platforms are more likely to produce results compare to a single promoting tool, that's why practicing social media for recruitment results in better ROI than conventional recruitment because the advantages are much more higher compare to its cost. Using social media platforms provide recruiters an

edge over competitors who don't practice recruiting through social media. It is been concluded from the literature that social media approaches can actually have the enhanced scope of increasing the recruiting market that can generally benefit, in comparison with traditional methods of recruiting sources such as referrals, recommendations, press advertisements and so on.

Fawzieh Mohammed (2015) aims to examine how employers can make effective use of social media as part of the recruitment process. It observes which platforms are best suited to host job search information, which can help in achieving recruitment goals, and how employers and applicants use them.

To conclude, the results show that the role of social networking sites in recruitment becomes much more important and is an upcoming topic for companies in the Middle East. It is in the fledgling stage at this point in time, but the results indicate a trend towards recruitment using social networking sites. HR departments are taking tentative steps and making initial experiences with those sites.

The site's networking reach is the strongest predictive factor for successful recruitment, especially in the direction of target group. Another important observation is that it doesn't impact the costs. Companies have recently started using Social Networking Platforms for their recruiting, and more information is needed about this.

Vijayan Ramasamy and Arasu Raman (2014) conducted research to determine if the elements of perceived corporate credibility and popular social media platforms attract job aspirants. The researcher tried to interpret employers perception on attracting job aspirants via social media platforms on the basis of extensive survey data.

Result indicates that SNS qualities are found to have a positive and direct impact on the reactions of employers towards this online media. This is also especially important considering the growing popularity of employer using social media platforms globally. On the basis of this outcome, firms and recruiters can easily identify that which social media sites are perfectly suited to target demographic, geographic area, nature of work and other related factors for their objectives.

The analysis also shows that there is a substantial connection between attracting job aspirants for the recruitment process through social media and perceived corporate reputation.

IV CONCLUSION

Social media as a marketing tool has a significant impact on, almost all, content marketing and on any functional area of a firm either it's a service or a product. Before the advent of online networks as a marketing tool, advertisers confronted the difficulties of contacting their target audience in the shortest conceivable time. Social media have a highly active and responsive community of each domain.

Basically social networking is a major piece of our routine life and it got very deeply rooted so it is very tough to ignore it to use in the recruitment procedure. Students, Colleges as well as companies are ought to be urged to utilize it in the selection procedure.

REFERENCES

- [1] Travis Huff (Aug 10, 2014), "How Social Media Changed the Hiring Process" <https://www.socialmediatoday.com/content/how-social-media-changed-hiring-process>
- [2] Susana Guedes (2015), The Use of Social Media within the Recruitment and Selection Process" <https://www.grin.com/document/300960>
- [3] Zina Bacha (2019), "Social Media's Impact on Recruitment" <https://strammer.com/en/social-media-impact/>
- [4] Marysol, Randy, Eyo and Christian (2019), "Use of Social Networking Sites for Recruiting and Selecting in the Hiring Process", International Business Research 12(3):66 https://www.rcsarchgatec.net/publication/331022707_Use_of_Social_Networking_Sites_for_Recruiting_and_Selecting_in_the_Hiring_Process
- [5] Tripathi, Roma. (2016). "An empirical study on recruitment and selection process with reference to Private Universities in Uttarakhand",.
- [6] Avinash S. Kapse, Vishal S. Patil, Nikhil V. Patil (2012) "E-Recruitment" International Journal of Engineering and Advanced Technology (IJEAT)ISSN: 2249 -8958, Volume-1, Issue-4, April 2012
- [7] Masa'd, Fawzieh. (2015). Deployment of Social Media in the Recruitment Process.
- [8] Ramasamy, Vijayan & Raman, Arasu. (2014). Recruitment in the Social Media Age: An Exploratory Study.

Impact of Lockdown on Small Businesses in India

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ABSTRACT

Out of all the economic crises occurred in the last decades, Coronavirus is one of the most harmful incidents. The report represents all the possible evaluations of the impact of lockdown on local businesses. The condition during this pandemic is obvious to be substandard and the ambition to grow and develop is become pointless, then what will be the outcome of this research? And even why does such a report is constructing whose result is already known? The simple answer is "expectations", the report will evaluate comparative conditions of local business and will provide the different expectations regarding the new strategies, new growth pattern, new business models, innovations and many more things which will help the businesses to revitalize their economic as well as social conditions. It is become important for businesses to revise their strategies for sustainable growth. The report will show all possible impact in a proper structure, importance of businesses in the economy and different influences of lockdown. Comparing the before lockdown and after lockdown conditions. All possible and related data are Analyzed with structured outcomes and results. Analyzing the data results and the business strategies concerning expectations to form the picture which will help in formulating the future prediction regarding economic growth as the most important component of the economy is "business". Therefore the future growth supposition is paramount.

Keywords – Sustainable Growth, lockdown, Covid -19, SME.

I INTRODUCTION

Out of all the economic crises occurred in the last decades, coronavirus is one of the most harmful incidents. It not only affects the demand side of the economy but also the supply side of the economy. Covid-19 is the biggest challenge face since World War 2. coronavirus causes distress to the global economy. For the country like India which is still developing, this pandemic situation may result in scandalous outcomes. Local businesses are one of the important pillars of the economy. With the pandemic, local businesses are affected adversely. To bring back the growth in the economy it is necessary to sustain the small business in the economy especially for a developing country like India. The lockdown attempted in India is the largest of its kind and this lockdown result in chaos and suffering among Indian citizens. Majority of the day to day needs and requirements of people is fulfilled by the local small businesses. Due to the lockdown customers, as well as sellers, are not ready to facilitate exchange, and with the government restrictions, the majority of the shops remains closed for a long while. Now, it is very important to understand the problems faced by local businesses in India. It's foremost to see what is the situation before and after the coronavirus crisis.

So the first objective of the study is to determine the comparative condition of local businesses before and after lockdown.

Small scale businesses are facing harmful impacts due to

- (a) Covid-19
- (b) social distancing
- (c) Nationwide lockdown.

No one is ready to go outside and facilitate exchange because of the fear of coronavirus. Neither customer is ready to buy product physically nor producers ready to sell physically. And if the producers are

ready to sell online, customers are not ready to buy it. The government allows the essential products to sell in the market but keeping in mind the physical distancing. Customers are standing in rows with 2 feet gap. Sellers are not able to sell things properly. The nationwide lockdown causes small scale, day to day businesses to shut down. They are daily wage earners, their livelihood depends upon the money they earn daily. With the limited concession given by the government, small businesses can start again. They have to rebuild the business plans and strategies because the economic condition is not the same as before and it will change frequently with time. They have to focus on how they will manage and operate their business and how and where they will invest the money provided by the Indian government. Hence the next objective for the study is to identify the common business plan and strategies adopted by the small scale businesses.

The more adverse effect is faced by startups they are already low on cash and employees and now the lockdown put them in huge losses. Not only startups but also the daily wage earners like auto drivers, car drivers etc, are facing miserable problems. India's startups are facing a constant decline in the growth path due to business disturbance caused by the pandemic. Almost 90% of startups are resulting in a decline in their revenue. Around 30-40% are either temporarily halting their operations or thinking to close down. B2C startups are the one who is adversely affected and around 60% facing close because their revenue came down to zero. This is the time for all such businesses to review their plans and strategy for growth and find as much as possible factors which helps them to restructure and regenerate. Hence, the next objective of the study is to assess the factors which help the startups to rebuild and restructure their business. Continue lockdown is constantly affecting the consumer consumption pattern. Except for the necessities, the consumption

cycle is broken. Consumers in the country could not able to buy different products. consumption is the most important pillar of the economy and the most important variable for growth, but unfortunately with nationwide lockdown consumption cycle is stopped hence investments stopped which affect the capital of the country, production halt which directly reduce the income of the workers and wages of the Labors, therefore, growth stagnated and the economy turns into the depression. Hence the next objective for my study is to assess the strategies which restart the consumption cycle in the economy. Indian local businesses are the key to the growth or we can say they are the fertilizer for plants. As fertilizers help the plant to grow and develop fast and effectively similarly local businesses help the different states of a country to grow and develop effectively, as mentioned before, all the necessities are exchanged by local businesses. But with nationwide lockdown, it becomes impossible.

II OBJECTIVES & METHODOLOGY

- (a) **Rationale behind the topic** - businesses are the most primary need for the economy during this pandemic and to know the situation and expectations about the condition it will become necessary to do research. I choose my research topic about impact of lockdown on local businesses in India because I'm interested to know the situation of businesses during this pandemic. Indian economy is continuously declining and will run down soon. to rebuild the economy foremost thing needed is money (capital) and the only way to get more and more capital is to sustain the businesses
- (b) **Objectives for the study:**
 - (i) to determine the comparative condition of local businesses before and after lockdown.
 - (ii) to identify the common business plan and strategies adopted by the small scale businesses.
 - (iii) to assess the factors which help the startups to rebuild and restructure their business.
 - (iv) to assess the strategies which restart the consumption cycle in the economy.
- (c) **Research methodology** - In order to gain a better insight into the possibilities to know the actual influences of lockdown on local businesses, secondary data is collected from various legitimate databases and accordingly the results and findings prepared. the method used for the research is both quantitative and qualitative as both of them are equally important for research like this. to compare the conditions of businesses at two different periods the identical data is used but based on two distinct intervals. moreover, graphs, pictures and other figures all are secondary sources.

III LITERATURE REVIEW

Khusgboo Mishra, "the impact of the lockdown on India's informal sector", this research paper shows the changes in revenue pattern and the income structure among many businesses during the lockdown. Specifically, the informal sector as the study also mentions about the importance and the position of this sector in the Indian economy .study shows that there is no cash in the economy reason being halting all kind of markets. Nationwide lockdown resulted in ceasing the sort of exchange in the market which directly end the supply of money in the economy or market. the main objective of the research is to conclude and analyse all kind of effect of lockdown on small vendors or on daily wage earners.

Amit Mudgill, "how will Indian lockdown play out for economy and market", the study represents 4 different scenarios for the situation of the domestic economy and market after lockdown. Also, the study shows that the local businesses are the most important to observe as the flow of cash in the market will tend to increase or decrease is based on the position and condition of the small businesses. the four different scenarios are bad, worse, better and the rise respectively. the main object of the study is to predict the economic and market situation on the bases of data and analysis.

Vikram Bahlekar, "Novel coronavirus pandemic-impact on the Indian economy, E-commerce, education and employment", the study shows the reasons for the birth of coronavirus in india, reasons for implementing lockdown in india. The study represents major sectors of the economy and the effects. this study also gave importance to the local businesses and small e-commerce sites. not only the market review but also the non-marketing sector such as education and all. The study also focuses on the employment rate and their earning which is constantly declining. The main objective of the study is to study the impact on economy, market, e-commerce, education and employment.

Prasanna Mohanty, "coronavirus lockdown- how serious could the impact be on Indian economy and GDP", the study analyses both the supply and demand side of the economy and represents many situations which may or may not occur. The study is quite biased towards the bad impact of lockdown and it shows that the GDP will decline at a very high rate. This decline will directly or indirectly impact the Indian market both internationally and domestically. The main objective is to show the impact and the effect of lockdown on GDP and market.

Divya Monga, "impact of covid-19 lockdown in India, managing workplace challenges", the study is based on the challenges faced by the employee as they have to work from home due to the lockdown. This study also focuses on the challenges faced by

unemployed people and those who are fired. The financial and social status of a firm is the most important because employees' stability will depend on the same. The main object for the study is to find

out the challenges faced by the employed, unemployed and fired people in India during the lockdown.

IV DATA ANALYSIS AND INTERPRETATION

It is quite clear that the growth declined and there is no doubt this will continue for long. To show the situation of India during this pandemic let's see the Indian GDP growth rate.

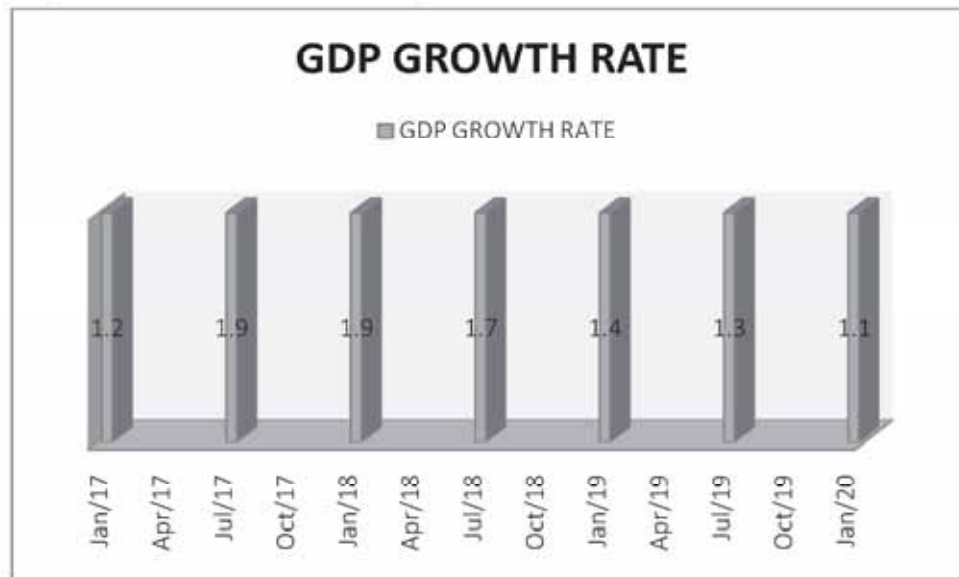


Fig. 1 GDP Growth Rate

GDP is the gross domestic product which is one of the most common factors to determine the growth in the economy. It is visible in the graph that the growth rate of Indian GDP is too low. In 2017 the GDP growth rate was nearly 1.9 which is quite impressive and secondly the rate was stable. But in 2020 is nearly 1. The current GDP is 4.9 per cent as against 6.8 per cent in 2018-19. On the other hand, the stability of GDP is totally uncertain.

India does not have any specific plan or strategy to overcome this damage and if they have, it is not officially revealed. Lockdown actually has a more adverse effect on the economy than coronavirus. Hence the decline in the GDP is more due to

lockdown and as lockdown removed it will again start healing.

V IMPACT ON INDIAN START-UPS AND MSMEs

Start-ups are the inauspicious one; they are already out of cash and employees and now the lockdown making it worse. MSMEs are the medium and small scale enterprises which need a good amount of investment to sustain. But the pandemic halted the money flow in the market and become trouble.

Opinion on the coronavirus (covid-19) impacting Indian start-ups and SMEs in March 2020

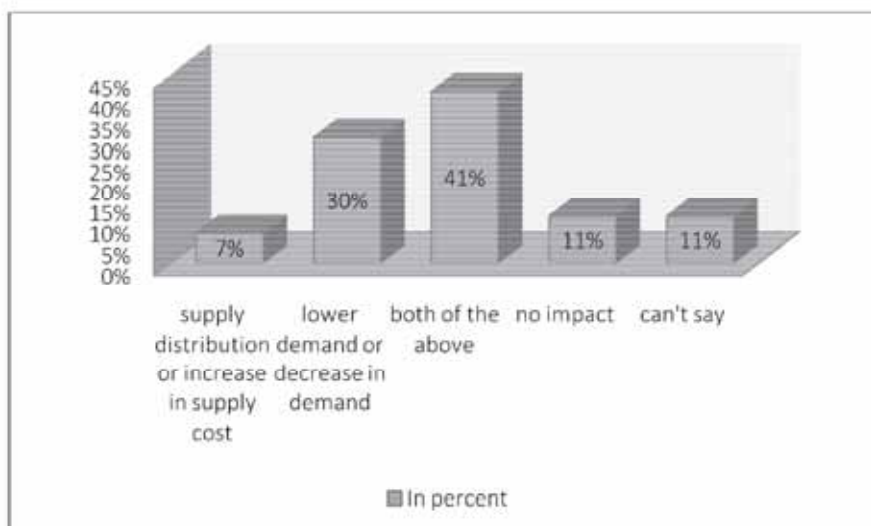


Fig. 2 Impact on SMEs

The graph at fig 2 represents five different kinds of impact that has great influence. Supply distribution or increase in supply cost means fluctuation in the supply chain. Supplies of products are available or not, the cost of distribution is high or low, all such factors will take into consideration. Impact on start-ups and SMEs with respect to supply distribution or an increase in supply cost is around 7% which is quite high.

The second factor is the lower demand or decrease in demand for product and services. Similar to the supply case this represents the fluctuations on the

demand side. Demand for the products are high or low, the prices for the products are rising or decreasing, consumers expectation and all. Impact on start-ups and SMEs with respect to lower demand or decrease in demand for product and services is 30% and staying around this level is very unhealthy.

The third-factor covers both the sides demand as well as supply. And the impact is 41% and at this rate economic conditions for start-ups and SMEs will be threatening. Fourth and last factors are no impact and can't say. Both of them are 11% and these factors are the one which is not defined yet.

VI INDIA BUSINESS CONFIDENCE GROWTH

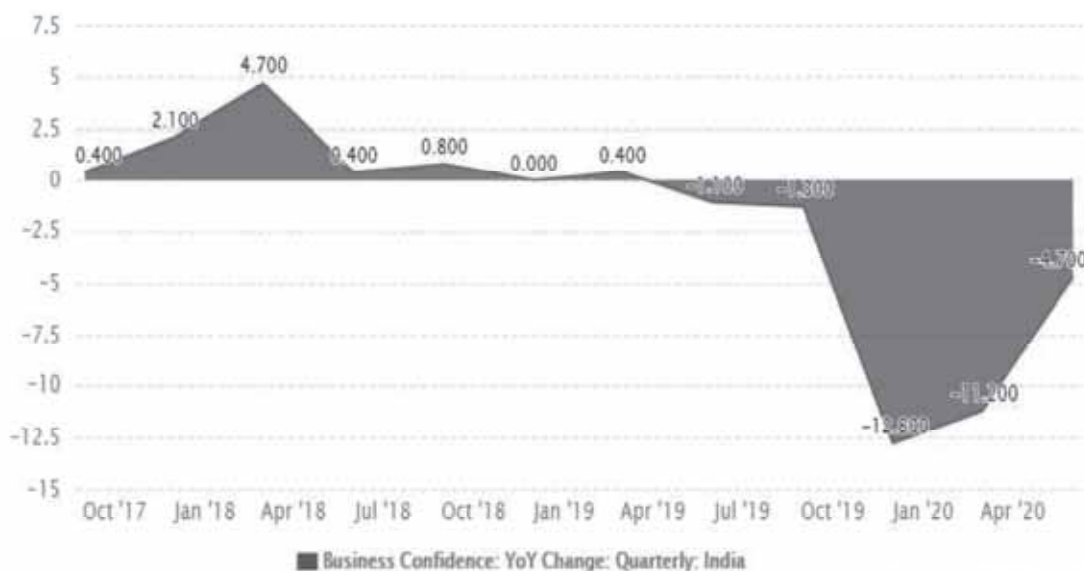


Fig. 3 Business Confidence: YoY Change : Quarterly: India

Taking nine indicators into consideration to find the BEI(India businesses expectation index) are:
(a) overall business situation

(b) production
(c) inventory in raw material
(d) order books

- (e) inventory of finished goods
- (f) profit margin
- (g) employment
- (h) export
- (i) capacity utilisation

These are the main nine factors which help in calculating the business confidence growth. It is clear that, from the starting of 2020 the confidence growth drops down to negative at -12.800 and the growth is still negative. The main reason is the lockdown because businesses are forced to halt their activities which result in the negative growth.

CMIE Data Shows Spike In Unemployment

Unemployment Rate In %



* For last week of March, CMIE collected 2289 observations. For first week of April, CMIE collected 9429 observations. The average sample size is 117,382.

Source: CMIE

Bloomberg | Quint

Till the mid-march they are below 4-5 but at the end of March and at the starting of April the rate increased to 23.4 and this sudden jump is appalling. It is visible in the graph that the rate before the march is low and stable but with halting the businesses the unemployment starts rising at a tremendous rate because businesses don't have enough capital to pay their employees hence they start firing them. On the other hand, the number of unemployed people increased in the economy and now they become a burden to the government.

Lockdown impacted on the Indian economy as:

- (a) increased unemployment
- (b) increased interest rates
- (c) increasing budget deficit

This will result in difficulties in the trade market as well. To increase the growth it will become important to provide the work for those who are unemployed and help them to sustain their lives.

The MSMEs in India is growing at a rate of 8.466%. MSMEs are one of the most important divisions of the economy. MSMEs contribute 6.11% of manufacturing GDP, from service activities 25%

The country like India (developing country) this pandemic becomes a big trouble. To grow again, capital is the primary need but with the poor condition, it is not achievable.

VII UNEMPLOYMENT RATES

The unemployment rate describes the frequency of the people getting unemployed and it is shocking to know that the unemployment rate spiked in one month to a great extent.

to GDP and 36% of Indian manufacturing output. With the lockdown and of course pandemic the growth of MSMEs decline and this decline has a great impact on the overall economy.

VIII FINDING OF THE STUDY

SMEs are the enterprises who are facing great service losses. Industrial sales decline which directly decline the investments.

Majority of the companies are not able to meet their basic needs like salaries and different bills. Their savings vanished and many companies are in the condition to borrow different sort of loans to facilitate their basic requirements.

Concerning the employees' salaries, many companies are able to pay the wages but many are unable. For example, companies have left stock and the supply chain is broken therefore they are neither able to sell remaining stock nor able to pay wages.

SMEs are in the absence of capital, investments, HR, physical assets, innovative ideas, market support and consumption pattern are lacking. The superior foundation is declined and major plan and strategies becoming irrelevant.

SMEs are the most significant part of the Indian economy. The investments are done in many states by SMEs but the pandemic results differently.

The Indian economy includes major sectors like railways, agriculture, service, manufacturing, technology, etc. but the growth of each sector is constantly declining both at macro and micro level.

The growth rate of GDP in India is declining continuously and the current rate is 4.6% which is very less.

The impact of lockdown on startups and MSMEs is severe and both supply-side and demand-side is affected adversely. Taking together the impact is at 41% fall.

The confidence growth of businesses in India is at negative, the recent data shows that the confidence growth of Indian businesses is -12.800 and unfortunately the negative growth is still maintained.

CMIE data shows that the unemployment rate in India gets a sudden jump in the last week of March. The previous rates are always below 5 and stable but the unemployment rate in the first week of April was 23.4 which is extremely high.

MSMEs are one of the major contributors to GDP but the growth rate of MSMEs in India is 8.466% and this will have an unfortunate effect on the economy for sure.

IX GOVERNMENT SCHEMES

Looking toward the current situation of businesses (especially in terms of small scale businesses) the government of India came up with many schemes to provide loans for restart the business activities. SMEs contribute almost 41% of total GDP and provide employment to the huge number of people. India is the only market place which is emerging in the world at this movement. To support the small scale businesses the top five schemes of government to provide loans are:

(a) MSMEs business loan in 59 minutes

This is the most famous scheme nowadays in small scale enterprises.

The loan is provided for the growth of MSMEs in the economy.

This loan can be taken by both new and existing business concerning the terms and conditions.

The loan can be taken up to the limit of rupees 1 crore.

Information regarding the loan is approved or not approved can be given within 59 minutes. The interest rates will depend on the essence of the business.

(b) credit link capital subsidy scheme for technology upgradations

This scheme grants finance for technology upgradation.

The loan can be used for both within the organization for example manufacturing or outside the organisation like marketing.

The government provides this loan with the main aim of reducing the cost of production.

15% of capital subsidies for applied businesses.

The maximum limit for this loan is set to 15 lacks.

(c) MUDRA loan

Micro-unit development and refinance Agency (MUDRA) LOANS.

Low-cost credit is the concept applied in this loan.

All kinds of the bank can provide this loan.

The structure is :

- (i) Sishu Loans up to Rs. 50,000/-
- (ii) Kishor Loans up to Rs. 5,00,000/-
- (iii) Tarun Loans up to Rs. 10,00,000/-

(d) national small industry corporation subsidy

This is the loan provided by the government for small and medium scale enterprises.

The loan is provided in two different ways financial benefit and market support.

In addition there are many more schemes to support start-ups in India i.e. Start up India initiative, ASPIRE, MUDRA BANK, ATAL Innovation Mission, Daring Process & Infra Development Fund etc

X CONCLUSION

Country like India which is still developing, lockdown impacted more adversely than coronavirus. Economic and social growth is stagnated and all the policies and plans are suspended. Not only the supply side but also the demand side is no more effective. Due to lack of planning, strategy and vision, the loss will take more time to recover. The world health organisation said that the suffering of people and businesses had lead to unsuitable market conditions. World Bank and FICO said that the Indian businesses are facing declining financial progress. With this pandemic, both domestic and international market is disturbed. Covid-19 is the biggest challenge face since world war 2. coronavirus causes distress to the global economy. For the country like India which is still developing, this pandemic situation may result in scandalous outcomes. Local businesses are one of the important pillars of the economy. With the pandemic, local businesses are affected adversely. To bring back the growth in the economy it is necessary to sustain

the small business in the economy especially for a developing country like India. The lockdown attempted in India is the largest of its kind and this lockdown result in chaos and suffering among Indian citizens. Majority of the day to day needs and requirements of people is fulfilled by the local small businesses. Due to the lockdown customers, as well as sellers, are not ready to facilitate exchange, and with the government restrictions, the majority of the shops remains closed for a long while. Lockdown result in the unfavourable conditions for Indian businesses. Neither fiscal nor monetary policy can help in this pandemic. Government need funds and the only way to increase capital is non disturbed market functioning both domestically and internationally. The world is in the condition where the two-fold effect is taking place: monetary deficiency and ineffective working due to illness. Both of them together causing such a terrible and critical effect on the economy which is never seen before. India with its huge population cannot survive this pandemic. India needs a strong policy and planning with the new scenario.

REFERENCING

- [1] <https://archives.tpnindia.org/index.php/sipn/article/view/8809>
- [2] <http://www.igidr.ac.in/pdf/publication/WP-2020-013.pdf>
- [3] <https://www.sciencedirect.com/science/article/pii/S0048969720324311>
- [4] <https://www.cliojournal.org/index.php/0976-075x/article/view/618>
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- [9] <https://www.jhss.org/wp-content/uploads/2020/06/Paper-6-2020.2.3-Tentacles-of-COVID-19-in-India-Impact-on-Indian-Economy-Society-Polity-and-Geopolitics.pdf>
- [10] <https://archives.tpnindia.org/index.php/sipn/article/view/8791>
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A Study of Organizational Culture and Organizational Performance

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I INTRODUCTION

Culture has been defined in many different ways and by many different theorists. For instance, according to Geert et al (2010) It is a way to differentiate one group of people with the other Kotter and Heskett (1992) pointed out in their study that it is something that develops and evolves continuously and this can be assessed through various scientific studies conducted on human behavior over a period of time. It involves the beliefs, value systems and behaviors in practice in a society. Moreover, Deal and Kennedy (1982) also tried to define culture in short as the ways and means in which people conduct themselves in the society. In fact whenever there are a set of a few people, there emerges certain internal culture which is quite complex and also unique at the same time. This culture leads to augment the cohesiveness among the members and develop bond amongst them so that they work well in a team. Definitely, this culture is developed and nurtured through leadership, organizational history and workforce. Culture in general and Organizational cultures in specific are complex in nature. Organizational cultures have a strong impact during the evolution of any organization. A right culture improves the cohesion among employees and also enhances the creativity within the employee. This in a long run improves the economic efficiency of any organization. Hence it is imperative to understand how organizational culture affects the employee's behaviors.

A good organizational culture improves the efficiency of the people working in the organization by giving each other the right direction and a sense of duty, accountability and responsibility towards each other and brings out development of an enterprise where its employees are motivated and lead towards improved work performance and thereby to work towards the strategic goals of the company. This positive environment in the workplace then becomes the culture in the organization and such organizations reap benefits of the same.

II LITERATURE REVIEW

Important issues or factors as brought out by various authors and researchers on the topic which have helped are discussed as follows:-

- (a) Stewart (2007) in his paper talked about how it is extremely important to access and assesses the beliefs and attitudes the employees of the organization and how this has to be matched with the profitability goals of the organization. It

is this which according to the authors generally defines the work culture of any organization.

- (b) Gallagher and Brown (2007) stated that. A company's culture goes a long way in deciding what and how a company handles its operations. How it treats and respects its clients, personnel and the stockholders.
- (c) Porter (2008) and Gallagher and Brown (2007), Kotter et.al., (1992) emphasized on the fact that by adopting positive cultural practices the net income of the organizations grew 75% during the period of 1977 to 1988.
- (d) Nash (2008) Brought out that it is the profitability of any organization that decides whether the organization is doing things in the right manner or not and it is this profitability which measures the organizational success. Thus he talked about culture in terms of profitability that measures the success.
- (e) Doyle in his research article in (2009) also opined that lucrativeness in terms of productivity and profitability is the most common measure or indicator of performance, particularly among companies of the western world. Profit margin, return on assets, return on equity, and return on sales are considered to be the common measures of financial profitability.
- (f) " (Geert, et al., 2010); was of the opinion that the values and norms adopted by the employees actually lead to an effective culture within an organization and this is the actual factor which thereby brings success to its organization.
- (g) Hofstede in his article in 2010 presented an onion model to understand the notion of organizational culture. The model primarily talked about importance of symbols, heroes, rituals and values that formulate belief and value system among the people of an organization thereby leading to formulation of organizational culture.
- (h) Rosenbusch et al., (2010) stated that when firms apply resources to innovative processes and are not able to generate innovative offerings to its customers then the resources go waste and eventually the performance suffers.

III OBJECTIVES AND METHODOLOGY

(a) Objectives

- (i) To understand the formulation of work culture of the organization.
- (ii) To study the employees' goals achievement in the organization with respect to the organizational culture.

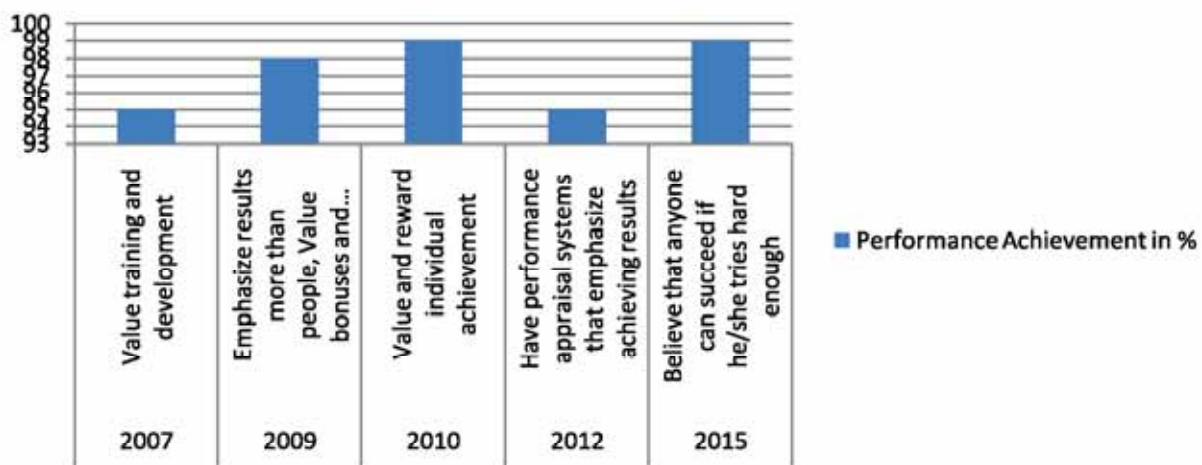
(iii) To study the impact of work culture on performance of an employee.

- (b) **Research Methodology** - There is enough literature to support that organizational culture influences the organizational performance. In the light of this it is important to examine how organizational culture may affect the organizational performance. The study therefore focuses on

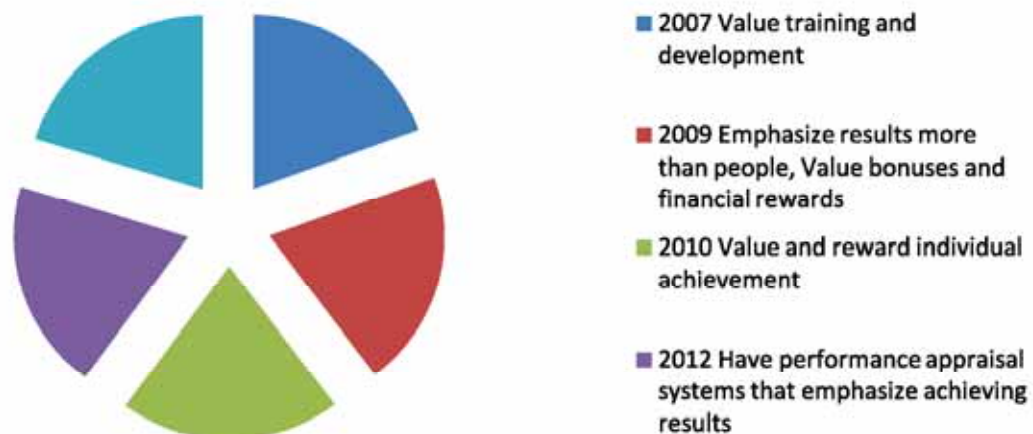
the organizational culture factors that influence employee behavior and thereby improve the work efficiency and the productivity of the organization. The present study is based on the secondary data available in the public libraries, websites, magazines, books, newspapers, survey reports, etc.

Year	Strategies	Performance Achievement in %
2007	Value training and development	95
2009	Emphasize results more than people, Value bonuses and financial rewards	98
2010	Value and reward individual achievement	99
2012	Have performance appraisal systems that emphasize achieving results	95
2015	Believe that anyone can succeed if he/she tries hard enough	99

Performance Achievement in %



Performance Achievement in %



IV FINDINGS

- (a) **Survey Report & Analysis** - Research survey report for organizational performance with respect to organizational culture- culture in an organization determines the performance orientation and this is so due to the fact that employees adapt to the external environment and integrate with their own value or belief system. (House et al, 2004) It is the practices and values adopted by the organization that leads to success in the face of several interrelationships and external challenges to bring out a change in how people participate and behave and how societal influences define their ways to adapt.
- (b) **Probable outcome** - From the above it can be brought out that different aspect are focused by different firms to generate success. Researchers like Peters and Waterman (1982) were of the definite opinion that strong organizational culture had a role to play. In today's world where companies continuously strive to develop innovative products and services for its customers, the companies differ in their approach towards innovation. In the past two decades emphasis is given in the organizational culture and the performance achieved therein. A search for identifying the strong set of values in the organization which enhance the performance is the necessity of the day. Peters and Waterman (1982) claimed that certain cultural traits differentiate a high performance firm from a low performance one.

V CONCLUSION

On the basis of the above the researchers conclude that any organization that has people working in a team has a specific culture and that in turn is also built by those who are the leaders. The value system, belief and the way they together define success formulates the organizational culture of that organization. This organizational culture does evolve overtime and strives towards facing the external challenges. The researchers also conclude that the organizational culture has a definite stimulus upon the employee goal achievement in the organization and also has a role to play in the formulation of collective organizational goals.

The organizational culture should strive towards positive culture and its leaders should work towards motivating the employees for improved performance, at the same time, deal with crises created out of any conflict. With such organizational culture the organizational resources would be used most amicably towards the achievement of the organizational and individual goals.

REFERENCES

- [1] Barney, J. B. (1986). Organization culture: can it be a source of sustained competitive advantage?
- [2] Deal, T.E. & Kennedy, A. (1982), *Corporate Cultures: The Rites and Rituals of Organizational Life*, Addison-Wesley, Reading, MA.
- [3] Innes, James (2012). *The interview book: your definitive guide to the perfect interview*.
- [4] Abu Kasim, Nor Aziah, Minai, Badriay and Chun, Loo Sin (1989). Performance Measures in Malaysia- The State of the Art. *Malaysia Management Review*, vol.24:3-9
- [5] Arthur, J.B.(1994). Effects of Human Resource Systems on Manufacturing Performance and Turnover. *Academy of Management Journal*, 37(3),670-687.
- [6] Barlow, J. (1999) from craft production to mass customization; innovation requirements for the UK housebuilding industry. *Housing Studies*, 14(1), 23-42.
- [7] Barney,J.(1991). Firm Resources and Sustained Competitive Advantage,*Journal of Management*, 1 (17): 99- 120 Baysinger, B.D.,&Mobley,W.H.(1983).
- [8] Employee Turnover: Individual and Organizational Analysis. In K.M. Rowland &G.R. Ferris (Eds.), *Research in Personel and Human Resource Management*. Greenwich, CT.JAI,269319.Brush,C.G.,&Vanderwerf,P.(1992).
- [9] A Comparison of Methods and Sources for Obtaining Estimates of New Venture Performance. *Journal of Business Venturing*, 7,157-170. Burns, W.J. Jr and McKinnon,S.M.
- [10](1993), "Information and Managers: a Field Study", *Journal of Management Accounting Research*, Vol.5,pp.84-123. Budde, A., Child, J., Francois, A.,& Kiesser,A.(1981). *Corporate Goals, Managerial Objectives and Organizational Structures in British and West Germany Companies*.
- [11]The University of Asian Management Center Working Paper Services.p206. Carroll,D.T.(1982). A disappointing Search for Excellence. *Harvard Business Review*, 6(6),p78-88.

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[1] Bowman, M. Peterson L. (1997). A Study on Video Browsing Strategies. *Technical Report*: 13(1), PP.8-12.

[2] Patil G., Forman M.J., (2004) *Handbook of Statistical Studies*, Himalaya Publishers, PP. 213.

[3] Sannela M., (2007) Constraint satisfaction & Debugging for Interface User Interfaces, Doctoral Thesis *Doctoral Thesis*. UMI Order Number: GAX95-09398. University of Washington.

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16 Aug 2020 (11: 30 AM) Dr. C. V. Raman University, Khandwa, M.P.
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